

Prime Front — extracted research

Historical source: `changelog.tex` at revision `ba2f0fc`. Original labels, results and caveats are retained; extraction changes ownership only. Complete original: `provenance/tfpt-source`. The publication assembly omits presentation boxes around excerpts.

Contents

2026-09-05 (CLVI) (all-place Tate / finite-carrier / Rankin audit graduates as v1021; isolated suite delta 1013 $\rightarrow$ 1014, isolated ledger-record delta 1177 $\rightarrow$ 1178, one new row PRIME.ALLPLACE.TATE.INTERSECTION.01 [O]; NO marker move; Python-only / Wolfram mirror deferred). v1021_all_place_tate_rank_audit.py (23/23): exact scalar Tate projector and good-place tensor/End splittings; the Tate identity remains inertia-fixed at $p = 2$; completed zeta is $2\xi(u)/(u(u-1))$, not $\xi(u)$; the symmetric-square prime coefficient is $a_p^2 - p^3$, not $a_p^2 - 2p^3$. Conditional on the cited external strict-floor premise, rank-nullity excludes representing the complete window form as one exact linear pullback through a fixed finite carrier; nonlinear methods, growing finite discretizations and direct limits are not excluded. An exact sparse counterexample corrects the historical Rankin inference: $A(X) = O(X^q)$ with nonnegative coefficients does not imply $b_n = O(n^{q-1+\varepsilon})$, and a maximum fitted on a finite window makes its same-window inequality tautological. Rankin's actual 1939 argument uses a quantitative summatory error term, not a pole and positivity alone. The correction of record is placed outside the preserved historical docstrings of rankin_positivity_miniature_probe.py and hecke_orbit_transfer_probe.py; their valid Jacobi, Hecke and Rankin–Selberg identities remain, while T52 is narrowed to a path-space vacuum resolvent plus classical local Satake determinants, not a path-space Fredholm determinant. The global all-place intersection form and its independent positivity remain OPEN. NO RH CLAIM. Surfaces: note_hilbert_polya_truncations; tfpt_prime_front; catalog part 19; concept map; dated RH balance; website T49 erratum; ScriptIndex and website changelog regenerated.

2026-09-04 (CLV) (r475-repair Lean audit of the selected-path arch tent rate; NO ledger row, NO marker move: PRIME.RDAGGER.ARCH_IDENTITY_AND_RATE.01 is experiments-side). The named Prop SelectedArchErrorQuadraticRate with fixed constant archRateConst = $4(1 + 1/64)^2 = 4.1259765625$ is **FALSIFIED** in the small-support regime (steps = 1, meshExp = 6, $x_0 = 1$: $\text{err}_{\text{arch}}/\Delta^2 = 8.0283458222 > 4.1259765625$; also 4.4488, 7.13–7.24); the endpoint-kink defect $-\theta(1 - \theta)/2$ is proved exactly. The $O(\Delta^2)$ rate itself is not refuted — large-support ratios 3.9893 ($k = 5$ –8) and 3.8466 ($k = 9$ –12) from arch_rate_probe.py (9/9) and verify_arch_rate.py (6/6). Additive Lean repair rh/lean/RH/SelectedArchErrorQuadraticRateClassical.lean: SelectedArchErrorQuadraticRateExists ($\exists C(f)$) is the correct interface; selectedArchError_tendsto_zero_of_rateExists proved; SelectedArchWeightedInterpolationEstimate OPEN. Lean build 3578 jobs green; five protected sorries unchanged. Catalog part_18 KILLED/LOSSY_CONSTANT. NO RH CLAIM. Surfaces: rh/README.md, rh/INVENTORY.json, rh/lean/README.md, website changelog.ts regenerated.

2026-09-04 (CLIII) (spectator-sector obstruction graduates as v1020; suite 1012 $\rightarrow$ 1013, ledger 1177 $\rightarrow$ 1178, one new row BULK.PRIME_COMPLETION.01 [O] and one existing row SEAM.BULK4D.RECON.01 [O] annotated (NO marker move, NO status change); Python-only / Wolfram mirror deferred as for v974–v1019, engine still DEFERRED_NO_ENGINE). v1020_spectator_sector_obstruction.py (9/9, ~ 25 s): finite free-fermion witness for the spectator-sector obstruction, re-derived (no probe imports) from the r644 audit harvest (spectator_sector_obstruction_probe.py, 9/9, 27.7 s, verdict OBSTRUCTION_WITNESSED_AND_REPAIR_SEPARATES, SPEC 07169b54..., FILE 7f58f498...). Stacking a decoupled trivial gapped sector C ($M=3$, Chern 0, gap ≥ 1.095) onto the seam model B ($M=1$, $N_Y=8$, 16 modes) leaves every seam datum unchanged (A1–A5: Chern $C_B=C_{B\oplus C}=-1$, $C_C=0$; zero modes 2/0/2 with B -support 1.0; edge dispersion coincident to 1.4×10^{-15} ; seam-

restricted covariance identical to 0.0 both grids; edge-profile overlap 1.0) and changes the bulk (A6: dim 16 vs 32, $E_0(C)=-25.31$, mid-strip rank 4 vs 8, $\|\Gamma_0-\Gamma_\alpha\|_{\text{HS}}$ 0.752536 vs 0.760202). Repaired criterion (B): Krylov generatedness $\text{spectator_dim}(B\oplus C) - \text{spectator_dim}(B)=16$ at all 128 momenta; commutant dim 1 (B) vs 17 ($B\oplus C$) generically, $\Pi_C=0\oplus 1$ in commutant (residual 0.0); selection unique (B selected, $B\oplus C$ rejected). Honest: $\text{spectator_dim}(B)=10$ at $p=0$ only (no onsite term at $M=1$, T_Y rank 1) — the criterion is “generated almost everywhere in p ”, not pointwise. DIMENSION.UPLIFT.FIREWALL.01 F2 dimension typing: 2+1D free-fermion hypothesis, re-scoped 4D conclusion. Ledger: new contract BULK.PRIME_COMPLETION.01 [O] (uniqueness in the category of seam-generated prime completions with trivial relative commutant; kill: a seam-generated completion with nontrivial relative commutant, or two inequivalent prime completions); the existing row SEAM.BULK4D.RECON.01 is annotated with the obstruction note (B7 as worded is unsatisfiable: $\partial(B \otimes C) = \partial(B)$ for any decoupled anomaly-free C with trivial boundary; uniqueness re-scoped to BULK.PRIME_COMPLETION.01) and stays [O]. The 2D modular-invariant uniqueness of the holomorphic $(E_8)_1$ net is untouched and is NOT a 4D no-spectator theorem. NO RH CLAIM. Surfaces: tfpt_research_contracts (obstruction note in the SEAM.BULK4D.RECON.01 paragraph + a new BULK.PRIME_COMPLETION.01 paragraph, both citing v1020); website ScriptIndex regenerated, changelog.ts regenerated.

2026-09-03 (CLII) (CI repair + README currency; NO theory change, NO marker moves, suite stays 1012). (1) Core Verification workflow. v553_exact_form_identities.py was the sole blocker of the GitHub *Core Verification* workflow since 2026-07-29 (250 consecutive failures, identical traceback): the corrupted-Green-column control (S2.CTRL) pairs t_1 with $L_P t_1 = \mu_1^P t_1$, so its 2×2 Gram is rank one BY CONSTRUCTION ($\sigma_2/\sigma_1 \sim 10^{-25}$); an LU solve on it is platform-dependent — finite round-off on macOS/Accelerate, exact-zero pivot $\Rightarrow$ LinAlgError on x86-64 OpenBLAS. span_value now evaluates the Dirichlet functional on the span itself via the minimal-norm pseudo-inverse (lstsq); every printed number is unchanged (25/25; S2.SPAN 9.0×10^{-13} , S2.SINES 1.42–4.8, S2.CTRL $255-7.7 \times 10^3$), verified under numpy 2.4.6 and 2.5.2. Consequence typed honestly: modules v554–v1019 had never run on GitHub CI before this fix – and the first pass beyond v553 exposed the second blocker: v570_separation_floor.py section 4 materialised the $n \times n$ pair kernel by outer products (n up to 26091 atoms on the kernel subset: 5.4 GB per dense temporary, > 30 GB peak), which OOM-killed the 16 GB runner (exit 143; reproduced in a 14 GB Linux container). The three pair-level readouts (Cauchy–Binet form, negative pair mass, best single pair) are now evaluated in row blocks (pair_kernel_stats); peak 32.7 $\rightarrow$ 3.5 GB, 8/8 unchanged, only the Cauchy–Binet noise figure moves $4.5 \times 10^{-14} \rightarrow 4.1 \times 10^{-14}$ (bar 10^{-9}). Third obstacle, structural: a hosted runner is $\sim 2.3 \times$ slower than the reference machine (v570 reached after 28 min vs. 12 min), so the full suite (~ 3 h here) cannot finish inside GitHub’s 6-hour job limit; run_all.py gained -shard K/N (the K -th of N interleaved slices, index mod N – the slices partition the list exactly and the interleaving spreads the heavy modules v640–v680 / v770–v790 evenly; measured ≤ 38 min per slice of four on the reference machine) and verify.yml runs a 2×4 matrix (Python 3.11/3.12 $\times$ shard 1–4) with unbuffered stdout, so a crash is reported at the module that caused it (the buffered CI log had pointed at v568 while v570 was the culprit). The local exit gate stays the plain python run_all.py. Fourth, in the first sharded pass: v649_discipline_audit.py D6.1 required the git-ignored local .lake/build directory among its

“build artefacts” – a reference-machine fact, absent from every fresh checkout; the check now requires the COMMITTED build descriptors (lakefile.lean, lake-manifest.json, lean-toolchain) and reports the local build directory informationally (18/18; the fresh lake build is the Lean Proofs workflow’s job). Fifth, exposed by the interleaving itself: v93 and v99 compute module-level mpmath constants (e.g. $(2/3)^6$) at IMPORT time with whatever global precision the previous module left behind (tfpt_constants sets 40 digits at import; v65, v35 and others lower mp.dps to 20–30 inside run() and leave it there), so their 10^{-30} checks passed in the historical full order by accident and failed in shard 1/3 (reproduced: v65 then v93 $\Rightarrow$ 1 FAIL). run_all.py now restores the canonical precision before every module, which makes the suite order-independent – every module sees exactly the state it sees standalone (where all 1012 are green). Sixth, two environment defects from the first sharded pass: the runner’s own -shard argument leaked into the sys.argv that the in-process embedded probes parse (v955–v959 and the other round-31-convention modules: “unrecognized arguments”, exit 2, pattern gates red) – run_all.py now scrubs its options from sys.argv after parsing; and v777 imports yaml for its preregistration file, which requirements.txt did not list (pyyaml added). What REMAINS red on Linux after all of this is typed, not patched: four modules whose frozen bars or pins sit at platform round-off level – v916 C1 pins the SHA of the float certificate vector (k, norm and $\lambda_{\min}$ reproduce to every printed digit, the byte hash does not), v966/v967 embed sealed probes whose CONTROL-world deviation is 1.3×10^{-5} against a 10^{-6} bar (the main identities sit at 10^{-16}), and v990 W(c-frozen) has its control at $1.1\text{--}2.2 \times 10^{-8}$ against a 10^{-8} tolerance. Widening a sealed bar is a re-seal and is left to the owner; the reference platform for those pins is the Apple-Silicon/Accelerate stack. (2) Sync Audit workflow. build.sh audit runs the rh/ gate (run_rh.py -fast) after audit_sync.py; the workflow installed no dependencies, so 257 sealed probes failed on numpy. With the dependencies installed (incl. numba, on which the SHA-pinned probe r445 gates) the gate still failed on GitHub, and those failures are not repairable from the repository: the sealed probes are bound to the reference machine – r464/r475/r487 read the git-ignored rh/lean/.lake mathlib cache, and on Linux (glibc + OpenBLAS, arm64 and x86-64 alike) 19/257 sealed smoke gates miss their frozen control bars by round-off (e.g. r257 G21: controls 9.9×10^{-3} vs bar 10^{-3}), on macos-latest still 6/257. Sealed sources are not edited to fit a platform; audit.yml therefore runs exactly what the badge names – audit_sync.py, platform-neutral, green – and documents that the rh/ gate stays in the local bash build.sh audit on the reference machine (a reproducibility debt now typed, not hidden). (3) README currency. Prediction count aligned with the website (27 status-graded falsifiable test surfaces, 16-entry frozen core registry) in the README prose, the hero image, the terminal GIF and the ./verify footer (all said 23); the document count corrected to the 12 published documents + the repo-only tfpt_prime_front (docs/THEORY.md list completed with S, N1, N2, P); the -full runtime corrected from “~4 min” to ~4–5 h (README, verify, docs/VERIFICATION.md); the Zenodo DOI corrected to the v5.4 record 10.5281/zenodo.21128999 (+ concept DOI 18328333; 20846087 is the v5.3 record); the SEAM.EQUIV.01 status-table row reworded per the 2026-07-22 route split (the “modulo a cited theorem” clause belongs to SEAM.EQUIV.MMST.01 [C]). (4) Lean Proofs workflow. Every run since the evening of 2026-08-03 ended in the runner’s shutdown signal (exit 143): the default target fans out over the 4 cores of the 16 GB runner, and since 2026-08-10 it also pulls in the 17 generated WallLadder/RungKz*

kernel-decide certificates (21–360 GB each; by the project’s own README buildable only serially via `scripts/build_wall_ladder.sh`). The wall-dependent audit lines (six `#print` axioms, fifteen `#check`, three signature-lock examples) moved VERBATIM from `AxiomCheck/AuditCheck/AuditContract` into the new `TfptCarrier/WallLadderAudit.lean`; the new root `TfptCarrier/CIRoot.lean` imports everything except `{WallCertifiedHead, WallLadderAudit}` (drift-guarded by `audit.sh` check 8); CI now pre-builds the heavy modules serially (QuarticHalf needs `-M 15360`) and runs `scripts/audit.sh -core` – all eight audit checks pass (run 33727029128, 27 min). No proof content changed; the wall rungs stay certified off-CI (`AUDIT_TRANSCRIPT.txt`). (5) Still red, not fixable from the repo: the `tfpt5-shadow` mirror sync fails with HTTP 403 — the `SHADOW_REPO_TOKEN` PAT (set 2026-06-12) expired after its last successful push on 2026-07-12 and must be re-issued.

2026-09-02 (CLI) (directed E_8 readout + Coxeter–Euler completion graduate as v1018–v1019; suite 1010 $\rightarrow$ 1012, ledger 1174 $\rightarrow$ 1176, two new rows; Python-only / Wolfram mirror deferred as for v974–v1017, engine still DEFERRED_NO_ENGINE). (1) v1018_e8_directed_readout.py (47/47): E8.DIRECTED.READOUT.01 [E] Identity, exact over $\mathbb{Z}/\mathbb{Q}$. Re-derived (no probe imports) from r609 (e8_directed_readout_probe.py, 49/49, verdict E8_READOUT_SEALED(7/8), SPEC 3edfb824...). Seven exact cells: Seifert $S + S^\top = A_{E_8}$, $\text{charpoly}(-S^{-1}S^\top) = \Phi_{30}$, $\text{rank}(S - S^\top) = 8$; Hamming enumerator $1 + 14y^4 + y^8$, $240 = 16 + 14 \cdot 16$, $S(3, 4, 8)$; $\text{srg}(120, 56, 28, 24)$ eig $56/8/-4$ mult $1/35/84$; $N(n) = 240\sigma_3(n)$ for $n \leq 10$; $A_P(n)/A_P(1) = \tau(n)$ for $n \leq 8$ on three axes, $E_4^3 - E_6^2 = 1728\Delta$; $(\mathbb{Z}/30\mathbb{Z})^\times \cong C_2 \times C_4$ (orders $\{1, 2, 2, 2, 4, 4, 4, 4\}$), $D_\chi = L(s, \chi)L(s-3, \chi)$ for $n \leq 200$; $E_6 \oplus A_2$ index 3, Smith $(1^6, 3, 3)$, glue $78/81/81$. C7 Gauss-code transform stays OPEN (rem:c7-audit). NO RH CLAIM. (2) v1019_coxeter_euler_completion.py (46/46, 4.5 s): E8.COXETER.EULER.COMPLETION.01 [E] Identity plus Numerical Euler products. Re-derived from r617 (SPEC 5aa3935b..., FILE 6ac6bab2..., 45/45, COMPLETION_EXACT). Exact: $\det(I - xC) = \Phi_{30}$, $\text{Tr } C = -1$; classical Moebius Φ_{30} ; $U = 1 \oplus C$, $\text{Tr } U = 0$, $\det(I - xU) = 1 - x^2 - x^3 + x^6 + x^7 - x^9$. Global Z_C and D_{E_8} as zeta quotients, abs. conv. $\text{Re } s > 1/2$. Numerical ($X = 10^5$): D_{E_8} residual 4.76×10^{-4} at $s = 0.75$, 4.16×10^{-12} at $s = 1.5$. Class: vanishing linear term generic from $\text{Tr } C = -1$ ($A_1 \rightarrow 1/\zeta(2s)$; $A_2 \rightarrow 1/\zeta(3s)$; $E_6 \rightarrow \zeta(4s)\zeta(6s)/[\zeta(2s)\zeta(3s)\zeta(12s)]$; B_2 still contains $1/\zeta(s)$); E_8 selects only the divisor set of 30. Beurling-generic. Fence (verbatim, no marker upgrade): The trace-free completion is zero-free and pole-free in $\text{Re } s > 1/2$. The splitting into the scalar zeta channel and the Coxeter channel is open and RH-equivalent. No RH claim. NO-GO E8.COXETER.REGULARIZED_SPLIT.NO_GO.01: $\det_2$ cannot isolate $1/\zeta(s)$. Surfaces: tfpt_prime_front §(i) + Prop. 1 (v1018) and a new paragraph after Prop. 1 (v1019); tfpt_4_frontier + introduction harvest notes; note_e8_gaussian_code C6 citation (C7 stays open); website papers.ts / primeFront.ts / VerificationDag.

2026-09-01 (CL) (kernel-Loewner positivity at $L = 0.3$ graduates as v1017; suite 1009 $\rightarrow$ 1010, ledger 1173 $\rightarrow$ 1174, one new Numerical/certified row (NOT [E])); Python-only / Wolfram mirror deferred as for v974–v1016, engine still DEFERRED_NO_ENGINE). v1017_kernel_loewner_positivity.py (26/26): PRIME.RDAGGER.KERNEL_LOEWNER.01 Numerical/certified float64 (NOT [E], NOT interval). Re-derived (no probe imports): $Q_W(h) \geq 2.1 \times 10^{-3} \|h\|_2^2$ on $\text{supp}(h) \subset [-0.3, 0.3]$ ($2L = 0.6 < \log 2$, prime term empty). G1 identity vs defining digamma ($\sigma_A(0) = -5.3721834192256654$, Dirichlet Rayleigh 1.180×10^{-2} , odd sector 0.2226, c_L in hull). G2 Loewner: $I - \text{Re } R_x$ PSD after zero-extension to $L^2(\mathbb{R})$; κ_w booked. G3 401-dim Legendre of a degree-48 Chebyshev surrogate +

Bernstein HS tail charged 3×: enclosed floor 2.122×10^{-3} (claimed $c = 2.1 \times 10^{-3}$). Independent r495: translation identity 6/6 exact over $\mathbb{Q}$ with strictly positive boundary-strip mass; doubled- c_L budget -2.188 (false-world). BOUNDARY: r496 NO_G0(compact-tail@ $L = 0.8$) named — the compact-tail method does not scale past the prime-free zone; this row does NOT claim $\lambda_*(L) \geq 0$ for general L . NO RH CLAIM. Surfaces: tfpt_prime_front new subsection after wave-14; tfpt_research_contracts wave-14 follow-on paragraph; tfpt_4_frontier + introduction harvest note; rh/paper/rh_program.tex kernel-Loewner theorem + certification box at the end of rh_program.tex §2; website papers.ts / primeFront.ts / VerificationDag.

2026-08-28 (CXXXIX) (the promote round — six exploration probes graduate as v987–v992 (suite 979 $\rightarrow$ 985, ledger 1162 $\rightarrow$ 1163: one new DECISION row QFT4D.LATTICE.FUNDAMENTAL.01; eight contract rows updated, NO status-marker upgrades; Python-only / Wolfram mirror deferred as for v974–v986). (Decision) QFT4D.LATTICE.FUNDAMENTAL.01: TFPT’s *physical* completeness criterion is the finite, local, unitary lattice quantum theory (Hamiltonian route: Gauss-law Hilbert space, hermitian local H , $T = e^{-aH}$ positive by construction, Lieb–Robinson cone); the exact continuum Osterwalder–Schrader limit (QFT4D.OS.RECON.01) is retyped as *mathematical reinforcement*, no longer the physical bottleneck; Poincaré invariance is an IR fixed-point property. Status: Decision (registered route/typing; no [E] claim, no marker move; QFT4D.OS.RECON.01 unchanged as the math programme). Anchors: Euclidean T2 kill of the overlap shortcut (exact; N_t -exact: violation absent at $N_t = 2$, appears at $N_t = 4$ det-only $\lambda_{\min} \approx -0.249$; Wilson control PSD everywhere) and the Hamiltonian route clearing T2 by construction (v989). (1) v987_os_dilation_package.py (21/21): kernel OS continuation exact ($B = P_1 + \frac{2}{3}P_2 + \frac{1}{3}P_3 > 0$, $H = -\log B$ PSD with gap $\log \frac{3}{2}$, Wick anchor $U(-in) = B^n$ for $n = 1..6$; v971 negative kernel has no real half-step); size-uniform free band; interacting congruence family; quantum SWAP $d(\theta) \sim \theta^{1.99}$. DYN.UNITARY.DILATION.01 executed legs grow; continuous field-level OS + branch selection stay [O]. (2) v988_psi_lambda_reduction.py (13/13): S3 crossed-product/tower exchange exact; S1/S2 quantitative skeleton measured (window HS bounded, global HS² logarithmic in the topological phase); remaining lemma reduced to cited quasi-free theorems + the MMST identification — reduction, *not* closure. SEAM.SIMPLECURRENT.GENERATOR.01 honest new typing: lattice shadow [E] (v983) + quantitative skeleton [E]-measured + reduction-to-cited-class [C] conditional. (3) v989_lattice_gate_battery.py (22/22): T4 exact SM anomaly bookkeeping; T5/T6 overlap index/GW circle; Euclidean T2 kill + Hamiltonian T2 clearance + chiral Gauss census (single-exponent Gauss iff $q_L = q_R$). TFPT4D.LATTICE.ACTION.01 + CHIRAL4D.NOMIRROR.01 executed harness + named kill; contracts stay [O]. (4) v990_wj_transduction_mechanism.py (13/13): $\mathbb{Z}_6$ content shadow + $W[J]$ identities $\partial W / \partial J = \langle O \rangle$, Hessian = Kubo, mixed $\partial^2 W / \partial J \partial \theta$ seam-coupled $\approx -9.3 \times 10^{-3}$, decoupled control exactly 0. FTRANSFER.GENERATING.01 + OBS.TRANSDUCTION.01 mechanism executed at finite level; contracts stay [O]. (5) v991_detline_bulk_edge.py (11/11): bulk twist-torus curvature $2\pi \cdot (+1)$ equals seam holonomy winding +1 (diff 5.6×10^{-16}); $M = 3$ control zero both sides. SEAM.DETLINE.UNIFICATION.01 finite shadow [E]; continuum Bismut–Freed stays [O]. (6) v992_joint_likelihood_v1.py (24/24): $\chi^2 = 11.80/\text{dof } 9$ ($p = 0.225$), $\nu_{\text{eff}} = 1$, TFPT at 0th percentile of 200 scrambled decoders, LOO stable, holdouts declared. PRED.JOINTLIKELIHOOD.01 v1 executed (numerical, ledger type [N]); promotion conditions typed; contract stays [O]. Paper sur-

faces: `tfpt_research_contracts` (executed-update paragraphs at each of the six contracts plus the decision at `QFT4D.OS.RECON.01` and `TFPT4D.LATTICE.ACTION.01`); `tfpt_4_frontier` (shorter decision mirror at the `CONTRACT.QFT4D` spine). Exploration note (not promoted): `experiments/nu-scalar-on-falsification/` leptogenesis discriminator (decouple route $\times 1.06$ in band, scenario route $\times 0.09$ killed.)

2026-08-27 (CXXXVII) (consolidation wave 14 — rounds r334–r357 frozen: the reviewer-authorized consolidation of the terminal, L2 and L* discovery rounds graduates as FIVE new modules `v978_terminal_density_martingale.py` / `v979_cover_growth_k2.py` / `v980_lstar_margin_chain.py` / `v981_lstar_borodin_duality.py` / `v982_dirichlet_matched_frame.py` (suite 970 $\rightarrow$ 975, ledger 1156 $\rightarrow$ 1161; every module re-derives its exact layer FROM SCRATCH – sympy symbolic + pure Fractions, no probe imports – and re-runs the sealed round verdicts as exact decision logic on the frozen record aggregates with tipping mutants; the eighteen discovery probes stay sealed in `experiments/tfpt-discovery/`, pinned in `rh/INVENTORY.json` and re-verified by `run_rh.py`; single-module tests green 24/24 + 28/28 + 26/26 + 22/22 + 23/23, each < 1 s, byte-identical on re-run). (1) v978 — the terminal density-martingale layer (r339 + r341), NEW PRIME.TERMINAL.DENSITY_MARTINGALE.01 [E]: $X(v) = d(v)/d(\text{root})$ is a martingale from MASS CONSERVATION ALONE; the moment dictionary $E[X_\infty^2] = mM_2$, $E[X_\infty^3] = m^2M_3$, $\max X_\infty = mq_{\max}$ (the terminal target IS a martingale moment; the banked r306 $C_2 = 1.0694$ certifies the $A = 2$ polylog form on the 57-rung set); the tilted tower $E[X_\infty^3] = E_Q[\prod \Gamma]$ with steps $\tilde{p}_c = p_c R_c^3 / \Gamma$ (the untilted reading breaks by an exact Fraction — caught); the exact hand-off $E_{3h} \leq (mq_{\max})^2 \text{msh}$; the algebraic pair ceiling $\Gamma \leq 4$ via $4R - R^3 = R(2 - R)(2 + R) \geq 0$; the r339/r341 letters honest-negative on the budget side (the target grows $8\times$ slower than the worst case; $R^* = 3/2$ a tuning surface); the r324 MEASURED composition stays the end state. (2) v979 — the three-arm cover, the growth law and K2 (r344/r346/r351/r353/r355), NEW PRIME.L2.COVER_GROWTH_K2.01 [E] Frame-A-typed: the FAB identity $F_{AB} = mq_{\max} / \log m$ exact; the data-free K1 formula $R_{\text{ALG}} = 4^{1/3} \rightarrow$ grid 8/5 interior via exact cube comparisons; the r355 mesh identity $h - \nu u \in (0, 3/2]$ exact; the first certifying cover (0/51, $m_0^* = 10^{22.6}$), the P02 predictor (51/51), the growth ceiling $C_{\text{FAB}} = 14.93$ (fresh tranche 0/6; polylog $m_0^* = 10^{18.9}$) — all under the BINDING r353 Frame-A restriction (frame B breaks the ceiling +21% and kills the reserve floor at $m \sim 760$: the sliding coverage is FINITE, PRIME.L2.RENYI3.SLIDING_BOUND.01 [O] retyped accordingly); K2 ($F_{AB} g_{\text{rel}} \leq 11.87$) is the sole cross-family survivor, certified NU-free over three aspects (r355) — the gap geometry is the ν -free coordinate of the lane. (3) v980 — the closed L* margin-law chain (r345/r347/r348/r350/r352/r354), NEW PRIME.LSTAR.MARGIN_CHAIN.01 [E]: the one-line identity $m'_2(p' + q' - m'_2) = p'q' - c'^2$ (Vieta); the two-level theorem (121/250, 79/250, 72/250 by hand; $r'_2 = 4375/9559$ = the r345 formula); the pinning theorem (orthonormal top-2 geometry $\Rightarrow$ the dressed charpoly factors as $(t - m)(t - mg_{21})$: $m'_2 =$ margin IDENTICALLY); the rate-equality theorem in exact ratio form; the ρ_K identities (toy 1/8, 23/24); the frozen censuses ALPHA_CLOSED ($\alpha = a_c + \delta$, residual 0.033), RHOR_REDUCED (one object, 500 $\times$), PHI_DICTIONARY_GO (c_{pred} at 5.5×10^{-4} , corr 1.0 — computability, no closed form) and DELTA0_UNRESOLVED (pool exhausted at $10^{3.90}$): the lane is FROZEN as a specialist problem; the r343/r345 protocol lesson (curvature-honest flatness) recorded as method. (4) v981 — the Borodin particle-hole duality (r356), NEW PRIME.LSTAR.DUAL_HOLE.01 [E] (the wave's strongest single theorem): the complementation $\Pi_N^u + G \Pi_{N-1}^{u\vee} G^{-1} = I$ bit-exact

at half filling with the reciprocal dual weight $u^\vee = 1/(uP^2)$ and a RATIONAL conjugator; $L^* \Leftrightarrow R > \frac{1}{2}I$ with margin $= 2 - 1/\lambda_{\min}(R)$ (spectral map symbolic, both directions realized); the half-filling law IS Borodin's rank condition (integer lemma); the dual weight is EXACTLY $u^\vee \propto c_j(1 - x_j)/|f|$ — the r354 anti-correlation of the two φ blocks is DUALITY ALGEBRA BY DESIGN; the honest main verdict DUALITY_REPARAM_ONLY stands (no carrier, no compression: the lane goes final to the memo), with RESERVE_LOCALIZED and the AC-class exclusion ($a_{\rho K} = 1.4222$ vs the Lubinsky-type constant prediction) banked census-side. (5) v982 — the matched Dirichlet frame (r357), NEW PRIME. WORLD.DIRICHLET_MATCHED_FRAME.01 [E] (census on 126 windows): the χ -arch side DERIVED symbolically from $\Lambda(s, \chi)$ ($F_A^X(\xi) = -\log(\pi/q) + \operatorname{Re} \psi((1 + 2a)/4 + i\xi/2)$; trivial reduction = zeta; conductor shift = $\log 3$ exact; parity kernel $e^{-w/2} \rightarrow e^{-3w/2}$ at 30 digits); SECOND_ARITHMETIC_LIVES: the r330 death was a FRAME ARTIFACT — the wall holds on 42/42 windows for $\chi \bmod 3$ AND $\bmod 4$, the living-world evidence goes from $n = 1$ to $n = 3$ arithmetics, the verbatim r330 battery retypes all four splits; mechanisms transfer while the zeta-graded signatures (exact pinning, saturated reserve, φ suppression $439\times$ vs $3\times$, counting constants) do not: THE L* MARGIN LEGISLATION IS A STATEMENT ABOUT HOW CLOSE ZETA'S WORLD SITS TO THE WALL; K2 holds 0/126 (the third independent test); the matched scramble breaks — the wall needs the arithmetic; kein Satz, NO GRH claim. Adjudication and surfaces. Block-B negatives consolidated as prose and row updates only (r334 capacity cap, r336/r340 world-blindness + Hall refutation with the wall-is-global-rescue find, r349 class law inside the v979 third arm, r353 FLOOR_KILLS binding); PRIME.LSTAR.SUBORDINATION.01 [O] and PRIME.L2.RENYI3.SLIDING_BOUND.01 [O] carry wave-14 notes, markers UNCHANGED; the wave-14 diary section in `tfpt_prime_front`, the wave-14 block in `tfpt_research_contracts`; `rh/`: INVENTORY via the guard generator, `run_rh.py` MODULES $\rightarrow$ v955–v982, README wave-14 block; website mirror + script index regenerated. The full-suite `run_all.py` pass at 975 modules, `bash build.sh` audit and the manifest regeneration close the wave as the joint exit gate; NO RH claim, NO GRH claim, NO L* claim anywhere in either direction; mincut base 4 / refined 5 UNCHANGED.)

2026-08-27 (CXXXV) (the master-route wave — the external bird's-eye review adjudicated and its promotable core integrated: ONE new verified module plus FIVE new ledger rows organize the entire 4D frontier into a single constructive route. (1) The conditional 4D dimension selector graduates as `v975_dimension_selector_4d.py` (suite 967 $\rightarrow$ 968, ledger 1149 $\rightarrow$ 1154; 16/16 sympy-exact, ~ 0.5 s): under the named TFPT-compatible axiom set A1 ($d > 2$: propagating local gauge fields), A2 (dimensionless Yang–Mills coupling), A3 (real self-dual/anti-self-dual 2-form sectors: the Euclidean Hodge star an involutive endomorphism of 2-forms), A4 (chiral Weyl representations: even d), the dimension $d = 4$ is UNIQUE and MINIMAL on the exact scan window $d = 2..12$ — and the selector is OVERDETERMINED: A2 alone = $\{4\}$ ($[g_{YM}] = (4 - d)/2$ forced symbolically from dimensionless-action power counting, unique zero 4) and A3 alone = $\{4\}$ (the explicit 6×6 star on $\Lambda^2(\mathbb{R}^4)$: $*^2 = I$, eigenvalues ± 1 at multiplicities 3/3 — the real $\mathfrak{su}(2)_+ \times \mathfrak{su}(2)_-$ split), while A1 & A4 alone give $\{4, 6, 8, 10, 12\}$ (chirality does NOT select 4 by itself — honest ablation ledger); Weyl chirality certified by exact Clifford algebras $d = 2..7$ (even d : γ_* anticommutes, $\gamma_*^2 = I$, traceless; odd d : the product is CENTRAL and scalar); signature typed honestly (Lorentzian $*^2 = -1$ on 2-forms — the real split is a EUCLIDEAN/OS-side statement);

mutants caught (the wrong power counting $[g] = (6 - d)/2$ selects $\{6\}$; the “A4 alone” overclaim refused); FIREWALL: μ_4 and g_{car} enter NOWHERE (“ $\mu_4 \Rightarrow 4D$ ” stays forbidden per DIMENSION.UPLIFT.FIREWALL.01), and AXIOM PROVE-NANCE from $\{c_3, g_{\text{car}}\}$ is the registered OPEN half — NEW ledger row DIMENSION.SELECTOR.4D.01 [C] (a conditional selector, not a derivation; no 4D construction contract advanced). (2) Four new research contracts register the genuinely new content of the review (all [O], no scripts, no marker moves): SEAM.SIMPLECURRENT.GENERATOR.01 (the seam-gap compression: ONE normalized simple-current/spin-field intertwiner with convergence + energy bounds + locality + braiding + Q-system closure generates the ENTIRE 128-dim extension sector — the v973 residual $N1 + N2 + N4$ collapses onto one convergence theorem; 1+1D in and out); TFPT4D.LATTICE.ACTION.01 (route step (2) of the firewall ordering made concrete: ONE fully explicit finite 4D lattice family $S_a = S_{\text{Wilson}} + \bar{\psi} D_{\text{GW}} \psi + S_{\Phi} + S_{\text{seam/top}}$ with SEVEN machine-checkable finite gates T1–T7 — gauge invariance, positive transfer matrix, EXACT seam restriction, anomalies incl. global $SU(2)$, index/generations, mirror separation, nonvanishing connected 4-point — plus the twistor flat-direction observable test as a kill test); SEAM.DETLINE.UNIFICATION.01 (the determinant-line hypothesis: $\text{Res}_{\text{seam}} \det D_{4D} \cong \det D_{\text{seam}}$ with connection AND bulk holonomy = the discrete orientation phase — would unify seam extension, anomaly freedom, generation index and CP orientation as projections of ONE object; the continuum Bismut–Freed identification is exactly the critical missing step); FTRANSFER.GENERATING.01 (the constructive successor of the FR.TRANSFER.01 guard: all four transfer bridges $F_{\text{pole}}/F_{\text{Boltzmann}}/F_{\text{relic}}/F_{\text{QCD}}$ must arise from ONE generating functional $W[J] = \log Z[J]$ — the guard stays binding, no upgrade permitted). (3) The programme section “the TFPT4D master route” in `tfpt_research_contracts` organizes the seven conditions (seam compatibility, RP, local unitary dilation, chiral anomaly freedom, one relevant direction = the ANCHOR.VGEO.02 torsor, approximate quantum-Markov recovery per Fawzi–Renner arXiv:1410.0664 and Chen–Rouzé arXiv:2504.02208, nontriviality), the dynamics correction (fundamental order: local unitary amplitudes $\rightarrow$ decoherence $\rightarrow$ Markov matrix; the DYN.MARKOV.EMBED.01 kernel result v971 stays the dephased shadow, the DCXCVII unistochastic/Jarlskog-sign finding cited as exploration-level motivation only), the programme ordering P1–P8 mapped onto existing + new rows, and the kill-criteria list (the route may die early); binding separation: RH and the PRIME.* programmes stay separate — a green RH probe would be neither necessary nor sufficient for the 4D physics. `docs/OPEN_PROBLEMS.md` updated in the same change (the 4D frontier now points at the master route and the five new rows). The full-suite `run_all.py` pass, `bash build.sh` audit and the manifest regeneration follow as the joint exit gate; NO marker moves anywhere — the only new verified piece is the conditional selector [C])

2026-08-27 (CXXXIV) (seam/alpha promotion wave, part 3 of 3 — both named faces of the alpha target now carry computed witnesses: the certified content of the three finished alpha exploration probes graduates from the experiments tree into the load-bearing suite as `v974_alpha_faces_computed.py` (suite 966 $\rightarrow$ 967, ledger 1148 $\rightarrow$ 1149; embedding convention as in v960–v970: the THREE probes embedded BYTE-EXACT with full-source SHA-256 pins gated and byte-warded against the experiments tree, executed verbatim in isolated namespaces — `seam_bfk_conical_det` 21/21 SPEC d06b3bbe VERDICT match-modulo-local-factor, `laughlin_pump_em1` 20/20 SPEC f9b5cb0b VERDICT pump-quantized-matches-chern, `quillen_rigidity_chain` 18/18 SPEC b4ee0dd0 VERDICT chain-

shadow-ok; plus the module-own exact section S0 (sympy/Fraction/mpmath, no probe imports): the BFK closed forms independently re-derived ($\det'_\zeta(\Delta_{S^1}) = l^2$ and $\det'_\zeta(|D|) = l$ from $\zeta_R(0) = -\frac{1}{2}$, $\zeta'_R(0) = -\frac{1}{2} \ln 2\pi$; Dirichlet $\det = 2a$; the $N = 4$ KMS reassembly as exact rationals in c_3 — $R_0 = 16c_3 \operatorname{circ}(2, -1, 0, -1)$, $\det' R_0 = 2^{16}c_3^3$, glued product $(2\pi)^2 = 1/(16c_3^2)$, gluing constant 2^{-4} ; spec multisets $\{0, 2, 2, 4\}$, $\operatorname{Tr} B^k = 4^k + 2 \cdot 2^k$ vs the v484 $\operatorname{Tr} C^k = 4^k + 2(-2)^k$, $B + C = 2(I + S)$, doublet ratio $4/\ln 2$ with the c_3 cancellation exhibited on a generic symbol; the v485 scale dictionary exact), the alpha anchor re-derived at 50 digits ($8b_1 = 164/5 = (4/5)41$ exact Fractions, $q(D_5) + q(A_3) = 2$, UNIQUE root on the scanned log window, $\alpha^{-1} = 137.03599921684071$, split residual 6.4×10^{-58}), the inflow bookkeeping exact (16 Majoranas = 8 complex copies, $c_- = 8 = g_{\text{car}} + N_{\text{fam}}$, $k_Y = 5/3$, $(1/k_Y)41/6 = 41/10 = b_1$) and a probe-free coarse FHS Chern certificate ($C(M=1) = 1$, $C(M=3) = 0$, integer ward); tipping mutants: a single-byte hash mutation caught by the pin, the wrong KMS unit ($2\pi \rightarrow 4\pi$) breaks the scale identity by exactly $-2\ln 2$, the b_1 mutant breaks coefficients and split residual; single-module test green 17/17 checks in ~ 5 s, byte-identical on re-run modulo WALL lines, green under both interpreters): (1) the BFK face executed — the Burghlea–Friedlander–Kappeler Mayer–Vietoris determinant formula made executable on the seam circle cut at the four μ_4 marks: gluing constant EXACTLY 2^{-N} (symbolic $N = 1..4$, general lengths, Laurent-polynomial identity + 50-digit numerics), massless reassembly $\det'_\zeta(\Delta_{S^1}) = l^2$, jump matrix = inverse mark Green matrix $R(m) = (G_m|_{\text{marks}})^{-1}$ exactly; against the v484 mark matrix NO global proportionality (kernels in SWAPPED μ_4 channels: gauge zero mode vs sign rep) but channel-wise EXACT — the diagonal-zeta face of the merged target is thereby SHARPENED to the channel-swap question; the v485 scale channel reproduced exactly via the KMS unit $2\pi = 1/(4c_3)$. (2) EM1 computed — the cited inflow step “boundary level = bulk response” now carries a computed lattice witness on the v367 collar: pumped charge == edge spectral flow == Streda == Chern == 1 per flux quantum (Wannier winding residual 0.0, Streda $\Delta N = C n_\phi$ exact integers, conjugation mutant sign-coherent across all four readings, wrong-band projector breaks quantization); single complex copy, the 16-copy collar as exact bookkeeping arithmetic only. (3) the finite Quillen identity two-sided — Berry curvature integral == Poincaré–Lelong divisor integral == +1 over the $U(1)$ -twist torus (both references, both sizes), the difference an EXACT form (3.3×10^{-16}), transition winding == Chern (Dai–Freed); typed conditional on the quasi-free rigidity premise (measured, not proven — SEAM.STATE.RPMIXING.01); typed DAG: the remaining open content of ALPHA.QUILLEN.EXACT.01 = {rigidity premise} + {channel-swap question} + {continuum Bismut–Freed identification} — no additional analytic unknown. LEDGER: NEW ALPHA.QUILLEN.FACES.01 [E] (the computed witnesses); UPDATED ALPHA.QUILLEN.EXACT.01 [O] (stays open — “why this functional” not closed), SEAM.CONTACT.UNIT.01/.02 (the BFK resummation named in v485 now executed), EM.WARD.01 and ALPHA.QUILLEN.INFLOW.01 (the EM1 step computed); NO marker moves anywhere; $\alpha^{-1} = 137.0359992168$ stays [E] regardless. The full-suite run_all.py pass, bash build.sh audit and the manifest regeneration follow as the joint exit gate)

2026-08-27 (CXXXIII) (seam/alpha promotion wave, part 2 of 3 — the seam route narrowing: the certified content of the three seam-route exploration probes graduates from the experiments tree into the load-bearing suite as v973_seam_route_narrowing.py (suite 965 $\rightarrow$ 966, ledger 1147 $\rightarrow$ 1148; embedding convention as in v960–v970: the THREE discovery probes embedded BYTE-

EXACT and executed verbatim with the printed SPEC SHA-256 hashes pinned and gated — mmst_wzw_coverage 19/19 SPEC e6f392cb, bcov_measure_uniqueness 20/20 SPEC 0875f39f, woit_battery_mmst 19/19 SPEC 451bd470; byte wards vs the experiments copies live; plus the module-own exact section S0 — the coverage arithmetic exact (the 240 E_8 roots enumerated as 112 integer + 128 half-integer spinor roots, $248 = 120 + 128$ with $120 = \binom{16}{2}$ bilinears, $c = 16 \times \frac{1}{2} = 8 = \text{rank}$ with $8 \leq 8 \leq 16$, $\det \text{Cartan } D_8 = 4 \rightarrow E_8 = 1$ by explicit simple-root Gram matrices, index $2 \times 2 = 4 = |\mu_4|$), the uniqueness linear algebra as exact rationals on a unimodular-mixed 18-parameter space (block ranks EXACTLY (9, 8, 2, 2), joint 13, gauge 4 inside every kernel $\Rightarrow$ moduli kernel EXACTLY 1; the full ablation ledger (1, 3, 1, 2, 3, 10) reproduced; the dropped- C_4 mutant opens the kernel to 3 — CAUGHT), the skeleton mechanisms exact (bipartite $SHS = -H \Rightarrow$ every odd function of H — in particular $\text{sign}(H)$ — vanishes identically on even distances, integer-exact on all odd powers, the next-nearest-hop mutant caught; $PHP = -H$ on a two-leg strip $\Rightarrow K_{\text{top}} = -K_{\text{bot}}$ exact), and the verdict bars as exact decision logic with tipping mutants (a fake COVERAGE_FULL is REFUSED by the nonempty N1–N4 gate, the kernel-dim mutant refused, hash mutation caught); single-module test green 25/25 gates (21 module-own + 3 pattern gates + runtime) in ~ 1 s, byte-identical on re-run): THE SEAM ROUTE NARROWING. (1) The MMST coverage carved (SEAM.EQUIV.MMST.01 [O] update): the cited Osborne–Stottmeister theorem (CMP 398 (2023) 219, arXiv:2107.13834) COVERS the bilinear half of the seam target — the $\mathfrak{so}(16)_1$ fermion-bilinear WZW currents converge STRONGLY on the finite-particle core (Thm 5.1 displayed for $u(1)$, nonabelian via Cauchy–Schwarz Eq. 229 + the closing remark incl. Majorana algebras), Virasoro/Koo–Saleur (Thms A/4.11/4.16), correlators (Thms B/C), polynomial error estimates $\text{Error}^2 \leq C 2^{-2\delta N}$, $\delta \in [0, 2]$ — and does NOT cover four NAMED items: N1 the μ_4 /GSO simple-current extension $SO(16)_1 \rightarrow (E_8)_1$ as a NET statement (the 128 weight-1 spinor currents are not bilinears), N2 the twist/spin-field sector (explicitly deferred), N3 the one-sided chiral edge net of a 2+1D bulk, N4 the OS/holomorphy selector $\det K = 1$ vs 4; NEW MEASUREMENT: the edge-correlator convergence rate on the v367 collar is $p = 3.48$ (Richardson 3.1–4.2, preregistered band $[0.5, 4.0]$), error $6.3 \times 10^{-2} \rightarrow 2.7 \times 10^{-6}$ over $N_x = 16..256$; the $M = 3$ control does NOT converge (min rel dev 0.836); HONEST: the ratio observable superconverges past $\delta_{\text{max}} = 2$ — consistent with the cited UPPER bound, the band’s upper edge calibration-informed; the coverage gates are executable transcriptions of a human literature adjudication. (2) The twistor measure rigidity (SEAM.EQUIV.TWISTOR.01 [O] update): on the computable v508/v515 sector the 18-parameter deformation of the declared measure data (contact normalisation, 4 sector weights, residue normalisation, 4 linking charges, 4 centre positions; 4 gauge directions $\Rightarrow$ 14 moduli) has executed-constraint Jacobian ranks C1 clock 9 / C2 lockstep+integrality 8 / C3 charge 2 / C4 null-ideal 2, joint rank 13 $\Rightarrow$ the moduli kernel is EXACTLY 1 = the uniform sector-weight shift $dv = (1, 1, 1, 1)$, mapping to the untwisted Okubo square $Q^{(0)} = 36(1, 2, 1, 0, 0)$, annihilated by every executed certificate functional BY CONSTRUCTION (exactly flat to all orders); ablation ledger (1, 3, 1, 2, 3, 10); honest: NOT a BCOV derivation, the $W_2 : W_{13} = 4:3$ Harvey–Moore tester typed NOT-TRANSCRIBABLE. (3) The cross-route OS skeleton (NEW SEAM.EQUIV.SKELETON.01 [E]): ALL five WOIT kill-test main invariants (α : forced $\eta = +i$, $\Theta^2 = +1$, bond RP; β_1 : GSO 2-torsion; β_2 : OS quotient + KMS $\lambda_{\text{max}} > 1$; β_3 : perp descent; γ : mirror flip, multiplicity-free, mark incidence) hold

VERBATIM on the p+ip collar edge — 5/5; ALL divergences control-typed and tracing to ONE mechanism (the twistor lattice’s exact chiral checkerboard $C(\text{even}) = 0$ vs the collar’s $K(\text{even})$ up to 0.1736), independently confirming v519-R4’s lattice-placement typing from the second route; the collar’s top edge realizes the anti-chiral state EXACTLY ($\max |K_{\text{top}} + K_{\text{bot}}| = 7.5 \times 10^{-16}$); the $M = 3$ trivial collar loses the skeleton first at GAMMA.MARK.INCIDENT — the skeleton tracks the topological phase. LEDGER: NEW SEAM.EQUIV.SKELETON.01 [E] (executable skeleton, typed FULL/PARTIAL per test — an executable-level narrowing, NOT a route closure); UPDATED SEAM.EQUIV.MMST.01 [O] (residual now the NAMED N1–N4 list), SEAM.EQUIV.TWISTOR.01 [O] (measure rigid on the computable sector up to ONE named flat direction), SEAM.EQUIV.01 [O] (parent prose: the open structure concentrated on the same named extension question from both sides); NO marker moves — both routes and the parent stay [O]. Python-only per GATE.WOLFRAM.02; the full-suite run_all.py pass, bash build.sh audit and the manifest regeneration follow as the joint exit gate)

2026-08-27 (CXXXII) (seam/alpha promotion wave, part 1 of 3 — the seam interaction front: the certified content of three exploration rounds of 2026-08-27 on the v529 Fidkowski–Kitaev seam toy and the v903 mixing slice graduates from the experiments tree into the load-bearing suite as v972_seam_interaction_front.py (suite 964 $\rightarrow$ 965, ledger 1144 $\rightarrow$ 1147; embedding convention of v969/v970: the THREE discovery probes embedded BYTE-EXACT with pinned source SHA-256 hashes, byte-warded against experiments/tfpt-discovery/ and executed verbatim with the printed gate counts, VERDICT letters and SPEC SHA-256 prefixes pattern-gated — majorana_rp_class 20/20 SPEC bcdfcde6 VERDICT class-empty-on-basis, quartet_avoiding_os 18/18 SPEC 6ced7be3 VERDICT os-viable-on-avoiding, seam_rp_rigidity 25/25 SPEC d09cd983 VERDICT rp-admits-mixing; plus the module-own exact section S0 (sympy / GF(2) integer certificates, no probe imports) — the Jaffe–Pedrocchi DECIDABILITY LEMMA on a 4-Majorana toy (the 9 products $\theta(M_a)M_b$ land on 9 pairwise-distinct crossing masks with unimodular coefficients, so the crossing matrix B is UNIQUE; the self-adjoint bond $H_c = s i g_1 g_2$ extracts to $B = \text{diag}(0, s, 0)$ and exactly ONE sign certifies — the wrong-sign mutant caught), the ODD-SPLIT ARITHMETIC (on $\mathbb{Z}_{16}$ exactly the 2 mirror-fixed straddling quartets split 2+2 and the 4 off-center ones 1+3; the odd block $[[0, b], [\bar{b}, 0]]$ has $-B$ PSD iff $b = 0$ — the obstruction; a 2+2 straddle needs only the good orientation; the flipped-sign-law mutant caught), the GF(2) GENERATION BOOKKEEPING (pair vectors on 16 points have rank exactly 15, the even algebra has $2^{15} = 32768$ monomials; the within-halves single-cut restriction has rank exactly 14 — deficit EXACTLY 1, witnessed by the left-parity functional), the S1 WINDOW ARITHMETIC (33 = 24+9, the 32+1 split, rank-nullity 33 – 16 = 17; the kernel value $-1/(1+c^2)$ at $c = \tanh(1/2)$ re-derived symbolically as $-\cosh^2(1/2)/\cosh(1)$, float pin -0.8240271368 ; both wrong-form mutants caught) and FOUR VERDICT BARS with tipping mutants (a mutated embedded-source byte breaks the pinned SHA-256; the three live records compose to exactly the claim triple; a tipped gate count 19/20 and swapped verdict letters do NOT compose); single-module test green 20/20 gates in ~ 4 s with both the venv and the system interpreter, byte-identical on re-run)): THE SEAM INTERACTION FRONT FROZEN. (1) The odd-split law (SEAM.INT.ODDSPLIT.01 [E], toy level): the Jaffe–Pedrocchi sufficient condition for Majorana reflection positivity (arXiv:1406.1384; Wei–Li–Xiang arXiv:1601.01994) is made DECIDABLE on the v529 toy (unique B), certifies the free FK Hamiltonian on all 8 bond cuts

($\eta = -i$ forced), scores a PERFECT confusion matrix against measured RP over 35 cells (23/12/0/0), and finds the μ_4 -covariant quartic space (dim 464) EMPTY on the basis with the support-level exclusion pinning the full 1820-dim quartic space — THE DISCOVERY: the v529 straddle law REFINES to the ODD-SPLIT LAW (JP predicted RP survival on CENTER-straddled cuts, $m = 4$ model, axes 7/15, 2+2 mirror split; direct measurement confirmed (37, 0, 0) at $g = 0.5/1/2$; the v529 anchor ladder reproduced exactly). (2) OS viability on the avoiding family (SEAM.INT.OSAVOID.01 [E], toy level): the clock-invariant $m = 4$ member's quartet-avoiding cut family generates the FULL even seam algebra (rank 15, dim 32768; single-cut members $m = 2/6$ typed deficit 1) and carries a POSITIVE OS/GNS structure at $g = 1$ (min $+4.4 \times 10^{-5}$, GNS 37/37, distances monotone) while the straddled control genuinely fails (-6.9×10^{-2}); the μ_4 clock maps the avoiding pair $\{3, 11\}$ onto itself exactly — the WOIT.OS.TWISTOR.01 kill-test-2 counterweight is NARROWED (an OS-viable cut geometry exists, selected by the toy's own clock), not removed. (3) The RP mixing census (SEAM.STATE.RPMIXING.01 [E], census): the v903 exclusivity is RAY- and REFLECTION-relative, not slice-wide — on the full 33-dim C_6 -covariant mixing slice θ_{abT} sees exactly ONE coordinate (a_J , kernel value $-1/(1+c^2) = -0.8240271368$ at $c = \tanh(1/2)$; 32/33 invisible $\Rightarrow$ a 32-dim MARGINAL RP hyperplane $\{a_J = 0\}$) and the θ_S Hermiticity-defect map has rank 16 $\Rightarrow$ a 17-dim first-order-neutral subspace with STRICT finite- s witnesses ($\lambda_{\min} = 0.1558$ at $s = 1/8$ — the very direction θ_{abT} kills); the v903 anchor reproduced ($a_J = +0.04068013$). LEDGER: NEW SEAM.INT.ODDSPLIT.01 [E] + SEAM.INT.OSAVOID.01 [E] + SEAM.STATE.RPMIXING.01 [E]; UPDATES appended to SEAM.INT.FKTOY.01 (straddle law $\rightarrow$ odd-split law), WOIT.OS.TWISTOR.01 (counterweight narrowed, contract stays Open) and SEAM.STATE.DERIVATION.01 (exclusivity typed ray-/reflection-relative). HONEST: NO marker moves anywhere; SEAM.EQUIV.01 stays [O]; the v529 MANDATORY FENCE (one toy, one interaction class, [C] flat-band parent) is inherited verbatim by all three results; JP is sufficient-only; the S1 census is sector-truncated ($\deg \leq 2$ Grams + $\deg \leq 4$ spots). Python-only per GATE.WOLFRAM.02. NO RH claim.)

2026-08-27 (CXXX) (consolidation wave 13 — the extraction repair and the terminal composition: the certified content of discovery rounds 323–327 (incl. the r326 Lean round and the r323 clean abort) graduates from the experiments tree into the load-bearing suite as v970_extraction_and_composition.py (suite 962 $\rightarrow$ 963, ledger 1133 $\rightarrow$ 1135; wave-4 embedding convention: the FOUR discovery probes embedded BYTE-EXACT and executed verbatim in their sealed -smoke stage with the printed SPEC SHA-256 hashes pinned and gated — fa_provenance 36/36 SPEC 9a6696f8 (r324-pre, sealed FIRST, then superseded mid-round by the binding reviewer course correction and BANKED), qmax_m2_origin 36/36 SPEC dc36cacb (importing the embedded r324-pre), extraction_order 18/18 SPEC 31277f91, group_mass_cap 34/34 SPEC 11e4fd40 (importing the embedded r324-pre and r324); full records sealed experiments-side, re-verified by rh/verification/run_rh.py; plus the module-own exact section S0 in pure Fractions with NO Lean call — the r324 interpolation $M_3 \leq q_{\max} M_2$ and $M_2 \leq q_{\max}$ exact (toy slack EXACTLY $1/36$, DOUBLE equality at the flat profile; both reversed-mutant directions caught), the F_A identity $F_A B \log m = m q_{\max}$ as exact constructional algebra (F_A DE-BLACK-BOXED as the rank-local normalization of $m q_{\max}$; the dropped-gauge mutant caught), the r327 group ledger exact on the sealed toy (partition $5 + 1 = A_1 = 6$, cap chain $m q_{\max} = 12/7 \leq n_g \times h_{gn} = 20/7$ slack $8/7$, two-ancestor bound $5 \leq 2 \times 3$ slack 1; the drop-group and wrong-window-max

mutants break by EXACTLY 1), the r325 onset formula $\alpha^* = (n_g + 1)D_0/2$ as an EXACT TOY STABILIZATION (the tent-window read equals the exact atom sum 35/16 for every $\alpha \geq 5/8$, differs below, and is CONSTANT under dyadic mesh refinement $D_0 \rightarrow D_0/4$; the nearest-neighbour mutant caught), the m_0^* composition arithmetic (the r324 log-space solver rebuilt verbatim landing $10^{59.6}$; the exact exponent algebra $158/1000 + 14/1000 = 172/1000 < 224/1000$ and $1 - e/2 = 914/1000 \geq 888/1000$; the r328B chain-audit gate S0-T5d: the block-level need 454/501 and the chain bar $94/501 \approx 0.188$ exact, the verdict survival $172/1000 < 94/501$, the non-sequitur $0.888 \times 1.002 < 0.908$ caught, the chain-honest $m_0^* = 10^{238}$ from the same solver, the false-fire window mutant caught; supercritical mutants return NONE and the DISCLOSED pre-freeze linear-space bug — a search capped at 10^{18} that misses the root — is rebuilt and caught), the SIX SEALED VERDICT BARS as exact decision logic with tipping mutants at every live clause boundary, and the wave-13 composition gate; the r326 Lean round consumed as a REPORT and the r323 abort as a NOTE; single-module test green 26/26 gates (22 module-own +4 pattern gates) in ~ 2 s, byte-identical on re-run): THE EXTRACTION REPAIR AND THE TERMINAL COMPOSITION FROZEN. (A) The clean abort (r323): the planned L^* indefinite-signature fork was aborted by the binding reviewer adjudication (L^* internally paused at allocation 0 %) at the END OF THE DESIGN PHASE, BEFORE any write access — no probe, no measurement, no rh/ file, nothing counts as a round (post-abort suite 73/73 with 103/103 pins). (B) The terminal composition (r324, the pre-work banked as r324-pre; r327 the anatomy): the round ran under a binding mid-round course correction, disclosed in full — the original F_A -boundedness contract was executed and sealed FIRST (fa-bounded-distributional: KS $0.0982 \leq 0.125$, $p_{\max} = 0.090$, envelope $C_F = 3.357$; the honest tension disclosed: the per-rank p values at the named spikes are 0.005/0.000/0.000), then superseded (the cleaner decomposition is $QMAX \times M_2$); the binding contract fired pileup-grows-subcritical ($e_{\text{tot}} = +0.172 < \text{CRIT} = 0.224$, halves $+0.141/-0.160$ both subcritical, the second FALLING — decided; by the reviewer contract a sufficient, first-class outcome): the pointwise M_2 export REFUTED ($C_2 = 2.2557$ fails 7/39 — exactly the banked spike set at +35..42 %) while the distributional r302 export holds GO (KS 0.023/0.016, tighter than the r302 core); the mechanism HALF AND HALF — the $O(\log m)$ SCALE COUNT CERTIFIES pointwise ($C_{\text{NSC}} = 2.0258$, 0/39) but the per-scale mass $O(1/m)$ is REFUTED ($C_{\text{PIL}} = 9.3583$, 11/39): the near-critical windows are ONE NEAR-MAXIMAL HEAVY SOURCE SCALE at the argmax block (kz53: $s_0 = 13.78$ of $G = 13.02$ at $n_{\text{sc}} = 5$, the ladder median), not multiscale convergence; the composition typed MEASURED: $\sum_j q_j^3 \leq 8.941 (\log m) m^{+0.172}/m^2 \Rightarrow N_3 \geq m^{0.914}/\sqrt{8.941 \log m}$, $N_2 \geq N_3$ (the r306 exact chain) $\Rightarrow N_2 \geq m^{0.888}$ for all $m \geq m_0^* = 10^{59.6} \Rightarrow$ the full chain to terminal_positive_main — m_0^* ASTRONOMICAL, the gap (274, $10^{59.6}$) IS THE DISCLOSED EXTRAPOLATION HYPOTHESIS, no cofinal claim (r328B independent chain audit, carried as a chain annotation with the record sealed: the bar 0.224 used the ATOM-level need 0.888, the block-level need is $908/1002 \approx 0.9062$ — the chain-honest bar is 0.188, THE VERDICT SURVIVES $0.172 < 0.188$, the chain-honest m_0^* is 10^{238} , and the going-forward bar is 0.188); r327 then located the spike structurally (cap-partial with anatomy SOURCE, median named ratio $1.057 \geq 0.5$): on ALL 65 rungs the heaviest group of the argmax block is EXACTLY ONE β/ω FOLD PAIR (one bulk + one window atom at one position, histogram $[0, 65, 0]$, median alignment 1.000 — the ancestors REINFORCE); at kz53 the single pair carries 88.8 % of the argmax block at

gap 0.076 — THE SPIKE IS LITERALLY ONE BULK/WINDOW COINCIDENCE (kz67 the exception shape: 6 groups); the Λ -pair cap REFUTED as a mid-ladder polylog ($C_{LV} = 1.1838$ fails 19/39, named 0/4 — the exact two-ancestor algebra holds at slack 0.0, the CONSTANT does not close), the direct group cap fails at both A, THE GROUP COUNT CERTIFIES pointwise ($C_{NG} = 2.6351$, 0/39, named 4/4 — the THIRD certified $O(\log m)$ count of the lane); $e_{\text{route}} = +0.106 < 0.224$ but the halves STRADDLE (+0.411/ − 1.183) — heavy-group-unbounded does NOT fire (the heavy-group coordinate DECAYS with depth: a shallow/mid phenomenon); the r324 MEASURED chain stays the end state, and the named direction is the COINCIDENCE GEOMETRY: where can the single heavy coincidence SIT (source geometry, not group count or multiplicity). (C) The extraction repair (r325) and the Level-C architecture (r326): r325 adjudicated the three reviewer variants for the R319 cofinality seam — elementwise-stabilization-go primary + co-letters canonical-mesh-rebuild-go + signed-defect-correction-go(sign) + anchor-only-insufficient: the repair is a QUANTIFIER STATEMENT, not a mesh theory — on the native v749 class (dyadic step-function autocorrelations, seed-sealed) ALL THREE channels (comb/arch/pole) of the canonical tower windows stabilize EXACTLY at the predicted finite anchor onset $\alpha^* = (n_g + 1)D_0/2$ AND are CONSTANT under dyadic mesh refinement (comb 3.3×10^{-18} , arch 1.5×10^{-15} , pole 2.0×10^{-17}) — NO mesh-cofinal ladder, NO transport, H_{cof} IS NOT NEEDED AND IS REPLACED AS THE TARGET ROUTE; variant B is the construction substrate of A (v749 T1.4b at rel dev 0.0), variant C the quantified density step (one-signed per-channel defect inside the rigorous interpolation envelope $(D^2/8)\|F''\|K_{\text{ch}}$, no wall margin anywhere); the anchor-only floor real ($+1.77 \times 10^{-4}/+1.59 \times 10^{-4}$ — the R319 false-floor mechanism on own elements); r326 implemented the architecture in rh/lean/RH/Elementwise.lean (merged and green; lake with exactly 8 intentional sorry warnings, run_rh -fast 75/75): sourceExact_buildPrimeWindow PROVED (the wave-12 reviewer target “exactly one construction theorem” — SourceExact ELIMINATED as a free assumption from the extraction route; built windows provably carry their source), the comb stabilization elementwise PROVED (onset $a_0(f)$ predefined from the element’s support alone, corpus gauge $2\Lambda/\sqrt{n}$, no mesh quantifier; honesty tie combRead_eq_window_channel), weil_nonneg_of_windowlocal PROVED (the EXTRACTION WITHOUT THE LADDER: one finite instantiation per element — Euclid anchor + native mesh) plus weil_nonneg_of_bordered (composition through the named Prop BorderedCompressionBridge, no truth commitment); SORRY CENSUS $5 \rightarrow 8$ with THREE NEW typed Level-C statements (arch_elementwise_stabilization + pole_elementwise_stabilization classical, specFamily_sourceExact_completion classical + definitional) — the wave-12 reservation “the Level-C distance appears in no sorry” PARTIALLY DISCHARGED; the five legacy sorrys byte-identical. THE HONEST FORMULATION OF THE NEW CONNECTION (binding, verbatim): “two window-local lemmata (over the canonical family) + the elementwise architecture + cited classics (density, v912 continuity, the Weil criterion) $\Rightarrow$ RH; open links: the arch/pole transcription (classical), the compression bridge, the source completion (definitional).” LEDGER: NEW PRIME.EXTRACTION.ELEMENTWISE.01 [E] (the R325 GO + the R326 implementation with the honest formulation verbatim); NEW PRIME.L2.RENYI3.MEASURED_COMPOSITION.01 [O] (the r324 measured chain, the certified counts $C_{\text{NSC}}/C_{\text{NG}}$, the SOURCE anatomy, the coincidence-geometry direction); UPDATED PRIME.L2.RENYI3.SLIDING_BOUND.01 [O] and PRIME.L2.RENYI3.PROVENANCE.01 [O] (the two-part

provenance question executed — F_A de-black-boxed, r324-pre banked, the share route composed MEASURED), PRIME.REDTEAM.EXTRACTION_AUDIT.01 [E] and PRIME.LSTAR.SUBORDINATION.01 [O] (the wave-13 Lean notes: census 5 $\rightarrow$ 8 with the three-level assignment — Level C now named typed statements; lstar_subordination byte-identical, L* stays paused); no other marker moves, mincut base 4 / refined 5 UNCHANGED. LEAN (rh/lean): NO change ships with this promotion — r326 is already merged and green (census 5 $\rightarrow$ 8). Papers: the wave-13 diary section sec:elementwise-extraction in tfpt_prime_front, the wave-13 block + the wave-13 state notes in tfpt_research_contracts, the new section “Elementwise extraction and the measured composition (v970)” in rh/paper/rh_program.tex (the Lean-theorem table with the proved kernel pieces prominent, the honest-formulation remark, the coincidence-geometry remark, the lane-status remark; the three-level remark and the Lean census section updated to 5 $\rightarrow$ 8) + recompiled PDF; rh/README.md wave-13 block with the lane status (terminal: the MEASURED composition + the coincidence-geometry direction; extraction: the architecture stands, 3 typed Level-C rests; L* paused; Lean: 8 sorries, all typed); rh/INVENTORY.json + make_inventory.py extended additively (the v970 pin + the r324-pre/r324/r325/r327 consumption notes, all pre-existing pinned entries byte-exact; 110 $\rightarrow$ 111 entries); run_rh.py MODULES $\rightarrow$ v955–v970, full RH suite green. The full-suite run_all.py pass at 963 modules, the final bash build.sh audit and the manifest regeneration follow as the joint exit gate; NO RH claim anywhere in either direction)

2026-08-27 (CXXIX) (consolidation wave 12 — the red-team / fork morning: the certified content of discovery rounds 317–322 (incl. the r319 extraction-chain audit and the r320 Lean repair) graduates from the experiments tree into the load-bearing suite as v969_forks_and_redteam.py (suite 961 $\rightarrow$ 962, ledger 1131 $\rightarrow$ 1133; wave-4 embedding convention: the FOUR discovery probes embedded BYTE-EXACT and executed verbatim in their sealed -smoke stage with the printed SPEC SHA-256 hashes pinned and gated — exception_families 38/38 SPEC 04fbe5c0, indefinite_fork 25/25 SPEC f2d98683, continuous_coordinate 39/39 SPEC e68883ad (importing the embedded r317), antiphase_sign_law 25/25 SPEC 761b51d4 (importing the embedded r318); full records sealed experiments-side, re-verified by rh/verification/run_rh.py; plus the module-own exact section S0 — the exact two-sided concentration bracket $q_{\max}\Phi_{H1} \leq \rho_2 \leq \Phi_{H1} = (F_AB)^2$ re-proved from scratch with both mutant directions caught, the U1–U3 red-team witnesses re-established in EXACT ARITHMETIC with no Lean call (U1: the $B = -1$ window represents the empty spec against the terminal type while the retyped bridge refuses it and accepts the faithful $B = 5/7$ witness; U2: the mesh-level-0 total node collision reduced exactly to the three rational e -facts $2 \leq e$, $3 \leq 2e$, $e \leq 4$ on the certified series bracket $685/252 \leq e \leq 685/252 + 1/35280$, kill $0 < 0$ exact; U3: the adversary $Z_{\text{loc}} = |F| + 1$, $runs = []$ demands $(|F| + 1)^2 < 5/7$, false for every F since $(|F| + 1)^2 \geq 1 > 5/7$ exact), the r320 separation-discipline and canonical-split certificates (witness at anchor 2, atoms $\{2, 3, 4\}$, mesh level 4 — the first satisfiable level, via the integer facts $2^7 < 3^5 < 2^8$ and the reduction $1/8 < 2/5$ exact; the level-0 failure $4/3 < 4$), the SIX SEALED VERDICT BARS as exact decision logic with tipping mutants at every live clause boundary, and the wave-12 composition gate; the r319/r320 Lean rounds consumed as REPORTS, their artifacts in rh/lean/ re-verified by lake build + the RH suite; single-module test green 22/22 gates (18 module-own + 4 pattern gates) in ~ 3 s, byte-identical on re-run): THE RED-TEAM MORNING AND THE TWO

FORKS FROZEN. (A) The extraction-chain audit and repair (r319/r320): the independent reconstruction of the chain from the two lemmata to Weil/RH found **THREE KERNEL-CHECKED TYPE INCONSISTENCIES** three levels above the boxes (U1 bridge $\times$ terminal via $B = -1$; U2 bridge $\times$ L* via the mesh-level-0 total node collision and $p = X - 1$; U3 pair_margin_main forces its source predicate **EMPTY** — the r273 disease one level up) plus the mesh-vs-anchor **COFINALITY SEAM** (cofinal_prime_windows proves the anchor direction at fixed mesh, not the H_{cof} refinement direction — **THE FALSE COFINALITY DIRECTION IS DOCUMENTED, NOT SOLVED**); the honest chain verdict is **BINDING**: “two lemmata $\Rightarrow$ RH” does NOT survive the literal reading — literally the two lemmata give **ONLY** window-local master positivity for the opaque, currently witness-less MainWindow; r320 **REPAIRED** the interface completely (bridge retype with u/B fidelity + separation discipline + budget_pos; the additional arch/border finding sealed by the new opaque SourceExact; pair_margin_main retyped onto the canonical extraction with signRuns_sum + canonical_split **PROVED**; three permanent sorry-free guards, axiom census kernel-checked without sorryAx; the sorry-free witness witness_represents; sorry census $5 \rightarrow 5$ with two typed **RE-TYPES**, lake build green). (B) The reviewer adjudication (binding, adopted on every surface): the proof graph has **THREE LEVELS** and the two true holes are named **WINDOW-LOCAL** from wave 12 on — Level A (local window mathematics, **PROVED**: $L^*(w) + T(w) \Rightarrow \text{MasterPositive}(w)$, cleanly typed per r305/r320; “for every canonical finite window, L* and terminal positivity imply augmented prefix positivity — this is a window-local theorem”), Level B (the universal window family — **THE** two arithmetic **WINDOW-LOCAL** holes: $\forall w \in W_{\text{canonical}} : L^*(w) \wedge T(w)$), Level C (extraction to Weil/RH, **OPEN**: source-exact realization + admissible transport + convergence/stabilization in the correct directed order + density/continuity for the Weil criterion); two binding caveats: the sorry census does NOT measure the Level-C distance (the missing extraction architecture appears in **NO** sorry, because the correct theorem statements do not yet exist), and SourceExact — a good firewall — must NOT stand as a free assumption in a final proof: the named open Lean target is CanonicalPrimeWindow + exactly **ONE** construction theorem sourceExact_buildPrimeWindow (load-bearing, not formalization polish); the typed per-layer reviewer assessment supersedes the wave-11 $4 \rightarrow 5$ scalar (finite dictionaries 9.5/10, formal window-local architecture 9/10, terminal mechanism 6/10, L* mechanism 2/10, source/extraction architecture 2–3/10, complete RH proof path $\sim 3/10$, audit quality 9/10 — “stronger as a window-local research program; as a complete RH proof chain currently less far than previously assumed — the removal of a shortcut that did not exist”). (C) The fiber fork (r317/r321): fork (b) sealed whac-a-mole(kz53, kz83) **BY CONTRACT** (the blind gap rule recovers the **REAL** spike family $B = \{kz55, kz67\}$ with finite certificates $C_B = 1.0536$, but class A stays empty at bar distance 0.017 and kz53/kz83 stay uncovered; the census find: the F_A top-3 are **EXACTLY** kz53/kz83/kz67 = 2.47/2.39/2.38 — one source-pure rank-local **QMAX** coordinate ranks the complete near-critical family on top, but as a **CONTINUUM**: the exception-family form is the wrong statement shape); fork (a) in the r317-sharpened form fired sliding-bound-go(G_{SQ}): $\sum_j q_j^3 \leq 1.3056 F_A(w)^2 (\log m)^2 / m^2$ for $m \geq 73$ with 0/39 mid-ladder test violations **AND** all four named r316/r317 violators **INSIDE** at reserves 7.0..9.6; the constant algebra-derived and source-pure ($b = (\max_{\text{cal}} B)^2 = 1.1426^2$, no target value in the calibration); honest: $C_{\text{impl}} = 7.97$ is $7.5\times$ looser than the r306 first-5 constant — **FORM**, not sharpness; the pure-algebra transfer does not close (B rising +0.122); scramble rejected only

via the r317 class side condition; the provenance question now the two-part $F_A/q_{\max}$ split. (D) The base fork (r318/r322): r318 p2-main-specific — P1 BANKED AS LANGUAGE (the index statement a total restatement of L^* , 10/10 instances both truth values; the global inequality vacuous; the invariants world-blind), classical sign regularity DEAD on MAIN (premise-fails-on-main); r322 algorithm-artifact — the $(D3, D4)$ sign law and the r312 97.6/2.4 anatomy are LEAST-NORM-PROXIMAL DYKSTRA-BASIN properties, not psd-solution-set properties (sealed random starts carry modal pair $(0, 2)$; the law not identity-forced — exact Fractions, positive forced value); the named residual: the SELECTION GEOMETRY. LEDGER: NEW PRIME.REDTEAM.EXTRACTION_AUDIT.01 [E] (the audit + repair + the honest chain reading + the full reviewer adjudication verbatim, incl. “the false cofinality direction is documented, not solved”); NEW PRIME.L2.RENYI3.SLIDING_BOUND.01 [O] (the theorem candidate with the disclosed looseness and the R324 lane note); UPDATED PRIME.L2.RENYI3.PROVENANCE.01 [O] (the fork executed both ways), PRIME.LSTAR.SUBORDINATION.01 [O] (wave-12 state + the binding lane pause: L^* internally PAUSED at allocation 0%, reviewer decision — the selection geometry not pursued, reopening only under the six documented r322 conditions, the external memo candidate the two-weights sampling formulation $\|J_N\| < 1$; the hole typed WINDOW-LOCAL), PRIME.LSTAR.ARCHITECTURE_ADJUDICATION.01 [E] (wave-12 red-team note + the assessment-table supersession pointer); no other marker moves, mincut base 4 / refined 5 UNCHANGED. LEAN (rh/lean): NO change ships with this promotion — r319/r320 are already merged and green (census 5, two typed retypes); the named open target CanonicalPrimeWindow + sourceExact_buildPrimeWindow registered in README/paper; rounds R324 (terminal $Q_{\max} \times M_2$) and R325 (extraction repair) IN FLIGHT, deliberately NOT consumed. Papers: the red-team/fork diary section sec:forks-redteam in tfpt_prime_front, the wave-12 block + the L^* wave-12 state in tfpt_research_contracts, the new section “Red team and the two forks (v969)” in rh/paper/rh_program.tex (the honest-chain remark, the THREE-LEVEL remark with both caveats, the SourceExact-target remark, the sliding-bound theorem candidate, the basin-lesson remark, the typed reviewer-assessment table, the lane-status remark; the “two true holes” renamed window-local throughout) + recompiled PDF; rh/README.md wave-12 block with the lane status (L^* PAUSED; terminal sharpened to $Q_{\max} \times M_2$, R324 in flight; extraction fork R325 in flight; Lean: 5 sorries, the two true WINDOW-LOCAL holes) + the Level-C construction-theorem TODO; rh/INVENTORY.json + make_inventory.py extended additively (the v969 pin + the r317/r318/r321/r322 consumption notes, all pre-existing entries byte-exact; 107 entries); run_rh.py MODULES $\rightarrow$ v955–v969, full RH suite green (86/86). The full-suite run_all.py pass at 962 modules, the final bash build.sh audit and the manifest regeneration follow as the joint exit gate; NO RH claim anywhere in either direction)

2026-08-26 (CXXVIII) (consolidation wave 11 — the architecture adjudication: the certified content of discovery rounds 305–316 (incl. 310b) graduates from the experiments tree into the load-bearing suite as v968_architecture_adjudication.py (suite 960 $\rightarrow$ 961, ledger 1127 $\rightarrow$ 1131; wave-4 embedding convention: the TEN discovery probes embedded BYTE-EXACT and executed verbatim in their sealed -smoke stage with the printed SPEC SHA-256 hashes pinned and gated — renyi3 27/27 SPEC 3bb365e153033ea8, fixed_head full 28/28 / smoke 27/27 SPEC ec2bb0086f31ac73, block_green 30/30 SPEC d51478504a645269, paired_cone 33/33 SPEC f8d99877acb562b1, blockgreen_nontriviality 34/34 SPEC fac7a8df

ec9eb81f, blockgreen_membership 32/32 SPEC 6c32f74962eef7af, renyi3_proof_fork 32/32 SPEC 6505dd10d5cce9fd, signed_cubic_flux 29/29 SPEC 841b319682af06c7, phi3_functional 29/29 SPEC 92d35a3a4186d330, two_regime_bound 35/35 SPEC 5c28b12b1c3998c5; full records sealed experiments-side, re-verified by rh/verification/run_rh.py; plus the module-own exact section S0 — the r306 HILL/LAGRANGE CHAIN (both Lagrange witnesses dev 0 EXACT, the power-mean slacks $1/64$ and $37/32768$ EXACT, the uniform equality case sharp, the flip mutant $-1/64$ NEGATIVE caught) with the Rényi BRIDGE on the equality-tight rational witness (every comparison exact, the reversed-chain mutant caught), the r314 OPENING-FLUX LEMMA $F_1 = g^3 - 3g g^2 + 2g^3 \equiv 0$ on five rational witnesses plus the exact flux telescope (deviation the rational 0 on three toy blocks; the dropped- $2g^3$ mutant lands $-2g^3 = -54/343$ EXACT), the r314 COLLISION COUNTING IDENTITY $3p_1p_2 - 2p_3 = 8(n + 3n(n-1))$ EXACT on four mult-2 toy blocks (both sides 760; the mult-1 mutant breaks by the exact factor 8: 95 vs 760), an r311-CLASS EXACT RATIONAL FARKAS MINICERTIFICATE (PD target $[[1, -1], [-1, 2]]$ in the span with the FORCED negative generator weight $(2, 3, -1)$ — the sign wall in miniature; dual $Y = [[0, 2], [2, 1]]$ with $\langle Y, G_i \rangle \geq 0$ and $\langle Y, Q \rangle = -2$ EXACT; the sign-flipped mutant target IS in the cone and the same Y fails on it — no overreach), the TEN SEALED VERDICT BARS as exact decision logic on the frozen record aggregates with tipping mutants at every live clause boundary, and the FOUR-LEVEL COMPOSITION GATE (a passing B2–B4 would hand the lane to architecture B, a firing r312 GO would keep Lane A open, a surviving two-regime bound would resolve the provenance — each tip changes the composed adjudication, the claim split is NOT hard-wired), no probe imports; single-module test green 30/30 gates (20 module-own +10 pattern gates) in ~ 50 s, byte-identical on re-run up to the runtime line): THE ARCHITECTURE DAY FROZEN IN THE REVIEWER'S BINDING FOUR-LEVEL STRUCTURE. Level 1 — real formal theorems (Lean, rh/lean/, already built and green; NO Lean change ships with this promotion): lstar_terminal_implies_master (r305: $L^* + \text{terminal } q_N < 1 \Rightarrow$ full master positivity via Schur bordering + principal submatrices; augmented_prefix_positive and free_window_positivity now COROLLARIES — no third arithmetic axiom); the four closed Inertia theorems (psd_base, positive_prefix_firewall incl. a from-scratch Sylvester criterion, sylvester_pullback, half_filling_boundary); the real PrimeWindow construction (r310: nodes = $\log p^k$, weights = $\Lambda(p^k)$ DERIVED via mathlib vonMangoldt); source exactness by rfl THROUGH derivation + mass conservation of ANY folding map (Finset.sum_fiberwise — aggregation is a quotient, not a projection) + the STRONG stabilization form onto the Weil prime side (r310b); the r309 rank-one update identities; Hill monotonicity + the Rényi-3 $\Rightarrow N_2$ bridge; SORRY CENSUS $9 \rightarrow 5$ with clean bookkeeping — the two TRUE holes stand alone (lstar_subordination, terminal_positive_main). Level 2 — certified finite statements: the Rényi-3 inequality $\sum q^3 \leq 1.069 (\log m)^2 / m^2$ on 57 rungs (r306, growing reserve -0.322 ; $A = 1$ fails exactly at kz53/kz67 — polylog-SQUARED is the honest form); the fixed-head census 77/77 (r307, min 2.19×10^{-3} , amplification 3.1×10^4); the block-Green identity on the finite objects (r308, toy t^2 pin $4/7$, f64 4.0×10^{-14}) + strictness of the cone with EXACT RATIONAL FARKAS CERTIFICATES (r311, MINI#0 + SM1#0, 0/16 in-span PD samples decompose); paired-cone soundness on 20714 steps (r309, 0 violations, 56 % certified); fold multiplicity EXACTLY 2 + 93 % far-triple cancellation (r313); the signed cubic identity with VANISHING boundary term (r314, decided in exact Fractions ON THE

REAL w9 DATA, every deviation the rational 0, f64 4.5×10^{-17} on all 57 rungs); the 21 small- m certificates (r316, $C_{\text{small}} = 1.0694$). Level 3 — negative architecture decisions (verbatim): fixed-head-dead (r307 head-grows: no fixed $r \leq 8$, best reserve 6.5×10^{-6} four decades under the bar — the one-atom anatomy a COORDINATE, not a DIMENSION); paired-cone-no-induction + paired-cone-world-blind (r309 B1–B4: B2 partial 56%, B3 not reached, B4 missed — B does NOT overtake A); the r308 discriminator = the budget sign / a chordal restatement (r311: the Δ -sparsity graph CHORDAL on every size, the trivial dual $Y_t = e_t e_t^T$ closes the stalls two-sidedly); coefficient-sign-wall — LANE A CLOSED AS A CONE LANGUAGE with the mechanism NAMED (r312: block-psd membership without rank-one-SDD membership, obstructed at the budget/border sign; Farkas mass on the border/budget row, t -share 0.583/0.725; the entire obstruction in 2.4% SDD-forbidden negative cross-mixings); floquet-expanding (r313: med sr 1.0600, 0/57 contracting — no transfer-operator contraction form remains open at chain level); triple-type-majorants-wrong (r313); phi3-all-blind (r315: the entire break on kz55+kz67, FCIX 0.955/0.915 vs 0.629 — exactly where the flux cancellation dies); two-regime-dead (r316, with the anatomy: the obstruction family cuts ACROSS the FCIX stratum, kz53 at bulk-normal FCIX; the r306 first-5 protocol was LOAD-BEARING; kz55/kz67 near-one-block, TOP1 0.558/0.785 vs 0.18). Level 4 — open mechanisms (typed): the constructive PSD-G rule (closed as a lane, open as a question), the signed cubic flux theorem, the quantitative source functional, the crossing_budget mathlib gap, the definitional source bridge, L^* , the terminal. LEDGER: NEW PRIME.LSTAR.ARCHITECTURE_ADJUDICATION.01 [E] (the four-level structure verbatim); NEW PRIME.SOURCE.RANKONE.UPDATE.IDENTITY.01 [E] (ONLY the exact update identities: determinant dictionary, Sherman–Morrison chain, $\pm(\eta \pm e_t)$ border split, local Schur reserve, signed source updates — per the reviewer’s binding claim split NOT one TRANSFER title); NEW PRIME.SOURCE.TENSOR.MECHANISM.01 [O] (the open question whether a source-pure cofinal control arises from them, registered AFTER r313/r316 with the documented negatives); NEW PRIME.L2.RENYI3.PROVENANCE.01 [O] (the pointwise GO as a certified finite statement + the open provenance question; trilogy state: identity exact, functional blind, two-regime dead; the R317 fork verbatim: a near-critical family coordinate OR a certified exception family — reviewer adjudication pending); UPDATED PRIME.LSTAR.CLOSED_FUNCTIONAL.01 [O] (the Lane-A closure note), PRIME.LSTAR.SUBORDINATION.01 [O] (wave-11 state: the two formal holes, the source interface, the architecture adjudication), PRIME.PORT.RHP.FULLSOURCE.BASEFIBER.01 (Lean restructuring note: sorries $9 \rightarrow 5$); no other marker moves, mincut base 4 / refined 5 UNCHANGED. The universality-class framing typed: the base is fine-metric (metric-only, twin invariance everywhere), the fiber is recursive (epstein holds, scramble breaks) — shared algebra, not necessarily a shared mechanism; the reviewer maturity raise $4 \rightarrow 5$ (formal architecture 9.5) documented as a REVIEWER ASSESSMENT, not a machine-checked fact. Papers: the architecture-adjudication diary section sec:architecture-adjudication in tfpt_prime_front (the wave-10 “in flight” spots resolved historically), the wave-11 block in tfpt_research_contracts, the new four-level section “The architecture adjudication (v968)” in rh/paper/rh_program.tex (one subsection per level, the Closure/Source theorem tables, the universality-class remark, the no-go catalog extended by eight wave-11 rows, the Lean status brought to the 5-sorry census) + recompiled PDF; rh/README.md wave-11 block with the lane status (A closed as cone language; B closed, identities banked; C

parked; fiber: the r306 GO stands, provenance open, R317 fork at the reviewer; Lean: 5 sorries, two true holes); rh/INVENTORY.json head-synced (100 $\rightarrow$ 101 entries: the v968 pin + the r306–r316 consumption notes, all pre-existing entries byte-exact); run_rh.py MODULES $\rightarrow$ v955–v968, full RH suite green. The full-suite run_all.py pass at 961 modules, the final bash build.sh audit and the manifest regeneration follow as the joint exit gate run by the coordinator; no round is in flight at this cut — R317 waits on the reviewer fork; NO RH claim anywhere in either direction)

2026-08-26 (CXXVII) (consolidation wave 10 — the cascade closure and the documented lane stop: the certified content of discovery rounds 301–304 graduates from the experiments tree into the load-bearing suite as v967_12_cascade_closure.py (suite 959 $\rightarrow$ 960, ledger 1126 $\rightarrow$ 1127; wave-4 embedding convention: the four discovery probes embedded BYTE-EXACT and executed verbatim in their sealed -smoke stage with the printed SPEC SHA-256 hashes pinned and gated — neff_target 32/32 SPEC 6f8cc40420c57165, unif_target 30/30 SPEC 36df942427d45fe4, atom_target 26/26 SPEC 375e9f2b8e6c1697, shortrange_law full 37/37 / smoke 32/32 SPEC 2cc5d23fdaa75346; full records sealed experiments-side, re-verified by rh/verification/run_rh.py; plus the module-own exact section S0 — the r303 MARGIN-INVARIANCE ALGEBRA (all four target margins $m_D = m_{\text{NEFF}} = m_{\text{UNIF}} = m_{\text{ATOM}} = 3/50$ EXACT on the rational slope set through the three gated product identities r300/r301/r302; the halved-need mutant breaks the $D \leftrightarrow \text{NEFF}$ invariance by EXACTLY $\text{sl}_{L1} = 1/5$ — the exact root of the refuted $\frac{1}{2}$ -conjecture; the record-decimal chain 0.055/0.908/0.094/0.888 EXACT with the disclosed 1/1000 m_{ATOM} rounding artifact; the σ decomposition $0.198 = 0.055 + 0.143$ EXACT; the $\frac{1}{2}$ -conjecture refutation 0.099 vs 0.055, dev 0.044 > the sealed 0.005), the r302 COHERENCE IDENTITY $(1 + CV^2) \text{surv}^2 n_{\text{eff}}^{\text{atom}} = n_{\text{act}} \chi$ on two rational toys with the r301 count identity attached (the lag-0 double-count mutant breaks by 5/7 EXACT, the swapped- D/Q mutant by 48/35 EXACT), the r304 CHI-LAG DECOMPOSITION $\chi = 1 + 2 \sum_k T_k/Q = D/Q$ on both toys (5/7 and 5/19 EXACT; factor-1 mutant 1/7 EXACT), the r304 ZERO-SUM TAUTOLOGY as a gate $(1 + 2 \sum_{\text{all}} \rho_k \equiv 0$ for mean-removed profiles; factor-1 and uncentered mutants 1/2 and 3/4 EXACT; the truncated net covariance $NC(1) = 0.556$ EXACT, $NC(16)$ recomposing to 0.710 within the disclosed 2/1000 rounding of the pinned $0.712 < 1$; the PERIOD-4 COMB CERTIFICATE: every strong lag $j \in (4, 16]$ sits at $j = 4m$ (+) or $j = 4m+2$ (–) and the sealed k_0 rule finds NO $k_0 \leq 8$), the – / – / + / + SIGN-PATTERN CERTIFICATE with the kz18/kz23 Fractions pins and the honest rho-sign 41/42, the four sealed verdict bars as exact decision logic with tipping mutants at every live clause boundary, and the lane-stop composition gate, no probe imports; single-module test green 27/27 gates (23 module-own + 4 pattern gates) in 1.3 s, byte-identical on re-run): THE CASCADE RETYPED, THE LANE STOP DOCUMENTED — *the rejections and retypings ARE the frozen content.* (A) THE r301 NEFF ANATOMY (the wave-9 rest executed): $n_{\text{eff}} = n_{\text{act}}/(1 + CV^2)$ EXACT (ward $\leq 6.8 \times 10^{-16}$ on 47 worlds) with the PERFECT count link $n_{\text{act}} = m$ on 42/42 — the effective-carrier count IS the constructive level-2 block count (+1.002); the whole Rényi order family grows at ONE exponent (+0.963/ + 0.926/ + 0.894/ + 0.738: ECHT anti-concentration, not a broadening tail); the margin is jackknife-STABLE (0/42 below NEED, no margin-fragile); sealed verdict neff-split(B1|B3): the growth statement became the BOUNDEDNESS statement unif-target (slope($1 + CV^2$) $\leq +0.094$, measured

+0.039, margin 0.055); neff-derived missed ONLY the sealed CV-flat clause (+0.039 > 0); B2 closed honestly (the $|dc|$ -weighted discrepancy is $10\times$ the raw D_{rank} and near-flat: the r300 bridge lived on the RAW positions). (B) THE r302 UNIF ANATOMY (the FIRST DERIVED of the lane): the CV^2 rise is STRUCTURELESS, the normalized block profile is profile-stationary (KS $0.043 \ll 0.125$ over a $3\times$ depth range) with an EXACT $1/N$ transient onto $m_2^\infty = 1.973$ (held-out dev 0.002; the r299 pointwise-cconv negative was the wrong convergence notion — convergence in DISTRIBUTION); the r301 depth flag resolved EXACTLY per half ($0.982 = 0.929 + 0.053$, $0.802 = 1.030 - 0.228$: the CV^2 head, not the count); the coherence identity EXACT with $\chi = 0.63$ DESTRUCTIVE and falling ($\rho_1 = -0.22$ its atom-level mechanism) $\Rightarrow$ unif-derived(B1+A2) under the sealed clause, ALL hypotheses typed MEASURED; the relocated rest: atom-target (+0.888 needed, +0.942 measured). (C) THE r303 REGRESS AUDIT (the retyping round): THE THREE 0.055 MARGINS ARE ONE ALGEBRAIC NUMBER — $m_D = m_{\text{NEFF}} = m_{\text{UNIF}} = m_{\text{ATOM}} = +0.0547$, invariance devs $\leq 9 \times 10^{-16}$; the core is $S = \sigma^* - \text{sl}_D = +0.0547$ (the r299 DIAG margin); the σ level is NOT the core ($\sigma^* - \sigma = +0.1976 = S + \text{ratio surplus } +0.1429$ EXACT) and the $\frac{1}{2}$ -conversion conjecture is REFUTED $\Rightarrow$ regress-confirmed: the cascade r297 $\rightarrow$ r302 is RETYPED as an exact reduction dictionary (coordinate finding), not six proof steps; THE HARD REVIEWER RULE (binding from r303 on, verbatim): *a round counts as progress ONLY if it adds NEW information, not if it re-expresses the same slack in a new coordinate.* THE FIRST CAUSAL COORDINATE: the mechanism ladder on 1008 sealed marginal-preserving builds is MONOTONE in ρ_1 (χ $0.630 \rightarrow 0.764 \rightarrow 1.029 \rightarrow 1.342$; end margin $+0.055 \rightarrow +0.057 \rightarrow +0.032 \rightarrow -0.044$: THE SIGN FLIP KILLS THE TARGET INEQUALITY) — but ρ_1 matching misses the destructive χ level by 0.134 $\Rightarrow$ mixing-insufficient (the within-block structure beyond lag 1 named as the gap); bycatch theorem-grade: $n_{\text{eff}}^{\text{atom}} = (L_1^a)^2/Q$ is a pure MARGINAL functional (invariance 1.0×10^{-15} on all 1008 builds — stationarity and mixing complementary, not redundant); rho-sign honest 41/42 (one rung positive: no raw per-rung theorem; Fractions-exact negative certificates kz18/kz23). (D) THE r304 SHORT-RANGE LAW (the reviewer stop case): the global lag profile $\rho_{1..16}$ of the dc profile is a STABLE, WORLD-SPECIFIC PERIOD-4 COMB (med $-0.222/-0.140/+0.089/+0.130$, then strong lags at every $k = 4m$ and $4m+2$ up to 16; halves-stable 3/3), NOT a decaying tail — no $k_0 \leq 8$ exists: longrange-structure + law-longrange fire on the LETTER of the sealed rule; the reviewer condition SPLITS: the net covariance $NC(16) = 0.712 < 1$ HOLDS (net-negative) while summability-with-small-tail FAILS ($SUM(16) = 1.563$); only the TRUNCATED NC carries content (the full sum is the gated zero-sum tautology); THE STRUCTURAL COUNTERPOINT (exact, ward 4.7×10^{-16}): the χ -relevant within-block structure IS short-range (shares die by $k \sim 4$; the r303 miss 0.134 sits at $k \leq 3$, dominated by lag 2 +0.181) — the long-range comb is INVISIBLE to χ ; lag-8 matching reproduces the χ LEVEL (0.652 vs 0.630, $|d| = 0.022 \leq 0.05$) but breaks the SLOPES ($0.028/0.027 > 0.02$) — the exact COMPLEMENT of r303(a): the mechanism is TWO-SCALE (level from the short lags, slopes from the rung-wise ρ_1 trend), no lag-matching family reproduces both; the graduated reviewer ladder is MONOTONE in χ but NOT in the margin (honest negative: the r303 kill came from per-rung flipped targets — the margin responds to the TREND, not the level). THE CONSEQUENCE (the sealed reviewer stop case, map (iii)): THE GLOBAL-PROFILE MIXING ROUTE OF THE L2 LANE IS DOCUMENTED CLOSED — the honest stop state: L2 generic $\Leftrightarrow$

anti-concentration of an explicit block field with LONG-RANGE (period-4 comb) structure; return later with new tools. What stands honestly: the exact identity dictionary (count, coherence, χ -lag), the two-scale split, $NC < 1$, the $-/-/+ /+$ sign pattern (Fractions-exact kz18/kz23), the marginal-functional invariance of $n_{\text{eff}}^{\text{atom}}$ (10^{-15} on all 2100 + 1008 builds). LEDGER: NEW PRIME.L2.CASCADE_CLOSURE.01 [E] (fine types Identity/Formal for the S0 skeleton + Numerical/Measurement for the ladders and censuses; the rejections and retypings ARE the frozen content); PRIME.L2.NEFF_TARGET.01 [O] RETYPED to the documented stop state (the rest is no longer NEFF/UNIF/ATOM — all one slack $S = +0.0547$ — but the stop state above, with the hard reviewer rule verbatim in the claim); PRIME.L2.REDUCTION_CHAIN.01 [E] retyping note (the exact identities STAND, the reading is refined: the chain is a dictionary, not six proof steps); no other marker moves, mincut base 4 / refined 5 UNCHANGED. LEAN (rh/lean): NO new statements — the stop carries no new exact target form (the period-4 comb and the two-scale split are measured ladder aggregates, not exact finite identities, and a universally quantified ladder form would be refutable — the r273 guard pattern of RH/Counterexamples.lean); the hole stays lstar_subordination. Papers: the cascade-closure diary section sec: cascade-closure in tfpt_prime_front (the wave-9 “r301/r303 in flight” spots resolved historically), the wave-10 block + the NEFF_TARGET stop-state update in tfpt_research_contracts, the new “The cascade closure (v967)” section in rh/paper/rh_program.tex (the margin invariance as its own theorem, the retyping as a methodological lesson — the sealing discipline caught the reparametrization trap; the causal ρ_1 coordinate + the two-scale finding, the period-4 comb as the named open object, the documented lane stop with the clean equivalence state) + recompiled PDF; rh/README.md wave-10 block with the lane status update (L2: documented STOPPED; L*: dormant since r296; both edges with a clean state); rh/INVENTORY.json + make_inventory.py extended additively (89 $\rightarrow$ 90 entries: v967 pin + the r301–r304 consumption notes, all pre-existing entries byte-exact); run_rh.py MODULES $\rightarrow$ v955–v967, full RH suite green. The full-suite run_all.py pass at 960 modules, the final bash build.sh audit and the manifest regeneration follow as the joint exit gate run by the coordinator; no round is in flight at this cut; NO RH claim anywhere in either direction)

2026-08-26 (CXXVI) (consolidation wave 9 — the DENS fork and the L2 reduction chain: the certified content of discovery rounds 296–300 graduates from the experiments tree into the load-bearing suite as v966_l2_reduction_chain.py (suite 958 $\rightarrow$ 959, ledger 1124 $\rightarrow$ 1126; wave-4 embedding convention: the five discovery probes embedded BYTE-EXACT and executed verbatim in their sealed -smoke stage with the printed SPEC SHA-256 hashes pinned and gated — dens_identity 39/39 SPEC ffb413c80cddc1d3, vdc_chain_provenance 27/27 SPEC e42a76eb8ae71422, window_border_transfer 28/28 SPEC 05e831bec627aee6, fejer_decay 32/32 SPEC f432e94450ad545d, diag_target 31/31 SPEC 55218b5db8ece163; full records sealed experiments-side, re-verified by rh/verification/run_rh.py; plus the module-own exact section S0 — the r297 σ^* -composition arithmetic ($\delta'(\sigma^*(\text{pad})) = \text{pad}$ EXACTLY for every rational slope pair, the pad-dropped mutant composes to 0: the r297-m2 sharpness as an identity), the r298 decomposition identity $S_F = B(\omega, \omega) + B(\Delta, \omega + \beta)$ on the exact positional Fejér block form (the hand toy 3 = 1 + 2 with attribution 1/1; the $|\Delta|$ and wrong-weight mutants break by exactly 4 and 2/3), the r300 participation identity $D \times n_{\text{eff}} = L_1^2$

with ratio multiplicativity and the machine-checked $\text{DIAG} \leftrightarrow \text{NEFF}$ equivalence (record decimals -0.571 in both decompositions, NEFF need 0.908 / margin 0.055 exact in BOTH coordinates; the signed-sum mutant breaks by exactly $8/3$), the r300 kernel envelope $F_H(s) \leq \min(H, 1/(Hs))$ exact-rational with equality witnesses on BOTH branches ($H = 2$: $s = 0, \frac{1}{2}$; $H = 3$: $s = 0, \frac{1}{4}$), and the five sealed verdict bars as exact decision logic with tipping mutants at every clause boundary, no probe imports; single-module test green 28/28 gates (18 module-own +5 pattern gates) in 1.3 s, deterministic on re-run): THE DENS FORK CLOSED HONESTLY, THE $\delta' > 0.21$ TARGET OF THE GENERIC HALF REDUCED TO ONE INEQUALITY. (A) THE r296 DENS FORK (honest negative, the lane closed): the reviewer hard fork on the r292 curvature axis lands dens-world-blind under the sealed rules — THE COUPLING NUMBER $\cos(e_{\text{top}}, \nabla \lambda_{\text{max}}) = +0.394$ sits BELOW the sealed 0.40 bar (noise max 0.331; T1 misses PART by 0.006, honest), the λ_3 control couples HARDER (-0.574 : a near-crossing eigenvalue-BAND property, not top-specific), every arithmetic candidate of the hash-sealed library stays ≤ 0.38 , and the only above-chance structure (the 4-dim moment-gradient subspace, 0.825) HOLDS on both dead controls (0.571/0.603) — construction-adjacent low-moment smoothness, the sealed world-downgrade fires (disclosed tension: the absolute collapse bar is conservative for subspace members, rule unmoved); PER THE PRE-ADJUDICATED REVIEWER FORK the DENS-identity lane is CLOSED and the resources move to the L2 front. (B) THE r297 TARGET INEQUALITY: $\delta'(F2) > 0.21$ is EQUIVALENT to $\sigma := \text{slope}(S_F/M_W^2) \leq \sigma^* = 2(\text{sl}_{c2} - 0.21) - \text{sl}_{\text{pref}} = -0.516$; measured $\sigma = -0.714$ — THE TRUTH CLEARS THE TARGET WITH 0.198 SIGMA MARGIN (0.099 in δ'): *what is missing is not room, it is provenance*; all three classical provenance routes VALID 47/47 but SLOPE-FAIL $\Rightarrow$ chain-provenance-partial(B3, slope miss 0.307 EXACT), with THE SURPRISE: the chain is EXACTLY ORTHOGONAL w.r.t. the WINDOW measure (devs 0.000 world-blind — the Fractions-proved Parseval sum rule attaches verbatim); the magnitude wall named (+0.22.. +0.24 imbalance growth). (C) THE r298 EXACT TRANSFER: $S_F = B(\omega, \omega) + B(\Delta, \omega + \beta)$ EXACT (8.8×10^{-16} of scale, 47 worlds), SIGN-PRESERVING (the $|\Delta|$ mutant breaks by ~ 1.7 of scale LOUD — the r297 magnitude error certified as a must-fail); the linear window zero MEASURED (the drive is 100 % transfer at the linear level); sealed verdict transfer-dominant: the window main term is EMPTY (med -3.94 dec, slope -1.386), the cross term negligible (-1.4×10^{-4}) $\Rightarrow S_F \approx B(P\Delta, P\Delta)$ — the vdC input IS the Fejér energy of the difference measure itself (share 0.99, $T > 0$ on 42/42; the two r297 gap halves unified, sp +0.69, broad-based). (D) THE r299 DECAY SPLIT: the exact spectral representation $B = (1/L) \sum_k F_H(\theta_k) |\hat{\Delta}(k)|^2$ is LOWPASS (0.93/0.04/0.02); THE STRUCTURAL FIND: FULL-SUPPORT overlap on 42/42 rungs — $\Delta_{\text{fresh}} \equiv 0$, Δ IS a pure c-value difference measure on ONE shared node set with NO pointwise convergence (cconv 0.86, +0.045: the decay is aggregate cancellation); the ET/Abel composition FAILS LOUD (composed $+1.948 = 1.504 + 0.444$ EXACT vs $\sigma^* = -0.516$; mass-target missed by 2.46 — the r297 magnitude wall recurs at the frequency level); the live edge fires: $\text{sl}_D = -0.571 \leq \sigma^*$ (margin 0.055) with FALLING ratio B/D (-0.168) $\Rightarrow$ decay-split (diag-target + ratio flatness; cvalue-target on the B3 side); the O-sign class separates MAIN (o-pos, reinforcing, $O < 0$ on 13/42 only) from both dead controls (o-neg) — the first world-separating sign class of the L2 lane, disclosed. (E) THE r300 DIAGONAL ANATOMY: $\text{sl}_D = 2 \text{sl}_{L1} - \text{sl}_{\text{neff}} = 2(+0.196) - (+0.963) = -0.571$ EXACT (dev 6.7×10^{-16}) — THE ENTIRE DIAGONAL DECAY IS PARTICI-

PATION GROWTH ('many small instead of few large' as a measured identity; $n_{\text{eff}} \sim N$, sp +0.96); BOTH magnitude factorizations fail exactly as r297 predicted (B1 chain-norm CS $-0.592 + 0.208 = -0.384$ EXACT AND the $|dw|$ identity census BREAKS — the proven sum rule does NOT attach to the difference measure, the chain-norm shortcut closed honestly; B2 $\max \times L_1 -0.542 + 0.196 = -0.346$ EXACT, miss 0.170 — the max is fully atom-controlled, $m_x/\text{maxatom}$ med 1.07: the irreducible loss is the fill decay -0.225 , INVISIBLE to every $\max \times \text{mass}$ bound); sealed verdicts diag-split(B3/neff-target) + ratio-bounded-structural (the exact kernel-envelope majorant R_{env} med 1.61 FALLS at -0.122 on 47/47 — the ratio half of the r299 rest pair settled at the structural level; the lobe-width heuristic refuted, sp -0.47); the FILL class separates MAIN (fill-low) from both dead controls (fill-high) — the second world-separating class. THE CHAIN STATE (the frozen wave content): [neff-target] $\Rightarrow \text{sl}_D \leq \sigma^* \Rightarrow \sigma \leq \sigma^* \Rightarrow$ the r297 target $\Rightarrow$ the v964-S0 vdC theorem $\Rightarrow \delta' > 0.21$ on the generic half (exceptions: 6 via the r287 F2 certificates, kz15 exact-finite via r270) — the L2 lemma stands reduced to ONE inequality: neff-target, $\text{slope}(n_{\text{eff}}) \geq +0.908$ (measured +0.963, margin 0.055; the D_{rank} bridge sp -0.81 real but correlational; round 301 in flight, NOT consumed). LEDGER: NEW PRIME.L2.REDUCTION_CHAIN.01 [E] (fine types Identity/Formal for the S0 skeleton + Numerical/M Measurement for the route tables; honest negatives VERBATIM: the magnitude-route catalog r297/r299/r300, the ET failure +1.948, no c-value convergence, the DENS closure); NEW PRIME.L2.NEFF_TARGET.01 [O] — the one remaining inequality with the named correlational bridge and the sealed kill list; CONTRACT UPDATES: PRIME.LSTAR.CLOSED_FUNCTIONAL.01 [O] (the DENS fork closed — front (2) answered negatively at the identity level, the lane routed to L2), PRIME.PORT.COUPLEDTAU.TERMINAL_CROSSRATIO.01 [O] (the L2 front reduced to neff-target); no other marker moves. LEAN (rh/lean): NO new statements — neff-target is a measured ladder-slope aggregate (a halves log-slope estimator over 42 rungs with a threshold derived from measured slopes), not an exact finite identity and not a matrix theorem, and a universally quantified ladder form would be refutable exactly like the pre-r273 universal edge forms (the machine-checked guard pattern of RH/Counterexamples.lean); the hole stays lstar_subordination. Papers: the L2-chain diary section sec:l2-chain-arc in tfpt_prime_front, the wave-9 block + the VDC_LEMMA/CLOSED_FUNCTIONAL state updates in tfpt_research_contracts, the new "The L2 reduction chain (v966)" section in rh/paper/rh_program.tex (the DENS closure paragraph, the reduction diagram, the exact identities as theorem environments — target equivalence, sign-preserving transfer, participation identity, kernel envelope — the magnitude no-go catalog as a table, the two world-separating classes as a remark, the NEFF target as an open problem) + recompiled PDF; rh/README.md wave-9 block (r301 in flight noted); rh/INVENTORY.json + make_inventory.py extended additively (84 $\rightarrow$ 85 entries: v966 pin + the r296–r300 consumption notes; the sync strictly additive next to the in-flight r301 worker); run_rh.py MODULES $\rightarrow$ v955–v966, full RH suite green (65/65 items, wall 489 s, 81/81 pinned entries byte-identical, ALL CHECKS PASSED). Mincut base 4 / refined 5 UNCHANGED (a reduction-plus-closure set moves no edge); the full-suite run_all.py pass at 959 modules, the final bash build.sh audit and the manifest regeneration follow as the joint exit gate run by the coordinator; the parallel r301 NEFF worker is NOT consumed; NO RH claim anywhere in either direction)

2026-08-26 (CXXV) (consolidation wave 8 — the L^* curvature arc: the cer-

tified content of discovery rounds 290–295 graduates from the experiments tree into the load-bearing suite as `v965_lstar_curvature_arc.py` (suite 957 → 958, ledger 1122 → 1124; wave-4 embedding convention: the six discovery probes embedded BYTE-EXACT and executed verbatim in their sealed -smoke stage with the printed SPEC SHA-256 hashes pinned and gated — `profile_functional` 32/32 SPEC `f953dd71f483d0fa`, `ridge_anatomy` 30/30 SPEC `bb512c17927818f5`, `curvature_form` 36/36 SPEC `050821ff05e1be74`, `metric_reconciliation` 43/43 SPEC `33c44cc697d4c3df`, `f10_stability` 42/42 SPEC `88c6fd1e3b5a5d39`, `f10_sp_hardening` 44/44 SPEC `4d7d809597d69afb`; full records sealed experiments-side, re-verified by `rh/verification/run_rh.py`; plus the module-own exact section S0 — the r292 polarization identity $H(u, v) = [d^2(u+v) - d^2(u-v)]/4$ with the wrong-prefactor must-fail, the r291 budget telescope (exact partition additivity of the side-selected first-order budget) with the dropped-atom must-fail, the r293 $\alpha = 1$ simple-zero doubling law ($|h(t_0+2d)|/|h(t_0+d)| = 2$ exactly, the double-zero mutant gives exactly 4 LOUD), and the sealed r294/r295 decision bars as exact Fractions logic with tipping must-fails at every clause boundary, no probe imports; single-module test green 25/25 gates (19 module-own +6 pattern gates) in 1.6 s, deterministic on re-run): THE GEOMETRY MEASURED, THE FUNCTIONAL SEARCH SEALED HONESTLY NEGATIVE, F10 NOT PROMOTED. (A) THE r290 BASIN GEOMETRY: the working set around MAIN is a SOFT-SHOULDERED, STRONGLY ANISOTROPIC TUBE in the exact θ_{eq} LAG coordinate (kill fraction 0.38/0.62/1.00 at $5 \times 10^{-4}/10^{-3}/2 \times 10^{-3}$; NEAR radius $\sim 5e-4..2e-3$ gap-equivalent); the world-directed axes kill 5–50x EARLIER than random (onsets $4 \times 10^{-5}..2.3 \times 10^{-4}$ vs the jitter threshold $10^{-3}..3 \times 10^{-3}$); the SMOOTH (arithmetic) axis is a privileged killer (onset 1.36×10^{-4}) yet ORTHOGONAL to the first-order wall gradient ($\cos = -3 \times 10^{-5}$) — collective, not gradient-linear; the r280 ridge is REAL (min $C = 185$ at factors 1..8, first death at 16). (B) THE r291 RIDGE ANATOMY: the lift is a FIRST-ORDER BUDGET phenomenon — one threshold in $(1.280, 1.291]$ separates lift from no-lift over ALL 18 matched-dose cases (PRIME/HEAD/XIPOS lift; $k_{min} = 9$, top atoms 2, 3, 5, 13, 11, 4, 29, 7, 89; exactly ONE overdrive retraction TOP6 at factor 8, margin 9.09); NO FIXED POINT (plateau min $C = 185$, never 186, the axis decoheres); LIFT MAIN-SPECIFIC (EPSTEIN first-order flat, $\theta_{up} = 5.03 \times 10^{10}$, never lifts); SMOOTH COLLECTIVE-QUADRATIC ($d^2 = -23.3$ vs -0.98 random, ratio 23.7). (C) THE r292 CURVATURE SPECTROSCOPY: the wall Hesse form is NEGATIVE on all 29 sealed directions and RANK-1 DOMINATED in the L2 spectral metric (92.5% of $\sum |\lambda|$, $\lambda_{top} = -0.418$) with the top axis a pure on-support DENS combination — NOT the SMOOTH axis ($|\cos| = 0.07$) and NOT the ridge (flattest sector, L2-rank 28/29); the m^* threshold and the TOP6 retraction are near-flip nonlinearities INVISIBLE to jets up to third order (q_R median $-0.911 =$ second-order ASSIST; $B_2 = 27.6/B_3 = 150.9$ over-predict); EPSTEIN second-order structureless (5.4×10^{-15}). (D) THE r293 METRIC RECONCILIATION: three metrics sealed BEFORE any evaluation (distortions 11/59/124, largest sector DENS); F10 beats the baseline OF ITS OWN METRIC for the first time in four rounds (home margin $+0.024 = 0.884 - 0.860$ vs the mixed r292 margin $-0.023 = 0.884 - 0.907$: mix-is-cause, both RE-DERIVED in the gates) and carries partial information ($+0.423$ test / $+0.826$ train); ALL 8 selected flips are SIMPLE h_{184} ZEROS ($\alpha = 1.000 \pm 0.003$, 225 gated wall evaluations) — but mstar-no-law (m_{dir}^* scatters 1.1295..1.3931 straddling the r291 bracket, a fixed-dose artifact; spreads 3.0/3.0/3.8/10.2 vs bar 1.25); the TOP6 retraction IS a SECOND simple h_{184} zero at $f_{ret} = 7.107$ (lift window 1.226..7.107), on the

side the monotone budget prognosis is blind to. (E) THE r294 STABILITY ADJUDICATION (honest negative): the $|\text{sp}|$ win of F10 replicates on ALL FIVE fresh seed-disjoint corpora (margins $+0.003..+0.115$, wins 5/5 re-derived) BUT the partial channel does NOT (median $0.299 < 0.3$, 2/5) $\Rightarrow$ sealed verdict f10-fragile, PROMOTION NO; robustness typed train-robust ($\sigma = 0.0101$) + rank2-carries (top DENS eigenaxis alone $+0.855$, DENS share 0.989 — the mechanism hint) + step-stable; window transport a KNIFE EDGE (w11 $+0.002$ / w7 -0.009) with DENS MECHANISM CONSTANCY ($0.795/0.989/0.834$); l2-not-dens. (F) THE r295 HARDENING ADJUDICATION (honest negative): TWENTY fresh corpora (192 forbidden seeds enumerated, zero overlap; H_{tr} hash gate 3447ed198a56) — F10 wins 14/20 (margin median $+0.028$, min -0.079): the sealed three-clause HARDENED bar fails on TWO clauses $\Rightarrow$ f10-sp-majority — the r294 5/5 was itself TOP-OF-DISTRIBUTION, exactly as the r293 partial was; a DOCUMENTED REGULARITY (19/25 combined census), NOT a theorem; PARTIAL20 median $+0.279$, IQR $[+0.182, +0.401]$; partial-family-map: NO family STRONG (PATH $+0.156$ / WORLD $+0.245$ / FRAC $+0.067$ NULL / DENS $+0.104$, pooled 2921); r293-luck (matched median $+0.346$: gain clause passes, level clause fails by 0.004); l2-via-conservation near-tautological (η_0 share 2.9×10^{-30}). THE FROZEN CONSEQUENCE: after FIVE sealed class families (local scalars best 0.263 / non-local best 0.471 / two-form mixed $0.884 < 0.907$ / metric-reconciled F10 fragile / hardened $|\text{sp}|$ form majority-only) NO closed predictive profile functional of the working set exists over the honest bar — F10 stays UNPROMOTED, the sealed r294/r295 rejections ARE the frozen content. LEDGER: NEW PRIME.LSTAR.CURVATURE_ARC.01 [E] (fine types Identity/Formal for the S0 skeleton + Numerical/Measurement for the geometry census; honest negatives VERBATIM: all-functionals-blind (5 class families), f10-sp-majority(14/20, kein Satz), mstar-no-law, r293-luck); NEW PRIME.LSTAR.CLOSED_FUNCTIONAL.01 [O] — the closed-functional question with the sealed kill catalog and the named open fronts (loss-corpus forensics K05/K07/K19, the rank-2 DENS core, why L2 substantially); CONTRACT UPDATE: PRIME.LSTAR.SUBORDINATION.01 [O] carried at the wave-8 state (the characterization question functionally negative-sealed, the geometry measured; no round in flight at this cut). LEAN (rh/lean): NO new statements — the wave carries no new formal target form, the hole stays lstar_subordination. Papers: the curvature-arc diary section in tfpt_prime_front (the wave-7 “r290 in flight” spots resolved historically), the wave-8 blocks in tfpt_research_contracts, the new “The curvature arc (v965)” section in rh/paper/rh_program.tex (basin geometry, budget mechanism, curvature-spectroscopy table, the five-family functional kill catalog as a table, the honest F10 story as a case study in sealing discipline) + recompiled PDF; rh/README.md wave-8 block; rh/INVENTORY.json + make_inventory.py extended additively ($78 \rightarrow 79$ entries: v965 pin + the r290–r295 consumption notes); run_rh.py MODULES $\rightarrow$ v955–v965, full RH suite green (59/59 items, ALL CHECKS PASSED). Mincut base 4 / refined 5 UNCHANGED (a geometry-census-plus-rejection set moves no edge); the full-suite run_all.py pass at 958 modules, the final bash build.sh audit and the manifest regeneration follow as the joint exit gate run by the coordinator; NO RH claim anywhere in either direction)

2026-08-25 (CXXIV) (consolidation wave 7 — the L^* coherence census: the certified content of discovery rounds 286–289 graduates from the experiments tree into the load-bearing suite as v964_lstar_coherence_census.py (suite $956 \rightarrow 957$, ledger

1120 $\rightarrow$ 1122; wave-4 embedding convention: the four discovery probes embedded BYTE-EXACT and executed verbatim in their sealed -smoke stage with the printed SPEC SHA-256 hashes pinned and gated — lstar_margin_scaling 29/29 SPEC 0a44ac4e3a76e809, l2_deterministic_cancellation 25/25 SPEC 761d88fa566faa14, destructive_coherence 31/31 SPEC da46f7eef702ac37, arch_kernel_diophantine 42/42 record SPEC 91cdc2b194502168; full records sealed experiments-side, re-verified by rh/verification/run_rh.py; plus the module-own exact section S0 — the Fejér window-sum identity, the van der Corput inequality with its Cauchy–Schwarz proof route and $H = 1$ equality witness, the Abel/Erdős–Turán bound, the wrong-prefactor and dropped-terminal must-fails, the 2-power resonance count $\binom{8}{2} = 28$, in pure Fractions; single-module test green 21/21 gates in 1.1 s, deterministic on re-run): THE MARGIN WARNING RESOLVED, THE vdC THEOREM NAMED, THE DIOPHANTINE ROUTE EXCLUDED. (A) THE r287 vdC THEOREM: the exact, CONSTANT-FREE, ARITHMETIC-FREE van der Corput inequality $|\sum_j P_j|^2 \leq \frac{m+H-1}{H} \sum_{|h|<H} (1 - \frac{|h|}{H}) A(h)$ at the frozen window $H = \lceil \sqrt{m} \rceil$ delivers $\delta' = +0.309 > 0.21$ WORLD-BLIND (admissible: L2 is the generic half) and certifies 6/7 exceptions +38/42 rungs — the L2 lemma has its first NAMED classical theorem candidate; F1 discrepancy/Erdős–Turán dies loud ($\delta' = -0.21$, 0/7, detector FIRE +1.44 dec); the autocorrelation surprise: on 39/44 worlds the block sequence REINFORCES at root scale — the c3 cancellation is already absorbed into the P_j magnitudes, the frames win through the $\sqrt{m}$ count economy, not lag structure. (B) THE r286 MARGIN-SCALING CLARIFICATION (the DCXX warning RESOLVED): 15 new anchors $N_w = 942.1218$, ALL margins mp-sign-safe positive (min $+1.806 \times 10^{-8}$, every anchor mp dps-30/45 staggered) — NO counterexample; the $O(1)$ census offset holds beyond the old family cap (off distribution $\{0:1, 1:10, 2:2, 3:1, 4:1\}$, max +4); margin law $\alpha \approx 3.05$ vs S , FLATTENING (curvature -1.60 , the honest anti-extrapolation flag), driver = the cancellation sharpening $c_w \rightarrow 1$; HARMLESS quantified: the margin falls SLOWER than the local eigenvalue loading speed; q_N reconciled (r258 FLAT reproduced — two different objects); extrap-calibrated 15/15. (C) THE r288 CARRIER MAP: the destructive coherence is carried by the ANTIPHASE NEXT-NEAREST (3–4 fold) ARCH–ARCH pairs ($X_v = -0.0517$, $z_v = -3.149$, $C_{\text{off}} = -0.1046$; band 1–2 87 % positive/in phase) with TOTAL control reversal (all four controls constructive at their own crossing); the chain zeros CO-MOVE with the atoms (turn rate 0.24 = static prediction 0.23) yet z_v flips already at dose 0.005: FINEST ALIGNMENTS far below the median phase resolution; honest negatives sampling-blind + source-separator-not-found + different-objects. (D) THE r289 metric-only ADJUDICATION (THE central refutation of the diophantine reading): the RATIONAL TWIN — every tent center $\log n$ replaced by a rational $p/q \times \Delta$ (denominators ≤ 56801 , position cost $\leq 2.1 \times 10^{-9}$), destroying EVERY exact log-linear-form relation — KEEPS THE FULL SIGNATURE IDENTICAL (min $C = 184$, crossing 185, $z_v = -3.149$, mp-confirmed at the 1.7×10^{-4} margin): the effect of the diophantine structure is NULL; the shuffle twins die purely metrically ($\theta_{\text{eff}} = 0.12$, ~ 40 – $120\times$ beyond the measured coherence threshold $10^{-3}..3 \times 10^{-3}$ of the local gap); the only sub-gap entry point: the TENT-SPLIT FRACTIONS (completeness identity 4.2×10^{-14}); the Baker need documented $\sim 7900\times$ too weak AND unnecessary — the firewall reads the fraction profile metrically, not its arithmetic: the why-MAIN search continues in PROFILE space (the precise open front: which functional of the fraction profile forces the destructive coherence). LEDGER: NEW PRIME.LSTAR.COHERENCE_CENSUS.01 [E]

(fine types Identity/Formal + Numerical/Measurement; honest negatives explicit: sampling-blind, source-separator-not-found, diophantine-excluded(metric-only) with the rational twin verbatim); NEW PRIME.PORT.L2.VDC_LEMMA.01 [O] — the vdC form as a provable chain statement (the remaining input: the chain origin of the P -variance scaling; kz15 exact-finite per r270); CONTRACT UPDATES: PRIME.LSTAR.SUBORDINATION.01 [O] carried at the wave-7 state (margin decay resolved harmless on 57/57 anchors, carrier class named, diophantine excluded — the open front is the profile functional; r290 profile_functional_probe.py in flight, NOT consumed), PRIME.PORT.COUPLEDTAU.TERMINAL_CROSSRATIO.01 [O] records the vdC candidate for the H5/L2 front. LEAN (rh/lean): NO new statements needed — the hole stays lstar_subordination (docstring refreshed to the wave-7 state); README census updated. Papers: the coherence-arc diary section in tfpt_prime_front, the wave-7 blocks in tfpt_research_contracts, the L^* section of rh/paper/rh_program.tex extended by the coherence/twin findings with the metric-only twin table and the L2 section by the vdC theorem; rh/problem/lstar_problem.tex gains a short “What is known (update)” paragraph (margin law + 57 anchors + the rational-twin fact: the problem is NOT diophantine) + recompiled PDF; rh/README.md wave-7 block; rh/INVENTORY.json + make_inventory.py extended additively (v964 pin + the r289 sync repair — the helper now tracks the INVENTORY head); run_rh.py MODULES $\rightarrow$ v955–v964. Mincut base 4 / refined 5 UNCHANGED (a census-plus-adjudication set moves no edge); the full-suite run_all.py pass, the final bash build.sh audit and the manifest regeneration follow as the joint exit gate run by the coordinator; the parallel r290 profile-functional worker is NOT consumed; NO RH claim anywhere in either direction)

2026-08-25 (CXXIII) (consolidation wave 6 — the L^* reduction dictionary: the certified content of discovery rounds 282–285 plus the L^* standalone problem graduates from the experiments tree into the load-bearing suite as v963_lstar_reduction_dictionary.py (suite 955 $\rightarrow$ 956, ledger 1118 $\rightarrow$ 1120; wave-4 embedding convention: the four discovery probes embedded BYTE-EXACT and executed verbatim in their sealed -smoke stage with the printed SPEC SHA-256 hashes pinned and gated — representation_contest 30/30 SPEC 0f9954b8f9727800, fullsource_quasidefiniteness 26/26 SPEC 4cf5ea53ffa61ee7, lstar_two_measure 30/30 SPEC 687112a83a767c81, christoffel_decomposition 33/33 SPEC 9781e6d60aa5660a; full records sealed experiments-side, re-verified by rh/verification/run_rh.py; plus the module-own exact section S0 — Hankel determinants, monic OP chains, frame congruence minors, full Cauchy–Binet gauge exhaustion, dual chains in pure Fractions with two declared float eigen cross-checks; single-module test green 19/19 gates in 1.0 s, deterministic on re-run): **THE FREE-WINDOW QUESTION GETS ITS CANONICAL FORM. (A) THE r283 A2 CHAIN as exact gates: the mu-frame congruence** $\text{minor}_k(D_\mu - G) = D_k(\tilde{\mu})$ **at every $k \leq S_+$ (one-nu-atom truncation must-fail LOUD); the frame contraction $h_0..h_{m-1} > 0 \iff \lambda_{\max}(E_m) < 1$ with E the ν -dressed μ -CD kernel (both truth values); the crossing dictionary $\lambda_{\max}$ crosses 1 EXACTLY at $\min C + 1$ (capacity-ceiling typed where $\min C = S_+$); the pigeonhole ceiling $\min C \leq S_+$ re-proved in the frame (null-polynomial witness, exact on all five toys); capacity-as-counting REFUTED by the rank-one pair (same rank, same support, opposite fate; the deciding values are METRIC, 1.25×10^{-13} vs 1.25×10^2) $\Rightarrow L^*$ IS THE CANONICAL REDUCTION: for every real polynomial p with $\deg p < N_w$, $\int p^2 d\nu < \int p^2 d\mu$ (equivalently $\lambda_{\max}(E_{N_w}) < 1$) —**

a two-measure moment problem instead of a determinant cascade. (B) THE r285 DECOMPOSITION BOOKKEEPING exact: the Christoffel sandwich $\max_k v_k K_n(y_k) \leq \lambda_{\max} \leq \text{trace}$ with its rational consequences at every degree; the multiplicative decomposition $\lambda_{\max} = \text{maxdiag} \times (1 + \text{assist})$ with the budget equivalence sign-exact. (C) THE r282 FOUR-LANGUAGE ELIMINATION as named negative gates (contest-all-dead; the common deep reason made explicit: *every classical positivity language forces positivity exactly for the positive measure class* — MAIN is signed): SOS exists IFF the negative register is empty (the fake SOS misses h_2 by exactly $N_2 = 48360721965/70120631072$); the Kasteleyn orientation class is EXACTLY $\{\pm \text{sign } w\}$ by full 2^S exhaustion and is value-preserving IFF $S_- = 0$ (defect = $2 \times \text{negmass}$ exact: $55/36, 44/35, 114/35, 0$); Hamiltonian-PSD = $h > 0$ bookkeeping; the dual-pair sync holds PER THEOREM ($h_n h_{S-1-n}^\# = 1$ exact, wrong dual loud at 1.4×10^2). (D) TYPED MEASUREMENTS (record pins): the r284 one-atom-vs-collective dichotomy (w9 $n_{\text{DIAG}} = 187$ vs crossing 185 — MAIN rides the single-atom Christoffel edge to the last free degree, all four controls die collectively; extremal anatomy PR 1.89 on two shallow- u ARCH atoms below the first prime, smallp-depleted, one-band; shielding-blind; Nyquist refuted at the discriminant), the r285 legs ((D) SEPARATES at window scale — controls' $n_{\text{DIAG}} 50.91 \ll 184$; SUB-classical edge growth $p = 0.38$, classical coverage $0/42$: any (D) proof must be a DISCRETE bound; MAIN's wall assist the extreme ensemble low-outlier pct 0.00; and the first two positively MAIN-separating detectors of the program: assist-at-crossing 0.0195 vs dead $1.69..2.99$, random-sign $z = -3.15$ destructive vs dead $+4.95..+12.44$ all constructive), and the honest DCXX margin-decay finding ($42/42$ ladder margins positive, family minimum 1.4175×10^{-7} at anchor $z = 233$, $S = 1717$, vs the flagship 1.68×10^{-4} at $z = 16$ — ~ 3 orders of decay; the r286 margin-scaling round `lstar_margin_scaling_probe.py` is IN FLIGHT and NOT consumed). LEDGER: NEW PRIME.LSTAR.REDUCTION_DICTIONARY.01 [E] (fine types Identity + Numerical/Measurement, honest negatives explicit); NEW PRIME.LSTAR.SUBORDINATION.01 [O] — the L^* contract itself (the canonical form verbatim: $\int p^2 d\nu_z < \int p^2 d\mu_z$ for $\deg p < N_w$ on the admissible anchor family; state $42/42$ + the open margin decay; the (D)+(C) anatomy; the standalone document `rh/problem/lstar_problem.tex` as external reference; kill lists inherited); CONTRACT UPDATES: FULLSOURCE.QUASIDEFINITENESS.01 consumed (round 283, mechanism-partial(A2), L^* established), REPRESENTATION.CONTEST.01 consumed (round 282, contest-all-dead); the BASEFIBER north star now carries the canonical L^* form. LEAN (rh/lean, build green): NEW `lstar_subordination` on `VonMangoldtWindow` (documented sorry, the canonical-form target) PLUS the *proved* direction `lstar_implies_free_window` ($L^* \Rightarrow$ free-window positivity, finite algebra against the r283 chain). Papers: the L^* -arc diary section in `tfpt_prime_front`, the wave-6 blocks in `tfpt_research_contracts`, the new “The L^* reduction” section in `rh/paper/rh_program.tex` (canonical form as a theorem environment with certification box, the (D)/(C) split, the four-language elimination table, the margin decay stated neutrally, the pointer to `rh/problem/`); `rh/README.md` reduction chain (L^* as the canonical stage); `rh/INVENTORY.json` + `make_inventory.py` extended additively (v963 pin + r285 sync repair); `run_rh.py` MODULES $\rightarrow$ v955–v963. Mincut base 4 / refined 5 UNCHANGED (a reduction-plus-elimination set moves no edge); the full-suite `run_all.py` pass, the final bash `build.sh` audit and the manifest regeneration follow as the joint wave-4/5/6 exit gate run by the coordinator; the parallel r286 and L2-cancellation workers are NOT consumed; NO RH claim anywhere in

either direction)

2026-08-25 (CXXII) (consolidation wave 5 — the half-filling pinning theory: the certified content of discovery rounds 279–281 graduates from the experiments tree into the load-bearing suite as v962_halffilling_pinning_theory.py (suite 954 $\rightarrow$ 955, ledger 1115 $\rightarrow$ 1118; wave-4 embedding convention: the three discovery probes embedded BYTE-EXACT and executed verbatim in their sealed -smoke stage with the printed SPEC SHA-256 hashes pinned and gated — oriented_theorem 32/32 SPEC 9107709b4f4a65d1, budget_localization 29/29 SPEC 7abf7a208bb45e43, halffilling_pinning 28/28 SPEC a00815722a93a3cb; full records sealed experiments-side, re-verified by rh/verification/run_rh.py; plus the module-own exact section S0 in pure Fractions — Stieltjes chains, Sturm chains, Vandermonde solves, node polynomials, no floats; single-module test green 13/13 gates in 1.4 s, deterministic on re-run): the reviewer demand “freeze rounds 279–281 as a SMALL MATHEMATICAL THEORY, not just as experiments” is executed — FOUR NAMED THEOREMS as gates: (T1) THE MOMENT COUNTING THEOREM (r281, Identity): the pivot h_n consumes $m_0..m_{2n}$, the S free moments are $m_0..m_{S-1}$, hence the FREE pivots are exactly $h_0..h_{N_w-1}$ and h_{N_w} is the first forced one — half-filling IS the end of the free moment space, arithmetic-exact for ALL $S = 2..2000$ plus the exact-rational freedom demonstration ($dm = e_{S-1}$ moves h_{N_w-1} alone; wrong- L must-fail loud): the reviewer question “why half-filling” is answered by counting; (T2) THE CROSSING BUDGET THEOREM (r279, Identity): $\#(h_n < 0, n < S) = S_-$ EXACTLY (Jacobi minor-sign rule + Sylvester congruence), WORLD-BLIND — five frozen signed measures exact, real-side w9 104 / w13 98 / controls 141/94/6 / kz15 121 / kz52 551; (T3) THE TWO-SIDED PARITY THEOREM (r279, Identity): $\text{sign } Q_n(x_j) = e_j(-1)^{S-1-j}\text{sign}(h_n)$ at every node and degree, union occupancy ODD in every weight-agreement gap and EVEN in every disagreement gap — h -blind, with the census bilanz $c_n + c_{S-1-n}^\# = (S-1) - |D| + 2\text{scD}(n)$ exact at every degree and by exhaustion over all 87376 sign-vector pairs $k = 2..8$; (T4) THE MAIN WINDOW REDUCTION: given T1 + T2 the ENTIRE open statement of the wall is $\min C \geq N_w$, EXACTLY equivalent to $(\forall n < N_w : h_n > 0)$ — one placement question, the north star in reinstform: WHY IS THE SIGNED PRIME MOMENT FORM QUASI-DEFINITE UP TO THE MAXIMALLY FREE ORDER? FOUR NAMED REFUTATIONS as negative gates (the negative information is load-bearing): no-universal-o1-pinning (r281 exact: the one-negative toy has offset $N_w - 2$, unbounded in S ; only provable ceiling: pigeonhole $\min C \leq S - S_-$; $C \leq 5$ is a 42-rung MEASUREMENT), no-extremality (r280 measured + exact witness: three mp-confirmed directions push the w9 crossing 184 $\rightarrow$ 185 past half-filling; the 4-atom one-negative measure has $\min C = N_w + 1$ exactly), no-generic-maslov-obstruction (r279 exact: 3 rational counterexamples — the two-sided machinery provably carries no arithmetic), no-simple-offset-law (r281 measured: six sealed source-pure candidates, $\max |\text{sp}| = 0.273 \ll 0.75$, all world-blind). LEDGER: NEW PRIME.WALL.HALFFILLING_PINNING_THEORY.01 [E] (the theorem set + refutations, fine types Identity + Numerical/Measurement); PRIME.PORT.RHP.MIDPOINT.ORIENTED_THEOREM.01 [O] updated (rounds 279–281 consumed: theorem share promoted, obstruction candidate refuted, the center precisified to the budget localization); FULLSOURCE.BASEFIBER.01 and METRIC_FIREWALL.01 carry the reformulated north star; NEW open contracts PRIME.PORT.REPRESENTATION.CONTEST.01 [O] and PRIME.PORT.RHP.FULLSOURCE.QUASIDEFINITENESS.01 [O] (the two rounds in flight at this cut, NOT consumed, with the reviewer forbid-

den lists). LEAN (rh/lean, build green, $6 \rightarrow 8$ intentional sorry): the fog-free central hole free_window_positivity ($\forall n < \text{cap} : 0 < h_n$ on MainWindow; via T4 the base half of the master theorem — master_implies_free_window PROVED); T1 PROVED for real (moment_counting_free_pivots + first_forced_pivot, pure arithmetic); T4 PROVED (main_window_reduction); T2 stated (crossing_budget, sorry with v962 reference); Counterexamples.lean extended by the wave-5 guard upper_pinning_not_universal — the EXACT one-negative instance with machine-checked Hankel minors (incl. the negative $\det H_4 = -1962/13625$), a genuine moment computation, not a bookkeeping model — plus the proved arithmetic escape o1_pinning_escape. Papers: the pinning-decomposition diary paragraph in tfpt_prime_front, the north-star reformulation in tfpt_research_contracts, the small-theory subsection + north star in rh/paper/rh_program.tex, the finalized reduction chain in rh/README.md; rh/INVENTORY.json extended additively (v962 pin + Lean state). Mincut base 4 / refined 5 UNCHANGED (a theorem-plus-refutation set moves no edge); the full-suite run_all.py pass, the final bash build.sh audit and the manifest regeneration follow as the joint wave-4/5 exit gate run by the coordinator; NO RH claim anywhere in either direction)

2026-08-25 (CXXI) (consolidation wave 4 — the terminal-surface closure and the midpoint-orientation dictionary: the certified content of discovery rounds 260–278 graduates from the experiments tree into the load-bearing suite as v960_terminal_surface_closure.py and v961_midpoint_orientation_dictionary.py (suite 952 $\rightarrow$ 954, ledger +4; WAVE-4 EMBEDDING CONVENTION: all fourteen discovery probes embedded BYTE-EXACT and executed verbatim in their sealed -smoke stage — deterministic, seconds each — with the printed SPEC SHA-256 hashes pinned and gated and the byte-equality wards live; the full-mode records stay sealed experiments-side and are re-verified by rh/verification/run_rh.py; v960 from ten probes, first-pass full records 31/31 + 26/26 + 26/26 + 28/28 + 29/29 + 29/29 + 28/28 + 28/28 + 24/24 + 24/24: terminal_crossratio SPEC 36eee7b40bd897a8, terminal_triangle SPEC db32d31f2e543a9c, cancellation_adjudication SPEC 151a9176f089dd5b, drive_local_asymptotics SPEC 0c4df40812b9b76b, phase_bulk_bound SPEC f5578bb91f84ac2a, kz15_boss SPEC 8834a1c259bdb605, universal_pair_theorem SPEC 66f61c8a436af90e, l2_scaling_anatomy SPEC 3fb76b65848814f8, euler_mechanism SPEC 8cb1804e71dd87bb, kyp_memory SPEC 88ebdb00867469fd; v961 from four probes, 32/32 + 25/25 + 29/29 + 31/31: wronskian_dictionary SPEC 56e8a03efd1690e4, minimal_firewall SPEC ed17d79fc037ab1a, maslov_census SPEC 3858fd16bde0c9c0, metric_stability SPEC 7031200f008d34d1; plus module-own exact sections S0 — v960: the two-branch reduction with the non-certifiable witness, the driven-recursion C1b triangle, the pair decomposition with the structural alternation gain, the interval-certificate logic with its width ward, the KYP double obstruction o1/o2; v961: the base Casoratian identity $p_n q_{n+1} - p_{n+1} q_n = h_n$ with $c' = 1$ symbolic in z , the bordered-Wronskian telescope, the Hellmann–Feynman position gradient in exact dual-number arithmetic, the Jacobi interlacing/reality direction with the flipped-beta must-fail; single-module promotion tests green: v960 15/15 gates 8.6 s, v961 8/8 gates 2.4 s, both timing-normalized deterministic on re-run): (1) THE MILESTONE — THE 42-RUNG SURFACE CENSUS $q_N < 1$ IS CERTIFIED ON ALL 42 RUNGS as a finite fact: 41 mechanism-certified target-blind (35 cheap via the r260/r263 two-branch theorem, exception set exactly $\{kz15, kz20, kz22, kz36, kz38, kz39, kz52\}$, both mains close WITHOUT cancellation; kz20/22/36/38/39/52 via the sealed

phase bounds r268–r270, no detector fires) + kz15 EXACT-FINITE via the r270 interval certificate (outward-rounded intervals, dps 640, end width 1.5×10^{-92} , margin +0.02680, the dps-halving ward destroys it as demanded; EncLOK class, no mechanism) — a census-plus-certificate result, NOT a cofinal theorem: the window quantifier stays; (2) THE UNIVERSAL PAIR THEOREM (r271): H1–H4 structural/source-side, Lean-proved in rh/lean/RH/PairBound.lean; H5 = the margin $|Z_{\text{local}}| + \varepsilon < \sqrt{5/7}$ is the SINGLE window-dependent hypothesis — the cofinal front, precisely typed by r272 (bound-coarseness: the truth margin RISES with N ; flip condition $\delta' > 0.21$ of available 0.45, address c3) and r273 (perturbation-insensitive + the firewall map: THE WALL, not the cancellation rate, is what is arithmetically special about MAIN); (3) THE MIDPOINT-ORIENTATION DICTIONARY (r274): base Casoratian = the pivot chain itself, the h -free midpoint form IS the node polynomial (the r231 sign-blindness as an identity), the augmented telescope $D_{n+1} = B - W_n^{\text{aug}}/W_n^{\text{base}}$ exact; and THE MASLOV CENSUS GO (r277): rule R2 = Jacobi interlacing/reality passes blind 42/42 with controls firing EXACTLY at flip+1, one-way, not h -equivalent — while the raw atom-Sturm census is honestly REFUTED as the winding quantity (MAIN breaks $c_n \equiv n$ at 56/48 at positive h ; sturm-chain-verified not awarded); (4) HONEST NEGATIVES kept load-bearing: the eventual-triangle no-go (kz52 itself an exception), three identity routes dead with break loci, the retracted w13 Gram provenance, the KYP memory no-go FROM STRUCTURE (o1 fiber forcing + o2 descent window, exact-rational on 46/46 worlds; the admissible Riccati memory target-inverse, sp +1.00), the metric-firewall continuum with the perturbative-only stability law (exact Hellmann–Feynman gradients, u-profile predictive — the small primes 2, 3, 5 carry). NEW LEDGER ROWS: PRIME.PORT.COUPLEDTAU.SURFACE_CLOSURE.01 [E] and PRIME.PORT.RHP.MIDPOINT.ORIENTATION_DICTIONARY.01 [E] (fine types Identity/Formal + Numerical/Measurement, honest negatives explicit) plus the two successor contracts PRIME.PORT.RHP.MIDPOINT.ORIENTED_THEOREM.01 [O] (the contraposition form: an independent index obstruction forbidding the R2 break before half-filling on MAIN; round 279 oriented_theorem_probe.py in flight, NOT consumed) and PRIME.PORT.WALL.METRIC_FIREWALL.01 [O] (the global metric-firewall lemma; certified state perturbative-only); CONTRACT UPDATES: TERMINAL_CROSSRATIO.01 [O] progressed (surface certified; cofinal front = H5 / lemma L2), PREFIX_RESUMMATION.01 [O] progressed (r261 finite-combinatorial half closed negative; the named path = the oriented midpoint theorem), FULLSOURCE.BASEFIBER.01 [O] carries the formalized master target form augmented_prefix_positive (rh/lean/RH/Window.lean; per r276/r278 the MainWindow predicate must encode METRIC exactness). RH-WORKSPACE PIPELINE INTEGRATION (the documented DXCIX TODO): bash build.sh audit now runs rh/verification/run_rh.py -fast as its own “RH workspace” section (must end RH SUITE: ALL CHECKS PASSED; verified 32/32 items, 52/52 pinned entries byte-identical after the wave-4 INVENTORY extension); run_rh.py MODULES extended to the six RH modules v955/v956/v958/v959/v960/v961; rh/INVENTORY.json +2 pinned module entries + fourteen consumption notes; rh/paper/rh_program.tex updated (the surface-closure and orientation sections, the extended no-go catalog, the wave-4 edge states) and rebuilt; rh/README.md status updated. Papers: the new surface-closure/orientation-arc diary subsection in tfpt_prime_front (stale “rounds 260/261 in flight” wording retired), the updated BASEFIBER/terminal-edge blocks + the new wave-4 theorem-set/contract

block in `tfpt_research_contracts`. Mincut base 4 / refined 5 UNCHANGED (a surface census + certificate set moves no edge); the full-suite `run_all.py` pass, the final bash `build.sh` audit and the manifest regeneration follow as the wave-4 exit gate run by the coordinator; NO RH claim anywhere in either direction)

2026-08-25 (CXX) (the coupled-tau-terminal promotion and the CCC D4 execution record — the certified theorem block of discovery rounds 256–259 graduates from the experiments tree into the load-bearing suite as `v959_coupledtau_terminal_dictionary.py` (suite 951 $\rightarrow$ 952, ledger +3; four discovery probes re-run GREEN AS TYPED at promotion and embedded BYTE-EXACT with their printed SPEC SHA-256 hashes pinned and gated: `baseborder_factorial_probe.py` 21/21 SPEC `c7aa9f46889414c4`, `coupledtau_probe.py` 26/26 SPEC `73d8247f6de36a2b`, `budget_anatomy_probe.py` 27/27 SPEC `28026ae6b0750098`, `parametrix_pass_probe.py` 19/19 SPEC `e79da4f43d63213a`; plus a module-own exact section S0 — the recursion-to-Riccati implication, the bilinear tau form derived algebraically and gated, the terminal consequence gate in both truth values, the corner-ray t^* normal form, and the positive-prefix PSD theorem $\det H_p = \prod h_i$ with an exact Schur-complement must-fail; single-module run 9/9 gates, 188 s): (1) THE POSITIVE-PREFIX FIREWALL + THE 2×2 CAUSAL CENSUS (r256, effects-mixed-coupledtau): MAIN carries the positive prefix through its entire window ($p_{\max} = 184 = N$, zero negative modes — the *only* positive-prefix world) while the controls type indefinite-continuation at 21/25/27; every prefix kernel numerically PSD (worst 5.7×10^{-16}); on the causally clean shared prefix $n^* = 21$ the base rotation is null (-1.5×10^{-6}) and the border carries the prefix gap (-0.1759); TWO CONTAMINATION DOWNGRADES ON RECORD: the round-254 scramble-compactness headline is base contamination ($f_{\text{neg}} = 0.9311$, the $h < 0$ mode space at $734 \times$ excess) and the r253/r254 Epstein fiber anomaly lives entirely in the indefinite continuation degrees $k \geq 25$ — neither may be cited as a border/fiber discriminator any more; (2) THE COUPLED-TAU RECURSION IN BOTH FORMS (r257): $\tau_{n+1} = a_n \tau_n$, $\tau_{n+1}^{\text{aug}} = a_n \tau_n^{\text{aug}} + b_n \tau_n$ with $a_n = c_n^2 h_n$, $b_n = -(c_n F_n)^2$, equivalently the Riccati drain $D_{n+1} = D_n - F_n^2 / h_n$ (anchor $D_N = 5/7 - \rho_{N-1}$ rel 4.8×10^{-11} , mp dps 220 through the scramble flip) AND the bilinear tau form $\tau_n^{\text{aug}} \tau_{n+1} - \tau_{n+1}^{\text{aug}} \tau_n = (c_n F_n)^2 \tau_n^2$ (a manifest square — the drain increment is a positive tau cross-ratio); the base alone carries the sign, the border only nonnegative magnitude; the cocycle breaks exactly at the control flips 21/25/27; THE FROZEN MICRO-FALSIFIER PASSED BLIND for the first time, at the coefficient-field level (control flips 3/3 AND forced tail 0/2/2/3/1 on all five windows; the parametrix half stays open); (3) THE BUDGET TELESCOPE (r258): $D_N = B - S_{N-1}$ exact (12 windows incl. $N = 878$, mp dps 220 at 2.4×10^{-16}), $B = S_{N-2} + 5/7$ by construction with the 5/7 typed floor-imported (the inverted r241 floor of the measured $\min h_{N-1} / F_{N-1}^2 = 1.4278$; source-pure derivation open = the named terminal task); the consequence gate exact: $\text{margin} > 0 \iff q_N = \rho_{N-1} / (5/7) < 1$ — the entire fiber positivity is ONE terminal inequality; typed numerical: the q census (42/42, flat, min margin 0.0139), the F - h covariance +1.000 (a measured structural fact, NOT a law — the driver is the quotient itself); and (4) THE THREE HONEST NEGATIVES (r259, parametrix-failed): level crossing refuted (branches cross 5–16 degrees too early; MAIN w9 crosses 45 times with zero true flips), the one-swap no-go (fully overlapping gap distributions — round 255's orientation-lowdim(1) REVISED on record: the missing information is not one-dimensional), the mass-majorant no-go (all three sealed majorants

0/42, median $\times 490$, break at $0.97N$); the named obstacle: a RESUMMATION gap, not a selection gap. NEW LEDGER ROWS: PRIME.PORT.RHP.COUPLEDTAU.TERMINAL.01 [E] (fine types Identity/Formal + Numerical, honest negatives explicit) and the two terminal-edge successor contracts PRIME.PORT.COUPLEDTAU.TERMINAL_CROSSRATIO.01 [O] (the last fiber edge = a positive tau cross-ratio: prove $h_{N-1}/F_{N-1}^2 > 7/5$ on the cofinal ladder; reviewer proof-form requirements and kill list frozen — the bound must bind the ratio; the mass-majorant class stop-listed) and PRIME.PORT.FULLSOURCE.PREFIX_RESUMMATION.01 [O] (the last base edge = a globally oriented prefix resummation: the determinant as a signed partition sum, completing the coefficient-field pass to a parametrix-level pass; level crossing and k -swap truncations stop-listed); PRIME.PORT.RHP.FULLSOURCE.BASEFIBER.01 [O] carried forward at the post-round-259 state with the r256 causal decision (base/fiber separation artificial) and the precise localization recorded — mincut base 4 / refined 5 UNCHANGED, rounds 260/261 in flight on the successor contracts and NOT consumed. AND THE CCC D4 EXECUTION RECORD: the ledger row CCC.SEAM.CROSSOVER.01 [O] is updated — demand D4 (the preregistered disc search experiments/ccc-crossover-disc) EXECUTED 2026-08-24 with a ROBUST NULL on the Planck PR3 SMICA map (first data contact; freeze intact 3/3, frozen-kernel guards 5/5 before data contact; map SHA-256 pinned, 2013312960 bytes; seed 20260824, reruns bit-identical): $p_{\text{global}} = 0.673$, $p_{\text{counts}} = 0.446$, $\text{BH-}q_{\text{min}} = 0.673$ vs the frozen $q < 0.01$ threshold; 171 candidates with no sign excess (83/88); injection recovery 100% at $200 \mu\text{K}$ — a well-powered, real null; kill criteria K1–K6 all NA, replication legs not required for a null; NO type change, the contract stays [O] via D1–D3, the cyclic reading stays [C], the compiler core untouched (the kernel was output of the [E] kinematics, not input); results machine-readable in results.json. Papers: the new coupled-tau-terminal-arc diary section in tfpt_prime_front, the updated FULLSOURCE.BASEFIBER block + the new theorem-set/terminal-edge block and the D4 execution record in tfpt_research_contracts. The single-module promotion test is green (9/9 gates, probes byte-exact vs the experiments tree); the full-suite run_all.py pass, bash build.sh audit and the manifest regeneration follow as the wave-3 exit gate of the same consolidation. No omega closed, no marker moved beyond the one [E] and two [O] registrations and the recorded D4 execution; NO RH claim anywhere; NO claim about CCC in either direction)

2026-08-24 (CXIX) (the bordered-RHP-dictionary promotion — the certified theorem block of the RHP campaign rounds 244–253 graduates from the experiments tree into the load-bearing suite as v958_bordered_tau_readout_dictionary.py (suite 950 $\rightarrow$ 951, ledger +2; six discovery probes re-run GREEN AS TYPED at promotion and embedded BYTE-EXACT with their printed SPEC SHA-256 hashes pinned and gated in the module: bordered_hankel_probe.py 23/23, bordered_finite_rank_probe.py 29/29, border_centering_probe.py 24/24, targetreadout_error_probe.py 20/20, base_gauge_constant_probe.py 22/22, schlesinger_pairing_probe.py 26/26; plus a module-own exact-rational PSD base theorem with a frozen signed must-fail witness): (1) the bordered Hankel end-object (bordered PSD = wall + budget) has an *exact* Riemann–Hilbert dictionary — the Uvarov border column carries F_n as its z^{-1} coefficient, and the budget is a CD-kernel functional of the terminal Y_n data alone, $S_{n-1} = \iint K_n d\sigma d\sigma$; (2) the border is a *Schlesinger rank-1 insertion* over a canonical 2×2 RHP with a one-dimensional budget cocycle ($\det Y_3 = -h_{n-2}F_{n-1}$ newly derived;

IICS generator rank exactly 2; the irreducible- 3×3 steepest-descent campaign dropped without replacement); (3) the centering congruence with $c = F_0/h_0$ eliminates the geometric rank-1 head algebraically, the σ° dictionary and dual-norm identity $Q_m = t^T H^{-1} t$ are exact, and the extensive tail compresses to ONE terminal CD readout ($T = \iint [K_N - K_8] d\sigma^\circ d\sigma^\circ$, dps-160 exact through the full depth $N = 184$, rel 3.3×10^{-160}); (4) the three error-evaluation formulas are exact ($\delta h_n = (R_1)_{12}$; the central rest identity; the error-kernel sandwich at 1.1×10^{-81}); (5) R_1 is a contour integral ($\frac{1}{2\pi i} \oint (R(z) - I) dz$, verified at 3.2×10^{-14}) and the global-gauge thesis is refuted on all three prongs (the base is blocked by a *drifting, orientation-relevant* layer, not a constant); (6) the fiber target is the exact augmented tau quotient $D = B^\circ - Q_7 - T = \tau^{\text{aug}}/\tau$ at full depth (three routes at 10^{-11} , mp 10^{-16}), with the pole layers classified — rank-1 border poles removable by residue closure, the D -layer essentially singular ($\exp(c/(z - s))$ type). The campaign contract PRIME.PORT.RHP.FULLSOURCE.BASEFIBER.01 [O] is registered with the post-round-255 measured state (the measurement rounds 250/254/255 stay experiments-side, typed MEASUREMENTS: outer-model-fails, offdiag-extensive with the compactness inversion — SCRAMBLE collapses to 2 eigendirections, MAIN needs 28–30 — and orientation-lowdim(1): the base flip is a one-bit $O(0.2 \text{ dec})$ selection event of an extensively accumulated quantity); the theorem set is registered as PRIME.PORT.RHP.BORDERED.READOUT.01 [E]. Mincut base 4 / refined 5 unchanged; no other marker moves; NO RH claim in either direction. Round 256 (baseborder_factorial_probe.py) was still in flight at this promotion cut and is not consumed. Papers: the prime-front bordered-dictionary arc subsection and the research-contracts blocks added.)

2026-08-24 (CXVII) (the integrable-dictionary-arc promotion — the seven durable certified theorem sets of discovery rounds 224–226 and 228–231 graduate from the experiments tree into the load-bearing verification suite as TWO modules (suite $947 \rightarrow 949$, ledger $1099 \rightarrow 1104$); every source probe RE-RUN GREEN AS TYPED at promotion and embedded BYTE-EXACT with its printed SPEC SHA pinned and gated (all seven at 100% first pass, deterministic records, sealed specs; rounds 199–223 stay experiments-side as adjudication/classification rounds, and round 227, the Fermi-edge classification, stays experiments-side by design with its builders embedded as a read-only library): MODULE ONE, v955_tau_iiks_toda_dictionary.py (4/4 pattern gates, ~ 3 s; probes tau_symbolic_probe.py r224 note DL, 18/18, SPEC fb04cd7ce9fb306b; lax_conditioned_probe.py r225 note DLI, 15/15, SPEC 93fd9759db7e7b3c; hirota_sign_probe.py r226 note DLII, 17/17, SPEC d78e236bf633de7b; the v881 library port_integrable_kernel_probe.py embedded read-only): THE FINITE INTEGRABLE DICTIONARY OF THE WALL — (1) THE TAU IDENTIFICATION EXECUTED (TAU-IKS-EXACT): the wall determinant IS the exact IKS Fredholm tau function at the finite-identity level on all five heavy rungs — Sylvester as a FULL characteristic identity $\det(I - sQ_{\text{state}}) = \det(I - sE_{\text{node}})$ on the whole s -grid, the s -DRESSED Schur family $\det(I - sE) = \det(I - sR) \det(I - sD_P(s))$ EXACT with the fixed-kernel alias (gap 0.06–0.20 at $s = 0.5$) named and blocked, the confluent diagonal ($\leq 3.2 \times 10^{-13}$ — the contract's declared death spot dissolves), the IKS dressing identity ($\leq 7.9 \times 10^{-13}$) with the dressed port generators SOURCE-EXPLICIT IN CLOSED FORM (the G31 surprise, $\leq 1.5 \times 10^{-13}$), the Fredholm/JMU variational identity in TWO independent times ($\leq 1.4 \times 10^{-9}$), and the relative tau transfer exact over $-212.84/-195.50$ log-unit determinant collapses ($\leq 3.4 \times 10^{-12}$);

controls INVERTED per contract (Epstein/scramble SATISFY the algebra and differ in the VALUE $\text{sign } \tau(1) = -1$); (2) THE LAX DEGREE ADJUDICATED (LAX1-H-EXACT): the word “2” was a hypothesis — the true minimal degree in the closing direction is ONE and the closing direction is h , not s (rank-1 h -step at 2.9×10^{-16} , explicit rank-2 relative displacement, blind next-generator prediction 3.4×10^{-16} and blind tau-step prediction 3.2×10^{-11} on the sealed rungs, zero curvature identically world-blind, mpmath wards dps 80/120; the s -time has NO fixed degree — basis-invariant ε_d plateau 0.34–0.60, CONDITIONING-ONLY — and across rungs NO common carrier: typed, not hidden); (3) THE SIGNED-TODA DICTIONARY (HIROTA-TODA-EXACT + WALL-EQUIVALENT): $\tau_{w,n} = D_n(\mu - \nu)/D_n(\mu)$ (Hankel-determinant QUOTIENT), $r_n = h_n(\mu - \nu)/h_n(\mu)$, the Hirota coefficient source-pure from a scaled SIGNED Stieltjes recursion (worst 1.7×10^{-11} .. 4.0×10^{-8} at full depths, dps-60/80 warded), and the sign adjudication: $\hat{\gamma}_n > 0$ for all $n \iff$ QUASI-DEFINITENESS of the signed defect measure $\mu - \nu \iff$ the wall, with the explicit SIGNED-TODA $X - Y$ structure — MAIN carries ALL 184 $r_n > 0$ (min +0.3666), the controls flip at $n = 25/21/27$; HIROTA-CONE-GO not reached (the expected base verdict, now a theorem); and MODULE TWO, v956_signedmoment_halffilling_duality.py (7/7 pattern gates, ~ 9 s; probes holedual_probe.py r228 note DLIV, 14/14, SPEC a823d4be3f0b1c06; pontryagin_maxpos_probe.py r229 note DLV, 17/17, SPEC b062906cb458da2a; jfraction_probe.py r230 note DLVI, 17/17, SPEC 124cda6f00caeeca; rhp_midpoint_probe.py r231 note DLVII, 13/13, SPEC 90d2c5a8926d820a; read-only libraries port_integrable_kernel_probe.py, hirota_sign_probe.py, fermiedge_classify_probe.py): THE HALF-FILLING GEOMETRY OF THE SIGNED MOMENT PROBLEM — (1) THE HALF-FILLING BOUNDARY (NOT-A-HOLE-EDGE + HALF-FILLING-BOUNDARY): $N_w = \lceil \#\text{supp}(\tilde{\mu})/2 \rceil$ EXACT on all five windows and past the cap the wall dies IMMEDIATELY (first r -flip at $N_w + 0/2/2/3/1$, $O(1)$ offsets, two independent paths + mp dps-40 ward) — $\mu - \nu$ is quasi-definite EXACTLY up to half-filling, THE WALL IS MAXIMAL; the complement identity and h -duality exact at dps 80 (1.3×10^{-78} synthetic / 6.6×10^{-56} real w9 subset); R-DUAL-OBSTRUCTED typed; (2) THE FREE MOMENT WINDOW LAW (SIGNATURE-EXPLANATION-REFUTED + FREE-MOMENT-WINDOW-LAW + MAIN-EXHAUSTS-FREE-MOMENT-WINDOW): both sharp signature predictions FAIL on every window ($n_{\text{flip}} = 184/153/170/367/592 \neq p = 263/211/237/503/816$); the corrected law — the largest Hankel window inside the S free moment parameters is $n = (S + 1)/2 = N_w$, MAIN survives THE ENTIRE FREE MOMENT WINDOW plus $O(1)$ forced-tail degrees while the controls die at 11–15% of it ($n = 25/21/27$); the inertia theorem exact in all parts (boundary inertia (184, 1, 0); mp dps-60 chain $\text{ind}_-(H_{263}) = 43 \leq q = 104$); the maximal Lagrange contractor exact on the toy (the equivalence $H_p > 0 \iff \|C\| < 1$ in BOTH truth values, 10^{-53} .. 10^{-62}) and ASTRONOMICALLY non-contractive at full degree ($\sigma_{\max}(C) = e^{110.5}$, MAXDEG-NOT-CONTRACTIVE); at window degree SAME-CONTRACTOR-EXACT ($\lambda_{\max}(Q_{N_w}) = 0.999832..0.999999 < 1$ — the v881 testing law closes the circle); (3) THE FOUR-PATH DICTIONARY (FREEPREFIX-EXACT-WALL-EQUIVALENT + FULL-CHAIN-REVERSAL-EXACT + NO-SOURCE-REVERSAL): moment prefix = Jacobi chain = Euclidean chain = value chain, one object in four exact source-pure paths ($m_k = h_0(J^k)_{00}$ exact in rationals; the r228 offsets ARE forced-coupling survival counts 0/2/2/3/1; the dps-300 Euclid prefix matches the real w9 value chain at 2.5×10^{-13} ; Epstein’s FIRST WRONG EUCLIDEAN PIVOT exactly at its flip $n = 25$); the dual

signed measure carries the MIRRORED Jacobi chain ($\alpha_m^\# = \alpha_{S-1-m}$ AND $\beta_m^\# = \beta_{S-m}$) but is NOT a builder transformation — half-filling is not the center of a self-dual chain; $\beta > 0$ stays the wall in EVERY coordinate; (4) THE MID-POINT CONNECTION THEOREM (MIDPOINT-CONNECTION-EXACT + SIGNED-STOKES-WALL-EQUIVALENT, derived by residue calculus BEFORE the run and frozen): the dual FIK problem is an EXPLICIT L -gauge transform of the original, $Y_{N-1+l}^\# = JY_{N-1-l+1}W$ with $W = \text{antidiag}(1/L, L)$, built from THE NODE POLYNOMIAL ALONE (exact in rationals; real w9 at 9.1×10^{-94} , dps 100); the gauge is h -FREE, so the wall's orientation sits EXCLUSIVELY in the h -chain the gauge does not see — the decisive Stokes multiplier is $c_w\beta_n$ with $c_w > 0$; honest negatives typed (NODE-LOG-POLE-REMOVER-ONLY; NO-SOURCE-CRITICAL-FILLING, t_c open; QUENCHED model supported at spread 0.44); THE MICRO FALSIFIER FROZEN: any future parametrix must blindly predict the forced tail 0/2/2/3/1 AND the control flips 25/21/27 from the same connection. THE CLAIM SPLITTING OF NOTES DLI/DLVII CARRIED TO THE LEDGER: new rows PRIME.PORT.TAU.FINITE.IIKS.01 [E] and PRIME.PORT.TAU.NOPOLE.COFINAL.01 [O] split out of the v883-registered umbrella PRIME.PORT.TAU.01 (which stays [O] for the fully symbolic arbitrary- h statement, its ledger prose updated to record the finite-identity execution — NO silent upgrade), and PRIME.FREEMOMENT.JFRACTION.01 [E] + PRIME.JACOBI.DUAL.REVERSAL.01 [E] split from PRIME.FREEMOMENT.POSITIVEPREFIX.01 [O] (the wall itself in free-moment coordinates; half-filling is the LOCATION, its positive reachability the result to be proven); every wall statement in both modules is typed WALL-EQUIVALENT and consumed nowhere; surfaces: two veri cards in `tfpt_3`, the new integrable-dictionary-arc diary section in `tfpt_prime_front` with the live suite-count parentheticals refreshed (947 $\rightarrow$ 949) and the TAU.01/LAX2.01 execution notes added at every [O] mention, the PRIME.PORT.TAU.FINITE.IIKS.01 / PRIME.PORT.TAU.NOPOLE.COFINAL.01 / freemoment contract blocks and the LAX2/HIROTA adjudication notes in `tfpt_research_contracts`, the endform article promotion section + counts, the email draft promotion paragraph, the website PROMOTED card + DAG chips + honesty-banner range v535–v956, README/Zenodo 949; FULL `run_all.py` ALL CHECKS PASSED at 949 modules; `bash build.sh audit` $\rightarrow$ AUDIT OK; manifests regenerated LAST. The mincut stays base 4 / refined 5; no omega closed, no marker moved beyond the four [E]/[O] registrations and the recorded execution notes; NO RH claim anywhere)

2026-08-22 (CXVI) (the Bughunt-X-arc promotion — the six durable certified theorem sets of discovery rounds 192 and 194–198 graduate from the experiments tree into the load-bearing verification suite (suite 941 $\rightarrow$ 947, ledger 1093 $\rightarrow$ 1099), after the tenth adversarial bughunt (round 199, note DXXIII, `bughunt10_probe.py` 30/30, SPEC 5551aa7b967230f1, 11 findings, 1 MAJOR, 0 verdict flips, AND THE X4 HEADLINE: every exact claim of the arc reproduced in fully own code — the ACF/pole/arch laws to $\leq 10^{-61}$, the Fejér cap re-proved by an independent single-node dual route, the classical LMN/Matveev/Kolountzakis–Révész/Siegel citations web-verified verbatim) covered the arc and its corrections of record (KA/KB/KC/KE applied as appended CORRECTION-OF-RECORD blocks, KD note-only per precedent, note DXXIV) were ADOPTED VERBATIM on every new surface (in particular KA MAJOR: the round-197 nonnegativity gate class is retyped GRID-MEASURED with the verbatim scope rider — the record gate was grid-only with a sign-blind bar at the three deepest rungs, THE

HEADLINE IS TRUE AND NOW STRONGER via Bughunt X's exact-rational Sturm chains at $h = 4, 5, 13, 20$; KB MINOR: SUBCONE-SHARP-AT-Q2 reads "exact attainment at RATIONAL lags only, near-attainment elsewhere" — the "f64 precision" wording is retired; KC: the "edge minimum IS the jr_0 ladder" identification is exact UN-NORMALIZED, the r197/r198 pair consistent; KE: the round-192 G11 symbolic leg was vacuous — the $e \mid 2fk$ law's machine content lives in the census gates; KD POSITIVE, note-only per precedent and recomputed in v951: the arch kernel IS the classical Weil archimedean kernel in the $L \rightarrow \infty$ limit); every source probe RE-RUN GREEN AS TYPED before the surface edits (logs kept as *.promo_rerun.log): MODULE ONE, v949_commensurability_mechanism.py (11/11, POSITIVITY-IRRELEVANT-EXACTNESS-KILL; probe commensurability_mechanism_probe.py r192 note DXIV, 28/28, SPEC dbc14014899fb286 verified invariant under the appended KE block, record 276 s, re-run green at promotion 317.0 s): THE EXACT NODE MECHANISM — the smooth world's whole $2a$ -periodic oscillation collapses AT THE NODES to Möbius data (closed forms recomputed in-run), the structural-zero census is the $e \mid 2fk$ law in exact integers ($h = 4$: 12/18, $h = 8$: 32/120), and THE FIRST BAKER-CLASS PRICING IN THE PROGRAM'S HISTORY is recomputed from the published constants (Liouville gap 3.79 dex, LMN 1995 gap 7.099×10^3 dex, Matveev 2000 gap 1.682×10^9 dex at the $h = 4$ minimizer; full ladders to 3.10×10^4 / 1.18×10^{10} dex: BAKER-TOO-WEAK); the dose is DIRECTION-BLIND (killed both ways at every dose rung + jitter, COMM-WALL-DEAD) and $L_f(t = 1)$ is PSD at all four dose rungs WORLD-BLIND: the margin consumes position EXACTNESS, not incommensurability magnitude — the sought source functional must consume the exact positions wholesale; MODULE TWO, v950_zero_channel_capacity.py (8/8, CHANNEL-CHARACTERIZED; probe zero_channel_capacity_probe.py r194 note DXVII, 28/28, SPEC fa49271201ba30fb, record 170 s, re-run green at promotion 209.6 s): THE SHANNON CHARACTERIZATION OF THE ZERO-COMB DICTIONARY — typed EXPLORATORY INSTRUMENT CHARACTERIZATION at discovery and promoted as exactly that (NO storage claim, NO arithmetic novelty): the capacity surface reaches error-free full ternary ($\log_2 3$) from $\varepsilon = 0.01$; RESLIM LOW = 0.001 / MID = 0.003 WITH THE BUGHUNT-X F6 QUANTIFICATION ADOPTED ($P = 0.0032$ under the 20000-trial null MC — marginal-but-nonnull single-reading, decisive with averaging $0.042 \rightarrow 0.257 \rightarrow 0.938$; the sqrt- n prediction held at 0.2325); LINEARITY-SCALE 0.01; parity-erasure recovery 1.000 WITH THE F7 COROLLARY TYPING (a corollary of the zero-SER cell, not independent evidence; the 108-case parity-code erasure theorem recomputed exactly in-run); P3 refuted honest (CHANNEL-GAIN-LOW > MID 0.508); the round-107 verdict cited NOT upgraded; MODULE THREE, v951_cancellation_functional.py (10/10, WALL-IS-WEIL-ACF-FORM-EXACT; probe cancellation_functional_probe.py r195 note DXVIII, 24/24, SPEC a50b85bb112513a1 verified UNTOUCHED by the Bughunt-X corrections, record 1036 s + 1061 s re-run, four pre-freeze amendments disclosed incl. A3 the substantive float64-direction-noise reversal, re-run green at promotion 1102.8 s): THE ACF LAW ($x^T W(u) x = -2 \int_0^{L-u} A_x A_x(\cdot + u) dt$ — the v947 two quadrature slots are ONE OBJECT; verified at every atom of $h = 4, 5$ on an own in-module wall build), THE POLE SQUARE ($8 \sinh^2(a/2)(\int e^{-t/2} A_x)^2$, sympy generic), THE ARCH LAW ($c^* = (\gamma + \ln 2\pi)/2$ exactly, every mode of $h = 4, 5$) — THE WALL IS A CLOSED TRUNCATED WEIL FORM of the PD test function g_x ; THE KD PIN RECOMPUTED IN-RUN (the arc's external handoff object):

$\kappa + c^* \rightarrow -\frac{1}{2}[\operatorname{Re} \psi(1/4 + i\omega/2) - \ln \pi]$ in the $L \rightarrow \infty$ limit (BH10: 6×10^{-18} ; finite- L corrections $O(e^{-L/2})$ typed not-small); per-atom manifest positivity PROVABLY IMPOSSIBLE (Wiener–Khinchin); the pole alone carries positivity; the sign law $n_+ = 0$ at all 14 rungs; priced honestly as an ALGEBRAIC RESTATEMENT (the relabeling barrier named, not crossed; WEIL-ALLTESTS $\leftrightarrow$ RH a flagged loop consumed by nothing); MODULE FOUR, v952_turan_extremal.py (9/9, TURAN-BUDGET-TAU-GAP; probe turan_extremal_probe.py r196 note DXXI, 23/23, SPEC a6edc3f911e8f069 verified invariant under the appended KB block, record 767 s + 802 s re-run, re-run green at promotion 795.6 s): THE CLASSICAL PD-CONE THEORY PRICED for the first time in 196 rounds, TWO-SIDED — every cone bound NEGATIVE at every rung while the truth is τ -deep positive (CONE GEOMETRY CANNOT SEE POSITIVITY; gapdex 11.35 $\rightarrow$ 89.03 == the τ ladder at slope -1.007 , R^2 1.000 — the relabeling barrier named AT THE CONE LEVEL) yet the classical Fejér cap describes the wall’s drain capacity almost exactly (CONE-DRAIN-O1-CAPTURE 0.14–0.24 dex flat — the round’s real news); the Fejér coefficient theorem machine-proved in-module at $n = 1, 2$ (construction + single-node dual certificates); THE KB RATIONAL-LAG IDENTITY RECOMPUTED ($M_{\text{sub}}(L/2) == 1/2 == \cos(\pi/3)$ identically — the Fejér extremal lifts exactly at rational lags ONLY); ARCH-LEG-SUBCONE-ONLY named; the TURAN-CONE-POSITIVITY loop flagged consumed by nothing; MODULE FIVE, v953_fewatom_reduction.py (10/10, A-V0-NONNEGATIVE-STURM-CERTIFIED; probe fewatom_reduction_probe.py r197 note DXX, 25/25, SPEC 35fb341bb281b04b verified invariant under the appended KA/KC block, record 790 s + 811 s re-run, re-run green at promotion 830.7 s): $A_{v_0} \geq 0$ AT ALL 14 RUNGS with THE KA SCOPE RIDER VERBATIM (the r197 gate class GRID-MEASURED; at $h = 15/16/20$ the record minimum sits below the bar’s resolution — print evidence, not gate certificate; THE HEADLINE IS TRUE AND NOW STRONGER) and THE STURM CONTINUUM CERTIFICATES RECOMPUTED IN-MODULE at $h = 4, 5$ (exact dyadic Fractions $\rightarrow$ Chebyshev $\rightarrow$ INTEGER primitive-PRS Sturm chain: zero roots in $(-1, 1]$, $P(\pm 1) > 0$ — $A_{v_0} > 0$ on ALL of $[0, L]$, no floats; Bughunt X extends to $h = 13, 20$ — THE BUGHUNT’S MATHEMATICAL DELIVERABLE FOLDED INTO THE PROMOTION, the bughunt round itself experiments-side per process precedent); THE ONE-LINE MECHANISM ($A \geq 0 \Rightarrow$ every ACF sample $\geq 0 \Rightarrow$ every atom negative — the v951 sign law reduced); the horizon bounded ($Q_{99} \in \{2, 3\}$ incl. the holdout) WITH THE MANDATORY SCALE-RELATIVITY RIDER (the demand scale consumes every atom; NOT-A-COMPLEXITY-DROP-IN-H; any lossy tail bound certification-dead); the KC identification exact UN-NORMALIZED; OBJECT-A NAMED (the X6 targeting result): “prove $A_{v_0(h)} \geq 0$ for all h ” is the ONE genuinely new tractable target — yields the sign law only, NO lever on wall positivity; and MODULE SIX, v954_nodeless_pf.py (10/10, PF-MODE-BASIS-DEAD-POLE-IS-THE-OBSTRUCTION; probe nodeless_pf_probe.py r198 note DXXII, 27/27, SPEC 7499c39a026d0d0f, record + deterministic re-run, amendment A1 disclosed, re-run green at promotion 817.1 s): THE PERRON–FROBENIUS ADJUDICATION — the r197 candidate route for Object-A DEAD IN THE MODE BASIS (off-diagonal censuses recomputed exactly at $h = 4, 5$: $(15, 6)/(38, 17)$ mixed, checkerboard-mixed both parities; the trivial route killed both ways by the exact exhibit $v = e_1$, $A(L/2) = -1$), the obstruction LOCALIZED (the cone tests recomputed at $h = 4$: the wall operator violates on 11..14 of 20 Fejér members, THE NO-POLE OPERATOR ON ZERO — removing the pole alone repairs cone invariance: the piece that carries the positivity is

the piece that breaks the cone), and the SURVIVING Z-STRUCTURE pinned (KERNEL-SPLIT-POLE-POSITIVE-HOPPING-Z: pole kernel negfrac 0.000 exactly, the wall's kernel mixing ENTIRELY pole-vs-hopping); Object-A stays open, GENUINELY FUNCTION-SPACE; the X6 discipline: “pole-vs-hopping balance” is the CLASS NAME of Object-W, not a new attack object. Ledger rows PRIME.COMMENSURABILITY.MECHANISM.01, PRIME.ZERO.CHANNEL.CAPACITY.01, PRIME.CANCELLATION.FUNCTIONAL.01, PRIME.TURAN.EXTREMAL.01, PRIME.FEWATOM.REDUCTION.01, PRIME.NODELESS.PF.01, all [E] NOT-RH-EVIDENCE active; the channel row carries the “instrument characterization, no storage claim” typing prominently; the arc's terminal residue written everywhere in the canonical note-DII/DXVI/DXXIV form: the TRIPLE $\{H1 \wedge H2 \wedge H3\}$ -cofinal (one rung per dyadic block, all three at the same h ; the limsup form only mod $D = 0.0042$) + {census-forall- k == LOOP, flagged} + {H-pin = the one λ -uniform edge of the pair: L1 = TAIL proven + H-pin open; WPD($a < \gamma_1^2$) $\Leftarrow$ H-pin; the WPD non- λ legs: extension instantiated, TAILWPD world-front}; surfaces: six veri blocks in tfpt_3, the new Bughunt-X-arc diary section in tfpt_prime_front with the live suite-count parentheticals refreshed (941 $\rightarrow$ 947; PDF recompiled), the endform article promotion section + counts, the email draft promotion paragraph, the website PROMOTED card + DAG chips + honesty-banner range v535–v954, README/Zenodo 947; one German research note appended to experiments/next.txt; FULL run_all.py ALL CHECKS PASSED at 947 modules; bash build.sh release green; bash build.sh audit $\rightarrow$ AUDIT OK; manifests regenerated LAST. Round 193 (Bughunt IX) and round 199 (Bughunt X) stay experiments-side as process rounds per precedent — round 199's Sturm-certificate deliverable is promoted INSIDE v953; the PRIME.RESIDUE.EXTERNAL.01 contract inventory deliberately NOT extended (the arc changes no residue statement). No omega closed, no marker moved beyond the six [E] rows, census cardinality 4 unchanged, θ_∞ stays OPEN, the λ_h limit stays OPEN; NO RH claim anywhere)

2026-08-21 (CXV) (the mechanism-arc promotion — the seven durable certified theorem sets of discovery rounds 184–191 graduate from the experiments tree into the load-bearing verification suite (suite 934 $\rightarrow$ 941, ledger 1085 $\rightarrow$ 1093), after the ninth adversarial bughunt (round 193, note DXV, 44/44, 9 findings, 1 MAJOR, 0 verdict flips, AND THE HEADLINE X5: every claimed-exact object of the arc reproduced in fully independent code with ZERO FAILED RECOMPUTES) covered the arc and its corrections of record (K1–K5, note DXVI) were applied as appended CORRECTION-OF-RECORD blocks and ADOPTED VERBATIM on every new surface (in particular K1 MAJOR: the round-186 structure token is written WALL-OFF-DIAGONAL-IS-ONE-FUNCTION-LOEWNER-EXACT everywhere — displacement rank 2 fixes ONLY the off-diagonal, the FULL wall is $M_h \sim L_f + \text{diag}(\Delta)$ with source-side $\Delta \neq 0$, NOT the canonical Loewner matrix of the Loewner-1934 dictionary, and $R_h(z)$ is the resolvent of $L_f + \text{diag}(\Delta)$, never the full-matrix claim; K2 MINOR: the ZB wiggle reads 1.07 in full precision (1.065464, twice replicated) — never the unsourced 1.14; K3 MINOR: the round-184 smoke lineage disclosed; K4: the glossary rule — every “source-side” qualified as either (eigenvector-free, given τ) or (root-free, ray-consuming)); every source probe RE-RUN GREEN AS TYPED before the surface edits (logs kept as *.promo_rerun.log): MODULE ONE, v942_pi_pattern_transfer_specificity.py (9/9, PI-TRANSFER-SPECIFICITY; probe pi_pattern_scan_probe.py r184 note DIV, 35/35, SPEC 00fc85173fe07470, record 191 s, re-run green at promotion

212.2 s): THE DETECTOR-SPECIFICITY THEOREM — all five predefined pi-derived comb worlds land in the fake-world class (log10 tails $-10.0.. -17.9$, both holdout halves, ALL 100 non-Mangoldt instances, ZERO anomalies) while the C-MANGOLDT positive control FIRES ON EVERY TRANSFERRED DETECTOR (spike $C = 131.04$ vs null max 12.60; the structured controls prove the detectors CAN fire; pi's classical CF laws replicate as measured expectations) — TRANSFER VALIDITY PROVEN, the load-bearing methodology of the whole arc; typed INSTRUMENT CHARACTERIZATION, NOT ARITHMETIC NOVELTY, no pi-numerology claim, the P-BBP PROVISIONAL flag travels; MODULE TWO, v943_mangoldt_ablation_localization.py (8/8, MANGOLDT-ABLATION-LOCALIZED; probe mangoldt_ablation_ladder_probe.py r185 note DV, 26/27 with the single FAIL the disclosed control-side Beurling density band (5.74 vs $[0.2, 5.0]$) — BH9-adjudicated an honest Poisson fluctuation, density-correct, the W4 headline unweakened; SPEC 504dcac5b2eac650, re-run green as typed at promotion 167.2 s, same single disclosed FAIL): THE ZERO-COUPLED SHARP LOCALIZATION — the additive property ladder W0 random $\rightarrow$ W5 true Mangoldt switches BOTH arithmetic signatures on ONLY at W5 and SHARPLY (S1 jump 12.07 dex, S2 jump $61\times$); THE BEURLING HEADLINE ANSWER IS NO (full multiplicativity without Riemann-zero coupling produces NEITHER signature); necessity confirmed by every ablation, EVEN ± 0.01 POSITION JITTER KILLS BOTH; MODULE THREE, v944_ground_residue_observability.py (11/11, GROUND-RESIDUE-OBSERVABILITY; probe ground_residue_obs_probe.py r186 note DVI, 33/33, SPEC 48637c8898a1da5a verified invariant under the appended K1 correction block, record 782 s, amendment A1 disclosed, re-run green at promotion 792.7 s): THE EXACT RESIDUE IDENTITY $\text{Res}_{z=\tau} R_h(z) = A_0^2/\|d\|^2$ gated at ALL 14 rungs to $\leq 7.8 \times 10^{-45}$, the Feshbach scalar form with $w'(\tau)$ EIGENVECTOR-FREE GIVEN τ ($\{\alpha, m, B\}$ source-linear, the CDLI adjudgate tie disclosed as prior art), STRICT INTERLACING $\Leftrightarrow A_0 \neq 0$ both directions exact, GAP-IS-RESIDUE-IN-DISGUISE ($\varepsilon \leq 2.55 \times 10^{-6}$: not an independent handle), the honest descent EIGENVECTOR-DESCENDS-NOT-ELIMINATED (11.2–90.7 orders), the raw-gap floor RELABELED-AND-STOPPED, the $\{l_0, l_2\}$ witness detector, and the K1-corrected off-diagonal Loewner law; MODULE FOUR, v945_zero_causal_stratification.py (10/10, ZERO-CAUSALITY-DEMONSTRATED-WITH-STRATIFICATION; ONE JOINT MODULE for probes zero_causal_synth_probe.py r187 note DVIII, 31/33 with the two FAILs the disclosed adjudication gates (the f-cell monotonicity violation and the r175-predicted S1 instrument death), SPEC c20e87eec6d158b9, re-run green as typed at promotion 819.0 s, and zb_wiggle_strat_probe.py r190 note DXI, 23/23, SPEC 8639b3a78503a0f9 verified invariant under the appended K2 block, re-run green at promotion 64.5 s — r190 upgrades r187 BY REFERENCE, house style): THE CAUSAL ZERO-COUPLING DEMONSTRATION — comb worlds with controlled zero spectra synthesized through the r175 bridge run backwards; Z0 VALIDITY 0.0006 on $C = 131.04$; the off-line dose surface monotone in δ everywhere (first response $(0.10, 10^{-2})$, first death $(0.05, 10^{-4})$); EXACT-ORDINATES-REQUIRED (Poisson AND GUE resamples both die); the stratification: the wiggle 1.07 deep inside every matched-dose selection spread ($5.09/3.07/3.98$), dose monotone in expectation, INV-FRAC 1.00 generic subset-overshoot, the per-zero leverage ladder ($\gamma_2 = 21.02$ carries the most, no first-zero dominance, strongly subadditive), depth parity not-artifact; the r185 interpretation upgrades to DEMONSTRATED MECHANISM on the S2 channel — still NO claim about

WHERE the true zeros lie; MODULE FIVE, v946_census_krein_pencil.py (8/8, CENSUS-KREIN-PENCIL-PARTIAL-LIFT; probe census_lift_probe.py r188 note DIX, 72/72, SPEC 8ada6b97d56aca46, record 2066 s + 2060 s re-run, log lineage disclosed in spec, re-run green at promotion 2067.1 s): THE EXACT KREIN PENCIL — $N_h(y) = (-1)^{K-1} \det(J) A_0 \det(\hat{A} - yJ)$ source-side with $\sum \rho_k = -y_t$ exactly (dyadic-exact E1 at all six rungs, integer-Bareiss E2 at $h \leq 13$); the residue-sign ladder $(1, 5)/(7, 3)/(6, 14)/(27, 14)/(45, 34)/(43, 73)$ MIXED at every true rung; MIXEDNESS-TRANSFORM-INVARIANT (definite impossible in class); MIXEDNESS-IS-ARITHMETIC (atoms-vs-no-atoms, wrong orientation, NOT a sign source); H2 == KREIN STRONG DEFINITIZABILITY in operator form; the bracket certified via ENVJ without computing a single root; roots never consumed, tau-free; MODULE SIX, v947_loewner_pick_dictionary.py (9/9, LOEWNER-PICK-DICTIONARY-MISMATCH; probe loewner_pick_probe.py r189 note DX, 28/28, SPEC a547448468899af9, record 1046 s + 1058 s re-run, three pre-freeze amendments disclosed, re-run green at promotion 1082.9 s): THE EXACT DICTIONARY — the wall is a DIAGONALLY-SHIFTED one-function Loewner matrix $\text{Raw}_h = L_f + \text{diag}(\Delta)$, with THE NEW EXACT COSINE-QUADRATURE DIAGONAL LAW $\text{Raw}[k, k] - f'_{\text{prime}}(b_k) = 2a p c_k$ (both quadratures of the same atoms in different slots; sympy per-atom, $\text{mp} \leq 6.0 \times 10^{-61}$, BH9 own recompute $\leq 6.3 \times 10^{-61}$); the pole leg a genuine Pick function with EXACT Herglotz point mass $2 \sinh^2(a/2) \delta_{-1/4}$; the Pick-class reading REFUTED with margins $(\lambda_{\min}(L_f) < 0$ at all 14 rungs, misses wall positivity by 9.4–87.9 orders, refinement deepens); SMOOTH-PSD-AT-NODES via the exact commensurate-sampling mechanism $\sin(2a \omega_k) == 0$ (lattice geometry, not a prime fingerprint); tau-screens both flat; the r45 LOEWNER-DEAD distinction carried; and MODULE SEVEN, v948_krein_sign_characteristic.py (10/10, KREIN-SIGN-CHARACTERISTIC-LAW; probe krein_definitizer_probe.py r191 note DXIII, 57/57, SPEC 332c1f48f48a6d82, record 1950 s + 1901 s re-run, no post-freeze amendments, re-run green at promotion 1983.4 s): THE SIGN-CHARACTERISTIC LAW — the kernel vector explicit, $\varepsilon_i = -\text{sign}((F/A_0)'(y_i))$, THE r188 RESIDUE LADDER IS THE KREIN SIGN-CHARACTERISTIC MULTISSET (two-route proven; in the module on the full 32-cell exact Sturm battery with no floats), THE PARITY SCAFFOLD (root-count parity per pole gap from residue signs alone — the new source-side coordinate, verified at all 81 gaps), THE $W(y)$ -CONGRUENCE-CLASS KILL BY THEOREM (the sign characteristic is congruence-invariant: the mixed ladder kills the entire $W(y) > 0$ class at once — the r188 upgrade path IMPOSSIBLE-IN-CLASS, remaining doors named honestly), the Langer degeneracy exhibited (Cayley–Hamilton; strong definitizability == H2 per rung), the realness-break witness detector (the Krein invariant sees the witness class where the raw ladder is blind), the strict definitizer ROOT-DEPENDENT (occupancy-minimality fails at $h = 8, 13$ by exactly one interior doubled gap). Ledger rows PI.PATTERN.SCAN.01, PRIME.MANGOLDT.ABLATION.01, PRIME.GROUND.RESIDUE.OBS.01, PRIME.ZERO.CAUSAL.SYNTH.01, PRIME.ZB.WIGGLE.STRAT.01 (both on v945), PRIME.CENSUS.SPECTRAL.LIFT.01, PRIME.LOEWNER.PICK.01, PRIME.KREIN.DEFINITIZER.01, all [E] NOT-RH-EVIDENCE active; the mechanism-arc rows carry the NO-RH fences and the “instrument characterization, not arithmetic novelty” typing prominently; the arc’s terminal residue written everywhere in the canonical note-DII/DXVI form: the TRIPLE $\{H1 \wedge H2 \wedge H3\}$ -cofinal (one rung per dyadic block, all three at the same h ; the limsup form only mod $D = 0.0042$) + {census-forall- k == LOOP, flagged} + {H-pin = the one λ -uniform edge of the pair: L1 =

TAIL proven + H-pin open; WPD($a < \gamma_1^2$) $\Leftarrow$ H-pin; the WPD non- λ legs: extension instantiated, TAILWPD world-front}; surfaces: seven veri blocks in `tfpt_3`, the new mechanism-arc diary section in `tfpt_prime_front` with the live suite-count parentheticals refreshed (934 $\rightarrow$ 941; PDF recompiled), the endform article promotion paragraph + counts, the email draft promotion paragraph, the website PROMOTED card + DAG chips + honesty-banner range v535–v948, README/Zenodo 941; one German research note appended to `experiments/next.txt`; FULL `run_all.py` ALL CHECKS PASSED at 941 modules; `bash build.sh` release green; `bash build.sh` audit $\rightarrow$ AUDIT OK; manifests regenerated LAST. Round 192 (the commensurability mechanism, note DXIV) STAYS experiments-side per precedent — it landed after the Bughunt-IX scope froze and waits for bughunt coverage; round 193 (Bughunt IX itself) stays as a process round. No omega closed, no marker moved beyond the eight [E] rows, census cardinality 4 unchanged, θ_∞ stays OPEN, the λ_h limit stays OPEN; NO RH claim anywhere)

2026-08-21 (CXIV) (the third externalization contract — the prime-front terminal residue packaged as a short, precise, self-contained EXTERNALIZATION CONTRACT PRIME.RESIDUE.EXTERNAL.01 for outside specialists in analytic number theory (large sieve, sampling/frame theory, de Branges spaces, explicit-formula methods), added as one new section in `tfpt_research_contracts` after the ALPHA.QUILLEN.EXACT.01 contract (before “Certifiability and recommended order”), plus a one-sentence pointer in the head keybox; DOCUMENTATION ONLY — no module touched, no number changed, no status marker moved, no ledger row added or edited, no gate closed or narrowed, NO RH claim (the contract identifier names the document, not a ledger row; the section states explicitly that it offers OPEN PROBLEMS and asserts no progress toward the Riemann Hypothesis in either direction): (1) the SELF-CONTAINED FINITE OBJECTS — rung h , modes $\omega_k = k\pi/a$ with $a = \frac{1}{2} \log h$ and $K = \lceil 1.25 h \log h \rceil$, the von Mangoldt atoms $(\log q, \Lambda(q)/\sqrt{q})$ as the only arithmetic input, the wall matrix $M_h = M_{\text{pole}} + M_{\text{arch}} - M_{\text{prime}}$ with the prime block linear in two atom transforms per mode (v935), the wall argmin ray d , the census polynomial $N(y)$ (numerator of $F(y) = c_0 + \sum (-1)^k c_k y/(y - b_k)$), the moment–Laurent form $\Phi(z)$ (v924) and the jet mass $\delta_h = |J_h|_{G_h}^2$ exactly (step A, v939); (2) the THREE MINIMAL OPEN STATEMENTS in the canonical note-DII form — R1 THE TRIPLE ($\{H1 \wedge H2 \wedge H3\}$ -cofinal, one rung per dyadic block, all three at the same h ; H1: no census root with $\text{Re } y \geq c^* y_t$, $c^* = 1.10\text{--}1.15$; H2: census complete-real nonnegative; H3: $y_t \leq 0.155 T_z^4$; the limsup form only mod the measured defect $D = 0.0042$), R2 THE LOOP CHARACTERIZATION (census-forall- k , honestly stated as RH-equivalent-in-currency via the four independent machine-detected proof-route cycles v928/v929/v930/v938; external value: a new independent sign source or a proof the loop is essential) and R3 THE H-PIN (the one λ -uniform edge of the pair $\{L1, \text{WPD}\}$ with the Ω -a/ Ω -b split and the two machine-exhibited linearity-escape maps — the eigenvector map and the census-root map, v937); (3) the COMPLETE TYPED HYPOTHESIS LIST — 11 PROVEN-FINITE rows citing v931/v932/v933/v934/v935/v936/v937/v938/v939/v940/v941 (theorem PF with the exponent the trace; the rate dictionary $a = p/2 - 1$; the subsidy-empty pigeonhole; the unconditional Landau/Gonek pricing; the mode-level Landau bridge; the tau-free DK exclusion $h \leq 13$ with the exact $b^*(h)$ schedule; the WPD $\Rightarrow$ H-pin consolidation; the exact census semigroup e^{-tT} , $T = 4y \partial^2 + 2 \partial$; step A exact; the sub-dof composition chain; the source-free Gram + projective linear-

ity), 7 CITED-CLASSICAL rows (Landau 1912; Gonek 1985/1993 with Gonek 1984 flagged never consumed; Montgomery–Vaughan 1974; Ortega-Cerdà–Seip 2002; Nazarov–Turán 1993; Rodgers–Tao 2020 + Polymath 15 as cited ceilings), 1 OPEN row (R1–R3); (4) the HONEST MEASURED BLOCK — margins ≥ 1.405 with selector margins 2.14/3.05, the frozen alignment triple (descriptive band (0.38, 0.54), wall lock $\mu_m = 0.2372 \log_{10} g_{\min}$ at R^2 0.9916, deep excess 5.64–7.58 dex), θ_∞ in $[0.0766, 0.0977]$ typed OPEN-NONPERTURBATIVE-VARIATIONAL, and the refuter ladder ALWAYS PAIRED per BH8-F7 (measured 30–33 orders with the proven $b^*(h)$ schedule 23.8/21.7/15.7/4.4 at $h = 4/5/8/13$, none at $h \geq 16$); (5) the KILL-ATLAS SUMMARY TABLE — eleven named dead route classes (pointwise symbol minorants, ℓ^1 majorants, phase-discarding additive forms, Vieta pinch/power sums, moment/trace caps, Riccati/manifold transport, dBN pinch, global CBJ frame, sub-dof scoping, Carleson-as-floor, naive floor-power composition) each with its one-line death mechanism and round/witness; (6) the RUNNABLE FINITE MODELS — v931–v941 + the substrate v922–v930, the eleven frozen SPEC-hashed discovery probes (r171–r182), the frozen builder radius4_an_probe.py with the four control worlds, the 2×10^7 verified-ordinate cache and the PT21 horizon, with exact paths; (7) the HONEST FORMALIZATION SURFACE — the only prime-front Lean content is the finite spacing/jet algebra (SpacingProduct.lean and companions); NOTHING of R1–R3 is formalised, stated plainly; (8) MUST-FAIL CONTROLS MF-P1–MF-P6 (Epstein/Scramble/Smooth refusal, the no-zero ancestry test, the predefinition test, and the loop firewall over the four flagged classes census-forall- k / A_0 -triangle / zero-verification-as-hypothesis / RH-conditional second moments); (9) ACCEPTANCE TESTS — an external result counts iff it delivers (a) an explicit all- h all- a bound, (b) a genuinely new sign source that separates AND independently orients, or (c) a proof that one of R1–R3 is RH-equivalent (recorded as closing the hardness question honestly, never as progress toward RH); the website paper mirror of tfpt_research_contracts (papers.ts) gains one section entry; tfpt_research_contracts.pdf, changelog.pdf and introduction.pdf recompiled and mirrored via bash build.sh website; maps and changelog.ts regenerated via bash build.sh gen; bash build.sh audit → AUDIT OK; manifests regenerated LAST. No omega closed, census cardinality 4 unchanged, θ_∞ stays OPEN, the λ_h limit stays OPEN; NO RH claim anywhere)

2026-08-20 (CXIII) (the post-bughunt-arc promotion — the six durable certified theorem sets of discovery rounds 177–182 graduate from the experiments tree into the load-bearing verification suite (suite 928 → 934, ledger 1079 → 1085), after the eighth adversarial bughunt (round 183, note DI, 20/20, 7 findings, 1 MAJOR, 0 verdict flips) covered the arc and its corrections of record (F1–F7, note DII) were applied as an appended CORRECTION-OF-RECORD block and ADOPTED VERBATIM on every new surface (in particular BH8-F1: the round-182 terminal adjudication is written SAME-CLASS-NOT-NEW-EDGE everywhere — a CLASS-level convergence, never an object identity — and BH8-F7: the round-177 refuter margin is always cited PAIRED, the proven $b^*(h)$ schedule 23.8/21.7/15.7/4.4 orders above the 10^{-25} bar at $h = 4/5/8/13$ and none at $h \geq 16$ alongside the measured 30–33 orders; per BH8-F2 the canonical rounds are 177 = manifold, 178 = L1/WPD, 179 = dBN, 180 = CBJ frame, 181 = CBJ sub-dof, 182 = alignment); every source probe RE-RUN GREEN AS TYPED before the surface edits (logs kept as *.promo_rerun.log): MODULE ONE, v936_manifold_invariance_exclusion.py (10/10, MANIFOLD-INVARIANCE-

EXCLUSION; probe manifold_invariance_probe.py r177 note CDXCV, 39/39, SPEC af86ec3b097ae8c4, record 1354.1 s, three amendments + one smoke fix disclosed, re-run green at promotion 1337.6 s): THE TAU-FREE DK EXCLUSION THEOREM — $\sin \theta \leq (r_0/\tau)/(FG - a)$ with τ CANCELLING in ratio form, direction-universal and witness-free, PROVEN $h \leq 13$ at the frozen bar (measured to $h = 20$, the split kept) + the exact required-bar schedule $b^*(h)$; the measured full-space refuter price ladder $1.35 \times 10^5 \rightarrow 6.73 \times 10^8$ strictly growing with the mechanism identified as ALIGNMENT-SHARING; the BA3 scale-gauge theorem (not a universal catcher); the induction route priced dead AS A REDUCTION (TRANSPORT-RELABELS-NOT-REDUCES + LEVEL-CHEAPER-THAN-INCREMENT); MODULE TWO, v937_l1wpd_closure_reduction.py (10/10, L1WPD-CLOSURE-REDUCTION; probe l1wpd_closure_probe.py r178 note CDXCIV, 29/29, SPEC 0e306146bebbd9be, record 228.9 s, no amendment, re-run green at promotion 224.4 s): WPD's λ -uniform content == the H-pin edge (AND-fire demonstrated at the declared edges — the pair $\{L1, WPD\}$ carries ONE open λ -uniform edge, not two); the three-part bridge-expressibility verdict (source data bridge-expressible per census; the floor escapes linearity at the eigenvector and root maps, exact exhibits; the SW pricing vacuous — no closure); the v925 all- x sharpening propagated with own replication ($x_0 = 121/112$, all 357 $D_{cs} > 0$); the r133-vs-r171 H1/H2/H3 name collision flagged; MODULE THREE, v938_dbn_heatflow_census.py (11/11, DBN-HEATFLOW-CENSUS; probe dbn_heatflow_probe.py r179 note CDXCVI, 26/26, SPEC 67eaf86c7bfa7d84, record 672.4 s, one smoke fix disclosed, re-run green at promotion 659.4 s): THE EXACT CENSUS SEMIGROUP — the de Bruijn–Newman flow transports onto the derived census polynomial as a closed-form FINITE sum e^{-tT} (no zeros, no ODE) with the exact trace law $\text{trace}(N_t) = \text{trace} + 2d(2d - 1)t$ (measured deviation 0.0) and the factor-4 normalization lemma (window $[0, 0.055]$ exact, BH8-verified); the dictionary THREEFOLD-INEQUIVALENT (every pinch claim dictionary-dependent); the missing half of the generator == the RH-conditional PAIR class (flagged loop, not consumed); theta-flow-inert floors ($\geq 4021 \times$ the window); the λ_h criticality ladder $2.39 \rightarrow 0.216$ strictly decreasing with THE LIMIT OPEN — honestly NOT an off-line-zero detector (Epstein slack larger); the witness preserved-not-expelled; MODULE FOUR, v939_cbj_frame_adjudication.py (10/10, CBJ-FRAME-ADJUDICATION; probe cbj_frame_probe.py r180 note CDXCVII, 41/41, SPEC d7fbf2d956184674, record 1042.5 s, no amendment, re-run green at promotion 1005.5 s): STEP-A EXACT — $\delta_h = |J_h|_{G_h}^2$ with remainder $R = 0$ proven generically (the single most promotable theorem of the arc, certified at 14 rungs, $\text{dev} \leq 1.9 \times 10^{-46}$); the cluster normal form (the basis-change determinant == the spacing product); the Montgomery–Vaughan pricing (killed exactly at linkage 1, carrying at 3.15π with the exact rational margin $1/21$ + the two-grid repair); the dof/seam/occupancy kill triple ($n = 474$ vs rank 128, dof 112.8; seam 0.994; -0.7484 dex/atom): the GLOBAL review form dead, the per-cluster floor carrying k -uniformly at fixed r ; the source-only selector ($\hat{h}_k = 7/13/31/\dots/8191$ recomputed in-run, Bertrand-cofinal) underperforms the block average yet clears the SF2 demand (margins $2.14/3.05$, all rungs ≥ 1.405); the house Gram min-eig ladder $1.1 \times 10^{-17} \rightarrow 5.2 \times 10^{-113}$; MODULE FIVE, v940_cbj_subdof_blockfloor.py (9/9, CBJ-SUBDOF-BLOCKFLOOR-KILL; probe cbj_subdof_probe.py r181 note CDXCIX, 37/37, SPEC 2db82c76ce5f067c, record 867.9 s, one spec-text amendment disclosed (the sympy-exact Fejér constant $1/6$, BH8-verified), re-run green at promotion 772.1 s): the sub-dof-scoped floor statement posed exactly and honestly KILLED at the decisive

measurement — the sub-dof mass fraction falls at $+0.999$ dex/rung (recomputed) and saturates at zero, the scoped margin dies AT THE SELECTOR RUNGS (8.02×10^{-3} at $\hat{h}(B3) = 13$, dead by ~ 125); the unscoped r180 floor remains the measured carrier (killed is the PROOF ROUTE through the well-conditioned subspace); CARLESON PRICED FOR THE FIRST TIME — the unconditional embedding WRONG-DIRECTION for a floor (Ortega-Cerdà-Seip, Ann. of Math. 155 (2002), BH8-web-verified) and the complete lower-class table with Nazarov–Turán (exponential in the term count) as the classical mirror of the measured occupancy law; FRACTION-WORLD-SEPARATING (floor value world-insensitive, mass location world-separating); the fixed- r compactness sketch; MODULE SIX, v941_alignment_law_factorization.py (11/11, ALIGNMENT-LAW-FACTORIZED; probe alignment_law_probe.py r182 note D, 37/37, SPEC e4cdb9a932093196 verified invariant under the appended correction block, record 775.6 s, five freeze retypings disclosed, re-run green at promotion 776.5 s): the sharpest unexplained regularity frozen as a MEASURED TRIPLE — the half-power envelope (α inside the descriptive band $(0.38, 0.54)$ at all 14 rungs, never a prediction per BH8-F4), the quarter-depth wall lock ($\mu_m = 0.2372 \log_{10} g_{\min}$, $R^2 0.9916$) and the deep excess ($5.64\text{--}7.58$ dex == the r181 kill mass); GRAM-SOURCE-FREE proven three ways; the key adjudication: $s_i A_0$ LINEAR in d , the location law PROJECTIVE and A_0 -free — the r178 obstruction does NOT bite; the one shared nonlinear link is the wall eigenmap (the law exactly as bridge-expressible as δ , given d); ALT-JETS-BREAK-ALIGNMENT; WITNESS-BREAKS-ALIGNMENT; the terminal adjudication SAME-CLASS-NOT-NEW-EDGE (four distinct formal statements over the same source object, the wall argmin ray d , in A_0 -quotient form; no new residue edge via the machine-checked G44 exclusion, not via identity). Ledger rows PRIME.MANIFOLD.INVARIANCE.01, PRIME.L1WPD.CLOSURE.01, PRIME.DBN.HEATFLOW.01, PRIME.CBJ.CONFLUENT.FRAME.01, PRIME.CBJ.SUBDOF.BLOCKFLOOR.01, PRIME.ALIGNMENT.LAW.01, all [E] NOT-RH-EVIDENCE active; the arc's terminal residue written everywhere in the canonical note-DII form: the TRIPLE $\{H1 \wedge H2 \wedge H3\}$ -cofinal (one rung per dyadic block, all three at the same h ; the limsup form only mod $D = 0.0042$) + {census-forall- k == LOOP, flagged} + {H-pin = the one λ -uniform edge of the pair: L1 = TAIL proven + H-pin open; WPD($a < \gamma_1^2$) $\Leftarrow$ H-pin; the WPD non- λ legs: extension instantiated, TAILWPD world-front}; surfaces: six veri blocks in tfpt_3, the new post-bughunt-arc diary section in tfpt_prime_front with the live suite-count parentheticals refreshed ($928 \rightarrow 934$) and the superseded awaiting-bughunt prose rewritten, the endform article §8.22 + counts + inventory, the email draft seventh-promotion paragraph, the website PROMOTED card + DAG chips + honesty-banner range v535–v941, README/Zenodo 934; one German research note appended to experiments/next.txt (DIII); FULL run_all.py ALL CHECKS PASSED at 934 modules; bash build.sh release green; bash build.sh audit $\rightarrow$ AUDIT OK; manifests regenerated LAST. No omega closed, no marker moved beyond the six [E] rows, census cardinality 4 unchanged, θ_∞ stays OPEN, the λ_h limit stays OPEN; the two bughunt rounds (176 and 183) stay experiments-side as process rounds per precedent. NO RH claim anywhere)

2026-08-20 (CXII) (the triple-cofinal-arc promotion — the five durable certified theorem sets of discovery rounds 171–175 graduate from the experiments tree into the load-bearing verification suite (suite $923 \rightarrow 928$, ledger $1074 \rightarrow 1079$),

after the seventh adversarial bughunt (round 176, note CDXCII) covered the arc with 0 verdict flips and its corrections of record (F1–F8, applied to the frozen records as appended CORRECTION-OF-RECORD blocks in round 177) were ADOPTED VERBATIM on every new surface; every qualifying source probe RE-RUN GREEN AS TYPED before the surface edits (logs kept as *.promo_rerun.log): MODULE ONE, v931_jetmass_floor_theorems.py (10/10, JETMASS-FLOOR-THEOREMS; probe jetmass_floor_probe.py r171 note CDLXXXVII, 36/36, SPEC 57de8b2a83677a9c, record 2056 s, two amendments disclosed, re-run green at promotion): THEOREM PF — the product floor $F/A_0 \geq (1 - c^*/z)^{(1+\kappa)/c^*}$ from the census product identity + the Vieta trace at coefficient level + a concavity lemma, conditional EXACTLY on {H1 + H2 per rung}, THE EXPONENT IS THE TRACE (the r140 far-field law its $\kappa \rightarrow 0$ shadow); H1 source-pure at all 25 rungs, H2 census complete-real incl. degree-116; the certified curve under the truth at $\sim 100k$ tail zeros; the factorization [PF] $\times$ [WF classical] $\times$ [RATE] with JETLOCK-MEAS eliminated; the witness modus-tollens boundary; BH7-F3 definitional legs recomputed honestly; MODULE TWO, v932_toproot_theta_statement.py (10/10, TOPROOT-THETA-STATEMENT; probe toproot_theta_probe.py r172 note CDLXXXVIII, 33/33, SPEC cf27df22aa5dffbf, record 2813 s, re-run green at promotion): TOPROOT stated SEQ-cofinal with three locked forms; the exact rate dictionary $a = p/2 - 1$ proven at $p = 3, 4, 5$; THEOREM TR-CAP proven and typed circular-for-TOPROOT; the A_0 -triangle route the FOURTH flagged loop; admissibility recomputed in-run ($p_{\max} = 10.2695$, six powers of margin); H3 ($y_t \leq 0.155 T_z^4$, ancestors == {SOURCE}) certified 26/26 margin ≥ 1.99 , REFUTABLE in the inflation witness and not norm-continuous; MODULE THREE, v933_h3_cofinal_adjudication.py (10/10, H3-COFINAL-ADJUDICATION; probe h3_cofinal_probe.py r173 note CDXC, 36/36, SPEC 876dafc977d3d8fc, re-run green at promotion 1339.5 s): saturation REAL with $p_{\text{loc}} \rightarrow 4.024$ and θ_∞ band $[0.0766, 0.0977]$ under the bar (OPEN); pigeonhole exact yet subsidy-empty (quantifier gap $D = 0.004183$ — the limsup form only mod D , BH7-F2); the witness excluded by the certified manifold {ground-state cert + two-sided lock + BA3 bridge $\times 3.6 \times 10^8$ }, escalation-stable $\times 10^5$, H3 DK-norm-stable at measured residuals — SCOPED to the DK radius (gated $h \leq 13$, measured to $h = 20$, crossover $h = 16$, BH7-F4); all saturation analytics recomputed in-run from the cited ladder; MODULE FOUR, v934_gonek_pricing_unconditional.py (8/8, GONEK-PRICING-UNCONDITIONAL; probe gonek_pricing_probe.py r174 note CDLXXXIX, 20/20, SPEC 3050678b352eaa9a, record 188 s, re-run green at promotion 244.2 s): Landau 1912 and Gonek 1985/1993 identified UNCONDITIONAL, Gonek 1984 machine-checked NOT-AN-ANCESTOR (the hidden loop detected, flagged, never consumed; externally re-verified in Bughunt VII); the envelope closed form with finite census-depth-insensitive ceiling; prefactor-insensitive absorption at any finite constant; $\hat{c} \leq 0.086$ at snr up to 2.7×10^4 , typed CONSTANT-EMPIRICAL-PER-CENSUS — the Gonek item LEAVES the residue; MODULE FIVE, v935_thetainf_landau_bridge.py (9/9, THETAINF-LANDAU-BRIDGE; probe thetainf_pin_probe.py r175 note CDXCI, 28/28, SPEC 3044558e5fa52e01, record 577 s, re-run green at promotion 718.1 s): THE MODE-LEVEL LANDAU BRIDGE — the program’s first linear per-mode classical identity, residuals $1.4 \times 10^{-5} \rightarrow 5.4 \times 10^{-5}$ at the 20M-zero census; the dictionary a proven bijection (pins nothing); the variational conditioning wall typed MEASURED-LAW extrapolation per BH7-F7 (“gemessene”, not “bewiesene” Verschwendung), $T_{\text{req}} = 3.76 \times 10^{14} \rightarrow 1.75 \times 10^{77}$ vs $T_{\text{PT}} =$

3.0×10^{12} ; θ_∞ re-typed OPEN-NONPERTURBATIVE-VARIATIONAL. Ledger rows PRIME.JETMASS.FLOOR.01, PRIME.TOPROOT.THETA.01, PRIME.H3.COFINAL.01, PRIME.GONEK.PRICING.01, PRIME.THETAINF.PIN.01, all [E] NOT-RH-EVIDENCE active; the arc's terminal residue written everywhere in the BH7-F1-corrected form: the TRIPLE $\{H1 \wedge H2 \wedge H3\}$ -cofinal (one rung per dyadic block, all three at the same h — NOT H3 alone; limsup only mod $D = 0.004183$) + $\{\text{census-forall-}k == \text{LOOP, flagged}\} + \{\text{L1, WPD}\}$; surfaces: five veri blocks in `tfpt_3`, the new triple-cofinal-arc diary section in `tfpt_prime_front` with the live suite-count parentheticals refreshed ($923 \rightarrow 928$), the endform article and the email draft refreshed with the §8.21-class promotion record and the triple wording, README/Zenodo 928, the website PROMOTED card + DAG chips + honesty-banner range v535–v935; one German research note appended to `experiments/next.txt` (CDXCVIII); FULL `run_all.py` ALL CHECKS PASSED at 928 modules; `bash build.sh` release green; `bash build.sh` audit $\rightarrow$ AUDIT OK; manifests regenerated LAST. No omega closed, no marker moved beyond the five [E] rows, census cardinality 4 unchanged, the quartic law stays MEASURED, θ_∞ stays OPEN; rounds 176–180 stay experiments-side awaiting Bughunt VIII. NO RH claim anywhere)

2026-08-19 (CX) (the endgame-arc promotion — the five durable certified theorem sets of discovery rounds 162–169 graduate from `experiments/` into the load-bearing suite as `v926_fullgap_growthlaw_theorems.py`, `v927_blockaverage_substrate_theorems.py`, `v928_depthblock_transfer_theorems.py`, `v929_sigmafloor_factorization.py` and `v930_window_instrument_mechanism.py` (suite 918 $\rightarrow$ 923, ledger 1069 $\rightarrow$ 1074); all five rows typed NOT-RH-EVIDENCE in either direction — identities, recipe-derived laws, finite/classical closures and one honest mechanism record: they close no omega, narrow no gate, move no other marker; the omega census stays at cardinality 4, the residue at $\{\text{TOPROOT, TLAWCAP-block, QSUBGAP-floor}\} + \text{the } a\text{-walls}$ — now carried WITH the r168/r169 terminal coordinates: the λ -uniform budget content factorizes as $[\text{census schedule, classical per } k, \text{ LOOP if for-all-}k] \times [\text{SIGMA-FLOOR} == \text{DC-leg (classical per census)} \times \text{JET-MASS-FLOOR (the terminal } \lambda\text{-uniform residue, typed OPEN)}]$; every measured leg typed verbatim, the quartic law NOT claimed proven: (1) v926 THE QUARTIC/GROWTH-LAW FAMILY (round 162, note CDLXVII, ledger row PRIME.FULLGAP.GROWTHLAW.THEOREMS.01 [E]; source probe `fullgap_growthlaw_probe.py`, 28/28, SPEC 26bdb5a87f63c519, PINNED from run-of-record 4061.6 s + deterministic re-run 4237.5 s with timing-normalized diff EMPTY, both logs kept, per the multi-hour convention — its GL algebra re-gated in Bughunt V G19/G20 and recomputed in-run) — GL1–GL5 exact (the loo pinch: every leave-one-out ground matches λ_1 within the ε^2 budget; the arrowhead compression with the dual row; the one-row price equivalence + razor vacuity: D3 COLLAPSES TO THE RAZOR; the rate bookkeeping $Jt_r == 1 + \text{FULLGAP}$; the ladder/quartic chases + the razor composition: the QSUBGAP-floor flows from the Θ -window through the razor); THE QUARTIC LAW $J == \Theta T_z^4$ typed MEASURED with the Bughunt-V free-exponent/AIC adjudication RECOMPUTED IN-RUN ($p = 3.9072 \pm 0.1136$; AIC prefers FIXED 4 (−30.87) over free (−29.79), rejects 3.5/4.5 at 3.6/5.2 σ); $\rho_j == 1.0000$ for ALL 189 left-out zone zeros (jet-COLLECTIVE, per-zero deflation REFUTED-MEASURED); the finite- P moment model undershoots by 1.4–4.5 dex (the Y3/R4 rate-blind trace-cap vacuity class, one level higher); (2) v927 THE COFINAL BLOCK-AVERAGE SUBSTRATE (round 166, note

CDLXXV, ledger row PRIME.BLOCKAVERAGE.SUBSTRATE.01 [E]; source probe tau_blockaverage_probe.py, 27/27, SPEC d86f42a04c69a4e2, RE-RUN GREEN-AS-TYPED AT PROMOTION 2372.4 s with identical SPEC and empty timing-normalized diff) — BA1 (a certified block sum > 0 forces ≥ 1 positive rung; dyadic hits COFINAL), BA2 (the determinant chain IS the τ sign, Jacobi/Sylvester), BA3 ($\tau \geq \text{zsum} - \text{OFF EXACT}$, proven-mod-cited: PT21 + HSW22 + the r131 OFF recipe + ward-class cache, NO-LOOP), the Weyl split measured VACUOUS by 10.9–54.6 dex; the certified block enclosures (all lower ends > 0 on B2/B3: POSITIVE-RUNG-PER-BLOCK CERTIFIED below the horizon), the wall dictionary $\text{sign}(\tau) == \text{sign}(\text{wall}) == +1$ at ALL 25 rungs, the tlaw ladder with 19 NEW corpus-depth rungs; the AVG-BUDGET-WINDOW beyond the horizon typed OPEN; (3) v928 THE DEPTH-BLOCK TRANSFER FAMILY (round 168, note CDLXXXIII, ledger row PRIME.DEPTHBLOCK.TRANSFER.01 [E]; source probe depthblock_transfer_probe.py, 36/36, SPEC a4cd07144e0c5222, ZERO AMENDMENTS, RE-RUN GREEN-AS-TYPED AT PROMOTION 2371.6 s) — DT1 PROVEN (the step chain is exact algebra on top of BA3); DT2 THE DEMAND LAW PROVEN-BY-RECIPE (the round’s discovery: $\varepsilon == \sqrt{h}(1+\eta)^2 G(T_{\text{PT}})/G(2\pi h)$ EXACT, the dyadic factor falls monotonically onto $2^{3/2}$); THE CENSUS 3/2-LAW sympy-exact ($T_{\text{req}}(h) \rightarrow (3\pi/\sigma_0) h^{3/2}$: the budget route can NEVER become self-supporting); the budget horizon RECOMPUTED ($h^* = 1.2566 \times 10^7$, $k^* = 23.58$: ~ 22 dyadic blocks on PT21); the Bertrand entry interface sieve-verified in-run to 10^6 ; UNIVERSALIZING THE CENSUS MACHINE-DETECTED AS THE RH LOOP (the per- k schedule acyclic); the step instantiated end-to-end (STEP(B2→B3) 9/9, STEP(B3→B4-partial) 11/11, SUBSTRATE-DIRECT, no self-supporting induction); ENTRY-NEW-CONFIRMED 4/4 (cone entry always at the largest new PRIME-POWER atom of the dyadic gap, excluding trailing 2-powers — the note-CDLXXXIII formulation, per the Bughunt-VI F1 correction of record; fakes die by NO-ENTRY); (4) v929 THE TERMINAL FACTORIZATION (round 169, note CDLXXXIV, ledger row PRIME.SIGMAFLOOR.FACTORIZATION.01 [E]; source probe sigmafloor_probe.py, 35/35, SPEC a16a4db1055488d2, RE-RUN GREEN-AS-TYPED AT PROMOTION 2375.2 s; AMENDMENT 1 disclosed: the all-rung onset-rate fit typed CACHE-TOP-LIMITED) — SF1 THE SUPPLY FACTORIZATION $\sigma == (1 - \text{slop}) \delta \text{DC EXACT}$ (identity devs $\leq 2 \times 10^{-60}$ at all 25 rungs, F64-immune): the r168 σ -flatness EXPLAINED AS TWO TRENDS ($\delta O(1)$ -flat $\times$ DC rising toward $1/2$) — the last unexplained measured law of r168 DECOMPOSED; the DC leg typed DC-CLASSICAL (proven-mod-cited per census; Landau 1912/Gonek 1993 AS FORM, GONEK-CONSTANT-UNPRICED); THE JET-MASS-FLOOR NAMED AND TYPED OPEN (the terminal λ -uniform residue, arithmetic-pinned, per-rung classical); the onset-excess cap REFUTED as a floor (SF2); ANY explicit polynomial rate census-absorbable (SF4, sympy-exact); the pinning-supply route machine-flagged as the RH loop’s costume (SF5); the anatomy block floor certified on B2/B3 (~ 11 dyadic blocks PROVEN-MOD-{measured lock, cited Gonek}); the controls finding: the raw floor holds in EVERY fake world while the BA3 bridge is FALSE — the arithmetic content is the {floor, bridge} PAIR; (5) v930 THE WINDOW-INSTRUMENT MECHANISM RECORD (round 167, note CDLXXXI, ledger row PRIME.WINDOW.INSTRUMENT.MECHANISM.01 [E]; source probe window_instrument_probe.py, 46/46, SPEC bfdcf374504006e7, PINNED from run-of-record 4138.5 s + re-run 4047.0 s per the multi-hour convention, both logs kept; the mid-run owner-directive re-freeze disclosed; the entry law

re-gated by the r168 batteries re-run green at this promotion) — WI1–WI6 exact (plant transport: the PSD premise survives positive band mass at any strength; the ghost secular threshold τ -priced; the perturbation law first-order symmetric; the budget-moment dictionary $2E^2 == 8A_0^2 \sin^2 y_t^2 \Phi^2 / y^3$; the theta chases; BANDPOS(unbounded ladder) $\iff$ RH — the loop identification); the Stieltjes-moment refutation RECOMPUTED from the pinned slots (Hankel NOT PSD, log-convexity break ≥ 1.5); THE MECHANISM FINDING pinned at its honest grade: NO PARTIAL COMB IS POSITIVE — cone entry only in the last atom’s tail with the tangent criterion from the prime source, all fakes die by NO-ENTRY (typed MEASURED, CHAIN-NOT-ASSEMBLED; the asymmetry law honestly DEMOTED to generic-cone); (6) SURFACES: five ledger rows (1069 $\rightarrow$ 1074); veri blocks in tfpt_3 (audit-counted body) + the new prime-front diary section “The endgame arc” with the suite-count refreshes (918 $\rightarrow$ 923 across the live parentheticals); endform article §8.20 + Anthropic email promotion paragraph; website PROMOTED feed card + DAG scripts + banner/meta v535–v930; README/Zenodo 923; German note CDLXXXVI appended to next.txt (head numeral re-verified immediately before writing: the concurrent Bughunt-VI lane had taken CDLXXXV — one collision resolved by re-read); (7) GATES: the endgame chain was independently re-audited mid-promotion by Bughunt VI (round 170, note CDLXXXV, 22/22, 0 MAJOR / 2 MINOR / 4 NOTE, NO verdict flips, NO arrow retypes — the arrow table A1–A10 re-verified with own code) and its live-surface recommendations are adopted on these new surfaces (F1: the entry pattern cited only in the note-CDLXXXIII prime-power formulation; F2: “result lines bit-identical / timing-normalized empty” wording; F3: the cofinality legs re-coded against real objects in v927/v928); three of the five affordable source probes re-run green-as-typed BEFORE any edits with identical SPEC SHAs and empty timing-normalized diffs (27/27 at 2372.4 s, 36/36 at 2371.6 s, 35/35 at 2375.2 s; logs kept as *.promo_rerun.log), the two multi-hour probes pinned with disclosure (r162 re-gated in Bughunt V; r167 re-gated by the r168 batteries); v926–v930 standalone green (12/12, 12/12, 11/11, 12/12, 10/10, each ~ 1 s); FULL run_all.py ALL CHECKS PASSED at 923 modules; build.sh release + EXIT GATE build.sh audit AUDIT OK; manifests last. NO RH claim in any direction — identities, recipe-derived laws and finite/classical closures say nothing about the truth of RH either way)

2026-08-19 (CIX) (the Bughunt-V corrections of record — the corrections that the round-164 adversarial audit (note CDLXIX, experiments/tfpt-discovery/bughunt5_probe.py, 29/29 gates, SPEC b466fd5e6dcbc640, record run + deterministic re-run bit-identical, 0 MAJOR / 4 MINOR / 2 NOTE, NO round verdict flips, every load-bearing razor/quartic/ladder/census claim of rounds 149–162 and the promotion wave v922–v925 independently CONFIRMED) recommended for promoted and live surfaces, applied to the LIVE surfaces only (frozen probes and notes are never retro-edited — the correction is the record); ONE documented count correction and NO other numeric value change anywhere; v925 stays green with unchanged gate count (14/14) and unchanged verdict: (1) BH5-F2, THE COUNT CORRECTION (72 $\rightarrow$ 73): v925_edge_cleanup_closures.py (docstring E1 headline, the D1 check text and the D1 inline comment + website mirror, byte-identical) and the ledger row PRIME.EDGE.CLEANUP.CLOSURES.01 said “72 sliver + first-zero targets” / “72 unique targets” — the record log’s own per-block certified counts (1/1, 1/1, 1/1, 1/1, 18/18, 51/51) sum to 73, and the unique-target arithmetic confirms 73: 71 sliver zeros + the first zeros above the

band at b8/b18 only (their slivers are EMPTY; at b5/b13/b24/b28 the first zero lies INSIDE the sliver and is already counted); all 73 certificates exist and were always green — only the headline count changes, the gate logic was already correct (the module gated $\sum == 73$ before this correction); the paper/website prose was already count-free (“per-zero”, “at every sliver + first-zero target”); (2) BH5-F6, THE ROUND-LABEL DRIFT (live-surface leakage only): the corpus convention fixes anchor_epslock = round 153 (r152 = the CDLVI promotion round, no promotable content) — corrected at the two live sites that had inherited the drift: the tfpt_prime_front scope paragraph (“the round-152/153 anchor coordinates” → “the round-153 anchor coordinates”) and the CVIII entry wording (“round-152/153/155” → “round-153/155”); the frozen assembly_walls docstring and note CDLXVI keep the drift as the record; (3) BH5-F1 CHECKED CLEAN on live surfaces: r150’s overstated “betapos == S1/jr by exact chase” (exactly: $S1/jr - \text{betapos} == \text{betapos}^2 / (\text{FULLGAP} - \text{betapos}) > 0$, magnitude 2.7×10^{-7} at $x = 5$ — below r150’s 4-digit print) lives ONLY in the frozen r150 probe and note CDLIV; v923 already promotes the corrected GF5a law with the factor $(\lambda_1 - \tau) / (\lambda_1 - \beta_0) \geq 1$ — no live edit needed; (4) BH5-F3 CHECKED CLEAN: the r160 rescue-instrument overstatement (“projected nonneg least squares” for a greedy eigenvalue-lifting loop; enum RESCUE-INFEASIBLE-IN-CLASS certifying only THAT trajectory) appears on NO live surface — r160 was never promoted, and the live scope paragraphs carry its verdict only as INFORMATIVE-NEGATIVE (the correct typing, confirmed by the audit); (5) BH5-F4/F5 CHECKED CLEAN: no leakage of “SPEC_SHA moves once” or the b8-SCRARITH 0.2597 misattribution to any live surface (frozen-file wordings stay as the record); (6) GATES: v922–v925 re-run green BEFORE any edit (13/13, 20/20, 12/12, 14/14, ~ 1 s each); v925 re-run green AFTER the correction with unchanged gate count 14/14; build.sh release + EXIT GATE build.sh audit AUDIT OK; manifests last; German note appended to next.txt. NO RH claim in any direction — a bookkeeping correction says nothing about the truth of RH either way)

2026-08-19 (CVIII) (the spectral-balance/edge theorem-arc promotion — the four durable certified theorem sets of discovery rounds 152–161 graduate from experiments/ into the load-bearing suite as v922_spacing_jet_sumrule_theorems.py, v923_spectral_balance_razor_theorems.py, v924_moment_laurent_rootladder.py and v925_edge_cleanup_closures.py (suite 914 → 918, ledger 1065 → 1069); all four rows typed NOT-RH-EVIDENCE in either direction — identities, enclosures and finite/classical closures: they close no omega, narrow no gate, move no other marker; the omega census stays at cardinality 4, the residue at {TOPROOT, TLAWCAP-block, QSUBGAP-floor(= the pair {SUSCAP2R, DELTA1FLOOR})} + the a -walls; every conditional or measured leg typed and carried verbatim; the family-wide exact algebra was Lean-hardened in the second Lean round (round 158, note CDLXII: five new Lean 4 modules, 28 fully proven theorems on the three standard axioms, build green) and each module re-checks the shipped Lean theorem names at every suite run: (1) v922 THE HPIN/SPACING THEOREM FAMILY (rounds 135 + 154, notes CDXXXIX + CDLVIII, ledger row PRIME.SPACING.JETSUMRULES.THEOREMS.01 [E]; source probes hpin_floor_probe.py, 33/33, SPEC 80366b4e62779398, PINNED from run-of-record 1837.6 s with THREE deterministic logs kept (D1/D2 re-gated by r154-G32 + Lean r158), and nearalign_probe.py, 31/31, SPEC f92b3fb59b142254, re-run green-as-typed at promotion, 1572.7 s) — the deriva-

tive identity $E'_N(\mu_j) == 4 \sin(A\mu_j)F'(\mu_j^2)$ with the spacing-product form (the H-pin floor is a ZERO-SPACING PRODUCT), the jet sum rules of both orders ($\sum 1/F' == -A_2/A_0^2$; $\sum F''/F'^3 == 2A_2/A_0^3$; the boundary-jet telescope IS the reciprocal-floor moment data), the A_0 -cancellation (the demand ratio is A_0 -FREE), the certified lattice tail, and the sign-uniform corollary carried as an OBSTRUCTION (census MIXED at every rung); SpacingProduct.lean proves the spacing product for GENERIC FINITE K over an arbitrary field; (2) v923 THE PINCH/ENCLOSURE/RAZOR FAMILY (rounds 157 + 161, notes CDLXI + CDLXV, ledger row PRIME.SPECTRAL.BALANCE.RAZOR.01 [E]; source probes spectral_balance_probe.py, 26/26, SPEC 3ed388698a138e31, re-run green-as-typed at promotion, 4077.8 s, non-timing diff EMPTY, and gfloor_probe.py, 26/26, SPEC cc7837138d41add7, PINNED from run-of-record 4068.2 s + deterministic re-run identical per the multi-hour convention, both logs kept, its GF algebra recomputed in-module) — SB1–SB5 (the trace loop $\tau \text{ TrH} == \text{tf}/\text{FULLGAP}$ with $1 \leq \text{tf} \leq K - 1$ UNCONDITIONAL: DELTA1FLOOR $\Leftrightarrow$ TRACEFLOOR two-sided, tail closed; the chi-cap; the enclosure $\rho^2 \delta_1 \leq g \leq \delta_1$; the OVG identity; the share floor) + GF1–GF5 (THE RAZOR ENCLOSURE $1/(s + 1/\delta_1) \leq g < 1/s$ with TWO-LEVEL EQUALITY at the lower end — the exact witness $\rho^2 = 1/(1 + P\delta_1)$ realizes $s == P = 10^6$ AND $g ==$ the lower end EXACTLY, no algebra-only improvement exists: THE g -FLOOR IS THE s -CAP GIVEN THE δ_1 -FLOOR, measured width $1.51 \times 10^{-4} \rightarrow 8.45 \times 10^{-8}$; the pinch law $1 - sg == g^2 T_2 / \rho^2$; the one-sided share pricing; the Newton value law $N_1 == 1/(H_t + s)$ with $B(q_0) == -\rho^2 P'_c(q_0)$ and the jet-ratio chase $J_g t_g == 1 + g$; the S1 absorption + twin squeeze: both final cores ONE statement-form at two weightings, the value-merge REFUTED — the J-family is BLIND to g); W1/W2/W3 cited from v920, no double count; (3) v924 THE MOMENT-LAURENT/ROOT-LADDER FAMILY (round 156, note CDLX, ledger row PRIME.MOMENT.LAURENT.ROOTLADDER.01 [E]; source probe rootladder_probe.py, 29/29, SPEC 02755d6b7ad0cfcfb, re-run green-as-typed at promotion, 1873.5 s, zero amendments) — the escaped census-root ladder is the zero set of the moment-Laurent $\Phi(z) = z - 1 + \sum_m J_{m+1} z^{-m}$ (self-similarity iff moment flatness, exact remainder), the QUARTER-CAP $J_2 \leq 1/4 + z_0|\rho|$ PROVEN (measured $z|\rho| \leq 0.0102$: proven headroom over the 0.1506 saturation), the exact sum rules, the sign-pattern law, the cascade ($T > 0$ pointwise SOURCE-PURE down to $Y^* = 1.02\text{--}2.1 b_{\text{top}}$: the escaped-root cap CERTIFIED), the two-sided split, and the witnesses (shape sector scale-blind; J-BOUNDEDNESS ARITHMETIC-PINNED); (4) v925 THE EDGE/CLEANUP CLOSURES (round 159, note CDLXIII, ledger row PRIME.EDGE.CLEANUP.CLOSURES.01 [E]; source probe edge_cleanup_probe.py, 34/34, SPEC f6c0318841bb3942, re-run green-as-typed at promotion, 1830.8 s) — SIMPLICITY FALLS (census row Z8 eliminated $10 \rightarrow 9$ by LM-split subsumption + zero-cost avoidance; residual NONDEGENERATE-CELL witness-certified free), THE Q-SWAMP CLOSES WHOLESALE with the 357 Turing-class local band certificates RECOMPUTED IN-RUN at every suite run from the committed PT21-warranted verified_zeros_n7000.json cache ($D_{\text{cs}} > 0$ at all integer $x = 3..121 \times \text{battery}$ $a \in \{1, 4, 16\}$, worst margin 0.346 at (12, 1); $x_0(\text{HSW}) = 121 + x_0(\text{BW25}) = 112$ recomputed; heights $\leq 7264.75 \ll 3 \times 10^{12}$, ward-typed): THEOREM A's conditionality SHARPENS to every integer $x \geq 3$ (H-pin untouched), and the band-edge sliver closes below horizon per-zero (pinned; the certificate price rides $e^{-\text{depth}}$, machine-pinned); (5) NOT PROMOTED, deliberately: the round-160 J_2 prime-force adjudication (note CDLXIV, verdict INFORMATIVE-NEGATIVE

— the single-lever search closed) stays experiments-side: multi-hour world-builds with no exact-algebra layer a module could recompute, residue reading still in active motion; likewise the round-153/155 anchor/census coordinates; (6) SURFACES: ledger rows (1065 $\rightarrow$ 1069); veri blocks in `tfpt_3` (audit-counted body) + the new prime-front diary section “The spectral-balance/edge theorem arc” with the suite-count refreshes (914 $\rightarrow$ 918 across the live parentheses); endform article §8.19 + Anthropic email promotion paragraph; website PROMOTED feed card + DAG scripts + banner/meta v535–v925; README/Zenodo 918; note CDLXVI; (7) GATES: all four affordable source probes re-run green-as-typed BEFORE any edits (identical SPEC SHAs; 31/31, 26/26, 29/29, 34/34; logs kept as `*.promo_rerun.log`), the two pinned probes disclosed (r135 three logs; r161 both logs); v922–v925 standalone green (13/13, 20/20, 12/12, 14/14, each ~ 1 s); FULL `run_all.py` ALL CHECKS PASSED at 918 modules; `build.sh` release + EXIT GATE `build.sh` audit AUDIT OK; manifests last. NO RH claim in any direction — identities, enclosures and finite/classical closures say nothing about the truth of RH either way)

2026-08-18 (CVII) (the prime-front theorem-arc promotion — the four durable certified theorem sets of discovery rounds 128–151 graduate from experiments/ into the load-bearing suite as `v918_doublelimit_reduction_theorem.py`, `v919_secular_gw_pinning.py`, `v920_loop_equivalence_theorems.py` and `v921_counting_dominance_closures.py` (suite 910 $\rightarrow$ 914, ledger 1061 $\rightarrow$ 1065); all four rows typed NOT-RH-EVIDENCE in either direction — reductions, identities and counting closures: they close no omega, narrow no gate, move no other marker; the omega census stays at cardinality 4, the residue at {TOPROOT, ONSETCAP(=TLAWCAP), SUSCAP2R} + DELTA1FLOOR + the a -walls; every conditional or measured leg typed and carried verbatim; all candidates survived the adversarial Bughunt III (round 130) and/or Bughunt IV (round 149, note CDLIII, 0 MAJOR): (1) v918 THEOREM R (round 128, note CDXXX, ledger row PRIME.DOUBLELIMIT.REDUCTION.THEOREM.01 [E]; source probe `doublelimit_proof_probe.py`, 28/28, SPEC 0c77ef7ce43fd62e, re-run green-as-typed at promotion, 398.5 s; independently re-derived in Bughunt III) — the load-bearing reduction of the arc, proven with elementary inputs: L1 + WPD $\Rightarrow$ (H-conv) + (H-trace) with the EXPLICIT RATE $\max(1, C)(-4 \log(1 - t/4)) d_1$ via the exact series identity $\log(R_{\text{fin}}/R_a)(t) = \sum_k t^k d_k/k$; with the round-122 NF-closure theorem: RH $\Leftarrow$ [NF-closure] + [Theorem R] + {L1, WPD} on dense a ; Lemmas N/S/X and the exact $C_{0k} \leftrightarrow$ jet dictionary travel with it; honest typing carried: WPD’s k -tail IS window positivity (exact witness $k^*(B) = 29959/76013/145094$ from $4w^* = 10001/10000$, recomputed in-run), L1 stays obstructed at the node-law wall — proven is the REDUCTION and the COORDINATE, not the convergence; (2) v919 THE SECULAR IDENTITY + THE GUINAND–WEIL PINNING (round 131, note CDXXXIII, ledger row PRIME.SECULAR.GW.PINNING.01 [E]; source probe `l1_weyllaw_probe.py`, 31/31, SPEC 7d8cc2e5ca8108fb, re-run green-as-typed at promotion, 217.4 s; independently reproduced in Bughunt IV from the classical explicit formula, $|\Delta \log_{10}| = 2.7 \times 10^{-7}$) — $\det(M_\eta - z) = -z C(z^2)/A_0$ EXACT (recomputed on an own exact-rational instance, Fractions, dim 11: the operator nodes ARE the census zeros, node count EXACTLY $K - 1$); $\tau = 2 \sum_\rho |E_N(\gamma_\rho)|^2$ within certified allowances (Guinand–Weil, cited), the certified smallness law, the certified gap law in the resolvability zone ($x = 13$: 21/21 zone zeros pinned, max gap $2.9 \times 10^{-17} \leq 5.6 \times 10^{-8}$; edge layer MEASURED-ONLY); L1-TAIL closed in closed form (HSW22 Cor. 1.2 + PT21, recomputed against an own

IBP integral); the crossover theorem $T = 2\pi x$ exact — the corpus constant $\text{INBAND_F} = 1/\text{KFAC} = 0.8$ is a THEOREM; the boundary-jet law; the band half of L1 (H-pin) stays OPEN, Z1 evidence typing stands; (3) v920 THE LOOP/EQUIVALENCE THEOREMS (rounds 140 + 142, notes CDXLIV + CDXLVI, ledger row PRIME.LOOP.EQUIVALENCE.THEOREMS.01 [E]; source probes `jetlock_bandmass_probe.py`, 33/33, SPEC 85e7ba691b3eef58, PINNED from run-of-record 3824.7 s + deterministic re-run 3783.4 s per the multi-hour convention (both logs kept, loop algebra re-gated in Bughunt IV and recomputed in-run), and `tlawcap_suscap2r_probe.py`, 26/26, SPEC 85971e173cd910f8, re-run green-as-typed at promotion, 1904.7 s) — the anti-double-counting layer, all recomputed exactly: $\text{BAND-MASS} \Leftrightarrow \text{TLAWCAP} \Leftrightarrow \text{EPS-LOCK}$ modulo $\{\text{JETLOCK}, \text{TAILVIS}\}$ (Theorem B2: band-mass is EPS-LOCK-COMPLETE), the onset IS the jet ratio and the jet ratio IS escaped census-root mass (J2/J3: $\text{JET-LOCK}(\text{poly}) \Leftrightarrow \text{TOPROOT}$; J4: the hardness is cancellation ALIGNMENT), the W1 pinch identity ($s \times \text{gap} \equiv 1$ is NOT an identity: $1 - g/\delta_1 \leq sg \leq 1$ exactly), $\text{QSUBGAP} \Leftrightarrow \text{SUSCAP2R} \wedge \text{DELTA1FLOOR}$ (W2, both directions exact), $\text{DELTA1FLOOR} \Leftarrow \text{FULLGAP}$ (W3, Cauchy interlacing, source-pure; measured TIGHT 1.0000), plus the exact DELTA1FLOOR-required witness ($s \equiv 1$ while $\text{gap} \rightarrow 0$ — the Bughunt-IV F1 correction of record carried in-module); reshape theorems: no omega closes, no future double-counting possible; (4) v921 THE COUNTING-CLASS CLOSURES (rounds 133 + 143, notes CDXXXVI + CDXLVII, ledger row PRIME.COUNTING.DOMINANCE.CLOSURES.01 [E]; source probes `dominance_proof_probe.py`, 40/40, SPEC 00b98f5eebf9c5fb, re-run green-as-typed at promotion, 339.3 s, and `toproot_tailvis_probe.py`, 27/27, SPEC 4fcd70beb7cf4f17, PINNED from run-of-record 4016.1 s + deterministic re-run 3921.4 s per the multi-hour convention (both logs kept, T1 re-derived independently in Bughunt IV)) — Theorems M/E (ball/edge counting, no sign reads), Theorem T UNCONDITIONAL ($N_{\text{fin}}(T) \leq N_{\text{true}}(T)$ for all $T \geq T^*(x)$; ladder 63.55/79.17/102.80/147.13 recomputed vs the classical γ_{K-1} anchors), Theorem C exact (MRB strictly weaker than DOM — per-node one-sidedness neither needed nor claimed), Theorem A CONDITIONAL on H-pin (closed forms recomputed: $x_0 = 121$, BW25 $x_0 = 112$; the Q-swamp strip $D < 0$ on $x \in \{13..89\}$ carried, not smoothed), Theorem T1 (TAILVIS existence is CLASSICAL from HSW22/RvM alone: $L^* = O(20)$ falling — TAILVIS eliminated as a standalone arithmetic omega, counting class) and Theorem T3 (the round-140 horizon limitation at $x = 24/28$ RESOLVED without new zeros; recomputed from the v919 pins to $< 2\%$); the window carrier $x \lesssim 2.3 \times 10^5$ disclosed (carrier class, not a new omega); (5) NOT PROMOTED, deliberately: the round-147 adjudgate elimination (AD1/AD2 + the cell lemma modulo simplicity) and the round-150/151 collapse-rate/multiblock coordinates stay experiments-side — their coordinates are still in active motion and the simplicity leg is open; (6) SURFACES: ledger rows (1061 $\rightarrow$ 1065); veri blocks in `tfpt_3` (audit-counted body) + the new prime-front diary section “The prime-front theorem arc” with the promotion of record and the suite-count refreshes (910 $\rightarrow$ 914 across the live parentheticals); endform article §8.18 + Anthropic email promotion paragraph; website PROMOTED feed card + DAG scripts + banner/meta v535–v921; README/Zenodo 914; note CDLVI; (7) GATES: all four affordable source probes re-run green-as-typed BEFORE any edits (identical SPEC SHAs; 28/28, 31/31, 40/40, 26/26), the two multi-hour probes pinned with disclosure; v918–v921 standalone green (13/13, 11/11, 17/17, 9/9, each ~ 1 s); FULL `run_all.py` ALL CHECKS PASSED at 914 modules; `build.sh` release + EXIT GATE `build.sh`

audit AUDIT OK; manifests last. NO RH claim in any direction — reductions and identities say nothing about the truth of RH either way)

2026-08-16 (CVI) (the Bughunt-III corrections of record — the four wording/label corrections that the round-130 adversarial audit (note CDXXXII, experiments/tfpt-discovery/bughunt3_probe.py, 20/20 gates, 0 MAJOR / 4 MINOR / 3 NOTE, NO verdict flips, every promoted number of v916/v917 independently CONFIRMED) recommended for promoted and frozen surfaces, applied to the LIVE surfaces only (frozen probes and notes are never retro-edited — the correction is the record); NO numeric value changes anywhere, both modules stay green with unchanged gate counts (20/20, 13/13) and unchanged verdicts: (1) v916_epstein_weil_violation.py (+ website mirror): the pin PIN_EULER_BOUND = 0.664 relabeled as the $N = 2 \times 10^4$ TRUNCATION of $\sum_{n \geq 4} r_Q(n) n^{-1.6} / r_Q(1)$ PLUS the declared Abel-model tail — NOT the “full-table value” (its old label); the true full sum is 0.645728 (bughunt 4-decade ladder $N = 4 \times 10^3..4 \times 10^6$, spread 8×10^{-7}) and v917’s 0.650 is the same construction at $N = 2 \times 10^5$; the pinned number 0.664 itself is UNCHANGED (a valid upper bound; both reads < 1 , the D1 gate logic stands); (2) v917_driver_rate_certification.py (+ website mirror + the ledger row PRIME.KR4.DRIVER.CERT.01): the localization census premise restated from the too-strong “every off-line zero below 45 is located” to the gated repair — $\delta \geq 0.01$ census boxes + band-straddle completeness + the window-width argument: $\max |v(a_0)| = 0.646 < 1$ on the census-blind strip, any $|v| > 1$ zero must sit at $\gamma \in (15.645, 15.703)$ INSIDE the straddle-boxed band, and blind-strip contributions to the depth diffs are negative or $\leq 10^{-40}$ — hidden zeros can only MASK the fire, never fake it (the localized verdict SURVIVES; papers and website prose checked: the too-strong sentence appears on no other live surface); the 0.650 Euler-region read carries its truncation label now too; (3) the round-129 “round-124 t_{death} ” misattribution (the collapse is ROUND 123): searched tfpt_prime_front, articles/, website — NO live surface carries the wrong round label, nothing to correct (the frozen round-129 probe and note CDXXXI stay as they are per the freeze convention; note CDXXXII documents the error); (4) the note-CDXXVII poly-filter class-label shorthand (the hull normalization $|p| \leq 1$ on the spectral hull dropped): searched papers, website, ledger — the shorthand leaked to NO live surface, nothing to correct (the frozen note stays; the probe’s own hypothesis-carrying statement was always right). GATES: v914–v917 re-run green BEFORE any edit; v916/v917 re-run green AFTER (20/20, 13/13, verdicts unchanged); build.sh gen + release; EXIT GATE build.sh audit AUDIT OK; manifests last; note CDXXXIV (head numeral re-verified immediately before writing: the concurrent L1-Weyl-law lane had taken CDXXXIII — one collision resolved by re-read). NO RH claim in any direction)

2026-08-16 (CV) (the Epstein detection-arc promotion — the two durable certified results of discovery rounds 123 and 125 graduate from experiments/ into the load-bearing suite as v916_epstein_weil_violation.py and v917_driver_rate_certification.py (suite 908 $\rightarrow$ 910); both rows typed NOT-RH-EVIDENCE in either direction — known falsehoods (the off-line zeros of $Q = x^2 + 5y^2$ are Potter–Titchmarsh 1935 / Davenport–Heilbronn 1936), new certified instruments; the min-cut is unchanged (flows 4/4): a detector is a falsifier, not a prover: (1) THE CERTIFIED EPSTEIN WEIL-POSITIVITY VIOLATION (v916, 20/20, ledger row PRIME.KR4.EPSTEIN.COLLAPSE.01 [E]; source probe epstein_collapse_probe.py round 123, frozen SPEC bb51d1a3299f4f62, 27/30 with exactly the three PRE-DECLARED falsified predictions G18/G19/G21 failing,

re-run green-as-typed at promotion, 998.5 s) — an explicit sha-pinned unit test vector (len 1038, sha b01436d53d2cbbbee, REPRODUCED at every suite run together with the full quadratic form) whose tent-autocorrelation test function pairs **NEGATIVELY** with the source data $-g''_Q$ built purely from $r_Q(n)$ lattice counts: $V = x^T T x = -1.9697 \times 10^{-2}$, error budget $\leq 4.3 \times 10^{-68}$, two-precision (dps 80/110) agreement 9.8×10^{-79} — windowed Weil positivity for ξ_Q **FAILS** at $t \leq 3.114$; the Q world dies at $t_{\text{death}} = 2.988$ (recomputed eigenvalue crossing $k^\dagger = 998$, mesh mate stable, Q -scramble dies at 2.73) while **TRUE** zeta and the conductor-matched null $\zeta_K = \zeta_{L-20}$ complete positivity through $L = 8.0$ (pinned run-of-record; ZK anchor and $L = 4.0$ prefix recomputed; the certificate vector reads **POSITIVE** on the matched null); the value channel is CERT-NUM, the off-line-zero interpretation step **COND-CLASSICAL** (Weil/Guinand explicit formula, cited); the three pre-declared falsified predictions travel verbatim (attribution **COLLECTIVE** — witness removal moves the death by only 0.018, all-located removal survives to 4.428; the law misses by $0.505 > 0.5$; the census is falsified: **FOUR** off-line pairs below 45, the round-117 witness never γ -minimal, the 15.6682 **DRIVER** carries $26\times$ its excess); (2) **THE CERTIFIED LOCALIZED RATE DETECTION OF THE DRIVER** (v917, 13/13, ledger row **PRIME.KR4.DRIVER.CERT.01** [C]; source probe `driver_cert_probe.py` round 125, frozen SPEC bcc64cb371dff9c8, 32/33 with exactly the single **PRE-DECLARED G11** fail, re-run green-as-typed at promotion, 881.1 s) — the driver $\rho = 0.9329696975 + 15.6682495313i$, source-located from the Λ_Q sieve ($\Delta\gamma = 6.6 \times 10^{-5}$), fires in the band-peeled rate channel at depth $m^* = 14$ with certified $\text{LB} = 1.000137 > 1$, **LOCALIZED** from $m_{\text{loc}}^* = 15$ (the violating window contains $a^* = 245.6815$: it is the driver); the band peel $\gamma \in (7.90, 31.40)$ (winding-complete, every peel $|\xi_Q|$ -verified, phantom peel doubly excluded) collapses the unpeeled price $m_2 = 908$ by $\times 65$ at sieve cost only $N = 2 \times 10^5$; the new exact algebra is recomputed symbolically at every run ($v^* = 1 + \varepsilon$ **EXACTLY REAL** at the matched pin, weight exactly 1, $\text{LB} \rightarrow v^*$ to six digits by $m = 25$, certified depth 32, $\text{Err} \approx 2.1 \times 10^{-12}$, $\text{meas} \leq \text{cond}$) together with the quantified detection-cost law $m^* \approx \ln(B_{\text{band}}/\varepsilon)/\ln(1/v_{\text{edge}})$, sieve price polynomial in $1/\varepsilon$ via the band, measured 3.19 certified depths per unit $\ln N$; the grade is carried verbatim and never upgraded — **CERT-GIVEN-AUDIT** (rigorous Cauchy given the incomplete-gamma audit comparator plus the **DECLARED** tail/peel models) and **DISGUISE-ADJACENT** (the deep read is an Euler-computable truncated windowed Weil transform) — and the honest caveat is carried: the pre-declared **G11** gate (locator relocates 4/4) **FAILED**, the weak round-117 witness (excess 2.9×10^{-5}) sits below the locator’s measured threshold at $N = 2 \times 10^5$, so the locator is typed a 3/4 **MEASURED** instrument and no 4/4 claim is promoted; (3) **SURFACES**: ledger rows **PRIME.KR4.EPSTEIN.COLLAPSE.01** + **PRIME.KR4.DRIVER.CERT.01** ($1059 \rightarrow 1061$); veri blocks in `tfpt_3` (audit-counted body) + the new prime-front diary section “The Epstein detection arc” with the promotion of record, the suite-count refreshes ($908 \rightarrow 910$ across the live parentheses) and the correction of record on the round-102 witness sentence (never γ -minimal); endform article + Anthropic email promotion paragraphs; website **PROMOTED** feed card + DAG nodes + banner/meta v535–v917; **README/Zenodo** 910; note **CDXXVIII** (head numeral re-verified immediately before writing: the concurrent selection lane had taken **CDXXVII** — one collision resolved by re-read); (4) **GATES**: both source probes re-run green-as-typed **BEFORE** any edits (identical SPEC SHAs, identical failing sets); v916/v917 standalone green (20/20 in ~ 12 s, 13/13 in ~ 1 s); **FULL** `run_all.py` **ALL CHECKS PASSED** at 910 modules; `build.sh` **release** + **EXIT GATE** `build.sh` **audit** **AUDIT OK**; manifests last. **NO RH** claim in any

direction — both rows are falsifier instruments on a classical known-falsehood world; zeta’s omega absorbs every finite certificate)

2026-08-15 (CIV) (the weekend promotion — the two durable proven results of the discovery weekend graduate from experiments/ into the load-bearing suite as `v914_pascal_region_theorem.py` and `v915_eulerpick_certified_floors.py`; suite 906 $\rightarrow$ 908, both modules green standalone (18/18 in ~ 20 s; 15/15 in ~ 40 s) and registered in `run_all.py`, the script registry and the status ledger (new rows `PRIME.PASCAL.REGION.THEOREM.01` [E] and `PRIME.EULERPICK.CERTIFIED.FLOORS.01` [E], both typed as certified-finite results with their citations disclosed and explicitly NOT as RH-evidence rows); all four source probes re-run green before any edit (`moonshot_sol_probe.py` 12/12, 0.4 s; `moonshot_o3_probe.py` 16/16, 100.8 s, frontier verbatim; `eulerpick_ladder_probe.py` 31/31, 102.8 s; the round-100 10^{13} compiled sieve NOT re-run — its `sieve4_run1.log` run-of-record is pinned per the PINNING DISCLOSURE convention); NO RH claim in any direction, no other marker moved, no gate closed or narrowed: (1) **v914 THE PASCAL-REGION THEOREM** (rounds 103 + 106): $C_{n,k}(256) > 0$ for EVERY $n \geq 0$ and every integer $0 \leq k \leq 7,444,682,106,464,286,365,865$ ($\sim 7.44 \times 10^{21}$), proven from cited external inputs alone — Platt–Trudgian 2021 Thm 1 ($T = 3,000,175,332,800$), Hasanalizade–Shen–Wong JNT 235 (2022) Corollary 1.2 ($|N(t) - M(t)| \leq 0.1038 \log t + 0.2573 \log \log t + 9.3675$, $t \geq e$), Rosser 1941 Thm 19, the classical γ_1 isolation; the module recomputes the COMPLETE round-103 four-region partition at every suite run ($B_0(T) = 7.57565571105606088 \times 10^{-10}$ anchored; decisive ratios $1.876981097339/1.176577026464/335.835/1416.754$; mechanism root $k^* = 1.405443828790708 \times 10^{19}$), recomputes the quadratic verification-height law $k_{\text{front}}(T) = (\lambda_\infty + O(1/\log T)) T^2/(a - 1/2)$ with $\lambda_\infty = 0.226987054723979955$ (residual $< 10^{-60}$), pins the 33-cell run-of-record frontier partition and re-proves a frozen 6-of-33 subsample with full 16384-packet endpoint inequalities INCLUDING the worst cell (endpoint ratio 1.000001535385559 ; the next 2×10^{-6} relative step fails — mechanism-exact); **THE ROUND-110 HSW ATTRIBUTION FLAG RESOLVED FROM THE PAPER ITSELF: Cor. 1.2 IS the $N(t)$ bound with exactly the constants consumed, Cor. 1.4 is the companion $S(t)$ bound ($\min\{\dots + 8.3675, 0.1095 \log t + 0.2042 \log \log t + 3.0305\}$) and is NOT used — the probe docstring’s “Cor. 1.4 is the corrected replacement” was the slip, the numbers were always right; the old (0.110, 0.290, 2.290) constants are the earlier Platt–Trudgian $S(t)$ bound whose proof consumed the invalid Cheng–Graham estimate; HONEST TYPING carried in module, ledger and papers: verification-powered, FORM-LOCAL (zero-location content below $\gamma_1 = 14.13$; says nothing about screw sections or Weyl disks), the $k \rightarrow \infty$ quantifier untouched, no wall positivity, no zero table, no zeta evaluator — NOT evidence for or against RH;** (2) **v915 THE CERTIFIED EULER–PICK FLOORS $N = 1..4$ (rounds 95 + 100):** outward-rounded interval positivity certificates with the recomputed/pinned split disclosed exactly — RECOMPUTED in-run: the certificate self-tests, the certified digamma, the own sieve to 1.6×10^7 with all three cited ψ -bounds warded against own data (Büthe 2018; Rosser–Schoenfeld 1962 Thm 12; Nair 1982), the cap- 4×10^6 $N \leq 2$ and cap- 1.6×10^7 $N \leq 3$ floors reproducing the round-95 record ($\log_3 = 2.3643695 \times 10^{-10}$), the summation-error model of the compiled run re-derived rigorously from the pinned $\pi(10^{13})$ plus an RS–Abel upper bound (no sieve needed), the Nair far-floor necessity (the crude $\psi \geq 0$ floor blocks $N = 4$ at ANY cap) with the corrected budget $X_{\text{req}}(4) = 10^{11.52}$, the $N = 5$ knowledge wall, and a recomputed detection subset ($N^*(5; 0.1) = 3$,

$N^*(8; 0.1) = 4$, $N^*(8; 0.4) = 3$; PINNED from run-of-record: the cap- 10^{13} intervals $N=1$ $[4.5917135 \times 10^{-2}, 4.5917136 \times 10^{-2}]$, $N=2$ $[9.0288887 \times 10^{-6}, 9.0288888 \times 10^{-6}]$, $N=3$ $[6.9310239 \times 10^{-10}, 6.9310252 \times 10^{-10}]$, $N=4$ $[8.278338 \times 10^{-15}, 1.3840906 \times 10^{-14}]$ (margin 0.749) with $\pi(10^{13}) = 346,065,536,839$ reproduced exactly by the recorded instrument; HONEST TYPING (round-108 F3 carried verbatim, no overselling): the falsification channel is DISPROOF-SOUND but REACH-CAPPED at $\gamma \sim 5-8$, far below Platt–Trudgian 3.0×10^{12} — zero live falsification power in the classically certified range; “open and empty” is a theorem given the cited inputs; the channel stays open and EMPTY; (3) SURFACES: `tfpt_prime_front` gains the promotion-of-record notes and `\veri{}` citations in the owning sandbox-diary subsections (instrument tier; roadmap; frontier audits) with the freeze-time suite counts rephrased honestly (906 at freeze $\rightarrow$ 908 today); the end-form article and the Anthropic email draft gain matching promotion-of-record paragraphs; the website prime-front page and feed gain the promotion entry and tier upgrades (Euler–Pick floors and Form-A frontier now named as modules, reach caps kept verbatim), the DAG E8 node gains both scripts, README and Zenodo counts move to 908/v1-v915; `ScriptIndex.tsx`, `changelog.ts`, `suite.ts` and the maps regenerated via `bash build.sh gen`; full suite re-run `run_all.py` $\rightarrow$ ALL CHECKS PASSED at 908 modules; `bash build.sh audit` $\rightarrow$ AUDIT OK; manifests regenerated LAST. NO RH claim anywhere)

2026-08-15 (CIII) (the boundary-and-resolvent sync — discovery freeze rounds one-hundred-eleven and one-hundred-twelve synced into every live surface; experiments/ only — TWO frozen probes, NO promotion, NO module, NO ledger row, NO marker moved, NO gate closed or narrowed, suite unchanged at 906, NO RH claim in any direction; both source probes re-run green before any edit (`unpriced_classes_probe.py` 26/26, 88 s; `resolvent_closure_probe.py` 36/36, 266 s): (1) ROUND 111 (note CDXI, contract PRIME.UNPRICED.CLASSES.01, `unpriced_classes_probe.py`, 26/26 gates, 88 s, SPEC `ec787fc5`, deterministic re-run bit-identical, verdict UNPRICED-ADJUDICATED — tally 25 $\rightarrow$ 30 candidates, 0 PASS): the five argument classes the round-108 audit named as genuinely OUTSIDE the atlas enumeration are all adjudicated and killed, none surviving as an open lever; (U-A, THE HEADLINE — UA-RATE-IS-ZERO-CURRENCY) Zagier’s published horocycle RH-equivalence (Zagier 1979/81: $m_y(f) = m(f) + o(y^{1/2})$ unconditional, $\text{RH} \iff \text{error } O(y^{3/4-\epsilon})$; Sarnak CPAM 34 (1981); Verjovsky 1994) — a published RH-equivalence NEVER ADJUDICATED UNTIL NOW, confirmed absent from every atlas artifact; the instrument built (incomplete Eisenstein series $\psi(t) = t^2 e^{-t}$, horocycle integral $= 3/\pi +$ scattering contour, warded two-route: $\text{dev} \leq 1.5 \times 10^{-8}$, $|\varphi(1/2 + it)| = 1$ to 9.9×10^{-32} — the unconditional 1/2 exponent is UNITARY, no spectral gap) measures the deep-window exponent 0.7451 (the RH-range 3/4 in the classically verified region) and, on planted-zero synthetic scattering worlds at $\beta = 0.6/0.75/0.9$, the exponents 0.6971/0.6222/0.5473 against the law $1 - \beta/2$ ($|\text{dev}| \leq 0.0029$) — THE HOROCYCLE RATE IS EXACTLY THE AFFINE REPARAMETRIZATION $\theta = 1 - \Theta/2$ OF $\sup \text{Re } \rho$: the emptied E2 zero-free/density currency, alignment content linear $\log y$ phases (the round-97 class, $\times 8.2$); rigidity technology rate-free (Ratner) or non-horospherical (Lindenstrauss–Mohammadi–Wang CRAS 361 (2023): unspecified exponents, explicitly beyond the horospherical case — the modular horocycle IS horospherical, where the classical spectral 1/2 has stood since 1981); DISGUISE by rule R1; (U-B — UB-INAPPLICABLE-BY-TYPE) the zero set of Hardy Z is infinite (29 sign changes on $[0, 100]$ measured =

the RvM count) while o-minimal definable sets have finitely many connected components — ζ on the line is definable in NO o-minimal structure; the serious adjacent result verified and typed (Masser JNT 131 (2011): rational points on the GRAPH, $\leq C(\log D/\log \log D)^2$ — count currency, position-free, unsigned); (U-C — UC-HOST-GAP-CONFIRMED) $\lambda \geq 1/4$ with positive multiplicity forces the line (the Selberg-zeta precedent) but $\lambda = 1/5$ with positive multiplicity yields the real pair $1/2 \pm \sqrt{5}/10$ exactly — positivity alone does not force the line, it needs identity AND the $1/4$ gap, which at the arithmetic quotients is Selberg’s own OPEN conjecture (Kim–Sarnak floor 975/4096, deficit 49/4096 exact); for ζ the host identity is the mountain (Connes’ trace formula $\iff$ RH) — Stage 1 of the roadmap in another language, no new lever; (U-D — UD-MAGNITUDE-LAW-ONLY) every proven FHK-type deliverable (ABRS 2019, FHK I+II, AOR moments; Harper RH-conditional) is a $|\zeta|$ -magnitude statement IN LAW $\rightarrow$ the emptied E1 class; the exception check closed exactly: iid uniform phases have ZERO signed expectation and a flip-invariant law — the randomized Euler product carries NO signed alignment observable; (U-E — UE-CANCELLATION-ONLY-INEFFECTIVE) Green–Tao $\log^{-A}$ savings long-interval with Siegel–Walfisz-ineffective constants, MRTTZ 2023 qualitative $o(1)$ on average, the charitable $C = 1$ envelope table showing the ENTIRE content in the constant, NO effective constant for Λ -nilsequence correlations, and the sharpest signed corollary of $|X| \leq \text{env}$ being $X \geq -\text{env}$ — orientation exactly at envelope strength, $\times 8.2$ short; **THE CLOSING SENTENCE:** the atlas stands at 30 candidates, 0 PASS, with the vocabulary boundary itself now adjudicated — every named argument class inside AND outside the original enumeration is formally priced; (2) ROUND 112 (note CDXII, contracts PRIME.SAFEPOINT.RESOLVENT.CLOSURE.01 + PRIME.CONNES.GROUNDSpace.BLOCK.01, `resolvent_closure_probe.py`, 36/36 gates, 262s, SPEC ea7863f2, deterministic re-run identical, two disclosed X1 tail-cut amendments; composite RESOLVENT-TRANSCRIPTION + CROSSCARRIER-BOUNDS + JENSEN-NO-DICTIONARY): **THE IDENTIFICATION** — arXiv:2511.22755’s operator (CCM’s rank-one $D_{\log}^{(\lambda, N)} = D_{\log} - |D_{\log} \xi\rangle \langle \delta_N|$ with ξ the lowest eigenvector of the Weil form, and its $\det_{\text{reg}}$ construction) is, **MODE FOR MODE**, the corpus’s own round-89 record extremal family (lattice $\pi k/a$, $a = \frac{1}{2} \log x$; the round-89 arbiter quotient IS the literal CCM operator); built explicitly at $x = 3, 5$ and certified: kernel $M\xi = 0$ to 10^{-68} , spectrum = record zeros (10/10 at $x = 5$, rel 2.7×10^{-8}), their $\det_{\text{reg}}$ formula executable as a rank-one determinant identity to 10^{-75} — **THE CORPUS HAD INDEPENDENTLY BUILT CCM’S OPERATOR BEFORE THEIR PAPER; THE GROUNDSpace-BLOCK VARIANT ELIMINATES CCM’S SIMPLICITY AND EVENNESS HYPOTHESES AT CONSTRUCTION LEVEL** ($M_{\text{blk}} = D(I - P)$ via the biorthogonal block projector, basis-rotation-invariant to 1.5×10^{-16} , **STABLE** where the simple selection swings $O(1)$ under 10^{-10} perturbations, the exterior/matrix-Wronskian identity $\det(M_{\text{blk}} - z) = \det(D - z) \det(I_2 - W(z))$ to 5.2×10^{-15} , PD quotient metric; the remaining realness step on E/K is the named unproven block-CCM lemma, finite-dimensional and zeta-free); **THE KILL:** the pins converge 16/16 (slope -0.65 , τ -screen 0/16) **BUT THE Z1 SCREEN FIRES** — band pins equal cache partial sums to rel $7.7 \times 10^{-12}/9.4 \times 10^{-12}$, the exact round-89 conviction **INHERITED BY THE LITERAL CCM CARRIER**; side-by-side at matched depth the Krein benchmark extrapolates genuinely (max dev 2.9×10^{-4}) while the CCM carrier band-transcribes (1.3×10^{-1}) — **THE KREIN CARRIER REMAINS**

THE ONLY NON-TRANSCRIBING ATTACK SURFACE IN THE CORPUS;
 CROSSCARRIER-BOUNDS: $\Delta_m = \text{Tr}[A_x^{m+1}]$ vs the round-102 Hausdorff $b_m(256)$
 — 17/17 m -rows MONOTONE LOWER BOUNDS FROM BELOW, deficit =
 the RvM tail beyond the band edge (median ratio 0.786; 11/41 roots beyond
 the band kept in all sums — the operator mirror of the Nyquist excess): the
 Hausdorff field and the CCM operator are ONE OBJECT ONLY IN THE
 LIMIT — at finite depth the operator is a band-truncated basis of the field from
 below (all 45 operator cells $n + k \leq 8$ nonnegative; a third carrier confirms via
 Krein σ -derivative moments to 8.7×10^{-4} – 2.7×10^{-3} within the bias model); THE
 JENSEN WEDGE (arXiv:2608.08682: $n^3 \log^2(n+2) \geq Kd^5 \Rightarrow$ hyperbolic, polyno-
 mially improving GORTW) verified verbatim but typed NO-DICTIONARY —
 the only corpus bridge (the Li transform at $a = 1/4$) is alternating-signed, so
 by round-108 form-locality the wedge adds NO unconditional Hausdorff cells;
 THE FORM-LOGIC GATES verify the architecture’s selling point exactly
 (F1: one Stieltjes representation would generate all three positivity families
 simultaneously; F2: finite certificates are form-local — Pick fires at $N = 5$ where
 Hausdorff stays positive to depth 40) — the logic is correct, AND PRECISELY
 THEREFORE WORTHLESS WITHOUT A NON-TRANSCRIBING CARRIER;
 the remaining analytic theorem is DOUBLY NAMED: CCM’s own §7–8 prolate
 approximation $\iff$ the corpus’s round-90 Weyl-disk contraction, pointwise
 at the pins; (3) SURFACES SYNCED IN THIS ENTRY: `tfpt_prime_front`
 gains the sandbox diary subsection “The vocabulary boundary priced, and the
 resolvent closure adjudicated: the CCM operator is the corpus’s own record
 family”; the end-form article gains §8.16 with the abstract status sentences
 and the traceability rounds 111–112 (with the Zagier 1979/81, Sarnak CPAM
 34 (1981), Verjovsky Kodai 17 (1994), Lindenstrauss–Mohammadi–Wang
 CRAS 361 (2023), Masser JNT 131 (2011), Kim–Sarnak, arXiv:2511.22755
 and arXiv:2608.08682 citations); the Anthropic email draft gains one status
 paragraph (the tally-30 close + the CCM identification as the collaborator
 hook: their operator is the corpus’s record family, and the corpus’s machine
 eliminates their simplicity hypothesis); the website prime-front page gains
 chapter 40 (the live-updates chapter renumbered $40 \rightarrow 41$) and one consolidated
 sandbox feed entry (verdict RESOLVENT-TRANSCRIPTION, new enum,
`script resolvent_closure_probe.py`); `website/lib/changelog.ts` regenerated via
`bash build.sh gen`; NO RH claim anywhere)

2026-08-15 (CII) (the corrections-and-frontier sync — discovery freeze rounds
 one-hundred-six through one-hundred-nine synced into every live surface, PRI-
 MARILY A CORRECTIONS ROUND: the round-108 big-picture logic audit
 and the round-109 Bughunt II independently convicted the published “three
 equivalent lemma forms” language and two related headlines, and the corrected
 wordings are now carried on every surface per the round-87/97 correction-
 of-record convention (frozen probes and notes are NOT retro-edited — the
 correction is the record); plus the new content: the $530 \times$ Form-A frontier
 extension with its derived quadratic law, and the code-synthesis adjudica-
 tion of the program’s founding intuition; `experiments/` only — FOUR frozen
 probes, NO promotion, NO module, NO ledger row, NO marker moved, NO
 gate closed or narrowed, suite unchanged at 906, NO round verdict flips, NO
 number wrong, NO RH claim in any direction: (1) THE CORRECTIONS
 OF RECORD (round 108, `bigpicture_logic_probe.py`, 31/31 gates, 2.5s, SPEC
 889edf4a, deterministic re-run identical, verdict BIGPICTURE-FINDINGS(3):

F1 FORMS-EQUIVALENCE-ONE-SIDED(+TRANSFER-NONE), F2 STAGE3-ENTRY-FORM-MISMATCH, F3 FALSIFIER-REACH-CAP; and round 109, note CDIX, contract PRIME.BUGHUNT2.R86.R105.01, bughunt2_r86_r105_probe.py, 30/30 gates, 11.6s, SPEC 759d0209, deterministic re-run identical, verdict BUGHUNT2-FINDINGS(7, max MAJOR): 1 MAJOR / 6 MINOR / 0 FATAL — the two audits INDEPENDENTLY CONVERGENT on the same headline finding): (K1) “three equivalent lemma forms” (paper §8.13/§8.14, prime-front 12.45/12.46, website chapters 37/38; the changelog C/CI wordings are frozen history and are corrected HERE, not retro-edited) is corrected to “three RH-SUFFICIENT lemma forms” — the honest form $\times$ direction table: the HAUSDORFF form is a GENUINE proven RH-equivalence (forward audited-sound via the H1c continuation chain, independently re-derived GAP-FREE in round 109, plus Zhang arXiv:2303.09396 Thm 2; backward elementary + gated), the WEYL-DISK and SIGN-POSITION forms are ONE-SIDED PENDANTS (form $\Rightarrow$ RH established; RH $\Rightarrow$ form OPEN — the round-90 lemma, measured 16/16 truth-tight but never proven, and the CF-realness/Connes-§6.6 hypotheses respectively), EVERY mutual equivalence that holds routes THROUGH RH (no direct form-to-form edge, gate J1.G5; the only direct bridge is the (AC) weld stopping at the exponential-autocorrelation cone), TRANSFER IS NONE — demonstrated by an explicit counterexample world: an off-line quadruple at $\gamma = 20$ (above γ_1) keeps EVERY Hausdorff cell positive ($n + k \leq 50$, b_n to $n = 240$) while the Euler–Pick section FIRES at $N = 12$ (certified negative pivot at 200 dps) — and CERTIFIED REGIONS ARE FORM-LOCAL: the $k \leq 10^{19}/7.4 \times 10^{21}$ Form-A theorems imply NOTHING about screw sections or Weyl disks, their zero-location content sitting below $\gamma_1 = 14.13$ where Platt–Trudgian is infinitely stronger; the stale adjective “uniform” in Form B’s name is retired on every surface (the round-92 V0a correction: pointwise contraction at the pins suffices); (K2) THE FALSIFIER REACH CAP (round 108 F3) is attached wherever the surfaces said “standing disproof channels / open and empty” (roadmap §8.14, prime-front 12.46, website chapters 37/38): both instruments are DISPROOF-SOUND (the disproof direction consumes only the proven forward implication) but REACH-CAPPED far below Platt–Trudgian’s 3.0×10^{12} (Euler–Pick $N \leq 4$ sees off-line zeros only at $\gamma \sim 5$ –8; the Hausdorff field is provably blind above $\gamma_1 = 14.13$ at the safe point) — “open and empty” is a THEOREM GIVEN THE CITED INPUTS, not an observation: zero live falsification power in the certified ranges; (K3) THE STAGE-3 INTERFACE FENCE (round 108 F2) is attached to “Stage 3 conditional-complete”: the only kernel-checked end-to-end extraction (v848 + CofinalWeil.lean) accepts ONLY the wall form H_{cof} , which is not among the three entry forms and is not producible from them without RH (test-class mismatch, absence-gated); the weakest link is the Stage-2 $\rightarrow$ 3 interface itself — finite acceptance gates (cells $n + k \leq 86$) against infinite-quantifier entry forms, a jump no corpus machinery bridges (v912 bridges convergence, not positivity); (K4) THE MINOR PROSE FIXES (round 109): the screwind mesh-ladder misattribution corrected in prime-front 12.45 (0.222/0.184/0.156 at $\delta = 0.012/0.006/0.003$ — the earlier 0.207 was the $\delta = 0.008$ round-93 value 0.2065; MESH-DAMPED stands), plus on record without surface impact: one hardcoded-true gate in the round-104 tally (the only live one across all 17 probes), two decorative tautological conjuncts in the round-92 probe (the countable Nevanlinna–Pick step asserted-with-citation, honestly typed everywhere), the roadmap probe’s stale r95 $N = 3$ acceptance value (r100 tightened $\log_3$ to $6.9310239 \times 10^{-10}$; frozen probe, finding on record), two sieve4_helper.c header slips (certificate UN-

AFFECTED: true worst per-term $13.33u \ll K_{\text{TERM}} = 32u$); **(K5) THE OCT BOUNDARY SHARPENED** (round 108 J2, absence-gated at 0 atlas hits each): wherever the surfaces state atlas completeness (paper §8.9/limitation 8, prime-front OCT subsection, website chapter 33), the vocabulary-relative fence now names the **FIVE UNPRICED** classes — ergodic/measure-rigidity positivity transfer, model-theoretic/o-minimal counting, bigger-group representation-theoretic positivity, GMC/Fyodorov–Hiary–Keating (reduces-in-spirit to magnitude, with an enumeration gap), higher-order Fourier uniformity of Möbius; **AND THE CLEAN SIDE** carried in the same breath (round 109 B1, own implementations): the round-103 theorem re-proved end to end ($B_0 = 7.575655711 \times 10^{-10}$ exact match, all four partition ratios to 10^{-9} , wall root $k^* = 1.40544 \times 10^{19}$ consistent), the $N = 4$ certification re-derived (Nair exact for $n \leq 60$, far-floor necessity confirmed, Cholesky logic sound), the Hausdorff H1c continuation GAP-FREE, the Lean theorems saying exactly what round 99 claims (axioms exactly [propext, Classical.choice, Quot.sound]), all 16 in-scope probes re-run green during the audit; (2) **ROUND 106** (moonshot_o3_probe.py, 16/16 gates, ~ 104 s, independently re-run green, verdict **MOONSHOT3-EXTENDED**(frontier = 7,444,682,106,464,286,365,865; quadratic law) + **MOONSHOT3-PARTIAL**(exact G / sign-regularity / fixed- N theorem) + **MOONSHOT3-OBSTRUCTED**(PF orientation; downward Hankel transport)): the round-103 theorem **EXTENDED 530-FOLD** — $C_{n,k}(256) > 0$ for **ALL** $n \geq 0$ and $0 \leq k \leq 7.4447 \times 10^{21}$, proven from Platt–Trudgian 2021 plus the **CORRECTED** Hasanalizade–Shen–Wong bound (JNT 235 (2022), Cor. 1.2: $|N(t) - M(t)| \leq 0.1038 \log t + 0.2573 \log \log t + 9.3675$; **HONEST SOURCE CORRECTION:** the commissioned (0.110, 0.290, 2.290) constants bound $S(T)$, not $N(T)$, and their Cheng–Graham input was later identified as invalid — replaced, not patched); mechanism: the retained q^k factor, a 16384-packet RvM lower bound below $T - 1$, a Gaussian-series tail enclosure above T , a 33-cell endpoint partition; worst gate lower/tail ratio 1.000001535385559, minimum packet count 25,397,045.4, the next 2×10^{-6} relative step **FAILS** — mechanism-exact; **THE LAW:** $k_{\text{front}}(T) = (\lambda_\infty + O(1/\log T)) T^2/(a - 1/2)$ with $\lambda_\infty = 0.226987054723979955$ — **VERIFICATION HEIGHT** qT **BUYS** q^2 **COLUMNS**, the geometric ceiling $k_{\text{geo}} = (T^2 + 1/4)/(a - 1/2)$ intrinsically unreachable (the route stops at $0.227 k_{\text{geo}}$); **NEW EXACT STRUCTURE:** the closed-form two-variable generating function $(X + Y - XY)G = XaF(a(1 - X)) + Y \frac{a}{1-Y} F(\frac{a}{1-Y})$ with the pole-divisor **EQUIVALENCE** (not an RH proof), total sign-regularity in the **REVERSED- k** orientation (the standard Pólya-frequency orientation is **WRONG** — the 2×2 minor manifestly negative), **THE IMPORTANT CORRECTION: HANKEL POSITIVITY ALONE IS NOT FORM A** (uniform measure on $[2, 3]$: every Hankel matrix positive definite yet $C_{0,1} = -3/2$ — the localizers H^+ and $H - H^+$ required), the fixed- N eventual-positivity theorem ($b_m(a) = (\sqrt{a} \log a/8)(1/2)_m/m! + O_N(\sqrt{a})$), and the exact downward-transport obstruction (for two atoms $\frac{d}{dt} \log \det H_2 = 4 - 3(y_1 + y_2)$, either sign possible — fixed- N eventual positivity cannot be propagated down to $a = 256$); (3) **ROUND 107** (note CDVII, contract **PRIME.CODE.SYNTHESIS.01**, code_synthesis_probe.py, 18/18 gates+wards, 2.2s, SPEC 5a6c3851, deterministic re-run bit-identical, verdict **CODE-READING-TRUE-DECODING-DIRECTION**): the program owner’s founding intuition “primes as error-correcting code in TFPT” given its first formal adjudication under that name and **VINDICATED AS MEASURED STRUCTURE** — the primes **ARE** the unique codeword of an error-correcting code in the compiler’s own Gram grammar (ambient: non-negative atomic measures at tent mesh $\delta = 0.006$; codeword: the prime-power comb; check family: nested Toeplitz sections, one check per depth; **MINIMUM**

DISTANCE: the round-96 rigidity law RE-MEASURED INDEPENDENTLY, $\ln \eta^*(r) = -1.0730r - 7.0783$, identical to four digits; decoding radius: 6/6 impostors die at the exact round-96 exits; rate $\rightarrow 0$); SAME GRAMMAR as the compiler's literal E8 code layer ($[8, 4, 4]$ self-dual, weight enumerator $\{0:1, 4:14, 8:1\}$, Construction A $\rightarrow 240$ roots, rebuilt exactly in-probe) — TFPT's one axiom INSTANTIATES at the arithmetic seam as this code, structure not progress; DIFFERENT DUAL TYPE with the decisive number measured: THE DUAL RANK GROWS WITH SLOPE 1.0000 ($k_{\text{fail}}/D = 0.9960/0.9975/0.9983/0.9987$; syndrome rank $5 \rightarrow 12$; a non-codeword passes every bounded-depth check family BIT-EXACTLY below its defect), adversarial LTC gap $\rightarrow 0$ beyond any bounded family's support (local errors testable and depth-improving, $0.9984 \rightarrow 1.0000$) — the code runs measure $\rightarrow$ identification (DECODING) while RH needs codeword $\rightarrow$ all checks (ENCODING): THE QUANTIFIER DOES NOT COMPRESS, and the reason is now a measured number; both surprise channels carried as live gates and EMPTY; (4) SURFACES SYNCED IN THIS ENTRY: `tfpt_prime_front` gains the sandbox diary subsection "The frontier extension, the code reading, and the campaign audited: the corrections of record" plus the corrected 12.45/12.46 wordings, the 12.45 mesh-ladder correction, and the OCT vocabulary fence with the five unpriced classes; the end-form article gains §8.15 with the form $\times$ direction status table, the corrected §8.13 close and §8.14 fences, the abstract status sentence, new limitation 11, the limitation-8 fence, and the traceability rounds 106–109 (with the Hasanalizade–Shen–Wong citation); the Anthropic email draft gains one status paragraph (the corrected three-forms state, the frontier law, the code-reading result); the website prime-front page gains chapter 39 (the live-updates chapter renumbered $39 \rightarrow 40$), the corrected chapters 37/38, the chapter-33 vocabulary fence, and one consolidated sandbox feed entry (verdict BIGPICTURE-FINDINGS, new enum, script `bigpicture_logic_probe.py`); `website/lib/changelog.ts` regenerated via `bash build.sh gen`; NO RH claim anywhere)

2026-08-15 (CI) (the roadmap — discovery freeze rounds one-hundred-three through one-hundred-five synced into every live surface: the campaign's complete machine-checked map compiled into the one artifact it never produced — a staged, milestone-gated research roadmap from today's frozen state to a complete RH proof, every stage falsifiable against the corpus's own instruments — fed by the largest proven positivity region of the campaign and the final classical pricing; experiments/ only — THREE frozen probes, NO promotion, NO module, NO ledger row, NO marker moved, NO gate closed or narrowed, suite unchanged at 906, NO RH claim in any direction; the honesty fences travel first: A ROADMAP IS NOT PROGRESS ON RH, NO STAGE IS CLAIMED STARTED, AND THE MATHEMATICS OF STAGES 1–2 DOES NOT YET EXIST: (1) ROUND 103 (`moonshot_sol_probe.py`, verdict MOONSHOT-PARTIAL(Form A)): from cited external inputs only — Platt–Trudgian 2021 (all zeros to $T = 3,000,175,332,800$ on the line), Rosser 1941, the classical γ_1 isolation; no zero table, no zeta evaluator — THE LARGEST PROVEN POSITIVITY REGION OF THE CAMPAIGN: $C_{n,k}(256) > 0$ for EVERY $n \geq 0$ and every $0 \leq k \leq 10^{19}$ (an infinite half-strip in n , ten quintillion complete k -columns; the scope inside the theorem: the $k \rightarrow \infty$ quantifier is touched nowhere, nothing about RH is proven); the three suggested proof routes die with named mechanisms — the exact prime-side transmutation turns the positive Beta spectral window into a sign-changing generalized-Laguerre source

window (the classical Laguerre zero theorem: no termwise-positive prime comparison exists), the Killip–Simon/Szegő direction dies on pure-point entropy ($w = 0$ a.e., entropy $-\infty$, floor $e \geq 0$ only), the asymptotic- a transport is nonuniform in (n, k) ; (2) ROUND 104 (note CDV, contract PRIME.LEVINSON.CLASS.01, levinson_class_probe.py, 23/23 gates, SPEC 65ac12a9, run-of-record levinson_class_probe.run.log, verdict LEVINSON-ADJUDICATED(LEVINSON-FAIL; tally $24 \rightarrow 25$, 0 PASS)): the LAST formally unexamined classical theorem type about zero positions — positive proportion on the line (Selberg 1942; Levinson 1974 $\kappa \geq 1/3$; Conrey 1989 $> 2/5$; the standing record $\kappa > 0.417293$, Pratt–Robles–Zaharescu–Zeindler 2020) — priced against the wall budget: the literal (liminf) class constrains NOTHING at any finite height (exact finite-modification argument), the granted-effective reading breaches every deployed cell by 2–3 orders ($382/1149/1059$ at $h = 184/388/839$), and a proportion theorem must come within $1 - \kappa^* < 4.8 \times 10^{-3}$ of ALL zeros ($\kappa_{\text{ledger}}^* = 0.9952/0.9983/0.9988$, each a LOWER bound) before it can feed the wall — with this round every named unconditional classical theorem type about zero positions is formally priced (zero-free regions, density, Weyl equidistribution, pair correlation, positive proportion); (3) ROUND 105 (note CDVI, contract PRIME.ROADMAP.01, roadmap_probe.py, 29/29 gates, SPEC 79092ebf, deterministic re-run identical, run-of-record roadmap_probe.run1.log, verdict ROADMAP-COMPILED(stages: S0 DONE; S1a|S1b OPEN; S2 OPEN; S3 CONDITIONAL-KERNEL-CHECKED; gates 29/29)): every machine-groundable claim asserted — acceptance-gate values re-computed from cited constants or grep-warded verbatim in their owning frozen artifacts, the stage DAG acyclic with exactly the named open stages, the downstream chain’s artifacts present with verdicts grep-verified; STAGE 0 (done, frozen): the atlas complete at 25 candidates 0 PASS, exactly one open edge E4, three equivalent lemma forms, two certified falsification instruments with open-and-empty channels (Euler–Pick floors $N = 1$: $[4.5917135 \times 10^{-2}, 4.5917136 \times 10^{-2}]$ down to $N = 4$: $[8.278338 \times 10^{-15}, 1.3840906 \times 10^{-14}]$ at cap 10^{13} ; Hausdorff certified depth 86, 5290 cells, $\gamma^* 189/563$), the $k \leq 10^{19}$ theorem re-derived inside the probe (decisive ratios $1.176577/335.8/1416.8$; the $n = 0$ mechanism wall re-located between 1.40×10^{19} and 1.41×10^{19}), the rigidity law $\ln \eta^*(r) = -1.073r - 7.08$, the seven-property specification sheet, 27 kernel-checked theorems; STAGE 1 (OPEN — new mathematics): structural positivity of Hodge-index type for $\text{Spec } \mathbb{Z}$ — verified literature state: Deninger’s dynamical Lefschetz trace formula PROVED for smooth foliated flows (Álvarez López–Kordyukov, arXiv:2402.06671) but NO arithmetic host constructed; Connes–Consani Riemann–Roch on the scaling-site orbits and for $\mathbb{Z}$ but NOT on the square of the scaling site; milestone (1a) an arithmetic dynamical system hosting the proven trace formula (periodic orbits $\log p$, weights $\log p/p^{m/2}$), acceptance gate: reproduce the (AC)/Euler–Pick interface $c^T P_N c = \langle -g'', f_c \star \tilde{f}_c \rangle$ at the 16 frozen σ of the SVPIN spec (minutes-scale, by machine); milestone (1b) OR Riemann–Roch on the square of the scaling site, acceptance gate: the intersection pairing on exponential autocorrelations must reproduce the certified $\mathcal{P}_N$ ladder ($N \leq 4$ floors as frozen acceptance values); STAGE 2 (OPEN — new mathematics): the Hodge-index/Castelnuovo analog on the Stage-1 substrate, acceptance gates = the corpus’s measured consumption requirements: FAIL the surrogate worlds exactly at the measured depths ($r = 0.264$ smooth by support, $r = 0.744$ scramble by weights), be SIGNED and ALIGNMENT-CARRYING (the v913 class), SURVIVE the τ -screen (bands $0.30/0.70$), and reproduce the certified Hausdorff cells (depth 86) while STRICTLY EXTENDING the $k \leq 10^{19}$ theorem’s reach; STAGE 3 (CONDITIONAL-COMPLETE — assembly, already machine-held):

from the Stage-2 inequality to localized Weil positivity in ANY ONE of the three lemma forms, then the machine-held extraction — v848 (EXTRACTION-CHAIN-COMplete, hypothesis (H) isolated), v912 (unconditional rate $O(D^2 \log(1/D))$), the Lean kernel tier (CofinalWeil/CofinalPredefinition, pickMatrix_posSemidef, sv_implies_rh with the honesty lock skeleton_not_unconditional), the SVPIN skeleton (SVPIN-ROUTE-OPEN), the Hausdorff equivalence (HAUSDORFF-EQUIVALENCE-SOUND), the CCM same-currency interface (CCM-SAME-CURRENCY); THE FALSIFICATION SPINE (parallel, permanent): the two certified instruments keep running as standing disproof channels, both open and EMPTY (a single certified negative would be an RH-disproof candidate); the extension walls are KNOWLEDGE walls, not compute walls (Euler–Pick $N = 5$ needs ψ -knowledge beyond 10^{19} , floor/ $\lambda_5 = 4.7 \times 10^5$ at any cap; the Form-A $n = 0$ mechanism exhausts at $k \approx 1.405 \times 10^{19}$); THE HONEST PRICING: Stages 1–2 require mathematics that does not exist today — the roadmap proves interfaces and obstructions, never existence; Stage 3 is assembly; the corpus’s contribution to every stage is the same — acceptance gates that turn each milestone into a minutes-scale machine check, so any candidate, from anyone, can be adjudicated immediately; NO timeline promised; (4) SURFACES SYNCED IN THIS ENTRY: tfpt_prime_front gains the sandbox diary subsection “The road from here: a machine-gated path to a complete proof”; the end-form article gains §8.14 with the abstract status sentence and the traceability rounds 103–105; the Anthropic email draft gains one status paragraph (the roadmap as the collaboration offer — each milestone has a minutes-scale acceptance test); the website prime-front page gains chapter 38 (the live-updates chapter renumbered $38 \rightarrow 39$) and one consolidated sandbox feed entry (verdict ROADMAP-COMPILED, new enum, script roadmap_probe.py); website/lib/changelog.ts regenerated via bash build.sh gen; NO RH claim anywhere)

2026-08-15 (C) (the instrument tier — discovery freeze rounds ninety-three and ninety-five through one-hundred-two synced into every live surface, INCLUDING one flagged correction of record to already-published text: the collective-rescue explanation, the certified Euler–Pick ladder and its $N = 4$ extension, the rigidity law, the SP pricing round that falsified the operative round-88 predictor extension, the CCM adjudication, the Lean kernel round, the α -induction depth record, and the Hausdorff safe-point instrument — the one open input now held in THREE equivalent lemma forms with TWO certified falsification instruments; experiments/ only — EIGHT frozen probes plus a Lean formalization round, several run as concurrent lanes, NO promotion, NO module, NO ledger row, NO marker moved, NO gate closed or narrowed, suite unchanged at 906, NO RH claim in any direction: (1) THE CORRECTION OF RECORD (round 97, note CCCXCVIII, sp_expsum_pricing_probe.py, 13/13 gates, deterministic 0.8 s twice, SPEC 55207ff7, verdict SP-OPERATIVE-FALSIFIED + SP-PRICED + SP-CLASSICALLY-OUT-OF-REACH($\times 8.2$) + SP-CONDITIONAL-LADDER + SP-PREFIX-DEAD-IN-WINDOW + SP-LITERAL-NONVANISHING-IN-RANGE; carried per the round-87 convention — frozen probes and notes are NOT retro-edited, the correction is the record): the round-88 rounding-margin statement priced against the full classical exponential-sum arsenal AND its operative form MEASURED FALSE beyond $x = 13$ — census extended from 79 points ($x \leq 13$) to 18798 points ($x \leq 890$, cache edge $\gamma_{7000} = 7264.75$), the operative (SP) FALSE from $x = 21$ onward with 567 τ -screened counterexamples, THE ROUND-88 EXACTNESS A SMALL- x ACCIDENT OF THE MARGIN

BUDGET, mechanism ARITHMETIC-FREE (Fejér tracking-variance floor $\text{rms} \rightarrow 1/(2\pi) = 0.159$, measured 0.26, vs budget 0.5 — no taper in the family survives); pricing (all constants generous, deepest rung $x = 890$): best unconditional miss $\times 8.2$ (Trudgian $S(t)$ ceiling 4.11), even RH itself (Carneiro–Chandee–Milinovich) 1.015 at the deepest rung; prefix/exceptional-set salvage DEAD IN-WINDOW (lowest violation $k/K = 0.010$, prefix depth stalls ≤ 131); HONEST FENCE: the deployed source-side approximant died, NOT TPL(i) — the eigenvector truth side unmeasured beyond $x = 13$, the published round-88 claim (exact at 79 points, $x \leq 13$) remains factually true; the corrective clause added to the published §8.10 wording, §8.12 property 1, the prime-front round-88 subsection, the website chapter 34 fence, and a new paper limitation 10; (2) ROUND 93 (note CCCXCIV, `collective_rescue_probe.py`, 10/10 wards + 7/7 law gates, verdict COLLECTIVE-IS-SUPPORT): round 92’s exit/re-entry FULLY EXPLAINED — exact causal onset bound (bit-identical prefix, spread exactly 0) plus measured offset ~ 2 lags, completed-stream $\max |\alpha|$ CONSTANT at 0.183932 ($r = 2.568\text{--}4.788$, band maxima falling), all Lyapunov candidates killed (the fixed-prefix class EMPTY by causality), mass-restored control dies at the IDENTICAL lag 400 — mass-without-atoms does not rescue, in-window survival requires the exact arithmetic weights; (3) ROUND 95 (note CCCXCVI, `eulerpick_ladder_probe.py`, 31/31 gates, verdict EULERPICK-CERTIFIED($N \leq 3$) + EULERPICK-GENERIC-DECAY + EULERPICK-DETECTION-LAW): the falsification ladder rebuilt to CERTIFIED standard (outward-rounded intervals end to end, $N = 3$ certified positive at cap 1.6×10^7 : $[2.3643695 \times 10^{-10}, 1.1497752 \times 10^{-9}]$), the channel self-tested on a planted negative family and EMPTY; decay GENERIC (control decomposition within $1.2\times$ of Euler, the true γ_1 appearing nowhere); detection law $N^*(\delta) = 6.1 + 1.95 \log_{10}(1/\delta)$, γ -BLIND beyond $\gamma \approx 50$ (undetected through $N = 36$); promotion honestly declined; (4) ROUND 96 (note CCCXCVII, `rigidity_inverse_probe.py`, 9/9 wards, verdict RIGIDITY-TIGHTENING): screw positivity to depth r pins the measure onto the prime comb exponentially tightly — ALL 17 adversarial impostors die (shifted-prime comb, golden quasi-prime comb at exact prime density, crystals, mass-matched tails, sub-mesh splits at every scale, jitters, a deep weight swap; all 15 single-atom deletions fatal within $J \leq 8$ lags), moduli law $\ln \eta^*(r) = -1.073r - 7.08$ with $c_{\text{mod}} = 1.073$ vs $c_\lambda = 0.814$ — CONDITIONING-PRICED up to an $O(1)$ alignment factor, the theorem candidate typed (anchors measured, law fitted, all-depth OPEN); (5) ROUND 98 (note CCCXCIX, contract on arXiv:2310.18423, `ccm_pn_adjudication_probe.py`, 22/22 gates, verdict CCM-CHECKED + CCM-SAME-CURRENCY): the one external published RH reduction adjudicated — CCM’s published local terms reproduce $\xi'/\xi(1/2 + \sigma)$ to rel 2.3×10^{-50} and their quadratic form reproduces the corpus EULER–PICK MATRICES ENTRYWISE (τ -screen: RELOCATION); NEW FINITE INSTRUMENT: all 6 prime-bearing Galerkin sections of Q_n positive ($\lambda_{\min} = 2.30 \times 10^{-3}$ at $n = 2.5$ down to 1.01×10^{-5} at $n = 13$; pole constraint load-bearing); controls die through the same construction — $P(n)$ IS localized Weil positivity, any semilocal prolate candidate finitely testable against the (AC) interface today; (6) ROUND 99 (note CD, the Lean round: `TfptCarrier/EulerPick.lean`, `DeltaOneNoGo.lean`, `ParityLemma.lean`, `SVSkeleton.lean`; 27 kernel-checked headline theorems, axioms exactly `[propext, Classical.choice, Quot.sound]`, no sorry, no `native_decide`): Euler–Pick forward PSD at the SV nodes for every N , the δ_1 no-go counterexample package, the FULL Parity Lemma under ONE named simplicity hypothesis (alternating signs at canonical gap midpoints —

exactly where zero simplicity enters), the SV skeleton with THE HONESTY LOCK skeleton_not_unconditional (an instance with RH = False — packaging alone yields nothing); (7) ROUND 100 (note CDI, sieve4_eulerpick_n4_probe.py, 22/22 gates, 2682s, cap $X = 10^{13}$, helper source SHA pinned, run-of-record sieve4_run1.log, hard external ward $\pi(10^{13}) = 346,065,536,839$ REPRODUCED EXACTLY): $\lambda_{\min}(\mathcal{P}_4) \in [8.278338 \times 10^{-15}, 1.3840906 \times 10^{-14}]$ CERTIFIED POSITIVE (margin 0.749), $N \leq 3$ floors tightened massively, the round-95 upgrade-path model CORRECTED (the beyond- 10^{19} tail floor was omitted; Nair 1982 — $\psi(x) \geq (x-2)\ln 2$ — unblocks it, corrected $X_{\text{req}}(4) = 10^{11.52}$), THE KNOWLEDGE WALL STARTS AT $N = 5$ (the floor exceeds λ_5 by 4.7×10^5 at any cap — no sieve helps); (8) ROUND 101 (note CDII, contract PRIME.SCREW.INDUCTION.01, screwind_induction_probe.py, 10/10 wards + 5/8 law gates — the 3 fails are FINDINGS, typed; companion screwind_meshdrift_check.py; verdict SCREWIND-KICK-LAW(exact) + SCREWIND-STEP-IS-WALL + SCREWIND-DICHOTOMY(descriptive-only)): DEPTH RECORD — all sections positive to $r = 9.0$ at BOTH meshes (corpus record 4.788), $\sup |\rho| = 0.183932$ attained at $k = 0$, flatness carried by a cancellation of giants (± 288.5 vs net RMS 0.023), THE EXACT KICK LAW at atom arrival (affine-exact, dev $\leq 2.8 \times 10^{-16}$, numerator pure arithmetic), G7 fails INFORMATIVELY: PRIME ARRIVALS STABILIZE (net arrival α positive 33/39, atom-bin median $|\rho|$ below background); THE WALL RELOCATES INTO THE CERTIFICATE, the named open piece — a source-certified two-sided energy floor with $\kappa_+ < 1/2$ — IS localized positivity; (9) ROUND 102 (note CDIII, externally proposed contract PRIME.HAUSDORFF.SAFEPOINT.01, hausdorff_safepoint_probe.py, 40/40 gates, 143.6s, SPEC dacdffe2, composite verdict HAUSDORFF-EQUIVALENCE-SOUND + HAUSDORFF-REPRODUCED + HAUSDORFF-CERTIFIED-DEPTH(86; $\gamma^* 189/563$) + HAUSDORFF-REPLICATION + HAUSDORFF-DETECTOR + HAUSDORFF-Z1-ZEROMEASURE + NOT-WORLD-NEW): the moment-field criterion ($\text{RH} \Leftrightarrow$ all Pascal cells $C_{n,k}(a) \geq 0$ at the safe point $a = 256$) built, audited, adjudicated — equivalence skeleton SOUND (Hausdorff/Widder needs no extra boundedness, the one sharp continuation step closes, companions symbolically exact), the proposer's spec numerically faithful (561/561 cells, weakest ratio 1.000220), THE HEADLINE: CERTIFIED DEPTH 86 (5290 cells), γ^* -reach 189 at $a = 256$ and 563 on the $a = 1024$ arm vs Euler–Pick's certified $N = 3$ ($\gamma \sim 5\text{--}8$) — THE CHEAPEST CERTIFIED RH-CONSEQUENCE INSTRUMENT IN THE CORPUS; three-carrier replication (signpos/Krein/SV pins, no zero cache anywhere in construction); the detector honestly priced ($\sim 1/\delta$ below γ_1 , provably BLIND above — Epstein control concrete: off-line witness LOCATED at $\rho = 0.69692705 + 36.37406369i$, RH-for- Q provably false, the Q Pascal field positive to depth 100 exactly as the phase model predicts); Z1 typing source-only in INPUT, zero measure in CONTENT; NOT-WORLD-NEW (Zhang arXiv:2303.09396 Thm 2 is the identical criterion at the central point — the novelty is the safe-point shift, the source-only decoder, the certified conditioning); THE NAKED REMAINING TASK: positivity of ALL $C_{n,k}(a)$ — Weil positivity in Hausdorff currency, THE THIRD EQUIVALENT LEMMA FORM beside the standing two; (10) THE CONSOLIDATED CLOSE, carried on every surface: the campaign now holds THREE equivalent lemma forms of the one open input (uniform Weyl-disk contraction; ground-eigenvector sign positions; Hausdorff cell positivity), three agreeing source-only carriers, two certified falsification instruments (Euler–Pick $N \leq 4$; Hausdorff depth

86), the rigidity law, and 27 kernel-checked theorems — and at the bottom, unchanged, localized Weil positivity; (11) SURFACES SYNCED IN THIS ENTRY: `tfpt_prime_front` gains the sandbox diary subsection “The three lemma forms, the certified instruments, and a correction of record” plus the corrective clauses in the round-88 subsection and the specification-sheet P1; the end-form article gains §8.13 with the abstract status sentence, the §8.10/§8.12 corrections, limitation 10 and the traceability rounds CCCXCIV and CCCXCVI–CDIII; the Anthropic email draft gains one status paragraph (the three-lemma-form state, the two certified instruments, the CCM interface point); the website prime-front page gains chapter 37 (the live-updates chapter renumbered $37 \rightarrow 38$), the chapter-34 correction pointer, and one consolidated sandbox feed entry (verdict HAUSDORFF-CERTIFIED-DEPTH); `website/lib/changelog.ts` regenerated via `bash build.sh gen`; NO RH claim anywhere)

2026-08-15 (XCIX) (the cohomological specification sheet — discovery freeze rounds ninety-one, ninety-two and the specification round synced into every live surface: two honest negatives, the Verblunsky-invariance kill with the Euler–Pick criterion and the (AC) identity pinned, and the campaign’s machine-checked characterization of the missing RH input compiled into a literature-facing requirements document for the cohomological programs; `experiments/only` — FOUR frozen probes, NO promotion, NO module, NO ledger row, NO marker moved, NO gate closed or narrowed, suite unchanged at 906, NO RH claim in any direction: (1) ROUND 91 (note CCCXCII, the patterns round, run in a parallel session): the program’s first magnetar giant-flare QPO bed (MAG.QPO.LADDER.01, `magnetar_qpo_ladder_probe.py`, 8/8 gates, SPEC 4ee58b0f) tests SGR 1806–20 and SGR 1900+14 against the geometric $(3/2)$ relaxation ladder with a 20000-draw log-uniform MC null, a 17-base look-elsewhere battery, a power gate (planted ladder $p = 5 \times 10^{-5}$) and a specificity gate (integer harmonics $p = 0.078$): base 1.5 gives $p = 0.3163/0.3558$, Fisher-joint $p = 0.3584$ — VERDICT NULL, S15-typed (placebo base 1.80 best in both sources, documented as an LEE-loaded base-battery artifact candidate, NOT escalated; SGR 0526–66 DATA-LIMITED); the LEE-controlled unclaimed-observable scan (PHYS.UNCLAIMED.DECODER.01, `unclaimed_observable_scan_probe.py`, 5/5 after disclosed amendment A1 — gate G02 mis-specified as a minimality bar, amended to a membership bar, no verdict bar moved) returns SCAN-UNDECIDABLE with the structural finding as the content: the frozen compiler vocabulary is SATURATED at 2σ tolerance (median placebo $C_{\min} 3.66 \leq \text{control } C_{\max} 5.46$) — new predictions provably cannot come from numeric scanning and must be derived theory-side; (2) ROUND 92 (note CCCXCIII, contract PRIME.SCREW.VERBLUNSKY.INVARIANT.01, `vbk_invariant_probe.py`, 23/23 gates, deterministic 14.1/14.0 s, SPEC c730781e, verdict VERBLUNSKY-NO-INVARIANT(mechanism exhibited)): the σ -correction (pointwise Weyl-disk contraction on $\sigma_r = 1 + 1/r$ accumulating at the interior point 1 suffices; $\sigma \downarrow 1/2$ uniformity NOT load-bearing), the exact δ_1 no-go (pin convergence cannot prove section positivity backwards), THE EULER–PICK CRITERION audited and pinned ($\text{RH} \Leftrightarrow P_N = [(P(\sigma_j) + P(\sigma_k))/(\sigma_j + \sigma_k)] \geq 0$ for all N with $P(z) = \xi'/\xi(1/2 + z)$; source-only falsification ladder from Γ , π , n^{-s} and an own Λ -sieve: $\lambda_{\min}(P_N) = 4.59 \times 10^{-2}$ down to 2.44×10^{-62} for $N = 1..12$, all positive, $\kappa = 2.27 \times 10^{61}$ at $N = 12$) and THE (AC) IDENTITY $c^T P_N c = \langle -g'', f_c \star \tilde{f}_c \rangle$ gated symbolically exactly and numerically against the corpus-exact screw g ($8.581810362 \times 10^{-2}$ vs $8.578893345 \times 10^{-2}$, rel 3.4×10^{-4}) — Euler–Pick positivity IS

Weil positivity on exponential autocorrelations, by identity; the kill: complete prime packets are high-rank INDEFINITE Toeplitz updates of displacement rank two (ranks 26/90/130, inertias (13, 102, 13)/(45, 70, 45)/(65, 50, 65)), the induced α step nonlinear and prior-state dependent ($\times 316$), the TRUE packet stream itself EXITS the Schur disk after $p = 2/3/5/7$ ($r = 1.122/1.620/1.950/2.400$) and re-enters only collectively (after $p = 11$: 0.313; full: 0.184); control wards reproduce SMOOTH $r = 0.264$ (diagnosed as a SUPPORT error — zero true prime mass before $\log 2$, PNT mass 0.282) and SCRARITH $r = 0.744$ (weight $\times 1.451$ at kept positions); the only exact survival condition is WALL-EQUIVALENT — clean kill, the remaining all-depth principle is Weil positivity in yet another currency; (3) THE SPECIFICATION ROUND (note CCCXCV; the intervening numeral CCCXCIV belongs to a concurrent discovery lane and is not part of this sync; contract PRIME.COHOMSPEC.SHEET.01, cohomspec_probe.py, 20/20 gates, 8.8 s, SPEC 423d934e, independently re-run deterministic, verdict COHOMSPEC-COMPILED(7 properties: 6 machine-grounded, 1 citation-typed)): the campaign’s measured characterization of the missing input compiled into a REQUIREMENTS DOCUMENT for any cohomology/intersection theory for $\text{Spec } \mathbb{Z}$ (Deninger’s program; the Connes–Consani scaling site), each property grounded by grep ward or independent recomputation in its owning frozen artifact — (P1) the signed, alignment-carrying, unconditional, sub-spacing ordinate-position input of the one open edge E4 (v913, kill-atlas DAG, the 24/0/19 tally, $\sim 1\%$ sub-spacing; sharpest corpus forms: $D_{\max} = x - 3/8$ at e^{-11} per forced skip, min margin 0.0317 / load 4); (P2) shape-independence (deployed exponent -3.379 recomputed by OLS as -3.3795 ; alternatives shallower by ≥ 2.2); (P3) not magnitude/density/existence (Littlewood 214.7/1527.1; zero-density empty for $A > 2$; border membership $\det M = s \det B$ recomputed in exact Fractions); (P4) the Gram form on exponential autocorrelations must BE the Euler–Pick matrices — the concrete interface any cohomological trace formula must match, recomputed (ladder rel dev $\leq 3.8 \times 10^{-9}$, (AC) weld rel devs $\leq 4.3 \times 10^{-11}$), testable at any finite N by machine today; (P5) positivity must fail on the control worlds exactly as measured ($r = 0.264$ by support, $r = 0.744$ by weights, both recomputed); (P6) survive the τ -screen (bands 0.30/0.70, fifteen DISGUISE routes); (P7, citation-typed) the function-field precedent mapped to its break points, verified against the live literature — Deninger’s dynamical Lefschetz trace formula proved for smooth foliated flows (Álvarez López–Kordyukov, arXiv:2402.06671) with no arithmetic host constructed (Doc. Math. ICM 1998, arXiv:math/0505354); Connes–Consani Riemann–Roch on the scaling-site orbits C_p (Selecta Math. 2017) but not on the square; the semilocal/prolate line (arXiv:2006.13771, arXiv:2310.18423) and Connes’ 2026 extremal letter (arXiv:2602.04022, zero reality by Connes–van Suijlekom Thm 6.1, convergence open = the corpus’s REALROOT-DEPTH-UNDECIDED); (4) SURFACES SYNCED IN THIS ENTRY: tfpt_prime_front gains the sandbox diary subsection “What any cohomology for $\text{Spec } \mathbb{Z}$ must supply: a machine-grounded specification”; the end-form article gains §8.12 with the abstract status sentence and the traceability rounds CCCXCII, CCCXCIII and CCCXCV with the verified literature list; the Anthropic email draft gains one status paragraph (the collaborator point: a testable interface where there was an analogy); the website prime-front page gains chapter 36 (the live-updates chapter renumbered 36 $\rightarrow$ 37) and one consolidated sandbox feed entry (verdict COHOMSPEC-COMPILED); website/lib/changelog.ts regenerated via bash build.sh gen; HONESTY FENCE carried on every surface: the sheet is a requirements document derived from machine-checked no-gos — it proves nothing

about Deninger’s program or Connes–Consani, claims no progress on RH, and whether any theory can meet the specification is OPEN; NO RH claim anywhere)

2026-08-14 (XCVIII) (the Stieltjes–Vitali pin route and the Krein screw-function carrier — discovery freeze rounds eighty-nine and ninety synced into every live surface: the externally proposed countable-pin reduction of the real-root architecture, and the construction of its one priced missing ingredient — the Krein inverse-spectral realization of Suzuki’s screw function, the first pin carrier of the campaign to pass the Z1 screen; experiments/ only — TWO frozen probes, NO promotion, NO module, NO ledger row, NO marker moved, NO gate closed or narrowed, suite unchanged at 906, NO RH claim in any direction: (1) ROUND 89 (note CC-CLXXXIX, externally proposed contract PRIME.STIELTJES.VITALI.PIN.01, stieltjes_vitali_pin_probe.py, 17/17 gates, 249 s, SPEC f450832f, independently re-run bit-identical, verdict SVPIN-ROUTE-OPEN): replace the full semilocal trace convergence by countably many positive resolvent scalars in the absolutely convergent Euler half-plane — the pins $P_x(\sigma) = \sum_k 2\sigma/(\lambda_{x,k}^2 + \sigma^2)$ must converge to $\xi'/\xi(1/2 + \sigma)$ at $\sigma_r = 1 + 1/r$ (source-only right side via Γ , π , $\Lambda(n)$, n^{-s}); then Herglotz normal-family compactness (ONE pin suffices), Vitali on the pins accumulating at the interior point i , the identity theorem on $\Im z > 1/2$, analytic continuation on the connected $\mathbb{C}_+ \setminus Z(\Xi)$ and the pole contradiction give (SV) $\Rightarrow$ RH, the functional equation closing $\beta < 1/2$; THE SKELETON IS SOUND gate by gate: weight-comparability constant 65.01 (bar 2×10^3) executed per rung (normal-family ratio 0.033 on all four), the sign-convention ambiguity HARMLESS for the pins ($\Xi(z) = \xi(1/2 - iz)$ vs $\xi(1/2 + iz)$ give the identical target via $\xi'/\xi(1 - s) = -\xi'/\xi(s)$; numeric lock at $\sigma = 1$: $4.61359285 \times 10^{-2}$ vs $4.61359517 \times 10^{-2}$, dev 2.3×10^{-8}), spectrum honesty MEASURED not assumed (census 4/10/20/41 all real, no zero mode, min spacing ≥ 1.3), the degenerate Herglotz limit excluded by the pin bound; the ONE named condition: all- x realness is the CF simplicity-plus-evenness hypothesis; the named non-gap: THE CHAIN MOVES THE ENTIRE BURDEN INTO (SV) ITSELF — no skeleton step is the wall, the wall is the premise; tail bookkeeping explicit, all three tails decreasing (true zero tail $2.85 \times 10^{-2} \rightarrow 1.18 \times 10^{-2}$ within 2% of the $\log T/T$ model; measured Nyquist-excess edge mass $\leq 1.31 \times 10^{-3}$, the window definition corrected in the spec after a smoke caught band spill; exact lattice tail $1.35 \times 10^{-2} \rightarrow 8.0 \times 10^{-3}$); THE FINITE PRE-CHECK CONVERGES ON ALL 16 FROZEN σ VALUES ($x = 3/5/8/13$; $x = 21$ skipped and declared by the arbiter cost law): Δ negative everywhere (missing tail dominates), slopes $-0.62 \dots -0.65$, measured drop 2.6 vs the a-priori RvM model 2.4 (bar 1.6), NO $\sigma \downarrow 1/2$ rate degradation on this ladder (the expected boundary effect beyond reachable depth, stated honestly), the FULL divisor row converging FASTER (the lattice comb compensates $\sim 2/3$ of the missing tail); CONTROLS ALL SEPARATE: mesh-CF MESH-POISONED through the same pins (median overshoot $0.94 \rightarrow 6.32$ growing like $\log x$ — the wrong limit, measured), SCRPOS/EPSTEIN/SMOOTH/SCRARITH separate at medians 2.7×10^5 – 8.8×10^5 (band metric) and 12.4–45.9 (target metric) on 16/16 rows (SCRARITH throws one imaginary pair — the world breaks the SV realness hypothesis, reported), Christoffel weights structurally excluded by AST, τ -screen 0/16 relocations at max slope 0.009 over ~ 47 decades — NO DISGUISE; THE HONEST WEIGHT, Z1-typed: on the extremal family the measured pin convergence IS the transcription of cache partial sums (band pins vs cache rel 7.7×10^{-12} / 9.4×10^{-12} / 2.1×10^{-5}) — instrument consistency, never source-side content; the naive Suzuki spectral readout is DEAD (SUZPIN-

FORM-SPECTRUM: hat-compression eigenvalues are a form-spectrum ladder $\sqrt{\mu} = 1.02/2.12/3.17 \dots$, not the ordinates, $\gamma_1 = 14.13$; $P_{\text{suz}}(1)$ grows $1.85 \rightarrow 2.47$ vs target 0.046) — the **SECOND** architecture of the campaign to survive every gate, the corpus’s logically sharpest open target, its priced remaining task exactly one: the Krein inverse-spectral realization of Suzuki’s screw function; three pre-freeze smoke fixes disclosed, zero post-freeze amendments; (2) **ROUND 90** (note CCCXC, contract PRIME.SUZUKI.KREIN.REALIZATION.01, krein_screw_realization_probe.py, 22/22 gates, 18s, SPEC bd5fba32, independently re-run bit-identical, verdict SUZKREIN-CARRIER-OPEN(lemma: uniform Weyl-disk contraction)): the priced missing ingredient **BUILT — THE CORRESPONDENCE:** g extracted corpus-exactly (Suzuki eq. 1.3 with the v643 convention lock; the Lerch coefficient $+1/4$ **GATED** against the origin expansion $g \sim \frac{1}{2}t \log t + At$ with $A = \frac{1}{2}(\log 2\pi - \psi(2)) = 0.707546$ — a -1 misreading would fail by $O(1)$), the screw property verified ($G(t, s)$ PSD on all four windows, $\lambda_{\min}/\lambda_{\max} \geq -8.1 \times 10^{-19}$), Krein’s accelerant/continual-Schur correspondence invoked with its hypothesis **CERTIFIED** (strict positivity of every Toeplitz section of $-g''$, certified by the completed Szegő run, $\max |\alpha| = 0.156$), the normalization **DERIVED** not fitted (lag reads are exact second differences of g , two independent routes agreeing to 1.8×10^{-10} ; partition of unity gives the pin as $\frac{1}{2}\langle -g'', e^{-\sigma|\cdot|} \rangle$; the Weil formula identifies $\xi'/\xi(1/2 + \sigma)$ layer by layer, archimedean/pole/prime each gated); **THE CONSTRUCTION:** Levinson/Szegő **IS** the Toeplitz-structured discrete Krein/Gelfand–Levitan solve, the Verblunsky α are the realized Hamiltonian data and **CAUSAL** (exact Toeplitz nesting — deeper windows only append), and **THE REALIZED HAMILTONIAN SEES THE PRIMES:** $|\alpha|$ -spikes at $r = \log q$ for $q = 2/3/4/5/7$, offset ≤ 1 bin, contrast 2.8–5.2; conditioning **TRIVIAL** (amplification ~ 23 under 10^{-25} perturbations — the feared e^{cx} explosion belongs to the trig-family spectral-resolution ladder, not the screw-kernel Toeplitz sections); the δ -rough pointwise profile declared honestly, the δ -stable objects (pins, disks, spike positions) gated; **THE CONVERGENCE:** all 16 frozen σ rows (verbatim from the SVPIN spec) **CONVERGE**, 16/16 truth-tight ($\sigma = 0.6$: $\Delta = +7.30 \times 10^{-5} \rightarrow +6.33 \times 10^{-7}$ over $L = \log 3 \dots \log 13$, factor 115), Weyl-disk contraction **MEASURED** $R \sim e^{-(\sigma+c)L}$ with $c = 0.85 \dots 1.76$ median 1.36 (limit-point behaviour), and **THE SURPRISE:** the disk center **RESUMS THE MISSING TAIL** ($|\hat{P} - S_{\text{trunc}}|/\text{tail-model median } 1.000$; at $\sigma = 0.6$ the center beats the truncated source sum by a factor ~ 600); **THE CONTROLS DIE AT THE POSITIVITY LEVEL ITSELF** — the strongest separation of the campaign: the prime-free **SMOOTH** accelerant **LOSES SCREW POSITIVITY** at window depth $r = 0.264$ (same r at both mesh sizes — a continuum property), the golden-scrambled **SCRARITH** world at $r = 0.744$ — **THE TRUE PRIMES** (positions AND weights) **ARE NECESSARY FOR SCREW POSITIVITY** at these windows; **THE Z1 SCREEN PASSED FOR THE FIRST TIME:** no cache transcription (min over all $N \leq 7000$ of the max- σ rel dev = 8.5×10^{-3} vs bar 10^{-6} ; AST firewall zero-free; SUZKREIN-EXTRAPOLATES(1.000)), explicitly distinct from DEBRANGES-COMB-BLIND in input (screw lag data, not wall-block moments), direction (inverse-spectral construction, not HB re-coordinatization) and adjudication (quantitative convergence + world controls, not structure existence), the dead SUZPIN form-spectrum readout never used; **THE REPRICED LEMMA AND THE HONEST PRICE:** the literal SVPIN trace-class norm is **MEASURED FLAT** (16/16 non-decaying; appended Verblunsky blocks grow — prime atoms arrive forever) — the correct currency is **WEYL-DISK CONTRACTION**, the minimal missing lemma stated exactly (“let g be Suzuki’s screw function with

every finite section of $-g''$ positive (= localized Weil positivity); then the Weyl disks $D_a(i\sigma)$ of the Krein realization contract with $R_a(\sigma) \leq C(\varepsilon)e^{-(\sigma+c)\cdot 2a}$ uniformly on $\sigma \geq 1/2 + \varepsilon$, with limit point $\xi'/\xi(1/2 + \sigma)$ "; suppliers: Krein's accelerant theorem, de Branges chain monotonicity; OPEN: the uniformity as $\sigma \downarrow 1/2$) — AND THE ALL- a SECTION-POSITIVITY HYPOTHESIS IS LOCALIZED WEIL POSITIVITY ITSELF: the carrier localizes the remaining task and fixes the currency, it does NOT remove the positivity input; disclosures: pre-freeze float64 calibration, two smokes (six fixes incl. a normalization slip caught by the table's own $\Delta = -\text{tgt}$ pattern), a first-full-run abort at a circular liveness filter (repaired and disclosed in the spec, SPEC-hash change documented 1f898f95 $\rightarrow$ bd5fba32) — no bar, grid, ladder or verdict-bearing rule moved; (3) SURFACES SYNCED IN THIS ENTRY: `tfpt_prime_front` gains the sandbox diary subsection "The Stieltjes–Vitali pin route and the Krein screw-function carrier"; the end-form article gains §8.11 with the abstract status sentence and the traceability rounds CCCLXXXIX–CCCXC; the Anthropic email draft gains one status paragraph (the missing input now has TWO precisely stated lemma forms, and the Krein carrier is the first source-only host whose controls die at the positivity level); the website prime-front page gains chapter 35 (the live-updates chapter renumbered 35 $\rightarrow$ 36) and one consolidated sandbox feed entry (verdict SUZKREIN-CARRIER-OPEN); `website/lib/changelog.ts` regenerated via `bash build.sh gen`; NO RH claim anywhere)

2026-08-14 (XCVII) (the real-root saga and the sign-position endpoint — discovery freeze rounds eighty-three through eighty-eight synced into every live surface: the real-root architecture and its three-lane conflict, the arbiter, the TPL round with the PARITY LEMMA and the counting law, the tested-simplicity round, the adversarial bughunt and the SIGN-POSITION PREDICTOR; experiments/ only — TEN frozen probes, NO promotion, NO module, NO ledger row, NO marker moved, NO gate closed or narrowed, suite unchanged at 906, NO RH claim in any direction; standing convention: the round-87 bughunt CORRECTED three MAJOR misstatements in the round-83/84 records, the frozen probes and notes are NOT retro-edited — the correction is the record — and every surface synced by this entry carries only the corrected numbers: (1) ROUND 83 (note CCCLXXXII, three lanes: `semilocal_realroot_limit_probe.py` 16/16, SPEC 8eff2685, verdict REALROOT-ARCHITECTURE-OPEN; `stc_sol_convergence_probe.py` 4/4, verdict STC-OPEN; `stc_opus_convergence_probe.py` 20/20, verdict STC-DISGUISE + STC-FALSE for the mesh family): the first route of the campaign to genuinely leave the kill atlas — source-only finite SELF-ADJOINT operators (real spectra by construction, no wall positivity, no zero data consumed), limit identified with Ξ via the full trace formula on a determining even Paley–Wiener class; skeleton audited as executable gates (determination lemma sound in two classical steps with NO convergence rate consumed; two repairable gaps repaired: an origin-exclusion minorant derivable from R3 itself, and the source-only $E''(0)$ pin $\sum_\rho 1/(\rho(1-\rho)) = 2 + \gamma - \log 4\pi$); census fully real 41/41 at $x = 13$, all six trace rows CONVERGE, world controls separate at median 1.26×10^6 – 1.40×10^6 vs the pre-frozen bar 5, honest price $\lambda_{\min} = 2.5 \times 10^{-54}$ at $x = 13$ (internal precision $\sim e^{-4\pi x}$); CORRECTED zero tracking (F1, stronger than first recorded): first-zero deviation -8.4×10^{-16} at $x = 8$ AND 13 (exactly the cache's own float64 quantization of γ_1 , $+8.407 \times 10^{-16}$ vs the 30-digit literature value), mean displacement over all 15 matched zeros 0.0 at float64 resolution; CORRECTED ε finals (F6): up to 117% under the exact census ($2.071 \times 10^{-8} \rightarrow 9.550 \times 10^{-9}$;

$3.708 \times 10^{-9} \rightarrow 6.290 \times 10^{-9}$; worst decay exponent $-4.47 \rightarrow -4.96$), all six rows staying CONVERGES; lane two hits 14.1347/21.0220/25.0109 at $x = 8$ source-only and proves R3 ALONE implies Weil positivity ($h = |\hat{g}|^2$ on a real spectrum) — full RH strength; lane three PROVES the Nyquist density obstruction (spec density $\ell/2\pi$ exact and mesh-independent, rel dev 2.22×10^{-16} over a $16 \times$ mesh sweep, vs Ξ 's log density — R3 AND R4 fail for every mesh at fixed window), unweighted trace diverges 4/4 to $x = 144$, weighted converges (honest finals $9.3 \times 10^{-4}/3.3 \times 10^{-6}/2.3 \times 10^{-6}/6.2 \times 10^{-4}$; F4) but the weights are the Christoffel function of the zero measure — the unknown; honest node-vs-zero pairing at $x = 55$: 18-vs-3 one-sided, 36-vs-6 two-sided (F2); the three-lane conflict deliberately frozen unresolved; (2) ROUND 84 (note CCCLXXXIII, `realroot_arbiter_probe.py`, 17/17, 933 s, SPEC fc8a3a2b, independently re-run bit-identical, verdict REALROOT-DEPTH-UNDECIDED): the conflict resolved BY MECHANISM — different operator family, not different sums, not a bug, not primarily depth; all three lanes summed honest unweighted sums against the identically normalized source side; a new deep rung $x = 21$ built at the honest price ($K = 80$, 128 dps $\geq$ the declared floor 119.6, $\lambda_{\min} = 1.25 \times 10^{-93}$): the mesh-CF $(0, 30)$ count grows $7 \rightarrow 22$ over $x = 5..144$ tracking the uniform Nyquist prediction (measured deviations 10.2/10.6/10.9% at $x = 13/21/34$ vs the frozen 30% tolerance; F3), the extremal/quotient family stays EXACTLY on the Ξ census at every measured depth — $(0, 30) = 3$, $(0, 60) = 13$, $(0, 100) = 29$ at $x = 21$, minimum zero $= \gamma_1$ to 10^{-4} , all 50 Nyquist-excess zeros exiled to $(100, 163]$; one unified table: mesh DIVERGES 4/4, extremal CONVERGES 4/4 on the same h ; NOT false-for-family, NOT quotient-escapes (the thinning is MEASURED, not proven; Connes §6.6 open); the Z1-TRANSFER identity names why a proof is the wall itself: the trig-Galerkin matrix IS the Gram matrix of zero evaluations, $M[j, k] = 2 \sum_{\gamma} B_j(\gamma) B_k(\gamma)$, $\lambda_{\min} = 2 \sum_{\gamma} E(\gamma)^2$ (6.31×10^{-5} after the analytic cache-tail correction, 92% model share) — source-only in INPUT, zero-measure in CONTENT; falsification rungs priced ($x = 34$: ~ 1.5 h; $x = 55$: ~ 10 h), NO finite rung can verify — the surviving lemma carries full RH strength; (3) ROUND 85 (note CCCLXXXIV, three lanes: `tp_sol_probe.py` 7/7 TPL-OBSTRUCTED, `tp_opus_probe.py` 32/32 TPL-REDUCED + TPL-DICHOTOMY-MEASURED + TPL-OBSTRUCTED, `tp_da_probe.py` 9/9 TPL-CIRCULAR): energy sign and zero census are LOCALLY INDEPENDENT observables (off-line quartets: $\Delta Q = -4\delta^2 E'(t)^2 < 0$ yet Rouché preserves the count; $\lambda_{\min}$ flips to -9.1×10^{-17} at $1.25 \delta^*$ while the $(0, 30)$ count stays 3); the ARCH block IS the smooth zero measure exactly (1.1×10^{-6}) — the entire e^{-cx} positivity is supplied by the PRIME BLOCK ALONE, no density-input argument can prove TPL(i); $\|\text{PRIME}\|/\text{gap} \sim 10^{4.36x}$ — any prolate comparison must be an EXACT cancellation; THE PARITY LEMMA: TPL(i) IS — no analysis, a finite combinatorial rewriting — the statement that the ground eigenvector of one explicit matrix carries a prescribed sign pattern, verified exactly on three rungs; THE COUNTING LAW: the Nyquist surplus peaks at $D_{\max} = x - 3/8$, the tracking band ends exactly at the peak, marginal cost per forced skip one fixed factor e^{-11} , constant to 11% over 23 DECADES; the measured census support simultaneously CONVICTED CIRCULAR (the recorded counts ARE the smooth RvM values to < 1 : 29.0023 vs 29; the instrument transcribes any fed measure including the prime-free world; outrunning classical verification needs dps $\sim 2.1 \times 10^{12}$; the only off-line-sensitive channel is the wall scalar, slope 2.03, independently confirming the $-4\delta^2 E'^2$ law); one sentence: the NUMBER of sign changes is forced by counting, the arithmetic substance sits EXCLUSIVELY in the POSITIONS, which the prime block alone must supply; (4) ROUND 86

(note CCCLXXXV, `simple_principle_probe.py`, 22/22, SPEC ef1bc6dd, verdict SIMPLE-PRINCIPLE-IS-TRANSCRIPTION): four readings tested against pre-registered bars — one-axiom STRONG-REFUTED (five normalizations, zero hits on $\log \pi$, gaps 0.226–1.341; the difference dictionary exact: a gauge orbit, empty as a source), transcription CONFIRMED 3/3 (the register’s Mertens head is EXACTLY $\prod_{p|210}(1-1/p) = 48/210$, i.e. 2.1293 bit = $\log_2(35/8)$ — the compiler pair itself; the $E''(0)$ pin is the Hadamard identity to 2.4×10^{-8}), fixed-point REFUTED (back-distance exactly 1.0000δ — every admissible measure is a fixed point), Gram-seat square law $\delta_* = \sqrt{\text{margin/curvature}}$ numerically EXACT on the Gram channel (ratio 0.9997, slope 2.0000; order split: position first-order at slope 0.9669, reality second-order) typed PATTERN-ONLY by the frozen FOLDCOV rule; the surviving principle: TFPT’s positivity is always GRAM POSITIVITY OF NODE EVALUATIONS — a theorem exactly where the nodes are compiler data, the arithmetic seam the single place whose nodes are not; two corollaries sharpen the OCT without moving it (the order split mechanically explains all 24 dead sign-source candidates; the $\sim 1\%$ sub-spacing price is instrument-dependent, $h^{-1.69}$ along the deployed ladder); (5) ROUND 87 (note CCCLXXXVI, `bughunt_r79_r85_probe.py`, 24/24, 230 s, SPEC 9346a32b, verdict BUGHUNT-FINDINGS(9, max MAJOR)): adversarial audit of rounds 79–85 — NINE findings, 3 MAJOR / 6 MINOR / 0 FATAL, NO round verdict flips, every finding pinned by an executable gate; the three majors are the F1/F2/F6 corrections carried above (the honest zero-tracking claim STRONGER than published); one systemic minor: NINE gates across the corpus hardcoded `check(..., True)` — never able to fail while counted in the N/N tallies, including the very line recording the round-80 “candidate #19 gate FAIL” verdict (the verdict right, the gate testing nothing); checked clean: every round-79–82 headline number reproduced on fresh re-runs, all ten probes re-ran green, no firewall violations; (6) ROUND 88 (note CCCLXXXVII, `signpos_probe.py`, 19/19, 11.5 s, SPEC b0003dcc, independently re-run bit-identical, verdict SIGNPOS-PREDICTOR-EXACT + SIGNPOS-TP-DEAD + SIGNPOS-RIGID + SIGNPOS-K-STABLE): the campaign’s most concrete endpoint — a SOURCE-ONLY predictor of the sign-change positions (the parity of $\text{round}(\theta(\omega_k)/\pi + 1 + S_x(\omega_k))$ at the Nyquist lattice, S_x the band-limited phase built from the prime-node comb) is EXACT at ALL 79 lattice points across $x = 3/5/8/13$, with measured first-order arithmetic content: the density alone fails at exactly FOUR lattice points and the prime-node comb repairs precisely those four — ARITHMETIC LOAD 4, the first arithmetically computable first-order-channel object of the campaign; scramble control fails 6/11 with $\lambda_{\min} = -1.11$; THE CATCH named precisely: exactness for all x is half-integer-margin control of the band-limited S at the lattice points (measured minimum margin shrinking to 0.0317) — verbatim TPL(i) itself, the RH hardness relocated for the THIRD time to the same seat, now as a rounding-margin statement about one explicit band-limited function of the primes; Gantmacher–Krein STRUCTURALLY DEAD ($\lambda_{\min}(\text{ARCH}) = -2.666$; M neither totally nonnegative nor Green’s/one-pair in any tested ordering; the minor census localizes nothing); the position map RIGID (modulus = the ordinate-to-lattice distance); the positions K-STABLE in the deployed band (the round-85 caveat discharged for the positions, the joint (x, K) declaration remaining for the margins); (7) SURFACES SYNCED IN THIS ENTRY: `tfpt_prime_front` gains the sandbox diary subsection “The real-root architecture, the Parity Lemma, and the sign-position predictor”; the end-form article gains §8.10 with the abstract status sentence, limitation 9 (the bughunt

corrections and the hardcoded-gate finding as a methodology limitation) and the traceability rounds CCCLXXXII–CCCLXXXVII; the Anthropic email draft gains one status paragraph; the website prime-front page gains chapter 34 (the live-updates chapter renumbered $34 \rightarrow 35$) and one consolidated sandbox feed entry (verdict SIGNPOS-PREDICTOR-EXACT); website/lib/changelog.ts regenerated via `bash build.sh gen`; NO RH claim anywhere)

2026-08-14 (XCVI) (the kill-atlas consolidation arc — discovery freeze rounds seventy-nine through eighty-two synced into every live surface: the RH implication DAG, the 50-route kill atlas, the SAT adjudication, the untested-five adjudication, the bird’s-eye shape/direction/bootstrap round and the OBSTRUCTION COMPLETENESS THEOREM; experiments/ only — FOUR frozen probes, NO promotion, NO module, NO ledger row, NO marker moved, NO gate closed or narrowed, suite unchanged at 906, NO RH claim in any direction: (1) ROUND 79 (note CCCLXXVI, `kill_atlas_dag_probe.py`, 43/43 gates after the N12/N13 self-correction of entry XCV, verdict ATLAS-DAG-CONSISTENT + ONE-OPEN-EDGE-CONFIRMED + FOUR-CLASSICAL-CITATIONS-CARRIED + NO-SIGN-SOURCE-PASSES + LOCALIZATION-DID-NOT-MOVE-THE-EDGE): the RH implication chain as an explicit 11-node, 10-edge DAG, acyclic on the conjunctive hypergraph, typed 3 PROVEN / 2 CERTIFIED-FINITE / 4 CITED-CLASSICAL / 1 OPEN with EXACTLY ONE open edge E4 (the predefined mesh-cofinal ladder positivity); the honest non-PROVEN list E1/E2/E8/E4/E7/E9/E10 carried as an executable gate; the 50-route atlas assigns every killed route to exactly one edge (17 E4 / 21 E2 / 8 E10 / 2 E1 / 2 off-chain), every verdict token grep-verified inside its own artifact; τ -screen 15 DISGUISE / 1 ADVANCE / 34 not-applicable with the single ADVANCE pinned NOT on E4; six coordinate systems ($\tau_h > 0$, $n_h - q_h > 0$, $\sigma_h < 1$, the anti-cancellation scalar, the P_{err} budget, v913’s best-conditioned (L)) pinned as ONE and the same edge — the localization campaign sharpened the edge’s type, closed the second open edge (v912) and corrected its statement (mesh order), and did NOT move it; (2) ROUND 80 (note CCCLXXVIII, `sat_projection_alignment_probe.py`, 35/35, SPEC 1b8b6f8e, verdict SAT-DISGUISE + SAT-LITTLEWOOD-EMPTIED + SELECTION-SIGN-MINED): the externally proposed signed-projection closure of E4 is adjudicated dead as submitted — the projection identity is EXACT (zero residual in exact Fractions) and EMPTY (A_2 ’s column block unit-triangular with $\det = 1$ as exact integers, so $P = I$ and $\|(I - P)y\|^2 \equiv 0$ identically; the ellipse inequality is $s \geq 0$ VERBATIM; the “optimal signed profile” w^* is B -independent, zero arithmetic content); the θ -average is verbatim v913’s (L) with its standing kills (HH-CLAIMS-WITHDRAWN, CLASSICAL-GAP $2.470 \times 10^{11} / 1.990 \times 10^{14}$); the proposed θ -selection is the kernel-checked sign-mined index (`signMinedIndex_not_familyNoninterfering`); the small-effective-rank premise is REFUTED (stable rank $109.6 \rightarrow 1595.2$); candidate #19 FAILS the frozen gate (separates without independently orienting) — coordinate system number SEVEN for E4, gate tally $18 \rightarrow 19$ candidates, 0 PASS / 14 FAIL / 5 UNTESTED; (3) ROUND 81 (note CCCLXXIX, `untested_sign_sources_probe.py`, 33/33, verdict SIGNSOURCES-ADJUDICATED): all five remaining UNTESTED candidate sign sources adjudicated FAIL with exact killing numbers — #20 G2-SEPARATES-NOT-ORIENTS (law exact at 7.2×10^{-16} on truth, defect energy ZERO on truth, class floors $0.191 / - 0.509 / - 0.227$ below the need), #21 KREIN-CERT-IS-WALL (Douglas exact over $\mathbb{Q}$: contraction margin $= 1 - \|C\|^2 = s/n$ VERBATIM), #22 U1-NAMED-TYPES-EMPTY (honest instrument on the full 2×10^7 certified

ordinate cache; smooth/jitter/shift surrogates violate by $104\text{--}636\times$; the jitter sweep prices the required ordinate precision at $\sim 1\%$ OF THE MEAN ZERO SPACING; Weyl carries no rate, rate-carrying density is the emptied E2 class, pair correlation conditional), #23 U2-BEYOND-CLASSICAL (MIN-U2 named exactly, h -flat; a planted off-line pair violates it at $\delta = 0.3635/0.2088/0.3533$ BELOW the classical zero-free widths $0.4475/0.4443/0.4487$ — on the deployed windows it already excludes zeros no classical theorem excludes), #24 U5-ENUMERATED-DEAD (log-convexity violated by truth itself at -0.182 ; downward-closure lemma: the zero comb is admissible in every enumerated class, so no upper-bound-type inequality can supply the required lower bound) — NEW TALLY: 24 candidates, 0 PASS, 19 FAIL, NO blanket UNTESTED left; (4) ROUND 82 (note CCCLXXX, `birdseye_shape_freedom_probe.py`, 35/35, 54 s, SPEC 8b78c201, verdict BIRDSEYE-OCT-CONSOLIDATED): (A) SHAPE-INDEPENDENCE-MEASURED — the deployed family is RH-saturating (margin-decay exponent -3.379); five structurally different admissible families (Fejér, Gauss-tent, Hann, $K\star K$ square, T5.2-style perturbation; Beurling–Selberg minorants typed INADMISSIBLE-BY-CAP) priced in the same Weil-square currency with an exact explicit-formula ward decay FAR shallower (exponents $-0.46\dots -1.09$, min gap 2.29) — the maneuver exists but buys nothing: single-window ladders fail E7 density (54.5% projection residue), mesh-dense families inherit $\lambda_{\min}(\Omega_{\text{EF}}) \leq s$ by the exact Schur bound ($3.97 \times 10^{-7} \rightarrow 4.19 \times 10^{-12}$), and the localization is SHAPE-INVARIANT (square shapes degenerate the alignment, 15/15 position-blind worlds positive; off-line exclusion BELOW every classical zero-free width, $\delta_{\min} = 0.055\text{--}0.26$ vs ~ 0.42 , 5/5 beyond-classical; the deployed linear coordinate reproduces the $\sim 1\%$ sub-spacing bar at $107.1/4.36/0.21\times$ margin for $\varepsilon = 0.5/0.1/0.01$); (B1) EXISTENCE-IS-DISGUISE — the existence direction closed PERMANENTLY at the border-membership step in exact Fractions (a positive extension always exists; $\det M = s \det B$ with PD $\Leftrightarrow s \geq 0$ both ways; the Krein ellipsoid contains the arithmetic border with margin EXACTLY s ; the Carathéodory–Toeplitz one-step margin equals the next Schur scalar) — the gap between “an extension exists” and “the arithmetic one is it” IS E4; (B2) BOOTSTRAP-STILL-DEAD — the 2×10^7 -ordinate cache certifies MIN-U2 at $2/5$ cells and the τ coordinate at $0/5$; $T_{\text{req}} \sim h^{4.77} (\tau) / h^{1.23} (\text{EF})$, extrapolated τ -coverage ends at $h \approx 36$, precision NOT binding, HEIGHT is; (C) THE OBSTRUCTION COMPLETENESS THEOREM, every premise machine-asserted: (i) exactly one open edge E4, (ii) the candidate map COMPLETE (24/0/19, no blanket UNTESTED), (iii) the missing input exactly characterized (signed, alignment-carrying, unconditional, $\sim 1\%$ sub-spacing, minimal form MIN-U2 beyond-classical), (iv) shape-independent across the audited admissible families — plus the dual/existence direction closed and the bootstrap dead; SCOPE in the same breath: finite-rung (cells to $h = 2854$, ladder cited to 12632), atlas completeness EDITORIAL and typed as such, E7–E10 classical citations, NO-WITNESS counter-evidence carried unsmoothed (all certified reads positive to $h = 12632$, deepest $2.79579794131272506 \times 10^{-15}$, decay flattening) — a no-go about the TYPE of the missing input is not evidence about its EXISTENCE, and the theorem is NOT a statement that RH is unprovable; (5) SURFACES SYNCED IN THIS ENTRY: `tfpt_prime_front` gains the sandbox diary subsection “The kill atlas, the complete candidate map, and the Obstruction Completeness Theorem”; the end-form article gains §8.9 with the abstract status sentence, limitation 8 and the traceability rounds CCCLXXVI–CCCLXXX; the Anthropic email draft gains one status paragraph; the website prime-front page gains chapter 33 (the

live-updates chapter renumbered 33 → 34) and one consolidated sandbox feed entry (verdict BIRDSEYE-OCT-CONSOLIDATED); website/lib/changelog.ts regenerated via `bash build.sh gen`; the stale changelog.pdf / introduction.pdf debt of entry XCV is cleared by the same rebuild; NO RH claim anywhere)

2026-08-14 (XCV) (editorial honesty correction, wording only — no number changed, no module touched, no status marker moved, no gate closed or narrowed, NO RH claim: the corpus-wide synthesis audit of note CCCLXXVI (discovery probe `kill_atlas_dag_probe.py`, 41/41, verdicts ATLAS-DAG-CONSISTENT + ONE-OPEN-EDGE-CONFIRMED + FOUR-CLASSICAL-CITATIONS-CARRIED, experiments/ only) reconstructed the RH implication chain as an explicit 11-node, 10-edge DAG and recorded that the corpus headline “the chain is reduced to exactly one unproven inequality” counts INEQUALITIES correctly, and counts correctly what the programme itself must supply, but drops four classical citations: the honest non-PROVEN list is E1/E2/E8/E4/E7/E9/E10 — two CERTIFIED-FINITE heads whose SCOPE is finite, the ONE OPEN inequality E4, and FOUR CITED-CLASSICAL edges (E8 the Suzuki/W1 identification, E7 density plus the equi-Lipschitz/Dini continuity modulus, E9 the faithful cap, E10 Weil’s criterion) — (1) WHERE THE QUALIFIER WAS ALREADY CARRIED, hence untouched: `tfpt_prime_front` states “theorem-grade modulo the named citations” at both extraction-chain sites and names Weil 1952, Bombieri 2000, Suzuki and Iwaniec–Kowalski Thm 5.12; the ledger row PRIME.FORM.CONVERGENCE.THEOREM.01 types the W1 dictionary, Weil’s explicit formula and criterion, the admissible BV class and the DENSITY leg as CITED and adds that (H_cof) is untouched and RH-hard; changelog XCIII carries the same pinning disclosure; the v912 docstring says verbatim that edge 6 is NARROWED, not closed; and the website mirror repeats the qualifier in the prime-front feed and the papers index; (2) WHAT IS CORRECTED: the two article surfaces that stated the reduction without it — `articles/2026-08-11/paper_endform_and_inertia_bridge_en.md` (abstract, §8.6, §8.7, §9) and `articles/2026-08-11/email_anthropic_draft_en.md` (status paragraph and ask 3) — each gain ONE clause naming the four classical legs beside the one open inequality; (3) THE AUDIT’S FOUR OTHER FLAGGED ITEMS, CHECKED AGAINST EVERY LIVE SURFACE AND NOT LIVE, hence no edit: NOGO-COMPOSITE-VERIFIED occurs only as the stated provenance of the promoted NOGO-CORE-VERIFIED core, in a ledger row titled verbatim “A NO-GO / TYPING ROW AND EXPLICITLY NOT PROGRESS” and in a module docstring that says it is NOT progress toward a proof; WIRING-DEGENERATE and THETA-CONVENTIONAL occur only in the seam/compiler lane (SEAM.STATE.WIRING.SELECTOR.01, v911) and are listed among no RH-chain route kills; the superseded matrix-stage conditioning exponents and the withdrawn Li–Keiper Vinogradov–Korobov envelope exist only in experiments/ and never entered a paper body, a ledger row or the public mirror; NO RH claim anywhere)

2026-08-14 (XCIV) (promotion round six — THE SIGNED-AND-ALIGNMENT LOCALIZATION, a NO-GO/TYPING module that is explicitly NOT progress, plus the mesh-order wording debt closed at its last two sites: ONE module (v913_ `signed_alignment_localization.py`, 24/24, verdict NOGO-CORE-VERIFIED, ~28 s; suite 905 → 906; ledger 1056 → 1057 with the new row PRIME.NOGO.SIGNED.ONLY.01 typed [O]/no_go_typing; discovery probe `signed_only_nogo_probe.py`, note CCCLXXIII, 87/87, SPEC 49530809, PROBE_SHA d1c42a05) — (1) ITEM ONE, THE MESH-ORDER DEBT (wording only, no number changes,

no marker move): note CCCLXX had logged two sites skipped during the CCCLXIX correction pass; v848_extraction_chain.py stated the chain as “the canonical cofinal ladder” and “CONCLUSION: cofinal finite positivity (H) on the canonical ladder” in BOTH its docstring and the text it PRINTS at runtime, and run_all.py carried the same wording in its registry line — all of them now say cofinal IN THE MESH-REFINEMENT ORDER $D_j = 2^{-j}$, because at a FIXED mesh D_0 the read is exactly cap-independent, so a ladder cofinal only in the window/cap parameter is eventually constant and converges to $W_C[K] + W_C[e_{D_0}]$, giving the FALSE FLOOR $Q_W \geq -|W_C[e_{D_0}]|$ (measured -2.114×10^{-3} at $D_0 = 1/32$, -2.128×10^{-4} at $D_0 = 1/128$); where the module explains why cofinality suffices it now carries the one-line reason in its proven form — were the limit negative, the per-element convergence of v912 would make the catch set $\{j : Q_j(f) < 0\}$ a TAIL of the mesh order, and a cofinal set meets every tail; module re-run unchanged at 19/19 and re-mirrored byte-identically into website/public/verification by the build step; (2) ITEM TWO, WHAT THE NEW MODULE SAYS: any argument that closes the deployed budget inequality for the DEPLOYED BUDGET SHAPE must be (a) SIGNED — it must orient a quantity that is ODD under the comb sign flip — and (b) ALIGNMENT-CARRYING — it must relate the position of the prime atoms to the spectral directions of K ; in particular it can be NEITHER a magnitude bound on $\psi(x) - x$ NOR a natural-grammar identity valid in every arithmetic world and therefore comb-blind; (3) THE PROMOTED CORE, exact and self-contained: the six kernel identities in exact arithmetic ($\int K_D = 0$; $\|K_D\|_\infty = 1$; $\|K_D\|_1 = 4D/3$; $D^{-1} \int K_D^2 = 2/3$; $\int K_D e^{-t/2} = -(D/8)T_D^2$; and the load-bearing $\|K'_D\|_1 = 4$ INDEPENDENT of D — the conversion constant of a magnitude hypothesis does not get cheap as the mesh refines), the geometric supply recomputed by TWO independent routes (closed form vs. direct quadrature, deviation $1.6 \times 10^{-50} / 2.5 \times 10^{-49}$; $B = -1.2648057425013541016$ at $h = 184$ and -1.3147508968858830811 at $h = 388$, negative and $O(1)$), the Littlewood floor $4 \log \log \log N_h$ (2.1654551 at $N = 263$, 4.1231791 at $N = 14634429$) against a slack that shrinks with depth — ratio 214.7 on the module’s OWN conservative slack and 1527.1 on the deployed one, so the ENTIRE MAGNITUDE CLASS IS EMPTY; the provable neutrality of Selberg’s symmetry formula ($\Lambda = \mu * \log$ and $\mu * \log^2 = \Lambda * \log + \Lambda * \Lambda$ are formal identities in the free module on $\{\log p\}$, information gain exactly 1.000); the exact three-term split with its congruence invariance and comb-flip parity (all three terms invariant under EVERY $\text{diag}(1, M)$, outer terms EVEN and the carrying term ODD, the F_4 kernel $A_2^\top B^{-1} A_2$ itself a congruence invariant — so no unsigned, flip-invariant hull can bound the carrier below); and the Beurling–Nyman/Baez-Duarte target exactly in $\mathbb{Q}$ ($\lambda_{\min}(G_N) \leq (\log 2\pi - \gamma)/N$: cap 0.420220 against the needed $c_B = 0.5523$, so there is NO N -uniform Gram floor and the deployed hypothesis is FALSE for $N \geq 3$, plus the explicit non-implying family $\tilde{G} = AA^\top + (4/5)^2 I$ with $\tilde{d}^2 \geq 1/2$ forever); (4) THE BOUNDARY, RESPECTED EXACTLY: the deployed matrix-stage reads (S3.5–S3.12, S4, S5) STAY in experiments/ because they inherit the float64 entry-slack premise and the cited ladder; PINNING DISCLOSURE — PINNED here are the identities, the split algebra, Selberg neutrality, the Beurling–Nyman witnesses, the supply recomputation, the module’s own prime-power sieve, the frame rebuild with h PREDICTED (184..12632), the square-root-barrier placement and the frozen probe SPEC-SHA reproduced BEFORE any evaluation; CITED and NOT pinned are the deployed ladder and its certified reads (X1), the deployed entry slack (X2), the classical constants and Littlewood’s Ω -theorem itself (X3), the float64 entry slack of the wall generators (X4), the CCCLXVIII demand sums

(X5), the CCCLXII/CCCLXIII chain measurements and deployed constants (X6) and the n_0 -normalised margin exponents (X7); (5) SCOPE, STATED IN THE SAME BREATH: TEN classes are proven empty for this budget shape (E1–E10), FIVE are merely unexplored with NO emptiness claimed (U1–U5) and FIVE clauses are named open (O1–O5, among them that nothing is said against arguments legitimately consuming zero positions and that the reverse implication rests on four unestablished premises); the theorem is FINITE-RUNG ($h = 184/388/839$ with the ladder to $h = 12632$) and makes NO all- h claim; it does NOT say that the Riemann Hypothesis is unprovable, that the wall route fails, or that no proof exists; (6) COUNTER-EVIDENCE CARRIED, NOT SMOOTHED: NO-WITNESS STANDS — the certified reads are POSITIVE at all NINE depths (0 negatives, 0 straddles) with deepest certified read $2.79579794131272506 \times 10^{-15}$ at $h = 12632$; the n_0 -normalised decay FLATTENS with depth (-3.21092511 globally against -2.67942161 on the deepest step $5746 \rightarrow 12632$) and the re-derived s/D^2 step $1393 \rightarrow 2015$ is POSITIVE ($+0.50302892$), so the normalised drift is NOT monotone, and no re-derivable exponent comes near the frozen collapse bar -8.0 ; a no-go about the TYPE of the missing input is not evidence about its EXISTENCE; (7) SURFACES: `tfpt_prime_front` gains the residual-obstruction subsection “The remaining obstruction is signed and alignment-carrying (localization)” with the probe’s own S9 wording, Paper 3 a new audit card with the `\veri` citation, the end-form article and the Anthropic email draft one honest paragraph each, and the website mirror is synced; the row supplies no positivity, no interval and no certificate, closes no gate, narrows no gate and moves NO marker anywhere — it must not be counted as progress nor as evidence for or against the Riemann Hypothesis; NO RH claim anywhere)

2026-08-13 (XCIII) (promotion round five — THE FORM-CONVERGENCE THEOREM: the extraction chain’s per-element convergence premise stops being a measurement and becomes an unconditional theorem, and a false cited premise it uncovered is corrected across the corpus: ONE module (`v912_form_convergence_theorem.py`, 35/35, verdict FORMCONV-PROVEN, ~ 12 s; suite $904 \rightarrow 905$; ledger $1055 \rightarrow 1056$ with the new row PRIME.FORM.CONVERGENCE.THEOREM.01; discovery probe `form_convergence_theorem_probe.py`, note CCCLXV, SPEC d911226f, promoted VERBATIM with no downscoping)

— (1) THE THEOREM: for f real, supported in the deployed window and AFFINE ON EVERY GRID CELL, the finite Galerkin form converges to the Weil functional, $Q_D(f) \rightarrow Q_W(f)$, UNCONDITIONALLY and with the explicit envelope $|Q_D(f) - Q_W(f)| \leq D^2[(8 \sinh(B/2) + m(B))A_2 + \Theta_0 A_0 + (A_0 + A_2)(\log(1/D) + \log B + 4) + 2A_0 e^{-B/2}(1/B + 2) + A_1(1 + D)] + (1 + D)(D^3/12)\kappa_3$, i.e. rate $O(D^2 \log(1/D)) = O(2^{-2j}j)$, with $\Theta_0 = 3 \log 2 + \pi/2 + \gamma + \log \pi = 5.372183419225665$ and, for continuous f , log coefficient exactly $7/24$ (sup $5/24$) — replacing the corpus typing MEASURED (rates $-1.58..-1.84$ per level, v848) that meta-audit CCCXXXVII Q-2 had flagged as a measured premise read as settled; (2) THE MECHANISM, three exact steps: the deployed lag vector IS the capped Weil functional on the even tent ($c_d = W_C[S_{dD,D}]$), so the finite form equals $W_C[\widetilde{K}_D]$ EXACTLY on the piecewise-linear interpolant of $k_d = Da_d$; the EXACT DEFECT LEMMA $k_d - K(dD) = -(D^2/12)G(dD)$ holds for every lag because $u \mapsto f(u)f(u + dD)$ is QUADRATIC on each cell and the midpoint error of a quadratic is exactly $-(D^3/24)q''$ — ZERO deviation in exact rationals over 1474 lag identities and 780 strictly interior points; and the faithful cap $C \geq b_K + D$ turns the error into W_C applied to ONE explicit function, bounded layer by

layer with elementary majorants; the interpolation constant is the interior sup of $|K''|$, NOT $\|f'\|_2^2$ (equal for continuous f , different for jump elements: E09 $3 > 2$, E10 $5/3 < 2$); sharpness is measured against a CLOSED-FORM leading term (ratio 0.575..1.066, drifting to 1 through $j = 18$ — the law is genuine, not a loose envelope), and uniformity (V) holds on every TWO-SIDED support window, not on an L^2 ball; (3) THE CORRECTED PREMISE (a correction of a wrong cited statement, NOT a downgrade of a result): the chain's cited " C^0 -continuity of Q_W at fixed support" is FALSE in the pure sup norm — must-fire control C5 exhibits the explicit even Lipschitz family $e_n(w) = (1/n) \min(1, w/e^{-n^2})(1 - w/2)_+$ with $e_n(0) = 0$ and $\|e_n\|_\infty = 1/n \rightarrow 0$ while $|A[e_n]| = 2.57, 4.28, 6.19, 8.14, 10.11, 12.09$ grows linearly — and the true hypothesis is uniform convergence PLUS an equi-Lipschitz (Dini) condition at the origin, which the admissible even compactly supported BV class supplies automatically (T5.2 verifies the corrected modulus of W_C on a declared 12-perturbation battery, worst true/bound 0.0226); the false premise is corrected wherever it was cited: `tfpt_prime_front`, `tfpt_research_contracts`, the v848 module docstring and its website mirror, `run_all.py`, the ledger row `PRIME.EXTRACTION.CHAIN.01` and the Lean prose of `TfptCarrier/CofinalWeil.lean`; (4) CLASSICAL INPUTS, all 11 typed (T4.3): NO zero-free region, NO PNT, NO zeta zeros, NO fit — the only cited arithmetic input is Rosser–Schoenfeld 1962 Thm 12, $\psi(x) < 1.03883x$ for all $x > 0$, consumed ONLY for the support-uniform constant and independently sieve-verified in-run to 10^7 (worst ratio 1.038821); PINNING DISCLOSURE (the CCCXXXVI lesson applied a priori): the W1 measure dictionary, Weil's explicit formula and criterion, the admissible class with its DENSITY leg, the all- x Rosser–Schoenfeld statement and the UNIVERSAL QUANTIFIER itself are CITED, not pinned by these gates; (5) LEAN (DELTA-A, honestly partial): the new kernel-checked module `TfptCarrier/CofinalEnvelope.lean` states the envelope premise as a named structure `FormEnvelope` (per-element constants, a DELTA-B window level, the explicit bound), DERIVES the convergence hypothesis from it (`tendsto_of_formEnvelope`), and restates `cofinal_weil`, `cofinal_weil_for_fixed_idx` and `cofinal_weil_predefined` with `hconv` REPLACED by the instantiated envelope — plus a non-vacuity lock proving the envelope STRICTLY STRONGER than bare `Tendsto` and an inhabited witness with nonzero error at the envelope rate; axioms `propext/Classical.choice/Quot.sound` only, no sorry, no native_decide; the envelope itself is NOT discharged inside the kernel, so DELTA-A is REDUCED, not closed; DELTA-B (stated, not a gap): (H-grid), (H-cap) and (H-align) hold for fixed f and all large j , which is exactly what `Tendsto atTop` needs; papers (`tfpt_3` new audit card, `tfpt_prime_front` the extraction-chain premise corrected and the theorem cited, `tfpt_research_contracts` the contract's cited hypothesis corrected) and the website mirror synced; the chain's genuinely open item is UNCHANGED — (H_cof), the PREDEFINED cofinal positivity inequality, is untouched and RH-hard; no marker moves; NO RH claim anywhere)

2026-08-13 (XCII) (cofinal-index noninterference hardening — the PREDEFINED requirement is moved from an overclaim in prose into an explicit, honestly external Lean contract; no marker move, no RH claim: `TfptCarrier/CofinalPredefinition.lean` adds (1) `cofinal_weil_for_fixed_idx`, the extraction implication for an arbitrary explicit index with `StrictMono`, `PSD` and form-convergence hypotheses — binder order prevents the theorem body from selecting the index but does not prove caller provenance;

(2) the negative theorem `old_api_accepts_sign_mined_idx`, exhibiting that the former mathematical payload accepts a selector branching on measured signs; (3) `signMinedIndex_not_familyNoninterfering`, which rejects that exposed selector under extensional family-noninterference; (4) the hardened `PredefinedCofinalHypothesis/cofinal_weil_predefined` API, requiring an explicit abstract `NoninterferenceContract.Predefined(A,idx)` certificate; and (5) the constantization pair, proving the exact residual limitation — after construction, a selected value can be represented by a constant selector with the same output, so extensional dependent types cannot recover algorithmic history. The concrete source boundary excluding the matrix family and its sign outputs therefore remains the named external audit premise unless the construction language or an equivalent effect/provenance system is formalized. The old `CofinalWeil.lean` core is relabelled as mathematical payload only; dependent Lean-module comments, audit locks, the Lean/verification READMEs, `tfpt_prime_front`, Paper 3’s audit card, the end-form article, ledger row `FORM.PRIME.COFINAL.WEIL.01`, registry text and the public prime-front feed are synchronized. No verification result, status marker, finite positivity claim or RH claim changes.)

2026-08-13 (XCI) (website/video maintenance — the `/prime-front` page gains the sigma-chain diary chapter and the explainer film its regional-theorem coda; NO theory change, NO marker moves, NO RH claim: (1) THE PAGE — new diary chapter “32 — The sigma chain and the regional theorem (sandbox probes)” covering the experiments freeze rounds 73–75 plus the morning package round, ALL SANDBOX per the page’s promoted-vs-sandbox convention (v911 remains the newest promoted module, every counter untouched): the identity $\sigma = 1 - s/n$ with the two 0.665s dismantled as a provenance-proven coincidence; the derived per-cell exact-rational chain certifying every built wall-legal cell (151/151 surface + 59/59 deep to $h = 6344$, worst bound 0.727, $O(1)$ margins); the joint Radau relation lifting definiteness to class level ($\inf \lambda_1 + 0.008$ vs -574); the SOS dual certificate (1111 exact rational certificates, 151/151 at $\eta = 0.273$) sealed as the three-part theorem package with the 202-line `stdlib-only` checker (the audit entry point — re-proves the theorem in 2s, teeth 3/3); the level-3 endform (legal sub-ladder to $h = 8204$ with the first measured termination signal, the sign living in the seat-to-bulk coupling; B3 Lipschitz-certified, B2 proved-conditional, B1 one measured scalar; the razor margin +0.0104 typed an irreducible measurement); the closed no-gos (Pick DEAD, finite-gap ILLDEFINED, shells JCONTRACT-DEAD); and the honest closing map in its frozen form — a REGIONAL finite positivity theorem plus a single open cofinal construction problem, the quantifier is RH, NOT “almost-RH”; the live-updates section renumbered $32 \rightarrow 33$, one new diary-feed entry (badge sandbox, verdict PACKAGE-SEALED); (2) THE FILM — new closing frame 10 “Das regionale Theorem und das kofinale Problem” extends the explainer $2:39.1 \rightarrow 3:05.1$ (26.0s window at 159.12s, crossfade in): the finite positivity question as a REGIONAL THEOREM (every matrix whose entry data lie in the certified region K is positive definite; on-screen chip “151/151 cells · SOS proof object · 202-line `stdlib` checker · re-proves in 2s”), the single remaining CONSTRUCTION problem (a predefined window sequence, cofinal, staying inside the region — keyword glow on “cofinal”) and the honest close as two dry statement beats: “The proof object is ready for audit — the RH quantifier is not”; full manual rebuild per the documented README sequence (EN+DE script line 10 — 1:1 for the de subtitle track, TTS re-run with all 10 lines at rate +0% inside

their frozen windows — frames 1–9 unchanged, captions rebuilt from 433 words, 9 transitions verified, render at 5554 frames, en/de subtitle tracks 34 → 37 cues, last cue ends 3:04.12); WEBSITE SYNC — the four public assets re-shipped (mp4 + en/de VTT, poster byte-identical), PrimeFrontVideo.tsx chapters + coda marker at 2:39, the component transcript verified character-identical to the caption track, JSON-LD duration PT2M39S → PT3M5S with uploadDate 2026-08-13, section header “2½ minutes” → “3 minutes”; nothing under experiments/, verification/, articles/ or the papers/ledger touched (the concurrent research lane owns those))

2026-08-12 (XC) (promotion round four — the consolidation of rounds sixty-four through seventy-one: the FINITE wall closure with its transfer law, and the wiring freedom theorem: THREE modules (v909–v911: finite wall closure, finite zero transfer, wiring freedom; suite 901 → 904; ledger 1052 → 1055 with the rows PRIME.WALL.FINITE_CLOSURE.01, PRIME.WALL.FINITE_ZERO_TRANSFER.01 and SEAM.STATE.WIRING.SELECTOR.01 closed) — (1) THE FINITE WALL CLOSURE (v909, 28/28, PRIME.WALL.FINITE_CLOSURE.01): on the deployed finite ladder every reachable wall face is certified from cited inputs and the composed census $B \wedge W1 \wedge W2$ holds on 39/39 matched surface + 8/8 deep rungs (frozen experiments runs of rounds 64–67, cited with their spec hashes) — the B -half via the v905 interval-certified class floor (min $c_B = 0.5523$), the $W1$ face via the monotone-composition measure inequality (the two +8..+9 dex composition gaps of rounds 55–59 DISSOLVE into one exact Loewner step, composition price +0.29 dex) plus VERIFIED ZEROS AS EXACT DATA at the named $j = 16$ seat (the truncated explicit formula with 7000 mpmath ordinates, every read tested against the independent prime side, the tail bracketed by the unconditional Rosser–Abel envelope: 39/39 surface, composed 67/67 with the cited deep 28/28), and the $W2$ face via the recomposed certificate $m_{\text{cert}} = FC + \hat{P}_{\text{arith}} - \text{TAILB} > 0$ (16/67 at the 7000-ordinate cache, 67/67 + 8/8 once the 2×10^7 -ordinate certified cache pays the priced tail; Odlyzko + LMFDB/Platt, every ordinate below the Platt–Trudgian height $T_0 = 3 \times 10^{12}$, EXTERNAL-CITED); the promoted module re-verifies the load-bearing spine SELF-CONTAINED on a reduced frozen subset with its own committed 7000-ordinate cache re-warded in-run (Rosser corridor per index both sides, γ_1 identity, independent $|\zeta|$ spot checks 2.1×10^{-12} ; heart ward on every read, slack +2.1..+4.8 dex; closure 6/6; the off-line-impostor control fires at $8.2 \times 10^4 \times$) and cites the full census rather than recomputing it; LANGUAGE FROZEN: $W1/W2$ are algorithmically independent evaluations of the SAME localized Weil form — a strong mutual crosscheck, NOT two independent proofs; positivity certified on a finite family of Galerkin sections along the MEASURED critical direction (direction-conditional, UNIF-PATH caveat); a finite verified-zero sum can never prove RH; (2) THE TRANSFER LAW (v910, 10/10, PRIME.WALL.FINITE_ZERO_TRANSFER.01, SPEC 40a7b5c3): the zero-supply economics of the finished wall — $T_{\text{req}}(h) \sim h^{2.8}$ ($\log_{10} T_{\text{req}} = -3.045 + 1.228 \ln h$, R^2 0.882) and the ratio to the window’s own spectral reach π/D_h GROWS (+0.897 dex/ $\ln h$): verdict RATIO-GROWING $\Rightarrow$ EXTERNAL-BATTERY / W-UNBOUNDED-PER-RUNG — the finite engine does NOT scale by buying zeros; the parametrized transfer law $\text{ZerosCertified}(T) \wedge \text{TailEnvelope}(T) \Rightarrow M_h \succ 0$ for all deployed $h \leq H(T)$ with the measured envelope $H(\gamma_{7000}/\gamma_{2M}/\gamma_{2 \times 10^7}) = 254/1256/2806$, $W1$ cheap (binds 3/75), the next h -decade at $T \sim 3.4 \times 10^9$, and $H(T)$ the measuring rod any analytic per-window bound must beat; the module re-verifies the shallow end (12 rungs h 142–254, anchors

$K = 250..7000$, closure census 2/3/4/6/8/12, zero non-monotone, heart ward on all 492 cells, H -consistency 12/12; one disclosed control-rule amendment, fail-first preserved: the jitter bar restored to the upstream frozen ≥ 5 -reads rule); (3) THE WIRING FREEDOM THEOREM (v911, 30/30 + 26/26 + 21/21, verdicts WIRING-DEGENERATE + THETA-CONVENTIONAL + RP-FRAME-COVARIANT; three frozen probes of rounds 69–71 embedded byte-exact, exact integer/rational arithmetic; SEAM.STATE.WIRING.SELECTOR.01 CLOSED — the v908-registered contract answered): the exact Gröbner census of the orbit/edge constraint classes leaves EXACTLY ONE admissible three-dimensional wiring component modulo the rule gauge (the rotation cell C_{rot}); the Z/X wirings are excluded gauge-invariantly by orientation propagation ($\det u < 0$ identically); the deployed pure- i point is an INTERIOR point, connected to the pure- J ray by the integer gauge element $(\oplus_5 J_2) \oplus I_6$ — pure- i IS A DEPLOYMENT REPRESENTATIVE, NOT A COMPILER THEOREM; no compiler-side demand distinguishes the θ_S sheet-swap frame within the 9-dim rule-gauge algebra (five demand classes all silent on the angle), the strict-collar RP Grams transform EXACTLY covariantly under the rule gauge (RP of a (frame, wiring) pair depends only on the relative angle on the δ -circle), and the same deployed parent that fails strict collar RP at θ_S (defect $2t$) PASSES it exactly in the integer-conjugated frame: the rounds-58/59 obstruction is a FRAME statement, not a wiring no-go; the canonical sentence is frozen (sha 79950314) and “pure- i is compiler-forced” is henceforth FORBIDDEN (equivalents without the frame qualifier included); the v898/v903 [O] premise unmoved; NEW COMMITTED DATA ARTIFACT: verification/verified_zeros_n7000.json (7000 mpmath dps-15 ordinates with disclosed in-module rebuild path and in-run wards); papers (tfpt_prime_front new subsection “The finite wall closure and the transfer law” + the rounds-60–63 open-fronts forward link, tfpt_research_contracts the wiring-selector block OPEN→CLOSED + the rounds-64–71 bridge + the frame qualifier on the v908 block, tfpt_1 Wick keybox dated addendum rounds 69–71, tfpt_3 four audit cards updated/added) and website mirrors synced (prime-front feed round entry, DAG, counters 901 → 904 / v535–v911, papers.ts, README, Zenodo, the reproducer now ships the zero cache); NO marker moves; NO RH claim anywhere)

2026-08-11 (LXXXIX) (reflux rounds sixty through sixty-three — the certificate round: the B-half of the wall end-form CLOSES as a certified surface theorem over the IDEAL source objects, the tail gets a mechanism map of five dead routes with named seats and two structural positives, the half-gap target is REGISTERED with a frozen constant and passes its FIRST BLIND HOLDOUT, and the round-60 seam questions close in equilibrium — no NESS needed: FOUR modules (v905–v908: B-floor ideal certificate, tail cartography, half-gap registered target, seam equilibrium wiring; suite 897 → 901; TWELVE frozen probes with all fail-first spec amendments preserved, embedded byte-exact and executed verbatim, plus two round-61 frame probes cited at docstring level; ledger 1040 → 1052 with 12 promoted rows + dated notes on the v903 ness-parent demand and the rounds-57–59 certifiable-B-floor demand) — (1) THE CERTIFIED IDEAL-OBJECT SURFACE FLOOR (v905, 21/21 + 25/25, bfloorpg-measured (certified-surface-floor-achieved($\min c_B=0.5914$)) + bfloorpgival-measured (ival-surface-floor-achieved($\min c_B=0.5523$, 0 refused / 0 failed / 0 skipped)), PRIME.PORT.BFLOOR.PG.01 + PRIME.PORT.BFLOOR.PG.IVAL.01): the chain $B \succeq \frac{1}{2}P_G + c_{\text{dom}}I$ and $P_G \succeq c_G I$, every inequality decided by EXACT-RATIONAL LDL (the v897 certificate class) on all 39/39 reachable steps — P_G is

Gershgorin-POSITIVE (the positive chain is classically certifiable; the single non-classical link is the dominance decision; after three dead certificate rounds the missing piece was the CERTIFICATE CLASS, not a new congruence) — and, via the SPEC-v3 interval rollout (full pipeline as rigorous outward enclosures, fail-closed with first-class refusals, Ogita–Rump error-free-transformation hi-tier certifying exactly the six former width-refusals), over the IDEAL source objects: $\min c_B = 0.5523$ on 39/39 (93.4% of the float reference), τ -screen PASS (-0.226), the smooth world REFUSED by the identical exact machine (0/35); HONEST SCOPE typed everywhere: a SURFACE statement — h -uniformity beyond $h \sim 900$ open, all h beyond the surface open, the $n > q$ half untouched and RH-hard; (2) THE TAIL MECHANISM MAP (v906, 14/14 + 10/10 + 20/20 + 22/22 + 24/24 + 22/22 from SIX frozen probes, tailsign-measured + tailrepair-measured + pgschur-measured + tailabel-measured + segsplit-measured + oscpair-measured, PRIME.PORT.TAILSIGN.01/.02 + PRIME.PORT.PG.SCHUR.01 + PRIME.PORT.TAIL.ABEL.01 + PRIME.PORT.TAIL.SEGSPLIT.01 + PRIME.PORT.TAIL.OSCPAIR.01; typed explicitly mechanism/negative cartography, NOT progress): FIVE dead routes with named seats (the tail sign is NET-ONLY — $\sup q_v$ positive beyond every cut, the terminal lobe positive 67/67; the pointwise repair is SET-DIFFUSE and grows as $X^{0.89}$ with an anti- τ head; the directional Löwner route loses TWO orders of magnitude by the floor-vs-inverse mechanism ($q \leq \bar{q}$ exact 39/39 but $n > \bar{q}$ dies 38/39, loss med 91.3); the cumulative/Abel route is exact (ψ /Riesz identities warded) but its honest integer envelope leaves the gap law $e^{+1.744\alpha}$ — the measured hole is the OSCILLATION, the true remainder itself $\sim 10^4 \mu_1$; the segment split is COSTLIER than global (gain < 1 on 67/67, the ANCHOR PRICE; the named missing object: a DIFFERENCE envelope for $\psi(y) - \psi(x) - (y - x)$ on short deep windows, Brun–Titchmarsh/Selberg class)) and TWO structural positives (headfloor-o1: the entire h -decay of the wall margin lives in the atom tail, the open statement collapses to the one-sided bound $\text{tail}_B > -\text{head}_B$ between two $O(1)$ objects; the 12-BIN REDUCTION: a tiny low-frequency window-harmonic carrier census, measurably NOT γ -concentrated at these depths, reduces the tail bound to ~ 12 windowed ψ -fluctuation Fourier coefficients — honestly typed: the reduced margin carries the FULL decay, dimension reduced, difficulty not); (3) THE REGISTERED HALF-GAP TARGET + THE FIRST BLIND HOLDOUT (v907, 17/17 + 14/14, halfgap-registered (reg-frozen(1/2, no-adjust) / surface-pass(67/67, min margin +2.48e-03) / origin-open(4)) + deepholdout-scored (halfgap-holdout-pass(28/28, min margin +0.2232) / law-continues(-1.925)), PRIME.PORT.HALFGAP.01 + PRIME.PORT.DEEP.HOLDOUT.01; ledger-typed a FALSIFICATION INSTRUMENT, explicitly NOT evidence for RH): $n_h - q_h \geq \frac{1}{2} \mu_1(h)$ registered on the 67-rung surface with the constant EXACTLY $\frac{1}{2}$ frozen under an explicit NO-ADJUST clause that is part of the object (registry sha ae292e55; four candidate origins of the $\frac{1}{2}$ typed OPEN — an algebraic derivation is demanded before any claim upgrade; reparam-declared: the inequality is the wall margin reparametrized, its value is falsifiability, not novelty); the first genuine blind holdout PASSES on 28 new deeper faithful rungs (h 1219–2854, bit-exact table fidelity, $\sim 90\times$ margin headroom, NO depth erosion, the honest cut-ladder drift disclosed; B-floor/ P_G persist at declared float level; the margin law -1.925 continues over 95 rungs; controls discriminate 3/3) — a pass is survival of a falsification attempt, never evidence; (4) THE SEAM EQUILIBRIUM WIRING (v908, 22/22 + 25/25, exact arithmetic, margstab-measured (interior-empty / stratum-not-isolated / escape-noncovariant(price 2ε) / floor-exchange) + nessparent-measured (price-zero / two-seat-law / finite-ness-

nogo / drive-rp-neutral / ness-not-forced), SEAM.CFIN.MARGINAL.STABILITY.01 + SEAM.CFIN.NESS.PARENT.01 closed NOT-NEEDED): strict 2-cycle RP is IM-POSSIBLE on the whole C_6 -covariant class (the seat law reduces exactly to $\text{diag}(a_J, -a_J)$, interior EMPTY; the only escape is covariance-breaking at exact linear price 2ε , and the floor exchange $\text{Pf}_4(\varepsilon) = (\varepsilon - \frac{1}{200})(\varepsilon + \frac{1}{200})$ puts the crossover exactly at the $1/200$ floor); the strict-collar obstruction is a TWO-SEAT LINEAR LAW with kernel $\{J, Z\}$, the deployed wiring is pure-i = a maximally obstructed covariant direction (explaining the v903 ‘30 entries, magnitude $2t$ ’ law exactly), and EQUILIBRIUM kernel witnesses V_J/V_Z carry the full canonical $1/200$ mixing at ZERO entropy production (stationary $\Rightarrow \sigma \equiv 0$ exactly; drive buys no RP) — the ness-parent demand closes as NOT-NEEDED and the successor contract SEAM.STATE.WIRING.SELECTOR.01 (is pure-i compiler-forced?) is registered; the v898/v903 [O] premise unmoved; papers (prime-front continuation section, research-contracts block, Paper 1 keybox addendum, Paper 3 audit cards) and website mirrors synced; NO marker moves; NO RH claim anywhere)

2026-08-10 (LXXXVIII) (numerical-robustness amendment to v772 against an upstream scipy 1.17.0 wrong-result bug + the runner-side version guard; NO gate/bar/semantics change, NO status change: the single failure of the 2026-08-10 full-suite run was root-caused to an UPSTREAM ENVIRONMENT BUG, not to the module or the theory — scipy ≥ 1.15 auto-detects matrix structure in `scipy.linalg.solve` and dispatches the complex-symmetric shift $A - zI$ (real symmetric A , complex z) of the v772 REC-d reconstruction Ward to the LAPACK ?sysv diagonal-pivoting driver, and scipy 1.17.0’s sysv path returns a WRONG solution on this matrix family (backward residual $\|(A - zI)G - V\|$ up to 9.6×10^1 at the two complex- z cells, inflating the REC-d relative residual to 2.6×10^3 ; real- z cells unaffected; fixed upstream in scipy 1.17.1); the amendment is ONE LINE: the Ward’s independent dense solve now passes `assume_a="gen"`, explicitly pinning the LU (gesv) driver that WAS the unconditional default when the module was frozen (identical semantics, available on every scipy ≥ 1.0 ; under numpy 1.26/scipy 1.13 the identical call already used LU and the gate read 5.2×10^{-13}) — all frozen bars, ladders, z points, preregistered fails (CAUCHY-6/GAP-7/GAP-8 part 1; EDGE-A part 2) and both pattern gates are byte-identically unchanged, REC-d stays a genuine two-path Ward (eigh route vs independent LU solve), and the amendment is fully disclosed in the module docstring; verified green under BOTH python 3.9.6/numpy 1.26.4/scipy 1.13.1 and python 3.14.3/numpy 2.4.2/scipy 1.17.0; the runner-side guard `scipy>=1.10,!1.17.0` added to `requirements.txt` (the affected release excluded for anyone installing the suite; the firewalled experiments/* sandbox pins are separate environments and untouched); website mirror byte-synced (`website/public/verification/v772_qf_feshbach_effective.py`) and `website/lib/discipline.ts` regenerated; `bash build.sh audit` $\rightarrow$ AUDIT OK after the change; WITH THIS the full-suite run of 2026-08-10 stands at 897/897 modulo the documented environment bug — the raw run under scipy 1.17.0 was 896/897 with the v772 REC gates as the SOLE casualty, every GAP value bit-identical to the preregistration — no other module touched, no ledger row moved)

2026-08-10 (LXXXVII) (reflux rounds fifty-seven through fifty-nine — the cartography round: the wall rewritten in tangent-Schur coordinates with the FIRST substantive τ -screen pass, the pivot/moment-matrix relocation map typed explicitly as mechanism-not-progress, the seam RP/modular

EXCLUSION with two registered dead readings, and the 12-bit health word typed a pure diagnostic: FOUR modules (v901–v904: tangent-Schur/B-floor, wall relocation map, seam RP exclusion, healthcode12 diagnostic; suite 893 $\rightarrow$ 897; ELEVEN frozen probes with all fail-first spec amendments preserved, embedded byte-exact and executed verbatim; ledger 1027 $\rightarrow$ 1040 with 13 promoted rows + 1 dated RP note on SEAM.CFIN.KSMIX.01) — (1) THE TANGENT-SCHUR SPLIT (v901, 26/26 + 24/24 + 18/18, tangentschur-measured (safeblock(minB=0.679) / gap(min=0.052, med=0.888)) + bfloor-measured (bfloor-screen-pass(slope=-0.247) / certfloor-dead) + signfree-measured (decirc-achieved(ell-b)), PRIME.PORT.TANGENT.SCHUR.01 + PRIME.PORT.BFLOOR.01 + PRIME.PORT.SIGNFREE.NORMALIZATION.01): with the co-block B PD the wall update is $PD \iff n - q > 0$ — two SOURCE-ONLY scalars (no τ_{h+1} , no forward sign; all identities warded to 8.4×10^{-14} , PD equivalence boolean-exact 39/39); the co-block floor $\lambda_{\min}(B) = 0.679$ is $O(1)$ ladder-wide while τ falls by factor 552 (the FIRST substantive τ -screen pass, slope -0.247; coordinate honesty printed: the raw co-block scales like τ , slope +0.753); the honest negative certfloor-dead: all four classical certified bounds negative on all 39 steps (best maximum -88 vs the true floor +0.679) — the floor is MEASURED, never certified; the failure-seat anatomy refutes the plan diagnosis (at all 12 v900 rank-1 failure points the co-block itself dies, the 2.5% off-mode restores it linearly, the seat is orthogonal to the critical direction); the sign-free normalization $\ell = \det(S)^{1/8}$ de-circularizes the update coefficient — CIRCULARITY REMOVED, POSITIVITY NOT GAINED, both said explicitly; (2) THE RELOCATION MAP (v902, 22/22 + 23/23, edgechristoffel-measured (rewrite-exact / ratio-below-one(0.999950)) + gramradau-measured (m0-identity-exact(4.9e-13) / gram-completion-fails(x2:42, m:42, p:0) / radau-exact(3.8e-15) / locwall-seen(42/42)), PRIME.CASE.EDGE.CHRISTOFFEL.01 + PRIME.PORT.GRAM.COMPLETION.01 + PRIME.PORT.RADAU.WEIGHT.01; typed explicitly a relocation/mechanism map, NOT progress): the exact positive-weight rewrite $1/d_{12} = 1 + \sum_m W_{h,m} Q(x_m)^2 - \beta$ ($W > 0$ exactly at 9.7×10^{-14} , $\beta \geq 0$ termwise, independent slogdet route on all 37 rungs) with the relocation diagnosis $1 - r \propto \tau$ (slope +1.008; the uniform $q < 1$ target is the wall's own PD premise QUANTIFIED, no independent positivity source; the Rayleigh fence 147 $\times$ tighter than the classical trace bound); the wall IS the moment matrix of the signed comb measure ($\lambda_{\min}(M_0) = \tau$ at 5.2×10^{-9}) but the $W \succeq 0$ Gram completion fails on 42/42 rungs at the $x = +1$ edge where the comb nodes accumulate (violation magnitude to -152 $\times$ the margin: NO source-only Gram representation at matched degree); the Gauss–Radau construction at the classical node is exact algebra (w^* IS the Christoffel function, med 0.9978, a pure μ_+ object; the P2 pivot is NOT a Radau weight); (3) THE SEAM RP/MODULAR EXCLUSION + THE TWO DEAD READINGS (v903, 25/25 + 23/23 + 20/20 + 20/20 + 23/23 + 18/18 from SIX frozen probes, seamstate-measured + seamnorm-measured + mediator-measured + twistedrp-measured + dilation-split + gappencil-measured, SEAM.STATE.DERIVATION.01 + SEAM.CFIN.MIXING.NORMALIZATION.01 + SEAM.CFIN.MINIMAL.MEDIATOR.01 + SEAM.CFIN.TWISTED.RP.01 + SEAM.CFIN.RP.DILATION.01 + SEAM.CFIN.GAP.PENCIL.01): strict reflection positivity forces $t = 0$ under BOTH deployable spatial reflections (the odd-sector Gram eigenvalues are EXACTLY $\pm|a_J|$ of the $\{4, 5\}$ duad at 2.2×10^{-16} : OS positivity $\iff a_J = 0 \iff$ the v898 mixing floor falls — REFLECTION POSITIVITY AND THE MIXING FLOOR ARE MUTUALLY EXCLUSIVE on this family); $u \geq t$ forced ($u = 0$ RP-excluded, the round-57 reading corrected); the 2π -KMS locus of the boundary reduction is EXACTLY

the point ($t=0, \beta=2\pi$); the complete twisted-OS census is exclusionary ($48 \rightarrow 16$ involutive $\rightarrow 6$ admissible $\rightarrow 0/6$ with strict RP at $t > 0$); the dilation route SPLITS (the v898 M2 parent is a θ_{abT} -marginal witness ON the RP cone boundary whose Schur compression carries the full Pfaffian mixing with the exact rational identity $t^2 \cdot 3m/(1-m^2) = 1/200$; the strict collar route family-wide obstructed by an exact linear law, 30 defect entries all of magnitude $2t$); the gap pencil is EXACT: $\text{Pf}(A_{\text{dep}} + tA_{\text{int}}) = -(t-1)(3t^2-1)(9t^3+21t^2-t-1)$ with Sturm uniqueness on $(0, 1/4]$, kernel dimension exactly 2, the three critical surfaces projections of ONE variety, and NO root at $1/8$; THE TWO DEAD READINGS as first-class negative ledger rows: ‘ $t = 1/8 = 2\pi c_3/|Z_2|$ is a compiler value’ is a DECORATION (55/55 scanned t pass all frozen v898 gates, allowed set $(0, \infty)$, pin-absent) and ‘ $N_{\text{fam}} = 3$ as minimal boundary-mediation rank’ is REFUTED (rank 1 suffices by the exact sign law + integer witness; the deployed mediator has rank 2 EXACTLY; what 3 pins is boundary purity = dimension bookkeeping); the [O] premise of SEAM.CFIN.WICKFUNCTOR.01/KMSMIX.01 is UNMOVED (rp-theta-open now carries the dated measured-exclusionary note); (4) THE HEALTH WORD (v904, 18/18, healthcode12-measured / diagnostic-only / trueword-allplus / softpivot-12(0/37) / v897-pivot10-reproduced / smoothclaim-refuted, PRIME.ARITH.HEALTHCODE12.01; ledger-typed DIAGNOSTIC, ZERO RH CONTENT in either direction): the true word is all-(+) on 37/37 (the certified Sylvester census repackaged, no new content); three plan claims corrected (the 12 factors live in the v899 12-window compression per rung, not in v897; the softest raw pivot is $k = 2$, not $k = 12$; smooth tips flags $\{2, 1\}$ first and never flag 3); the one surviving claim reproduced byte-exact (the v897 Epstein control refused at pivot index 10); the seeded syndrome table distinguishes four adversarial fingerprints — a classifier of manipulated combs, a tool, not a target; ALSO: the two parallel-session diary entries renumbered final (CIII $\rightarrow$ CXXV, CIV $\rightarrow$ CXXXIV; zero duplicate numerals among the 2026-08-10 notes); papers (tfpt_prime_front new Section “The tangent-Schur coordinates and the relocation map” + the part-intro chain extended, tfpt_research_contracts the rounds-57–59 registration blocks + the dated RP note in the v898 block, tfpt_1 Wick keybox dated RP addendum, tfpt_3 five audit cards + the dated note on the v898 card) and website mirrors synced (prime-front feed round entry, DAG +v901–v904, counters 893 $\rightarrow$ 897 / v535–v904, README + Zenodo to 897/v904); NO marker moves; NO RH claim anywhere — every relocation typed as such, nothing gained positivity anywhere)

2026-08-10 (LXXXVI) (website/video maintenance — the /prime-front page brought up to the round-56 state and compressed, and the explainer film refreshed; NO theory change, NO marker moves, NO RH claim: (1) PAGE CURRENT — the stale hero counters replaced by single-source constants (suite scripts now read from the generated lib/suite.ts, the diary-run count computed from the feed data itself: 285 entries), the honesty banner and big-picture statistics interpolate the same sources (span v535–v900 inside the 893-script suite), the stale “314 probes” qualifier dropped from the sandbox-check statistic (kept as the dated lower bound 6638+); (2) PAGE COMPRESSED — the rendered text payload reduced from ~ 445 KB to ~ 182 KB and the built HTML from 1.30 MB to well under 0.9 MB with ZERO loss of honesty content: the four very long “preserved verbatim” status recaps (the T102–T176 sprint recap of the honesty banner, the end-of-series paragraph, the “Near” meaning-level paragraph, and the phase-2 full-proof narrative) moved word-for-word into a lazily loaded module (verbatimRecaps.tsx) behind collapsed on-demand expanders

(VerbatimRecap.tsx), each replaced in place by a compact honest summary that keeps every fence (“Sandbox; not RH evidence”); the diary feed now mounts full entry texts only on expand, and the inline feed window returned to its declared ~ 16 newest entries (44 older entries moved verbatim to the lazy archive, 225 $\rightarrow$ 269); (3) THE FILM REFRESHED — the one stale narration line of the 2026-08-03 explainer updated to the current suite state (“Almost nine hundred modules”; on-screen stat now “893 modules · machine-checked · 84 Lean files”), full TTS/captions/render re-run through the frozen frame windows (still 2:39, burned-in English captions, en+de subtitle tracks rebuilt from the same source; the component transcript verified character-identical to the caption track; JSON-LD uploadDate 2026-08-10); all other narration, timings and claims unchanged — the film still states “no proof of RH” explicitly)

2026-08-09 (LXXXV) (reflux rounds fifty-four through fifty-six — the reviewer’s “immediate” list delivered: the certificate rollout becomes INTERVAL-RIGOROUS (the informal ε_c lag-evaluation error model is RETIRED from the ladder), the channel-mixing state the block Wick functor awaits is CONSTRUCTED (KMS + exact Schur generation), the conditional diagonal contract becomes a NORM SQUARE in the frequency weights, and the normalized core update gets its exact two-dimensional anatomy with the honest negatives registered: FOUR modules (v897–v900: certified interval ladder, KMS/Schur mixing, Christoffel norm-square, core update anatomy; suite 889 $\rightarrow$ 893; EIGHT frozen probes with all fail-first spec amendments preserved — v898–v900 embedded byte-exact and executed verbatim, v897 embedding the 66-minute ladder probe byte-exact with SHA wards, re-certifying all 15 tier-1 + 3 tier-2 rungs verbatim in-suite and freezing the full 42-rung census; ledger 1020 $\rightarrow$ 1027 with 7 promoted rows + 4 dated notes on PRIME.PORT.TAIL.01 / PRIME.PORT.CERTIFIED.LADDER.01 / PRIME.CASE.PAIRCORR.CONTRACT.01 / SEAM.CFIN.WICKFUNCTOR.01) — (1) THE CERTIFIED INTERVAL LADDER (v897, probe verdicts ballhead-proven + ballladder-complete 10/10, 3960 s, PRIME.PORT.BALLLADDER.01): $\sigma_h > 0$ with RIGOROUS mpmath.iv interval-arithmetic shifts on ALL 42 reachable rungs $h = 142\text{--}878$ — 15 exact-rational integer Bareiss/Sylvester certificates ($h \leq 300$, floors $4.5 \times 10^{-5}\text{--}2.1 \times 10^{-4}$) + 27 validated-precision Cholesky dps 120/200 certificates (floors $5.2 \times 10^{-6}\text{--}8.4 \times 10^{-5}$, pivot/bound ratios $2.3\text{--}9.9 \times 10^{115}$); the GL-48 node-enclosure lemma (radius 10^{-90} , definite sign changes, disjoint intervals, 2 in the interval weight sum), native outward-rounded interval transcendentals, exact midpoint/radius extraction, the rigorous shift $2h \text{rad}_{\max}$ (+ h/Q on the tier-1 grid) — no working-precision rounding in the tier-1 decision path; the Epstein control REFUSED at pivot 10 by the identical interval machinery; the informal conservative ε_c model of v884/v887 is RETIRED; the validated-precision tier label carried honestly, never upgraded; remaining named: the Lean composition (the asymptotic tail untouched, PRIME.PORT.TAIL.01); (2) THE CHANNEL-MIXING CANDIDATE (v898, 30/30, kmsmix-measured [kmsmix-found(u=1, t=1/8, $\beta=1$), schurmix-generates(10/10), rp-theta-open], SEAM.CFIN.KSMIX.01 + SCHURMIX.01): the C_6 -covariant channel-mixing KMS state EXISTS — the first point of the frozen grid passes ALL block-functor gates (CAR strict, exact covariance with the forced zeros, all 15 duad cross-blocks at the floor, grading 5/5 + 10/10, all 15 block Wick monomials with the canonical Pf_4 signs of the v896 functor; robust at $\beta = 2$; the hermitian commutant measured exactly, $112 = 62 + 50$ with the 33-dim mixing slice); EXACT (sympy): the Schur/Feshbach elimination of the boundary gives $A_{\text{eff}} = \kappa A_{CC} + \frac{t^2 m}{1-m^2} V J_3 V^T$ and GENERATES

all 10 carrier duads from the bare diagonal state (uniform $3J$ block, canonical signs) — on both fronts (RH port, Wick functor) the real correlation lives in the ELIMINATED boundary; the frozen 15-signature table is the registered prediction; rp-theta-open the named open check; the [O] premise UNMOVED; (3) THE NORM-SQUARE CONTRACT (v899, $19/19 + 15/15 + 19/19$, christratio-measured (winner-christoffel / extsource-decoupled(0.454)) + kernelsos-measured (index-large; rmin=1; not-absorbed) + edgedefect-measured (normsquare-achieved; kill=periodic; chain=carried(0.21)), PRIME.PORT.CHRISTOFFEL.RATIO.01 + PRIME.CASE.KERNEL.SOS.01 + PRIME.CASE.EDGEDEFECT.01): the EXACT deflated-Christoffel pivot identity $1/d_{12} = 1 + v_*K_\sigma(y_*)$ (independent route 2.0×10^{-11} ; the winner identification by two orders of magnitude) with the honesty fence $\lambda_{\min}(I - G) = \tau$ EXACT (a coordinate change, NOT an independent positivity source); c'/c SENS $[0.223, 5.258]$, $r_{12} > 0$ on 31/31; the pair-contract kernel's frequency weights $W_{f,m} \geq 0$ EXACTLY with the ENTIRE negative content collapsing to ONE top-edge tent (closed-form boundary leakage, $r_{\min} \leq 1$), and the PERIODIC full-weight fold KILLS it exactly — negative index 0 everywhere, 79/79 modified margins positive, the kz-9-alias-9 absorption failure $1.381 \rightarrow 0.000$, the boundary term β carried closed-form (max 0.21) — the conditional diagonal contract of v894 is a NORM SQUARE in the frequency weights (reviewer case 1 at the finite level); the arithmetic hypothesis itself REMAINS CONDITIONAL (pair-correlation class per v889); (4) THE CORE UPDATE ANATOMY (v900, $20/20 + 23/23$, normcore-measured (family-bounded(2533) / update-exact(udim=2) / region-open) + graphregion-measured (coupling-free / graph-region-open / shadow-lawless), PRIME.PORT.NORMALIZED.CORE.01 + PRIME.PORT.GRAPH.REGION.01): the normalized deep core obeys $X' = c(X + U)$ EXACTLY (8.3×10^{-16}) with $c = \tau/\tau'$ and an effectively TWO-DIMENSIONAL input (one matrix mode at 97.5% energy); the honest negatives REGISTERED as the boundary conditions of any invariant-region theorem: no linear coupling law (both R^2 BELOW the 200-shuffle null q_{95}), the rank-1 truncation fails (the positivity is carried by the 2.5%-energy off-mode), naive product/graph invariant sets refused, the 2D shadow lawless — any region construction must keep the exact $X + U$, truncating no mode; papers (tfpt_prime_front new Section “The certified interval ladder and the norm-square contract”, tfpt_1 Wick keybox extended with the constructed candidate, tfpt_3 audit cards, tfpt_research_contracts round-54–56 registrations + dated notes) and website mirrors synced; NO marker moves; NO RH claim anywhere — the asymptotic tail and the one-sidedness stay open exactly as before)

2026-08-09 (LXXXIV) (reflux rounds fifty through fifty-three — the closure architecture: the exact hermitian congruence with a NON-DECAYING inheritance margin, the flag-chain induction, the honest Rouché kill, the 8×8 reduction (the wall IS the fixed Schur core to seven digits), the explained margin scale, the assembled theorem skeleton with ONE bounded-margin statement open, the concrete conditional diagonal contract, the collectivity theorems, and the Wick functor arc resolved at block level: FIVE modules (v892–v896: closure architecture, relative margins, diagonal refinement, collective comb, Wick block functor; suite 884 $\rightarrow$ 889; FOURTEEN frozen probes embedded byte-exact with all fail-first spec amendments preserved; ledger 1012 $\rightarrow$ 1023 with 10 promoted rows + dated skeleton updates) — (1) THE CLOSURE ARCHITECTURE (v892, $16/16 + 15/15 + 14/14 + 16/16$): the exact congruence $A_{h+1} = A_h^{1/2}(I + H_h)A_h^{1/2}$ (6.5×10^{-14} , H exactly hermitian) with the inheritance

margin $\eta_h = 1 + \lambda_{\min}(H_h)$ NON-DECAYING (min 0.0050, median 0.29, slope +0.108 while τ collapses at -2.74) — the open inequality is bounded-margin-shaped, not collapsing; $\rho(W^{-1}\Delta C)$ was a misleading statistic (non-normal, $\|M\|/\rho$ up to 26) — the hermitian H is the honest carrier; ALL 12 LDL flag quotients $Q_k > 0$ on all 31 truth steps (soft-flag min 2.06×10^{-14} , sign-decidable at $6.4 \times 10^9 \times$ the noise floor; the smooth world violates at the BULK flags first) — the shortest induction shape; the two-sided contour-norm (Rouché) route honestly killed ($M \geq 1$ on 22/31 including off-cap; the argument principle itself verifies exactly); and THE WALL IS THE FIXED 8×8 SCHUR CORE: $\lambda_{\min}(S) w_{\text{core}}/\tau = 1 \pm 8.4 \times 10^{-8}$ with $w_{\text{core}} \geq 0.999937$ on 41 rungs, conditional only on the TAU-RELATIVE exterior bound ($\lambda_{\min}(R)/\tau$ trendless at 210–2200; the absolute margin shrinks $h^{-2.865}$); (2) THE MARGIN SOURCES (v893, 20/20 + 18/18): SCALE-MATCHED — in the dangerous direction the increment and the operator collapse TOGETHER (slopes -3.716 vs -3.456 , residual correlation 0.974, 94 % shared variance): the non-decay of η is EXPLAINED (numerator and denominator are sections of ONE arithmetic object; open: only the $O(1)$ scatter); the relative laws $d_{12} = c\tau$ (trendless; the kz-21 outlier diagnosed as a COORDINATE-ARTIFACT in the round-53 sandbox — the kz-19 mechanism repeats, corrected spread $124 \rightarrow 15$: SOFTFLAG TAU-TIED) and $\lambda_{\min}(R) \geq 210\tau$; COMPRESSIONS-DISTINCT (the port bulk floor is absolute, the core exterior tau-tied); THE PRINTED SKELETON: base certified + $R \geq 210\tau$ + core $\leftrightarrow \tau$ (7 digits) + $\eta > 0$ — the ONE unconditionally open statement is the τ -sign inheritance in bounded-margin form; (3) THE DIAGONAL REFINEMENT (v894, 11/11 + 13/13 + 12/12; the route stays CONDITIONAL per v889): the exact band-limited prime kernel $K_{h,m}$ (regrouped at 4.5×10^{-15} ; the LaTeX contract statement frozen in-probe; all 79 finite margins positive); the endpoint bracket ($F'(1) \geq$ deficit on 142/227 — the global linear collapse fails, deep small- a cells pass monotonically); the inner-zone accounting (scale-normalized FLAT; the hard band NON-SHRINKING at $\sim 20\%$ of aliases / 38–56 % of mass; stability on an a -graded mid shell); (4) THE COLLECTIVITY (v895, 18/18 + 12/12): the true avoidance law is ONE-SIDED ($\max(-\mu_{\min}) = 0.9950 < 1$ on all 31 steps = PD inheritance itself; no norm-bound shape); the geometry/atom split is EXACTLY degenerate (the atom cutoff is slaved to the tent edge — no separable atom channel; the increment is the collective window re-test); the deep core IS the port core (the fixed aliases $a_m = \pi^2 m^2$ to 0.1 %; ALL FOUR surgeries kill the coherence incl. the wrong- Λ world — the signal is the ENTIRE multiplicative von Mangoldt comb); (5) THE WICK ARC (v896, 27/27 + 33/33 + 26/26): the six compiler roles exist in the deployed seam (sector law, grading, C_6 intertwining exact) but the vacuum kernel is channel-diagonal; the PROVED scalar obstruction (the C_6 2-cycle $\{4, 5\}$ forces a duad zero; both relaxation witnesses constructed); the BLOCK RESOLUTION (commutant dimension 33; the canonical block covariance carries 15/15 blocks and 15/15 block Wick monomials with the canonical sign law, interleaving character +1 symbolic) and the decisive fact SEAM-DIAGONAL (the deployed seam has zero cross-blocks — the value level awaits a physical mixing mechanism; the [O] premise unmoved); papers and website mirrors synced; NO marker moves; NO RH claim anywhere)

2026-08-09 (LXXXIII) (reflux rounds forty-two through forty-nine — the great consolidation: the certificate rollout COMPLETES ($\sigma_h > 0$ PROVEN on ALL 42 reachable rungs), the finite Pfaffian/ K_6 signature CLOSES (fermionic signs gauge-matched via the canonical character; the self-hosting counting theorem

forces $g_{\text{car}} = 5$; the flavor hexagon is the $\text{Aut}(C_{\text{fin}})$ orbit), the four route decisions of the diagonal half land (the wall dies 100 % through off-diagonal coherence; PNT-insufficient; the input is pair-correlation class), the surviving positivity architecture is measured (total positivity of the section family on 37/37 rungs; the wall margin IS the pole distance of the integrable s -flow; inheritance is a multi-factor statement), and the Möbius/carrier-invariance route is honestly killed with mechanisms: FIVE modules (v887–v891: certified ladder complete, finite Pfaffian signature, route decisions, total positivity flow, Möbius firewall kills; suite 879 $\rightarrow$ 884; FOURTEEN frozen probes embedded byte-exact with all fail-first spec amendments preserved; ledger 999 $\rightarrow$ 1012 with 11 promoted rows + 2 dated route retypes) — (1) THE COMPLETE HEAD (v887, 7/7, certified-ladder-complete): $\sigma_h > 0$ on ALL 42 reachable rungs (12 exact-rational integer Bareiss/LDL + 30 validated-precision mpmath Cholesky dps 120/200 with precision doubling; the module closes $h = 859/878$ with floors $\geq 8.352/9.187 \times 10^{-6}$ and pivot/bound ratios $\sim 10^{115}/10^{195}$; the 40-rung parent rollout stays sandbox evidence, runtime-excluded; Epstein REFUSED at pivot 10; proven modulo the declared conservative evaluation error model; ball arithmetic and the Lean composition remain named); (2) THE FINITE SIGNATURE (v888, 27/27 + 19/19 + 42/42, exact integer/sympy): the S_6 Specht channels $(1, 0, 2/3)$ exact; the 15 doily lines = the 15 Plücker monomials of $Gr(2, 5)$ with perfect sign match; the $(16, 6, 2, 10)$ Hadamard anchor signature; the $S_6 \rightarrow S_5$ vacuum selection (orbits $[1, 5, 10]$ equal as sets to $(\Lambda^0, \Lambda^4, \Lambda^2)$); THE FLAVOR HEXAGON IS THE $\text{Aut}(C_{\text{fin}})$ ORBIT ($g^2 = \sigma$ exact, g^3 = the W -edge sheet swap, the 6-orbit = the deployed transport edge for edge, $(2/3)^6$ = the frozen recovery value, $0/600$ non-automorphisms factor); the K_6 motif theorem ($35 = 15$ perfect matchings + 10 vacuum triangles = secants + 10 vacuum-free = externals; q^* = vacuum incidence); THE FERMIONIC PFAFFIAN SIGNS gauge-matched to the Hodge table via the CANONICAL character $\chi(i) = (-1)^{i+1}$ (triple-identified: vacuum-row Laplace; Λ^4/Λ^5 volume form; C_6 crossing character); THE SELF-HOSTING COUNTING THEOREM $\binom{g+1}{2} = g!!$ with $g = 5$ the only nontrivial solution and $N_{\text{fam}} = (g - 2)!! = 3$ ([E] theorem; the Wick-compiler premise stays [O] — P2 narrowed to ONE premise, no marker move); the mod-30 anchor clock CLOCK-DISTINGUISHED (period-4 moduli exactly $\{5, 10, 15, 30\}$); the operative-Coxeter-30 reading separately DEAD (sandbox, both sides); (3) THE ROUTE DECISIONS (v889, 8/8 + 12/12 + 10/10 + 12/12): the wall dies through PURE off-diagonal coherence (diagonal profile frozen at the kill point; separation > 10 deep; honestly diag-intermediate); $\theta^* = 0.700$ frozen (outside margin +0.0214 uniform on 42 rungs; inside law $\sim 0.87/\log^2 h$); pnt-insufficient (the PNT-smooth reference itself violates the port margin on every rung; the truth's positivity is the mask-mass INTERACTION; ε_A is 6–970 $\times$ too large); and the signed-homotopy classification homotopy-indefinite-arithmetic (exact envelope identity at 4×10^{-14} ; the fixed-mask kernel is concavity-locked NSD; the diagonal route's arithmetic input is PAIR-CORRELATION CLASS — retyped from unconditional candidate to conditional reduction theorem); (4) THE SURVIVING ARCHITECTURE (v890, 10/10 + 7/7 + 14/14): TOTAL POSITIVITY of the section family (all 12 leading minors strictly positive on all 37 full-window rungs; Desnanot–Jacobi exact); the POLE-FREE s -corridor with $s_h^* = 1/\lambda_{\text{max}}(C_h)$ — the wall margin IS the pole distance of the integrable s -flow (slope -2.90); the multi-factor determinant anatomy ($Q_h = \prod (1 + \mu_i)$ exact; the truth keeps EVERY factor off -1 while the smooth-mass world crosses on 22/28 steps and flips Q 13 times; the one-scalar

Möbius bridge honestly closed bridge-diffuse: $|\alpha| \sim 10^{-3}$ is determinant-inert) — POSITIVITY INHERITANCE, IF IT EXISTS, IS A MULTI-FACTOR/TOTAL-POSITIVITY STATEMENT; (5) THE KILL BATTERY (v891, 10/10+13/13+7/7): the round-CVI carrier-invariance was a NORMALIZATION ARTIFACT — fit-free gauge-free cross-ratios CR-DEAD (pooled median 0.128; anchors disagree; no cocycle), source-frozen gauges show REAL motion (GAUGE-MADE; the scalar cocycle does not track the wall, corr 0.129; Jacobi dead), and the six-world census shows the arithmetic separates AT THE FRAME (every control world including the smooth ones loses window subcriticality; scramble passes the Möbius bars BETTER than truth — rank-2 kinematics); the surviving arithmetic remnant is the deep-core 8-node cross-ratio coherence (4.3×10^{-4} vs smooth 2.7×10^{-2}) — prime-mass-driven, the named object; related sandbox kills recorded (static Cauchy identification dead; the Cauchy route can never certify: dev/τ grows at slope +1.46); papers and website mirrors synced; NO marker moves; NO RH claim anywhere — the hardness decision stands: the open one-sidedness carries full RH weight)

2026-08-09 (LXXXII) (reflux rounds forty/forty-one — the flow corridor of the prime front: the determinant chain to the tau function lands with the PARAMETRIX DECISION (the Euler-product comb is GLOBALLY rigid — every smoothing-based parametrix is dead), the FIRST RIGOROUS POSITIVITY STATEMENT of the program (exact integer Sylvester certificates $\sigma_h > 0$ on the head rungs), the complete flow/induction anatomy of the ladder (degree-2 Lax closure; NO monotone one-prime induction in any insertion order — positivity is a property of the COMPLETE comb), and the register-gapcode DISENCHANTMENT row: FOUR modules (v883_tau_chain_parametrix.py, v884_certified_head_positivity.py, v885_ladder_flow_anatomy.py, v886_register_gapcode_null.py; suite 875 $\rightarrow$ 879; NINE frozen probes embedded byte-exact with all fail-first spec amendments preserved; ledger 989 $\rightarrow$ 999 with promoted rows, the decided design constraints, and the open-contract registrations PRIME.PORT.LEADING.SIGN.01 + PRIME.PORT.TAIL.01) — (1) THE TAU CHAIN AND THE PARAMETRIX DECISION (v883, 5/5 + 3/3 + 3/3, tau-chain-exact + parametrix-measured (fluctuations-required) + zones-measured (both-required)): the Schur determinant identities $\sigma_h = \det(I - E)/\det(B)$ and $\det(I - E) = \det(I - R)\det(I - D_P)$ are machine-exact (4.8×10^{-13} in log space) with positive bulk factors, hence $\text{sign } \tau_h = \text{sign } \sigma_h = \text{the wall with } \tau_h := \det(I - D_P)$, and the Jacobi variational identity $\frac{d}{ds} \log \det(I - sD_P) = -\text{tr}[(I - sD_P)^{-1}D_P]$ holds on the true family; the κ/ρ readout: $\text{slope}(\log \sigma) = -2.93$ vs $2 \times$ the Mellin fluctuation slope -2.53 ($\sigma \sim \text{fluctuation}^2$ within 16 %); THE DECISION: the prime-power lattice with fully smooth quadrature masses ($\tau = -78$ to -1706) and even with EXACT local $\pm \frac{1}{2}$ -log-unit mass sums (-78 to -5537) is ORDERS worse than the plain continuum (-0.11 to -1.26) against the true comb ($+1.7 \times 10^{-4}$ to $+6.7 \times 10^{-7}$), and the zone refinement kills BOTH ways (edge-only smoothing -3.7 to -22.1 ; interior-only -77 to -7551): the exact Λ -mass-position pairing is load-bearing EVERYWHERE — the multiplicative Euler-product structure is globally rigid, the unperturbed object of any RH analysis MUST carry the full von Mangoldt comb, and every small parameter lives in the flow/deformation direction; (2) THE CERTIFIED HEAD (v884, 5/5, certified-head): $\sigma_h > 0$ PROVEN on kz 9 ($h = 184$), 12 (151), 13 (168) — independent mpmath rebuild of the window lags (dps 60/100, conservative error model $\varepsilon_c = 10 \times$ dps-disagreement, cross-ward

1.1×10^{-14} which CAUGHT a sign bug in the rebuilt Arch near-branch), matrix shift $\sim 2 \times 10^{-18}$ (~ 14 orders below the margins), then EXACT INTEGER Bareiss/LDL on the $Q = 10^{20}$ grid: all pivots positive (Sylvester) $\Rightarrow K \succ 0 \Rightarrow \sigma_h > 0$ via the exact v866 equivalence — no Lanczos, no floating point in the decisive step; certified floors $\lambda_{\min} \geq 3.633/3.327/3.842 \times 10^{-4}$; the Epstein control through the IDENTICAL machinery is REFUSED at pivot index 10; typed honestly: proven MODULO the declared conservative transcendental-evaluation error model (validated-numeric standard), the ball-arithmetic closure and the 42-rung rollout are the named follow-ups — the head part of PRIME.PORT.TAIL.01 is delivered on three rungs; (3) THE FLOW/INDUCTION ANATOMY (v885, $8/8 + 5/5 + 13/13 + 11/11$, isoflow-measured (flow-open) + ladder-measured (perturbative + non-monotone) + primeladder-measured + lax2-measured (flow-noisy / lax2-partial)): the gauge-fixed IKS generator flow closes in DEGREE 2 (residual medians $0.244/0.248$ with $\{Y^2f, Y^2g\}$; degree 1 fails at $0.498/0.457$) — an isomonodromy-compatible Lax structure, typed as structural precondition (controls close too; the arithmetic stays in the VALUE); the window-ladder step is marginally perturbative (accuracy median 0.458) but NON-MONOTONE in raw h ; the ONE-PRIME LADDER DECIDES: the pure-Arch start is catastrophically subcritical ($\tau(0) = -9.9 \times 10^{13}$ at kz 9; G_+ not even PD deeper), the last sign crossing sits at $u^*/U = 0.991\text{--}0.999$ in EVERY insertion order (ascending needs 97–99 % of the atoms, edge-first needs 100 %), per-atom increments only 54–64 % positive: POSITIVITY IS A PROPERTY OF THE COMPLETE COMB — v877's truncation reversal sharpened to atom resolution, no monotone one-prime induction exists, induction must run in a flow coordinate, not in comb content; and the raw degree-2 coefficient basis is ill-conditioned NOISE (roughness 1.365 vs 0.7 ; operator predictivity 0.350 vs 0.3 ; the integrated tau-transfer identity itself warded EXACT at 5.6×10^{-11}) — the conditioned flow coordinate is the named open object (PRIME.PORT.LAX2.01); (4) THE GAPCODE DISENCHANTMENT (v886, $24/24$, gapcode-measured, an honest NEGATIVE/limit row per the frozen probe's own typing): the error-code reading of the 210-register is LITERALLY TRUE on the prime side (the register bits $\{2, 3, 5, 7\}$ are the first four parity checks of the sieve; code rate $48/210$; hard floor $g_k \geq w(p_k \bmod 210)$ with 0 violations in 5.76×10^6 pairs; $I(\text{state}; \text{gap}) = 1.14$ bits) — AND the code is THE SIEVE: a zero-parameter wheel–Cramér null explains $R^2 = 0.99839$ of the state profile, the arithmetic excess is 4.02 % and shrinking, no knee at four checks, 210 sits ON the foreign-wheel trend ($z = -0.61\sigma$), all eight anchor Walsh seats below 2.5σ exactly as CRT predicts: everything the register knows about gaps, every 4-prime wheel knows — nothing moves with c_3 or φ_0 ; the register's uniqueness remains the arithmetic forcing $\text{rad } |W(E_8)| = 7\#$ with $\prod(p-1) = 48 = \Omega_{\text{adm}}$; papers: the prime-front rounds-40/41 section and contract registrations; website mirrors and generated surfaces synced; NO marker moves; NO RH claim anywhere — the demand-curve decision stands: the open one-sidedness carries full RH weight)

2026-08-09 (LXXXI) (reflux rounds thirty-eight/thirty-nine — the port compression of the wall: the four finite anchor theorems land, the Carleson wall becomes the EXACT operator geometry of ONE dressed port block (gauge, testing, Schur, integrable class), and the port source gets its universal law (the $\sqrt{n/X}$ uniformization, the exact $1 - e^{-1/2}$ edge mass, the Mellin–Cauchy kernel, the closed criticality budget): THREE modules (v880_finite_anchor_theorems.py, v881_carleson_port_geometry.py, v882_port_source_mellin.py; suite $872 \rightarrow 875$;

EIGHT frozen probes embedded byte-exact with all fail-first spec amendments preserved; ledger 972 $\rightarrow$ 989 with 11 promoted rows + 6 open-contract registrations) — (1) THE FINITE ANCHOR THEOREMS (v880, 26/26, finite-anchor-closed): the closed census-free normal form $q^*(x) = \sum_{i < j} x_i x_j + \sum_i x_i = \binom{|x|+1}{2} \bmod 2$ (weight-only; the v845 selector FORCES the linear part $(1, 1, 1, 1)$ — the 2^{16} search replaced by a theorem); the EXCLUSIVE anchor classification of $PG(3, 2)$ lines (all 15 doily lines carry the weight multiset $\{2, 1, 1\}$ = the anchor $a = (1, 1, 2)$ with per-line Vieta $(4, 5, 2)$, $e_2 = g_{\text{car}}$, $e_3 = |\mathbb{Z}_2|$; the 20 others split EXACTLY as 10 secants = the WRONG anchor $(1, 2, 2)$ + 10 external lines — the anchor law characterizes the doily); the doily as the MULTIPLICATION TABLE $\Lambda^2 E \times \Lambda^2 E \rightarrow \Lambda^4 E$ of the five-slot carrier (wedge nonzero EXACTLY on doily lines; $5 \times 3 = 15$ factorizations); and QUADRATIC ONE-STEP EXHAUSTION forces $g_{\text{car}} = 5$ uniquely among odd g — the theorem [E], the Calderón premise explicitly [O]: P2 narrowed, NOT eliminated, no marker move; (2) THE OPERATOR GEOMETRY (v881, 11/11 + 5/5 + 8/8 + 5/5, pick-scalarized + testing-identified + port-schur-exact + integrable-confirmed; four sides of ONE object, counted once): the review’s literal rank-2 Pick target $I - C^*C = \Gamma^*\Pi\Gamma$ is REFUTED as stated and replaced by the exact rank-2 JACOBI DISPLACEMENT $[J, \Delta] = b_h(e_{h-1}r^\top - re_{h-1}^\top)$ (rel $\leq 4.3 \times 10^{-14}$, source-only, blind holdouts included); the GAUGE identity $E = S(\sqrt{\tilde{\nu}} K_{\text{CD}} \sqrt{\tilde{\nu}})S$ — the wall operator is ORTHOGONALLY EQUIVALENT to the plain Carleson Gram, its diagonal the CLASSICAL testing functional $\tilde{\nu}_m K_h(y_m, y_m)$ (the corpus wording updated: the arithmetic sits in the NODE AND WEIGHT distribution of the two measures, the critical cancellation is the coherent geometry of a Carleson Gram operator — not an irreducible kernel phase); the Schur/Haynsworth PORT REDUCTION $I - E \succeq 0 \Leftrightarrow I - R \succeq 0 \wedge I - D_P \succeq 0$ with $(1 - \lambda_{\max}(D_P))/\tau = 1.00$ on ALL rungs (THE PORT IS THE WALL: 13–54 nodes; bulk margin $420\text{--}45000 \times \tau$; inertia integer-exact including both indefinite controls) — satisfying the round-37 NON-DECOMPOSITIONAL demand; and the theorem-grade surprise $[Y, D_P]$ of EXACT rank 2 (10^{-14}): the dressing PRESERVES the IIKS integrable class — the dressed port operator is an integrable kernel with two explicit generators; (3) THE SOURCE LAW (v882, 7/7 + 5/5 + 6/6, sqrt-uniformized + mellin-kernel-confirmed + atoms-identified (budget-closed)): under $r = \sqrt{n/X}$ the weighted prime measure uniformizes to Lebesgue dr (Kolmogorov 5×10^{-4} at $X = 10^7$; own SPF sieve; deployed tables = the true comb at 0.0033); the last-log-unit edge mass equals $1 - e^{-1/2} = 0.393469$ (measured 0.3936) — the wall’s $\sim 39\%$ port mass IS the classical PNT edge law; the port symbol is the Mellin–Cauchy kernel $1/(1+2i\tau)$ and the FIT-FREE continuum prediction reproduces the deployed port numerators to 0.029 at the deepest rung (the deviation = the shrinking arithmetic fluctuation); the port numerators are the EXACT deployed-window prime sums (1.5×10^{-13}) with the explicit-formula reading at the alias frequencies, and the criticality BUDGET CLOSES ($+1.405 - 1.674 + 0.284 = +0.015$): $T \rightarrow 1$ is PNT growth exactly compensated by window geometry plus Christoffel — the wall is an ERROR-TERM statement about prime partial sums at the port frequencies; (4) THE HARDNESS DECISION and the OPEN CONTRACTS (ledger rows, sandbox-backed): PRIME.ERRORTERM.SCALE.01 DECIDED — injecting the exact off-critical zero signature, the wall margin equals perturbation ENERGY on the τ law exactly (ratios 1.00–1.10; $A^* \sim \sqrt{\tau}/\delta^2$ with the frozen convention $\Delta\lambda = O(A^2\delta^4)$; the kill localizes THROUGH the port block): the reduction chain is an exact reformulation at RH strength, NO unconditional slack; new

open contracts registered [O]: PRIME.PORT.LIMIT.01 (compressed operator-norm convergence slope -2.80 , criticality from below, atom-at-edge Weyl- m class — the fixed-space limit theorem is the demand), PRIME.PORT.SCALAR.01 (the wall as ONE scalar inequality $\sigma_h = [1 - \tilde{\nu}_{m^*} K_h(y^*, y^*)] - b^\top (I - E_{\text{rest}})^{-1} b \geq 0$, exactness warranted on all 42 rungs), PRIME.PORT.COCYCLE.01 (the fixed 12×12 window carries the wall exactly), PRIME.CASE.SUMRULE.01 (prove the Case C_0/C_1 sum rule $\Rightarrow$ unconditional $T_h \leq 1$; the deployed chains are measured Killip–Simon class), PRIME.PORT.RIEMANNHILBERT.01 (the discrete 2×2 IKS Riemann–Hilbert problem is WELL-POSED, resolvent closure 10^{-12} ; the smooth PNT model VIOLATES the floor at finite depth — the prime discreteness is load-bearing: any steepest-descent program must keep the lattice in the unperturbed problem); papers: the prime-front rounds-38/39 section, tfpt_1 finite-theorem keybox, tfpt_3 audit cards, tfpt_research_contracts registrations; website mirrors and generated surfaces synced (875/v882); NO marker moves; NO RH claim anywhere)

2026-08-09 (LXXX) (reflux round thirty-seven — the partition closure: the compact closing round of the reopened Cotlar route — the analytic core is SAVED (the exact tridiagonal CD identity with the route’s FIRST h -uniform derived constants) and the decomposition chapter is CLOSED ENTIRELY (cells, packets, all frames): the cancellation is ATOMICALLY GLOBAL and the certificate demand is retyped NON-DECOMPOSITIONAL: ONE module (v879_envelope_partition_closure.py; suite $871 \rightarrow 872$; two probes embedded byte-exact, the contract chain $4621b899 \dots \rightarrow 5fd6bf61 \dots \rightarrow 27d9f0a3 \dots \rightarrow 2199e9b1 \dots$ machine-verified at run time) — (1) THE ANALYTIC CORE (envelope_derivation_gap_probe, 7 checks with the TWO frozen-honest FAILs T1.4/C.1 pattern-gated at exit 1, verdict envelope-empirical-only): multiplication by $\cos \theta$ acts EXACTLY tridiagonally on the odd frame (the mirror symmetry closes the top boundary inside the space, $A_{h-1, h-1} = -\frac{1}{2}$; the single rank-2 commutator defect at $k = 0$; the Christoffel–Darboux telescoping identity at max residual 1.3×10^{-13} on every rung, battery + all five complete-comb holdouts), and the DERIVED pointwise bound $|U_{ij}| \leq [C_{\text{int}} + \sqrt{(G_+^{-1})_{00}(K_{-,i}^{-1/2} + K_{+,j}^{-1/2})}] / |\cos \theta_i^- - \cos \theta_j^+|$ holds with ZERO entrywise violation and h -UNIFORM source constants — $C_{\text{int}} \in [1.232, 2.328]$ (max/min $1.89 \leq 2.0$, log–log slope $+0.106 \leq 0.15$) and $\sqrt{(G_+^{-1})_{00}} \in [0.661, 0.899]$ from $h = 168$ to 1445 : THE FIRST ANALYTIC UNIFORMITY STATEMENT OF THE ROUTE, at entrywise grade; the two honest FAILs ARE the finding — the analytic envelope certifies NO cell decay (every Prüfer cell contains near-diagonal geometric pairs; $K_1^{\text{an}}/K_2^{\text{an}}$ blow up as h^2): the measured cell-envelope decay is CANCELLATION-CARRIED, provably not entrywise-derivable; and the frozen discrimination bar was pointed at the wrong constant (C_{int} itself discriminates: 1.41 truth / 3.59 Epstein / 12.8 scramble); the gap decomposition: no predeclared accounting below 3.568 (bar 1; C_1 – C_4 damped censuses + cell variants $n = 8/16/32$), diagonal share 15 – 24% , $\sum_r \varepsilon_r = 6.9$ – 12.9 α -uniform on clean complete-comb data (deep holdouts IN/ABOVE the battery band, slope $+0.237$) — the round-36 gap ($B_C \sim 4$ vs 1 , local defects $O(10)$) is STRUCTURAL to every cell frame: NO cell-partition Cotlar accounting of this family can certify; (2) THE TERMINAL STATEMENT (wave_packet_partition_probe, $6/6$, verdict partition-class-closed): the typed next object — a non-cell partition where the diagonal carries the mass — is built honestly and KILLED BY MEASUREMENT: both coherent-state designs (rank-Gabor on the node-rank phase space; chain packets through the exact discrete OP transform) are honest TIGHT frames on every rung ($\|B\|_2 = \|C^G\|_2$ exact at 10^{-8} rel; the gauge iden-

tity $\sigma_{\max}(C^G)^2 = 1 - \lambda_1(\Delta)$ exact); the Gabor envelope DECAYS in phase space ($0.529 \rightarrow 0.007$ at kz 243 — the first partition of the program to show decay) and the discrimination is massive (truth E_{Schur} 4.985 vs Epstein 128.7 vs scramble 9006.6); BUT the diagonal does NOT carry under ANY pairing (nearest-packet share ≤ 0.070 , empirical-partner share ≤ 0.183 at injectivity ≤ 0.77 — diagonal mass $\leq 18\%$) and the Schur constant GROWS ($4.985 \rightarrow 9.222$, slope $+0.295$; every functioning design ≥ 3.5 on every rung) — the cancellation that holds $\|C\| \leq 1$ is ATOMICALLY GLOBAL, it lives in NO partition of this family; (3) THE BOOKING: ledger 971 $\rightarrow$ 972 (PRIME.PARTITION.CLOSURE.01) with the dated round-37 notes on PRIME.CARLESON.PRIME.01 (the constraint set extended: the embedding certificate must be NON-DECOMPOSITIONAL — eigen-enclosure / Loewner-order / passivity, all three measured territory; the new carried assets typed: the tridiagonal identity, the h -uniform derived constants, their source-law persistence as $h \rightarrow \infty$ as the named open object) and PRIME.PRUEFER.COMPENSATION.02 (from BOUNDED to CLOSED-AS-A-CLASS, with the stop-list entries: wave-packet / coherent-state partitions of the contractor family; entrywise bounds on the cell envelope); papers: the prime-front round-37 section “the partition closure” + the open-fronts chain extended, tfpt_3 audit card, tfpt_research_contracts recorded block + the dated Carleson note; website mirrors and generated surfaces synced (872/v879); NO marker moves; NO RH claim anywhere)

2026-08-08 (LXXIX) (reflux round thirty-six — the complete-comb reversal: the deep-alpha negatives were ARTIFACTS, the preregistered Cotlar route REOPENS under its own frozen bars, the Prime Carleson chain is machine-exact, three exact compiler theorems land with kernel-checked mirrors, and the ledger gets its first QA fix plus a CI guard: FIVE modules (v874–v878; suite 866 $\rightarrow$ 871) — (1) THE ARTIFACT (v877, 8/8, deep-alpha-artifact): the negative Krein floors at kz 142/177/243 ($\lambda_1 = -331/-135/-215$, two independent probes) were COMB-TRUNCATION artifacts — core.build_window silently caps its atom table at $\text{ATOM_MAX} = 4 \times 10^5$ while those windows demand support to $4.4 \times 10^5/8.0 \times 10^5/1.8 \times 10^6$; with the COMPLETE canonical comb the certified corner enclosures are strictly positive ($+1.06 \times 10^{-5}/+1.52 \times 10^{-5}/+1.20 \times 10^{-5}$) and the Cholesky-certified full and Krein floors positive on all three rungs (extended builder = the IDENTITY on the controls, bit-equal atoms); NO negative canonical window exists; the certified ladder’s end at kz 121 was the atom-table DATA boundary, not a structural α -wall; (H_{cof}) unaffected; the silent truncation typed an infrastructure BUG with the registered follow-up (the builder must fail loudly beyond its table); (2) THE REVERSAL (v877, 9/9, cotlar-bounded-v2, the round’s headline): v2 re-executes the round-35 contract with cells, pairing, danger geometry and decision bars frozen IDENTICALLY (v1 spec SHA 4621b899... re-verified at run time; v2 spec SHA 5fd6bf61...; the single substantive change — complete combs at the deep holdouts — warded bit-identical elsewhere): the deep sums COLLAPSE INTO THE BATTERY BAND (kz 142: S_U 32.07 $\rightarrow$ 5.65, S_C 58.78 $\rightarrow$ 4.10; kz 177: 14.29 $\rightarrow$ 5.97; kz 243: 13.94 $\rightarrow$ 5.87), both channels BOUNDED by the frozen v1 rule (ratios $0.95/0.94 \leq 1.2$, log-log slopes $0.006/0.007 \leq 0.10$) — the v1 kill was ENTIRELY the artifact; RUN 3 (gated on bounded, correctly withheld in round 35) unlocks and PASSES (K_1/K_2 h -stable on all five complete-comb holdouts: 8.36/8.14 and 40.35/40.47, bar $1.2\times$); Epstein/scramble still break the contrast bars; the truncation audit re-types every affected finding DATED (pruefer v1 confounded $\rightarrow$ re-decided; residual_quadrature STRENGTHENED — its stalls detected the truncation

correctly, a validated sign detector; the resonance α -law addendum void; the polygon holdout rows numeric-void; radau/preconditioner/cdcore/uvarov/skeleton unaffected); THE DATED CORRECTION on PRIME.KREIN.CONTRACTOR.01: the round-35 closing note is corrected — the v1 verdict was correct ON THE DATA AS MEASURED and v873's booking stands as the record of the preregistered v1 execution, but the stop-list entry is AMENDED (the class is NOT closed), the α -not- h law is retired (the truncation's signature), and the route reopens as PRIME.PRUEFER.COMPENSATION.02 with the remaining gap typed ($B_C \sim 4$ vs 1; local defects 7–10); (3) THE CARLESON WAVE (v876, $6/8 + 7/8 + 5/5$ with the three frozen-honest FAILs S3.1/S3.2/S2.1 pattern-gated at exit 1, NOT refit): the Carleson ward $\lambda_{\max}(M_-) = \|C\|^2 = 1 - \tau$ at rel $1.5 \times 10^{-13}/1.3 \times 10^{-15}$ makes arrows (i)–(iii) of the Prime Carleson chain MACHINE-EXACT (embedding constant $\|C_h\|^2 = 1 - \tau_h$), the surviving analytic target registered as PRIME.CARLESON.PRIME.01 [O]; the polygon $S_0 \geq |S_2|$ BREAKS on all 47 rungs at $2\theta \approx 1.5\pi$ (typed: the WRONG compression of the Loewner order) and the holonomy is null with inverted contrast; the residual quadrature realizes ρ_h at FULL degree on all 44 floor-positive rungs (k^*/h median 1.000, slope 0.974; mp escalation past the 53-bit wall; a single atom just beyond the pole port; discrimination 7–9 $\times$); the resonance is THICK ($\sim 1/5$ constant, excision gains nothing, soft direction disjoint — the wall is phase-distributed); (4) THE THEOREMS (v874 $14/14 + 11/11 +$ v875 $15/15$, with the Lean mirrors TfptCarrier/FlavorFeedback.lean and TfptCarrier/GaussianShells.lean, 18 theorems, lake build green 3418 jobs, axioms propext/Classical.choice/Quot.sound, Lean manifest $88 \rightarrow 90$ files): the FEEDBACK NORMAL FORM ($P^{-1}R_sP = [[s+4, 0, 3], [0, 0, -2], [4, 1, 5]]$ exact symbolic in s ; $\chi_{R_s} = (t - s - |\mu_4|)q_{\text{wind}} - 12t$ with $12 = N_{\text{fam}}|\mu_4| = \dim g_{\text{SM}}$; the honest $\mathbb{Z}_2^2$ -not- μ_4 typing kernel-checked); the WINDING DECODER ($q(\{2, 3, 5, 6\}) = (-4, -4, 2, 8)$; $D(y) = (y+4)^2(y-2)(y-8)$ with budget coefficients (2, 48, 32, 256); $|\mu_4|q(|Z_2|)/|R(E_8)| = -1/15 =$ the Walsh message eigenvalue — typed AUDIT theorem, not a functor); and the GLOBAL SHELL THEOREM ($\hat{\Theta}_u/\Theta_L = -1/15$ for ALL odd shells from $\text{Sp}(4, 2)$ transitivity + $(1+i)$ doubling + $\Theta_L = 240\sigma_3$ — the $n \leq 16500$ census REPLACED as argument, retained as ward); (5) THE LEDGER QA FIX + THE GUARD (v878, 10/10, GATE.LEDGER.01): the first PRIMARY-KEY violation found and fixed — FORM.QGE0.03 was double-booked (2026-06-15 CohomologyGrading; 2026-06-18 SeamDeckClosure flat closure); the SeamDeckClosure row RENAMED FORM.QGE0.04 with a dated QA note and every flat-closure reference updated INCLUDING the two 2026-06-18 mentions in this changelog (corrected in place, documented here); the guard enforces unique claim ids, acyclic supersession, unique active supersession targets modulo a frozen 2-pair allowlist, and the dependency cross-reference cycle census frozen remove-only; NO marker moves; NO RH claim anywhere)

- **New modules (5).** v874_feedback_decoder_lean.py (14/14 + 11/11 probe gates + 4/4 Lean mirror checks, FEEDBACK-NORMALFORM-EXACT + WINDING-DECODER-EXACT; probes flavor_feedback_probe.py + g31_winding_decoder_probe.py embedded BYTE-EXACT and re-run verbatim; the Lean mirror TfptCarrier/FlavorFeedback.lean, 11 theorems); v875_shell_global_lean.py (15/15 + 4/4, SHELL-GLOBAL-THEOREM; probe gaussian_shell_global_probe.py; the Lean skeleton TfptCarrier/GaussianShells.lean, the ShellSystem hypothesis bundle + 7 consequence theorems); v876_carleson_polygon_wave.py (6/8 + 7/8 + 5/5 with the three frozen-honest FAILs pattern-gated at exit 1; probes phase_polygon_probe.py, residual_quadrature_probe.py, pi_resonance_anatomy_probe.py, ~ 9 min); v877_complete_comb_reversal.py (8/8 + 9/9;

probes `deep_alpha_sign_probe.py` + `cotlar_v2_complete_comb_probe.py`, ~17 min; the v1/v2 spec-SHA chain machine-warded); `v878_ledger_integrity.py` (10/10, the CI guard). Suite 866 → 871; all five standalone green; `run_all` ALL CHECKS PASSED.

- **The reversal (the round’s deliverable).** The discipline machinery worked end to end on its own freshest negative: the residual horizon flagged the deep stalls, `deep_alpha_sign` typed the silent comb truncation at certificate grade ($\text{ATOM_MAX} = 4 \times 10^5$; complete-comb floors strictly positive — NO negative canonical window), and the IDENTICALLY frozen round-35 bars re-ran on complete data and REVERSED the closure: `COTLAR-BOUNDED-V2`, run 3 unlocked and passed, the route reopened as `PRIME.PRUEFER.COMPENSATION.02`. The correction is booked DATED on every surface (ledger, papers, website) while `v873` and the round-35 records stand as what was measured; the remaining gap is typed, not hidden ($B_C \sim 4$ vs 1; local defects 7–10). NO RH claim.
- **Ledger.** 13 new rows (`FLAVOR.FEEDBACK.NORMALFORM.01`, `E8.WINDING.DECODER.01`, `FORM.FLAVOR.FEEDBACK.01` [F], `E8.SHELL.GLOBAL.01`, `FORM.E8.SHELL.GLOBAL.01` [F], `PRIME.PHASE.POLYGON.01`, `PRIME.RESIDUAL.QUADRATURE.01`, `PRIME.PI.RESONANCE.ANATOMY.01`, `PRIME.CARLESON.PRIME.01` [O], `PRIME.DEEPALPHA.SIGN.01`, `PRIME.PRUEFER.COMPENSATION.02`, `PRIME.TRUNCATION.AUDIT.01`, `GATE.LEDGER.01`) + the dated round-36 CORRECTION notes on `PRIME.KREIN.CONTRACTOR.01` (the stop-list entry amended, the route reopened, the α -not- h law retired) and `PRIME.PRUEFER.COMPENSATION.01` (the v1 record stands as-measured) + dated notes on `E8.SIMPLEX.FOURIER.01` (census → theorem), `E8.G31.CLOCK_ALPHABET.01` (the decoder) and `PRIME.FLOOR.SKELETON.01` (the ladder end was a data boundary) + THE QA FIX: `FORM.QGEO.03` was double-booked since 2026-06-18 (a primary-key violation); the SeamDeckClosure flat-closure row is RENAMED `FORM.QGEO.04` with a dated QA note, all references updated (papers, scripts, registry, website, and the two 2026-06-18 entries of this changelog corrected in place — documented here); 958 → 971 rows; NO marker moves.
- **Papers.** `tfpt_prime_front`: the new round-36 section “The complete-comb reversal” (`\veri{v876/v877/v878}`; the artifact, the reversal, the Carleson chain, the theorems crossref) + the DATED CORRECTION paragraph appended to the round-35 section + the open-fronts chain extended with round 36 and its round-35 clause corrected; `tfpt_1`: two new Gaussian-code keybox entries (the global shell theorem `\veri{v875}`; the winding decoder `\veri{v874}`) + the census sentence upgraded; `tfpt_2`: the feedback normal form added to the winding keybox (`\veri{v874}`); `tfpt_3`: five new audit cards + dated corrections on the `v857/v873` cards; `tfpt_research_contracts`: the `PRIME.CARLESON.PRIME.01` [O] registration, three round-36 recorded blocks, the round-36 correction notes on the contractor and paircorr blocks, and the `GATE.LEDGER.01` QA record.
- **Website.** Prime-front feed round 36 (`primeFront.ts` + the verdict enum); counters 871/v878 (HonestyBanner, prime-front page metadata and hero); DAG +v874–v878; `papers.ts` (the research-contracts round-36 correction, the architecture –1/15 upgrade); `ResidualChain.tsx` carries the renamed `FORM.QGEO.04`; generated surfaces (`ScriptIndex`, `changelog.ts`, `suite.ts`, `discipline.ts`, maps) regenerated; README + Zenodo synced to 871/v878; manifests regenerated last (Lean manifest 88 → 90 files).
- **Infrastructure note (typed as a bug, follow-up registered).** `core.build_window` silently truncates the canonical comb at its atom-table cap; until the loud guard lands, every deep-window readout must check the demand $e^{2\alpha} \leq \text{ATOM_MAX}$ explicitly (the round-36 modules do).

2026-08-08 (LXXVIII) (reflux round thirty-five — the Cotlar decision: the first fully preregistered uniformity test of the program, EXECUTED: ONE module (v873, the executed round-34 preregistration `PRIME.PRUEFER.COMPENSATION.01`;

suite 865 $\rightarrow$ 866) — the composite verdict cotlar-growing / route dead BY THE CONTRACT’S OWN FROZEN RULES, booked exactly as frozen: (1) THE PROVENANCE CHAIN (machine-warded in the module’s gate) — contract frozen + hashed (SPEC SHA-256 4621b899...7440811; 8/8 synthetic freeze wards; the decisive analysis locked behind the operational flag `pruefer_unfreeze.flag`, ABSENT at freeze) $\rightarrow$ committed byte-exact PRE-EXECUTION in the round-34 commit 526ca3eb (FILE SHA-256 93208a1b...4825d9fd — the proof of precedence) $\rightarrow$ the unfreeze flag created AFTER that commit with its audit line committed $\rightarrow$ executed with exactly TWO documented MECHANICAL fixes, both typed verbatim in the probe (the $h \leq 900$ battery filter that the frozen spec’s own battery definition mandates — the committed code omitted the spec’s own text; the per-step joint positive renormalization against float overflow at near-breakdown chain tails — invariant for `atan2` and the wrapped increments in exact arithmetic, validated at $\leq 6.6 \times 10^{-4}$ against a 60-digit mpmath reference), the FROZEN_SPEC literal byte-identical throughout (SHA re-verified at every stage; executed FILE SHA-256 15d35b26...5ffb4cc) $\rightarrow$ re-executed verbatim at promotion (embedded BYTE-EXACT, RUN 1 + RUN 2, ~ 22 min); (2) RUN 1 (the anatomy, anchors kz 9/12/13/26/40) — the predeclared danger geometry is REAL: the frozen cells $\{0, 15\} \cup \{7, 8\}$ capture 0.98/0.61/0.94/0.85/0.81 of $\lambda_{\min}(T_1)$ — source-only Prüfer phase cells localize the negativity WITHOUT the computed soft eigenvector (kill 3 silent); but the LOCAL compensation fails ($\sum_r \varepsilon_r = 6.88\text{--}10.08$) and the cross-block envelope does NOT decay (Spearman $-0.17\text{--}0.00$ vs the frozen ≤ -0.8 bar, BIMODAL with the second peak exactly at the predeclared π -resonance cells $d = 7\text{--}8$); (3) RUN 2 (the Cotlar decision, the 42-rung battery + the frozen deep holdouts kz 90/116/142/177/243) — the battery is FLAT (S_U 5.55–6.30, S_C 3.97–4.78) and the deep holdouts EXPLODE (kz 142: S_U 32.07/ S_C 58.78; kz 177: 14.29/30.76; kz 243: 13.94/44.85), both channels GROWING per the frozen rule ($\log\text{--}\log$ slopes $0.209/0.408 \geq 0.20$), the contrast bars PASS (Epstein max rel 3927% / local-defect ratio 224 $\times$; scramble 314462% / 1.26×10^6 — kill 4 silent), and the measured carry-forward law is typed: THE GROWTH TRACKS kz-DEPTH (α), NOT WINDOW SIZE h (kz 90/116 at $h = 1430/1433$ stay INSIDE the battery band while kz 177 at SMALLER $h = 1219$ explodes) — any uniform certificate must be α -aware; RUN 3 correctly NOT executed (gated on BOUNDED); (4) THE KILL TABLE — kills 2 (power-law Cotlar growth) and 5 (the compensation stays global) FIRE, kills 1/3/4 do NOT; the blockwise Cotlar–Stein / phase-cell class on Prüfer phases is CLOSED and stop-listed; the surviving demand narrowed: a NON-STATIONARY phase bound on the explicit kernel with the π -resonance as the known critical structure; the honest FAILs pattern-gated, nothing refit — preregistration + frozen bars + committed hashes is the standard the program now holds itself to; NO marker moves; NO RH claim anywhere)

- **New module (1).** `v873_pruefer_cotlar_decision.py` (the executed preregistration: the probe `pruefer_compensation_probe.py` embedded BYTE-EXACT in its EXECUTED form and re-run verbatim in an isolated namespace — RUN 1 + RUN 2, ~ 22 min; the pattern gate encodes the frozen census INCLUDING the honest FAILs: the provenance wards P1–P3 (byte-equality vs the experiments source, the executed file SHA, the committed unfreeze-flag audit line), the spec-SHA ward G0, the danger-geometry capture bands, the local-dominance and envelope-decay FAILs, the battery/holdout Cotlar censuses, the frozen GROWING decision with slope bands, the α -not- h law, the contrast bars, the kill table, and the RUN-3-withheld ward). Suite 865 $\rightarrow$ 866; standalone green; the two mechanical fixes documented verbatim in the probe’s own docstrings with the spec literal SHA unchanged.

- **The verdict (the round’s deliverable).** The program’s first fully preregistered uniformity test returns its own frozen verdict, and the negative is booked with the same machinery as a positive would have been: the blockwise Cotlar–Stein route on source-only Prüfer phase cells is DEAD — the Cotlar sums are h -stable on the battery but explode on the frozen deep holdouts as a power law in depth. What survives, typed: the danger-geometry positive (source-only cells find the dangerous blocks without the soft eigenvector), the truth/Epstein/scramble discrimination, the π -resonance as the named critical structure, and the α -not- h growth law as a constraint on every future candidate. NO RH claim.
- **Ledger.** 1 new row (PRIME.PRUEFER.COMPENSATION.01, the executed contract with the full provenance chain and the frozen census) + the dated round-35 closing note on PRIME.KREIN.CONTRACTOR.01 (the blockwise Cotlar/phase-cell class CLOSED by the pre-registered test’s own rules; the STOP-LIST entry: blockwise Cotlar–Stein on Prüfer phase cells; the demand narrowed to a non-stationary phase bound with the π -resonance critical structure and the α -not- h constraint; the danger-geometry positive and the discrimination recorded as carry-forward assets); 957 $\rightarrow$ 958 rows; NO marker moves.
- **Papers.** `tfpt_prime_front`: the new round section “The Cotlar decision: the first fully preregistered uniformity test, executed” (`\veri{v873}`; the contract, the execution discipline, the verdict, what survives, and the honest note that preregistration + frozen bars + committed hashes is the program’s standard) + the round-34 section’s “not run” prose given its forward pointer + the open-fronts chain extended with round 35; `tfpt_3`: the audit card; `tfpt_research_contracts`: the round-35 dated notes on the PRIME.KREIN.CONTRACTOR.01 block and the contractor registration block (the execution record with the executed file SHA verbatim).
- **Website.** Prime-front feed: the round entry “reflux round thirty-five”; counters 865 $\rightarrow$ 866 modules / `v535–v873`; DAG extended with `v873`; generated surfaces regenerated (ScriptIndex, changelog.ts, maps); README and Zenodo updated to 866 modules / `v873`.
- **Scope.** One module, one executed contract: the verdict is a route decision under the strictest protocol the program has used — every bar, kill and holdout frozen and hashed BEFORE execution, the frozen file committed pre-execution, the two mechanical fixes documented verbatim with the spec literal SHA unchanged, the honest FAILs pattern-gated and NOT refit, RUN 3 correctly withheld by the contract’s own gating; the unfreeze flag with its audit trail is committed with this round; NO marker moves; NO RH claim anywhere.

2026-08-08 (LXXVII) (reflux round thirty-four — the Christoffel–Darboux wave: the kernel NAMED, the compensation identity EXACT, the measure-relation closure, and the preregistered next test: FOUR modules (`v869–v872`, from seven frozen probes; suite 861 $\rightarrow$ 865) plus the FROZEN preregistration PRIME.PRUEFER.COMPENSATION.01 committed byte-exact and NOT run — the consolidation of the 2026-08-08 evening CD/Uvarov campaign in three waves plus one commit-time contract: (1) THE CD WAVE (the kernel identification) — the reproducing kernel K_+ of the closed-form SourceContractor (`v866`) is EXACTLY the Christoffel–Darboux kernel of an explicit source measure $\mu = \sum [2 \sin^2(\varphi/2) d_+(\varphi)/L] \delta_{2 \cos(D\tau)}$: the displacement rank collapses from the growing τ -coordinate budget (12–14, the $\sqrt{L}$ law) to EXACTLY 2 in the multiplication coordinate $x = 2 \cos(D\tau)$ with a hard σ_2/σ_3 gap of 6.6×10^{12} – 4.8×10^{13} on ALL 7 rungs including the blind holdouts `kz 40/49/60`, and the FIREWALLED chain-only reconstruction (Stieltjes–Lanczos source Jacobi chain + node/geometry data ONLY, enforced by the reconstruction signature) rebuilds C entrywise at 8.1×10^{-14} – 5.3×10^{-13} — the whole contractor is three named objects: the arm weights, the phase/geometry factors, and ONE source Jacobi chain, with

the honest boundary typed PRE-RUN and confirmed (the rank-2 collapse is WINDOW GEOMETRY — the controls collapse too, exactly as the derivation forces for any even density; the arithmetic lives in the MEASURE: control chains $O(1)$ off at $0.038/0.062$ vs the 10^{-2} bar); the μ_4 quarter-turn Clark-phase hypothesis is falsified SHARPLY (the coupled pairs obey the EQUAL-PHASE law: offset $-0.5..+0.6^\circ$ at $\bar{R}$ $0.97-0.99$, NOT 90° ; the Clark rank leg dies at E -rank $85-99$; the phase coordinate itself source-only clean, circularity fence exact); the factorization $C = D_- U D_+$ assembles EXACTLY (1.3×10^{-14}) with $\|D_+\| \leq 0.9654$ by the Christoffel variational theorem, $\|D_-\| \leq 0.8655$ measured, and U non-unitary BY THEOREM (the deployed grid $2\times$ -oversamples the folded pairs: rows ≥ 1.158 — the $\sqrt{2}$ over-normalization is structural); and the Gauss-node frame DECIDES the repair: exact where algebra promises ($D_+^G = I$ at 4.7×10^{-11} , lossless bridge, frame-invariant port share — theorem P5) yet the unitary core does NOT exist (co-isometry defect $O(1)$, $0.93-1.30$, cross-measure node misalignment at near-pole pairs), the surviving asset being the LADDER-WIDE damping bound $D_-^G \leq 0.997041$ with $34\times/2900\times$ discrimination and the named hypotheses (H-D)/(H-U)/(H-PORT) registered; (2) THE UVAROV WAVE (the measure-relation decision, two honest kills with typed residues) — NONE of the three classical spectral transformations (Uvarov/Christoffel/Geronimus) relates the two channel measures exactly or at fixed small rank at the source pole $x_{\text{pole}} = 2 \cosh(D/2)$ (machinery warded exact on synthetics at 9.2×10^{-16} ; typed residue: Geronimus with SMALL NEGATIVE MASS uniformly closest at $3.5-8.1\%$ Weyl residual, non-growing, discriminating — misses the 5% bar, no $\lambda(D)$ law), and the co-isometry defect is DIFFUSE: full-rank, growing LINEARLY with h (Pearson $+0.996$, $\times 3.39$ first-to-last third), pole removal changes nothing, the closest-co-isometry bracket $O(1)$ at near-full rank — NO finite-matrix compensation exists at this ingredient list (both closures stop-listed); (3) THE HEADLINE (the compensation identity) — the defect splits EXACTLY into two source-built terms, $I - C^*C = T_1 + T_2$ with $T_1 = I - U^*U$ (the INDEFINITE cross-measure Jacobi geometry) and $T_2 = U^*(I - D_-^2)U$ (the PSD arithmetic Christoffel damping), warded at 10^{-12} on all 42 rungs and transported losslessly into the Gauss frame; the EXACT global minimizer of the directional compensation ratio IS the soft direction (overlap ≥ 0.9991 ; min ratio $= 1 + \tau/|v^*T_1v|$ to all printed digits), the rank-one pole deflation gives $\Delta = \Delta_{\text{bulk}} + spp^*$ with the certified bulk floor at $98-100\%$ of λ_2 and $s = \kappa\tau$ reproducing the v864 κ law — THE WALL AS TWO EXPLICIT SOURCE NUMBERS (kz 9 at the soft direction: $-0.0328 + 0.0330 = 1.68 \times 10^{-4} = \tau$), with the honesty line typed (the truth-side ratio ≥ 1 is implied by upstream certified positivity on these finite rungs — the identity buys the FORM: one two-term inequality at one named direction) and the discrimination anatomy measured (Epstein/scramble BREAK the damping's sign, $\max D_- = 34.2/2917 > 1$, and under-compensate on their OWN soft directions at worst ratios $-175/-446513$); (4) THE PREREGISTRATION (committed, NOT run) — PRIME.PRUEFER.COMPENSATION.01: source-only Prüfer phases of the two arm chains, EXACTLY 16 fixed phase cells (boundaries $k\pi/8$, entrywise pairing primary, danger families predeclared), Cotlar–Stein decision rules and all success/kill criteria frozen BEFORE any deployed-data run, deep holdouts kz 90/116/142/177/243 never used by the CD wave, the decisive analysis locked behind an operational unfreeze flag, $8/8$ synthetic freeze wards green; SPEC SHA-256 4621b899...7440811, FILE SHA-256 93208a1b...4825d9fd, committed byte-exact (any modification invalidates the preregistration); NO marker moves;

NO RH claim anywhere)

- **New modules (4).** `v869_cdcore_clarkphase.py` (10 + 8 checks, zero fails, CDCORE-IDENTIFIED + CLARKPHASE-DEAD; probes `cdcore_probe.py` + `clarkphase_probe.py`: the frame factorization $F = \text{diag}(\gamma) \text{diag}(s) V_{\text{poly}}$ machine-exact (3.0×10^{-13} , Chebyshev 4th kind), the reproducing/projection wards ($P^2 = P$, $PF = F$ at 10^{-14}), the decisive displacement test (x-rank 2 with the 10^{13} gap vs τ -rank 12–14, Spearman +0.96, slope +0.17 vs $\sqrt{L}$'s +0.50), the firewalled CD reconstruction within certified budgets on construction AND holdouts, the entrywise weighted transport (6.8×10^{-13}), the leverage trace ward ($\sum l_j = h$ at 9.3×10^{-16}), the structural control collapse typed pre-run with the $O(1)$ chain discrimination; the Clark falsification: passivity and spread wards, the E-rank leg (85–99 vs the ≤ 8 bar), the equal-phase offset law ($\bar{R} \geq 0.97$), the exact circularity fence ($\max |dz| = 0.0$ under comb perturbation), Epstein/scramble discriminate in E-rank/offset); `v870_christoffel_gauss_frame.py` (17/17 + 9/9, CHRISTOFFEL-PARTIAL + GAUSS-STILL-DEFECTIVE; probes `christoffel_transition_probe.py` + `gauss_node_unitary_probe.py`: the classical wards W1–W6 (trace, variational, Golub–Welsch, bridge, assembly, frame transfer), the row theorem P3, the payoff census (product bound ≤ 1 on 0/42 rungs — honest), the softport regression $\beta(kz9) = 0.6057$ / ladder max 0.8591 with the sharpening question answered (pole share ~ 0.86 in all three coordinate systems); the Gauss frame: tightness/Gauss–Christoffel/unit-rows exact, σ -spectra match the grid contractor, τ lossless, port share frame-invariant, the co-isometry certificate 0.93–1.30 BREACHED (the measured content), $D_-^G \leq 0.997041$ ladder-wide, the named hypotheses registered); `v871_pole_uvarov_crossdefect.py` (7 + 11, POLE-TRANSFORM-DEAD + CROSSDEFECT-DIFFUSE; probes `jacobi_pole_uvarov_probe.py` + `gauss_crossdefect_probe.py`: the machinery ward on synthetics (9.2×10^{-16}), the two-measure wards with the cdcore regression, the three-transformation census (all FULL/PARTIAL False), the Geronimus residue with the blind holdout transfer (ratio 0.97) and the 2.58×2.14 discrimination; the defect anatomy: traceless ward (10^{-13}), the rank-growth law ($\times 3.39$, Pearson +0.996), mode stability ($0.123 \leq 0.15$), the $U_0 + R$ split with the PSD base theorem and the τ ward ($\lambda_{\min}(\Delta_{\text{pos}}) = \tau$ to all digits)); `v872_damping_compensation.py` (10, COMPENSATION-EXACT; probe `cd_damping_compensation_probe.py`, spec v2 with the basis-free exact-minimizer amendment: the split ward (10^{-12}), the unitary transport (7.7×10^{-11}), the exact Feshbach deflation ($\lambda_{\min}(\Delta_{\text{bulk}}) = 0$ at 2.6×10^{-15}), the κ regressions, the T2 sign theorem (zero negative entries), the exact global compensation census (min ratio 1.000008, implied by upstream positivity — the anatomy, not new evidence), the bulk floor ($c/\lambda_2 \geq 0.98$), the four-way alignment table, the isolated scalar, and the discrimination anatomy). Suite 861 $\rightarrow$ 865; all four standalone green with pattern gates encoding the frozen censuses (check counts, FAIL ids, verdicts, exit codes) and the byte-exact provenance ward vs the embedded sources; all seven probes re-run identically at promotion (2026-08-08); promoted VERBATIM with no downscoping (the round-31 embedding convention).
- **The preregistration (committed, NOT run).** `experiments/tfpt-discovery/pruefer_compensation_probe.py` — the FROZEN contract PRIME.PRUEFER.COMPENSATION.01: source-only Prüfer phases (structural AST firewall on the construction functions), EXACTLY 16 fixed phase cells with the entrywise pairing primary and the danger families DGR1/DGR2 predeclared, RUN 1/2/3 protocols (anatomy / Cotlar–Stein decision / uniformity candidate) with all bars, verdict rules and kills frozen BEFORE any deployed-data run, deep holdouts kz 90/116/142/177/243 (never used by the CD wave), the decisive analysis locked behind the operational flag file `pruefer_unfreeze.flag`, and 8/8 synthetic freeze wards green at freeze time. Committed BYTE-EXACT with this round: SPEC SHA-256 4621b89958531d6d3baae9fe762dbd10d23dc22eed77a57aa1c6b179a7440811, FILE SHA-256 93208a1b2edebde31388a87192055c9bf3e5a3de29af9fb3e34ddc904825d9fd; any modification invalidates the preregistration. Booked as a dated PREREGISTRATION note on PRIME.KREIN.CONTRACTOR.01 (the contract's next test); NO vN module, NO analysis run,

NO result claimed.

- **The compensation statement (the round’s deliverable).** The wall’s operator coordinates gain their classical names: the contractor’s kernel IS the Christoffel–Darboux kernel of one explicit source measure (the “non-monomial band-spreading letter” of rounds 32–33 is NAMED at kernel level — with the honest boundary that the naming is geometry, the arithmetic is the chain and the weights), the defect is the EXACT sum of an indefinite Jacobi cross-geometry and a PSD Christoffel damping, and the floor demand is ONE two-term inequality at ONE named direction with both terms explicit source objects ($s = \kappa\tau > 0$). The classical escapes are closed with certificates and stop-listed: classical pole transformations at x_{pole} (typed Geronimus residue), finite-rank cross-defect corrections (linear rank growth), μ_4 -offset Clark kernels (the equal-phase law). The next test is PREREGISTERED, not run. NO RH claim.
- **Ledger.** 4 new rows (PRIME.CONTRACTOR.CDCORE.01, PRIME.CONTRACTOR.CHRISTOFFEL.01, PRIME.JACOBI.POLE.UVAROV.01, PRIME.CD.DAMPING.COMPENSATION.01) + the dated round-34 note on PRIME.KREIN.CONTRACTOR.01 (the kernel NAMED; the compensation identity; the Uvarov/finite-rank/Clark closures with the stop-list entries; the Prüfer preregistration with BOTH SHAs recorded verbatim) and the dated round-34 note on PRIME.FLOOR.PAIRCORR.01 (the wall as the two-term inequality at the soft direction, both terms source-built); 953 → 957 rows; NO marker moves.
- **Papers.** `tfpt_prime_front`: the new round section “The Christoffel–Darboux wave: the kernel named, the compensation exact, the anatomy of discrimination, and the preregistered next test” (`\veri{v869..v872}`) + the part-intro chain extended; `tfpt_3`: four new audit cards; `tfpt_research_contracts`: the round-34 dated notes on the PRIME.KREIN.CONTRACTOR.01 and PRIME.FLOOR.PAIRCORR.01 blocks including the preregistration record with both SHAs.
- **Website.** Prime-front feed: the round entry “reflux round thirty-four”; counters 861 → 865 modules / v535–v872; DAG nodes extended with v869–v872; generated surfaces regenerated (ScriptIndex, changelog.ts, maps); README and Zenodo updated to 865 modules / v872.
- **Scope.** The CD-wave modules are exact structural namings and typed route decisions under frozen preregistered protocols (the derivations typed BEFORE running; the structural non-discrimination of the rank collapse typed PRE-RUN — window geometry, not a kill; the non-unitarity of U a THEOREM, not a miss; the compensation census implied by upstream positivity and typed as anatomy); the Uvarov/crossdefect modules are honest kills with typed residues (machinery warded on synthetics first); the preregistration is a COMMIT-TIME contract — no analysis mode was executed, the file hash is the proof of freezing; NO marker moves; NO RH claim anywhere.

2026-08-08 (LXXVI) (reflux round thirty-three — the wall’s operator form: the Krein coordinates, the SourceContractor formula, the Perron closure, and the quadrature reach: EIGHT modules (v861–v868, from sixteen frozen probes plus one Lean module; suite 853 → 861) — the consolidation of the 2026-08-08 Krein/port/formula campaign in five strands: (1) THE KREIN CHAIN — the deployed window form gets an EXACT Krein normal form $Q_h(t) = \|B_+t\|^2 - \|B_-t\|^2$ (entrywise ward $\leq 10^{-15}$, both canonical cuts; B carries $\sqrt{|\Lambda|}$ — linear in Λ , the round-32 grade barrier passed by construction) with the Douglas pencil identity $1 - \|C_2\|^2 =$ the τ -margin in the positive-side metric (rel $\leq 3.9 \times 10^{-9}$): truth contracts on every rung, Epstein $h=2$ explodes to $\|C_E\| = 46.8$, the scramble to 3693 — the discriminator IS the Douglas equivalence; the register wiring typed (the μ -sign and the deck are TWO separate C_2 s, the identification one faithful- μ_4 character away with three candidate constructions machine-verified; the Redheffer/Mertens echo exact: $\det R_n = M(n)$ with the vacuum column’s

ENTIRE Smith deviation in the single invariant factor $|M(n)|$; no resolvable floor–Mertens correlation, $\min 4p = 0.378$); the defect theorem kernel-checked (TfptCarrier/KreinDefect.lean: contraction $\Leftrightarrow$ PSD with the full-rank Douglas converse, SourceContractor the NAMED hypothesis with the circularity warning typed, krein_cofinal_weil composing contractors on a cofinal ladder to Weil nonnegativity — FORM.PRIME.KREIN.DEFECT.01 [F]); the defect has rank ONE ($\lambda_1 =$ the τ -margin exactly, separation $3.9\text{--}14.1\times$ — the Redheffer Smith invariant, the vacuum code’s one-qubit price and the Krein soft port are ONE rank-one structure), the MONOMIAL CLOSURE THEOREM extends the word-census emptiness to EVERY word of ANY length (all source letters monomial, contractor monomial mass $0.23\text{--}0.24 \Rightarrow$ miss ≥ 0.874 ; the 408 sign flips kill the corridor form, typed v2), and the 2-torsion weld law supplies the missing operator’s TYPE (the deck’s anticommutant is entirely faithful- μ_4 — the deck welds only as $J = MD$; all four candidates weld exactly, the control refuses exactly, the contractor connection null at $\sqrt{2}$); (2) THE MACHINE — the 16-slot colligation architecture makes contraction a CONSEQUENCE (exactly unitary, $\|D\| = 1/4$, $\sigma_{\max} \leq 1 + 10^{-9}$ automatic, provably comb-blind) with the compiler-side discovery booked in Paper 1: $\mathbb{F}_2^4$ IS the divisor lattice of 210 with Walsh–Hadamard carrying the lattice Möbius function and the scalar-limit determinant $\prod_p(1 - 1/p) = 8/35$ EXACT; the identification gate fails honestly and localizes the gap — the contractor couples DIFFERENT $|\tau|$ bands, the J flip couples equal $|\tau|$: the missing object is the grid-side band intertwiner, the explicit-formula kernel itself; (3) THE SCALAR REDUCTION — the exact Feshbach reduction turns the floor into ONE port impedance ($\tau > 0 \Leftrightarrow s > 0$; four source ports pass; the pole port carries 84% of the soft mode with the exact skeleton $\kappa^{-1} = \beta^2 + \lambda_1\rho$, the closed-form a -term — the Poisson/Cauchy average of the signed density at $s = 1/2$ — and $\kappa - 1 \approx 6e^{-\alpha/2} \rightarrow 1$ at Pearson -0.99 ; the backflow ≤ 17 bulk modes cancelling 99.9%: the classical shape EXISTS, the boundable term is exactly the arithmetic); the divisor-tower Weyl load repairs the hull’s comb-blindness at LOAD level ($O(1)$ response) and the repaired phase readout discriminates at 1–2 orders (Epstein $\kappa = 42.7$ / scramble 77.6 outside the $1.5\times$ truth window; the typed caveat carried: Spearman(s, τ) = -0.8 , the discrimination is the load-bearing content); (4) THE FORMULA (the campaign’s headline) — the Douglas contractor factors EXACTLY as the target-free closed-form source expression $C = W_- F G_+^{-1} F^H W_+$ (1.4×10^{-14} on construction rungs AND blind holdouts; no zeros, no τ , no fit) with CERTIFIED defect transfer on all seven rungs (the frozen Sylvester-12 kill fires as designed, correcting rank-12 to $\sqrt{L}$ growth, $k^* = 24.48$); the norm statement is the exact reformulation $\|C\| \leq 1 \Leftrightarrow G_- \preceq G_+ \Leftrightarrow K \succeq 0$ — and the PERRON CLOSURE is proven: $\rho(|C|) = 2.4\text{--}3.1 > 1$ everywhere, so NO absolute Schur/Hilbert-type inequality can ever certify — cancellation provably carries the arithmetic, the certificate must be PHASE-AWARE (the sharpest demand registered: PRIME.KREIN.CONTRACTOR.01 [O], one oscillatory-integral-grade bound beating 1 by the measured $e^{\text{slope}\alpha}$ margin — it would discharge SourceContractor and with it (H_{cof})); quadrature certificates for $s > 0$ EXIST on every rung ($m^* \leq 426$, the Neumann frontier killed) but the depth law $m^* \sim \sqrt{\text{cond}(G)}$ (Spearman $+0.99$) is INTRINSIC — all three source preconditioners fail informatively, the $m \approx 17$ prediction honestly failed, J_∞ named the free Chebyshev chain (Rakhmanov-generic typed): the certificate depth is the price of the cancellation; (5) THE AUDITS — the 210 register is canonical up to PROVEN gauge (Boolean layer generic 210/210 as warned;

the Euler determinants pin $\{2, 3, 5, 7\}$ uniquely; the anchor prime 2 forced by ramification; two gauge classes = the chirality pair, then proven gauge by two exact no-go wards — the orientation functional vanishes identically via the Möbius complement, quadratic readouts provably blind by transposition; the 6-vs-7 note stands), and the $17 = 12+3+1+1$ moving-sector identification is honestly buried at space level (principal angles $\sim 90^\circ$); NO marker moves; NO RH claim anywhere)

- **New modules (8).** `v861_krein_normalform_lean.py` (37/37 + 8/8, zero fails, DECK-MU-PARALLEL + REDHEFFER-ECHO-EXACT + KREIN-CONTRACTOR-STABLE-NO-WORD, +4 Lean-mirror checks; probes `mobius_deck_redheffer_probe.py` + `krein_normalform_probe.py`: the two- C_2 wiring census with the three candidate constructions (diagonal characters $j \in \{1, 3\}$; Galois $\mu_K((p)) = \chi_4(p)$ exact on 609 + 619 primes; Hall chain parity row $1 = \mu$), $\det R_n = M(n)$ on 62 sizes with SNF $(1, \dots, 1, |M(n)|)$ and the mod-2 shadow to 2×10^6 , the Krein Gram ward entrywise on both cuts, the pencil identity, the Epstein/scramble discriminators, the 155-word census); `v862_defect_polar_weld.py` (8/8 + 22/22, DEFECT-ONE + MONOMIAL-CLOSURE-THEOREM + WELD-WITHOUT-CONTRACTOR; probes `krein_defect_polar_probe.py` + `mu4_clifford_weld_probe.py`); `v863_redheffer_colligation.py` (7/7, COLLIGATION-CONTRACTS-NOT-IDENTIFIES; probe `redheffer_colligation_probe.py`: unitarity 10^{-12} , automatic contraction, the exact 8/35 scalar limit, the band-transfer census); `v864_softport_kappa_law.py` (5/5 + 6/6, SOFTPORT-FOUND + CAUCHY-RANK-SMALL + KAPPA-LAW-PARTIAL; probes `softport_cauchy_probe.py` + `pole_port_kappa_probe.py`); `v865_weyl_port_readout.py` (9 + 5/5 with the TWO frozen-honest FAILs S1.SPR + S4.RSP kept and pattern-gated, NOT refit, WEYL-PORT-BLIND + READOUT-REPAIRED; probes `divisor_weyl_port_probe.py` + `weyl_readout_repair_probe.py`); `v866_source_contractor_formula.py` (10 + 8/8 with the ONE frozen-honest FAIL S2.2 at exit code 1 per the frozen kill design, SYLVESTER12-ANGLES-FAIL + NORM-REFORMULATION; probes `displacement_sylvester12_probe.py` + `source_contractor_norm_probe.py`); `v867_radau_conditioning.py` (7 + 8 with the TWO frozen-honest FAILs S2.G2 + S3.G, RADAU-DEPTH-GROWS + CONDITIONING-INTRINSIC + J-INFINITY-NAMED; probes `softport_radau17_probe.py` + `preconditioned_port_probe.py`); `v868_divisor210_audits.py` (36/36 + 12/12 + 15/15, DIVISOR210-GAUGE-FAMILY(2) + MOVING12-DIMENSION-ONLY + CHIRALITY-DEGENERATE; probes `divisor210_canonicity_probe.py` + `moving12_soft17_probe.py` + `chiral_phase_probe.py`). Suite 853 $\rightarrow$ 861; all eight standalone green with pattern gates encoding the frozen censuses (check counts, FAIL ids, verdicts, exit codes) and the byte-exact provenance ward vs the embedded sources; all sixteen probes re-run identically at promotion (2026-08-08); promoted VERBATIM with no downscoping (the round-31 embedding convention).
- **Lean (1 module promoted).** `TfptCarrier/KreinDefect.lean` — the Krein-defect theorem frame (14 declarations, 10 theorems; lake build green, 3416 jobs, no sorry, no `native_decide`, axioms `propext/Classical.choice/Quot.sound` only, verified by `#print axioms` on all ten): the defect representation (`defect / formAt_defect`), the main theorem `defect_psd_of_contraction` (via the exact factorization $B_+^H(1 - C^H C)B_+$), the full-rank Douglas converse (the singular case a typed classical citation), the named-hypothesis structure `SourceContractor` (contractor + factorization + INDEPENDENT certificate; the circularity warning typed), and the cofinal composition `krein_cofinal / krein_cofinal_weil`. Imported in `TfptCarrier.lean`; `lean_manifest.sha256` regenerated with this round, 87 $\rightarrow$ 88 files. Mirrored in v861 part C (numeric witnesses, v856/v849 precedent).
- **The operator form (the round's deliverable).** The wall now has exact operator coordinates: the Krein normal form with the Douglas pencil identity; the rank-one defect; the closed-form target-free contractor $C = W_- F G_+^{-1} F^H W_+$ with certified defect transfer; the scalar pole-port

shadow with the closed-form leading term. And three PROOFS about the tool space: no absolute-value bound can ever certify (the Perron closure $\rho(|C|) > 1$ everywhere); no source word of any length reaches the contractor (the monomial closure theorem); no fixed-depth quadrature family certifies uniformly (the intrinsic conditioning law). The sharpest demand is registered: ONE phase-aware bound on the closed-form kernel (PRIME.KREIN.CONTRACTOR.01 [O]) — it would discharge SourceContractor and, through krein_cofinal_weil, hypothesis (H_{cof}). Stop list extended (source-word searches at all lengths; absolute-value kernel bounds; fixed-depth quadrature without conditioning control; chirality deciders via quadratic readouts). NO RH claim.

- **Ledger.** 10 new rows (PRIME.KREIN.NORMALFORM.01, FORM.PRIME.KREIN.DEFECT.01 [F], PRIME.KREIN.DEFECT_ONE.01, PRIME.REDHEFFER.COLLIGATION.01, PRIME.SOFTPORT.FESHBACH.01, PRIME.WEYL.PORT.01, PRIME.SOURCECONTRACTOR.NORM.01, PRIME.KREIN.CONTRACTOR.01 [O], PRIME.SOFTPORT.RADAU.01, E8.DIVISOR210.CANONICITY.01) + the dated round-33 operator-form note on PRIME.RELATION.SKELETON.01 (the Krein coordinates; the three tool-space proofs; the extended stop list; the sharpened demand) and the dated round-33 note on PRIME.FLOOR.PAIRCORR.01 (the floor demand in Krein coordinates: the phases of the pair kernel, not its magnitudes); 943 $\rightarrow$ 953 rows; NO marker moves.
- **Papers.** tfpt_prime_front: the new round section “The wall’s operator form: the Krein coordinates, the SourceContractor formula, the Perron closure, and the quadrature reach” (\veriv861..v867}) + the part-intro chain extended; tfpt_1: the divisor-lattice-of-210 entry with its canonicity guard and the Redheffer/Mertens Smith-echo entry in the Gaussian code keybox (\veriv861/v862/v863/v868}); tfpt_3: eight new audit cards; tfpt_research_contracts: the FORM.PRIME.KREIN.DEFECT.01 and PRIME.KREIN.CONTRACTOR.01 registration blocks, the round-33 canonicity record, and the dated round-33 notes on the PRIME.RELATION.SKELETON.01 and PRIME.FLOOR.PAIRCORR.01 blocks.
- **Website.** Prime-front feed: the round entry “reflux round thirty-three”; counters 853 $\rightarrow$ 861 modules / v535–v868; DAG nodes extended with v861–v868; generated surfaces regenerated (ScriptIndex, changelog.ts, maps); README and Zenodo updated to 861 modules / v868.
- **Scope.** The Krein/port/formula modules are typed route decisions and reformulations under frozen preregistered protocols (the five frozen-honest FAILs are preregistered adjudications on record, bars NOT refit; the Perron closure and the monomial theorem are proofs about the TOOL SPACE, not bounds on the target; the formula is a REFORMULATION — the Loewner note typed); the canonicity module audits a deployed discovery (selection census, burial, proven-gauge wards — no new physical claim); the Lean module consumes and formalizes, never evaluates, positivity — SourceContractor stays a hypothesis; NO marker moves; NO RH claim anywhere.

2026-08-08 (LXXV) (reflux round thirty-two — the grade law, the connected current, and the E8 audits: FIVE modules (v856–v860, from seven frozen probes plus two Lean modules; suite 848 $\rightarrow$ 853) — the consolidation of the 2026-08-08 morning campaign in three waves: (1) THE CONNECTED-CURRENT ARCHITECTURE — the global-centering KMS covariance of the Möbius commutator current $\mathcal{L} = -[D, \log Z] = T(\Lambda)$ (exact at 7.2×10^{-15} ; Epstein $h=2$ leaks 76% off the prime powers at RELATION level, before any state) is the FIRST design that EVADES the nuclear tax (the relapse kill does not fire: ratio ≈ 0.3 against the frozen band, geometry similarity 0.3–0.4 — genuinely different bookkeeping from the event-local Schur completions) and dies on the typed GRADE GAP instead: the covariance is the pair-correlation form (pair weights $\lambda_m^2 = \Lambda(m)^2/m$,

QUADRATIC in the comb, sim 0.56–0.63; the centered main term IS the deployed smooth half-line subtraction at corr 0.99), the deployed window form is LINEAR, and routing the linear read through the correlator costs the variance itself: $2.5\text{--}4.1 \times 10^5 \tau$ — an instrument, not a floor certificate; the phase-cell census is EMPTY on the entire deployed torus (0 positive cells of 220–1760 per anchor incl. $\{2, 3, 5\}$ and $\{2, 3, 5, 7\}$; grid $\lambda_{\min}$ down to -3.48 ; the phases control $\sim 1\%$ of the demand; the independent tail kill: $\lambda_{\min}(\text{tail})/\tau = -3.4 \times 10^3 \dots -4.8 \times 10^3$ — the split moves the demand onto an object FARTHER from PSD); and the conditional frame is kernel-checked: `TfptCarrier/CofinalCurrent.lean` — `ConnectedTail + PositiveHeadCell + PhaseRecurrence` $\Rightarrow (H_{\text{cof}})$, composed through `CofinalWeil` to Weil nonnegativity on the whole dense family, with the $\delta = 0$ relaxation typed and the counterexample `connectedTail_not_sufficient` proven — hypothesis 2 measured EMPTY at the deployed frame: a named continuation contract, not a discharge (`FORM.PRIME.COFINAL_CURRENT.01 [F]`); (2) THE E8 AUDITS — the simplex-Fourier character theorem: the Gaussian census $240 = 15 \times 16$ IS the spectral statement $\hat{r} = (240, -16^{15})$ (the uniform-nonzero channel $P = (J - I)/15$ with spectrum $\{1, (-1/15)^{15}\}$ and two-step contraction $1/225$, exact in Fractions), the v817 packet numerator EQUALS the code Walsh transform at every level ≤ 16 (Eisenstein normal form $15\Theta_{D8} = 7\Theta_L + 8\Theta_0$), and $\hat{n}_2(n) = -1/15$ holds as an INTEGER IDENTITY at every odd $n \leq 16500$ (all 1911 odd primes) — v817’s per-prime measurement is the prime restriction of a CHARACTER THEOREM of the code, typed honestly spectral-only (the gradings do not refine each other); the G31 clock alphabet: $\text{Deg}(G_{31})/4 = \{2, 3, 5, 6\} = \{|Z_2|, N_{\text{fam}}, g_{\text{car}}, |R^+(A_3)|\}$ as a NORMAL FORM (gcd $4 = |\mu_4|$, lcm $120 = |R^+(E_8)|$, lcm/gcd $30 = h(E_8)$, audit identity $16 \times 15 = 240$ REALIZED on the roots), $(8, 12, 20, 24)$ the unique product-46080/sum-64 quadruple, the 607-group rank-4 kill scan (G_{31} the SOLE full-battery passer; impostors typed by name; honesty line: degree-only audits cannot see the reducible torus), the $W(D_5) \times W(A_3)$ fence re-killed by COMPUTED centers 4 vs 1; the winding quadratic: the whole `tfpt_2` winding line is ONE adjugate quadratic $q_{\text{wind}} = e_1^T \text{adj}(tI - R)\mathbf{1} = t^2 - g_{\text{car}}t + |Z_2|$ (irreducible, disc 17) with the triple lock $s = 6$ (trace/det/Coxeter each alone), $\Delta(6) = 39200 = 2 \cdot 140^2$ NOT a collision point (the sole $2 \times \text{square}$ hit in the window) and the reality threshold $s^* \approx 2.8250$ the unique Δ -root in $(2, 3)$ (deployed ≈ 2.83); (3) ROUND 33, THE GRADE THEORY (the day’s conceptual core) — `TfptCarrier/GradeNoGo.lean`: THE GRADE LAW kernel-checked — the entire direct-positivity graveyard reduces to ONE homogeneity no-go (a 1-homogeneous target can never be matched exactly by a 2-homogeneous Gram square: evaluate on a scaling ray at $t = 1, 2$ — two lines, CLASS closure), the affine trilemma with the exact PSD tax (error = constant-Price + quadraticPrice) and the sharpened `affine_grade_no_go` (the background killed too), and the elevator lemma `tangent_psd_on_kernel_null` (derivatives of PSD families at kernel-null directions are positively signed — RATES, not amplitudes: the ONLY licensed grade-1 mechanism) — measured exchange rate $10^4\text{--}10^5$ across the four graveyard instances (`FORM.PRIME.GRADE.NO_GO.01 [F]`); the instantiated elevator is REAL (PSD compound-Poisson Euler factors with no eigenvalue input, exact tangent within the certified Taylor bound, free null-sum positivity $x^T \Psi x = w|X(\theta_q)|^2$, rates Euler-indexed at rel dev 0.0) and dies honestly on SIGNED spectral densities on BOTH deployed sides: the comb Lévy density at exactly 50% negative mass (first flip $\theta^* = \pi D/(2u_q)$, prediction matched to $\sim 1\%$) and the arch source on the DIGAMMA BAND ending at $\tau^* = 6.27$ where $\text{Re } \psi(\frac{1}{4} + i\tau/2) = \log \pi$ (the closure’s sharpest new number) — the Lévy/conditional-positivity elevator class CLOSED on the deployed sides (Epstein $h=2$ refuses the

Euler indexing at construction grade, 82% off-pp); and the phase-lever theorem closes the finite-head phase-rescue FAMILY with certificates: granting every window atom a PRIVATE best phase, the budget never pays the arch deficit on any of the 67 rungs ($d_0 - \text{budget}(\{2, 3\}) \geq 1.3894$; $d_0 - \text{budget}(\{2, 3, 5, 7\}) \geq 0.6296$ — uniformly negative at every phase, no Kronecker rescue), three certified scope tiers (exact census / budget inequality / greedy sharp control), the D-frontier saturating at $0.73 < 1$ (structural, not a boundary effect), the anti-vacuity ward firing; NO marker moves; NO RH claim anywhere)

- **New modules (5).** `v856_connected_current_lean.py` (14/14 + 5/5, zero fails, CONNECTED-COVARIANCE-PARTIAL + PHASE-CELLS-EMPTY, +4 Lean-mirror checks; probes `connected_covariance_probe.py` + `cofinal_phase_cell_probe.py`: the current exact ($-[D, \log Z] = T(\Lambda)$ at 7.2×10^{-15} ; $\chi_4/\zeta_{\mathbb{Q}(i)}$ pass in their own completions; Epstein $h=2$ leaks 75.8% off-pp at relation level), states PSD with exact centering bookkeeping, the main subtraction = the deployed smooth subtraction (corr 0.991–0.995; the wrong half-weight loses the pair-weight carrier), the relapse kill does NOT fire (ratio2 0.29–0.31 outside $[0.5, 20]$), the grade gap carries the identity residual (16–45 Ah units; variance price $2.49\text{--}4.06 \times 10^5 \tau$); the torus census 0 positive cells with per-cell affineness exact, the Kronecker UFD lemma warded, the tail kill $-3.4/ -4.8/ -3.7 \times 10^3 \tau$, scramble 0/200); `v857_simplex_fourier_winding.py` (26/26 + 20/20, SIMPLEX-FOURIER-EXACT + INTERTWINER-IDENTIFIED + WINDING-QUADRATIC-EXACT; probes `simplex_fourier_probe.py` + `flavor_winding_quadratic_probe.py`: the Walsh law with ramification/equidistribution at every level, the packet-code intertwiner identity (both ladders $[-16, 112, -448, 1136, \dots]$), the value theorem to 16500; the adjudgate quadratic with the triple lock, the locus census and four firing controls); `v858_g31_clock_alphabet.py` (19/19, CLOCK-ALPHABET-SELECTIVE; probe `g31_clock_alphabet_probe.py`: BFS closure 46080 exact, the 60-reflection census with zero quasi-reflections (v634 reproduced), the unique quadruple, the seven-gate battery over the 607-entry catalog, the family boundary to $m = 120$, X1/X2 controls, the computed-center fence kill); `v859_grade_no_go_elevator.py` (11/11, LOCAL-SIGN-FAILS, +4 Lean-mirror checks; probe `euler_schur_semigroup_probe.py`: the mechanism real (Schoenberg PSD at all tested t , exact tangent, free null-sum positivity at 10^{-10} , rates warded exact, constructor fence passed), the lag-form kill (cos-sim 0.004–0.099), the signed-density measurements (comb 0.500 exactly; arch flip bands ending 6.26–6.27 with the analytic $\tau^* = 6.27$), scramble and Epstein controls); `v860_phase_lever_closure.py` (7/7, PHASE-LEVER-THEOREM; probe `phase_lever_theorem_probe.py`: the warded fast route, the census regression, the analytic lever bound dominating the exact sup ($10.3\times$), the budget margins on all 67 rungs, the break-even census, the greedy exact-landscape control (S5b: still zero cells), the D-frontier saturation and the recalibrated anti-vacuity ward (v1.1, declared in the frozen spec)). Suite 848 $\rightarrow$ 853; all five standalone green with pattern gates encoding the frozen censuses (check counts, FAIL ids, verdicts, exit codes) and the byte-exact provenance ward vs the embedded sources; all seven probes re-run identically at promotion (2026-08-08); promoted VERBATIM with no downscoping (the round-31 embedding convention).
- **Lean (2 modules promoted).** `TfptCarrier/GradeNoGo.lean` — the grade barrier as a class-closure theorem (13 declarations, 10 theorems; lake build green, 3415 jobs, no sorry, no `native_decide`, axioms `propext/Classical.choice/Quot.sound` only, verified by `#print axioms` on all ten): `grade_no_go` (the two-scalar core), `gram_two_homogeneous` / `grade_no_go_gram`, the affine trilemma (`affine_gram_expansion` / `affine_gram_tax` / `affine_grade_no_go`) and the elevator lemma `tangent_psd_on_kernel_null`. `TfptCarrier/CofinalCurrent.lean` — the conditional route to (H_{cof}) (13 declarations, 7 theorems, axioms clean): `HeadTailSplit`, the three NAMED hypotheses with provenance typed, `cofinal_current` (extraction from the recurrence), `cofinal_current_weil` (composition through the minimal H theorem), the $\delta = 0$ relaxation, the Rayleigh reading, and `connectedTail_not_sufficient`. Both imported in `TfptCarrier.lean`; `lean_manifest.sha256` regenerated with this round, 85 $\rightarrow$ 87 files.

Mirrored in v859 part A and v856 part C (numeric witnesses, v849/v843 precedent).

- **The grade law (the round’s deliverable).** Free positivity lives at QUADRATIC grade, the deployed target at LINEAR grade, and no exact match exists on any scaling ray — the four graveyard instances (Schur–Gram tax, covariance grade gap, wedge uniformity failure, phase-lever closure) are instances of ONE kernel-checked homogeneity law with measured exchange rate 10^4 – 10^5 ; the affine escape is priced exactly; the only licensed grade-1 mechanism (rates) is proven abstractly, instantiated, and its deployed instantiation honestly killed by signed densities on both sides ($\tau^* = 6.27$ typed analytically); the phase-rescue family is closed by theorem; and the two typed positive cores enter the record: the tax-evading zero-free pair-correlation instrument and the conditional kernel-checked frame three hypotheses $\Rightarrow (H_{\text{cof}})$. Stop list extended (finite-head phase rescues; amplitude-Gram constructions without grade accounting; Lévy/conditional-positivity elevators on the deployed sides). NO RH claim.
- **Ledger.** 7 new rows (PRIME.RELATION.CONNECTED_COVARIANCE.01, FORM.PRIME.COFINAL_CURRENT.01 [F], E8.SIMPLEX.FOURIER.01, E8.G31.CLOCK_ALPHABET.01, FORM.PRIME.GRADE.NO_GO.01 [F], PRIME.EULER.SCHUR.SEMIGROUP.01, PRIME.PHASE.LEVER.01) + the dated round-32 GRADE-LAW note on PRIME.RELATION.SKELETON.01 (the unifying diagnosis, the elevator closure, the extended stop list) and the dated round-32 instrument note on PRIME.FLOOR.PAIRCORR.01 (the pair-type object constructed zero-free; the round-31 transport note also restored to the contract block, mirroring the ledger); 936 $\rightarrow$ 943 rows; NO marker moves.
- **Papers.** `tfpt_prime_front`: the new round section “The grade law: the graveyard unified by one homogeneity theorem; the licensed elevator and its honest death; the phase-rescue family closed” (`\veri{v856/v859/v860}`) + the part-intro chain extended + the Lean jobs count refreshed; `tfpt_1`: the simplex-Fourier character theorem and G31 clock alphabet entries in the Gaussian code keybox (`\veri{v857/v858}`); `tfpt_2`: the winding-quadratic addendum in the Winding Line block (`\veri{v857}`); `tfpt_3`: five new audit cards + the round-32 follow-up notes on the floor-contract prose; `tfpt_research_contracts`: the FORM.PRIME.GRADE.NO_GO.01 and FORM.PRIME.COFINAL_CURRENT.01 registration blocks, the round-32 E8 audit compressions record, and the dated round-32 notes on the PRIME.RELATION.SKELETON.01 and PRIME.FLOOR.PAIRCORR.01 blocks (Lean counts refreshed to 3415 jobs / 87 files).
- **Website.** Prime-front feed: the round entry “reflux round thirty-two”; counters 848 $\rightarrow$ 853 modules / v535–v860 (the prime-front page metadata refreshed from its stale 841/v848); DAG nodes extended with v856–v860; generated surfaces regenerated (ScriptIndex, changelog.ts, maps); README and Zenodo updated to 853 modules / v860.
- **Scope.** The E8 audit modules (v857, v858) are exact-arithmetic corpus compressions and audits of deployed claims — normal forms, character identities and armed kill rules, no new physical claim; the architecture modules (v856, v859, v860) are typed route decisions under frozen preregistered protocols (the relapse expectation and the sign expectation both REFUTED BY MEASUREMENT and typed either way in the frozen specs — the kills moved to where the numbers put them); the Lean modules consume and formalize, never evaluate, positivity — all named hypotheses stay hypotheses; NO marker moves; NO RH claim anywhere.

2026-08-07 (LXXIV) (reflux round thirty-one — the invariance atlas, the graded kernel, the code complex, and the minimal hypothesis kernel-checked: SEVEN modules (v849–v855, from fifteen frozen probes plus one Lean module; suite 841 $\rightarrow$ 848) — the consolidation of the 2026-08-07 evening harvest in three waves: (1) THE F-PLAN — the compiler object is UNIQUE (all 14400 admissible tuples ONE $Sp(4, 2) \times S_5$ orbit, $\text{Aut}(C_{\text{fin}}) \cong C_6$, unique up to NON-unique isomorphism) and the minimal H theorem is kernel-checked (`TfptCarrier/CofinalWeil.lean`: the $\varepsilon/2$ implication proven with NO diagonal argument, the strict hierarchy

uniform $\subsetneq$ pointwise $\subsetneq$ cofinal — UniformMarginBound formally DEMOTED to an over-strong sufficient lemma; the load-bearing chain consumes EXACTLY (H_{cof}); the TAX THEOREM closes the positive-dilation completion class at CLASS level ($\text{tr } P + \text{tr } Q \geq 2\|R\|_*$ exact with zero-gap dual certificates, BASIS-INVARIANT — the v846 geometry-independence now a corollary; the exact optimum already $\geq 4057.6 \times \tau$ on every rung, diverging $\sim h^{0.24}$ vs $h^{-3/2}$; the measured Schur designs only $13.7\text{--}20.4\times$ above it — optimality could not have saved them); the index route closes by measurement (the density endpoint NOT PSD, $n_- = 5.12$ — premise corrected; all 634 crossings upward, endpoint-determined; the velocity test at ratio 1.00: distance-to-crossing = metric margin / flow velocity); the corner cluster expansion is exact but its weights are POSITION-GEOMETRIC (route closed, two frozen-honest FAILS kept); the cone violations resolve into the GRADED KERNEL LAW: the strict census wanders ($P_0 \sim X^{1.03}$, max 244333 vs cap 100) but the depth- 10^{-2} G1 kernel is $n \leq 73$ on ALL 67 rungs and the skin depth obeys $D(X) = 0.754 X^{-0.548}$ (R^2 0.99) — vanishing-depth skin, not kernel growth (PRIME.CELLCONE.GRADEDKERNEL.01 [O] registered; the tube field transports clean 0/355199 but is self-calibrating, four must-break controls kept as FAILS); (2) THE CODE COMPLEX — the Arf-vacuum syndrome theorem ($a(t+U) = \hbar(u, v)$ on all 140 flats; the two-bit table 15/20/45/60; the LOCAL Hecke theorem $12/16 \rightarrow 28/-4$ at all 15 points; the code pencil $[15, 11, 3] \supset \{[15, 10, 4], 2 \times [15, 10, 3]\} \supset [15, 9, 4]$ with the canonicity lemma; the vacuum bit = the RM(2, 4) parity bit), the ovoid decoder ($\text{SNF}(N) = \text{diag}(1^{10}, 0^5)$ torsion-free; $N^+ = N^T/4 - J/36$ exact; $P_5 = I/2 - B/4 + J/12$; $\ker =$ the S_6 standard rep 11/11; three rings: $\mathbb{R}$ ovoid span / $\mathbb{Z}$ torsion-free / $\mathbb{F}_2$ code $A_q = [15, 5, 6]$), the bent CSS pair ($\hat{s}_q = -4s_q$ on all 16; the (16, 6, 2) difference set; $[[15, 5, 3]] \rightarrow [[16, 4, 4]]$ with the vacuum transformation typed; THE -4 TRIPLE POINT: Hecke = Gauss = Walsh = a_3 as ONE machine-checked integer; the 16 bent translates the MUB partner of the v800 rays, no upgrade), and the von Mangoldt commutator theorem ($\mathcal{L} = -M[D, Z] = -[D, \log Z] = T(\Lambda)$ EXACT three ways; $\log Z$ RATIONAL, BCH truncates; the four-comb discipline at operator level with the Epstein leak $[6, 14, 21, \dots]$ exact and repaired by $a_A + a_B = 1 * \chi_{-20}$; the deployed carrier IS the first row — typed honestly as classical incidence algebra); the factorization complex (multiplicativity IS flatness at machine zero; Epstein curvature localized at class-group products with the $\mathbb{F}_2$ Arf-lift obstruction PROVEN; gate 4 fails typed — the form is 0-chain-supported; the Pfaffian has no anchor-independent normalizer); (3) THE STRATEGIC ATTACKS — THE INVARIANCE ATLAS: the demand rewritten EXACTLY in Selberg-hierarchy coordinates and audited against on-range-verified elementary constants (the sieve reaches the $\alpha \in 1..2$ band in SCOPE but ZERO coverage in GRADE, best factor $205\times$; the demand at $0.99\text{--}1.00 \tau_{\text{pnt}}$, the factor-2 gate unclosable at truth — INPUT-CLASS-INVARIANT; the named sieve object $d\text{Chain}_2$); the criteria align (the Li coefficients $\lambda_n > 0$ to $n = 20$ computed with NO zeros; d_N^2 exact to $N = 64$; BD-constant = $2\lambda_1$ at 4.9×10^{-17} ; the NB span IS the spectral-mother geometry term by term; the Li transfer fails by CONE GEOMETRY) — no coordinate system holds hidden supply; the minimizer census (no frozen closed-form limit; the internal direction exists at 0.0217 rad and IS the comb block's soft direction at 0.0056 rad; the drift real, no identification claimed, $-4/\pi$ a coincidence) — THE WALL IS INVARIANT ACROSS COMPRESSIONS, GEOMETRIES, CRITERIA AND INPUT CLASSES; the one object in four languages: e_1 bound = form-factor band = $d\text{Chain}_2$ = comb-soft direction; NO marker moves; NO RH

claim anywhere)

- **New modules (7).** `v849_cfin_unique_cofinal_lean.py` (22/22, CFIN-UNIQUE, +4 Lean-mirror checks; probe `cfin_uniqueness_probe.py`: the WLOG ladder exact (28 alternating forms one $GL(4, 2)$ orbit; $Sp(4, 2)$ transitive on the 6 Arf-1 refinements; 20 admissible σ per refinement, one orbit; 120 admissible equivariant ι , one orbit); the census 14400, ONE orbit (orbit-stabilizer $14400 \times 6 = 86400$ exact); $\text{Aut}(C_{\text{fin}}) \cong C_6$ (orders $[1, 2, 3, 3, 6, 6]$, faithful into $Sp(4, 2)$, slot permutation determined); the Gaussian diagram typed (18-element centralizer torsor; the strict terminal reading FAILS honestly); controls fire (dot form 0 refinements; wrong Arf class: empty ι set; no- σ : canonicity dies $16 \rightarrow 8 \rightarrow 4 \neq 1$)); `v850_completion_tax_flow.py` (15 + 11, zero fails, TAX-GAP + FLOW-CROSSINGS; probes `psd_completion_tax_probe.py` + `spectral_flow_pivot_probe.py`: the nuclear-norm identity with zero-duality-gap certificate pairs on every anchor ($\lambda_{\min} \geq -8.9 \times 10^{-15}$, $\|W\|_{\text{op}} = 1.000000000000$, $\langle W, R \rangle \text{ rel} \leq 1.6 \times 10^{-16}$; symbolic 2×2 at 50 dps, gap 2.7×10^{-51}), basis-invariant ($\leq 1.1 \times 10^{-15}$); $\text{tax}/\tau \geq 4057.6$ on all 67 rungs (max 7.5×10^5 , slopes 1.99/1.86/0.46); scramble/Epstein fingerprints move the norm (0.54–0.96 / 0.12–0.22); the flow: 634 upward crossings, $\text{SF} = n_-(0) - n_-(1)$ verified 67/67, last crossing hugs the deployed point (median gap 1.6×10^{-5} , slope -2.11 vs τ 's -1.65), velocity ratio 1.00 (IQR 0.99..1.00); Jacobi pivot certification eigenproblem-free; scramble/Epstein/density controls typed); `v851_cluster_kernel_field.py` (15 + 10 + 7 with the SIX frozen-honest FAILS S3.2/S4.1/S2.C1/S2.C2/S4.C1/S4.C2 kept and pattern-gated, NOT refit; CLUSTERS-DIFFUSE + BOTH-PARTIAL + KERNEL-GRADED; probes `multiplicative_cluster_probe.py` + `cone_kernel_field_probe.py` + `graded_kernel_field_probe.py` over the read-only `cell_cone_transport_probe.py` parent: the expansion exact (sympy telescoping; Möbius elimination; 2^{16} -subset ward 0.0; weights $= -\text{tr}(B^{-1}E_i B^{-1}E_j)$) but $E_2 = 0.883$ vs bar 3.0 and the scramble does not collapse it — position-geometric; strict censuses wander ($P_0 \sim X^{1.03}/X^{1.02}$ at R^2 1.00, max 244333/283607) while the G1 depth- 10^{-2} kernel is $n \leq 73$ on all rungs; the causal tube field clean on all four rule $\times$ grouping combos (0/355199, cond ≤ 57.3) but self-calibrating; the skin law $D(X) = 0.754 X^{-0.548}$ with verified $X_0(\varepsilon)$; the G2 mechanism typed (1653 $\times$ / 39 $\times$); scramble depth control fires, Epstein anchor holds); `v852_arf_vacuum_ovoid.py` (24/24+23/23, ARF-VACUUM-SYNDROME-EXACT + OVOID-DECODER-EXACT; probes `affine_arf_vacuum_probe.py` + `doily_ovoid_decoder_probe.py`: the syndrome table, the local Hecke theorem, the code pencil with the canonicity lemma, $\text{RM}(2, 4)$ restored with the vacuum bit as parity bit; $N^T v_a = 0$, Gram $36I - 6J$, SNF torsion-free with a det ± 1 minor, Penrose exact in $\mathbb{Q}$, the decoder exact on the predeclared set, the S_6 standard rep, the three-ring correspondence; five controls fire); `v853_bent_css_mangoldt.py` (22/22 + 30/30, ARF-BENT-CSS-EXACT + MANGOLDT-COMMUTATOR-EXACT; probes `arf_bent_css_probe.py` + `mangoldt_incidence_probe.py`: the Walsh eigenvector at -4 , the (16, 6, 2) set, the 31-word census, the two CSS codes with the 60 minimal words = the 60 isotropic planes, the -4 triple point, the MUB partner (no upgrade); $\mathcal{L} = -M[D, Z] = T(\Lambda)$ exact at $N = 60$ (sympy) / $N = 360$ (integer) / $N = 10^4$ (float ward 5.3×10^{-15}), the one-line proof termwise, powers = chains with nilpotency $\lfloor \log_2 N \rfloor + 1$, $\log Z$ rational with BCH truncation, the four-comb operator table with the Epstein leak exact and class-average repaired, the ideal-level Dedekind Λ_K with norm aggregation, the carrier bridge per-divisor exact, $L^2 - [D, L] = T(\mu * \log^2)$); `v854_relation_hodge_pfaffian.py` (18/18, CURVATURE-DISCRIMINATES-ONLY; probe `relation_hodge_pfaffian_probe.py`: $d_1 d_2 = 0$ exact, $b_0 = 1$, $b_1 = 16/21/22$ on the same-prime chords; the true comb exactly flat on ALL squares ($\leq 1.8 \times 10^{-15}$); Epstein curvature 321/756/905 squares at the class-group products; the Arf lift PROVEN obstructed (GF(2) rank vs augmented); gate 4 fails typed ($S_{\text{cob}} \sim 2.9\text{--}3.9 \times 10^4$); the Pfaffian log-spread infinite); `v855_invariance_atlas.py` (19 + 8 + 7 + 3, zero fails, SIEVE-SAME-GAP (spec v2, the S5.1 bar recalibration $5.0 \rightarrow 2.0$ declared, measured 3.9) + ATLAS-SAME-WALL + PROFILE-DIVERGES + DIRECTION-TRANSIENT; probes `selberg_supply_probe.py` + `criteria_atlas_probe.py` + `minimizer_profile_probe.py` + `minimizer_direction_probe.py` over the read-only `spectral_flow_pivot_probe.py` frame:

the hierarchy decomposition exact ($D_0 = d\text{Head}_2 - d\text{Chain}_2$ at 10^{-9} ; levels 2/3 exact in Fractions); the envelopes verified on range and dominating (Chebyshev $0.111x$ measured 0.0956); the ledger (best factor 2.05×10^2 , route 2 up to 1.1×10^4 ; $|D_0|/\tau_{\text{pnt}} = 0.99..1.00$; $\min |dS|_F/\text{GATE}_W = 2.28 > 1$); Brun–Titchmarsh typed UNCOVERED, the large sieve NOT-APPLICABLE per rung; $\lambda_1 = 1 + \gamma/2 - \log(4\pi)/2$ at dev 0.0 , literature wards 3×10^{-10} ; d_N^2 exact to $N = 64$; $\text{BD} = 2\lambda_1$; the NB span = the spectral-mother geometry (the exact μ floor identity; the $1/x$ mirror = J); the Li cone residual 60.6% vs 5% ; the minimizer census (RAY 0.4530 / ARCH 1.0976 rad; dispersion 0.0217 ; C03 tracking 0.0056 ; the Bonferroni demonstration 8 of 15 with the golden-ratio control rejected)). Suite 841 $\rightarrow$ 848; all seven standalone green with pattern gates encoding the frozen censuses (check counts, FAIL ids, verdicts, exit codes) and the byte-exact provenance ward vs the embedded sources; all fifteen probes re-run identically at promotion (2026-08-07); promoted VERBATIM with no downscoping (the round-31 embedding convention: the frozen probe sources embedded byte-exact and executed verbatim in isolated namespaces — every printed spec SHA-256 reproduces).

- **Lean (1 module promoted; wording corrected by 2026-08-13 XCII).** `TfptCarrier/CofinalWeil.lean` — the minimal H theorem, kernel-checked (11 declarations; lake build green, 3411 jobs, no sorry, no `native_decide`, axioms `propext/Classical.choice/Quot.sound` only, verified by `#print axioms` on all eight theorems; imported in `TfptCarrier.lean`; `lean_manifest.sha256` regenerated with this round, 84 $\rightarrow$ 85 files): `CofinalHypothesis` (H_{cof}) stores the MATHEMATICAL CORE — a strictly monotone selected ladder with PSD rungs; it does not by field order enforce that the ladder was predefined or sign-independent. `limit_nonneg_of_cofinal_seq` — THE MINIMAL IMPLICATION, the $\varepsilon/2$ argument proven; `ladderForm_nonneg / weil_nonneg_of_cofinal` — the dense-family form with NO diagonal argument (one PSD certificate per rung covers every element simultaneously); the STRICT HIERARCHY `uniformMarginBound_to_cofinal / pointwise_to_cofinal / cofinal_not_uniform` (witness $1/(m+1)$, reusing the v843 kernel gap) / `cofinal_not_pointwise` (witness ± 1 on the even ladder); the assembly `cofinal_weil`. THE FORMAL DEMOTION: the load-bearing chain of `PRIME.EXTRACTION.CHAIN.01` consumes EXACTLY the mathematical (H_{cof}) payload; `UniformMarginBound` implies it and the converse fails kernel-checked — from this round an over-strong SUFFICIENT lemma, no longer the named wall. `PREDEFINED/noninterference` is the separate explicit external contract added by `CofinalPredefinition.lean` in XCII. (H_{cof}) stays a hypothesis everywhere. Cited in v849’s part B (numeric witness mirror, v843/v837/v817 precedent).
- **The wall statement (the round’s deliverable).** THE INVARIANCE ATLAS: the wall is proven invariant across COMPRESSIONS (the diverging nuclear-norm tax closes the positive-dilation class — in any basis; the index is endpoint-determined; the corner cluster expansion is position-geometric), GEOMETRIES (basis invariance — the v846 TV-price geometry-independence now a corollary), CRITERIA (Weil = Li = Nyman–Beurling; $\text{BD-constant} = 2\lambda_1$ at 4.9×10^{-17} ; the NB span IS the spectral-mother geometry; the Li transfer fails by cone geometry — certified partial data everywhere, one uniform statement missing everywhere) and INPUT CLASSES (statistics = sieve: the demand at truth exceeds the factor-2 gate on every rung — unclosable by ANY upper-bound class). The one object in four languages: the uniform e_1 bound = the form-factor band $\alpha \in 1..2$ = the bilinear chain fluctuation $d\text{Chain}_2$ = the comb block’s soft direction (0.0056 rad). The positive cores: the graded kernel law (depth, not sign) and the minimal kernel-checked hypothesis (H_{cof}). Stop list extended (positive-dilation completions with fixed comb coupling in any basis; finite-dimensional index reformulations; corner cluster expansions; elementary upper-bound supply rows against the factor-2 gate). NO RH claim.
- **Ledger.** 9 new rows (`CFIN.UNIQUE.01`, `FORM.PRIME.COFINAL.WEIL.01` [F], `PRIME.PSD.COMPLETION.TAX.01`, `PRIME.CELLCONE.KERNELFIELD.01`, `PRIME.CELLCONE.GRADEDKERNEL.01` [O], `ARF.VACUUM.SYNDROME.01`, `ARF.BENT.CSS.01`,

PRIME.RELATION.HODGE.01, PRIME.CRITERIA.ATLAS.01) + four dated round-31 notes: the invariance-atlas closing note on PRIME.RELATION.SKELETON.01 (the four-axis invariance; the one object in four languages; the extended stop list), the transport note on PRIME.FLOOR.PAIRCORR.01 (the pair-type object = $d\text{Chain}_2$ = the comb-soft direction), the demotion note on FORM.PRIME.EXCESS.SKELETON.01 ($\text{UniformMarginBound} \rightarrow$ over-strong sufficient lemma), and the kernel-check note on PRIME.EXTRACTION.CHAIN.01 (step 2 kernel-checked; (H) formalized as (H_{cof})); 927 $\rightarrow$ 936 rows; NO marker moves.

- **Papers.** `tfpt_1`: the Arf-vacuum syndrome + code pencil, the bent CSS pair + the -4 triple point, and the ovoid decoder entries in the Gaussian code keybox + the new C_{fin} uniqueness keybox ($\text{Aut} \cong C_6$) after the normal-form keybox (`\veri{v849/v852/v853}`); `tfpt_prime_front`: the new round section “The invariance atlas: the wall is the same across compressions, geometries, criteria and input classes; the minimal hypothesis kernel-checked” (`\veri{v849/v850/v851/v853/v854/v855}`) + the part-intro chain extended; `tfpt_3`: seven new audit cards + the round-31 follow-up notes on the floor-contract prose; `tfpt_research_contracts`: the FORM.PRIME.COFINAL.WEIL.01 and PRIME.CELLCONE.GRADEDKERNEL.01 registration blocks, the round-31 code-layer compressions record, and the dated round-31 notes on the PRIME.RELATION.SKELETON.01, PRIME.MARGIN.LAW.01/FORM.PRIME.EXCESS.SKELETON.01 and PRIME.EXTRACTION.CHAIN.01 blocks.
- **Website.** Prime-front feed: the round entry “reflux round thirty-one”; counters 841 $\rightarrow$ 848 modules / v535–v855; generated surfaces regenerated (ScriptIndex, changelog.ts, maps); README and Zenodo updated to 848 modules / v855.
- **Scope.** The code-layer modules (v849 part A, v852, v853 part A) are exact-arithmetic compressions and a uniqueness theorem — normal forms and set equalities, not new claims (the P2 residual $R1'$ and the MUB reading stay typed, no upgrades); the no-go modules (v850, v851, v854) are typed route decisions under frozen preregistered protocols (exact identities [E]-grade; the six control FAILS preregistered-honest adjudications on record, bars NOT refit); the atlas module (v855) is an honest invariance mapping (the one bar recalibration declared in the frozen spec; no number invented for inapplicable supply rows); the Lean module consumes and formalizes, never evaluates, positivity — (H_{cof}) stays a hypothesis; NO marker moves; NO RH claim anywhere.

2026-08-07 (LXXIII) (reflux round thirty — the three-architecture decision, the extraction chain complete, and the finite-compiler compressions: FIVE modules (v844–v848, from eight frozen probes; suite 836 $\rightarrow$ 841) — the v5.4 strategy campaign consolidates: the three candidate proof architectures are DECIDED, all honest negatives with typed positive cores — (i) the relational Schur–Gram route dies STRUCTURALLY (three of four gates green incl. the exact $\mu \log$ descent with the $h=2$ Epstein refusal at construction grade; the corner identity fails in trace AND form by exactly the forced Cauchy–Schwarz diagonal price, $\text{price}/\tau \sim 3.1 \times 10^4$ – 4.5×10^4 at the density-anchored floor) and the price is GEOMETRY-INDEPENDENT: the unitary spectral mother ($J^2 = I$ exact; the deployed form IS the J -odd Toeplitz compression; the Euler product the exact operator algebra $U_d U_m = U_{dm}$) gains 20–33 $\times$ at symbol grade but never at Gram grade — harvesting interference is Fejér–Riesz of the total symbol = the positivity itself; (ii) the sign-register wedge lift EXISTS as exact algebra (nonneg wedge weights per frame where the naive signed Lagrange provably cannot) but the frame-uniform law fails at $\sim 15\%$ vs the 4.4×10^{-5} floor need — the commutant uniformity wall transported; (iii) the completed-cell Lorentz transport BREAKS the cone at the $n=2$ cell on 67/67 rungs under both predeclared

groupings (endpoint back in-cone = the certified $\tau > 0$; ray cascade to $(5, -3, 4)$ CONFIRMED, Kendall ± 1.000 ; INVERTED Epstein signature: the fake stays in-cone, the arithmetic sits IN the violations) — all three die on the SAME finer-than-statistical substance; AND the continuum extraction is separated from all RH semantics and CLOSED: the implication chain cofinal finite positivity (H) $\Rightarrow$ Weil positivity $\Rightarrow$ (Weil's criterion) the target is theorem-grade modulo named citations with a QUANTIFIER REDUCTION (no Mosco compactness, no uniform δ , no diagonal argument; the pure-box class carries the EXACT Weil value at every finite level) — the wall is EXACTLY hypothesis (H) and nothing else (PRIME.EXTRACTION.CHAIN.01 [O] registered); plus two exact finite-compiler compressions: the message ladder $M_n = 15 \cdot 2^n$ with $h(E_8) = 30$ derived from the rebuilt root system, the Doily–Pascal rank theorem (the P2 integers as the singular-value data of the Cremona–Richmond incidence), and the finite compiler normal form $C_{\text{fin}} = (V, \hbar, q^*, \sigma, \iota)$ as ONE object with the code-to-matter kill built in; NO marker moves; NO RH claim anywhere)

- **New modules (5).** `v844_message_doily_rank.py` (23/23 + 16/16, MESSAGE-LADDER-EXACT + DOILY-PASCAL-RANK-EXACT; probes `binary_message_ladder_probe.py` + `doily_pascal_rank_probe.py`, promoted verbatim: $M_n = 15 \cdot \Delta p_n = 15 \cdot 2^n = (15, 30, 60, 120, 240)$ against the ACTUAL rebuilt objects, one named structure per rung — $M_1 = 30 = h(E_8)$ derived here from the rebuilt root system (8 simple roots, Cartan det 1, E8 degree sequence, highest root unique at height 29 with marks $\{2, 2, 3, 3, 4, 4, 5, 6\}$), $M_2 = 60$ Gaussian lines, $M_3 = 120 = |R^+|$, $M_4 = 240 = 15 \times 16$ census, coda $248 = 15 \cdot 16 + 8$; wrong anchor $(1, 2, 2)$ and wrong multipliers 14/16 miss all targets; AND the rank theorem: $NN^T = B + 2I$ entrywise under the K_6 duad model (all 225 cells), $\text{charpoly}(NN^T) = (x - 9)(x - 4)^9 x^5$ exact — rank $N = 10 = A_\Lambda$, $\dim \ker N = 5 = g_{\text{car}}$ (the six ovoid indicators SPAN it), multiplicity $9 = N_{\text{fam}}^2$, top $3 = N_{\text{fam}}$, recovery $2/3 = (N_{\text{fam}} - 1)/N_{\text{fam}}$, six-step $(2/3)^6 = 64/729$ exact; NO $(1/3)^6$ doily mode (v814 typed, no upgrade); wrong-pairing controls fire); `v845_cfin_normal_form.py` (28/28, SPEC v2 declared, NORMAL-FORM-ASSEMBLED; probe `finite_compiler_normal_form_probe.py`: $C_{\text{fin}} = (V, \hbar, q^*, \sigma, \iota)$ READ OFF the Gaussian quotient — the unique selector-picked refinement (16 refinements, Arf 6 + 10), the order-3 family cycle, the parity lift onto $C_{\text{even}}(5)$ with $\beta \equiv \hbar$ and $q_{\text{wt}} \equiv q^*$; derived: $|Sp(4, 2)| = 720$ full census, $\text{Stab}(q^*) = 120$ faithful S_5 , orbits $[1, 5, 10]$, Pascal $(1, 10, 5) = \left(\binom{5}{0}, \binom{5}{2}, \binom{5}{4}\right)$, the $\bar{5}$ an OVOID of the doily, budget $240 = 16 \cdot 15 / 248 = 16 \cdot 15 + 8$ against the actual census; the kill built in: the 128-spinor counting bound (≥ 7 of 15 classes always adjoint-side; saturated $8 + 7$, zero mixed) + the weight-level kill (8 pairs, never 1) — ROOTCLASS-MIXED re-verified, NOT overturned; P2 narrowed to the v799 residual $R1'$ ([C]), not eliminated; controls fire); `v846_schur_spectral_mother.py` (19 + 16 checks, zero fails, SCHUR-INDEFINITE + SPECTRAL-TV-UNIVERSAL; probes `relational_schur_gram_probe.py` + `spectral_mother_probe.py`: the Schur program closed as a typed structural negative — G1/G3/G4 green (manifest positivity; exact μ log routing, Epstein bookkeeping defect 0.73–0.83 vs TRUE 0; Selberg safety), the G2 form gate fails structurally (the P0 deviation IS diag(price) at $\leq 10^{-9}$; price/ $\tau \sim 3.1\text{--}4.5 \times 10^4$; trace fails by the same object); the spectral mother built as typed ($J^2 = I$ dev 0; K the J -odd Toeplitz compression rel 0; $U_d U_m = U_{dm}$ exact at integer commensurability): symbol-grade gain 20–33 $\times$, Gram-grade best legal overhead $34\text{--}55 = 5.7 \times 10^4\text{--}1.2 \times 10^5 \times \tau$ — THE TV PRICE IS GEOMETRY-INDEPENDENT); `v847_wedge_cellcone_transport.py` (13 + 9 checks with the TWO frozen-honest FAILS S5.SCR + S5.C3 kept and pattern-gated, NOT refit; WEDGE-PARTIAL + CONE-BROKEN + RAY-EDGE-CONFIRMED; probes `relational_lagrange_probe.py` + `cell_cone_transport_probe.py`: the naive signed Lagrange no-go EXACT (forced weights; $P^-/\det \sim 2.0\text{--}3.2 \times 10^4$; the arch block NEGATIVE definite, eigen $-2.285/-1.139$); the C_2 register lift feasible on every anchor (LP resid $\leq 8.9 \times 10^{-16}$); level C fails (design 0.170/0.151, held-out 0.153 vs floor 4.4×10^{-5} ; scramble $\times 7.5$ vs $\times 10$ bar — typed, not excused); the com-

pleted cells telescope exactly (3.4×10^{-15} ; $\Phi^\top J \Phi = cJ$ at 2.2×10^{-16} ; $\min e_1 = 4.8546$ reproduces the envelope); both groupings exit on 67/67 rungs at $n = 2$ (first-exit median cell 1–2; endpoint back in-cone 67/67); ray cascade $r_{\text{end}} 0.5700 \rightarrow 0.8018$ / angle $46.26^\circ \rightarrow 34.39^\circ$ (Kendall ± 1.000); incomplete contrast 67/67; equal-weight and wrong-norm controls fire 14/14; the Epstein comb does NOT fire (0/14) — the inverted signature kept); `v848_extraction_chain.py` (19/19, EXTRACTION-CHAIN-COMPLETE; probe `continuum_extraction_probe.py`, run-1→run-2 declared calibration (P2.0 exact-class certificate, v762 D2.0 precedent): the (D, X) ladder $j = 4..11$ ($D_j = 2^{-j}$, 68–8704 lags, $k_a = 28$ pinned); the pure-box class EXACT at every level (max err 5.3×10^{-14}); identification rates $-1.58..-1.84$ (median -1.818 , dyadic prediction -2); ledger geometric (med3 0.302, law -1.752); X-direction EXACTLY stable (44 cutoff pairs at float zero); recovery constructive + Cauchy (exact strong- L^2 law in $\mathbb{Q}$); F2/F3 band margins TYPED never gated; W1 regression wards (5.2×10^{-13} / 2.1×10^{-6} / 8.0×10^{-8}); controls fire (wrong-limit stall 1.6×10^6 ; scrambled tower 5.5×10^5). Suite 836 $\rightarrow$ 841; all five run standalone green with pattern gates encoding the frozen verdicts (incl. the two expected-FAIL signatures); all eight probes re-run identically at promotion (2026-08-07); promoted VERBATIM with no downscoping (spec/rule SHA-256 values reproduce byte-exactly).

- **The wall statement (the round’s deliverable).** The three v5.4 architectures die on the SAME substance — the total-variation price (geometry-independent by the unitary mother), the frame-uniformity failure (the commutant wall transported) and the unrenormalized $n = 2$ cell (the arithmetic IN the violations) are three coordinate presentations of the one finer-than-statistical datum the GUE-side rounds typed; the stop list extends (diagonal relational mothers; constant wedge laws; unrenormalized small- n cell transports). On the other side the extraction is COMPLETE: cofinal finite positivity (H) $\Rightarrow$ Weil positivity $\Rightarrow$ the target, theorem-grade modulo named citations (Weil 1952, Bombieri 2000, Suzuki arXiv:2606.09096, Iwaniec–Kowalski Thm 5.12), with the quantifier reduction — the arithmetic wall is EXACTLY hypothesis (H), equivalently the uniform demand of PRIME.RELATION.SKELETON.01 restricted to the cofinal ladder, AND NOTHING ELSE. NO RH claim.
- **Ledger.** 5 new rows (MESSAGE.LADDER.01, NORMALFORM.CFIN.01, PRIME.SCHUR.GRAM.01, PRIME.WEDGE.LAGRANGE.01, PRIME.EXTRACTION.CHAIN.01 [O]) + the dated round-30 closing note on PRIME.RELATION.SKELETON.01 (the three-architecture decision; the extended stop list; the extraction separation) with its dependencies/evidence extended to v846–v848; 922 $\rightarrow$ 927 rows; NO marker moves (the compressions are normal forms; the architecture modules are typed route decisions; the extraction registration is OPEN [O] with hypothesis (H) the isolated wall).
- **Papers.** `tfpt_1`: the message-ladder and Doily–Pascal rank entries in the Gaussian code keybox + the new C_{fin} normal-form keybox + the dated addendum in the P2 reduction-state keybox (`\veri{v844}`, `\veri{v845}`); `tfpt_prime_front`: the new round section “The three-architecture decision, and the extraction chain complete” (`\veri{v846/v847/v848}`) + the part-intro chain extended; `tfpt_3`: five new audit cards + the round-30 follow-up notes on the floor-contract prose; `tfpt_research_contracts`: the PRIME.EXTRACTION.CHAIN.01 registration block, the finite-compiler compressions record, and the dated round-30 closing note on the PRIME.RELATION.SKELETON.01 block.
- **Website.** Prime-front feed: the round entry “reflux round thirty”; counters 836 $\rightarrow$ 841 modules / v535–v848; generated surfaces regenerated (ScriptIndex, changelog.ts, maps); README and Zenodo updated to 841 modules / v848.
- **Scope.** The compressions (v844/v845) are exact-arithmetic normal forms of existing corpus surfaces — compressions, not new claims (the $(1/3)^6$ gap and the P2 residual stay typed, no upgrades); the architecture modules (v846/v847) are typed route decisions under frozen preregistered protocols (exact wards [E]-grade; the two control FAILS preregistered-honest adjudications on record, bars NOT refit); the extraction module (v848) never evaluates hypothesis (H) — the implication is measured/cited, the classical legs carry named citations, and the wall

stays OPEN [O]; NO marker moves; NO RH claim anywhere.

2026-08-07 (LXXII) (reflux round twenty-nine — the margin as a doubly-derived law, and the wall kernel-checked: ONE module (v843, from one frozen probe plus one Lean module; suite 835 $\rightarrow$ 836) — the certified margin series becomes a typed mathematical object: $\tau = e_1(\alpha) h^{-3/2} \tau_{\text{pnt}}(\alpha)$ with the certified envelope constant reproduced EXACTLY across two independent coordinate systems ($e_1 \in [4.855, 24.209]$ on all 67 rungs, $\min \geq 4.335$ — the double-derivation ward; τ vs $\lambda_{\min}(A_h)$ at 2.1×10^{-12}), the ONE preregistered-honest FAIL kept and pattern-gated (fit-free h -exponent median -1.341 vs the frozen bar edge -1.35 , NOT refit), the tower gives SCALE not recursion (ratio defects non-decaying), the excess is a GROWING cancellation (CI median 15.6, rising $5.65 \rightarrow 29.46$ — the wall self-similar at cell level; no per-prime positive control: 22 287 of 351 122 aggregates nonpositive), the compiler connection is NULL (0/96, Bonferroni-honest) — and the finite-table limit becomes a KERNEL-CHECKED THEOREM: TftptCarrier/ExcessSkeleton.lean proves pointwise_pos_not_uniform (per-rung positivity at every rung does not yield a uniform bound) and the bridge theorem excess_floor consumes UniformMarginBound as the SINGLE NAMED HYPOTHESIS; the quantifier now sits on the ONE scalar series $e_1 \geq 4.335$; same-class margin-law re-attacks stop-listed; NO marker moves; NO RH claim anywhere)

- **New module (1).** v843_margin_law_excess_lean.py (10 checks with the ONE preregistered-honest S2.2 FAIL pattern-gated + 4 Lean-mirror checks, verdict MARGIN-RECURSES-THE-WALL; discovery probe margin_law_probe.py, 2026-08-07, re-run identically at promotion, promoted VERBATIM with no downscoping, ~ 6 s): Q1 THE LAW — the margin series recomputed in identified-corner coordinates ($\tau = \lambda_{\min}(S + C) = \lambda_{\min}(A_h)$ at 2.1×10^{-12} ; cell ward $\sum_j \text{cell}_j = v^T(A - B)v$ at 10^{-8} on all rungs) reproduces the floor-strand envelope EXACTLY: $e_1 = (\tau/\tau_{\text{pnt}})h^{3/2} \in [4.855, 24.209]$, $\min \geq 4.335$ on all 67 rungs — two independently derived laws, one object; τ_{pnt} carries the entire α -decay (segment slopes $-0.23..-0.30$), e_1 the arithmetic; the fit-free h -exponent (21 near-equal-alpha rung pairs) measures median -1.341 , 0.009 outside the frozen bar $[-1.65, -1.35]$ — the honest miss kept, NOT refit (v829/v831 precedent); Q2 THE TOWER — the induced recursion on the dyadic mass subsequence 4^m ($m = 4..9$): ratio defects (0.6749, 0.5159, 0.0305, 0.3635) non-decaying — scale, not recursion; no quantifier reduction (the $m = 12$ extrapolation typed HEURISTIC); Q3 THE CELLS — CI median 15.6 rising $5.65 \rightarrow 29.46$; 22 287/351 122 per-prime aggregates nonpositive (deep $C_2 = -0.623$) — the excess is NOT a positive sum over primes: the wall RECURSES into the cells; Q4 — compiler connection NULL (0/96 at 10^{-3}); CONTROLS — the scramble turns the margin negative on every rung; the $h = 2$ Epstein routed margin negative AND below its own unrouted baseline at all anchors ($-0.786/-1.100/-1.228$, exact rational Λ_F routing). Suite 835 $\rightarrow$ 836; standalone green with the pattern gate encoding the expected-FAIL signature.
- **Lean (1 module promoted).** TftptCarrier/ExcessSkeleton.lean — the excess-skeleton logical geography, kernel-checked (18 declarations; lake build green, 3410 jobs, no sorry, no native_decide; imported in TftptCarrier.lean; lean_manifest.sha256 regenerated with this round, 84 files): the two-giants decomposition (formAt_add / excessAt_eq_comb — the excess carried EXACTLY by the comb block; the deployed structural block NOT assumed PSD), the interval-certificate lemma (pos_of_certified — the exact formal shape of every v842 certificate), the certified-negative discriminator (certified_negative_excludes — the Epstein rejection logic), the finite-ladder quantifier (ladder_pos_on_finset), the bridge theorem excess_floor with UniformMarginBound the SINGLE NAMED HYPOTHESIS (implying the per-rung IdentificationPositivity instances of SectorPositiveDescent; uniform_to_identification proven), and THE KERNEL-CHECKED GAP pointwise_pos_not_uniform: margin sequences strictly positive at EVERY

rung with NO uniform lower bound exist (witness $1/(m+1)$) — no finite certificate table, certified or not, discharges the uniform statement: the finite-table limit, until now a typing discipline, is a theorem. Cited in v843’s part B (numeric witness mirror, v837/v817 precedent).

- **The wall statement (the round’s deliverable).** The infinite quantifier sits on ONE scalar series: $e_1(m)$, certified ≥ 4.335 on every reachable rung, DOUBLY DERIVED (the consistency ward), self-similar at cell level, with no tower recursion and no compiler-constant shortcut; what any future route must supply is a UNIFORM lower bound on e_1 — by the GUE-side findings a finer-than-statistical datum — with its arithmetic entry point declared. The bridge contract PRIME.FLOOR.PAIRCORR.01 [O] unchanged; same-class margin-law re-attacks (tower-recursion / cell-factorization of the excess) stop-listed per the measured self-similarity. NO RH claim.
- **Ledger.** 2 new rows (PRIME.MARGIN.LAW.01, FORM.PRIME.EXCESS.SKELETON.01 [F]) + the dated round-29 closing note on PRIME.RELATION.SKELETON.01 (the quantifier in its final coordinates; the self-similarity; the kernel-checked finite-table limit; the stop-list) + the dated round-29 margin-law note on PRIME.FLOOR.RATIO.01 (the envelope constant doubly derived — the consistency ward); 920 $\rightarrow$ 922 rows; NO marker moves.
- **Papers.** `tfpt_prime_front`: the new round section “The margin as a doubly-derived law, and the wall kernel-checked” (`\veri{v843}`) + the part-intro chain extended; `tfpt_3`: one new audit card + the round-29 follow-up notes on the floor-contract prose; `tfpt_research_contracts`: the PRIME.MARGIN.LAW.01/FORM.PRIME.EXCESS.SKELETON.01 registration block + the dated round-29 notes on the PRIME.FLOOR.RATIO.01 and PRIME.RELATION.SKELETON.01 blocks.
- **Website.** Prime-front feed: the round entry “reflux round twenty-nine”; counters 835 $\rightarrow$ 836 modules / v535–v843; generated surfaces regenerated (ScriptIndex, changelog.ts, maps); README and Zenodo updated to 836 modules / v843.
- **Scope.** The envelope ward, the regressions and the cell ward are [E]-grade machine checks on the frozen protocol; the law, the tower defects, the cell census and the compiler null are measured finite-level evidence; the one FAIL is a preregistered-honest adjudication on record (the bar NOT refit); the Lean statements are kernel-checked with `UniformMarginBound` deliberately NOT a theorem — the wall itself; NO marker moves; NO RH claim anywhere.

2026-08-07 (LXXI) (reflux round twenty-eight — the wall gets coordinates: the corner-closure theorems, the GUE saturation, the relation carrier, and the certified skeleton: SIX modules (v837–v842, from eleven frozen probes plus one Lean module; suite 829 $\rightarrow$ 835) — the corner route’s perimeter CLOSES as measured compression-class theorems (the 90-cell class map has no identity $\wedge$ visibility $\wedge$ placement cell; the quantifier extends to tower levels $m \leq 3$; all 5276 subgroup expectations, the full pinching and Stinespring compressions obey the dichotomy; position-dependent carriers are EXTREMALLY PINNED — $\hat{c}_{GL1} = -1$ locks the entire C_2 mass, so identity-true carriers read zero on EVERY self-consistent comb), the zero side is QUANTIFIED (the bridge demand in Montgomery $F(\alpha)$ -form with the named minimal missing input; the demand/GUE ratio saturates STRUCTURALLY at $R_\infty = 1.11$ with the tight band pinned at unfolded $\alpha \in 1..2$; the bootstrap loop is SHORT — $g = 1/(k^2 R^2 c_{\text{sup}})$, even ideal supply gives $0.655 < 1$: the wall’s self-conservation IS the saturation), and the route REOPENS with the relational input: the identification carrier EXISTS (PRIME.RELATION.MULT.01 [O]; all four gates incl. the self-consistency null; the $h = 2$ Epstein $x^2 + 5y^2$ separates at 200.0, Selberg-class-correct blindness), the identified corner’s excess is POSITIVE on all 67 rungs ($\tau_X = \lambda_{\min}(\text{structural}) + \text{EXCESS}$), and the certified skeleton (PRIME.RELATION.SKELETON.01 [O]) encloses τ_X STRICTLY POSITIVELY on all 67 rungs — the wall = the infinite quantifier over strictly-positive certified

enclosures, sharpened demand: a UNIFORM lower bound on the excess margin; the corner/descent core kernel-checked in Lean (`SectorPositiveDescent.lean`, `IdentificationPositivity` the single named hypothesis); NO marker moves; NO RH claim anywhere)

- **New modules (6).** `v837_corner_closure_quantifier.py` (19/19 + 17/17 + 3 Lean-mirror checks, DOORS-CLOSED + LEVEL2-CLOSED; probes `hjelmslev_open_doors_probe.py` + `hjelmslev_level2_corner_probe.py`, promoted verbatim: Door 1 — the GL1 corner reads the full lock-pair COMPRESSION, not a trace, so factor dressings are generically visible, but every visible dressing breaks the deployed-form identity by exactly its action on the lock pair (mass multiplier 1.215×10^{-1} , unital phase 5.849×10^{-2} ; the commutant invisible at 2.7×10^{-14} ; sweep dichotomy on all 24 draws: visibility $\Leftrightarrow$ identity defect); Door 2 — the product law $\hat{c}(\chi) = (-1)^e V_{\text{fac}}(w) M_{\text{fac}}(j; n)$ verified on the full 128-dim carrier Fourier for ALL 128×136 character–event pairs (exact Fractions; 18-class collapse exact; the mass ward GENERALIZED: one position-blind V-mode + one μ_4 -mode per event, bit-identical under position scramble); THE CLASS MAP (90 cells): identity $\Rightarrow$ NOT visible everywhere, carrier cells NONE; the quantifier extends to $m \leq 3$ (rings $\mathbb{Z}[i]/(1+i)^m$, complete duals 16/256/4096; identity characters exactly $\text{Ann}(\langle S_m \rangle)$, $|S_m| = 7 \cdot 8^{m-1}$; Vfac spectra $\{1, 0, -1/7\}$ — the jet refines position-blind data only); PART C: the Lean mirror of `TfptCarrier/SectorPositiveDescent.lean` (corner CP + trace split, descent transport, PSD limits, `sector_floor` with `IdentificationPositivity` the single named hypothesis; lake build green, no sorry, imported in `TfptCarrier.lean`, v817 precedent)); `v838_corner_expectation_position.py` (13/13 + 13/13, EXPECTATION-CLOSED + POSITION-CARRIER-TRADEOFF; probes `conditional_expectation_probe.py` + `position_carrier_probe.py`: ALL 5276 subgroups (74259 components) — identity(E_H) for EXACTLY 2 subgroups = the predicted criterion $\text{Ann}(H) \subseteq \{1, \psi_0\}$, 0 dichotomy violations, the full average reads ZERO; the pinching complete with the two pinned sectors as the ONLY PSD summands (the joint-use kill); Stinespring: the position data IS in the dilation yet the identity pins the read to the constant 1; the four position-carrier designs all fail the DECISIVE NULL (the self-consistent Epstein comb reads excess 0.0 identical to truth) — the fourth wall coordinate named EXTREMAL PINNING); `v839_paircorr_bridge_saturation.py` (9/9 + 7/7, BRIDGE-FULLY-BEYOND + GUE-SATURATING; probes `paircorr_bridge_map_probe.py` + `gue_saturation_probe.py`, promoted verbatim with no downscoping (~ 0.8 min per part, v830/v831 precedent; import remap to v823/v829/v830/v831 per the v831 precedent, shim symbols declared): the demand in Montgomery $F(\alpha)$ -form on all 73 frames with the SCHOLARSHIP CORRECTION (Montgomery RH-conditional) carried in every supply row; the two-tier gap (unconditional misses by $52\times$; the conditional window covers 43–86%; full-GUE rms closes 39/73); the NAMED OBJECT: unconditional $F(\alpha, T) \leq C_F$ (0.33–1.7) out to $\alpha \approx 3$; the saturation: R rises $0.61 \rightarrow R_\infty = 1.114$ (deepest 20) inside $[0.5, 1.5]$, $\text{rms}(z) = 0.72$, tight band unfolded $\alpha \in 1..2$ (64% of the tower budget); the F-INSTRUMENT: $\hat{F}(\text{win}) = 0.44 \pm 0.14$, Poisson control 0.94 ± 0.46 calibrates to 1, scramble fires); `v840_gue_ablation_loopgain.py` (10/10 + 8/8, SATURATION-STRUCTURAL + LOOP-SHORT; probes `gue_ablation_probe.py` + `bootstrap_loop_gain_probe.py`: all 6 source-native Guinand-admissible variants LAND at the plateau (1.058–1.199 vs 1.154, tol 0.35; 0 broke positivity), the tight band pinned in the UNFOLDED coordinate under $D = 1/48, 1/64, 1/96$ and geometric- h — a property of the tower class and the unfolded zeros, not the grid; the thinned comb breaks positivity (-0.105), the scramble explodes ($\times -954770$), Epstein positive-trivial ($\times 9461$); the loop: supply $c_{\text{hat}} = 0.88$ GUE-consistent, demand R climbing to 1.24, headline $g(k=1) = 0.529$, $g(k=2) = 0.132$, $N_{\text{max}} = 0$ induction steps, IDEAL supply gives $1/R^2 = 0.655 < 1$; the Poisson circularity ward passes ($g_P = 0.296$; base case breaks 17.6%)); `v841_relation_carrier_ladder.py` (18/18 + 13/13, RELATION-CARRIER-EXISTS + EXCESS-NONNEGATIVE; probes `multiplicative_relation_probe.py` + `relation_corner_ladder_probe.py`: THE BREAKTHROUGH — the identification carrier EXISTS with the relational input: $\mu * 1 = \delta$ and $\Lambda = \mu * \log$ EXACT in the truncated convolution

frame; the four-comb discriminator exact (TRUE 0; s2s/ χ_4 0 — Selberg-class-correct blindness; the $h = 2$ Epstein $x^2 + 5y^2$ reads 200.0 on 24 class-group-obstruction sites, $21 = 3 \times 7$ first); ALL FOUR GATES pass incl. the self-consistency null (14/70 missing product relations, excess -0.297 vs 0 at truth); the amplitude wiring fixes L-safety AUTOMATICALLY (H2 reads 196/392/496 exact on the anchors); the EXCESS positive on all 67 rungs (min $+2.285$, max $+3.704$; scramble -1.224) while τ_X decays $5.98 \times 10^{-4} \rightarrow 1.71 \times 10^{-5}$; `v842_excess_certified_skeleton.py` (9/9, SKELETON-CERTIFIED; probe `excess_certified_skeleton_probe.py`: strictly positive certified interval enclosures of τ_X on ALL 67/67 rungs (widths 5.4×10^{-11} – 6.6×10^{-9} , three to five orders below the margin; `chol_cert` discipline; midpoints reproduce the float ladder at 4.9×10^{-13}); the $h = 2$ fake certified-NEGATIVE on every anchor ($-0.786/-1.100/-1.228$, exact rational Λ_F routing); the scaling law typed: width slope $+0.62$ vs margin slope -0.52 per α , horizon $\alpha^* \approx 9.1$ (mass $\sim 7.5 \times 10^7$) far beyond the ladder end 6.304 — certifiability not binding). Suite 829 $\rightarrow$ 835; all six run standalone green with v757-precedent pattern gates; all eleven probes re-run identically at promotion (2026-08-07); the two zero-side modules promoted VERBATIM with no downscoping (measured ~ 1.5 min each, v830/v831 runtime precedent).

- **Lean (1 module promoted).** `TfptCarrier/SectorPositiveDescent.lean` — the corner/descent core of the two hardest fronts, kernel-checked (lake build green, 3409 jobs, no `sorry`, no `native_decide`; imported in `TfptCarrier.lean`; `lean_manifest.sha256` regenerated with this round): corner compression by a hermitian idempotent is linear/idempotent/CP with the corner-trace split; descent towers with the measured-zero compatibility defect transport compatible positive families; entrywise limits of corner states are PSD (via `GramCompactness`); and the final theorem `sector_floor` passes `IdentificationPositivity` through as the SINGLE NAMED HYPOTHESIS — the kernel-checked logical geography of the wall: structural positivity proven, the identification datum deliberately NOT a theorem. Cited in v837’s part C (numeric witness mirror, v817 precedent).
- **The wall statement (the round’s deliverable).** The corner route’s perimeter is fully surveyed and CLOSED (register, tower levels, compressions, position carriers — four stop-list entries), the zero side is quantified (the demand SATURATES the GUE boundary structurally; the loop is SHORT: the wall conserves itself through the saturation), and the route REOPENS with the relational input: the identification carrier exists, the identified corner’s excess is positive on all 67 rungs, and the certified skeleton is strictly positive — the wall takes its sharpest form, $\tau_X = \lambda_{\min}(\text{structural}) + \text{EXCESS}$, and what remains is the INFINITE QUANTIFIER over strictly-positive certified enclosures: any future route must supply a UNIFORM lower bound on the excess margin, by the GUE-side findings a finer-than-statistical datum that no finite table settles. The bridge contract `PRIME.FLOOR.PAIRCORR.01` [O] unchanged. NO RH claim.
- **Ledger.** 6 new rows (`PRIME.CORNER.OPENDOORS.01`, `PRIME.CORNER.EXPECTATION.01`, `PRIME.FLOOR.BRIDGEMAP.01`, `PRIME.FLOOR.GUEABLATION.01`, `PRIME.RELATION.MULT.01` [O], `PRIME.RELATION.SKELETON.01` [O]) + the dated round-28 note on `PRIME.FLOOR.PAIRCORR.01` (the four closure coordinates complete; the saturation structural; the loop short; the relation route registered with the sharpened demand); 914 $\rightarrow$ 920 rows; NO marker moves (the closures are typed route decisions, the registrations OPEN [O], the zero-side modules necessary-side consistency).
- **Papers.** `tfpt_prime_front`: the new round section “The wall gets coordinates: the corner closure theorems, the GUE saturation, the relation carrier, and the certified skeleton” (all six `\veri`) + the part-intro chain extended; `tfpt_3`: six new audit cards + the round-28 follow-up notes on the floor-contract prose; `tfpt_research_contracts`: the round-28 note on the `PRIME.FLOOR.PAIRCORR.01` block + four new blocks (the corner-closure quantifier closed at registration, the bridge/saturation/loop evidence block, and the two OPEN registrations `PRIME.RELATION.MULT.01` / `PRIME.RELATION.SKELETON.01`).
- **Website.** Prime-front feed: the round entry “reflux round twenty-eight”; counters 829 $\rightarrow$

835 modules / v535–v842; generated surfaces regenerated (ScriptIndex, changelog.ts, maps); README and Zenodo updated to 835 modules / v842.

- **Scope.** The closure modules (v837/v838) are typed route decisions under frozen preregistered protocols (exact wards [E]-grade, float window legs typed); the zero-side modules (v839/v840) are necessary-side demand/supply mappings and instrument calibrations with every supply row carrying its conditionality tag (Montgomery RH-conditional — the scholarship correction is part of the frozen protocol); the relation modules (v841/v842) register an OPEN route — the carrier exists and the skeleton is certified, the positivity along the ladder remains UNPROVEN and is exactly the wall; NO marker moves; NO RH claim anywhere.

2026-08-07 (LXX) (reflux round twenty-seven — the two-route decision at the wall, and three exact corpus compressions: FIVE modules (v832–v836, from seven frozen probes; suite 824 → 829) — the corner route’s STRUCTURAL half closes weight-generically (the character-corner identity $T_{\text{GL1},X} = V^* e_{\text{GL1}} \pi(P_X) e_{\text{GL1}} V$ holds as polynomial algebra in free event weights with $\hat{c}_j = -1$ exact for all events; the Gaussian Hjelmslev CP tower $\mathbb{Z}[i]/(1+i)^m$, $m = 1..5$, is strictly projective at certified cb defect ZERO and carries the identity verbatim) — BUT identity and state corner are COMB-BLIND and the level- m motion is the pure register-dilution law 16^{1-m} : the arithmetic wall RELOCATES into the identification step and stays PRIME.FLOOR.PAIRCORR.01; the commutant SOS route is CLOSED DEFINITELY by exact rational certificates (unique trivial feasible point; forced $G = \text{diag}(1, -1, -1)$ with dual point $q(0, 1, 0) = -1$) — both routes stop-listed; plus the anchor affine normal form ($T(x) = 2x - 2$, the whole budget from ONE recursion), the flavor bidirectional checksum ($Ra = (4, 10, 13) / R^T a = (6, 18, 8)$, 1 of 12), the $(1+i)$ ramification ladder (four corpus roles = ONE object) and the PG(3, 2) flag normal form ($105 = 45 + 60$ as the $\text{Sp}(4, 2)$ -orbit split, the doily obstruction typed); NO marker moves; NO RH claim anywhere)

- **New modules (5).** v832_anchor_flavor_checksum.py (18/18 + 15/15, ANCHOR-AFFINE-EXACT + FLAVOR-BIDIR-CHECKSUM (selective); probes anchor_affine_probe.py + flavor_bidir_probe.py, promoted verbatim: the anchor power sums $p_n = 2 + 2^n$ obey $p_{n+1} = 2p_n - 2$ identically (sympy); $T(x) = 2x - 2$ has the UNIQUE fixed point $2 = |\mathbb{Z}_2|$ and the T -orbit of 4 is the compiler quintet (4, 6, 10, 18, 34), $p_0 = 3 = N_{\text{fam}}$ prepended — the whole budget from one recursion: $|R(E_8)| = p_1 p_2 p_3 = 240$, $\dim E_8 = 240 + q_3 = 248$ (ladder identity $p_4 - p_3 = p_3 - 2 = 8$), $h(E_8) = p_2 p_3 / 2 = 30$, $|R(D_5)| = 40$, $\Omega_{\text{adm}} = 48$, $10b_1 = 41$; the flavor matrix decodes the SAME anchor bidirectionally — $Ra = (4, 10, 13) = (p_1, p_3, N(3+2i))$, $R^T a = (6, 18, 8) = (p_2, p_4, p_3 - 2)$; of the 12 down-row candidates exactly ONE (the accepted (1, 5, 2)) passes the full identity set, the new one-number kill being the anchor contraction $(Ra)_2 = 10 = p_3$ (siblings: 11, 12); controls fire incl. the sibling reproducing tfpt_2’s failure numbers verbatim); v833_gaussian_ramification_ladder.py (33/33, RAMIFICATION-LADDER-EXACT; probe gaussian_ramification_probe.py: the four documented roles of $\pi_2 = 1+i$ re-certified from scratch as ONE ladder — norm doubling $((1+J)^T(1+J) = 2I_8$ exact, zero class empty 0/240, $240 = 15 \times 16$, elementary divisors $(1^4, 2^4)$), the 4-bit address (deck trivial), the non-split jet $(\mathbb{Z}[i]/(2) \cong \mathbb{F}_2[\epsilon]/(\epsilon^2)$ unique among 24 bijections, deck $= 1+\epsilon$, exactly 0/65536 deck-equivariant sections, the 120 root pairs the $q=1$ shell), and the metaplectic lift $(\zeta_8 = (1+i)/\sqrt{2})$, $(SH)^3 = \zeta_8 I$, $(T_3 K_3)^3 = iI =$ the deck; exact $\mathbb{Z}[\zeta_8]$ BFS census $|C_2/\mu_8| = 11520$, ZERO Galois-mixed classes, $C_2 = K \sqcup \zeta_8 K$, $\chi(H \otimes I) = 1$ the RM–CSS phase bit); controls: the split ring admits 0 isos, the split extension splits 65536/65536); v834_pg32_flag_completion.py (26/26, PG32-FLAGS-EXACT + INCIDENCE-SPLIT; probe pg32_flag_completion_probe.py: $\binom{4}{2}_2 = 35$, $140 = 35 + 105$, $105 = 35 \times 3$ flags $\cong$ point pairs; the RM layer rebuilt as set equalities ($[15, 10, 4]$ enumerator exact, Grams $22I + 6J / 6I + J / 28I + 7J$); the vacuum coordinate is ORIGIN RESTORATION; the kill typed as a

split: $105 = 45 + 60$ is the $\mathrm{Sp}(4, 2)$ -ORBIT decomposition on both sides (720 brute force), the polarity dictionary on the 60 non-isotropic rungs is bijective/equivariant/incidence-preserving, the 45 doily rungs are obstructed ($(t+U) \cap U = \emptyset$ 45/45, flag Gram $18I+3J \neq 22I+6J$) — “105 checks = 105 flags” is a deck-equivariant bijection, NOT an incidence isomorphism (the typed reason the v822 dilation died)); v835_corner_hjelmslev_tower.py (21/21 + 20/20, CORNER-IDENTITY-SYMBOLIC + HJELMSLEV-STRUCTURE-ONLY; probes character_corner_probe.py + hjelmslev_cp_tower_probe.py: the corner identity holds as POLYNOMIAL ALGEBRA in free event weights (symbolic toy leg exact; all 3 deployed windows on two independent code paths); the entire equality step consumes ONE piece of arithmetic — the glue identity $\sum_m \Theta_m = 240\sigma_3$ + the uniform H^* mass — forcing $\hat{c}_j = -1$ EXACTLY for all 136 events (exact group-algebra Fourier, 128-dim register); honest scope: the identity-carrying object is NOT positive (1 of 12 sectors PSD), the positive GNS corner is NOT τ_X , and the scramble proves identity + state corner COMB-BLIND while the lock data moves ($\tau = +5.98 \times 10^{-4} \rightarrow -3.51$); the Hjelmslev ladder $m = 1.5$ carries exact counts $15 \cdot 8^{m-1}/35 \cdot 16^{m-1}/105 \cdot 32^{m-1}$, strictly projective CP channels (certified cb defect identically ZERO), level-exact $\hat{c}^{(m)} = -1$, fence silent — but H5 decides AGAINST identification: the level- m corner is comb-blind with pure dilution 16^{1-m} (ratio 0.0625 exactly); the one live door: position-dependent Kraus data on the level- m flags — register-side dressings provably cannot carry it (hjelmslev_position_kraus_probe.py, POSITION-KRAUS-TRADEOFF, 13/13, probe-level, cited in the provenance)); v836_commutant_sos_closure.py (29/29, COMMUTANT-SOS-INFEASIBLE; probe commutant_sos_probe.py, the declared SPEC v1→v2 witness-triple repair documented: the degree-2 SOS ansatz over the canonical five-dim abelian subalgebra $\{\Pi_A(0), \Pi_A(1), \Pi_A(4), \Pi_A(7), \Pi_A(9)\}$ of the 39-dim commutant is closed DEFINITELY — (a) the exact reduction lemma collapses the SDP (4 blocks S_+^5 , 60 unknowns, 85 constraints) to a rational LP with the TRIVIAL diagonal rewriting as unique feasible point (Vandermonde kernel $\{0\}$): no cross-sector positive transfer; (b) the rank-3 det form has signature (1, 2) ($\det S = t^2 - x^2 - y^2$, compiler null vector $q(5, -3, 4) = 0$), coefficient matching FORCES $G = \mathrm{diag}(1, -1, -1)$ (not PSD) with the rational dual certificate $q(0, 1, 0) = -1 < 0$, and q -negative directions are achievable even on the nonneg cone (832/2799 truncation cuts); FENCE-CLEAN on the algebra layer, FENCE-HIT on the positivity branch — the nontrivial version is pair-correlation substance; controls fire (comb-specific identification, the v815 sector pattern, wrong-ratio inconsistency)). Suite 824 → 829; all five run standalone green and encode their frozen patterns per the v757 precedent; all seven probes (plus the position-Kraus companion) re-run identically at promotion (2026-08-07).

- **The wall statement (the round’s deliverable).** Both corner-era routes are DECIDED: the corner route delivers everything structural (identity, projector, strictly projective CP tower, level-exactness) and shows the structure is placement-blind — the arithmetic lives entirely in the IDENTIFICATION step (a positive P_{lock} whose corner IS the deployed window form); the SOS route shows no positive algebraic rearrangement can manufacture the floor. The wall stays exactly PRIME.FLOOR.PAIRCORR.01 [O], relocated into identification, with both routes stop-listed per house discipline. NO RH claim.
- **Ledger.** 5 new rows (ANCHOR.AFFINE.01, GAUSSIAN.RAMLADDER.01, PG32.FLAGS.01, PRIME.CORNER.CHARACTER.01, PRIME.COMMUTANT.SOS.01) + the dated round-27 two-route note on PRIME.FLOOR.PAIRCORR.01 (corner structural half closed / wall relocated; SOS closed with the rational dual certificate; both stop-list entries; the position-Kraus trade-off finding); 909 → 914 rows; NO marker moves (the compressions are normal forms of existing corpus surfaces; the corner/SOS results are typed route decisions).
- **Papers.** tfpt_1: the anchor affine normal form keybox (Theorem 8) + the affine pointer in the anchor-first refinement + the $(1+i)$ ramification-ladder entry in the Gaussian code keybox ($\backslash\mathrm{veri}\{v832\}$, $\backslash\mathrm{veri}\{v833\}$); tfpt_2: the bidirectional anchor checksum keybox after the spectral-selector block ($\backslash\mathrm{veri}\{v832\}$); tfpt_prime_front: the new round section “The two-route decision at the wall” ($\backslash\mathrm{veri}\{v834/v835/v836\}$)

+ the part-intro chain extended; `tfpt_3`: five new audit blocks + the round-27 follow-up notes on the floor-contract prose; `tfpt_research_contracts`: the `PRIME.CORNER.CHARACTER.01/PRIME.HJELMSLEV.CPTOWER.01` and `PRIME.COMMUTANT.SOS.01` registration blocks + the dated round-27 note on the `PRIME.FLOOR.PAIRCORR.01` block; `note_e8_gaussian_code`: a dated pointer to the ramification ladder in the machine-verification section.

- **Website.** Prime-front feed: the round entry “reflux round twenty-seven”; counters $824 \rightarrow 829$ modules / `v535–v836`; generated surfaces regenerated (`ScriptIndex`, `changelog.ts`, `maps`); `README` and `Zenodo` updated to 829 modules / `v836`.
- **Scope.** The three compressions (`v832–v834`) are exact-arithmetic normal forms of existing corpus tables — compressions, not new claims; the corner/Hjlemslev/SOS results are typed route decisions under frozen preregistered protocols (exact wards `[E]`-grade, float window legs typed, the honest scope measured); the queued Lean follow-up (`SectorPositiveDescent.lean`) stays queued; NO marker moves; NO RH claim anywhere.

2026-08-07 (LXIX) (reflux round twenty-six — the typed circularity boundary: ONE module (`v831`, from one frozen probe; suite $823 \rightarrow 824$) — the correlation-corrected alias second moment is EXACT (sympy-proven bilinear form $\tau = (S_2 - S_c)/2 - S_s^2/(4P_0) + O(P_0^{-2})$, identity-warded on all 73 battery frames), the round-25 premise “the phases carry the gap” is OVERTURNED (the AMPLITUDES carry it: the tower law decomposes exactly as $-2.505 = -3.172$ amplitude law + 0.668 fading alignment), the exact Guinand split puts the coherent sum in the prime-comb fluctuation at $0.01 \times$ the Poisson square-root scale (smooth -994 / fluctuation $+995$, each $\sim 1000 \times$ the residual, cancelling; the comb scramble explodes it $10^6 \times$ — THE CANCELLATION IS THE ARITHMETIC) — and the analytic-envelope route of `PRIME.FLOOR.RATIO.01` is CLOSED HONESTLY at its typed circularity boundary: by Guinand the comb’s self-cancellation IS the zero-side floor statement itself, the required control is even deeper than Montgomery-type pair-correlation input, the envelope’s constant is arithmetic substance equivalent to the target — stop-list entry, no further analytic-envelope variants; the demand moves to the NEW bridge contract `PRIME.FLOOR.PAIRCORR.01` [O]; NO marker moves; NO RH claim anywhere)

- **New module (1).** `v831_prime_alias_second_moment.py` (15 checks with the SEVEN preregistered-honest premise-overturning FAILs `S1.SIGN/W2B/W2C/W2D/S4.GEOM/C1/C2` pattern-gated — the FAIL pattern IS the finding; verdict `ALIAS-CORRELATION-PAIRCORR`; discovery probe `prime_alias_second_moment_probe.py`, 2026-08-07, re-run identically at promotion; promoted VERBATIM with NO downscoping — measured runtime ~ 0.1 min in-tree, the zero list is the `v823` cache + vectorized RS scan): the EXACT BILINEAR FORM (sympy-proven, S_0 3/3): in the pole frame the zeros+pole gram is exactly $M_2 = [[P_0 + (S_2 + S_c)/2, S_s/2], [S_s/2, (S_2 - S_c)/2]]$ with $\tau = (S_2 - S_c)/2 - S_s^2/(4P_0) + O(P_0^{-2})$ — the correlation combination at the leading term is the coherent phase sum S_c (rotation-invariance ward at the conditioning-aware machine bar on all 73 frames, truncated-series dev 3.8×10^{-7}); THE PREMISE OVERTURNED: the diagonal (random-phase) part $\tau_{\text{diag}} = S_2/2$ slopes -3.172 not -1 (W2B), phase scramble -3.054 (W2C), Poissonized zeros -3.654 with q_{poiss} median $0.34 > 0.5 q_{\text{true}}$ (W2D), and $q = S_c/S_2$ changes sign across the battery ($[-0.324, 0.552]$, median 0.19 ; deep $M = 1632$ suppression only $\times 1.1$) — the full tower -2.505 (R^2 0.98, W2A PASS) decomposes EXACTLY as amplitude law -3.172 + fading alignment $+0.668$; THE GUINAND SPLIT (exact, identity-route residue 0.019 , soft bar met): $G_Z = (B - S_p - P) + (S_p - S)$ gives smooth share -994.15 / prime-fluctuation share $+995.15$, cancelling to $|S_c^{\text{fluc}}|/\sigma_{\text{sqr}} = 0.01$ (SQRT-CANCELLATION REGIME); the smooth surrogate does NOT carry it (`S4.GEOM` 0.868,

deficit-slope dev 2.274); comb scramble explodes the coherent sum $\times 2.0 \times 10^6 - 1.7 \times 10^7$, the Epstein $x^2 + 5y^2$ comb $\times 5.1 \times 10^3 - 1.3 \times 10^4$ — comb-specific arithmetic; THE TYPED CIRCULARITY BOUNDARY: proving the tower τ -law requires bounding an oscillatory prime sum AT its square-root scale = variance-type, pair-correlation-equivalent substance (Montgomery-type on the zero side by the explicit formula), and by Guinand the comb’s self-cancellation IS the zero-side floor statement itself. Suite 823 $\rightarrow$ 824; standalone green with the v757-precedent pattern gate.

- **Contracts.** NEW: **PRIME.FLOOR.PAIRCORR.01 [O]** — the floor $\leftrightarrow$ pair-correlation bridge: the floor’s envelope constant is Guinand-EQUIVALENT to the zero-side floor statement; demands typed in both directions (FORWARD: an unconditional variance-type bound $|\text{aniso}(S_p - S)| \leq C\sigma_{\text{sqrt}}$ uniform in h with the pair-correlation-grade entry point DECLARED — no hidden circularity; BACKWARD: instrument calibration of floor margins into effective pair-correlation statements, never a theorem about zeros); KILL: fluctuation share collapsing below 0.6 while the suppression persists, or the scale ratio rising systematically above 3 (one-point regime — the boundary mis-typed, the route reopens on PNT-grade input); CLOSE: the forward demand delivered with its entry point named; explicitly does NOT promise an unconditional proof (the proving direction contains pair-correlation-grade arithmetic, fenced). **PRIME.FLOOR.RATIO.01 [O] ANALYTIC-ENVELOPE ROUTE CLOSED** (dated closure note): the round-25 alias-phase blocker resolves INTO the typed boundary; NO further analytic-envelope variants (STOP-LIST entry per house discipline); kill criteria unchanged, still [O], promotion fenced.
- **Ledger.** 2 new rows (PRIME.FLOOR.ALIASMOMENT.01 + the contract row PRIME.FLOOR.PAIRCORR.01) + the dated round-26 closure note on PRIME.FLOOR.RATIO.01; 907 $\rightarrow$ 909 rows; NO marker moves (the bilinear form and its expansion sympy-proven [E]-grade wards; the overturned premise and the sqrt-scale cancellation measured; the contracts [O]).
- **Papers.** `tfpt_prime_front`: the new round section “The typed circularity boundary: the analytic-envelope route closes, and the floor–pair-correlation bridge is named” (`\veri{v831}`); `tfpt_3`: one new audit block + the round-26 follow-up notes on the floor-contract prose; `tfpt_research_contracts`: the PRIME.FLOOR.PAIRCORR.01 registration block, the dated closure note on PRIME.FLOOR.RATIO.01, and the typed-blocker note on the depth-kill/budget block.
- **Website.** Prime-front feed: the round entry “reflux round twenty-six”; counters 823 $\rightarrow$ 824 modules / v535–v831; generated surfaces regenerated (ScriptIndex, changelog.ts, maps); README and Zenodo updated to 824 modules / v831.
- **Scope.** The bilinear form, its $1/P_0$ expansion and the det identity are sympy-proven [E]-grade wards; the overturned premise, the exact Guinand split shares, the sqrt-scale ratio and the comb-scramble/Epstein fingerprints are measured finite-level evidence on the frozen battery; the seven FAILs are preregistered-honest adjudications on record (the FAIL pattern IS the finding, pattern-gated); the boundary is a TYPED BOUNDARY, not a theorem — the route closure is a discipline statement, not a positivity result; NO marker moves; NO RH claim anywhere.

2026-08-07 (LXVIII) (reflux round twenty-five — the exclusion detector and the depth kill: SIX modules (v825–v830, from eleven frozen probes; suite 817 $\rightarrow$ 823) — the verified PSD rungs of the GL1 prime-comb tower become a hash-preregistered *window detector*: certified exclusion regions with rigorous Cholesky/Higham + witness-Rayleigh certificates to $X = 24.81$, a zero locator validated OUT-OF-SAMPLE on a disjoint untouched window (83% detection, 0% false positives, precision 0.086), and the capstone comb-native window verification whose census reconciles against the Riemann–von Mangoldt count ($21+4$ typed misses = 25 = cache = RvM; new deepest certified rung $X = 25.5$, comb cap 1.2×10^{11}) — registered as the new contract **PRIME.DETECTOR.WINDOW.01 [O]**; and the **PRIME.FLOOR.RATIO.01**

kill gates, played at full sieve depth, SURVIVE with growing margins while the $\alpha^* \approx 11$ horizon falls as a float-convention artifact (citation grade to $\alpha = 12.75$; envelope certified-explicit $\rho \geq 4.335 h^{-3/2}$ on 73/73; the alias-phase proof blocker named) — every statement typed strictly weaker than classical verification; NO marker moves; NO RH claim anywhere)

- **New modules (6).** `v825_prime_exclusion_ladder.py` (26/26 + 21/21, LADDER-EXTENDED + SATURATION-TYPED: every verified PSD rung of the GL1 tower ($D = 1/64$) carries a rigorous $\lambda_{\min} > 0$ certificate — Cholesky PD verification with the Higham backward-error bound plus a Rayleigh-residual enclosure, e.g. $\lambda_{\min}(X=24.81) = 1.078 \times 10^{-6} \geq 9.70 \times 10^{-7}$ CERTIFIED — and is inverted through the tent-read Guinand identity into quadruple-exclusion regions $\{1/2 \pm \delta \pm i\gamma\}$ on the frozen rank-4 battery, every published boundary point re-proved by a witness-Rayleigh certificate; the census threshold $\Xi_{\text{eff}} = X \delta_{\text{mb}}$ falls $0.639 \rightarrow 0.457 \rightarrow 0.274 \rightarrow 0.218$ and PLATEAUS at $0.218 \pm 3\%$ (gates recomputed from the frozen deep series; mechanism SUPPORT-ACTIVE-BUT-X-STALLED: support slope -0.68 , rank-12 gain growing $19.3 \rightarrow 25.0\%$ below the 30% bar); multi-zero double injection breaks without interference rescue; honest reach typed: Nyquist $\pi/D = 201$, region INSIDE the Platt-Trudgian strip — consistency re-derivation, not new territory); `v826_prime_exclusion_battery2.py` (16/16 + 13/13, FLOOR-LOWERED + RANGE-DECIDES-DECLINE: battery v2 designed a priori from instrument diagnostics only and SHA-256-hashed `fd39fb42..` BEFORE any evaluation (no zero datum; $v1 \subset v2$, pointwise dominance live-verified); old-grid floor ≤ 0.0979 with the grid-censoring caveat typed; the measurement-range extension (exact-subset grid, bit-for-bit ward) UNCENSORS the series $0.1066/0.0982/0.0960/0.0913/0.0816$ at slope -1.39 — the v825 plateau was the instrument, not the tower; benchmark $\delta \geq 10^{-3}$ at $X^* = 81.6$ (extrapolation, typed); side-finding: rank correlation -0.872 of the uncensored boundaries with the distance to the nearest true ordinate, hash-verified non-circular); `v827_prime_zero_locator.py` (the ONE preregistered-honest C3 FAIL + 13/13, LOCATOR-NUL + LOCATOR-V2-RESOLVES: the width profile $W(\gamma)$ PEAKS at true ordinates (explicit-formula redundancy: a real zero makes the injected quadruple redundant, the boundary rises); $v1$ honestly failed its frozen gates (12/13 peaks but 61% false peaks at $\ln 1.5$) — on record; the post-hoc separation (matched ≥ 0.82 , false ≤ 0.73) froze $\ln 2.2$ for $v2$, preregistered `f57a2e7f..` BEFORE any test evaluation; out-of-sample on the disjoint window $[60, 120]$: $20/24 = 83\%$ detection, 0% false positives, precision 0.086, all four controls (scramble/Epstein no peaks, shifted null below the structural re-lock ceiling, grid refinement 7/7 stable); depth law $54 \rightarrow 62 \rightarrow 83\%$); `v828_prime_comb_window.py` (12/12, COMB-VERIFIES-WINDOW, the capstone: on $\gamma \in (60, 120]$ at $X = 24.8125$ ONE certified positivity object yields location (21/25 ordinates to ± 0.25 , max error 0.242, ZERO unmatched peaks), exclusion ($\delta \geq \delta_{\text{mb}}(\gamma)$ pointwise, uniform bound 0.0496, witness-certified at six frozen samples) and the census (21+4 typed misses = 25 = cached verified count = rounded RvM main term $25.237 \rightarrow 25$); miss autopsy complete (1 pair-merge below the grid resolution +3 prominence-limited; the depth-recovery prediction at the NEW deepest certified rung $X = 25.5$, $\lambda_{\min} = 8.07 \times 10^{-7} \geq 7.26 \times 10^{-7}$ CERTIFIED, verified as typed: $0/3 + 0/1$); the scramble fails ALL THREE axes; WEAKER-THAN-CLASSICAL typing mandatory and carried verbatim: Turing proves $N(T)$ and $\delta = 0$ exactly, the comb leaves a δ_{mb} -strip unresolved and can never close it at exponential comb cost — a necessary-side consistency demonstration; does NOT bear on RH); `v829_prime_floor_depth.py` (16/17 with the ONE preregistered-honest S5.HLAW FAIL + 12/12, ENVELOPE-HOLDS-DEEP + FAMILY-SCALES: the PRIME.FLOOR.RATIO.01 kill gates K1 ($\rho h^{3/2} \geq c = 4.85$, NO refit) and K2 ($\cos^2 \theta \geq 1/2$) played at $X = 18.375\text{--}25.5$ on uniform-grid tower frames whose $h = 588\text{--}816$ sit INSIDE the deployed h -range while the depth doubles — the test decouples depth from dimension — and SURVIVED: margins $\times 5.76/6.24/6.53/7.16/8.17/8.92$ growing monotonically, $\min \cos^2 \theta = 0.849$, non-decay +0.060 per log-unit (the h -law wins); the typed miss: the single pair collapses (gap $40\times \rightarrow 673\times$) and the certified top-100 family takes over (0.977–0.981 of the floor, ρ_{certfam} within 2%); α -coverage typed: citation grade only $\alpha \in \{9.19, 10.36, 11.05\}$ — exactly the v830 blocker); `v830_prime_float_budget.py` (10/10 + 19 checks with the FIVE

preregistered-honest asymptotic FAILs A7/A8/A9/A10/S2.EXP, BUDGET-LINEAR-CLOSES-ALL + ENVELOPE-ASYMPTOTIC-PARTIAL: the deployed quadratic float convention $100 \varepsilon \|A_2\|_F^2$ was four orders above the true tail term at depth; the explicit Higham-linear chain (compensated banded accumulation with TwoSum, $N_{\text{SUB}} = 2^{16}$; the irreducible atom-position term $\varepsilon X/D$; exact fsum dots; dps-40 spot anchors with $\times 10$ caps) is $7 \times -171 \times$ tighter and closes the citation-grade family gate 6/6 (old: 3/6) — citation grade extends to $\alpha = 12.75$, FULL SIEVE DEPTH; CONVENTION NOTE: the deployed v818 convention stays FROZEN in the existing suite, the linear budget is registered as convention for NEW modules only; the analytic part runs near-verbatim: family closed form exact on ALL 73 battery frames (3.6×10^{-11}), sympy-proven limit algebra, phase conspiracy excluded (dip floor 0.170), and THE EXPLICIT CERTIFIED ENVELOPE $\rho \geq \rho_{\text{certfam}} \geq 4.335 h^{-3/2}$ on 73/73, non-decaying; the proof blocker typed: alias phase correlations — random-phase predicts $\tau \sim h^{-1}$, the tower measures $h^{-2.5}$ — the envelope stands certified-explicit, not proven). Suite 817 $\rightarrow$ 823; all six run standalone green and encode their frozen patterns (incl. the expected-FAIL patterns) per the v757 precedent; all eleven probes re-run identically at promotion (2026-08-07); the deep sieves (to 1.2×10^{11} , ~ 17 – 25 min per probe) are downscoped in the suite modules to fast live sub-ladders at $X \leq 18.375$ with the full-depth numbers recorded as frozen reference constants and every decision gate RECOMPUTED from them — predeclared in each module’s PROVENANCE.

- **Contracts.** NEW: **PRIME.DETECTOR.WINDOW.01 [O]** — the comb-native window detector (location + exclusion + census, hash-warded end to end, validated out-of-sample); OPEN: the depth-to-width law as theorem, the completeness mechanism, window extension beyond Nyquist (explicitly NOT promised); KILL: out-of-sample detection $< 40\%$ on a deeper certified rung, a census contradiction on any PD-certified window, or a false positive surviving the grid-refinement ward; mandatory weaker-than-classical typing carried by every module of the strand. **PRIME.FLOOR.RATIO.01 [O] DEPTH-HARDENED** (dated contract-text update): kill gates played at the contract’s own preregistration and survived at $X = 25.5$; the round-24 $\alpha^* \approx 11$ horizon REMOVED as a float-convention artifact (citation grade to $\alpha = 12.75$; deployed v818 budget convention unchanged, the Higham-linear budget is convention for NEW modules only); the envelope now certified-explicit ($c_{\text{cert}} = 4.335 h^{-3/2}$ on 73/73); the remaining proof blocker NAMED (alias phase correlations, random-phase h^{-1} vs tower $h^{-2.5}$); kill criteria unchanged, still [O], promotion fenced.
- **Ledger.** 7 new rows (PRIME.EXCLUSION.LADDER.01, PRIME.EXCLUSION.BATTERY2.01, PRIME.EXCLUSION.LOCATOR.01, PRIME.EXCLUSION.WINDOW.01, PRIME.FLOOR.DEPTHKILL.01, PRIME.FLOOR.BUDGET.01 + the contract row PRIME.DETECTOR.WINDOW.01) + the dated depth-hardening update on PRIME.FLOOR.RATIO.01; 900 $\rightarrow$ 907 rows; NO marker moves anywhere (certificates and preregistration hashes [E]-grade wards; exclusion maps, locator scores, envelope constants measured; the contracts [O]).
- **Papers.** **tfpt_prime_front**: the new round section “The exclusion detector: the certified ladder becomes a window-verification instrument, and the floor survives its kill gates at full sieve depth” (all six \code{veri} citations; the weaker-than-classical typing carried in the body); **tfpt_3**: six new audit blocks + the two round-25 follow-up notes on the floor-contract prose; **tfpt_research_contracts**: the PRIME.DETECTOR.WINDOW.01 registration, the depth-kill/budget registration block, and the dated PRIME.FLOOR.RATIO.01 note.
- **Website.** Prime-front feed: the round entry “reflux round twenty-five”; counters 817 $\rightarrow$ 823 modules / v535–v830; generated surfaces regenerated (ScriptIndex, changelog.ts, maps); README and Zenodo updated to 823 modules / v830.
- **Scope.** The certificates (Cholesky/Higham, witness-Rayleigh, preregistration hashes, sympy algebra, dps-40 anchors) are [E]-grade machine wards at float precision; the exclusion maps, locator scores, envelope margins and closure constants are measured finite-level evidence on frozen instruments; the honest negatives (LOCATOR-NULL, the S5.HLAW single-pair collapse,

the five asymptotic FAILs of the analytic envelope) are preregistered adjudications on record; the mandatory typing is everywhere: locations to ± 0.25 and exclusions to $\delta \geq \delta_{\text{mb}}$ are strictly weaker than classical verification, every verified window lies inside the Platt–Trudgian strip, and the strand is necessary-side evidence — NO marker moves; NO RH claim anywhere.

2026-08-06 (LXVII) (reflux round twenty-four — the floor-theorem skeleton: TWO modules (v823–v824, from four frozen probes; suite 815 $\rightarrow$ 817) — the sector floor $\det \hat{A}_2 = \lambda\tau$ becomes an EXACT machine-verified sum of squares over zero+pole rank-one carriers (Lagrange identity), the fixed pair (pole $\times \gamma_1$) is certified strictly positive on all 14 rungs with the budget tightened ~ 10 orders by the psd-remainder monotonicity chain, and the three-piece uniform certified lower-bound skeleton closes at CITATION grade for all h at the deployed α up to the validity horizon $\alpha^* \approx 11$ — PRIME.FLOOR.RATIO.01 stays [O], NARROWED: the floor bound is battery-relative and α -bounded, necessary-side only, NO RH claim)

- **New modules (2).** v823_prime_lagrange_floor.py (7/8 with the ONE preregistered-honest old-budget FAIL S3.CERT + 9/9, LAGRANGE-CONCENTRATED + PAIR-CERTIFIED: every per-zero layer of the v692 master identity is EXACTLY rank-one — the odd-extension symmetry factors the common phase, $v_\gamma = 2\sqrt{w(\gamma)}(S_1, S_2)$ with the real closed form $S_i(\phi) = \sum_j t_{ij} \sin((h-j-\frac{1}{2})\phi)$ and the alias weight $w(\gamma) = D \text{csinc}^2(\gamma D/2) \geq 0$ (layer dev $\leq 1.2 \times 10^{-16}$, pole rank-one $\leq 4.8 \times 10^{-17}$); the LAGRANGE IDENTITY $\det(G_Z + P) = \sum_{\text{pairs}} w_i w_j (a_i b_j - a_j b_i)^2$ holds at machine precision on all 14 rungs (ward $\leq 1.4 \times 10^{-9}$); the POLE is the universal non-collinear leg (the pole family carries 1.0000 of the pair total, every top-100 pair is pole $\times$ zero) and the moving zero leg obeys the ALIAS-COMB LAW (median comb distance 0.0007–0.0061 vs uniform 0.25); A0 typed honestly: the atom-side rank-one framing FAILS as frozen ($0.10-0.23 < 0.5$) — the exact SOS realization lives on the zero+pole side; THE ROUTE CHANGE: $R = \hat{A}_2 - G_Z - P$ is an exact float 2×2 with $\lambda_{\min}(R) = 1.6 \times 10^{-7} - 2.8 \times 10^{-6} \geq \text{margin}$ verified per rung, and the 2×2 psd fact $\det(B+R) \geq \det B$ ELIMINATES the tail estimate from the chain — BUD $0.14-7.1 \rightarrow 2.4 \times 10^{-12} - 2.7 \times 10^{-9}$, median 9.8 ORDERS tightened; the certified interval $X^2(\text{pole}, \gamma_1) - \text{BUD}$ is strictly positive on 14/14 (γ_1 pinned to **zetazero(1)** within 10^{-11} ; dps-40 mpmath ward inside the interval); the fixed pair carries 0.0063–0.5832 of the floor with slope $h^{+1.06}$ — a GROWING brick; controls fire (scramble $\times 45.8-49.0$, Epstein $\times 1784-50029$ at det scale, collinear $\det = 9.2 \times 10^{-16}$ with interval containing 0)); v824_prime_floor_skeleton.py (12/12 + 9/9, FLOOR-PARTIAL + TAIL-CLOSED-ALL-H: PIECE 2 UNIFORM-VERIFIED — the ANALYTIC $h \rightarrow \infty$ limit $X_\infty(\alpha) = 16\alpha\pi^2 \sin(\alpha\gamma_1) \sinh(\alpha/2)$ [bracket] (Dirichlet closed form = direct sum at 5.7×10^{-13} , pipeline 8.5×10^{-13} , ZERO sign flips over 14 $\alpha \times 10$ synthetic h ; the explicit bound $L(h) = X_\infty^2(\alpha)(1 - C(\alpha)/h)$ for $h > h_0(\alpha) = C(\alpha) \leq 499.6$; honest limitation: 25 α -NODES of $\sin(\alpha\gamma_1)$ on $[2, 12]$ — h -uniform per α , NOT ladder-uniform in α); PIECE 3 UNIFORM-VERIFIED — FAMILY EXHAUSTION: the certified top-100 (pole $\times$ zero) family carries median 0.952 (min 0.931, max 0.974) of the floor, all carriers on-line by verified computation ($\leq 2 \times 10^4$); the residue 0.015–0.049 with trend slope $+0.010$ (truncation depth, not a structural carrier); the analytic family limit stays positive across ALL fixed-pair nodes (min 1.62×10^{-4} at $\alpha = 2.68$) — the family never dies simultaneously; PIECE 1 CLOSED BY THE TAIL REPAIR: the crude coherence-discarding envelope closes only 4/14 ($h \leq 434$; the autopsy names the coherence discard — measured band slack $\times 2.7 \times 10^3 - 2.4 \times 10^5$); the PRODUCT-SUP envelope (exact Dirichlet closed form, grid-converged with doubling ward; the rigorous Lipschitz certificate of the sup is a NAMED elementary step, typed not claimed) + Abel summation against RvM counting with EXPLICIT unconditional Trudgian-grade constants (factor 2.13; the Vinogradov–Korobov region typed honestly USELESS, 0.985) closes ALL 14 rungs at the FIXED verified horizon $T_{\text{ver}} = 3 \times 10^{12}$ with margins 10^3-10^6 (the secondary top-100 family gate closes 14/14 too); THE LAW CHANGE: $\log h$ coefficient $+1.98 \rightarrow +0.13$ — the $h e^\alpha$ growth

was an ARTIFACT of the coherence discard, the sharpened law is h -FREE at fixed α ; remaining growth α -only ($q = +1.79$, the off-line allowance $e^{2\alpha\delta}$ of the critical strip), re-crossing X_∞^2 near $\alpha^* \approx 11.2$ — far beyond the deployed battery ($\alpha \leq 6.146$) but finite and honestly typed; controls fire (synthetic off-line pairs break the psd chain 4/4 exactly at the off-line locus AND stay inside both envelopes; the scramble kills the family structure; the regression ward reproduces the old $\{184, 210, 218, 434\}$ closure boundary)). Suite 815 $\rightarrow$ 817; both run standalone green and encode their frozen patterns per the v757 precedent; all four probes re-run identically at promotion.

- **The net floor statement (the round’s deliverable, verbatim honesty).** On every rung of the deployed 14-rung battery, $\lambda\tau = \det \hat{A}_2 \geq X^2(\text{pole}, \gamma_1) - \text{pert}(h) > 0$ at CITATION grade — no per-rung eigencheck, no zero-location input beyond the critical strip; inputs: the strip, verified on-line zeros to $T_{\text{ver}} = 3 \times 10^{12}$ (Platt–Trudgian, cited), RvM counting with explicit unconditional constants (cited), the analytic pair limit, the product-sup per-zero envelope. The complete three-piece skeleton: exact SOS identity [E-grade wards] + analytic fixed-pair bound (h -uniform per deployed α) + certified 0.93–0.97 family exhaustion + psd remainder closed for all h up to $\alpha^* \approx 11$. This is NECESSARY-side evidence on a frozen battery — NOT RH; the floor bound is battery-relative and α -bounded.
- **Contracts.** NEW: PRIME.FLOOR.LAGRANGE.01 (the exact Lagrange SOS identity + the pair certification) and PRIME.FLOOR.SKELETON.01 (the three-piece skeleton + the all- h tail closure). PRIME.FLOOR.RATIO.01 [O] NARROWED (dated contract-text update): WHAT IS NOW CLOSED — the deployed-battery skeleton at citation grade (exact SOS, analytic fixed-pair bound with explicit $h_0(\alpha) \leq 500$, certified family exhaustion, h -free psd closure at T_{ver}); WHAT REMAINS — (i) $\alpha > \alpha^* \approx 11.2$ needs verified on-line DEPTH beyond T_{ver} (never location), (ii) the family version of the analytic bound at the $\sin(\alpha\gamma_1)$ nodes, (iii) the product-sup Lipschitz certificate (named elementary step), (iv) the V_∞ positivity itself — the $O(1)$ capture and the $\rho > 0$ demand at infinity remain the contract; kill criteria unchanged; promotion of any ρ bound stays FENCED.
- **Ledger.** 2 new rows (PRIME.FLOOR.LAGRANGE.01, PRIME.FLOOR.SKELETON.01) + the dated narrowing update on PRIME.FLOOR.RATIO.01; 898 $\rightarrow$ 900 rows; NO marker moves ([O] stays [O]; exact identities [E]-grade wards, certified intervals and shares measured/[C] per the ledger fine-typing).
- **Papers.** `tfpt_prime_front`: the new round section “The floor-theorem skeleton: the floor as an exact sum of squares, and the tail closed for all h ” (both `\veri` citations); `tfpt_research_contracts`: the two registrations + the PRIME.FLOOR.RATIO.01 narrowing note.
- **Website.** Prime-front feed: the round entry “reflux round twenty-four”; counters 815 $\rightarrow$ 817 modules / v535–v824; generated surfaces regenerated (ScriptIndex, changelog.ts, maps); README and Zenodo updated to 817 modules / v824.
- **Scope.** The exact identity layer (rank-one factorization, Lagrange SOS) carries identity-grade machine wards at float precision; the certified intervals, shares and closure margins are measured finite-level evidence; the citation-grade chain uses ONLY the critical strip + cited verified depth + cited explicit RvM constants — no zero-location input, no RH-strength assumption; the honest boundaries (battery-relative, α -bounded, the α -nodes, the named sup certificate) are typed in the modules and the contract; NO marker moves; NO RH claim anywhere.

2026-08-06 (LXVI) (reflux round twenty-three — one inequality: the floor reduces to the prime comb against its own density: NINE modules (v814–v822, from thirteen frozen probes; suite 806 $\rightarrow$ 815) — the selection problem of the unified compactness contract is finite-level SOLVED by Mosco form convergence + Friedrichs minimality, the positive-descent master theorem applies to BOTH instances with the new prime summability number (kernel-checked Lean core),

and the sector floor reduces to the SINGLE ratio inequality $\rho = \tau/\tau_{\text{pnt}} > 0$ with a measured $h^{-3/2}$ envelope (the new contract PRIME.FLOOR.RATIO.01 [O]); the K5 follow-up locates the deployed transport bit-exactly ($T_{v221} = B^6$, the dated SIXTHROOT correction) and types the six-step composition clock-only with the canonical T_{10} proposal; the Kraus tower gains the spread/commutant deciders and its 39-dim nonabelian commutant closure; the RM cascade lands (the 15-label channel = punctured $\text{RM}(1,4)^*$ with the $[[15,1,3]]$ CSS code and the closing self-reproduction cycle, the rule-A protocol set = the 105 minimal dual checks, the E_7 vacuum completion $112 + 21 = 133$ as a matrix identity); and the vacuum-completion reading of the continuum dies honestly in both transcriptions with the c^* pencil bound as the frozen fence)

- **New modules (9).** `v814_k5_sixstep_transport.py` (23/23, SIXSTEP-CLOCK-ONLY + TRANSPORT10-PROPOSED: the rate $(2/3)^6$ arises canonically on THREE spatial routes (doily alternation, hexagon compression, hexagon circulation), each blocked by a typed obstruction (no unit mode — the norm obstruction [E neu]; the bipartite sign $-2/3$; the wrong space $\times 9$) — the deployed six is the CLOCK exponent ($v124 \lambda_n = (1 - n/3)^6$, v486 hand, fixed eigenbasis); sixth-power blindness [E neu]: C_6 and $2K_3$ have identical sixth powers, only per-step data distinguish walk from clock; THE CORRECTION (dated note on the v808 row): T_{v221} (the exact spectral sum of v221's transfer $(1 - w)^6$) = B^6 BIT-EXACTLY — the sixth-root verdict upgrades from SPECTRAL-ONLY to BITEACT-vs-v221; the canonical proposal $T_{10} = P_{10}^6$ in the Λ^2 basis passes ALL gates (spectrum $\{1, (1/3)^6 \times 5, (2/3)^6 \times 4\}$ with multiplicities $(5, 4) = (g_{\text{car}}, |\mu_4|)$, equitable v774 quotient = $(Q_{\text{Pet}}/3)^6$ bit-exact) — a promotion-ready proposal, NO deploy claim); `v815_kraus_spread_commutant.py` (21/21 + 24/24, SPREAD-SIGMA-BROKEN + COMMUTANT-EXTENDS + AORB-NOT-MAXIMAL: σ acts on the 6 spreads as two 3-cycles, ZERO fixed (outer-class forced), no invariant coarsening — but the direct-sum protocol is σ -stable as a FAMILY with invariant witnesses $\sum B_{45}(s) = 4I + 2B$ and per-orbit A_{orb} (integer spectrum $\{0^5, 1^2, 4^5, 7^2, 9^1\}$); $[E, K] = 0$ lifts EXACTLY to channel / KMS tower / odd places (the C_2 -character expectation unique per place) and the 600-dim register; the $\{K, \sigma\}$ commutant is 39-dim nonabelian $\mathbb{R} \oplus M_3(\mathbb{R}) \oplus M_3(\mathbb{C}) \oplus M_3(\mathbb{R}) \oplus M_1(\mathbb{C})$ with A_{orb} the canonical abelian 5-dim subalgebra, window-silent beyond the K -spectrum); `v816_prime_mosco_selection.py` (23/23 guards+controls, 6/6 legs, MOSCO-SELECTS: the decider table on identical rungs — moment oscillation 22.0829 (the failed selector, reproduced exactly) vs Friedrichs resolvents 0.0004 / ledger-adjusted Weyl 0.0843 / raw μ -face 0.0000; cofinal-unique 2.5×10^{-5} ; M2 recovery exact 1.2×10^{-12} ; M1 margins +2.63 with the EDGE family typed a genuine boundary channel; the import diagnosis completed at form level — nothing whitened at the core, the whitened control reproduces 5.8772 exactly); `v817_positive_descent_master.py` (14/14, MASTER-BOTH-INSTANCES: the 7-hypothesis master theorem with the kernel-checked Lean core (`PositiveDescentMaster.lean`: telescoping + Cauchy tail, positivity closure, sector commutation); G_{net} re-verified (Choi PSD, rate 0.267/doubling); THE NEW NUMBER: the prime packet state defects are summable at $0.701/\text{doubling} \approx 2^{-1/2}$ with $\hat{m}_2(p) = -1/15$ exactly for every odd prime; control K4: positivity is a SEPARATE hypothesis); `v818_sector_floor_attack.py` (9/13 + 13/15 with exactly the preregistered FAILS, FLOOR-MECHANISM-PARTIAL + CAPTURE-BOUNDED / THEOREM-SHAPE / AMPLIFIER-MECHANISM: $\text{onem} = F(r) \varepsilon K$ symbolically exact with the sign entirely in the vanishing weight; interlacing capture $\tau/\lambda_{\min}(A_h)$ median 1.53 (range 1.04–4.36) — the 2-mode lock block is an $O(1)$ -faithful witness of the full floor; capture angle $\cos \theta$ median 0.990, scramble-robust (frame content); the rotation law closes symbolically with 100% staircase sign-match — r -monotonicity is now a calculus statement; the amplifier is carried by the smallest prime powers, envelope $\rho h^{3/2} \in [4.85, 24.2]$ non-decaying; the contraction constant is density-level (Epstein $s_E = 0.241$)); `v819_prime_packet_rm14.py` (21/21, RM14-EXACT, Lean companion `PacketRM14.lean`: the 15-label channel row hull = punctured $\text{RM}(1,4)^* = [15, 5, 7]$, enumerator exact; χ_{NSR} is ONE codeword (7+8 its two sides, C_2 the affine bit); the cycle

$\text{RM}(1, 3) \rightarrow E_8 \rightarrow V \rightarrow \text{RM}(1, 4)^* \rightarrow \text{RM}(1, 3)$ closes with exactly 1344 equivalences; CSS $[[15, 1, 3]]$ with dual $[15, 10, 4]$, logical distances $(7, 3)$, triorthogonality $8/4/2$; ζ_8 typed [H]); `v820_prime_kraus_rm24.py` ($16/16 + 14/14$, KRAUS-RM24-RULE-CANONICAL + PLANEFRAMES-EXACT: the literal leg-support claim dead twice (weights $1/2/3 < \text{distance } 4$; Sp orbits $15+90$ vs $45+60$); the canonical ω -built rule identifies the rule-A protocol set with the 105 weight-4 checks of $[15, 10, 4]$ exactly, Sp/ σ /deck/KMS-covariant; $A_3 = 12 / B_3 = 16$ certified as PLANE-COUNT statements ($\sigma_3(3) = 28$, $a_3 = -4$); the graded frame intertwiner $V^*V = \sigma_3(n)I$, $V^*\Gamma V = a_n I$ exact for $n = 3, 5, 7$); `v821_prime_vacuum35.py` ($22/22$, VACUUM35-EXACT: $140 = 105 + 35$; Grams $22I+6J / 6I+J / 28I+7J$ entrywise; the E_7 completion $112 + 21 = 133$ as a matrix identity (v170 anchor [C])); Weitzenböck $H_{105}^T H_{105} = 2B^2 + 14I$ as the canonical label-side left factor with the honest v758 scope; the $\pm B$ cancellation inside one Gram; tight frame constant 28 on mean-zero; $\text{RM}(2, 4)$ dual-containing); `v822_prime_vacuum_dilation.py` ($17/19 + 12/14$ with the four FAILs being the preregistered PSD deciders, UNSHORTEN-DEAD + DILATION-DEAD: the 35-row Stinespring form fixes the shape exactly ($6I+J$ ward, Weitzenböck bookkeeping integer) and buys $\times 13.1$ — and both sectors STILL fail under both normalizations; THE GENERAL OBSTRUCTION QUANTIFIED: $\text{PSD} \iff \text{coupling} \leq c^* = (2/21)\lambda_{\text{pencil}}(T_{\text{dep}}, T_{\text{cont}}^2)$, measured deficits $\times 3 \times 10^7$ (GL1) / $\times 2 \times 10^2$ (f8) — the reading dies with the calibration, not the geometry; the continuum's completion role is already exhausted inside T_{dep} ; c^* is the frozen fence; module 7 / path-state NOT buildable).

- Contracts.** NEW: PRIME.MOSCO.SELECTION.01 (selection solved finite-level; the three infinite-level ingredients typed), TFPT.POSITIVE_DESCENT.MASTER.01 (both instances; the Lean core; positivity a separate hypothesis), PRIME.FLOOR.RATIO.01 [O] — **the new main contract candidate**: the sector floor reduces to the single ratio inequality $\rho(X) = \tau/\tau_{\text{pnt}} > 0$ with the measured $h^{-3/2}$ envelope (constant ≈ 4.85 , non-decaying), direction owned by the density rotation law (calculus statement, hypotheses verified), capture angle-certified frame geometry ($\cos \theta$ 0.990, scramble-robust), the amplifier carried by the smallest prime powers; KILL = the envelope failing at depth or the capture angle collapsing; NO RH claim, PROMOTION FENCED. Also registered: K5.SIXSTEP.TRANSPORT.01, PRIME.AORB.REFINEMENT.01, PRIME.PACKET.RM14.01, PRIME.KRAUS.RM24.01 (carrying PRIME.C2.PLANEFRAMES.01), PRIME.VACUUM35.01, and PRIME.CONTINUUM.UNSHORTEN.01 as the vacuum-route CLOSURE row (both transcriptions dead, the c^* pencil bound the frozen fence, the exhaustion insight). Dated notes on CARRIER.PETERSEN.RADIAL.01 (the SIXTHROOT BITEXACT upgrade with the v221 evidence — the frozen SPECTRAL-ONLY stands as that probe's adjudication, ABEL-DEAD precedent — and the T_{10} proposal), PRIME.KRAUS.DOILY.01 (spread/commutant/aorb addenda), PRIME.Z1.COMPACTNESS.01 and PRIME.POSITIVE_DESCENT.01 (selection solved via Mosco, unique limit via the master theorem, the floor the single remaining object $\rightarrow$ cross-ref PRIME.FLOOR.RATIO.01). NO marker moves; the honest deaths recorded as preregistered adjudications; all declared repairs carried verbatim in PROVENANCE.
- Ledger.** 10 new rows (the nine module rows K5.SIXSTEP.TRANSPORT.01, PRIME.AORB.REFINEMENT.01, PRIME.MOSCO.SELECTION.01, TFPT.POSITIVE_DESCENT.MASTER.01, SECTOR.FLOORATTACK.01, PRIME.PACKET.RM14.01, PRIME.KRAUS.RM24.01, PRIME.VACUUM35.01, PRIME.CONTINUUM.UNSHORTEN.01 + the contract row PRIME.FLOOR.RATIO.01) + 4 dated updates; $888 \rightarrow 898$ rows; NO marker moves anywhere.
- Papers.** `tfpt_prime_front`: the new round section “One inequality: the floor reduces to the prime comb against its own density” (the Mosco selection, the master theorem, the floor mechanism and the new contract, the Kraus commutant tower, the vacuum-route closure); `tfpt_1`: the round-23 keybox entries (the clock-only six-step with the T_{10} proposal and the SIXTHROOT correction, the RM cascade with the $[[15, 1, 3]]$ CSS code, the E_7 vacuum completion); `tfpt_2`: the plane-frame Hecke match ($\sigma_3(3) = 28$ and $a_3 = -4$ as plane counts) and the RM-code reading of the 15-label channel join their sections; `tfpt_3`: nine new audit

blocks; `tfpt_research_contracts`: the registrations and dated updates above.

- **Website.** Prime-front feed: the round entry “reflux round twenty-three”; counters 806 $\rightarrow$ 815 modules / v535–v822; papers.ts and VerificationDag updated; generated surfaces regenerated (ScriptIndex, changelog.ts, version.ts, maps); README and Zenodo updated to 815 modules / v822.
- **Scope.** The exact results (the bit-exact transport location, the commutant tower, the RM enumerators and Gram identities, the E_7 completion) sit behind the standing fences (ROOTCLASS-MIXED intact; no matter semantics; the E_7 /fingerprint readings [C]; the T_{10} and vacuum readings proposals/[H], not deployments); the analytic strand is measured finite-level evidence only — PRIME.FLOOR.RATIO.01 carries its kill criteria and its promotion fence, the honest kills (the vacuum route in both transcriptions, the four preregistered floor FAILs) are on record as adjudications; no marker moves; NO RH claim anywhere.

2026-08-06 (LXV) (reflux round twenty-two — the K5 edge machine: five exact structures, two precise middles, and the honest kills: ELEVEN modules (v803–v813, from fifteen frozen probes; suite 795 $\rightarrow$ 806) — the jet-code wave gives the Gaussian compiler its ring-theoretic normal form ($W = L/2L$ free over the dual numbers, non-splitness = the no-origin obstruction), reconstructs the Hamming code from the NS/R bit alone ($AGL(3, 2) = \text{Aut}(H_8)$), extends the CP intertwiner by the affine Gray register chart, and records two preregistered honest kills (the syndrome algebra and the analytic Clifford-activation ordering); the K5 wave certifies the Petersen carrier geometry whose radial sixth power IS the deployed transport spectrum, the doily incidence identity behind the recovery base rate, the cut-code reading of the Arf split, the Kraus context protocol with its exact commutant surprise, the flavor-filtration fingerprint — and closes the round with the P1 index-KMS identity $c_3 = 1/(I \cdot \beta)$ and its convention audit)

- **New modules (11).** `v803_e8_jetcode_affine_nsr.py` (18/18 + 15/15, JETCODE-EXACT+AFFINE-NSR-EXACT: $\mathbb{Z}[i]/(2) \cong \mathbb{F}_2[\epsilon]/(\epsilon^2)$ with $\epsilon = 1+i$ (2 ramifies; unique iso; the split ring $\mathbb{F}_2 \times \mathbb{F}_2$ fails all 24 bijections); $W = L/2L$ FREE of rank 4 over the dual numbers (Hermite-certified $\mathbb{Z}[i]$ -basis); the exact self-extension $0 \rightarrow \epsilon W \rightarrow W \rightarrow V \rightarrow 0$ with $\ker \epsilon = \text{im } \epsilon$; the deck IS the jet unit $J = 1+\epsilon$, re-deriving the v782 transition-bus torsor on all 240 roots; ZERO μ_4 -equivariant splittings among all 65536 sections — non-splitness IS the no-canonical-origin obstruction; the 120 root pairs = the $q=1$ unit shell ($240 = 15 \times 8 \times 2$: root = (address, error jet, orientation)); $\text{Stab}(\chi_{\text{NSR}}) = AGL(3, 2)$ of order 1344 = $\text{Aut}(H_8)$ with the SAME natural 8-point action, and affine functions on the NS/R torsor reconstruct $RM(1, 3) = H_8$ with exactly 1344 equivalences — typed internal reconstruction, NOT a P2 removal); `v804_prime_carrier_gray.py` (23/23, GRAY-INTERTWINER-EXISTS: the affine Gray map encodes $C_2 \times \mu_4$ into the R-class torsor respecting the v786 kill (a group iso is impossible — exponent 4 vs 2 — and not demanded); the fiber family deck-covariant EXACTLY with TRIVIAL measured μ_4 -cocycle (residual = a pure $\mathbb{Z}_3$ line twist on the σ -fixed classes); the extended Stinespring map’s GL1 channel re-lands on the deployed Weil window at 6.0×10^{-16} ; one declared control repair); `v805_e8_syndrome_algebra.py` (13/13, SYNDROME-DEAD, the preregistered kill fires: max rank 222/256 over all four frozen phase conventions, the $\pm r$ proportionality obstruction structural for the whole diagonal-phase family, both post-hoc escape directions score worse (215/160); survives: $16 + 240 = 256$, the 16 v112 neutral kernels = the diagonal MASA, same-class products A_0 -valued with μ_4 coefficients exactly); `v806_hecke_local_clifford.py` (16/18 with the two FAILs the preregistered decider gates themselves, controls 4/4, LOCAL-CLIFFORD-BREAKS: all four $p \bmod 8$ class sectors fail PSD — signed character combinations carry no completed L -function, the trivial mod-8 component is imprimitive; class 1 is the UNIQUE positivity-completable class (Euler repair exact, $+1.4 \times 10^{-5}$); the margin ordering does NOT

track the proven activation depths (Spearman +0.40) — the Clifford activation reading stays decorative analytically, the arithmetic multirate theorem untouched; POSITIVE side-result: χ_8/χ_{-8} are two NEW PSD instances of the $\Gamma_{\mathbb{R}}$ conductor rule (exact parities: χ_8 even, χ_{-8} odd) — the rule map now covers the full mod-8 dual group; one declared bar re-freeze); `v807_lorentz_nullselector.py` (22 checks with the three honest h -order FAILs encoded +14/14, LORENTZ-COORDS-REVEAL+NULLSELECTOR-ALGEBRAIC: $M(5, -3, 4) = 2(1, 2)^T(1, 2)$ exact — the compiler triple is a rank-one spinor square, Euclid $(2, -1) \mapsto (5, -3, 4)$; THE REVEAL: the spinor slope is strictly monotone in the window width α (66/66, Kendall 1.000, cross-ratio contraction CV 0.004) — the h -oscillation was α -jitter; the approach $2 - r \sim \alpha^{-0.23}$ stays glacial; the null selector $|v_d|^2 = \det M_d = d(4 - d)$ forces $d = 4$ on the RR/Serre functor vector with the anchor identities $i+j = N_{\text{fam}}$, $ij = |\mathbb{Z}_2|$, $i^2+j^2 = g_{\text{car}}$, $2ij = |\mu_4|$; THE BRIDGE: $g^2 - N^2 = 4d = |H|^2$, so null $\iff$ glue index = d — independent of the v781 census, same output {4}; honest downgrade: the seam family has no d -dependence to vary, the missing theorem typed); `v808_petersen_sixthroot.py` (19/19+16/16, PETERSEN-RADIAL-EXACT+SIXTHROOT-SPECTRAL-ONLY: the K5 edge machine — charges $(-4, +1, +6)$ = the $SU(5)$ decuple against the certified v774 table; Petersen $SRG(10, 3, 0, 1)$ with $|\text{Aut}| = 120$ census; distance shells $(1, 3, 6)$ charge-pure; the flavor hexagon = the distance-2 shell edge-by-edge; equitable quotient with hypercharge eigenvector $(6, -4, 1) \rightarrow -2$; $\text{spec}(P^6) = \{1, 64/729, 1/729\}$ = the deployed transport spectrum EXACTLY; the 10-dim multiplicity prediction ($\times 5 = g_{\text{car}}$ fast, $\times 4 = |\mu_4|$ slow) typed [H neu]; $B = \frac{1}{18}[[13, 1, 4], [1, 13, 4], [4, 4, 10]]$ is the unique symmetric doubly stochastic PSD sixth root in the corpus basis, $B^6 GL(3, \mathbb{Q})$ -conjugate to v486's M^6 and the cusp-diagonal form but bit-equal to NEITHER — the corpus freezes the spectrum, not the basis); `v809_curve_code_doily.py` (21/21, DOILY-EXACT: $NN^T = B + 2I$ entrywise, $\text{spec} = \{9, 4^9, 0^5\}$; $N/3$ has singular values $\{1, 2/3, 0\}$ — the recovery base rate $2/3$ as the unique nontrivial singular value of the canonical duad-to-syntheme incidence, the $(2/3)^6$ identification typed pending the six-step composition; Petersen edges = syntheses 15/15; every census bridge factors exactly $N_{\text{code}} = P_{\Delta}^T N_{\text{curve}}^T P_{\Gamma}$ — a duality, not an isomorphism; the Arf switch set T_6 = the six within-block duads); `v810_cutcode_moment.py` (17/17 + 16/16, CUTCODE-EXACT+MOMENT-INCIDENCE-PARTIAL: the cut map is injective-isometric on all 256 cells and the Arf split $16 = 1 + \bar{5} + 10$ IS the cut classification $(0|5) + (1|4) + (2|3)$; Clebsch $40 = 5 + 20 + 15$ over the Arf shells with within-10 = Petersen (census 120); roots/lines grade $80 + 160 / 20 + 40$ — Arf/cut grading, NOT matter; the master moment $\text{Tr}_{S^+} X^2 = 4|X|^2 = 4h(E_8) = 120$ from one symbolic identity; the $210 = \binom{10}{4}$ map DECORATIVE per the frozen rule — the equivariant bijection killed by the exhaustive fixed-point obstruction, the partial $80 \rightarrow 5 \times 16$ miss-slot map and the Newton tie survive as audit); `v811_prime_kraus_doily.py` (21/21, KRAUS-DOILY-PROTOCOL: the 105 Kraus legs = 15 diagonal + 90 off-diagonal; the canonical $45 + 60 =$ reversal-quotient (the 90 legs double-cover the 45 flags 2:1) + fiber expansion ($15 \times 4 = 60 =$ the v783 stabilizer rays); the $Sp(4, 2)$ obstruction certifies no leg-subset partition — the literal partition is spread-relative = the ledger T3 census; the 45 transports quadratic ($P_x P_y = \pm P_{x+y}$) spanning $\text{End}(\mathbb{C}^4)$ at rank 16; THE SURPRISE: $[B_{45}, B_{60}] = 0$ exactly — $K = \frac{3}{7}E + \frac{4}{7}R$ is a direct-sum protocol with E a conditional expectation; measured: the certified spread is NOT σ -invariant — the named next falsifier); `v812_flavor_graph_filtration.py` (16/16, FILTRATION-FINGERPRINT-ONLY: the $Q/K/L$ row budgets are exact, order-exact counts of the $K_{3,2}/\text{prism}/K_5/H_8$ incidence chain with level-wise additivity mirroring $L = K + Q$; NO entry-level reconstruction from any frozen candidate; the exhaustive false-positive rates 0.005–0.75% make the misses informative — typed audit fingerprint); `v813_p1_index_kms.py` (13/13, P1-IDENTITY-CLOSED: $I \cdot \beta \cdot c_3 = 4 \cdot 2\pi \cdot \frac{1}{8\pi} = 1$ EXACT in formal arithmetic; the index is an independent c_3 -free theorem (zero occurrences in all four sources, gated), $\beta = 2\pi$ independently measured (v526; the radian pin is the one shared convention and cancels), c_3 stays the P1 axiom the identity EXPLAINS; the finite evenness precursor measured ($w_1 = w_3 = \frac{1}{4}$ exactly at every level, symmetric zero-sum offset $\pm 2^{-(l+1)}$ — the no-anomaly shape); the sea state does NOT equidistribute (dev 0.188) — the bridge must normalize the modular response; controls:

index $2 \rightarrow 1/(4\pi)$, booked elsewhere by the corpus). Suite 795 $\rightarrow$ 806; all eleven run standalone green and encode their frozen patterns per the v757 precedent (the two honest kills encode their expected-FAIL patterns explicitly); all fifteen probes re-run identically at promotion.

- **Contracts.** NEW: E8.RAMIFIED.JETCODE.01 [E] (carrying E8.AFFINE.NSR.01), PRIME.CARRIER.GRAY.01 (demands D1–D3: odd-place fiber charts, the $\mathbb{Z}_3$ line twist as crossed-product structure, the infinite-level CP extension), E8.SYNDROME.ALGEBRA.01 (DEAD as frozen, successor criterion named: root-individual operator data), HECKE.LOCAL.CLIFFORD.01 (analytic ordering DEAD; next falsifier: primitive sector data, not class indicators), PRIME.LORENTZ.SPINOR.01 (the reveal + the named 1D monotonicity candidate), CARRIER.PETERSEN.RADIAL.01 [E/H] (carrying TRANSPORT.SIXTHROOT.01, the basis-freeze question named), CURVE.CODE.DOILY.01 (the $(2/3)^6$ six-step target named), CARRIER.CUTCODE.01 [E] (carrying CARRIER.MOMENT.INCIDENTENCE.01, the 210 decorative), PRIME.KRAUS.DOILY.01 (protocol-grade; the commutant/spread falsifier named), FLAVOR.GRAPH.FILTRATION.01 (fingerprint), P1.INDEX.KMS.01 registered OPEN [O] (the one open bridge: even modular-response normalization over the I deck sectors; kill = any asymmetric sector offset). Dated notes on ARF.BOUNDARY.CODE.01 (the affine NS/R reconstruction sharpens the attack surface; $R1'$ unchanged), PRIME.CP.INTERTWINER.01 (the Gray extension; D1–D3 unchanged), PRIME.SECTOR.CONTINUA.01 (the rule map covers the full mod-8 dual group) and E8.ONEOBJECT.01 (the null-selector addendum: a second independent $d = 4$ mechanism on the same invariant $4d$). NO marker moves; both kills recorded as preregistered adjudications; the declared repairs (Gray C2 scramble, local-Clifford C1b bar, Kraus report text) carried verbatim in PROVENANCE.
- **Ledger.** 11 new rows (E8.RAMIFIED.JETCODE.01, PRIME.CARRIER.GRAY.01, E8.SYNDROME.ALGEBRA.01, HECKE.LOCAL.CLIFFORD.01, PRIME.LORENTZ.SPINOR.01, CARRIER.PETERSEN.RADIAL.01, CURVE.CODE.DOILY.01, CARRIER.CUTCODE.01, PRIME.KRAUS.DOILY.01, FLAVOR.GRAPH.FILTRATION.01, P1.INDEX.KMS.01) + 4 dated updates; 877 $\rightarrow$ 888 rows; measured/typed throughout; NO marker moves anywhere.
- **Papers.** `tfpt_prime_front`: the new round section “The K5 edge machine: five exact structures, two precise middles, and the honest kills” (the Kraus protocol, the Gray intertwiner, the local-Clifford negative, the doily and Lorentz strands, the P1 index identity); `tfpt_1`: the jet-code normal form and the affine NS/R reconstruction join the architecture narrative (keybox entries; the cut-code grading of Theorem 2’s Clebsch geometry); `tfpt_2`: the Petersen carrier geometry of the transport spectrum and the flavor-filtration fingerprint join their sections; `tfpt_3`: eleven new audit blocks; `tfpt_research_contracts`: the registrations and dated updates above.
- **Website.** Prime-front feed: the round entry “reflux round twenty-two”; counters 795 $\rightarrow$ 806 modules / v535–v813; papers.ts and VerificationDag updated; generated surfaces regenerated (ScriptIndex, changelog.ts, version.ts, maps); README and Zenodo updated to 806 modules / v813.
- **Scope.** The exact results (the jet-code normal form, the affine NS/R reconstruction, the Petersen/doily/cut-code incidence identities, the Kraus protocol identities, the index-KMS identity) sit behind explicit fences (ROOTCLASS-MIXED intact everywhere; no matter semantics; the Hamming reconstruction is internal, not a P2 removal; c_3 stays the P1 axiom — the identity explains, it does not derive); the honest kills (syndrome algebra, analytic Clifford ordering) and the precise middles (the 210 decorative, the filtration fingerprint, the spectral-only sixth root, the glacial α -approach) are preregistered adjudications on record; no marker moves; no RH claim anywhere.

2026-08-06 (LXIV) (reflux round twenty-one — the descent functor completes at finite level and the boundary code becomes three physical axioms: ELEVEN

modules (v792–v802, from thirteen frozen probes; suite 784 $\rightarrow$ 795) — the prime channel delivers all three demands of PRIME.POSITIVE_DESCENT.01 at finite level (sector continua as one $\Gamma_{\mathbb{R}}$ functor, the exact limit object with the first measured sector floor, the Stinespring carrier intertwiner) plus the halving-tails/ $k=5$ tower mechanism and the R -microstate honest negative; the seam/code strand forces Type II from three physical axioms, identifies the missing Clifford bit as the metaplectic S -lift at $\tau = i$, decides the canonical outer bridge and reads the carrier Pascal at character level; the clock strand turns the coset assignment into a theorem; and the G_{net} strand measures the martingale limit hypotheses as met)

- **New modules (11).** v792_ftransfer_kms_coset.py (18 checks, KMS-COSET-THEOREM: the coset carried by a clock chart is a FUNCTION of its KMS/modular typing datum — $S = -(\ln \lambda)^2/2$ with λ the time-1 PGL_2 holonomy multiplier per clock e-fold; Schwarzian-free, derivative-free classifier (non-circularity gated on its own source), blind assignment ($F_{\text{pole}}/F_{\text{Boltzmann}}$ modular with $|\ln \lambda| = \Delta = 6 \log(3/2)$, F_{QCD} autonomous, F_{relic} degenerate) and sympy-exact unblinding; controls incl. the v578 Möbius clock as the positive case — the executor $\rightarrow$ groupoid $\rightarrow$ coset chain of the CONTRACT.F.01 refinement is whole); v793_f8sector_conductor.py (15/15+16/16, F8SECTOR-PSD+CONDUCTOR-FUNCTORIAL: the f_8 sector, broken at $-132..-151$ under the register-trivial GL1 continuum, is PSD on the entire frozen ladder with its OWN weight-4/conductor-8/no-pole continuum ($+1.52 \times 10^{-4} \rightarrow +3.20 \times 10^{-5}$); the continuum assignment is ONE closed rule $\chi \mapsto q^{s/2} \prod_j \Gamma_{\mathbb{R}}(s + \mu_j)$ (duplication ward 2.7×10^{-15}); the twist $f_8 \otimes \chi_{-4}$ has conductor 16 by Atkin–Li + the Fricke ward (6.7×10^{-16}) and lands PSD with the rule continuum; four-sector coherence; the conductor datum load-bearing at exactly $\ln 2$); v794_cp_extension_gate.py (17/17, CPGATE-UNDECIDED-FALLING: restriction exactness/interlacing/uniform bounds measured (the frozen $e^{X/2}$ pole prediction recalibrated, declared); the limit object = the per-sector positivity floor on $V_{\infty} = \text{Z1-COMPACTNESS}$ sector-decorated (anchor 3.882×10^{-6} reproduced); deep trend: no crossing, GL1 power-law to 3.9×10^{-6} at $X = 18.375$, χ_4 SATURATES at $\sim 1.5 \times 10^{-6}$ — the first measured sector floor); v795_halving_tails_k5.py (20/20+17/17, TAILS-IDENTIFIED+K5-MECHANISM-FOUND: exact identities $v_2(D_p) = 6 + v_2(X_7) / 8 + v_2(X_1)$ with termwise-integral divisor sums; class-7 base $\iff R_3(p) \equiv 16 \pmod{32}$; k deterministic on the 2-power residue-tower cells with zero exceptions at 10^6 , $k = 5$ only in cell (5, 3) of density $1/64 \Rightarrow P = 1/128$ = the observed half mass; the class-7 mirror law $v_2(D_p) = 3 + v_2(p+1)$; the governing-field derivation typed open); v796_duad_syntHEME_bridge.py (24/24, BRIDGE-CANONICAL: the Sylvester outer bridge β with $\beta\sigma = \tau\beta$, $\beta(q^*) = S^*$ unique up to the order-6 joint stabilizer; q_{Θ} pulls back constantly to $q_{\text{even}}^* = q^* + \hbar(\cdot, A)$ — the anchor shift resolves the v784 Arf mismatch; $t_A \mapsto \rho = J$; χ_{NSR} an exact two-variant torsor); v797_r_microstate_identification.py (14/14, R-NO-ARROW-REALIZATION: the honest negative — no arrow-level realization of the R -grading; the count identity $16B_n = 256R(n)$ exact but count-level only); v798_seam_clifford_modular_s.py (27/27, MODULAR-S-PARTIAL: the per-factor Hadamard IS the metaplectic S -lift at $\tau = i$, landing exactly in the missing coset $\zeta_8 G_{31}$; the deck J = the metaplectic anomaly of the total Fourier (R2 placed); the strict q^* census EMPTY (0/46080), one G_{31} -conjugacy class of survivors, the σ -orbit Arf defects XOR to the anchor A (R3 named)); v799_seam_code_typeii.py (19/19, TYPEII-FORCED: exhaustively over all 308,993 subspaces of $\mathbb{F}_2^8$, locality $\iff$ self-orthogonal, integer spin $\iff$ doubly even, S -closure/ $|\text{disc}| = 1 \iff$ self-dual = the 30 $\hat{e}_8$ copies; residual $R1 \rightarrow R1'$ = the three physical axioms A1–A3); v800_e8_torsor_fourier.py (30/30, TORSOR-FOURIER-PARTIAL: 120 canonical projective Fourier rays; the carrier block = $(1+5+10) \boxtimes (1+3)$ under $W(D_5) \times W(A_3)$ at character level — impossible at point level; the weight/character bases exactly mutually unbiased, ROOTCLASS-MIXED intact; the 45 deck-even modes = the 45 context Pauli observables); v801_prime_cp_intertwiner.py (29/29, CP-INTERTWINER-EXISTS: $\Phi = V^* \pi V$ from the 105 Kraus legs, arrow algebra = the full M_{15} ,

Choi exact-rational ($105 \times 1/7$); the four automorphic channels of ONE map land on the deployed GL1 Weil window (6.0×10^{-16}) and the $\Gamma_{\mathbb{R}}$ -rule windows, all PSD; F1 retyped as a negative Choi eigenvalue); `v802_gnet_martingale.py` (15/15, MARTINGALE-HYPOTHESES-MET: exact Haar filtration, defects summable at ~ 0.25 per doubling, unique limit by telescoping, determinant witness ≥ 0.99 ; decimation converges to the WRONG degenerate limit — the coherent bond load-bearing). Suite 784 $\rightarrow$ 795; all eleven run standalone green and encode their frozen patterns per the `v757` precedent; all thirteen probes re-run identically at promotion.

- **Contracts.** NEW: `SEAM.CODE.TYPEII.01` (R1 $\rightarrow$ R1': the seam satisfies A1 mutual locality, A2 integer conformal spin, A3 holomorphy/index one — the three-axiom equivalence certified exhaustively), `SEAM.CLIFFORD.MODULAR_S.01` (partial: coset positive, R2 solved as the metaplectic anomaly, R3 named through the Arf defects), `CURVE.CODE.OUTERSPIN.01` (decided CANONICAL; the `v784` inner kill stands), `PRIME.CP.INTERTWINER.01` (D1–D3 registered: dilation family, normality on the Z1-COMPACTNESS object, the limit identification — contains RH, fenced), `GNET.MARTINGALE.LIMIT.01` (hypotheses measured; steps 5–7 the typed analytic remainder). UPDATED with dated notes: `PRIME.POSITIVE_DESCENT.01` (all three demands now finite-level; the remaining analytic core restated as the per-sector positivity floor + D1–D3), `PRIME.Z1.COMPACTNESS.01` (the sector-decoration cross-reference), `CONTRACT.F.01/FTRANSFER.CLOCKS.01` (the coset theorem completes the fibered refinement), `HECKE.MULTIRATE2ADIC.01` (the tails identities, the residue tower, the mirror law; governing field typed open), `ARF.BOUNDARY.CODE.01` (all three residuals moved), `CURVE.CODE.2TORSION.01`, `E8.TRANSITIONBUS.01`, `E8.CLIFFORD2Q.01`, `HECKE.ARROW_MESSAGE.01`.
- **Ledger.** 11 new rows (`FTRANSFER.KMSCOSET.01`, `PRIME.SECTOR_CONTINUA.01`, `PRIME.CP.EXTENSION.01`, `HECKE.HALVINGTAILS.01`, `CURVE.CODE.OUTERSPIN.01`, `HECKE.R_MICROSTATE.01`, `SEAM.CLIFFORD.MODULAR_S.01`, `SEAM.CODE.TYPEII.01`, `E8.TORSOR.FOURIER.01`, `PRIME.CP.INTERTWINER.01`, `GNET.MARTINGALE.LIMIT.01`) + 10 dated notes; 866 $\rightarrow$ 877 rows; honest deaths and declared repairs carried in the module provenance blocks (`[C]/[E]`/measured typing per the probes); NO marker moves anywhere.
- **Papers.** `tfpt_prime_front`: the new round section “The descent functor completes at finite level, and the boundary code becomes three physical axioms” (demands (1)–(3), the depth-class mechanization, the two honest adjudications) + the positive-protocol close retyped; `tfpt_1`: five round-21 keybox entries (outer bridge, Type II, metaplectic S -lift, torsor Fourier; the R1–R3 residual prose retyped); `tfpt_2`: the Type-II forcing, the martingale follow-up and the Clifford completion join their sections; `tfpt_3`: eleven new audit blocks + the stale next-step/residual prose retyped; `tfpt_4_frontier`: the coset-theorem note; `tfpt_research_contracts`: the five registrations and the dated updates above.
- **Website.** Prime-front feed: the round entry “reflux round twenty-one”; counters 784 $\rightarrow$ 795 modules / `v535–v802`; `papers.ts`, `VerificationDag`, `OpenGates`, `HonestyBanner` and prime-front counters updated; generated surfaces regenerated (`ScriptIndex`, `changelog.ts`, `version.ts`, `maps`); `README` and `Zenodo` updated to 795 modules / `v802`.
- **Scope.** The exact results (the coset theorem, the $\Gamma_{\mathbb{R}}$ rule instances, the tails/tower identities, the outer-bridge census, the Type-II equivalence chain, the metaplectic coset identities, the character-level carrier block, the Stinespring/Choi certificates) sit behind explicit fences; the honest caps and negatives (the empty strict census, the mutually-unbiased cap, the no-arrow-realization, the undecided-falling trend) are preregistered adjudications on record; sector PSD stays finite-level evidence — GRH-type statements unproven; the limit identification contains RH and is NOT claimed; no marker moves; no RH claim anywhere.

2026-08-05 (LXIII) (reflux round twenty — the largest promotion of the day: ELEVEN modules (`v781–v791`, from sixteen frozen probes; suite 773 $\rightarrow$ 784) — the strategic round lands the $d = 4$ forcing census with its honest clock kill, the

transition-bus torsor, the two-qubit Clifford identification and the curve/code 2-torsion partial; the prime channel lands the check32 theorem, the packet-480 kill and the arrow-ledger/broadcast pair; and the positive protocol lands the positive C_2 lift, the multirate ladder with its constant-depth proof, the SNF/ μ_4 adjudication and the positive-descent decider with the new open contract PRIME.POSITIVE_DESCENT.01)

- **New modules (11).** `v781_one_object_clock_census.py` (21/21 + 23/23, ONE-OBJECT-PARTIAL+CLOCK-FIBER-DEAD: the TFPT glue pattern admits an even unimodular DIAGONAL glue of $A_{d-1} \oplus D_{d+1}$ iff $d = 4$ (exact census $d = 2..12$; the two `v92` Lagrangians reproduced; explicit E_8 certificate; $d = 9$ dies at isotropy; controls fire) with the corollaries $g_{\text{car}} = d+1 = 5$, $N_{\text{fam}} = d-1 = 3$, $|\mu_4| = 4 = d$; honesty gate: $c_3 = 1/(2\pi d)|_{d=4} = 1/(8\pi)$ is a corpus-legitimate REWRITING, NOT a new derivation of P1; the $\mathbb{Z}_{12} \times_{\mathbb{Z}_6} \mathbb{Z}_{30}$ clock action on the 60 Gaussian lines is DEAD at three levels — full line-compatible group order 23040, max element order 12); `v782_e8_transition_bus.py` (35/35, TRANSITION-BUS-TORSOR: the 240 roots are 15 coordinate 8-frames whose pair fibers are canonical $v^\perp$ -torsors; NO deck-equivariant $V \times (V \setminus 0)$ labeling exists (proof-grade obstruction); the frozen symplectic predicate reproduces all 57600 inner products; $240 = 5 \times 3 \times 16$ spread layer; the A_{15} comparison quantified); `v783_two_qubit_clifford.py` (32/32, CLIFFORD-PARTIAL(H4): the 60 Gaussian lines ARE the 60 two-qubit stabilizer rays entry-exactly over $\mathbb{Z}[i]$ (60/60, support census $4 + 24 + 32$); $G_{31} = \text{index-2 Clifford subgroup with } 46080 = \mu_4 \times \text{Pauli}_{16} \times Sp(4, 2)$, classes = Pauli contexts, spreads = MUB pentads; the index bit is the Galois $\sqrt{2}$ /Hadamard bit, not $J \leftrightarrow -J$); `v784_curve_code_2torsion.py` (33/33, CURVE-CODE-PARTIAL: every CM generator period certified as an integral $\mathbb{Z}[\zeta_{12}]$ recognition; the correspondence dies at two exact layers — deck syntheme-side $[3, 3]$ -free vs code duad-side, and curve theta even/Arf-0 ($1+6+9$) vs q^* odd/Arf-1 ($1+5+10$); joint census 0 with positive control 6); `v785_hecke_check32.py` (20/20, CHECK32-THEOREM: $f_8 \equiv E_{\text{odd}} \pmod{32}$ to $q^{100000} = 25000 \times$ the Sturm bound 4 (one cited classical ingredient); $a_p \equiv 1 + p^3 \pmod{32}$ on 9591/9591 odd primes with the cube-map decoder; mod-64 fails at q^3 ; controls 91.7% and $\sim 31/32$); `v786_prime_packet480.py` (28/28, PACKET480-ADDRESS-ONLY: the header ($p \bmod 30$, $a_p \bmod 32$) is exact 7-bit address arithmetic but the canonical intertwiner to the 128 spinor roots is IMPOSSIBLE — exponent 8 vs 2; 3 of 7 bits realizable; the 128 stays a fingerprint; kill fired as preregistered); `v787_hecke_arrow_broadcast.py` (48/48 + 21/21, ARROW-LEDGER-STRUCTURED+BROADCAST-EXACT: the 15 ramified arrows ARE the 15 polar labels (7 NS + 8 R), spread census (3, 1, 1, 1, 1), $T/196 = (4/49)I + (45/49)\Pi_0$ exact with the 105 leg classes = the `v756` Kraus set, $a_7 = +24$ sign-derived from the full 137600-line census; $\bar{T}_n = M_n \otimes I_{16}$ on all odd shells 3..13 with $B_n = 16R(n)$ arrow-exactly, new identities $b = 2A_p$ and $n_B = A_p B_p/2$; honest negative at $p = 7$); `v788_positive_c2_lift.py` (42/42, C2LIFT-THEOREM: $E_{\text{odd}} \pm f_8 = 2A/2B$ are POSITIVE theta series with $B = 16R$ and $a_n = \sigma_3(n) - 32R(n)$ — check32 becomes a kernel corollary; microstates 1, 4, 10, 24, 43; automaton censused on 41053 pairs + 70 prime powers; five-condition validator with joint detection 1.000000 and the tamper blind spot exactly the $16\mathbb{Z}$ lattice); `v789_multirate_constdepth.py` (23/23 + 24/24, MULTIRATE-THEOREM/SPINLIFT-VERIFIED+CONSTDEPTH-THEOREM: $v_2(1+p^3-a_p) \geq 5 + 2[\chi_{-4}] + [\chi_8]$ on all 78497 primes $< 10^6$ with sharp witnesses 3/7/5/17; sifts Sturm-certified at level ≤ 512 ; mod-512 breaks at $n = 9$; $\text{Sh}(g) = -8E_{\text{odd}} + 256H$ exact with Kronecker factor χ_8 ; the constant depths PROVEN via the two named $h = 1$ ingredients); `v790_snf_mu4_theta.py` (18/18 + 17/17, SNF-FINGERPRINT+MU4-PARTIAL: the $256R(n)$ representation identity and the SNF ($1^4, 2^4$) match are exact but the isometry census is EMPTY at every admissible level (kissing 240 vs 8; 0/20160; the naive 4+4 split inadmissible by theorem); the NEW exact identity $c_{\text{sig}} = \frac{1}{15}E_4(q^2) - \frac{6}{5}E_4(q^4) + \frac{32}{15}E_4(q^8) - 8f_8$ — the cusp part of the quartic μ_4 character is exactly $-8f_8$ with $-8 = 52 - 60 = -\text{rank}(E_8)$; the C_2 channel is pure Eisenstein; the all-shell quartic vanishing is FALSE); `v791_positive_descent.py` (30/30, DESCENT-PARTIAL: the packet GNS state on $\mathbb{N}[C_2] \otimes \mathbb{N}[\mathbb{F}_2^4] \otimes \mathbb{N}[\mu_4]$ is manifestly positive in exact rationals; the naive

linear pushforward is NOT a state (F1); the GL1 descent is bit-identical to the deployed Weil window and its UNIQUE PSD sector of 24 (F2: the breaking tensor factor is the continuum/pole leg)). Suite 773 → 784; all eleven run standalone green and encode their frozen patterns per the v757 precedent; all sixteen probes re-run identically at promotion.

- **Lean.** `TfptCarrier/Check32.lean` (13 kernel theorems: the cube bijection on the 16 odd residues, the first-coefficient congruences as exact integer statements, the mod-64 failure witness) and `TfptCarrier/PositiveC2Lift.lean` (the positive-lift kernel with check32 as a corollary), both kernel-checked, lake build green (3406 jobs), Lean tree 80 modules; dated Lean notes carried in the `HECKE.CARRIER_CHECK32.01` and `HECKE.POSITIVE_C2_LIFT.01` ledger rows.
- **Contracts.** `PRIME.POSITIVE_DESCENT.01` registered OPEN [O] with the three demanded objects — (1) sector-adapted continua (the f_8 -sector continuum as the finite-level falsifier), (2) GL1-sector PSD persistence in the Z1-COMPACTNESS frame (Weil positivity retyped as sector compression of a manifestly positive object), (3) the carrier intertwiner — plus stop conditions and inherited falsifiers; cross-referenced both ways with `PRIME.Z1.COMPACTNESS.01` (dated add-on note). Dated notes on `HECKE.GEOM.01` (the 2-adic skeleton now load-bearing), `HECKE.GEOM.HALFINT.01` (the ladder form of the Shimura lift; Kronecker factor = χ_8), `RTF.GNS.LEDGER.01` (the four-character envelope closed multiplicatively), `E8.GAUSSIAN.CODE.01` (the Clifford identification and the bus torsor), `PRIME.Z1LOOKAHEAD.01` (the packet-480 impossibility), `ARF.SPINORCOMPILER.01` (the q^* spread deployment and its Arf-parity boundary) and `ARF.ROOTCLASS.01` (the fence held through the round).
- **Ledger.** 11 new rows (`E8.ONEOBJECT.01`, `E8.TRANSITIONBUS.01`, `E8.CLIFFORD2Q.01`, `CURVE.CODE.2TORSION.01`, `HECKE.CARRIER_CHECK32.01`, `PRIME.PACKET480.01`, `HECKE.ARROW_MESSAGE.01`, `HECKE.POSITIVE_C2_LIFT.01`, `HECKE.MULTIRATE2ADIC.01`, `HECKE.SNF_THETA.01`, `PRIME.POSITIVE_DESCENT.01`) + 8 dated updates; 855 → 866 rows; measured/typed throughout, honest kills recorded as preregistered adjudications, the [C neu]/[E neu] typing carried, NO marker moves anywhere.
- **Papers.** `tfpt_1`: the four strategic entries join the code keybox (the $d = 4$ forcing census with the P1 honesty gate, the transition-bus torsor, the Clifford identification, the curve/code partial); `tfpt_2`: the stabilizer-identification follow-up joins the G_{net} page; `tfpt_3`: eleven new audit blocks; `tfpt_prime_front`: the new section “The positive protocol: the prime channel as a positive routing code, and what the descent still needs” (check32 theorem, positive lift, multirate ladder + proof, arrow ledger + broadcast, the two preregistered adjudications, the descent and its three-object contract); `tfpt_research_contracts`: the `PRIME.POSITIVE_DESCENT.01` registration and the Z1-COMPACTNESS add-on note.
- **Website.** Prime-front feed: the round entry “reflux round twenty”; counters 773 → 784 modules / v535–v791; papers.ts narrative mirrors updated; README and Zenodo updated to 784 modules / v791.
- **Scope.** The exact results (the forcing census, the torsor structure theorem, the stabilizer identification, the check32/positive-lift/multirate theorems modulo their named classical ingredients, the broadcast factorization, the c_{sig} identity) sit behind explicit fences; the three fired kills (clock fiber, packet-480, all-shell quartic vanishing) are preregistered adjudications firing inside green machinery; the c_3 link stays typed INTERPRETATION (P1 is not derived); ROOTCLASS-MIXED stays binding (no code→matter reading anywhere); the descent contract names what is still missing; no marker moves; no RH claim anywhere.

2026-08-05 (LXII) (reflux round nineteen: SEVEN promotions (v774–v780, from twelve frozen preregistered probes, all first-run adjudications reproduced identically at promotion; suite 766 → 773 modules) — the Arf compiler lands with its fired matter fence and the boundary-code uniqueness chain, the external-clock contract is EXECUTED on its expected K1 kill, remainder (a) of the (L1)

majorant closes in the corrected $(1 + \ln M)$ form, the G_{net} GNS precursors cohere, and the sharpened-Z1 trilogy measures the z1-compactness unification)

- **New modules (7).** `v774_arf_spinor_compiler.py` (46/46, ARF-SPINOR-EXACT: the Arf/spinor compiler on $V = L/(1+i)L$ — parity lift $\iota \cong C_{\text{even}}(5)$ with $\beta = \bar{h}$ exact, unique σ -selected q^* (census $4 \rightarrow 2 \rightarrow 1$; the weight form IS q^*), Arf census $6+10$ with $Sp(4,2) \cong S_6$, $16 = 1+\bar{5}+10$ as $\text{Stab}(q^*) \cong S_5$ orbits, K_6 duads, $B = I + A_{KG(6,2)}$ with exact ovoid eigenvectors, hypercharge table $X = (-2, -2, -2, 3, 3) \rightarrow$ the `v310/v14` dictionary, moments $(16, 0, 120, 0)$ with the chain $40/41/240/248$, Pati–Salam $8+8$ with $B-L$ exact, $\chi_{\text{NSR}} = \text{anchor bit}$; $A_3^{\text{Fam}} \neq A_3^{\text{PS}}$ naming discipline); `v775_gaussian_class_d5_purity.py` (18/18, ROOTCLASS-MIXED — THE FIRED PHYSICAL KILL: no $D_5 \oplus A_3/SU(5)$ convention makes even one class set pure, ≥ 7 adjoint-side classes for EVERY embedding by the 128-spinor-root bound, $0/56$ splits; the code $\rightarrow$ matter reading incl. the “empty mailbox = ν_R ” reading is fenced out of all main claims); `v776_boundary_hamming_uniqueness.py` (31/31, BOUNDARY-CODE-UNIQUE: census $135 \rightarrow 30 \rightarrow 14 \rightarrow 2 \rightarrow 1$ without Hamming/ E_8 input, ONE deck-invariant $\mathbb{Z}_2$ flag bit, Construction A $\rightarrow E_8$ exact, $g_{\text{car}} = 1+4 = 5$ as OUTPUT; residuals R1–R3 typed, NO P2-removal claim); `v777_ftransfer_clock_jets.py` (24+14 checks, 0 failures: FTRANSFER.CLOCKS.01 EXECUTED — the K1 kill fired exactly as the frozen prior expected, NO-COMMON-CONNECTION, transported Schwarzians sympy-exactly $\{-\Delta^2/2, -\Delta^2/2, 0\}$; + the fibered CONTRACT.F.01 refinement FTRANSFER-FIBERED-CARRIES: discrete PGL_2 base with $\text{CR} = 4/3$ exact, constant seam cocycle $\{0, \pm\Delta^2/2\}$, thermal-vs-RG coset split); `v778_qgeo_gridsup_logsum.py` (19/19+19/19: remainder (a) of the `v745` (L1) majorant FULLY closed in the corrected $(1 + \ln M)$ form; the literal `v715` all-refinements clause is FALSE at $r_1 = 1$ and repaired; certified grid Fourier log-sum theorem with explicit constants; GATE.QGEO does not move); `v779_gnet_gns_arf.py` (27/27+27/27: GNS precursors COHERENT — exact Haar tower, commuting index-4 expectations, duality defect 0 with ratio 4; the exact dim law $d_c(\ell) = 4^{\ell-1} + 2^{\ell-1} \cos(\pi c/2)$ makes the $\mathbb{C}[\mathbb{Z}_4]$ obstruction exactly $2^{-\ell}$ and explains the $\ell = 1$ anomaly; the honest negative: the $1+5+10$ echo is non-geometric, K_{matter} does not govern transport); `v780_z1_compactness_trilogy.py` (gates $3/4+1/4+$ legs $3/6$ with exactly the preregistered fails: the N2 family carries contact/collision/coupling natively but not the widening cadence; the finite boundary triple is exactly Herglotz and dies as a whitened $K=M/2$ import, cell-mass exactly 0.500 beyond the half-window; the raw variable-edge family is bounded (0.936) + equicontinuous (0.807) with summable $\sim$ rank-one entry poles, $c_{\text{mass}} 0.032 \ll 1$). Suite 766 $\rightarrow$ 773; all seven run standalone green and encode their preregistered patterns per the `v757` precedent.
- **Lean.** `TfptCarrier/ArfSpinorCompiler.lean` (23 kernel theorems: parity lift, $\beta = \text{symplectic form}$, selector uniqueness, Arf census, orbit partition, traceless/primitive X , moments $16/0/120/0$ with the chain, $\chi_{\text{NSR}} = \text{anchor bit}$, PS split, must-fail dot-form control) and `TfptCarrier/CellCocycle.lean` (18 declarations: exact Banachiewicz/bordered-Schur update, PD cell $\Rightarrow$ PSD correction $\Rightarrow$ monotone Loewner flow, bounded-monotone entrywise convergence naming the missing uniform Loewner bound, Redheffer/linear-fractional composition over arbitrary rings), both kernel-checked, `lake build` green; dated Lean notes added to the PRIME.QFCOCYCLE.01 and PRIME.GRAM.DIAGONAL.01 ledger rows.
- **Contracts.** FTRANSFER.CLOCKS.01 moves PENDING $\rightarrow$ EXECUTED (K1 kill as the frozen prior expected; freeze guards byte-verified; the four dictionary legs pass at $571 \times / 1.15 \times 10^{-4} / 0.83\% / 0.0602$); CONTRACT.F.01 carries the dated jet-route-closure + fibered-refinement note (next named step: coset assignment from KMS/modular clock typing); ARF.BOUNDARY.CODE.01 registered OPEN [O] (derive evenness/self-duality from the seam axioms; residuals R1–R3; kills named); GATE.QGEO dated note (residue (a) closed in $(1 + \ln M)$ form, the literal `v715` clause corrected, (b)/(c) open, gate does not move); GATE.METRIC.08/.11 dated notes (the $2^{-\ell}$ obstruction law as the finite precursor of the identification); PRIME.Z1.OPERATOR.01 and PRIME.KMS.INDUCTIVE_STATE.02 carry the measured unification (compactness carried, selection

= import-faithful coupling as the single shared open object; merged target Z1-COMPACTNESS, cross-referenced, no row deletion).

- **Ledger.** 6 new rows (ARF.SPINORCOMPILER.01, ARF.ROOTCLASS.01, ARF.BOUNDARY.CODE.01, QGEO.GRIDSUP.01, GNET.GNSLIMIT.01, PRIME.Z1.COMPACTNESS.01) + dated updates on FTRANSFER.CLOCKS.01, CONTRACT.F.01, QGEO.CARL1.01, GNET.LOCALNET.01, GNET.PPINDEX.01, GATE.METRIC.08/.11, PRIME.Z1.OPERATOR.01, PRIME.KMS.INDUCTIVE_STATE.02, PRIME.QFCOCYCLE.01, PRIME.GRAM.DIAGONAL.01; 849 → 855 rows; all measured/typed, NO marker moves anywhere.
- **Papers.** `tfpt_1/2`: the Arf compiler, the fired matter fence and the boundary-code uniqueness join the code sections (after the symplectic code lemma), and the G_{net} follow-ups gain the v779 continuum-strand paragraphs; `tfpt_3`: seven new audit blocks + dated notes on the v715/v745/v746/v773 blocks; `tfpt_prime_front`: the Arf-compiler round in the incidence programme, the QGEO ($1 + \ln M$) note, and the new section “The sharpened-Z1 trilogy: compactness carried, selection open”; `tfpt_research_contracts`: the executed clock contract, the fibered CONTRACT.F.01 note, the ARF.BOUNDARY.CODE.01 registration, the GATE.QGEO/GATE.METRIC notes, the Z1/KMS unification notes and the `CellCocycle.lean` legacy; `tfpt_4_frontier`: the jet-route-closure note.
- **Website.** Prime-front feed: the round entry “reflux round nineteen”; counters 766 → 773 modules / v535–v780; research-contracts and F_transfer mirrors updated (`papers.ts`, glossary, OpenGates, DAG nodes); README and Zenodo updated to 773 modules / v780.
- **Scope.** The exact results (Arf finite algebra + Lean, boundary-code census, sympy-exact clock kill and cocycle, the grid Fourier log-sum theorem, the dim law) sit behind explicit fences; the fired matter kill and the preregistered partials are criteria firing inside green machinery and stay on record; the honest residuals (R1–R3, residues (b)/(c), the import-faithful coupling) are named, not claimed; no marker moves; no RH claim anywhere.

2026-08-05 (LXI) (the qf offensive: **FIVE** promotions (v769–v773, from eight frozen preregistered probes, all first-run adjudications; suite 761 → 766 modules) — the diagonal Gram route CLOSES at a moving spectral edge, PRIME.GRAM.DIAGONAL.01 is closed per its own frozen stakes, and the sharpened PRIME.Z1.OPERATOR.01 takes over. **THE GATE-3 AUDIT PAIR:** v769 (merged, 5/5 gates + 34/168 cells, 14/14 + 14/14 guards+controls, qf-gauge/gate3prime-dead) — Gate 3’s full-ladder Cauchy demand on q_f was provably **STRONGER** than the diagonal contract needs: a deterministic ε -net subsequence (density 0.144) makes all 14 q_f profiles Cauchy at the exact parent bars the full ladder failed, and the contract’s own E_Y corner objects are **BLIND** to q_f motion (corr +0.038; the 0.34 mode-entry jump at $M = 888$ leaves the corners at routine level; 370 cross-cluster pairs, median $\rho = 1.13$) — q_f is **REPRESENTATION GAUGE**, owning the ε -scale distribution of the Yosida deficit, not the value (VAR_RATIO 0.021); the double limit is non-uniform (deficit X -slope grows 88× over four decades) but not certified singular; yet the corner-native weakened Gate 3’ **DIES** on its own predeclared 1.6×10^7 comb ($X = 16.5625$): the corner increments fall to $X \sim 12.9$ and then **RISE** sustained (+0.10..+0.34 per X unit at $\varepsilon = 10^{-3}$, 0/56 cells, broad-spectrum) — the v764 precondition is **REFUTED** at the corner level. **THE TRANSPORT PAIR:** v770 (merged, gates 4/5 + 4/5 with exactly the preregistered decider/Z fails, 19/19 + 14/14, qf-bundle-partial/qf-settles-positive) — the Kato/polar transport of the rank-6 near-kernel is well-defined with wide margins (rank stable on 888..972, gap 6/7 = 0.34..0.56, angles $\leq 2.72^\circ$, TV flattening) and repairs the rigid frame for 14/14 functions (median med5 ratio 26.7 → 1.004); the residual non-Cauchy part is the frame-independent band-weight drainage

(radial share ~ 0.64) — and the drainage was a TRANSIENT: on the 10^8 comb ($X = 18.375$) the band weights plateau at positive per-function constants ($R2$ family 0.2249–0.3583, $R1$ family 0.0082–0.0793; zero-bar depth $X^* \sim 227$, i.e. never), the 6/7 gap bottoms at 0.1008 then recovers to 0.1397, the 7th/8th threshold crossings (992/ ~ 1108) are typed, the holonomy exponent is ~ 1 (step refinement closed) — the Feshbach/boundary-triple treatment becomes MANDATORY. THE CENSUS: v771 (gates 6/12 with exactly the preregistered fails, 26/26 guards+controls, qf-representation-open) — the $6 = 1+5$ hypothesis $E_{qf} \cong E_7 \oplus E_{-2}$ FAILS the frozen census (the deployed scalar comb realizes only two characters of V ; no rank-6 lift exists; the near-kernel is a continuum-vs-odd-places balance, ro-dominant count 0/6 vs predicted 5) while the label side is exact and uniquely canonical ($BB^T = 4I + 3J$, spectrum (1,9,5); 27/27 wrong forms + 5/5 wrong labelings die on σ -sharpness); the honest residue: ONE rung-stable ram-odd contact direction ($\cos = 0.997$) plus a second contact at $\cos \sim 0.64$; the dimension match stays typed DECORATIVE. THE FIXED- d PAIR: v772 (merged, gates 9/12 with exactly cauchy-6/gap-7/gap-8 failing + edge-a fail/edge-b pass/KM2 quiet, 28/28 + 20/20, ~ 180 s at full frozen ladders per the v677 suite precedent, feshbach-partial/edge-keeps-moving; one declared guard-normalization correction of the G1.9 z -independence Ward, no gate bar touched, repeat run identical) — the $d = 6$ reduction is EXACT (reconstruction 8.8×10^{-13} against independent complex dense solves, 5 rungs $\times 5 z$) and matrix-Herglotz certified, but its Cauchy tail flattens where mode 7 grazes the band; $d = 7$ converges strongly ($b_2 = +0.502$) but loses separation at the top rung; $d = 8$ has an internal 8/9 crossing (87°); on the 10^9 comb ($X = 20.6875$, 160 s) the 7/8 edge closes into an AVOIDED CROSSING (gap 0.0039 at $M = 1240$, tail 0.0074 vs bar 0.10) while the transported $d = 7$ block stays Cauchy straight through; the 9th mode enters at $M = 1276$; the entry cadence WIDENS ($\Delta X = 1.625/1.8125/2.625$, mean 2.02, spread 0.381 — not regular at the frozen 0.25 bar) — fixed- d Feshbach is closed PERMANENTLY: convergence was never the problem, band ownership is. THE CLOSURE DECIDER: v773 (gates 2/8 with exactly the six convergence-cell fails, 14/14 guards+controls, cocycle-domain-only; one declared implementation correction: Hotelling refinement of the carried cocycle state after a numerically destroyed first execution, coefficients/algebra/gates untouched, the eigh-based layer reproduced identically) — STRUCTURE WITHOUT LIMIT: the exact Möbius/Redheffer cell identity holds at 9.7×10^{-12} over 73 rungs $\times 5 z$ (coefficients = the added source rows/columns; independent dense-solve Ward 1.3×10^{-13}), every cell Schur block is PD (min eig $D_k \in [0.0605, 0.0668]$ — a monotone Loewner flow), and the Nevanlinna/Stieltjes domain is preserved with ZERO breaches in all 730 rung $\times$ cell tests INCLUDING both typed mode-entry transitions ($M = 992$, $M = 1108$; transition increments unremarkable) — but no renormalized object converges at reachable depth (0/6 cells: the corner absorbs a flat $\sim 0.1\%$ per rung, the band increments rise with the moving edge). THE CONTRACT MOVES: PRIME.GRAM.DIAGONAL.01 CLOSED per its own frozen stakes (dated closure note with the full decision cascade: Gates 1/2/4 positive from round LX, Gate 3 dead at the corner level via v769, Gate 5/v764 never executed, cocycle domain-only; survivors typed: the exact anti-alias theorem v760, the unconditional paired Abel bound v761, the canonical dense family v762, the Kato bundle frame and settled levels v770, the Herglotz-certified exact Feshbach reduction v772, the domain-preserving cell cocycle v773; NO new variants, the ten-item stop-list stays binding); PRIME.Z1.OPERATOR.01 stays OPEN [O] and is SHARPENED (dated note: a self-adjoint geometric bulk operator

with a canonical finite-dimensional boundary/threshold structure whose Weyl M -function delivers the qf block and whose relative trace formula reproduces the full Weil formula; mandatory measured constraints: the Hecke/E8 bulk + archimedean lift, the moving-edge cadence (entries 888/992/1108/1276, ΔX widening $1.625 \rightarrow 2.625$, avoided crossing 0.0039), the ram-odd contact direction ($\cos = 0.997$), the settled coupling levels ($R2$ 0.225–0.358, $R1$ 0.008–0.079), the cell-ordered domain-preserving prime transport; additional kills: cadence/level contradictions = dead on arrival); the PRIME.KMS.INDUCTIVE_STATE.02 compactness note carries the dated follow-up (the q_f pointer is adjudicated; handover to the sharpened Z1). Papers: `tfpt_prime_front` gains the closure section “The qf offensive: the route closes at a moving spectral edge, and what survives”; `tfpt_research_contracts` carries the closure cascade + the Z1 sharpening; `tfpt_3` gains the five audit blocks. Both declared implementation corrections are carried verbatim in the module PROVENANCE blocks. No marker moves on evidence lines; NO RH claim anywhere)

2026-08-05 (Two working notes join the published document set)

- **note_e8_gaussian_code (working note N1) published.** The Gaussian code bridge: E_8 over $\mathbb{Z}[i]$ via Construction A over the extended Hamming code $[8, 4, 4]$ placed μ_4 -equivariantly, the canonical four-bit quotient $L/(1+i)L \cong \mathbb{F}_2^4$ (the 240 roots distribute exactly 15×16 ; the code returns as the message space), and the G_{31} quartic companion — exact-arithmetic probes $26/26 + 22/22$ (promoted as v689/v690) and 65 kernel-checked Lean 4 theorems. No claim beyond the stated algebra.
- **note_hilbert_polya_truncations (working note N2) published.** A computable, zeta-free truncation family for the Weil measure: measurements on a Hilbert–Pólya candidate (v714, v716–v721, v727–v734); SHA-256-frozen truncation spectra hit 100% of the first 377 zeta zeros at tolerance 0.25 with no prime table and no zero data in the construction path; the remaining statement (Weil positivity in the limit) localized in four machine-verified equivalent languages. Explicit no-proof fence: no theorem about ζ , no RH claim.
- **Structure sync.** Both notes registered in `build.sh` / `make_docs_map` / `make_manifest` / the document-set box, mirrored to the website (`papers.ts/release.ts`, new “working note” class) and added to the Zenodo deposit (description + upload list). The German-language big-picture overview (`big_picture_2026-08-02_de`) stays repo-only: the published set and website are English by house rule and no supplement pattern exists.

2026-08-04 (LX) (the diagonal gram round: NINE promotions (v759–v763, v765–v768; no v764 — the named unexecuted gate; suite $752 \rightarrow 761$ modules) — the frequency front closes exactly, the paired tail is unconditional, and the wall moves into q_f . THE OFFENSIVE FOUNDATION: v766 (17/17, handoff-bulk-converges) — the ε -regulated resolvent $G^\varepsilon = (A_X + \varepsilon I)^{-1}$ is the ADMISSIBLE operator-system evaluation; local Cauchy defects fall at $b = 0.174$ – 0.310 per X unit, ε -robust over three decades; the bare A^{-1} does NOT stabilize (+45%, named negative block); the layer decomposition is a CANCELLATION BALANCE (leading channel up to $1.9 \times 10^{12} \times$ the total defect); v767 (6/6, handoff-gram-converges) — the growing-frequency PSD source Gram: Candidate A missed honestly (slope +0.471 territory), the predeclared Candidate B (anti-alias $N_f = 2M+1$) converges (errors $0.0855 \rightarrow 0.0377$ over $\dim Q$ $738 \rightarrow 5734$, slope -0.369 ; PSD by construction, min symbol $+7.4 \times 10^{-3}$); v768 (merged from two probes, gates $11/13 + 4/4$, tail-weil-partial+compat-eps3-converges) — the quadrature tail TERMINATES ALGEBRAICALLY (2.4×10^{-13} uniform: no quadrature tail exists, every layer

error is structural), Weil identification on the frozen battery $\kappa = 0.97768 \rightarrow 0.99028$ (agreement 0.0485), all layer slopes -0.365 with atom+pole a $10.5\times$ cancellation pair, and the two frozen $\varepsilon = 10^{-3}$ endpoint fails of part 1 are DECIDED POSITIVELY by the part-2 preregistration on the deepest 36-rung ladder ($b = 0.178/0.186$, med5 $0.343/0.467$, $b_2 = 0.069/0.096$; first wall sign at $\varepsilon = 3 \times 10^{-4}$: $b_2 = -0.011$, reported never gated). THE SIX-STRAND DECISION LINE: v759 (8/8, resolution-boundary) — E_{total} is q -invariant under $N_f = q(2M+1)$ to $\sim 10^{-13}$ on all three fixed windows: the remaining handoff error is boundary/cutoff/object-gluing, NOT quadrature; v760 (14/14, antialias-corrected) — the anti-alias claim becomes an EXACT theorem of the M -cell space (Parseval 2×10^{-14} , moments 3.5×10^{-13} , Gram 5.9×10^{-13} ; exact alias formula matched at every count; must-fail witness error exactly 1 at $2M-2$); the sharp minimal count is CORRECTED to $N_{f,\min} = 2M-1$ (spread- S : $M+S$), the deployed $2M+1$ stays exact, nothing patched; v761 (merged, $24+10$ checks, combined abel-paired-bound) — the Stieltjes/Abel split is exact (6/6 sympy certificates), the matrix identity holds to 1.45×10^{-11} , E_{origin} closes via the W1/Suzuki bookkeeping (comb-independent, verified on the controls), and the UNCONDITIONAL bound $\eta_K = |\det_K| + |\Theta_K(0)E(1)| + B_1 I_K$ with $B_1 = 3.734$ frozen on the finite range holds for all 24 kernels on all 5 rungs with pure $1/\log X$ decay — NO RH-strength input; the companion DERIVES the correct breaker standard (symmetric zero-violation gate + envelope hypothesis): Epstein breaks at $B_1^E = 2.95 \times (7/24)$, scramble $262\times$, truth passes $24/24$; the parent's frozen abel-dead stays on record as the calibration lesson; honest typing: identity and slope-1 normalization are measure-generic, the certified ζ -specificity is envelope quality + measure positivity; v762 (26/26, dense-core-canonical) — the canonical countable dense test family of the (D, X) tower: admissibility LOCATED per class (hats direct; the bare box fails the r^{-2} criterion and enters only correlated/tent-read — named caveat), density rates hat -1.566 / box -0.503 per level, exact $\mathbb{Q}$ correlation closure on 8/8 type pairs, explicit stage map with I_{64} exact, and the 24 battery typed an initial diagnostic package (hat 8 IS family member hat(2,3), rank 35); v763 (merged, gates $9/10 + 7/12$ preregistered, yosida-partial/qf-dead) — the bounded Yosida transform carries the handoff rates with NO $1/\varepsilon$ bound and NO PD-margin assumption anywhere ($|b_Y - b_G| \leq 10^{-13}$, sandwich verified; the circularity kill did NOT fire), the near-kernel converges as an identified stable OBJECT, every fixed f has a monotone contraction-certified ε -limit — but q_f (the battery near-kernel pairing) is NON-CAUCHY at honest maximal depth ($X = 15.1875$, 279849 atoms, $4\times$ rung density) and SURVIVES orthogonalization by structural subordination (89–99.9% of every battery function lies in the 6-mode near-kernel span): Q3 closes NEGATIVELY — THE q_f WALL is the round's named wall object (density and near-kernel avoidance collide on the same function class); v764 NOT EXECUTED — its precondition (theorem-capable bounds from v761 AND v763) failed via Gate 3; documented as the named open gate inside the new contract, no module fabricated; v765 (merged, $16+8$ checks, redteam-green-combined) — firewall CLEAN (zero blacklist hits across all 21 source-path functions), baseline reproduced exactly, 8/8 controls break; RT6 decided: the symbol gate is the ONLY detector for excess-mode deck corruption (min symbol $-0.45..-1.72$, all other gates measurably blind), the deficit mode is caught by rate/ratio/ κ — BINDING: certificates must always carry BOTH gate families (symbol/PSD and rate/ratio/identification). THE NEW CONTRACT: PRIME.GRAM.DIAGONAL.01 registered OPEN — PSD source matrices G_n (no target decomposition, no zeros, no positivity tests) with corner error $\leq 2^{-n}$ against W on the canonical dense family $\Rightarrow$ Weil positivity on the rational span by PSD limits

+ density; decision state recorded (Gates 1/2/4 positive, Gate 3 negative on the canonical class = the q_f wall, Gate 5 not executed, redteam green; kills that did NOT fire: no RH-strength input, no spectral gap; the 10-item stop-list binding). **LEAN ROUND 7: GramCompactness.lean** (8 theorems), **AntiAliasExact.lean** (19 general- N theorems), **DenseWeilCore.lean** (42 theorems); lake build green (3402 jobs), manifest at 76 files. No marker moves; NO RH claim anywhere)

- **New modules** (9). v759_handoff_fixed_window_resolution.py (8), v760_antialias_exact.py (14), v761_atom_pole_abel.py (24+10, one module from two probes per the v518/v668 precedent, the preregistered C.EPSTEIN miss encoded per the v757 pattern), v762_dense_weil_core.py (26), v763_yosida_handoff.py (12+14 guards/controls, gates 9/10 + 7/12 preregistered), v765_handoff_redteam.py (16+8), v766_handoff_bulk.py (17), v767_handoff_frequency_gram.py (6), v768_handoff_tail_weil.py (12+8 guards/controls, gates 11/13 + 4/4) — all wired into run_all.py (suite 752 → 761, ALL CHECKS PASSED); discovery probes remain in experiments/tfpt-discovery/ with frozen results.
- **Lean.** TfptCarrier/GramCompactness.lean (8 theorems — the abstract finite-stage Gram compactness/diagonal-extraction closure for the contract’s compactness step), TfptCarrier/AntiAliasExact.lean (19 general- N theorems: discrete orthogonality, offset-invariant exact quadrature, Parseval, moment reconstruction, threshold witness, midpoint alias sign; axioms only propext/choice/Quot.sound), TfptCarrier/DenseWeilCore.lean (42 theorems: enumeration bijection, stage bounds, grid module closure; honest analytic remainder in the header); imports added to TfptCarrier.lean; lake build green (3402 jobs); lean_manifest.sha256 at 76 files.
- **Contracts.** PRIME.GRAM.DIAGONAL.01 registered OPEN [O] in tfpt_research_contracts + ledger (target form, the round’s measured decision state, the not-fired kill criteria, the 10-item stop-list, and the unexecuted Gate 5 = the planned v764 documented as the named open gate); PRIME.KMS.INDUCTIVE_STATE.02 gets the dated note: the compactness step now has MEASURED handoff evidence (v766/v767/v768) and the abstract Lean closure (GramCompactness.lean); the surviving open object is the q_f wall of v763.
- **Ledger.** 9 new module rows (PRIME.HANDOFFRES.01, PRIME.ANTIALIAS.01, PRIME.ABELPAIR.01, PRIME.DENSECORE.01, PRIME.YOSIDAQF.01, PRIME.HANDOFFREDTEAM.01, PRIME.HANDOFFBULK.01, PRIME.HANDOFFGRAM.01, PRIME.HANDOFFTAIL.01) + the contract row + the dated KMS note; finite convergences typed measured, exact results typed [E]; the honest deaths/PARTIALs (tail-weil $\varepsilon = 10^{-3}$ first pass, QF-DEAD, parent ABEL-DEAD) documented as such; NO marker moves.
- **Papers.** tfpt_prime_front: the new round section “The diagonal gram round: the frequency front closes exactly, the paired tail is unconditional, and the wall moves into q_f ” (all nine \veri citations); tfpt_research_contracts: the PRIME.GRAM.DIAGONAL.01 contract block + the KMS dated note; tfpt_3: the round’s audit block.
- **Website.** Prime-front feed: the round entry “the diagonal gram round”; counters 752 → 761 modules / v535–v768; README and Zenodo updated to 761 modules / v768.
- **Scope.** The exact results (anti-alias identities, Abel identity + unconditional η_K , dense-core algebra, three Lean modules) sit behind explicit fences; the PARTIALs and deaths are preregistered criteria firing inside green machinery and stay on record; no RH claim, no marker moves; the $\varepsilon \rightarrow 0$ wall (PD persistence) and the battery-limited identification remain open exactly as quantified.

2026-08-04 (LIX) (the incidence programme: SEVEN promotions (v752–v758, 134 new checks, all green; suite 745 → 752 modules) — the second external

review, fully adjudicated: five exact wins, one decorative seven, and the keystone negative that names the wall as the missing factor. **THE CENTERPIECE:** v752 (36/36, proj-hamming-exact) — the projective Hamming incidence lemma on $V = L/(1+i)L$: $h = H/4$ is $\mathbb{Z}[i]$ -valued with hermitian Gram determinant 1 (the UNIMODULAR hermitian E8 lattice over $\mathbb{Z}[i]$), $\bar{h}$ alternating and nondegenerate, so $(V, \bar{h})$ is symplectic over $\mathbb{F}_2$; on the 15 points $BB^\top = 4I + 3J$ EXACT with the design parameter set 2/3/4/7/15/16 and eigenvalues $7^1(+2)^9(-2)^5$ (the multiplicities (1, 9, 5) are the symplectic signature); $K^2 = (4/49)I + (45/49)\Pi_0$; NS/R is a POINT of the geometry ($\chi_{\text{NSR}} = \bar{h}(\cdot, \text{FSUM})$, the anchor bit; $248 = 120 + 128$); **THE v737 RESOLUTION:** the seam-48 distribution 0:96/1:64/2:64/3:16 derived exactly ($16 \times$ the 3×5 label table) AND the 5×48 coordinatization exists via exactly ONE $\bar{u}$ -invariant spread (kill explained, not revised); two honest corrections to the review derivation documented; companion Lean module `ProjectiveHamming.lean` (32 theorems, kernel-checked, lake build green 3391 jobs). **FOUR MORE WINS:** v753 (25/25, polarity-match) — the 15 ramified Hecke hyperplanes ARE the $\bar{h}$ -orthogonal spaces, canonical bijection $y(\varphi) = \bar{G}^{-1}\varphi$, σ -functorial, deck and parity commute; canonicity census: exactly 1 of 28 nondegenerate alternating forms is σ -invariant $= \bar{h}$; v754 (19/19, twostep-exact) — the real $n \rightarrow 4n$ down-up pass IS exactly K^2 , degree factor $196 = (2 \cdot 7)^2$ closed, KMS half-weight exponent-exact, identical integer matrix on all 9 contexts, $T = 4B^2$, cone-preserving; honest boundary: naive label chains do not carry K^2 (correspondence composition mandatory); v755 (13/13, schur-recursion-alive) — $S_k \succeq 0$ on all 8 ram-odd stages of the tower nesting ($\lambda_{\min}$ flat, long-double-hardened), Douglas trivial, controls break immediately; the Albert/Haynsworth induction frame stands; honestly: for ζ data equivalent to tower PD — the remainder is the structural Gram certificate; v756 (7/7, kms-incidence-cp-covariant) — 105 explicit Kraus terms, all four compatibilities exact (σ at 0, half-weight 10^{-16} , $\beta=1$ balance 7×10^{-18} , Gate-0) — step 3 of the master contract SOLVED on the ramified layer; local candidate state $\tau_{\text{inc}} \otimes \tau_{\text{Toeplitz}}$. **THE DECORATIVE SEVEN:** v757 (26 checks, one preregistered break, fano-disc7-decorative) — the preregistered four-condition Fano $\rightarrow$ discriminant(-7) test breaks exactly at condition 2: 2 splits in $\mathbb{Q}(\sqrt{-7})$ so the 2-rank is $\leq 2 < 3$, the code $\mathbb{F}_2$ -structures are arithmetically unrealizable; the three-cycle half is real (Fano $\bar{\sigma}$ = the $\times 2$ multiplier, C corner = fixed point, norm $14 = \dim G_2$); the seven-correlation is permanently typed decorative. **THE KEYSTONE:** v758 (8/8, cert-continuum-root-dead) — the review certificate [continuum root $\oplus$ Kraus] is NOT mountable, the wall IS the missing left factor (arch+pol PSD at no stage, Levinson break exactly between the $n=2/n=3$ cells ladder-wide, already W_0 indefinite); real remain the [E] building blocks + the corrected target shape: cell-wise cascade factorization, rescue strictly cell-ordered. **CONTRACTS:** PRIME.PD.PERSISTENCE.01 gets the big dated update (induction form registered / assembled certificate closed / cell-wise factorization the named open object); PRIME.KMS.INDUCTIVE_STATE.02 carries the step-3-solved note. No marker moves; no RH statement anywhere)

- New modules (7). v752_projective_hamming_incidence.py (36), v753_ramified_polarity.py (25), v754_ramodd_twostep.py (19), v755_simpler_schur_recursion.py (13), v756_kms_incidence_stinespring.py (7), v757_fano_disc7_bridge.py (26, one preregistered break), v758_simpler_certificate.py (8). Suite 745 $\rightarrow$ 752 modules, ALL CHECKS PASSED; the one [FAIL] line in the green run (v757 C2.d) is exactly the preregistered honest break. All seven probes re-run before promotion (outputs identical modulo runtimes).

- **Lean.** `TfptCarrier/ProjectiveHamming.lean` committed (32 theorems, kernel `decide/norm_num` only, no `sorry/native_decide`; lake build green, 3391 jobs); import added to `TfptCarrier.lean`; `lean_manifest.sha256` regenerated (73 files).
- **Contracts.** `PRIME.PD.PERSISTENCE.01`: the big dated update — (i) the induction form registered (the Schur ladder on the canonical tower, v755; open need = the structural Gram certificate per step, measured boundary data recorded), (ii) the assembled certificate a CLOSED route (the v758 keystone negative: the wall is the missing left factor), (iii) the corrected target shape (cell-wise cascade factorization) the named open object. `PRIME.KMS.INDUCTIVE_STATE.02`: dated note — step 3 (complete positivity) solved on the factorized ramified 15-label Toeplitz layer (v756); the remainder stays exactly the compactness step.
- **Ledger.** 7 new module rows (`E8.PROJHAMMING.01`, `PRIME.HECKEPOLARITY.01`, `PRIME.HECKETWOSTEP.01`, `PRIME.SCHURREC.01`, `PRIME.KMSSTINESPRING.01`, `QGEO.FANODISC7.01`, `PRIME.CERTROOT.01`) + dated notes on `PRIME.PD.PERSISTENCE.01`, `PRIME.KMS.INDUCTIVE_STATE.02` and `E8.SEAM48.01` (the v737 resolution); 828 → 835 rows.
- **Papers.** `tfpt_prime_front`: the new section “The incidence programme: five wins, one decorative seven, and the wall as the missing factor” (the $BB^T = 4I + 3J$ formula prominent with the 2/3/4/7/15/16 design set, the v737 resolution, the keystone negative). `tfpt_1/tfpt_2`: the symplectic code lemma added to the code sections. `tfpt_3`: seven audit blocks.
- **Website.** Prime-front feed: the round entry “the incidence programme”; counters 745 → 752 modules / v535–v758; README and Zenodo updated to 752 modules / v758.
- **Scope.** The exact lemmas are finite census/incidence statements behind explicit fences; the two honest negatives (v757, v758) are preregistered criteria firing inside green machinery; excluded on purpose: `big_picture_*`, `note_*`, `articles/`, the news-checker note and the other worker files; no marker moves; no RH statement anywhere.

2026-08-04 (LVII) (the full day wave: TWELVE promotions (v740–v751, 157 new checks, all green; suite 733 → 745 modules), the frozen external-clock preregistration, Lean round 6 (47 new theorems), and the retroactive record of the editorial commit. THE KMS END-FORM: v740 (8/8, kms-extension-dead) — the strong master contract form is algebraically dead twice: $\beta = 1$ KMS is impossible on Gate-0’s nonzero-grade Laurent unitaries ($T(u_p u_p^*) = 1$ vs $T(u_p^* \sigma_i(u_p)) = 1/p$, exact defects 1/2, 2/3, 4/5), and exact covariant *-restrictions do not exist; local extended Gram positivity survives (55,296 monomials/window); v741 (9/9, kms-toeplitz-dead) — the Bost–Connes semigroup Toeplitz correction repairs the algebraic KMS step COMPLETELY (boundary error $10^{-2} \rightarrow 10^{-9}$, directed system), but the covariant inductive step stays dead (UCP covariance nonmonotone, preregistered); the master contract is refined to `PRIME.KMS.INDUCTIVE_STATE.02` (operator-system compactness; keep the proven local blocks, ask only for a weak-* cluster state). THE CHANNEL ANATOMY: v742 (14/14, interference-collective) — the W3 margin is ONE collective scalar balance (arch + ram-odd vs split + inert), strictly monotone over 35 windows, with TWO exact Ward identities ($\sum c = 0$ to 1.8×10^{-15} ; rigid block = $\dim \cdot \dim \cdot m_0$); no pair reduction; scramble $\times 2 \times 10^3$ – 3.9×10^6 ; v743 (7/7, schur-cone-dead) — exact Moebius update (2.9×10^{-41}) + exact T^*JT identity, then the one-liner kill: cone-preserving iff layer-positive, and no prime layer is ($c_0 = 0$) — layer-wise recursion is the wrong granularity level; v744 (15 checks, hecke-sos-channels-partial) — no canonical column choice factorizes (cos-half indefinite; PSD- B^*B consumes 5–6 orders beyond the margin); the Ihara channel route fails coherently (channels grade positions, positivity lives in frequencies — structural, not ζ -specific); finiteness

measured: $\dim 16$ vs $168\text{--}862$ required frequencies. **THE PROOF BLOCK:** v745 (11/11, l1-sector-proven-modulo-elementary) — (L1) of the CAR majorant lemma proven modulo elementary steps for all 6 sectors (exact geometric sums instead of Euler–Maclaurin, leading term at 6×10^{-4} , $\gamma = 2$ derived, $39744+108$ inequalities 0 violations, $r_1 = 1$ sharp); **GATE.QGEO** does not move (L2 hard-technical, L3 medium remain). **THE NET THEOREM:** v746 (16/16, gnet-local-functor-alive) — net axioms exact (isotony/graded locality/clock covariance), Watatani index **LOCALLY** exactly 4 for every interval $\ell \geq 2$, Ramond = half-line/bond defect (solitonic; leakage $\sqrt{2/N}$); 4 must-fails fire. **THE ZUSE/WOLFRAM ADJUDICATION:** v747 (24/24, mixed) — the tower as a confluent multiway system: diamond exact (CRT theorem), branchial = Grassmann $[4, 2]_q$ at the prime places (the one new fingerprint), Λ recursion = causal path statistics; A2/A4 renamings, A1/A3 useful typings; v748 (15/15, equivalently-useful) — the σ -quotient is confluent everywhere (two-line lemma: σ is a multiway automorphism); only the half-orbit **WEIGHTING** breaks, exactly at the ramified place, same location as $[D, A]$, not the same object; rests as exploration + the one reference sentence in the introduction’s Zuse positioning. **THE SIMPLIFICATION TRILOGY:** v749 (8/8, tower-nested-reduces) — **THE** structural upgrade: the window quantifier reduces exactly to the nested (D, X) tower (**X**-nesting 6.7×10^{-18} , dyadic D -refinement exact — PD fine forces PD coarse; every deployed window a tower member at dev 0.0); the canonical truncation replaces the historical window family in **PRIME.PD.PERSISTENCE.01**; honest limits: incommensurable chains, falling margins; v750 (5/5, gluing-detector) — the gluing identity is an off-line detector at identity level (sees $\delta = 0.01$, sharper than the PD break $\delta^* = 0.02$; envelope slope measures δ); the rigidity thesis honestly false (the identity holds unconditionally); v751 (15/15, ward-monotone-mixed) — running deterministic in direction (100%, parameter-free ζ/L constants, $\mp u/2$ drifts from $p^2 \equiv 1 \pmod{4}$, slope-Ward cancellation 4×10^{-4} — the margin inherits **ZERO** deterministic drift), but the balance sign is zero content (budget $2.9 \times 10^4 \times$ margin) — the induction route is RH-circular. **THE CLOCK PREREGISTRATION:** experiments/ftransfer-clocks/committed (design YAML byte-frozen + contract note) and **FTRANSFER.CLOCKS.01** registered in the contracts paper — four frozen external clocks (proper time / inverse temperature / RG time / e-folds), the one-class Riccati/Schwarzian prediction (the seam channels transport to $-\Delta^2/2$ exactly), three kills (K1/K2/K3), honest prior “expected: K1 kill”; executor **PENDING** (the FTC.01 data interfaces need curated g_{*s} /PDG overlay tables first). **LEAN ROUND 6:** TraceLedger.lean (28 theorems — the finite Gauss-quadrature trace formula as an exact ledger kernel, monic-Jacobi intertwining certificate, sharp must-fail at m_6) + PinningLemma.lean (19 theorems — L-PIN-1 Wilkinson + L-PIN-2 Kato–Temple/Temple positivity in sqrt-free rational form); lake build green (3390 jobs), no sorry/native_decide. **RETROACTIVE RECORD:** commit 414471b2 (2026-08-04, between LVI and this round) was the pure editorial restructuring of tfpt_prime_front — no content changes, the ~ 248 -page paper reorganized into parts with part intros; recorded here for the dated trail. **NO RH claim, NO marker moves)**

- New modules (12).

v740_kms_extension_switch.py	(8),	
v741_kms_toeplitz_semigroup.py	(9),	v742_channel_interference.py (14),
v743_schur_cone_recursion.py	(7),	v744_hecke_channel_columns.py (15),
v745_qgeo_car_l1_sector_lemma.py	(11),	v746_phys_gnet_local_functor.py (16),
v747_automaton_multiway_tower.py	(24),	v748_automaton_sigma_orbifold_confluence.py
		(15), v749_simpler_tower.py (8), v750_simpler_gluing.py (5), v751_ward_monotone.py

(15) — 157 checks, each promoted verbatim from its discovery probe with numbers frozen from the promotion run (all twelve probes re-run before promotion; outputs identical modulo runtimes; sibling imports resolve against the promoted v696/v716/v718/v735/v740/v747 modules). The three [FAIL] lines in the green run (v740 K1.ii/K1.iii, v741 T2.ii) are exactly the preregistered honest kills.

- **Lean.** `TfptCarrier/TraceLedger.lean` (28 theorems) + `TfptCarrier/PinningLemma.lean` (19 theorems) committed (kernel-checked, no sorry/native_decide; lake build green, 3390 jobs); imports added to `TfptCarrier.lean`; `lean_manifest.sha256` regenerated.
- **Contracts.** `PRIME.KMS.INDUCTIVE_STATE.02` registered (operator-system compactness end-form; .01 annotated as settled at the finite level); `PRIME.PD.PERSISTENCE.01` restated on the canonical nested tower (`PRIME.TOWERNEST.01` paragraph); `FTRANSFER.CLOCKS.01` registered (executor pending); dated `GATE.QGEO` note (the (L1) proof block).
- **Ledger.** 12 new module rows + 2 new contract rows (`PRIME.KMS.INDUCTIVE_STATE.02`, `FTRANSFER.CLOCKS.01`) + dated notes on `PRIME.KMS.INDUCTIVE_STATE.01`, `PRIME.PD.PERSISTENCE.01`, `GATE.QGEO.01` and Lean notes on `PRIME.MOONSHOT.05/PRIME.K1CAPTURE.01`; 813 → 827 rows.
- **Papers.** `tfpt_prime_front`: the new section “The simplification wave” (the tower upgrade, the two closed hopes, the KMS end-form, the channel anatomy). `tfpt_2`: the G_{net} local-net paragraph (the algebraic-QFT counterpart of the OS package). `tfpt_3`: 12 new audit blocks. `introduction`: the one Zuse-positioning reference sentence (the multiway reading measured out, equivalently useful).
- **Website.** Prime-front feed: the round entry “the full day wave”; counters 733 → 745 modules / v535–v751; README and Zenodo updated to 745 modules / v751.
- **Scope.** Five honest kills promoted as encoded expected outcomes (preregistered criteria fire inside green machinery); the exact lemmas are finite/census statements behind explicit fences; the clock contract is a preregistered search-target design typed [X] with the honest prior “expected: K1 kill”; no marker moves; no RH statement anywhere.

2026-08-04 (LVI) (the morning after: **FOUR** review strikes (v736–v739, 104 new checks, all green) — two exact structural lemmas, two honest kills, and two new research contracts. **STRIKE 1, EXACT** (v736, 26/26, orbit-packet-exact): the Gaussian ORBIT PACKET lemma — Burnside $7 = (15+3+3)/3$ on the 15 nonzero classes; the canonical packet split $240 = 5 \times 48$ (one fixed block + four moved blocks of 12 Gaussian lines each, label-free canonical; packets = $1 + 4 = 5 = g_{\text{car}}$); the (1, 1, 2) anchor from the fixed-syndrome leader weights (0, 1, 1, 2) with leader pair e_6/e_7 = the v638 anchor pair; the $q = 16$ normal form $240 = 16 \cdot 15$, $248 = 240 + 8$; the CIRCULARITY FENCE is part of the lemma — P1/P2 come back as EXACT-INTERNAL-RECONSTRUCTION (reconstruction, NOT derivation), and the packet law is σ -CLASS-specific (160 free order-3 elements of G31 give Burnside 5); companion Lean module `OrbitPacket.lean` (34 theorems, kernel-checked, lake build green at 3388 jobs). **STRIKE 2, DEAD** (v737, 24/24 machinery, seam48-dead): the seam-48 intertwiner — the sharpest structural sharpening — dies on its preregistered criterion: the 48×5 incidence matrix is NOT identically 1 (entry distribution 0:96/1:64/2:64/3:16), representative-independent (0 of 2304 order-5 elements) with the must-fail control firing (0 of 25 random operators); valuable residues: the four moved blocks carry the v623 character table EXACTLY, the fixed block deviates exactly by the 12 lifted marks, $u^5 = \pm J$ exact — $240 = 48 \cdot 5$ remains a factorization WITHOUT coordinatization. **STRIKE 3, EXACT** (v738, 34/34, hecke-mod-ramified-channels): the Gaussian–E8 Hecke tower projects onto

$V = L/(1+i)L$ exactly and σ -functorially over ALL 5907 submodules (no kill); odd layers act as degree $\cdot \text{id}$ (the fiber is Hecke-rigid); the ramified layer IS the 15 hyperplanes with the 2:1 deck; channels = the 7 σ -orbit channels +1 trivial (resolving 7-vs-8); NS/R = the σ -fixed parity character (v722 re-derived); ram-odd ($n = 2, 8, 32, \dots$) is the unique negative-pressure channel; honest boundary: the W3 margin is CROSS-CHANNEL CANCELLATION — no transfer-matrix reduction from the projection alone. STRIKE 4, DEAD (v739, 20/20, rank3-jet-dead): the review’s first-jet reading of the rank-3 wall is killed by its own ε^0 test — the jet read itself is EXACT (the lock block as the first jet of ONE function to 4.6×10^{-16} , Loewner coordinates, odd-sector Schwarzian form $[1 - r_{12}^2]_{\text{odd}} = (3/8) S[\tilde{g}](1) \varepsilon^4$), but the ε^0 coefficient is identically 1 (not 0), the even sector exceeds the net entry ($1.15\text{--}6\times$), and the pure jet block carries no collinearity (factor $\geq 1.9 \times 10^3$): the third power is even/odd COMPENSATION (T-B substance), not a jet identity; class (c) for the envelope route; krein-link-weak (correlation 0.678 vs control 0.946). TWO NEW CONTRACTS: PRIME.KMS.INDUCTIVE_STATE.01 (the review master contract — extend the v733 Gate-0 functor to a positive global KMS state at $\beta = 1$ with $T_h = \omega \circ \iota_h$; five separation steps individually named; kill = complete positivity failing already on a finite extension) and PRIME.PD.PERSISTENCE.01 (the universal-theorem form of the wall with the important correction $\lambda_{\min} \geq 0$ instead of $\geq \delta$ — the Ihara lesson: exact zero modes after rank saturation are admissible; target = cofinally infinitely many PD windows via state/Gram/cone-preserving recursion, NOT eigenvalue bounds; the review blocklist confirmed as permanent kills). NO RH claim, NO marker moves)

- **New modules (4).** v736_orbit_packet.py (26), v737_seam48_intertwiner.py (24 machinery), v738_hecke_mod_ramified.py (34), v739_rank3_jet.py (20) — 104 checks, each module promoted verbatim from its discovery probe with numbers frozen from the promotion run (all four probes re-run before promotion; outputs identical modulo runtimes; sibling imports resolve against the promoted v563/v683/v696 modules).
- **Lean.** TfptCarrier/OrbitPacket.lean committed (34 theorems, kernel decide/norm_num only, no sorry/native_decide; lake build green, 3388 jobs); import added to TfptCarrier.lean; lean_manifest.sha256 regenerated with the new file.
- **Ledger.** 4 new module rows (E8.ORBITLETTER.01, E8.SEAM48.01, PRIME.HECKEMODRAM.01, PRIME.RANK3JET.01) + 2 new contract rows (PRIME.KMS.INDUCTIVE_STATE.01, PRIME.PD.PERSISTENCE.01) + dated notes on E8.GAUSSIAN.CODE.01 (orbit packet closed, seam-48 dead), PRIME.Z1.MOONSHOT.01 (the ramified fiber typed exactly) and PRIME.RANK3FUNC.01 (the jet simplification dead); 807 $\rightarrow$ 813 rows.
- **Papers.** tfpt_prime_front: the new section “The morning after: four review strikes” (the two exact structures, the two graves, the 7-channel structure, the documented exact jet/Loewner/Schwarzian forms, the two new contracts). tfpt_research_contracts: the two new contracts + the review blocklist confirmed as permanent kills. tfpt_1/tfpt_2: the orbit packet lemma in the code sections (the compact number-family table with the circularity fence; the seam-48 kill recorded). tfpt_3: 4 new audit blocks.
- **Website.** Prime-front feed: the round entry “the morning after: four review strikes”; counters 729 $\rightarrow$ 733 modules / v535–v739; README and Zenodo updated to 733 modules / v739.
- **Scope.** Two honest kills promoted as encoded expected outcomes (preregistered criteria fire inside green machinery); the exact lemmas are census/reconstruction statements behind explicit fences (no P1/P2 derivation claim); no marker moves; no RH statement anywhere.

2026-08-03 (LV) (the closing slice: ONE promotion (v735, 10 construction checks,

green) — the L1 route portfolio completed honestly, plus one number-fidelity fix on the website. THE STATE-TRANSPORT ROUTE STAGNATES (v735, 10/10, ucp-stagnates): for each window the simple-spectrum GNS shift generates the commutative spectral algebra $C^*(J_h, 1) = \mathbb{C}^h$, so a UCP map is exactly a row-stochastic transport kernel and the Choi SDP reduces to a finite transport LP — all eight adjacent maps along the nine-window ladder exist CANONICALLY as monotone quantile couplings (unitality/state preservation to $3.1 \times 10^{-12}/1.2 \times 10^{-15}$, Choi minimum 0), every Choi rank inside the sharp transport bound $h + h' - 1$ (ranks 344..2688, log-log slope 0.991 vs bar 1.25: LINEARLY controlled sparse-transport ranks) — but the preregistered covariance gate S2.3 FAILS HONESTLY (aggregate shift/grade/phase defects 0.797..1.227..0.058: slope -0.487 , tail not monotonically decreasing): mere state transport is NOT the missing L1 mechanism; the optimal maps are quantile Markov/conditional-expectation couplings, NOT *-homomorphisms (multiplicativity defects $\sim 5\text{--}8 \times 10^{-3}$ quantify the operator-system-vs- C^* obstruction); the full noncommutative groupoid algebra was not tested. THE PORTFOLIO, complete: Sonin transfer dead (v732), UCP stagnates (v735), Gate 0 weak functor (v733), Suzuki bridge a measurement (v734) — what remains for L1 is atomicity/identification substance, not transport machinery. QUALITY FIX (website only): the prime-front feed entry for v727 misquoted the Carleman evidence as “band 0.34–0.41 vs the 0.5 threshold”; corrected to the docstring values — the measured Gauss/Freud growth band $[0.638, 1.117]$ makes the Carleman sum diverge (all repository surfaces — ledger, registry, run_all, papers — already carried the correct band; the remaining v727–v734 feed numbers spot-checked against the docstrings, no further discrepancy). NO RH claim, NO marker moves)

- **New module (1).** v735_strat3_ucp_inductive.py (10 construction checks) — promoted verbatim from strat3_ucp_inductive_probe.py (probe re-run before promotion; output identical modulo runtime; the sibling import rewired to the promoted v718 module).
- **Ledger.** 1 new row (PRIME.UCPLIMIT.01) + the dated LV closing-slice note on PRIME.Z1.MOONSHOT.01 (the L1 route portfolio complete; stays OPEN); 806 $\rightarrow$ 807 rows.
- **Papers.** tfpt_prime_front: one closing-slice passage in the keystone section (the portfolio sentence); tfpt_research_contracts: PRIME.Z1.MOONSHOT.01 update V; tfpt_3: 1 new audit block.
- **Website.** Counters 728 $\rightarrow$ 729 modules/v535–v735; the Carleman number-fidelity fix in the keystone feed entry; README + Zenodo 729/v735; generated surfaces regenerated.

2026-08-03 (LIV) (the keystone round: EIGHT promotions (v727–v734, 90 new checks, all green) — THE WALL IN FOUR EQUIVALENT LANGUAGES, the K1 diagram closed classically, and honest graves for two strategy routes. THE WALL, MAXIMALLY PRECISE (v727, 11/11, l1-determined-wall-typed): determinacy of the limit moment problem is CLASSICAL (the raw τ -measure does not carry the limit; Gauss-damped Weil moments identify against the closed geometric side at 1.4×10^{-3} over $m_0..m_{16}$; the measured Gauss/Freud band $[0.638, 1.117]$ makes Carleman diverge) and the identification chain (a)–(d) contains RH NOWHERE (Weil 1952 unconditional); the seeming paradox resolves honestly — “ T_h is PD” is a MEASUREMENT per h , not a theorem (scramble: Levinson death at depth 61); the one remaining statement is PD PERSISTENCE: infinitely many PD windows suffice for RH, each window a

FINITE Levinson decision, measured 9/9 (min headroom 0.718); the converse is NOT shown; equivalently (Riesz–Haviland): the geometric side defines a positive measure on $\mathbb{R}$. THE FOURTH LANGUAGE (v734, 10/10, s1-canonical-suzuki-bridged): the Jacobi/Wheeler data define via an EXACT Krein correspondence (Weyl identity 1.6×10^{-15} , nilpotency 3.1×10^{-16}) a canonical-system Hamiltonian per window with $H_h \geq 0$ MEASURED on all nine (min $l_k = 0.033..0.377$); the boundary phase carries the γ -side at scale EXACTLY 1; scramble breaks the Wheeler/Krein chain at depth 31; Suzuki (JFA 2021, GRH $\equiv$ positivity of the canonical family, unconditional only $\omega > 1$) becomes the fourth anchor — so the wall now reads: moments (Hankel-PD) / state (Levinson-PD) / symbol (Fejér ≥ 0) / Hamiltonian (Krein $l_k > 0$), each finitely decidable per window, the h -quantifier IS the RH substance. THE K1 DIAGRAM CLOSSES CLASSICALLY: the memo’s locality/symmetry mechanism for the $\sim 900 \times$ super-resolution is DEAD on two preregistered bars that die honestly (v728, 11/13, k1b-atom-pinning) — what carries the scale is ATOM PINNING of the raw measure (Nevai-type; lab rate $K^{-1.84}$, weight ratio $\rightarrow 1.03$, real correlate 0.64; off-line pairs break POSITIVITY instead of mislocating nodes); behind it the explicit PINNING LEMMA is certified (v730, 12/12: residual bound + Kato–Temple, one-line proofs, 0 violations at 598 peaks/535 matched zeros incl. ALL 377 of the largest window, SHA256-frozen; the certificate SATURATES at window width — sub-width precision needs atomicity beyond every window depth = L1, the sharpest localization); the gap layer: strong measured universality KILLED on the preregistered bar (v731, 5/5, gap-univ-killed: deviation plateaus 0.33; the uniform-in- h Szegő condition breaks like $h^{-0.64}$; a fixed-window CONDITIONAL candidate remains via Lubinsky 2009/Levin–Lubinsky 2008/Avila–Last–Simon 2010/Totik 2009) — so: capture theorem (v721) + pinning lemma (v730) + conditional gap rigidity (v731) + atom structure (= L1) = K1. TWO HONEST GRAVES: naive reflection positivity is DEAD on the truncations (v729, 5/5, rp-dead-on-truncations: the total window fails plain AND KMS-twisted RP at full scale; the FE symmetry buys exactly the atom-free Connes–Consani 2021 regime $|u| < \log 2$ and no more; bulk universality EMERGING at gap points, $0.304 \rightarrow 0.150$; the pinning lab reproduces the super-resolution scale, spacing/error up to $211 \times$); and the DIRECT transfer of the Connes–Consani Sonin compression is DEAD (v732, 21/21 construction checks, sonin-rank-grows: bad rank $19 \rightarrow 86$; fenced — not the CC mechanism itself, retuning forbidden). PLUS THE FIRST EXACT BRIDGE INTO CONNES’ FRAMEWORK (v733, 13/13, gate0-weak-functor: the σ -descended groupoid maps by an exact coefficient-one graded $*$ -algebra functor candidate into the S -local periodic-orbit subalgebra, $S = \{\infty, 2, 3, 5\}$, 6859 convolutions at deviation 0, $\kappa \equiv 1$ at all three places; full-algebra extension typed OPEN). THE LITERATURE ANCHOR, as the dual council reads it: the wall has three names — Weil 1952 (explicit-formula positivity), Connes 1999/Connes–Consani 2021 (trace formula/atom-free regime), Suzuki 2021 (canonical-system positivity) — with Meyer 2005 the proven boundary line (unconditional spectral realization WITHOUT positivity); TFPT adds the computable zeta-free truncation framework with emergent prime places and per-window decidability. NO RH claim, NO marker moves)

- New modules (8). v727_l1_identification.py (11), v728_k1b_superresolution.py (13; the two preregistered memo-bar deaths B1.1/B2.2 encoded as the expected promoted outcome), v729_strat2_rp_universality.py (5), v730_strat2_pinning_lemma.py (12), v731_strat2_gap_universality.py (5), v732_strat3_sonin_prolate.py (21),

v733_strat3_gate0_census.py (13), v734_s1_canonical.py (10) — 90 checks, each module promoted verbatim from its discovery probe with numbers frozen from the promotion run (all eight probes re-run before promotion; outputs identical modulo runtimes; sibling imports rewired to the promoted v696/v714/v716–v721 modules).

- **Ledger.** 8 new rows (PRIME.L1IDENT.01, PRIME.K1BPIN.01, PRIME.RPUNIV.01, PRIME.PINLEMMA.01, PRIME.GAPUNIV.01, PRIME.SONIN.01, PRIME.GATE0.01, PRIME.S1CANON.01) + the dated LIV keystone note on PRIME.Z1.MOONSHOT.01 (L2 resolved classically as atom pinning + pinning lemma; L1 typed in four equivalent languages; the two strategy kills and the weak functor recorded; the literature anchor; stays OPEN); 798 → 806 rows.
- **Papers.** tfpt_prime_front: the new section “The keystone round: the wall in four equivalent languages” (the maximally precise wall statement, the four languages, the literature-anchor paragraph with Weil 1952/Connes 1999/Meyer 2005/Connes–Consani 2021/Suzuki 2021, the closed K1 diagram, the two graves, the weak functor); the two stale “open K1b question” spots in the moonshot-arc section now point forward. tfpt_research_contracts: PRIME.Z1.MOONSHOT.01 update IV — the contract at its final state of the day. tfpt_3: 8 new audit blocks.
- **Website.** Prime-front feed: the round entry “the wall in four languages” (with the explicit no-proof fence); counters 720 → 728 modules / v535–v734; README and Zenodo updated to 728 modules / v734.
- **Scope.** No marker moves anywhere: PD persistence remains a MEASUREMENT per window (9/9 is not a universal quantifier); the two kills are honest deaths of strategy routes, cleanly fenced (the CC mechanism itself untouched); the weak functor is a finite-basis statement, the full-algebra extension open; no RH statement anywhere.

2026-08-03 (LIII) (the evening bundling: ELEVEN promotions (v716–v726, 211 new checks, all green) — THE MOONSHOT ARC COMPLETES AT MEASUREMENT LEVEL (“the Hilbert–Pólya candidate, measured” — with the explicit no-proof fence), and the three physics interfaces move: the v_{geo} torsor closes in calibration form, G_{net} gets its first exact witnesses, and both thermal-time routes for F_{transfer} die. THE MOONSHOT (v716–v721): stage 2 GLUES (v716, 18/18, moonshot-stage2-glued: one object, ONE normalization — the free 3-scalar LSQ returns $\kappa = (1, 1, 1)$ to $< 10^{-12}$ on all five windows; the $1/4$ in $\text{Re } \psi(1/4 + i\tau/2)$ DERIVED as the μ_4 fixed-sector offset; $\log \pi$ only through the declared self-dual UV cell; E8 forced AT THE GLUING — μ_2 tower 0.326 / wrong μ_4 class 1.000 / wrong twists 0.474 all rip); stage 3 is a STATE (v717, 21/21, state-on-truncations: constructive GNS vector state on every truncation via Levinson PD; the naive tower reading misses by $|\Delta|/W3\text{-margin} = 104\text{--}1563$ — the trace-formula boundary IS the localized RH substance; KMS $\beta = 1$ detailed balance measured; Ihara an exact state, Epstein breaks); stage 4 CONVERGES MEASURED (v718, 10/10: 100% of 377 frozen zero targets at tol 0.25 at $h = 1433$, rate -1.61 , monotone GNS K -ladder $0.4678 \rightarrow 0.0003$, SHA256 prediction firewall, GUE light $\langle r \rangle = 0.6178$ vs 0.6189 , scramble dies as a state at depth 61); the Satz-1 slice is EXACT (v719, 24/24, satz1-ledger-exact: the finite trace formula is exact Gauss quadrature at 1.7×10^{-11} and the term dictionary to the classical Weil formula CLOSES — pole 1.7×10^{-13} / atoms 1.8×10^{-15} / arch 3.4×10^{-16} ; $\Delta \rightarrow \Gamma'/\Gamma$ term + prime term classically, $\sigma = 1.000161$; E8 census over $\{\mathbb{Z}^8, E8\}$ (Mordell 1938): ONLY the Gaussian E8 glues); the K collapse (v720, 14/14, k2k3-collapsed-classical: K3 → measured tightness (sigma-finite, vague topology forced), K2 → classical analysis on $s > 1/2$ (unconditional Chebyshev majorant, exact slowdown law), the boundary EXACTLY $s = 1/2$ — Mertens

slope 1.9994); and the K1 capture lemma (v721, 14/14, k1-lemma-capture-only: capture proof-near from Markov–Stieltjes + symmetrized Christoffel + a closed capture condition; the certified radii sit $\sim 900\times$ above the measured errors — the super-resolution is trace-formula content, the open K1b question). NET: everything a Hilbert–Pólya candidate needs exists at MEASUREMENT level; the remaining hard substance is (L1) identification at the line $s = 1/2$ (no mass loss) + (L2) node convergence as a theorem; the contracts stay OPEN; NO RH claim. THE PHYSICS INTERFACES: G_{net} (v722, 9/9, ramified-sees-nsr: the NS/R grading IS the parity character of $E8(\mathbb{Z}[i])/(1+i) = \mathbb{F}_2^4$ — the Ramond projection is $(1+i)$ -ADIC at the one ramified edge of the Hecke tower; 15×16 classes parity-PURE, both controls fire; and v726, 57/57, t2-slice-go: optimal Pimsner–Popa constant EXACTLY $1/4$ and Watatani index EXACTLY 4 on the CAR ladder via an explicit quasi-basis with FORCED weights, μ_4 DERIVED from the clock, the Ramond sector healed STATE-PRESERVINGLY by the Klein dressing — GNET.RAMIFIED.01 registered with kills; GATE.METRIC.08/10 typing unchanged); F_{transfer} (v723, 11/11, stt-killed + internal-pair-confirmed: the QCD 1-loop clock is PARABOLIC and not diagonalizable — no constant-rescaled modular flow reaches it; the pole multiplier exactly $(2/3)^6$; and v724, 12/12, t3b-dead: conditioned modular flows of one internal mother state come out loxodromic/complex, the frozen solver classes do NOT arise — BOTH thermal-time routes closed, the external clock contract CONFIRMED and sharpened to $\{\text{one unit}, \theta_i, C_p\}$); v_{geo} (v725, 21/21, torsor closure pass: the interface is structurally CLOSED as an $\mathbb{R}_+$ scale torsor — complete export table, dimension-matrix rank 1, all conditions λ -homogeneous, two-anchor consistency 0.11%, the calibration theorem stated; FENCE: no scale derivation (No-Unit); the one remaining dimensionless ratio NAMED: $H_{\text{EW}} = \ln(M_{\text{Pl}}/v_{\text{EW}}) = 37.1776$). PLUS LEAN ROUND 5: SineGramKeystone.lean + WatataniIndexFour.lean committed (lake build green, 3387 jobs, kernel-checked, no sorry/native_decide) — the v701 sine-Gram keystone kernel and the μ_4 index-4 certificate in exact arithmetic)

- **New modules (11).** v716_moonshot_arch_glue.py (18), v717_moonshot_state.py (21), v718_moonshot_spectral.py (10), v719_moonshot_traceformula.py (24), v720_moonshot_k2k3.py (14), v721_k1_node_capture.py (14), v722_phys_ramified_ns_r.py (9), v723_phys_modular_clock.py (11), v724_phys_t3b_modular_flows.py (12), v725_phys_vgeo_torsor_audit.py (21), v726_phys_car_pp_index.py (57) — 211 checks, each module promoted verbatim from its discovery probe with numbers frozen from the promotion run (all eleven probes re-run before promotion; outputs byte-identical modulo runtimes).
- **Ledger.** 11 new rows (PRIME.MOONSHOT.02–.06, PRIME.K1CAPTURE.01, GNET.RAMIFIED.01, FTRANSFER.STT.01, FTRANSFER.COCYCLE.01, VGeo.TORSOR.01, GNET.PPINDEX.01) + dated LIII notes on PRIME.Z1.MOONSHOT.01 (the big update: stages 2–4, Satz-1 slice and K collapse done; kill audit K1/K3/K4 do not fire, K2 half-standing; remaining substance (L1)+(L2)+(L3); stays OPEN), ANCHOR.VGeo.02 and METROLOGY.CLOSURE.01 (torsor closure in calibration form; typing unchanged), FIRSTPRINCIPLES.BOUNDARY.01 (both thermal-time kills; anchor census $\{\text{unit}, \theta_i, C_p\}$), GATE.METRIC.08 (index measured on the ladder; the identification half registered under GNET.RAMIFIED.01) and GATE.METRIC.10 (the NS/R grading’s arithmetic home); $787 \rightarrow 798$ rows.
- **Papers.** tfpt_prime_front: the new section “The moonshot arc: the Hilbert–Pólya candidate, measured” (the four-stage narrative + the end ledger, no-RH fence stated twice) and the stage-2 fence in the L1/moonshot section updated. tfpt_research_contracts: PRIME.Z1.MOONSHOT.01 rewritten to the post-run state (stages done, kill audit, remain-

ders), PRIME.Z1.OPERATOR.01 update III, the GATE.METRIC.08/10 follow-ups (v726/v722), the No-Unit keybox torsor paragraph (v725), and the F_transfer thermal-time kill paragraph (v723/v724). **tfpt_3**: 11 new audit blocks + the stage-1/montage fences updated. **tfpt_1/2**: the code-section follow-ups extended (E8 forced at the gluing; census) and the $G_{\text{net}}/v_{\text{geo}}/F_{\text{transfer}}$ interface pointers added. **tfpt_4_frontier**: the first-principles boundary follow-up (clock kills + torsor).

- **Website.** Prime-front feed: the round entry + a separate moonshot highlight (“the Hilbert–Pólya candidate, measured” with the explicit no-proof fence); counters 709 $\rightarrow$ 720 modules / v535–v726; the open-gates, status and glossary surfaces absorb the torsor/ G_{net} /thermal-time state; README and Zenodo updated to 720 modules / v726.
- **Lean round 5.** SineGramKeystone.lean + WatataniIndexFour.lean committed (lake build green, 3387 jobs, kernel-checked, no sorry/native_decide): the finite algebraic kernel of the v701 keystone (the product-to-sum identity $2 \sin A \sin B = \cos(A-B) - \cos(A+B)$ over an arbitrary commutative ring via Chebyshev recursion — the half-integer sine-moment form IS a Gram matrix, $S = \sum_i 2w_i s_i s_i^T$, hence PSD for nonnegative weights, with explicit Pythagorean-triple certificates; the FFT limit and the deployed window wiring honestly NOT formalized) and the μ_4 index-4 certificate of the v726 slice in its smallest faithful matrix model ($M_4(\mathbb{Z}[i])$: the clock-order shadow $S^{12} = -1 \Rightarrow H^4 = 1$ forced by the NS spin structure, the explicit 13-element quasi-basis with $\sum vv^* = 4 \cdot 1$ EXACTLY $= N(1+i)^2$, the Pimsner–Popa constant $\lambda^* = 1/4$ sharp via an SOS certificate at the mixing minimizer, μ_2 /three-sector controls give index $2/3$; the CAR/Fock layer and the Ramond dressing honestly NOT formalized); TfptCarrier.lean imports added; lean_manifest.sha256 regenerated with the new files.
- **Exploration (firewalled).** experiments/p9-forecast/ committed as a standalone preregistered forecast workspace (FRB/GW/PSR/UHECR detector kernels + hypothesis YAMLS; no ledger row, no paper claim, no website surface — experiments firewall). The K1b super-resolution probe and the L1 determinization probe are NOT in this round (workers still running; next round).
- **Scope.** No marker moves anywhere: the moonshot results are MEASUREMENTS (diagnostic SHA256 typing; the operator family stays zeta-free); PRIME.Z1.OPERATOR.01 and PRIME.Z1.MOONSHOT.01 stay OPEN; the v_{geo} closure is the calibration form, not a scale derivation (No-Unit stands); GATE.METRIC.08/10 typing unchanged (the Q-system identification is the registered open half); the external clock contract of F_transfer is CONFIRMED, not internalized; no RH statement anywhere.

2026-08-03 (LII) (the third daily bundling: FIFTEEN promotions (v701–v715, 158 new checks, all green) — the T-B census reaches 69/70, the Z1 continuum candidate is ASSEMBLED, and the moonshot’s atom layer is groupoid-internal. HIGHLIGHT 1 (v712, 5/5 — the P4 strike): the v692 margin identity SCALARIZED along the transverse direction (the penalty pays only the transverse zero mass; median gain $\times 4.23$ on the open ten) closes nine of the ten remaining windows: 69/70 COMPLETE FAMILY WINDOWS CLOSE at the cited 3×10^{12} (unconditional-modulo-citations); the single remainder is $h = 5690$ with $T^* = 1.6 \times 10^{14}$ (down from 8.5×10^{14}); the deck lever honestly dead (triangle inequality). HIGHLIGHT 2 (v713+v714): the L1 MONTAGE (v713, 16/16, 11-assembled-measured) assembles the Z1 continuum candidate explicitly — cover limit 6.2×10^{-8} , point masses at the D^2 rate, one UV slot, the 5b negative exposed as a normalization artifact, divergence exactly at $s \leq 1/2$ (the critical line as the boundary of the construction, a consistency signature, not positivity), the missing theorems NAMED; and the MOONSHOT stage 1 (v714, 19/19, moonshot-go) shows the atom layer is GROUPOID-INTERNAL from the $\mathbb{Z}[i]$ -E8 Hecke tower —

primitive degrees = Gaussian prime norms exactly (no prime projector anywhere), de-divisorization at 4×10^{-13} , σ descent 100 positions/100 masses/368 moments at 0.00; honestly fenced: the finite counting facts are E8-UNSPECIFIC, specificity is stage 2 of the newly registered contract PRIME.Z1.MOONSHOT.01. **HIGHLIGHT 3** (the chain arc S-A-S-G, v702–v711): the lookahead question DECIDED (v702, 13/13, flow-verifier-not-generator: full comb verified $913 \geq 898$, autonomous reach 2–4 slots, $g \sim 5$ –12 bits/slot information-theoretic); tolerance induction DEAD at RH grade (v703, 10/10); G1 open as a closed form (v704, 5/5: best law C2 median 0.9947, max 0.3130); the arch IS a deck-sector trace (v705, 7/7: exact tower traces 3.4×10^{-16} , scalar forced 1, must-fail $\times 82$ — the geometry anchor); WEYL-NULL with the Schur-parameter identity (10^{-40}) and the log 2 find (v706, 10/10); the section edge is an exact resolvent identity (3×10^{-13}) with the corridor position ~ 0.53 open (v707, 9/9); the best position functional transports scalar-free (Levinson energy extremum, median 0.9986; outliers exactly on 16/64/81; v708, 7/7); the residual carries NO zero signature behind a temporal SHA256 firewall (v709, 10/10, layering-rejected); the two-stage law dies by its own bar but its Hecke stage heals the prime powers $11.7\% \rightarrow 0.53\%$ circle-free from E8 counting (v710, 7/7); the first-birth error CONVERGES (promotion run $\theta = 1.851$, $R^2 = 0.692$, bars 0.5/0.6; v711, 7/7) — net: $G1 = [\text{E-edge}] + [\text{E-Hecke}] + [\text{M-rate}]$. **THE REST:** the keystone identity (v701, 11/11: $B = \text{sine-moment form}(c + \text{pole}) + \text{rank-1 pole square exact}$; the three gaps collapse onto ONE; triplication μ_3 -unique; V5 numerology dead) and the QGEO CAR route (v715, 22/22, qgeo-car-rates-summable: all 6+1 channels Schatten-Cauchy with summable rates, FH renormalization lattice-derived via Barnes G at 8.8×10^{-7} , RP cone stable; the majorant lemma (L1)–(L3) named — GATE.QGEO does not move). Between the bundlings, two website-side rounds landed separately: the visualization round (commit 52bcf00c: four animated schematics of the August-3 offensives on /prime-front, promoted and sandbox clearly separated, no new claims) and the prime-front explainer film (commit 76b092a0: a 2:39 German faceless-explainer video with burned-in captions, embedded on /prime-front; states “kein RH-Beweis” explicitly))

- **New modules (15).** v701_big_picture_hunt.py (11), v702_z1_lookahead.py (13), v703_chain_tolerance_scaling.py (10), v704_chain_mass_law.py (5), v705_chain_deck_sector.py (7), v706_chain_weyl_mass.py (10), v707_chain_section_edge.py (9), v708_chain_position_functional.py (7), v709_chain_zero_layer.py (10), v710_chain_two_stage_hecke.py (7), v711_chain_firstbirth_scaling.py (7), v712_rank3_transverse_deck.py (5), v713_l1_montage.py (16), v714_moonshot_hecke_groupoid.py (19), v715_qgeo_car_continuum.py (22) — 158 checks, each module promoted verbatim from its discovery probe with numbers frozen from the promotion run (v711: the worker-run point estimate $\theta \sim 1.25/R^2 \sim 0.90$ vs the promotion run 1.851/0.692 documented; both far inside the preregistered bars).
- **Ledger.** 16 new rows (PRIME.KEYSTONE.01, PRIME.Z1LOOKAHEAD.01, PRIME.CHAINTOL.01, PRIME.CHAINMASS.01, QGEO.DECKSECTOR.01, PRIME.WEYLMASS.01, PRIME.SECTIONEDGE.01, PRIME.POSFUNC.01, PRIME.ZEROLAYER.01, PRIME.TWOSTAGE.01, PRIME.FIRSTBIRTH.01, PRIME.RANK3TRANSV.01, PRIME.L1MONTAGE.01, PRIME.MOONSHOT.01, QGEO.CARLIMIT.01, plus the new contract PRIME.Z1.MOONSHOT.01); dated LII notes on PRIME.Z1.OPERATOR.01 (montage + moonshot; stays OPEN — the continuum theorems are missing), PRIME.RANK3DENSITY.01 (69/70, $T^* = 1.6 \times 10^{14}$) and GATE.QGEO.01 (rates summable, lemma named — the gate does not move); 772 $\rightarrow$ 788 rows.
- **Papers.** tfpt_3: 15 new audit blocks. tfpt_research_contracts: the

PRIME.Z1.OPERATOR.01 update II (montage, moonshot, chain arc; formally OPEN), the new contract PRIME.Z1.MOONSHOT.01 (groupoid program; stage-2 gluing as the next gate; kill criteria K1–K4), the prob:R1 update II (69/70), and the GATE.QGEO note. `tfpt_prime_front`: three new subsections (the chain arc S–A–S–G as an honest section narrative; the L1 montage and the moonshot; the T–B census at 69/70). `parity_toeplitz_classification`: the transverse-strike paragraph (69/70). `tfpt_1/2`: the Hecke-tower follow-up in the code sections (E8-unspecificity fence stated).

- **Website.** Prime-front feed entry (the third daily bundling); suite counters 694 $\rightarrow$ 709; README and Zenodo description updated to 709 modules / v535–v715. (The two separate website rounds referenced above: 52bcf00c visualization, 76b092a0 explainer film.)
- **Scope.** No marker moves; the 69/70 closure is unconditional-MODULO-CITATIONS on the declared finite family (T–B itself stays the conjecture); PRIME.Z1.OPERATOR.01 stays OPEN (continuum theorems missing); v714 is honestly fenced (E8-unspecific finite counting facts — specificity is stage 2); GATE.QGEO does not move; no RH statement anywhere.

2026-08-03 (LI) (the afternoon bundling: **NINE** promotions (v692–v700, 140 new checks, all green) plus the **TWO** Lean modules committed — the T–B chain closes 60/70 windows and the Z1 series records its ground. **HIGHLIGHT 1** (the T–B chain, v692+v693): T–B(block) is **TYPED** (v692, 7/7: $\hat{A}_2 =$ positive zero-Gram + psd rank-1 pole layer, exact per entry; the margin identity $\det(G_Z + P) = \det G_Z + c_P(s_\perp^\top G_Z s_\perp)$ — the razor-thin margin IS the transverse zero mass, a **SUM OF SQUARES**; on-line zeros only help by 2×2 psd superadditivity; “*E* kippt nicht” = a **QUANTIFIED PARTIAL-RH TAIL** statement, neither a 2c-envelope question nor a W3 renaming) and then **LARGELY CLOSED** (v693, 5/5: the explicit Ingham-form zero density arXiv:2507.15184 + Hasanalizade–Shen–Wong + halving + Platt–Trudgian built into a sharpened safe-side envelope — sinh difference pairing, $V(0) = 0$, on-line subtraction, **PEN** down $\times 6.5$ –14.4: 60/70 complete windows close **UNCONDITIONALLY-MODULO-CITATIONS**; exact remainder $9 \times T^* \approx 1$ – $3 \times 10^{13} + h = 5690$ at 8.5×10^{14} ; extension grows $\sim e^{3.74a}$; Simonič honestly listed trivial-in-range). **HIGHLIGHT 2** (the Z1 series 5–5d, v695–v698, contract stays OPEN): the **MEASURE** comes from counting (v695, 25/25: seam+orbifold dead null-calibrated; the E8 counting route delivers the Weil measure **EXACTLY** — atoms 0.0, arch/pole via Γ duplication, 7/8 target spikes $q = 0.000$; comb+pole positive-feasible, signedness = pole subtraction); the **CANONICAL OPERATOR** exists (v696, 18/18, z1-jacobi-opaque with the renaming clause **REFUTED**: CMV/Jacobi moments 2×10^{-13} ; features on prime-power slots $q = 0.000$, amplitude–mass link $r = +0.76$, positivity load-bearing 170/171 vs 2865); the **MASSSES** transfer exactly (v697, 14/14, z1-uvarov-sequential-closed: atoms are lag insertions, duality proven; $\Delta\alpha = w_1/E$ at 5.6×10^{-17} ; the **INVERTED** stabilization law — the Γ flow predicts the counting masses to $\sim 10\%$); the **POSITIONS** are forced (v698, 15/15, z1-recursion-semi: windows 0.5–2 cells, jitter null 30/30, adversary –516; shooting recovers masses to 0.11% median; honest negatives: greedy saturation needs lookahead, residual noise-like, E-transport recursive — the continuum reading is the remainder). **THE REST**: v694 (20/20, closure-both-near-proof: retention closed with an $O(k^2)$ certificate + straddle boundary case, separation law **FORM-CORRECTED** additive $\alpha^* = C_{\text{cell}}/\delta + C''/\Delta\gamma$, $C'' \leq 0.59$, 0 exceptions in 97 tests; the two open parent configs detect at $\alpha^* = 7.90$), v699 (18/18, cone-dynamics-dead: prime updates are translations, $\sim 99\%$ increments spacelike, no semigroup — the review-7.3 dynamic-cone route killed honestly; the leaf functional separates scramble/Epstein where

det is blind), v700 (18/18, orbit60-parked: all cascade routes dead, no involution of type $2^{27}1^6$ in the line group of order 11520, Coxeter does not descend, no A_5 signature). PLUS LEAN ROUND 4: GaussianCodeBridge.lean + QuarticHalf.lean committed (lake build green, 3385 jobs, kernel-checked, no sorry/native_decide): the Gaussian-code-bridge algebraic core (SNF certificate, 15×16 census with the zero class provably empty, σ semantics) and the quartic-half mechanism (μ_4 -orbit vanishing, $\sum \langle \alpha, x \rangle^4 = 576q^2$ over the explicit 240 roots); Chevalley stays cited-not-formalized)

- **New modules (9).** v692_rank3_lockgram.py (7), v693_rank3_density_close.py (5), v694_interpolation_lemma_closure.py (20), v695_z1_trace_operator.py (25), v696_z1_jacobi.py (18), v697_z1_uvarov.py (14), v698_z1_flow_recursion.py (15), v699_cone_dynamics.py (18), v700_orbit60_census.py (18). All nine discovery probes committed alongside; the zero-comb caches reused repo-relative with local fallbacks.
- **Lean round 4.** Two new committed proof modules (imports added to TfptCarrier.lean; lake build green, 3385 jobs, no sorry, no native_decide; lean_manifest.sha256 regenerated WITH the new files): GaussianCodeBridge.lean (the v689 algebraic core: $\mathbb{Z}[i]$ -module and SNF certificate with unimodular P, Q in both directions, the 240-root census 15×16 with the zero class provably empty, μ_4 stability, σ as the order-3 family action with coordinate block $= F_1 + F_2 + F_3$) and QuarticHalf.lean (the v690 provable part: the μ_4 -orbit factor $1 + (-i)^d + (-1)^d + i^d = 0 \iff d \not\equiv 0 \pmod{4}$, the per-pair weight law, the full vanishing half incl. the trivial extras, and the quartic power sum $\sum_{\alpha} \langle \alpha, x \rangle^4 = 576 (\sum_i x_i^2)^2$ over the explicit 240 roots with holomorphic isotropy; the Chevalley basic-invariant step cited, not formalized).
- **Ledger.** 9 new rows (PRIME.RANK3LOCKGRAM.01, PRIME.RANK3DENSITY.01, PRIME.INTERPCLOSURE.01, PRIME.Z1MEASURE.01, PRIME.Z1JACOBI.01, PRIME.Z1UVAROV.01, PRIME.Z1FLOWREC.01, QGEO.CONEDYN.01, E8.ORBITLEAN.01); dated notes on PRIME.RANK3UNIF.01 (T-B typed and largely closed), PRIME.INTERP.01 (both blocks near-proof), PRIME.Z1.OPERATOR.01 (the 5–5d series status; stays OPEN), E8.GAUSSCODE.01/E8.QUARTICHALF.01 (formally verified in Lean; Chevalley cited-not-formalized).
- **Papers.** tfpt_3: 9 new audit blocks. tfpt_research_contracts: the prob:R1 update inside the tenth slice (T-B typed + 60/70 closed with the exact T^* remainder list) and the PRIME.Z1.OPERATOR.01 series-5–5d update (measure from counting [E], canonical operator, masses+positions forced (measured); remaining: lookahead autonomy + continuum reading); Lean addenda on the two review contracts. tfpt_prime_front: two new subsections (the T-B chain; the Z1 series). parity_toeplitz_classification: the T-B closure paragraph (v692–v693).
- **Website.** Prime-front feed entry (the afternoon bundling); suite counters 685 $\rightarrow$ 694; README and Zenodo description updated to 694 modules / v700.
- **Scope.** No marker moves; the T-B closure is unconditional-MODULO-CITATIONS on 60/70 windows of the declared finite family (the remainder carries exact T^* ; extension beyond the family typed); PRIME.Z1.OPERATOR.01 stays OPEN (lookahead autonomy + continuum reading); the two kills (CONE-DYNAMICS-DEAD, ORBIT60-PARKED) are honest closures of review routes; no RH claim anywhere.

2026-08-03 (L) (the great bundling: TEN promotions (v682–v691, 182 new checks, all green) — the five proof offensives of the day land in one round, and the master contract PRIME.UNIFPOS.01 is registered. **HIGHLIGHT 1** (v685, surface-closed, 8/8 — the theorem-level result): $\det S > 0$ **UNCONDITIONALLY** on the entire declared window surface — the symbolic envelope $K_{\text{env}}(a, h) \leq 0.9798 < 1$ for all

62 complete windows $a \geq 3.434$, the five below by finite certificates $\kappa' \leq 0.108$; exact U_0 rebooking $M' = M + \Delta$, inputs typed [E]/a-cited (Gram/Hutchinson γ_1 ; Platt–Trudgian 3×10^{12}); a SURFACE theorem on the declared family, NOT uniform in all a — T-B (the absorption margin) stays open, no RH statement. The chain below it: v683 (19/19, three functionals exact 4.9×10^{-16} , all entry-wise routes typed circular, $\kappa_{\max} = 0.0895$) and v684 (8/8, the zero side by the explicit formula — residuum $\leq 6.9 \times 10^{-6}$, 22 491 budget-certified zeros, unconditional $\kappa_{\text{unc}} = 0.039\text{--}0.190 < 1$ class (a), the pretentious escape blocked $\times 634$ by the classical zero-free strip). **HIGHLIGHT 2** (v691, hecke-sos-ihara-mechanism-extracted, 27/27): the target factorisation $A = B^*B + P$ **EXISTS EXACTLY** in the Ihara lab (B by Chebyshev recursion, $P \succeq 0 \iff$ Ramanujan), the deployed ζ form is exactly the sine/defect HALF of the canonical split (index lemma), the Euler mechanism is measurable (resonance lattice exact 12/12, depth $\times 1.98$), and the missing piece is named exactly: Z1, a Hilbert–Pólya-type operator (PRIME.Z1.OPERATOR.01, registered OPEN — offensive 5 running). **THE REST OF THE BUNDLE:** v682 (lk-split-dies, 20/20: the naive smooth $L + K$ split is structurally dead — the pencil maximizer sits at $\gamma_1 = 14.13$ found from primes alone, spike law $\mu_{\max} \approx 1 + 2a/\Omega$, $\theta \sim 2.47a$: the windows resolve individual zeros; one-sided/multi-resolution survive), v686 (geomsos-trace-exact-transport-open, 19/19: $\Lambda(n)$ circle-free from E_8 shell counting at 7.1×10^{-31} , cover-SOS canonical on dim 3, transport open at 91.4% top-3 mass; contract PRIME.GEOMSOS.01 with K1–K5), v687 (kernel-class-too-narrow, 18/18: the band-limited positive kernel class collapses exactly onto $\{\lambda \text{Fejér}\}$, class supremum $0.0901684 < 0.10076$ — W2 stays closed via the v680/v681 route), v688 (interp-falsifier-constructive, 15/15: the in-kernel matched filter detects every off-line quadruple from $2\alpha\delta \geq 1.974$, $\times 2$ over the v677 mode map, masking adjudicated 48/48), v689 (gaussian-code-bridge-exact, 26/26: $E_8(\mathbb{Z}[i])/(1+i) \cong \mathbb{F}_2^4$ by exact SNF, the $240 = 15 \times 16$ census, σ as the RM(1,3) family permutation, must-fails fire), v690 (quartic-half-alive, 22/22: the vanishing half $\{2, 14, 18, 30\}$ proven but honestly typed trivial (μ_4 -orbit factor); the substance: $F_8/F_{12}/F_{20}/F_{24}$ algebraically independent G31 BASIC invariants, Chevalley cited, Jacobi carries 60/60 mirrors). **THE MASTER CONTRACT:** PRIME.UNIFPOS.01 (the Uniform Positivity Theorem — Suzuki’s localized Weil operator positive semidefinite for every $a > 0$ from an operator/geometric representation defined without zeros and without RH-equivalent input; the machine-checkable intermediate form $B_a = L_a + K_a$, $|\langle K_a v, v \rangle| \leq \theta \langle L_a v, v \rangle$, annotated with the v682 verdict; kill criteria: zero-defined C_a or RH-equivalent contractivity = renaming) as the tenth slice, plus the review contracts E8.GAUSSIAN.CODE.01/E8.QUARTIC.HALF.01/PRIME.W3.INTERPOLATION.01 and the OPEN PRIME.Z1.OPERATOR.01)

- **New modules (10).** v682_lk_split_theta.py (20), v683_rank3_functionals.py (19), v684_rank3_zeroside.py (8), v685_rank3_uniformity.py (8), v686_geometric_sos.py (19), v687_extremal_kernel.py (18), v688_interpolation_detector.py (15), v689_gaussian_code_bridge.py (26), v690_quartic_half.py (22), v691_hecke_sos.py (27). All ten discovery probes committed alongside; the zero-comb caches (zero_comb_cache_n2000.json, c1_zero_ext_n2500.json, coverage_hole_zscan_cache.npz) were already committed and are reused repo-relative with local fallbacks.
- **Ledger.** 15 new rows (PRIME.LKSPLIT.01, PRIME.RANK3FUNC.01, PRIME.RANK3ZERO.01, PRIME.RANK3UNIF.01, PRIME.GEOMSOS.01, PRIME.KERNELCLASS.01, PRIME.INTERP.01, E8.GAUSSCODE.01, E8.QUARTICHALF.01, PRIME.HECKESOS.01; contracts PRIME.UNIFPOS.01,

E8.GAUSSIAN.CODE.01, E8.QUARTIC.HALF.01, PRIME.W3.INTERPOLATION.01, PRIME.Z1.OPERATOR.01); dated notes on PRIME.WEIL.OPERATOR.01, PRIME.W3STRUCT.01, PRIME.ZEROGAP.01, E8.CODESEM.01, E8.ST31.01.

- **Papers.** `tfpt_3`: 10 new audit blocks. `tfpt_research_contracts`: the tenth slice (the master contract PRIME.UNIFPOS.01 with target statement, intermediate form, v682 annotation and kill criteria; the four review contracts registered). `tfpt_prime_front`: the great-bundling paragraph (rank-3 surface theorem, kernel collapse, falsifier, Hecke-SOS mechanism). `parity_toeplitz_classification`: the rank-3 chain paragraph (v683–v685). `tfpt_1`/`tfpt_2`: the Gaussian code bridge and the quartic half in the code sections.
- **Website.** Prime-front feed entry (the great bundling); suite counters 675 $\rightarrow$ 685; README and Zenodo description updated to 685 modules / v691.
- **Scope.** No marker moves; v685 is a SURFACE theorem on the declared window family, NOT a uniform-in- a statement; T-B (the absorption margin, `prob:R1`) stays open; PRIME.Z1.OPERATOR.01 is registered OPEN (offensive 5 running); no RH claim anywhere.

2026-08-03 (XLIX) (the Monday-morning promotion round: **TWO** promotions (v680–v681, 24 new checks, all green) — **THE PINCH BREAKS AND THE HOLE CLOSES**: the pointwise W2 density map at the anchor window is now **GAPLESS**. **HIGHLIGHT 1** (v680, pinch-broken-split, 13/13): the v678 11.7% pinch was a **BOOKKEEPING ARTIFACT** of one-sided capture — centered capture (the same zero-gap theorem spent two-sided, $\text{dist}(t, Z) \leq H_{\min}(t - 26)/2$, machine-checked on 6595 comb grid points with 0 violations) **DOUBLES** the threshold to $A_1 < 1/(2a_0) = 0.18034$: the existing Bellotti–Wong constant 0.10076 passes with 79% headroom; and the Beurling–Selberg minorant **ELIMINATES** A_1 from the counting chain entirely (mass loss exactly π/a_0 , extremal per Logan/Littmann; explicit prime term $P = 2.534$, positive from $t^* = 1.11 \times 10^7$; no Platt cap, every window incl. $a \rightarrow \infty$; Weil identity on the comb at 9.0×10^{-5}); the family reach $[10, 870]$ is closed verification-backed (min $s_{\text{tot}} = 0.0063$ over all 5 windows $\times$ lattice modes); the honest residue at that point: the $O(1)$ coverage hole (2500, 7.27×10^6) = 3.46 decades. **HIGHLIGHT 2** (v681, hole-closed-split-type, 11/11): the hole attacked on the three named paths and **CLOSED** with split typing — H3 as the main lever (the exact almost-periodic prime term with a hierarchical Lipschitz certificate moves the abstract entry from $t^* = 1.11 \times 10^7$ down to $t_x = 1.53 \times 10^5$, a factor 72.5); the vectorized Riemann–Siegel scan with 223 949 budget-certified zeros (Gabcke remainder, correctness 603/603 against the certified strip, mpmath 12/12, found/expected 0.99774) carries (2515, 1.56×10^5) with floor 0.01664; H1 honestly adjudicated (the Platt constant reproduces the hole boundary exactly — it cannot enter); **THE GAPLESS MAP**: $s_{\text{tot}}(t; a_0) \geq 0.02259 \log(2 + t) - 0.5185$ for ALL $t \geq 10$, every region with named support and type (comb [E] / RS scan [E]-verification-consistent / exact-prime Weil chain abstract / Selberg uniform / Trudgian-2S unconditional from 1.74×10^{25}); **THE W2 CHAIN AT THE ANCHOR COMPLETE**: density (v669) + frame-Gårding (v674/v678) + pointwise (v681); the calibration history documented with the pinned stage-1 duplicate bug)

- **New modules (2).** `v680_pinch_attack.py` (13), `v681_coverage_hole.py` (11). Both discovery probes committed alongside (`pinch_attack_probe.py`, `coverage_hole_probe.py`) together with the committed stage-1 scan cache `coverage_hole_zscan_cache.npz` (~ 1.2 MB; regenerated from scratch on a cache miss — a speed-up, not an input).
- **Ledger.** 2 new rows (PRIME.PINCHBREAK.01, PRIME.HOLECLOSED.01); dated notes on PRIME.ZEROGAP.01 (the pinch is broken — the quantified target was a one-sided bookkeeping arti-

fact; the residue moved to the coverage hole and was closed the same day), PRIME.FEJERDENS.01 (the pointwise map at the anchor is gapless: the F3 obstruction resolved by two-sided book-keeping + minorant replacement) and PRIME.PACKETGARD.01 (the W2 chain at the anchor is complete: density + frame + pointwise, each with split typing); the ninth consolidated slice on PRIME.WEIL.OPERATOR.01.

- **Papers.** `tfpt_3`: 2 new audit blocks. `tfpt_research_contracts`: the ninth slice of PRIME.WEIL.OPERATOR.01 (the W2 end-state after the pinch break and the hole closure: the pointwise density floor at the anchor window is a gapless split-type map — comb-certified / scan-certified / abstract-Weil / unconditional-asymptotic; remaining: deep family windows $a > 4.43$ (Selberg-only entry), the formal Mosco writeup, the projection-norm form, $a \rightarrow \infty$ (= W3/W4 territory); kill criteria unchanged; no RH statement).
- **Website.** Prime-front feed entry (the pinch-break round); suite counters $673 \rightarrow 675$; sandbox counters $267 \rightarrow 269$ probes and $5923 \rightarrow 5947$ checks; README and Zenodo description updated.
- **Scope.** No marker moves; W2/W3 stay open (the pointwise map at the anchor is closed with MIXED typing — the abstract region is modulo the off-line window above 3×10^{12} until the unconditional Trudgian-2S entry; the deep family windows $a > 4.43$, $A5(a)$, the formal Mosco writeup and $a \rightarrow \infty$ stay open; uniform W3 remains the conjecture); both verdicts are split-type by construction, the typing ledger is explicit; no RH statement anywhere.

2026-08-02 (XLVIII) (the sixth and final promotion round of the day: **TWO** promotions (v678–v679, 29 new checks, all green) — **THE DAY ENDS AT THE WALL WITH A DOOR HANDLE**: the last W2 gap now carries a concrete number (11.7% in one explicit constant), and the orbifold front reaches the continuum-convergence level. **HIGHLIGHT 1** (v678, zerogap-floor-only): the best explicit UNCONDITIONAL zero-gap theorem, documented and machine-verified — the S -difference route with $S_{\text{bound}} = \min\{\text{Platt } |S| \leq 2.5167 \text{ to } 3.06 \times 10^{10}; \text{Trudgian 2014; Bellotti 2025 Cor. 1.5, asymptotic floor } 4\pi \cdot 0.10076 = 1.26619\}$, verified on ALL 1999 Turing-certified comb gaps (0 violations on each chain separately, min air $2.05\times$, median $5.24\times$); adaptive bands $\delta_p = \kappa H_{\min}$ unconditionally hold $\geq \kappa$ ordinates (0 misses) $\Rightarrow$ the v674 FRAME packet floor is now UNCONDITIONALLY positive ($0 < B_p \leq V_p$ everywhere, median discount 0.037) — the frame-Gårding chain is fully grounded in cited unconditional inputs; the projection form does NOT stabilize adaptively either (typed residual with inverted expectation, v642/v662/v674 pattern: $6/6$ (κ, C) cells miss, $1/\log$ competitive, minimizer single-mode 0.898 — the pointwise obstruction is re-partition-invariant); **THE QUANTIFIED PINCH**: pointwise capture of a guaranteed zero needs the explicit $S(t)$ constant $A_1 < 1/(4a_0) = 0.09017$ — the best cited constant 0.10076 (Bellotti 2025) misses by 11.7% at every height: the last W2 gap as a concrete named target inequality at the frontier of explicit analytic number theory, independent of RH. **HIGHLIGHT 2** (v679, orb-os-continuum-slice, 19/19): the first continuum-OS slice of the seam orbifold B — correlator convergence with UNDERSTOOD rates (all six σ -channel observables at the uniform raw rate 0.659 = the Fisher–Hartwig $2/3$ branch; τ -channel contrast 1.298 vs $4/3$, the channel law $\rho = 2(1 - \beta)^2 - 2\beta^2$; after one FH term the limits sit $< 0.05\%$ at the CFT values; the ε channel exact); **RP SURVIVES THE LIMIT** ($\lambda_{\min}$ extrapolations bounded away from zero: σ 1.36×10^{-3} margin $7\times$, τ 2.80×10^{-4} margin $358\times$, mixed 1.34×10^{-3} margin $31\times$; must-fail $\eta = -1$ flips); cluster exact in space AND Euclidean time ($2\Delta = 0.222220$ vs $2/9$ at 8×10^{-6} ; time gap = the ε level, cosh form, new time machinery); characters $1/36, 1/9, 5/18, 4/9$ at 10^{-12} with the measured N^{-2} rate — E0/E2/E3/E4 measured at the convergence level, E1 discrete, the formal-limit

remainder named (GNS, uniform bounds); GATE.QGEO does not move)

- **New modules (2).** v678_zero_gap_theorem.py (10; the probe’s declared FAIL at the literal Z3.3 adaptive stabilization bar promoted as a typed-residual check with inverted expectation, v642/v662/v674 pattern, numbers unchanged), v679_orbifold_continuum_os.py (19). Both discovery probes committed alongside (zero_gap_theorem_probe.py, orbifold_continuum_os_probe.py).
- **Ledger.** 2 new rows (PRIME.ZEROGAP.01, QGEO.ORBOS.01); dated notes on PRIME.PACKETGARD.01 (the typed OPEN residue supplied: the frame floor is now unconditional), PRIME.FEJERDENS.01 (the theorem family extended by the sharper Bellotti floor 1.26619), PRIME.TURINGCERT.01 (all 1999 certified gaps verified against the explicit theorem) and GATE.QGEO.01 (the continuum-OS data measured at the convergence level; the gate residual is now the formal limit construction + the v622/v623 seam identification — NO marker move); the eighth consolidated slice on PRIME.WEIL.OPERATOR.01.
- **Papers.** tfpt_3: 2 new audit blocks. tfpt_research_contracts: the eighth slice of PRIME.WEIL.OPERATOR.01 (the W2 end-state: frame-Gårding fully unconditionally grounded — zero-gap theorem + Fejér chain; the last gap carries a concrete number: the pointwise/projection form closes iff the explicit $S(t)$ constant A_1 improves from 0.10076 to < 0.09017 (11.7%) — a named target at the frontier of explicit analytic number theory, independent of RH; kill criteria unchanged; no RH statement).
- **Companion note (no module).** The second citable short note note_w3_detector_structure.pdf (8 pages) stands ready uncommitted for the user: the W3 structure theorem (v677) + the two-lab validation (Epstein census, Ihara threshold map) + the $C = 1$ quadrature mechanism (v676) as paper #2 of the prime-front line.
- **Website.** Prime-front feed entry (the zero-gap round); suite counters 671 $\rightarrow$ 673; sandbox counters 265 $\rightarrow$ 267 probes and 5894 $\rightarrow$ 5923 checks; README and Zenodo description updated.
- **Scope.** No marker moves; W2/W3 stay open (the frame form is now unconditionally grounded, the pointwise A5(a) statement stays open with a quantified external target; uniform W3 remains the conjecture); GATE.QGEO stays open (convergence-level data, the formal limit named); the honest typed-residual FAIL (ZEROGAP-FLOOR-ONLY) is promoted as the finding, not hidden; no RH statement anywhere.

2026-08-02 (XLVII) (the fifth and final promotion round of the day: **FOUR** promotions (v674–v677, 76 new checks, all green) — **THE WALL IS SURVEYED:** two theorems, one frame-Gårding, and the honest typing “uniform W3 = the conjecture”. **HIGHLIGHT 1** (v676, c1-quadrature-mechanism): $C = 1$ is a **DISCRETIZATION THEOREM** on the declared surface — q_r is the exact zero-side reading of the lock profile (Weil explicit formula on the complete comb, median residual 1.1×10^{-2} on 67 windows, $q_{\text{pred}} > 0$ on 67/67), the h^{-1} is the DST normalization ($q_r(N/2)/F_\alpha$ h -flat at slope +0.04), the constant is the zero-free RvM density integral (ratio 1.005; tertiles 0.66/0.43/0.37 predicted vs 0.61/0.45/0.39 measured), the lock sign via the v591 pole killer; honest: the v596 exponent -1.01 was flip-contaminated (clean -1.28 ; dated note on PRIME.LOCKPROJ.01), “norm $\leq 1/h$ ” is a direction statement, and $\sup \leq 1$ does NOT follow from the mean (the $\sin^2$ sampling budget is the precise remainder, factor-2 headroom). **HIGHLIGHT 2** (v677, w3st-structure-theorem): the equivalence chain as a **THEOREM** — odd-Toeplitz = Cantoni–Butler compression (1.5×10^{-15}), the sandwich theorem instead of naive DST diagonality (parity defect measured 0.92..1.55), the per-lag Weil dictionary unconditional with the master identity $x^\top Ax = \sum T_x(\gamma) + P(x)$, $T_x \geq 0$ on-line (alias comb) and cosh-amplified off-line terms (5.8×10^{-16}); the

own Epstein winding census (exactly 12 off-line zeros, ζ_K control 0) predicts the form break quantitatively ($\lambda_{\min}$ ratio 0.803, factor-2 gate); the threshold map $2\alpha s_{\min} \approx 1.4..2.6$ over 67 windows (the Ihara echo) — W3-on-the-family = theorem + detector certificate, UNIFORM W3 = the conjecture (Weil/Yoshida), typed as such. PLUS the frame-Gårding (v674, packet-average-only: the projection packet norm does NOT escape the $1/\log$ drift — the central honest negative promoted as a typed-residual check with inverted expectation, v642/v662 pattern, minimizer single-mode tight 0.90 — BUT the frame inequality $Q + C_0G \succeq c_0Y$ holds at every M with the v669 theorem constants, $c_0 = 0.3058$, margins $+1.52.. + 2.29$, a -uniform, and the Mosco mechanism is numerically complete, $8/8$; named remainder: within-packet equidistribution, $\theta \rightarrow 0.20$) and the needle saturation (v675, needle-emergent-bulk: all four assembly candidates miss — jump set too dense $p = 0.007$, phase gradient wrong sign, lock rotation cleanly killed, pole weight significant but INVERTED — the needles are an emergent bulk property; W3 recommendation: MARGIN-regime form + Ihara calibration instead of a needle predicate))

- **New modules (4).** v674_packet_garding.py (21; the probe’s declared FAIL at the literal P2.1 stabilization bar promoted as a typed-residual check with inverted expectation, v642/v662 pattern, numbers unchanged), v675_needle_mechanism.py (21), v676_c1_mechanism.py (12), v677_w3_structure_theorem.py (22). All four discovery probes committed alongside (packet_garding_probe.py, needle_mechanism_probe.py, c1_mechanism_probe.py with the committed c1_zero_ext_n2500.json extension cache, w3_structure_theorem_probe.py).
- **Ledger.** 4 new rows (PRIME.PACKETGARD.01, PRIME.NEEDLEMECH.01, PRIME.C1MECH.01, PRIME.W3STRUCT.01); dated notes on PRIME.LOCKPROJ.01 (the exponent correction: -1.01 was flip-contaminated, clean -1.28), PRIME.UNIFC.01 (the $C = 1$ mechanism grounded), PRIME.GROUNDTRUTH.01 (the Ihara detection law echoed in the threshold map), PRIME.FEJERDENS.01 (the frame-Gårding connection) and PRIME.W3LAND.01 (the mechanism search saturates); the seventh consolidated slice on PRIME.WEIL.OPERATOR.01.
- **Papers.** tfpt_3: 4 new audit blocks. tfpt_research_contracts: the seventh slice of PRIME.WEIL.OPERATOR.01 (W2 end-state: density plane closed, Gårding in frame form with theorem constants, Mosco complete, remainder = within-packet equidistribution; W3 contracted to “MARGIN-regime generic bound + needle risk map”, $C = 1$ demystified-and-grounded as a quadrature theorem, the structure theorem types W3-on-the-family as theorem + certificate and uniform W3 as the conjecture; kill criteria unchanged).
- **Website.** Prime-front feed entry (the structure-theorem round); suite counters $667 \rightarrow 671$; sandbox counters $261 \rightarrow 265$ probes and $5818 \rightarrow 5894$ checks; README and Zenodo description updated.
- **Scope.** No marker moves; W2/W3 stay open (the frame form holds with theorem constants, the pointwise A5(a) statement stays open; W3-on-the-family is a theorem + certificate, uniform W3 IS the conjecture — typed, no RH statement); the honest typed-residual FAIL (PACKET-AVERAGE-ONLY) and the fourfold needle miss (NEEDLE-EMERGENT-BULK) are promoted as findings, not hidden; the $C = 1$ statement carries no RH lever beyond the density and is typed as such.

2026-08-02 (XLVI) (the fourth promotion round of the day: FIVE promotions (v669–v673, 65 new checks, all green) — THE W2 DENSITY PLANE CLOSES (v669, the highlight of the round: the exact identity $s_{\text{tot}} = 2\pi(F_a \star dN)$ via the Weil explicit formula on the tent test pair, verified 2.9×10^{-6} pointwise / 7.2×10^{-8} t -averaged against the Turing-certified comb — the envelope peaks ARE the

zeros ($\gamma_{1..4}$ to 0.0002), the dips ARE the zero gaps — plus the UNCONDITIONAL chain RvM + Trudgian $\Rightarrow \rho_{a,\delta} \geq 0.306 \log(2+t) - C_0$ a -uniformly with 10/10 finite certificates on the zero-free grid, margins ≥ 1.36 ; the honest floor: the literal $1/a$ and the plane-wave π/a widths sit BELOW the RvM threshold $4\pi A_1 = 1.4074$, the structural explanation of the Gårding drift — the remaining W2 piece is the packet-to-point translation below the floor); THE NEEDLE SEARCH NARROWS THREEFOLD (v670 block deflation honestly FAILED: fidelity p_{90} only $50.53 \rightarrow 49.35\%$ for $K = 1 \rightarrow 8$, leak median 1.000 everywhere — the coupling is bulk-spectral, not low-rank; v671 the Lehmer link is a clean NULL: h^3 -partials all $p > 0.1$, placement control unremarkable — the needles are NOT zero-comb-driven; together with v667 not-in-the-BD-frame: the mechanism search moves frame-/assembly-side); and THE LI DOUBLE (v672 the W1 $\Rightarrow$ Li corollary: $g_n = \frac{1}{2}e^{-|u|/2}L_{n-1}^{(1)}(|u|)$ derived exactly (Laguerre), the $h = 1433$ window contains 30/32 finite Li coefficients at $< 10\%$ form error ($n = 1$ honestly 24%, a jump artifact; $n = 5$ hair-thin 10.03%), pole cancellation to six digits, odd sector certified by $\lambda_{\min} = +1.516 \times 10^{-3} > 0$; v673 the $E_8 \leftrightarrow$ comb Li lock: $\Lambda(E_4, s) = (2\pi)^{-s}\Gamma(s)\zeta(s)\zeta(s-3)$ completed with residues $\pm 1/240$ — the E_8 240 IS the residue normalizer — $\lambda_n^L = 2\lambda_n^\zeta$ exact, E_8 -arithmetic vs comb at budget usage 0.124, the naive single-map Li refused as non-tempered))

- **New modules (5).** v669_fejer_density.py (14), v670_w3_block_deflation.py (18; verdict BLOCK-DEFL-FAIL promoted as the honest preregistered result), v671_lehmer_resonance.py (10; verdict LEHMER-NULL), v672_li_corollary.py (11), v673_li_e4.py (12). All five discovery probes committed alongside (fejer_density_bound_probe.py, w3_block_deflation_probe.py, lehmer_resonance_probe.py, li_corollary_probe.py, li_e4_probe.py).
- **Ledger.** 5 new rows (PRIME.FEJERDENS.01, PRIME.BLOCKDEFL.01, PRIME.LEHMERNULL.01, PRIME.LICOROLLARY.01, PRIME.LIE4.01); dated notes on PRIME.GARDING.01/PRIME.GARDENV.01 (v669 explains the drift: per-mode control below the RvM floor is not certifiable at any height), PRIME.W3LAND.01/PRIME.THETAPRED.01 (the threefold narrowing v670/v671), PRIME.KEIPERLI.01 (the Li strand connects, v672/v673) and PRIME.SHADOW.01 (the 240-residue identity + the Li lock); the sixth consolidated slice on PRIME.WEIL.OPERATOR.01.
- **Papers.** tfpt_3: 5 new audit blocks. tfpt_research_contracts: the sixth slice of PRIME.WEIL.OPERATOR.01 (W2: the density plane closed, remainder = the packet-to-point translation below the RvM floor; W3: narrowed threefold — not low-rank, not zero-comb-driven, not in the BD frame $\Rightarrow$ frame-/assembly-side; new: the Li corollary and the E_4 Li lock; kill criteria unchanged).
- **Website.** Prime-front feed entry (the Fejér-density round); suite counters 662 $\rightarrow$ 667; sandbox counters 256 $\rightarrow$ 261 probes and 5753 $\rightarrow$ 5818 checks; README and Zenodo description updated.
- **Scope.** No marker moves; W2/W3 stay open (the density plane closes at the wave-packet level only — the pointwise A5(a) Gårding inequality stays open); the honest FAIL verdict (BLOCK-DEFL-FAIL) and the clean null (LEHMER-NULL) are promoted as findings, not hidden; positivity statements remain finite (30/32 Li coefficients, $n \leq 32$), NOT Li's criterion; no RH statement.

2026-08-02 (XLV) (the closing bundle of the day: NINETEEN promotions in one pass (v650–v668, 301 new checks, all green) — the ORBIFOLD FRONT COMPLETES AT THE LATTICE LEVEL (modular data v650: nine $Z[g, h]$ match $|\theta/\eta|^2$, S-covariance measured at a clean N^{-4} rate, T exact as the $\mathbb{Z}_6$ Dehn

shift, $\text{deck}^3 = (-1)^F$ as exact $\mathbb{Z}_6$ trace arithmetic; assembly v651: $H^2(\mathbb{Z}_3, U(1)) = 0$ enumerated, of six candidates exactly B survives, T kills the naive $\mathbb{Z}_3$ exactly; Arf hardening v652: the 6^6 classification leaves $\{B, C3\}$, the one-Fock-space pin forces B , the μ_6 ladder measures the $C3$ -excised states directly; bond-defect theorem v653: twist = deck = bond defect as a lattice theorem in $\mathbb{Q}(\zeta_6)$ with $D_{\text{can}} = L^4$, $D_{\text{can}}^3 = -1$); the ST31 $d/4$ -THEOREM (v654: every Springer-regular d -clock has $x^{d/4} = \pm i \text{Id}$, converse exact at $d \in \{8, 20, 24\}$, the unique $d = 12$ exception is the compiler-clock class; “free $\Rightarrow$ regular” killed); the W2/W3 SERIES (v655 Mosco preparation: resolvent Cauchy + uniform $H_{\log}$; v656 margin bridge typed as lock identification; v657 the exact 2D formula $r_{\text{id}} = (1 - q \tan^2 \theta) / (1 - \tan^2 \theta)$, the deficit angle-driven; v658 the uniform bound typed FRAGILE (α -fragility $\pm 60\%$); v659 the landscape: $\lambda_{\min} > 0$ on ALL 635 points, every peak a rotation artifact, MARGIN-regime share 0.0%; v660 the rotation predicate honestly FAILED (necessary, not sharp; 47/52 needles are diagonal crossings; successor block deflation); v661–v663 the Gårding arc: drift undecidable on 4 stages $\rightarrow$ both remedies refuted, the drift lives in the total symbol $\rightarrow$ THE ENVELOPE HOLDS measured a -uniformly, $(c_0, C_0) \approx (0.021, 0.055)$, “flat” was a t -range artifact, remaining task = a Fejér spectral-density bound); DISCIPLINE AND CONTROLS (v664 look-elsewhere: 42 slots / 19 hits / 6 kills, global $p = 5.1 \times 10^{-3}$ conservative, NO single observation significant — re-types executed; v665 Keiper–Li on two independent routes, consistent at budget usage 0.124, injection detected from $n = 1$; v666 Turing certificate: the comb complete below $\gamma_{\max}$, integrals at 5% of the Lehman bound; v667 Baez–Duarte control frame: Vasyunin 1.7×10^{-31} , C_{BD} cross-anchor 6.4×10^{-8} , drift SHARED = intrinsic, needles NOT shared = frame-side; v668 ground truth + firewall, one module from both probes: true positivity has NO uniform margin, $\delta(K) \rightarrow 0$ exactly, detection reach $K^* \times s \approx 2\text{--}3$, Fejér reads blind — and without the Euler product the machinery breaks by ~ 13 orders of magnitude: THE central W3 recalibration); plus LEAN ROUND 3 (three new certificate files, lake build green, 3383 jobs, no sorry) and the Nature-Comms primon-gas reference typed honestly in the prime-front paper)

- **New modules (19).** v650_orbifold_modular.py (17), v651_orbifold_assembly.py (17), v652_orbifold_arf.py (15), v653_bond_defect.py (18), v654_st31_degree8.py (30), v655_w2_mosco.py (7), v656_margin_link.py (11), v657_rid_alignment.py (15), v658_w3_uniform_bound.py (11), v659_w3_landscape.py (14), v660_theta_predicate.py (20), v661_garding.py (12), v662_garding_edgeband.py (16; the probe’s declared FAIL at the literal symbol-stability bar promoted as a typed-residual check with inverted expectation, v642 pattern, numbers unchanged), v663_garding_envelope.py (18), v664_look_elsewhere.py (14), v665_keiper_li.py (13; shared zero cache zero_comb_cache_n2000.json committed), v666_turing_cert.py (6), v667_baez_duarte.py (12), v668_ground_truth.py (35 = 22 + 13; ONE module merged verbatim from the two probes ihara_ground_truth_probe.py + epstein_firewall_probe.py). All discovery probes committed alongside.
- **Ledger.** 19 new rows (QGEO.ORBMOD.01, QGEO.ORBASM.01, QGEO.ORBARD.01, QGEO.BONDDEF.01, E8.ST31D8.01, PRIME.WEIL.MOSCO.01, PRIME.MARGINLINK.01, PRIME.RIDGEOM.01, PRIME.W3BOUND.01, PRIME.W3LAND.01, PRIME.THETAPRED.01, PRIME.GARDING.01, PRIME.GARDEGE.01, PRIME.GARDENV.01, META.LOOKELSEWHERE.01, PRIME.KEIPERLI.01, PRIME.TURINGCERT.01, PRIME.BAEZDUARTE.01, PRIME.GROUNDTRUTH.01); dated notes on QGEO.TWISTOPE.01, QGEO.KLEINRP.01 and GATE.QGEO.01 (the orbifold front is complete at the lattice level; the $[C]$ remainder is the continuum CFT statement + the seam identification — *no marker moves*), on

E8.ST31.01/E8.ST31DEG.01 (v654 + Lean round 3), on EXTREV.LATTICE.01 ($6 = p_2(a)$: observation without statistical weight, $p = 0.169$), E8.CODESEM.01 (number battery $p = 0.593$ — the v646 finding quantified) and E8.CODE.01 (14/16 typed FORCED + the Lean code certificate), and the consolidated W2/W3 note on PRIME.WEIL.OPERATOR.01.

- **Lean round 3.** Three new committed proof modules, lake build green (3383 jobs, no sorry): `G31WordOrders.lean` ($\chi_w \mid X^{24} - 1$ and $\chi_u \mid X^{20} - 1$ via conjugate-quartic witnesses $\chi\bar{\chi} = \Phi_{24}/\Phi_{20}$, no proper divisor by companion-matrix kernel `decide` — all eigenvalues primitive), `HammingCode.lean` (self-duality, weight distribution $\{0:1, 4:14, 8:1\}$, coset-leader distribution $\{0:1, 1:8, 2:7\}$, covering radius 2), `SquareParity.lean` (the combinatorial kernel of the $c = w^2$ parity kill at the multiset level, the permutation-level bridge honestly typed as not formalized).
- **Papers.** `tfpt_3`: 19 new audit blocks. `tfpt_research_contracts`: the fifth slice of PRIME.WEIL.OPERATOR.01 — the consolidated W2/W3 state (W2: envelope measured valid, Mosco prepared, drift intrinsic, remainder = Fejér spectral-density bound + symbol proof; W3: reduced to lock sign + $q \tan^2 \theta \leq 1 - \delta$, landscape mapped without positivity loss, ground-truth recalibrated — shrinking margins are the expected behavior of true positivity, the alarm signal is only $\lambda_{\min} < -\text{floor}$; kill criteria unchanged). `tfpt_prime_front`: the closing-bundle recalibration paragraph + the external-context note on Wei/Zhai/Lu et al., “The Riemann Hypothesis manifested in dynamical quantum phase transitions” (Nat. Commun. 2026, DOI 10.1038/s41467-026-74935-8) — their primon-gas energies $\log n$ with weights $\Lambda(n)/\sqrt{n}$ are literally the TFPT atom table and the DQPT times are the zero comb; typed honestly as complementary verification, not RH progress.
- **Website.** Prime-front feed entry (the closing bundle); suite counters 643 $\rightarrow$ 662; sandbox counters 236 $\rightarrow$ 256 probes and 5452 $\rightarrow$ 5753 checks; README and Zenodo description updated.
- **Scope.** No marker moves anywhere; GATE.QGEO does not move (the continuum statement stays open); W2/W3 stay open (measured/typed progress only); the two honest FAIL verdicts (THETA-PRED-FAIL, EDGEAND-UNHEALED) are promoted as findings, not hidden; no positivity claim beyond the measured surfaces, no RH statement.

2026-08-02 (XLIV) (the discipline audit: the suite measures its OWN scientific process discipline and freezes it as checks (v649, META.DISCIPLINE.01) — ledger census 715 rows / 710 active with 214 documented kills / honest negatives / retypes, must-fail census 643 modules / 6040 static `check()` sites / 1469 negative-control keyword occurrences across 233 modules, preregistration census 47 contract rows (29 naming kill criteria before execution; executed chains FTR.PGL2.01 v533 $\rightarrow$ v632 and PRIME.WEIL.OPERATOR.01 K1–K3 $\rightarrow$ v643 verified in the ledger), deterministic replay 12/12 on a declared sample spanning v55–v648, five classical anchors recomputed against the literature (Jacobi r_4 , Construction $A \rightarrow E_8$, Shephard–Todd G31 degrees, Suzuki archimedean constants, completed-zeta functional equation), 54 committed Lean proof modules — and the honest limit typed [C]: process discipline, not physics truth, the open gates stay open; PLUS the public mirror: a new /method page (“the verification framework”) built from a new generated data surface `website/lib/discipline.ts`)

- **New module.** `v649_discipline_audit.py` (18 checks, ~ 200 s; discovery probe `discipline_audit_probe.py` 17/17, verdict DISCIPLINE-MEASURED): a read-only meta-module that parses the suite’s own files — ledger, module sources, contracts paper, Lean tree — and certifies the measured discipline metrics as frozen minimum bars. D1 ledger census (715 rows, 710 active, display classes E/C/O/X/Axiom/other = 169/222/282/37/2/3 at freeze; 214 rows with negative-evidence keywords: kill, ill-posed, honest negative, must-fail, retyped, superseded, dead, bingo, numerology); D2 must-fail census (643 modules, every one with checks; 6040 static

- `check()` call sites, clearing the published 5452 counter; 1469 must-fail/kill/scramble occurrences in 233 modules; typing marks $[\mathbf{E}] \times 3579$ vs $[\mathbf{C}] \times 1323$); D3 preregistration census (47 contract rows, 29 naming kill criteria; executed chains machine-verified: FTR.PGL2.01 preregistered v533 $\rightarrow$ executed v632, PRIME.WEIL.OPERATOR.01 kill tests K1–K3 $\rightarrow$ W1 theorem-closed v643, REG.FREEZE.01 frozen 2026-06-09); D4 reproducibility (deterministic replay 12/12 on the declared sample v55, v91, v108, v205, v305, v405, v505, v555, v600, v634, v643, v648 — two fresh subprocess runs each, identical up to timing lines; 396 sympy-exact modules, 77 with explicit seeds); D5 external anchors (five classical recomputes against the literature: Jacobi 1834 four-square counts exact $n = 1.40$, Construction A $[8, 4, 4] \rightarrow E_8$ with 240 minimal vectors, Shephard–Todd G31 degrees (8, 12, 20, 24), Suzuki $\psi(\frac{1}{4})/L/A$ to 25+ digits, completed-zeta functional equation at 3×10^{-31}); D6 Lean layer (54 committed TftptCarrier modules via `git ls-files`; `lake build` honestly *not* re-run in-suite); D7 the limit, typed $[\mathbf{C}]$ (process discipline, not physics truth; 278 class-O rows stay open incl. SEAM.THEOREM.01 and PRIME.WEIL.OPERATOR.01 W2–W4). Freeze discipline: every bar is the value measured at freeze time; a future census regression fails the module and forces an honest dated re-freeze.
- **Ledger.** New row META.DISCIPLINE.01 (canonical status DISCIPLINE-CERTIFIED); no other row changes, no marker moves anywhere.
 - **Website.** New generated data surface `website/lib/discipline.ts` written by the new `verification/make_discipline_stats.py` (stdlib-only, hooked into `bash build.sh gen`; freshness enforced by `audit_sync.py` section A.generated). New page `/method` (“The verification framework”): the sandbox $\rightarrow$ probe-with-kill-criteria $\rightarrow$ suite $\rightarrow$ ledger $\rightarrow$ generated-mirrors pipeline as a static SVG; the measured D1–D6 numbers rendered from `discipline.ts`; the “buried coincidences” graveyard ($|G31| = |W(D_5)| \cdot |W(A_3)|$ killed three ways v634; the bytecode p_n reading 0/11 v646; $c = w^2$ dead by parity theorem v647; the fine-invariant $\leftrightarrow C = 1$ bridge dead after h -control v637; the naive 48×5 incidence v629; the ill-posed B-test v624; the same-day Lerch erratum v643); “what would falsify this” (the open contracts’ kill criteria); the E/C/O/X status typology with the measured distribution; and a sober AI-transparency paragraph (agents execute, the deterministic suite decides — `python3 verification/run_all.py` replays everything). Navigation entry, a compact “how we keep ourselves honest” band on the home page, and the `/method` link added to the prime-front honesty banner; suite counters 642 $\rightarrow$ 643 on the affected pages, README and Zenodo description.
 - **Scope.** The meta-module measures *process* discipline, not the truth of any physics claim; it is read-only and moves no marker; the `/method` page renders only generated or machine-checked numbers — no new claims anywhere.

2026-08-02 (XLIII) (the second round of the day: THE LERCH ERRATUM (honest, corrected the same day) plus six promotions (v643–v648) — the W1 chain (v631, v640–v642) had read Suzuki’s eq. (1.3) with Lerch coefficient -1 ; the paper’s own §2.2 data lock $+1/4$ (machine evidence v643 C0.1), every measured number transfers VERBATIM via the exact identity $c_{\text{gal}}^{\text{sm}}(\tilde{g}) = -4 c_{\text{gal}}^{\text{sm}}(g)$, and only the labels change: Suzuki’s smooth layer is $+\rho$, the true dictionary is the SINGLE scalar $+1/D$ on both layers (sign-compatible with positivity), and the origin constant vanishes, $\kappa = 0$ exactly; **ON THE CORRECTED READING:** W1 becomes a MEASURE-LEVEL THEOREM (the projection lemma closes the L_0^2 remainder — Suzuki’s mean-zero condition is automatic on the u -side; $A_{\text{arch}} = -g''_{\text{smooth}}$ exactly at every lag, 3.4×10^{-52} ; form equality 1.28×10^{-10}), W2 STARTS in honest slices (classical FEM density at rate; Rayleigh–Ritz monotone from above on all six nested sequences; $\lambda_a = 0^+$ within $\sim 10^{-9}$, consistent with Thm 1.3, no sign statement; Mosco remainder typed), the $\mathbb{Z}_3$ TWIST SECTOR IS REFLECTION POSITIVE under the parafermionic Klein-twist pairing (mirror

× charge conjugation, ω^{kq} phases, $\eta = (1, 1)$ unique among 36; N -stable 48..384; full mixed OS Gram PSD — the named v639 open item resolved at the lattice OS level), the RM(1,3) REVERSE READING is honestly two-part (anchor decomposition $(0, 1, 1, 2)/\text{norm } 6$ exact with the σ action selecting the anchor sector; the bytecode p -sequence has NO code reading — the bingo is buried), the ST31 DEGREE ROUND anchors the μ_4 center as a POWER of both regular clocks ($w^6 = \pm J$ with $\chi_w = x^4 + ix^2 - 1$ exactly primitive ζ_{24} ; $u^5 = \pm J$ central; u^4 free with census $\{5:48\}$, $48 = 240/5$) and KILLS $c = w^2$ by a parity theorem, and the W3 SIGN-UNCERTAINTY TOOLBOX is typed: a real 25-digit dictionary to the critical strip (phase slope $= L = \log \pi - \psi(\frac{1}{4})$, the W1 δ_0 weight) whose mass lever dies at $d = 1$ ($e^{-E^*} = 0.967$ where $< \frac{1}{2}$ is needed; $d \geq 21$ required) — while the W3 surface itself is empirically positive on all 67 complete windows ($\min \lambda_{\min} = +8.26 \times 10^{-4}$; the incomplete combs are exactly the v618 flip set $\{1219, 1292, 1445\}$))

- **The erratum (first, honest, dated).** The v631/v640–v642 chain read the Hurwitz–Lerch block of Suzuki’s screw function (eq. 1.3) with coefficient -1 ; the correct coefficient is $+1/4$, locked by the paper’s own §2.2 data ($A = \frac{1}{2}(\log 2\pi - \psi(2)) = 0.70754637$ reproduced only with $+1/4$; $g(0) = 0$; machine evidence v643 C0.1). All chain identities are correct identities of the kernel $\tilde{g} = g - \frac{5}{4}$ Lerch, and all measured numbers transfer verbatim via $c_{\text{gal}}^{\text{sm}}(\tilde{g}) = -4 c_{\text{gal}}^{\text{sm}}(g)$ — no check flips. Corrected labels: Suzuki’s smooth layer $= +\rho$; the two-layer dictionary ($-4D$ smooth, D^2 atomic) collapses to the *one* scalar $+1/D$; $\kappa = 0$ exactly (the $-\frac{5}{4}L\delta_0$ term of v640 was an artifact of the misreading). Documented as dated CONVENTION ERRATUM blocks in the four modules (all re-run green, numbers unchanged), erratum notes on the five PRIME.WEIL.* ledger rows (CONTACT/DICT/BOUNDARY/PORTABLE/MATRIX), erratum sentences in the tfpt_3 audit blocks, the contracts paragraph and the prime-front theory-open section, and the website mirrors (feed, W1 dictionary map, honesty banner).
- **New modules.** v643_w1_theorem.py (11 checks: convention lock/erratum evidence, projection lemma, $A_{\text{arch}} = -g''_{\text{smooth}}$ exact, $\kappa = 0$, derived D^8 moment brackets, form equality 1.28×10^{-10} , pole rank 1); v644_w2_form_density.py (7 checks: classical FEM density at rate, Rayleigh–Ritz monotone on nested spaces, λ_a scan, typed Mosco/norm-resolvent remainder); v645_klein_rp.py (17 checks: dressed-string reality, charged Klein blocks PSD N -stable, $\eta = (1, 1)$ unique of 36, must-fail controls, full mixed OS Gram); v646_rm13_reverse.py (20 checks: exact anchor identity, generic/specific split, bytecode negative, selective kill control); v647_st31_degree24.py (25 checks: regular 24/20 clocks with central powers, the parity-theorem kill of $c = w^2$, u^4 census $\{5:48\}$); v648_sign_uncertainty.py (12 checks: 25-digit dictionary anchors, the $d = 1$ mass-budget death, surface positivity 67/67, flip-set reproduction, typed verdict).
- **Ledger.** New rows PRIME.WEIL.THEOREM.01, PRIME.WEIL.W2.01, QGEO.KLEINRP.01, E8.RM13REV.01, E8.ST31DEG.01, PRIME.SIGNUNC.01; dated erratum notes on PRIME.WEIL.CONTACT.01, PRIME.WEIL.DICT.01, PRIME.WEIL.BOUNDARY.01, PRIME.WEIL.PORTABLE.01, PRIME.WEIL.MATRIX.01; dated notes on PRIME.WEIL.OPERATOR.01 (contract state: W1 theorem-closed, W2 started, W3 open with tool diagnosis, W4 unchanged), QGEO.TWISTOPE.01 (open item resolved), E8.CODESEM.01, E8.ST31.01, PRIME.UNIFC.01 (independent flip-set confirmation, $\text{corr} = +0.704$).
- **Scope.** No marker moves; the erratum changes labels, not numbers (the transfer identity is exact and machine-checked); W1 closes as a theorem at the window level, W2 is started (not closed), W3 stays open (the sign-uncertainty route is closed as a typed negative — the toolbox needs a large parameter the ζ strip does not have), W4 unchanged; GATE.QGEO does not move; no positivity claim beyond the measured surface, no RH statement.

2026-08-02 (XLII) (website: the home page catches up with the 2026-08 arcs — a new “geometric realization” section (the seam axioms force the μ_3 -cover $y^3 = x^4 - 1$, $N = 3$ pinned, the physical seam is the conformal seam, the covered seam and its $\mathbb{Z}_3$ orbifold; static SVG map seam $\rightarrow$ curve $\rightarrow$ E8 with the 60-line/ST31 quotient) and a new “code and primes” section (E8 as an error-correcting code with the RM(1,3) bit dictionary; primes as the shadow of the finished geometry; the W1 Weil-operator contact with its honest W2/W3 scope — no RH claim); claim-stack honesty updates)

- **Website only, no theory change.** New home sections GeometryArc (mirrors v617, v620, v622, v623, v628, v629, v633, v634, v639) and CodePrimesBand (mirrors v625, v626, v638 and v630, v631, v640–v642), placed between the claim stack and the honesty band; every card carries its display marker and the open items are stated in place.
- **Claim stack.** The declared-inputs layer records the conditional v624 reduction (three selectors force $d = 4$, so the two inputs reduce to $d = 4$ plus π under the named architecture); the numerical layer now names the honest $\sin^2 \theta_{13}$ stress ($\approx 2.0\sigma$, the largest single pull) instead of leaving it to the predictions page.
- **No marker moves; no new claims.** All content mirrors existing ledger rows; the bedrock (GATE.QGEO) and the RH-hard steps W2/W3 are stated open where the new sections mention them.

2026-08-02 (XLI) (the ten-front batch lands (v632–v642 promoted) — **THE PGL₂ CONTRACT EXECUTED:** the four transfer solvers share ONE Möbius action on the disc -7 norm line where they act at all (Koide reading exactly intertwined with the base translation, g_{QCD} exactly conjugate to it, Boltzmann = pole by the single-flow theorem; kill criterion NOT met); **THE $\mathbb{Z}[i]$ -E8 QUOTIENT AND ITS STABILIZER:** the μ_4 -quotient of the 240 roots IS the hermitian-unimodular $\mathbb{Z}[i]$ -E8 with the 60-hyperplane system of ST31, G_{31} is the FULL unitary stabilizer with Molien-unique degrees (8, 12, 20, 24) and the exact clock identities $\sigma = c^4$, $J = c^9$ — while the numerology $|G_{31}| = |W(D_5)| \times |W(A_3)|$ is KILLED three ways (real structure: $(Z_4 \circ 2^{1+4}).\text{Sp}_4(2)$; the compiler clock is NOT the regular 12-element); **P CANONICAL AND CONSTRUCTED:** the Lorentz congruence matrix is the unique minimal-Frobenius operator-compatible class in the full census AND, mod sign, the Frobenius-minimal integer congruence transporting the C_V null frame onto the canonical rank-one rays (finite 16-family); an HONEST NEGATIVE: after h -control the fine Hodge invariants carry NO independent information about the $C = 1$ margin ($\rho = -0.04$, $p = 0.75$ — the direct window-level bridge route closes); **THE CODE DICTIONARY:** the unique equivariant Hamming placement is Reed–Muller RM(1,3) on AG(3,2) with information bits one per μ_4 pair, the σ 3-cycle on the syndrome flag, and decode = projection verbatim (3840/3840); **THE TWIST OPE:** the interacting $\mathbb{Z}_3$ orbifold slice stands at the abelian vertex level ($h_\sigma = 1/36$ three ways, exponent $2\Delta = 2/9$, crossing exactly symmetry-protected, closed four-point form; RP validated in the real class, the $\mathbb{Z}_3$ Klein-twist pairing typed open); and **THE W1 CLOSURE TRIO:** the boundary equation $A_{\text{arch}} = \frac{1}{4}g''_{\text{smooth}} - \frac{5}{4}(\log \pi - \psi(\frac{1}{4}))\delta_0$ EXACT with the derived $1 + 1/(6d^2)$ moment law, the frozen dictionary PORTABLE on three fresh windows (atom constant D^2 at machine precision), and the full-matrix operator level CLOSED (block norm 2.7×10^{-3} derived, 6.3×10^{-6} after measure-level re-binning; pole block rank 1; two typed lattice residuals) — plus Lean certificates for the

W1 dictionary identities, the Lorentz congruence, and the G_{31} order identities)

- **New modules.** `v632_ftransfer_pgl2.py` (25 checks: substrate, discrete intertwining, native PGL_2 classification, five must-fail controls); `v633_orbit60_quotient.py` (17 checks: hermitian-unimodular $\mathbb{Z}[i]$ -E8, σ census $19 \times 3 + 3$, line group 11520, cascade killed); `v634_st31_structure.py` (56 checks: full stabilizer count, Molien uniqueness, Springer regulars, the numerology kill, $\sigma = c^4/J = c^9$, honest clock typing); `v635_p_canonicity.py` (18 checks: the 40-solution census, minimal-Frobenius class, fine-invariant separation); `v636_p_construction.py` (25 checks: null-cone census, boost normal form, the finite 16-family, must-fail gl_2 ansatz); `v637_fine_c1_bridge.py` (8 checks: the preregistered honest negative); `v638_code_semantics.py` (27 checks: RM(1,3) dictionary, syndrome flag, decode = projection, the 30-census kill control); `v639_twist_ope.py` (25 checks: three weight routes, two-point, crossing, closed four-point, OPE data, differentiated RP); `v640_w1_boundary.py` (11 checks: the exact boundary equation, three boundary constants, the derived moment law); `v641_w1_portability.py` (10 checks: the frozen-dictionary kill test on $h = 285/540/997$); `v642_w1_matrix.py` (8 checks: operator-level closure, pole-block rank 1, the two typed lattice residuals as inverted-expectation checks, numbers unchanged from the probe).
- **Lean.** Three new certificate files in `experiments/lean4-carrier-rigidity` (lake build green, no sorry): `WeilDictionary.lean` (the exact v631 W1-dictionary identities: Lerch collapse, structure theorem), `LorentzCongruence.lean` ($P^\top J_{\mathrm{det}} P = J_{\mathrm{fix}}$ by kernel decide), `G31Orders.lean` (the G_{31} /glue order identities $8 \cdot 12 \cdot 20 \cdot 24 = 46080 = 1920 \cdot 24$, $60 = 7 + 11 + 19 + 23$).
- **Ledger.** New rows `FTR.PGL2.01`, `E8.ZIQUOTIENT.01`, `E8.ST31.01`, `PRIME.PCANON.01`, `PRIME.PCONSTRUCT.01`, `PRIME.FINEC1.01`, `E8.CODESEM.01`, `QGEO.TWISTOPE.01`, `PRIME.WEIL.BOUNDARY.01`, `PRIME.WEIL.PORTABLE.01`, `PRIME.WEIL.MATRIX.01`; dated notes on `PRIME.WEIL.DICT.01`, `PRIME.WEIL.OPERATOR.01`, `E8.INCIDENT.01`, `E8.CODE.01`, `QGEO.ORBCAS.01`, `PRIME.HODGECON.01`, `FTR.DISC7.NORM.01`, `EXTREV.LATTICE.01`.
- **Scope.** No marker moves; the honest negatives (cascade route, fine-invariant bridge, $\mathbb{Z}_3$ mirror pairing, gl_2 ansatz) are typed results that close routes, not gaps; W1 is theorem-capable at the window level with the L_0^2 projection the last remainder; W2/W3 stay open and unmoved; no positivity claim, no RH statement; `GATE.QGEO` does not move.

2026-08-02 (XL) (the W1 dictionary lands (v631 promoted) — the v630 non-scalar residual IS the zeta pole term: the Lerch collapse $[e^{-t/2}\Phi(e^{-2t}, 2, \frac{1}{4})]'' = 4e^{-t/2}/(1 - e^{-2t})$ (exact) yields the structure theorem $g'' = -2 \cosh(t/2) - 4 \times$ (the TFPT arch density) — Suzuki's smooth layer is $-4 \times$ the window density MINUS the pole block (TFPT's separate v591 rank-one); the closed per-lag ratio law $-D[4 + (e^t + 1)(1 - e^{-2t})]$ verifies, after pole subtraction the smooth conversion is the SCALAR $-4D$ (monotone to 1.0006), and the atom-layer constant is D^2 exactly: W1 of `PRIME.WEIL.OPERATOR.01` closes at the measured level on both halves — $\hat{A}_{\mathrm{arch}} = -(1/4D) \text{ Galerkin}_{\mathrm{smooth}} + \text{pole rank-one}$; the theorem-level remainder and the RH-hard steps W2/W3 stay typed open)

- **New module.** `v631_w1_dictionary.py` (7 checks: the exact Lerch collapse, the structure theorem, the route certificate, the closed ratio law, the scalar $-4D$ closure, the D^2 atom constant, the typed remainder).
- **Ledger.** New row `PRIME.WEIL.DICT.01`; resolution note on `PRIME.WEIL.CONTACT.01`.
- **Scope.** The implication map stays explicit: W1 measured-closed $\rightarrow$ W2 (open) $\rightarrow$ W3 (open, RH-hard) $\rightarrow$ W4 (classical given W2+W3); closing W1 does not move W3; no positivity claim, no RH statement.

2026-08-02 (XXXIX) (the six-front batch lands (v626–v630 promoted) — **THE E8 CODE**: Construction A on the self-dual extended Hamming code $[8, 4, 4]$ yields E8 exactly (shells 240/2160; every single-bit error exhaustively correctable: “E8 is an error-correcting code” is a THEOREM); **THE HODGE CHAMBER**: all 67 complete windows land in the **POSITIVE** cone of the cover polarization lattice on **ONE** sheet (the measured half of the geometric positivity route; honest typing: chamber membership is density-layer, the fine $C = 1$ arithmetic lives inside); **THE ORBIFOLD CASIMIR**: the covered seam’s deck classes $\{1/6, 1/2, 5/6\}$ carry exactly the $\mathbb{Z}_3$ -twist Casimir data (exact closed form, sector table $(1/72, -1/24, 1/72)$, twist gap $1/18$); **THE INCIDENCE CENSUS**: the naive 48×5 root incidence is **KILLED** ($19 \times 12 + 3 \times 4$) with the sharp positive residue $60 = D_{\text{start}}$ as the free clock-orbit count on the roots; and **THE SUZUKI FIRST CONTACT**: the TFPT atom table IS Suzuki’s prime measure literally (positions $\log n$, weights $\Lambda(n)/\sqrt{n}$, exact) — **W1’s atomic half CLOSED**, the smooth conversion measured non-scalar (the preregistered residual, now with data))

- **New modules.** `v626_e8_code.py` (7 checks: Hamming $[8, 4, 4]$ self-dual, Construction A even unimodular = E8, shells, exhaustive syndrome decoding, typed compiler ties $8/4/16/14$); `v627_hodge_chamber.py` (5 checks: exact transport $z = P^{-1}y$, $\det S > 0$ on $67/67$, one sheet, honest scramble typing); `v628_orbifold_casimir.py` (5 checks: exact closed form, exact $1/N$ expansion $\pi(6\nu^2 - 6\nu + 1)/12$, sector table, twist gap $1/18$); `v629_root_incidence.py` (6 checks: 240-root model, the kill, $60 = D_{\text{start}}$ free clock orbits, 12 σ -fixed roots, controls); `v630_suzuki_contact.py` (4 checks: the literal atom identity, tent structure, the measured non-scalar Galerkin profile, contract typing).
- **Ledger.** New rows `E8.CODE.01`, `PRIME.HODGECONE.01`, `QGeo.ORBCAS.01`, `E8.INCIDENCE.01`, `PRIME.WEIL.CONTACT.01`.
- **Scope.** No marker moves; no positivity claim beyond the measured surface; no RH statement; the interacting orbifold statement and the W1 normalization dictionary stay the named residues.

2026-08-02 (XXXVIII) (the prime-shadow audit lands (v625 promoted): the checkable core of “primes are the shadow of the finished geometry” is **EXACT** — $\Theta_{E_8} = E_4$ with shell counts $240\sigma_3(n)$ (multiplicative over coprime addresses: the ‘address space’ reading IS unique factorization), the primes act as **COMMUTING** Hecke channels ($T_p\Theta = (1+p^3)\Theta$ for $p = 2, 3, 5, 7$; $[T_2, T_3] = 0$) with the compiler’s theta as **SIMULTANEOUS** eigenvector, and $L(E_4, s) = \zeta(s)\zeta(s-3)$: the zeta function is the factorized shadow of the E_8 counting function — primes enter **AFTER** the geometry; the speculative framings (eigenfrequencies, RH as coherence) stay typed hypotheses)

- `v625_prime_shadow.py` (`PRIME.SHADOW.01`, 6 checks; probe 6/6, **PRIME-SHADOW-EXACT**). Theta from the glue decomposition $(\theta_2^8 + \theta_3^8 + \theta_4^8)/2$; shells $240\sigma_3(n)$ exact for $n = 1..12$; multiplicativity census with the non-coprime must-fail ($\sigma_3(4) = 73 \neq 81$); Hecke eigenvalues $1 + p^3$ and commuting channels; $L(E_4, 6) = \zeta(6)\zeta(3)$ to $5 \cdot 10^{-8}$. Honest scope: classical Jacobi/Hecke facts realized verbatim by the compiler’s own objects — the direction of explanation (geometry first, primes as readout) fixed within the narrative.
- **Sync.** Ledger row + note on `EXTREV.LATTICE.01`; `tfpt_3` (audit block); diary; suite 618 → 619 scripts; website/README/zenodo counters; mirrors regenerated.

2026-08-02 (XXXVII) (the external-review lattice audit lands (v624 promoted) — **THE FOUR-MARK CLOSURE**: under the $D_{d+1} \oplus A_{d-1}$ glue architecture

three independent selectors force $d = 4$ (disc-group census, the norm equation $(d+1)/4 + (d-1)/d = 2$, the Pythagorean $(3, 4, 5)$ triple of cycles/marks/carrier) — the two-input presentation reduces to ONE boundary degree $d = 4$ plus π , conditional on the architecture; THE ANCHOR BYTECODE ($\chi = (t-1)^2(t-2)$, two-state recursion, $240+8 = 248$); THE LORENTZ CONGRUENCE $P^\top J_{\det} P = J_{\text{fix}}$ EXACTLY (index 6) — the prime-front determinant form and the cover polarization lattice are the SAME rational quadratic form; the review's B -test retyped ill-posed (B complex symmetric); and the RH architecture preregistered as PRIME.WEIL.OPERATOR.01 with verified Suzuki citations)

- **v624_external_lattice_audit.py** (EXTREV.LATTICE.01, 14 checks; probe 14/14, LATTICE-AUDIT-PASSED). Disc-group census with negative controls $d = 3, 5, 8$; unique norm-equation solution (no other even target $2k$, $k \leq 10$); Pythagoras at $d = 4$; $(1, 1, 2)$ unique partition; $c_3 = 1/(8\pi)$; bytecode identities exact; the congruence with $\det P = -6$, $36 = 6^2$, $6 = p_2(a)$; $B = M^\dagger J$ complex symmetric ($\det 8$) — the literal integer- R test cannot be posed; third $\mathbb{Q}(\omega)$ ratio an exact square. AX.P2.01 keeps its typing.
- **PRIME.WEIL.OPERATOR.01 (new research contract)**. The W1–W4 chain (exact Galerkin identification with Suzuki's localized Weil operator A_a ; form density; uniform discrete positivity — the RH-hard step, with the $C = 1$ contraction reading as candidate mechanism; continuum passage via Yoshida's odd criterion), kill tests K1–K3, citations verified by web lookup (arXiv:2606.09096, arXiv:2607.24830). No RH statement.
- **Sync.** Ledger rows EXTREV.LATTICE.01 + PRIME.WEIL.OPERATOR.01 + notes on AX.P2.01/QGEO.EQORDER.01; tfpt_research_contracts (contract block); tfpt_3 (audit block); diary; suite 617 $\rightarrow$ 618 scripts; website/README/zenodo counters; mirrors regenerated.

2026-08-01 (XXXIV) (the follow-through round (v619–v621 promoted): the two $C = 1$ violators are TRUNCATION ARTIFACTS of the prime-data cap (flip set = truncation set exactly, mechanism reproduced by injection at both scales, $C = 1$ EXCEPTION-FREE on the complete-comb surface); the cyclic- N census makes the bedrock residue CONDITIONAL (seam-admissible primitive-Lorentz orders = $\{3, 5\}$ exactly, $N = 6$ reduces to $N = 3$, and the compiler's machine-checked 27/81 pin $N = 3$ uniquely); and the interacting Klein–Landau semigroup CONTRACTS to the μ_4 -commensurate steps with the clock surviving as a positive transfer over the whole coupling grid)

- **v619_flip_mechanics.py** (PRIME.FLIPMECH.01, 6 checks; probe 6/6, FLIPS-ARE-TRUNCATION). Atom demand $u \leq 2\alpha$ vs data cap $U_{\max} = 12.899$: exactly the two v618 flip windows are truncated ($\Delta u = 0.677/0.089$); no zero resonance (collective spectrum); injection reproduces both scales ($-5e-5/ -1e-4$ vs observed $-1.0e-4$; $-0.18/-0.22$ vs -0.29); $C = 1$ with ZERO exceptions on the 67 complete windows (max 0.982). The flip windows are retired as data-boundary artifacts.
- **v620_cyclic_n_census.py** (QGEO.NCENSUS.01, 9 checks; probe 9/9, N3-PINNED). Full ∞ -ramification iff $\gcd(N, 4) = 1$; genus table 1, 3, 3, 6, 7; primitive sheet dims; Chevalley–Weil signatures ($N = 3$: both sheets Lorentz; $N = 6$: no primitive Lorentz sheet – reduces to $N = 3$); the pinning $\det_{\mathbb{Z}}(1 - \text{deck}) = N^3$: 27 (the v597 constant) vs 125; saturation 81 vs 625: $N = 3$ unique.
- **v621_interacting_semigroup.py** (WOIT.GAMMA.SEMI.01, 6 checks; probe 6/6, CLOCK-SURVIVES-INTERACTING). Free v524 pattern reproduced at $N = 16$ (even steps PD, odd steps zero one-particle diagonal); at $g > 0$ Hermiticity survives exactly on $\{4, 6, 7\}$ (the μ_4 -commensurate window; mechanism: the survivor is α_4 -invariant exactly, breaking translation

invariance to the quartet stabilizer); the clock step stays PD over $g \in \{1/32..8\}$: the reconstructed rotation group of the interacting toy is the clock tower.

- **Sync.** Three ledger rows + notes on PRIME.UNIFC.01, QGEO.SEAMFORCE.01, WOIT.GAMMA.TOY.01; tfpt_3 (three audit blocks); tfpt_prime_front (flip-mechanism sentence); diary; suite 612 $\rightarrow$ 615 scripts; website/README/zenodo counters; mirrors regenerated.

2026-08-01 (XXIII) (the three-front round (v616–v618 promoted): the internal SU(2) SEPARATES kinematically (kill test (6)’s first slice — $\rho_{\text{tw}} = \text{right-}j$ verbatim, the clock factorizes as left- $u \circ \text{right-}u$ exactly, the deck is spacetime-side, and the complex choice breaks the internal factor to $U(1)$ with the mark torsor as its μ_4); the conformal seam axioms FORCE the μ_3 -cover ($\mathbb{Z}_4$ -Möbius rigidity + uniform weights + genus 3 + the seam reflections matching v599’s pattern — the bedrock residue narrows to the cyclic-3 choice and the physical $\leftrightarrow$ conformal identification); and the equidistribution constant $C = 1$ is FROZEN on the declared surface with the sharpened sign-flip dichotomy (violator set = flip set exactly; honest correction of the XXIII note))

- **v616_su2_internal_kinematic.py** (WOIT.SU2.KIN.01, 17 checks; probe 17/17, SU2-KINEMATIC-SEPARATED). Right-sp(1) fiber-preserving, commutes exactly with the spacetime quaternion action, intersection $\{0\}$; RHO4 = left- $e^{i\pi/4} \circ \text{right-}e^{i\pi/4}$ exact; DECK4 = left- i ; internal $SU(2) \rightarrow U(1)$ by the complex choice; σ_{std} fixes right- j and inverts the internal charge. Kill test (6)’s kinematic branch does not fire; the dynamical half stays live on $\mathcal{A}_{\text{hol}}$.
- **v617_seam_cover_forcing.py** (QGEO.SEAMFORCE.01, 14 checks; probe 14/14, SEAM-FORCES-COVER). Order-4 Möbius multiplier forced primitive; harmonic cross-ratio orbit $\{2, 1/2, -1\}$ (must-fail: $4/3$ not in it); weight census $81 \rightarrow 4 \rightarrow 2$ (mark equivalence kills the alternating pair); $y^3 = x^4 - 1$ exact; Riemann–Hurwitz genus 3; bond reflection = the v599 $(k, 5-k)$ pattern with the two v519 cut points.
- **v618_uniform_constant.py** (PRIME.UNIFC.01, 6 checks; probe 6/6, UNIFORM-C1). 69 windows, q_{model} one-signed on the whole ladder; $\varepsilon h \leq 0.982$ on all 67 lock-sign windows ($C = 1$); tertiles 0.61/0.45/0.39; exactly two q_{real} sign-flip windows (1219, 1445) = the violator set exactly; scramble breaks by $> 10^4$. Honest correction: the XXIII note’s mechanism (“ q_{model} crossing”) was wrong and the edge flip 1445 was missed.
- **Sync.** Three ledger rows + notes on WOIT.GAMMA.TOY.01, QGEO.COVER.01, PRIME.LOCKPROJ.01; tfpt_3 (three audit blocks); tfpt_research_contracts (kill-test-(6) slice note); tfpt_prime_front ($C=1$ frozen-module note); diary; suite 609 $\rightarrow$ 612 scripts; website/README/zenodo counters; mirrors regenerated.

2026-08-01 (XXIII) (the mode-separation round lands (v606 promoted — the suite reaches 600 scripts): the infinity torsion SEPARATES the three V -eigenlines (all pure 3-torsion at infinity, classes pairwise distinct — the selection carrier the real structure could not provide; the canonical “+1” rule stays open); the arithmetic-identity route for c is closed (cubic field disc -783 , Galois S_3 , not abelian); the equidistribution conjecture is posed with the explicit constant $C = 1$ in the prime-front paper; and the contract survey executes its bookkeeping (the disc-7 preregistration’s discrete half marked executed via v571/v575/v578; the WOIT γ milestone documented as the designed next step))

- **v606_mode_separation.py** (QGEO.MODESEP.01, 7 checks; probe 7/7, MODES-SEPARATED). Unique intertwiner (rank 3, 1-param); all three eigenline lifts pure torsion; fixed-frame signatures $(2, 0, 2)/(2, 2, 0)/(1, 2, 0)$, pairwise distinct, none trivial; $\text{char}(7\Gamma(c)c) = y^3 + 3y^2 + 6y - 1$ irreducible with discriminant $-783 = -3^3 \cdot 29$ non-square.

- **Sync.** Ledger row + notes on QGEO.TRANSLATOR.01/QGEO.SEAMMARKS.01 and the cross-reference on FTR.DISC7.NORM.01; tfpt_prime_front (the constant-1 statement in sec:theory-open); tfpt_3 (audit block); diary; suite 599 → 600 scripts; website/README/zenodo counters; mirrors regenerated.

2026-08-01 (XXII) (the audit-and-measurement close of the day: the gate audit documents the cover program as MODEL-COMPLETE on the operator half (ledger note on GATE.QGEO.01, no status move — the residual is the conformal seam identification, the zero-mode selection, and the identity of c); honest negatives quantified (c without independent geometric identity; the zero-mode line is not R -real); tfpt_1 gains the consolidated “cover program at a glance” paragraph; and the prime-front uniformity sharpens: $\varepsilon \cdot h \leq 0.98$ on all 68 floor-passed windows — $|q_{\text{real}}/q_{\text{model}}| \leq h^{-1}$ uniformly on the declared surface (note on PRIME.LOCKPROJ.01))

- **No new modules.** Sandbox measurements and typed notes only: c^2 , $c\Gamma(c)$, $\Gamma(c)c$ outside the word algebra (curiosities documented: $\text{char}(7\Gamma(c)c) = y^3 + 3y^2 + 6y - 1$ integer monic; $|\det(14c)|^2 = 28^3$); $\ker V$ not R -real and no $0 \leftrightarrow 2$ swap; tercile medians of $\varepsilon \cdot h$: 0.61/0.44/0.39 (stable, slightly decreasing); the single blow-up ($h = 1219$) is exactly the declared q_{model} zero-crossing exclusion.
- **Sync.** Ledger notes on GATE.QGEO.01 and PRIME.LOCKPROJ.01; tfpt_1 consolidation paragraph; diary; suite unchanged (599, green); mirrors regenerated.

2026-08-01 (XII) (dictionary round 2 honest negative (the $Q = U + V$ double criterion over ~ 50 canonical elements: no Q/V hit; kill not triggered, the flag-adapted search is the designed next session); the real-structure map documented as blocked on the dictionary; and the self-contained equidistribution problem statement added to tfpt_prime_front (sec:theory-open) — the v596 identity family posed TFPT-free for external consumption)

- **No module.** Exploration and editorial only: ledger untouched except mirrors; the one dictionary entry stays $U = G_2$ (2026-08-01 XI); the open problem now has a publication-grade statement (explicit couplings c_γ , closed constant $K(\alpha, D)$, the observed collective cancellation, and the uniformity question named as the open content).

2026-08-01 (IX) (the C-D-E round: the 1D lock projection (v596 promoted, T199 — the near-identity along the closed direction, median 7.7×10^{-4} , coupling spectrum collective); the v590 involution group formalized in Lean with its Klein-four closure $A \cdot B = S_0$; and the big-picture strategy survey (the open core funnels into GATE.QGEO + the RP slot; two new geometric strategies preregistered))

- **v596_lock_projection.py** (PRIME.LOCKPROJ.01, 6 checks; T199 6/6, NEAR-IDENTITY-1D). Along the closed v591 direction (parameter-free): $|q_{\text{real}}/q_{\text{model}}|$ median 7.7×10^{-4} , decay $h^{-1.01}$; the coupling spectrum is collective (max single-zero share 5.9%, $N_{50} = 56$, heavy zeros 14.1/25.0/30.4/40.9); 400-zero truncation fails (v589 plateau); scramble breaks by six orders — the arithmetic content of Problem 7.1 is ONE explicit identity family, equidistribution-flavored.
- **Lean.** A, B, klein_closure ($A \cdot B = S_0$), involutions and V -commutation added to ParityWeightLaws.lean; lake build green (3374 jobs).
- **The big-picture survey (E).** The gate/contract census shows the open core is SMALL: GATE.METRIC.19 funnels the whole G_{net} line into GATE.QGEO + standard AQFT assembly;

GATE.QGEO itself is narrowed (v574/v590) to the parabolic μ_4 realization; the RP slot is the one dynamical open; absolute scales and external interfaces are typed contracts. Two new strategies preregistered in the diary: (i) the μ_4 -cover homology model (H_1 of the cyclic covers $y^4=x^4-1$ / $y^3=x^4-1$ as $\mathbb{Z}[i]$ - resp. $\mathbb{Z}[\omega]$ -modules of rank $3/2$ — the compiler Q as a canonical homology operator; testable by finite computation); (ii) RP positivity as HODGE positivity (the seam kernel as the polarization form of the cover’s Hodge structure — the Riemann bilinear relations would make positivity a theorem; testable against the v572 Gram data via exact Beta-function periods).

- **Sync.** Ledger row + notes; `tfpt_prime_front` (48 $\rightarrow$ 49 modules, `sec:v596/sec:t199`, 199 probes / 4944 checks); Paper II (“thirty modules”); `tfpt_3`; diary; suite 589 $\rightarrow$ 590 scripts; website/README/zenodo counters; mirrors regenerated.

2026-08-01 (VIII) (the 0-1-2-3-4-5 round: repository pushed (v576–v594, 111 files); the residual bookkeeping executed (v595 promoted, T198: the v593 residual was the σ MAPPING — identity-level closed forms 1.00000–1.00017, honest amendment of the v593 attribution); derivation sketches added to the theorem section; the determinant law formalized in Lean (`det_S_closed`, build green))

- **v595_mapping_completion.py** (`PRIME.MAPCLOSE.01`, 4 checks; **T198** 4/4, **MAPPING-CLOSES**). The exact dictionary is $\sigma = d/N$, hence $a_{\text{eff}} = ND/2$ with limits $[u_0/(ND), 2\alpha/(ND)]$ ($ND = 2\alpha + O(D)$ — why the α -form carried a first-order residual); entries AND det match at 1.00000–1.00017 (1.00000 at $h = 1445$); kernel piece 9×10^{-6} (= the genuine $O(1/N^2)$); the v593 numbers stand, its residual attribution is superseded (note on `PRIME.CUTOFF.01`).
- **Manuscript-grade theory section.** `sec:theory-proofs` added to `tfpt_prime_front`: derivation sketches for all seven theorems (Dirichlet sums and branch merge; geometric ladders; factorization/separability; the direction and determinant laws; the exact dictionary; partial summation + Bütthe).
- **Lean.** `det_S_closed` and `det_denominators_factor` added to `ParityWeightLaws.lean` (the closed determinant law as a field identity; the E^2 cancellation structural); full lake build green (3374 jobs).
- **Repository.** Commit 0701e1e pushed (v576–v594, 111 files, +19133 lines); the remaining hard opens (determinant-level zero theorem; OS/RP; the μ_4 geometric model) stay documented.
- **Sync.** Ledger row + amendment note; `tfpt_prime_front` (47 $\rightarrow$ 48 modules, `sec:v595/sec:t198`, 198 probes / 4938 checks); Paper II (“twenty-nine modules”); `tfpt_3`; diary; suite 588 $\rightarrow$ 589 scripts; website/README/zenodo counters; mirrors regenerated.

2026-08-01 (VII) (the full follow-up slate lands: the cutoff completes the density layer END-TO-END (v593, T196), the FIRST UNCONDITIONAL STATEMENT via Bütthe 2018 (v594, T197), the consolidated theorem section in `tfpt_prime_front`, and the Lean-4 formalization of the round’s algebraic cores (`ParityWeightLaws.lean`, builds green against Mathlib))

- **v593_cutoff_completion.py** (`PRIME.CUTOFF.01`, 4 checks; **T196** 4/4, **CUTOFF-CLOSES**). The v592 finite- N det gap (0.19–0.50) was the integration cutoff: σ_0 -corrected closed integrals match entries to 0.7–1%, det to 0.2–1%; residual $O(1/N^2)$, shrinking — the density layer of Problem 7.1 is analytically closed end-to-end.
- **v594_unconditional_cert.py** (`PRIME.UNCONDCERT.01`, 5 checks; **T197** 5/5, **verdict UNCONDITIONAL ENTRY CERT**). Partial summation (machine-verified) + $|\psi(x) - x| < 0.94\sqrt{x}$ (Bütthe 2018, unconditional to 10^{19} ; external data) $\Rightarrow \sup |\text{Osc}| \leq 17.4$ unconditional (measured 1.474); certificate margin $565\times$ — the first unconditional statement of the program; the determinant level stays with the zero-oscillation theorem.

- **Theory section + Lean.** `tfpt_prime_front` gains `sec:theory` (“The closed-form theory: seven statements”, Theorems 1–7 with module and Lean citations); new Lean-4 module `ParityWeightLaws.lean` (branch merge, rank-one determinant, null vector, direction law + approach, sheet involution $S_0^2 = 1/[S_0, V] = 0/\text{tr} = -1$) — full lake build green (3374 jobs).
- **Sync.** Ledger rows + notes on `PRIME.DETLAW.01` and `PRIME.ZEROCOMB.01`; `tfpt_prime_front` (45 → 47 modules, `sec:v593/sec:v594/sec:t196`, 197 probes / 4934 checks); Paper II (“twenty-eight modules”); `tfpt_3`; diary; suite 586 → 588 scripts; website/README/zenodo counters; mirrors regenerated.

2026-08-01 (VI) (the continuum determinant law (v592 promoted, T195): $\det S(a)$ closed with the e^{2a} coefficient identically zero and exact leading law $640\pi^2 e^a/a^3$; the real dominance tracks the closed formula at correlation 0.9985 (the v570 growth derived); entry-level arithmetic certificate with margin $47.6\times$; PLUS the Paper-II consolidation section (the deterministic–arithmetic dissection as one narrative))

- **v592_continuum_det_law.py** (`PRIME.DETLAW.01`, 6 checks; probe T195 6/6, **DET-LAW-DERIVED**). e^{2a} coefficient $\equiv 0$ (rank-one); e^a term with exact closed coefficient carries the determinant at window scales (0.995–1.0002); leading law converges monotonically; dominance correlation 0.9985; finite- N gap typed (0.19 → 0.50); entry certificate $\sup |\text{Osc}| \times \text{TV}$, margin $47.6\times$, conditional on the measured sup (1.47) — the unconditional sup IS the zero-oscillation theorem.
- **Paper-II consolidation (follow-up 5).** New subsection “The deterministic–arithmetic dissection (machine survey)” before the cross-reference table: the v582–v592 arc as one narrative (two layers; the density layer closed-form with the rank-one pole term and the two laws; the arithmetic layer identified as the zero comb with a structural recovery plateau; the two named remaining opens). Follow-ups 2/3/4 stay open with reasons documented (no forced modules).
- **Sync.** Ledger row + notes on `PRIME.PENCIL.SEPFLOOR.01` and `PRIME.POLERANKONE.01`; `tfpt_prime_front` (44 → 45 modules, `sec:v592/sec:t195`, 195 probes / 4925 checks); Paper II (“twenty-six modules” + dissection section); `tfpt_3`; diary; suite 585 → 586 scripts; website/README/zenodo counters; mirrors regenerated.

2026-08-01 (V) (the pole term is EXACTLY rank-one and the locking-direction law is derived (v591 promoted, T194): $S^{\text{pole}} = -32\pi^2 a e^a g g^T$ with $\det \equiv 0$ symbolically; $v_2/v_1 = -(a^2 + 16\pi^2)/(2(a^2 + 4\pi^2))$ with limit exactly $-1/2$ — the v577 null-ray conjecture DERIVED, the v586 drift explained; plus the honest B/C rounds: deeper zero sums plateau (structural, note on v589) and the grading shortcut for the involution demands is falsified (note on v590))

- **v591_pole_rank_one.py** (`PRIME.POLERANKONE.01`, 5 checks; probe T194 5/5, **POLE-RANK-ONE**). Denominators factor completely ($D_{11}D_{22} = D_{12}^2$); pole part exactly separable, residuals exponential-free; direction law with limit $-1/2$ and approach $-6\pi^2/(a^2 + 4\pi^2)$; ladder match 0.04–1.4% ($h = 1445$: -1.2248 vs -1.2253); via v586 the law describes the real corpus locking direction; the density layer = the correction theory of a rank-one matrix.
- **The B and C rounds, honest.** Deeper zero sums (500/1000 zeros, $\gamma \leq 1419$) do NOT improve the depth recovery (plateau ~ 31 – 37 at $h = 184$; entries degrade): the bottleneck is sub-cell placement reconstruction, exponentially beyond finite sums — note on `PRIME.ZEROCOMB.01`. And NO V -commuting involution implements the corpus μ_4 grading (all six fail; ΣS_0 is an infinite-order shear): the two v590 demands stay independent — note on `QGEO.INVOL.01`. The OS/RP positivity theorem (D) remains open (no quick construction; the v572/v584 design space is exhausted).

- **Sync.** Ledger row + notes on PRIME.NULLRAY.01 and PRIME.LOCKDIR.01; tfpt_prime_front (43 → 44 modules, sec:v591/sec:t194, 194 probes / 4919 checks); Paper II (“twenty-five modules”); tfpt_3; diary; suite 584 → 585 scripts; website/README/zenodo counters; mirrors regenerated.

2026-08-01 (III) (the zeta zeros enter the instrument (v589 promoted, T193): the arithmetic depth layer is IDENTIFIED as the explicit-formula zero comb — correlation 0.82 with the first 200 damped zeros, a factor 5.7 of the lock depth recovered at the smallest window; the zero-oscillation bound becomes a quantified target)

- **v589_zero_comb.py** (PRIME.ZEROCOMB.01, 4 checks; probe T193 4/4, **ZERO-COMB-IDENTIFIED**). The residual mass oscillation of the atom table is the explicit-formula comb $-4 \sum_{\gamma > 0} \sin(\gamma u)/\gamma$ (dense-grid correlation 0.82, slope 1.28 = truncation deficit; pointwise 1.00 at $u = 3$); adding the comb to the density model improves the $h = 184$ lock ratio $176 \rightarrow 31$ (factor 5.7; non-monotone in truncation — honest), deep windows out of reach ($h = 540$: $2646\times$); the zero-oscillation bound is now the quantified target “control $\sum \sin(\gamma u)/\gamma$ at resolution π/D with amplitude accuracy = lock depth”. No bound claimed, NO RH statement.
- **Sync.** Ledger row + notes on PRIME.CLOSEDELTA.01 and PRIME.LOCKSPLIT.01; tfpt_prime_front (42 → 43 modules, sec:v589/sec:t193, 193 probes / 4914 checks); Paper II (“twenty-four modules”); tfpt_3; diary; suite 582 → 583 scripts; website/README/zenodo counters; mirrors regenerated.

2026-08-01 (II) (the deterministic layer of Problem 7.1 closes in one function (v588 promoted, T192): $G_{ij}(\beta)$ carries the comb side at the pole exponent and the archimedean side as the TRIVIAL-ZERO LADDER; closed B to 2×10^{-5} , the closed defect to 0.2% on all 70 windows, census decay $h^{-1.40}$ — the explicit formula’s skeleton, pole vs Γ -factor, in closed form)

- **v588_closed_delta.py** (PRIME.CLOSEDELTA.01, 6 checks; probe T192 6/6, **CLOSED-DELTA-EXACT**). $G_{ij}(\beta) = \sum_d e^{-\beta d} W_{ij}(d)$ machine-exact (finite geometric-trig series over the v587 formulas); $c_{ar}(d) = -Df(dD)$ with $f(w) = \sum_n e^{-(2n+1/2)w}$ verified 1.000002 (near field $d \leq 32$ as explicit quadrature constants); closed B : entries 2×10^{-5} , det 6×10^{-5} , all 70 windows; closed defect vs the v585 deterministic layer: 0.9999–1.0023 on all 70 windows incl. deep/anomalous; census decay $h^{-1.40}$ (= v585’s -1.43). Remaining for a theorem: elementary asymptotics of G and the ladder; the arithmetic layer stays with the primes.
- **Sync.** Ledger row + notes on PRIME.WCLOSED.01 and PRIME.LOCKSPLIT.01; tfpt_prime_front (41 → 42 modules, sec:v588/sec:t192, 192 probes / 4910 checks); Paper II (“twenty-three modules”); tfpt_3; diary; suite 581 → 582 scripts; website/README/zenodo counters; mirrors regenerated.

2026-08-01 (I) (a NEW EXACT FORMULA closes the deterministic layer’s entries (v587 promoted, T191): the diagonal lag weight is the single closed expression $W_{kk}(d) = (2/N)[(N-1-d) \cos(\omega_k d) + \sin(\omega_k(d+1))]/\sin \omega_k$, machine-exact for all lags; the exact cell-sum reproduces the prime-free model’s entries and determinant to 0.03%)

- **v587_w_closed_form.py** (PRIME.WCLOSED.01, 6 checks; probe T191 6/6, **CLOSED-FORM-EXACT**). The diagonal companion of the v576 cross formula, machine-exact (1.9×10^{-15}) for $h = 7$ –1000, $k = 1$ –3, all lags; the building blocks are closed Dirichlet sums, the apparent piecewise break at $d = m$ cancels on assembly, the reflection-edge suppression is an exact two-term cancellation; the exact cell-sum reproduces the v583 entries (1.0011–1.0036) and

det (0.9999–1.0003); macro limit $g_k(\sigma) = 2(1-\sigma)\cos(2\pi k\sigma) + \sin(2\pi k\sigma)/(\pi k)$ with the v579 kernel its edge-anchored version identically. The first executed step of the v585/v586 classical program; named next: the arch/ B -side closed form, then the δ_{PNT} expansion.

- **Sync.** Ledger row + notes on PRIME.CHEBLOEWNER.01 and PRIME.LOCKSPLIT.01; `tfpt_prime_front` (40 → 41 modules, `sec:v587/sec:t191`, 191 probes / 4904 checks); Paper II (“twenty-two modules”); `tfpt_3`; diary; suite 580 → 581 scripts; website/README/zenodo counters; mirrors regenerated.

2026-07-31 (XIX) (the locking DIRECTION is density-fixed (v586 promoted, T190): real vs prime-free locking eigenvector 0.030° median on all 69 windows while the depth stays $1350\times$ apart — THE PRIMES ARE A PURE DEPTH AMPLIFIER ALONG A DENSITY-FIXED DIRECTION; the v577 slow-decay puzzle dissolves as a comparator artifact)

- `v586_pnt_lock_direction.py` (PRIME.LOCKDIR.01, 7 checks; probe T190 7/7, **DIRECTION-DENSITY-FIXED**). Census on all 69 regular windows: angle max 0.331° , median 0.030° , decay $h^{-1.16}$; witness certificate — the quadratic form of the real $B - S$ along the deterministic direction reproduces the minimal eigenvalue within $[0.98, 2.9]$ (median 1.42): the arithmetic content of Problem 7.1 is ONE quadratic form along ONE deterministic vector; the deterministic direction drifts ($-1.73 \rightarrow -1.19$, limit -0.551 under $1/\log h$, consistent with the null-ray -0.5 , not settled) — resolving v577’s comparator artifact; scramble must-break $6\text{--}25^\circ$ vs 0.026° .
- **Sync.** Ledger row + notes on PRIME.NULLRAY.01 and PRIME.LOCKSPLIT.01; `tfpt_prime_front` (39 → 40 modules, `sec:v586/sec:t190`, 190 probes / 4898 checks); Paper II (“twenty-one modules”); `tfpt_3`; diary; suite 579 → 580 scripts; website/README/zenodo counters; mirrors regenerated.

2026-07-31 (XVIII) (the two-layer split of the locking cancellation (v585 promoted, T189): THE DOMINANCE IS DENSITY, THE LOCKING IS ARITHMETIC — the prime-free model misses the Paper-II defect by 2–4 orders (median $1350\times$) while reproducing $\det S$; layers $h^{-1.43} \times h^{-1.08} = h^{-2.51}$; the Problem-7.1 budget splits into a classical density part and a zero-oscillation part)

- `v585_pnt_locking_split.py` (PRIME.LOCKSPLIT.01, 6 checks; probe T189 6/6, **TWO-LAYER-SPLIT**). The v583 model through the normalised defect on all 70 windows: median ratio 1350, growing $h^{1.08}$ — the depth of the lock is the primes; the one-mode geometry is density-level (coarse lock $10^{-2}\text{--}10^{-4}$ without primes); density layer $h^{-1.43}$ always positive (scatter 0.70), real $h^{-2.51}$; real sign overshoots exactly at $h = 1219, 1445$ (+ the typed 1292 anomaly), deterministically never. Budget: density ~ -1.4 classical, primes ~ -1.1 zero-oscillation.
- **Sync.** Ledger row + notes on PRIME.PNTMODEL.01 and PRIME.PENCIL.ONEMODE.01; `tfpt_prime_front` (38 → 39 modules, `sec:v585/sec:t189`, 189 probes / 4891 checks); Paper II (“twenty modules”); `tfpt_3`; diary; suite 578 → 579 scripts; website/README/zenodo counters; mirrors regenerated.

2026-07-31 (XVI) (the named next step executed the same day: THE SMOOTH FUNCTIONAL IS IN CLOSED, PRIME-FREE FORM (v583 promoted, T188) — the two-term classical law $4e^{u/2} - 2(\zeta'/\zeta)(1/2)$ (no zeros) reproduces $\det S$ on all 69 regular windows parameter-free to 1.016–1.143; the $h = 1292$ sign flip is genuine prime-fluctuation content)

- `v583_pnt_model.py` (PRIME.PNTMODEL.01, 8 checks; probe T188 8/8, **PRIME-FREE-CLOSED-FORM**). The two-term law holds on the atom table (oscillation band < 1.5 around

the parameter-free constant $-2(\zeta'/\zeta)(1/2) \approx -5.372$; the prime-free grid model (density $2e^{u/2}$, hard cutoff, theoretical constant) reproduces $\det S$ on all 69 regular windows to 1.016–1.143 (mean 1.039), the S entries to 0.995–1.001, the dominance growth with correlation 0.998; honesty: constant sensitivity $\sim 0.38/\text{unit}$ — the residual band is the zero-oscillation; the anomalous $h = 1292$ window typed (prime-free +1844 vs real –1465: the sieve-horizon sign flip IS prime-fluctuation content). FINAL RELOCATION: h -uniform dominance = prime-free two-integral inequality + zero-oscillation bound.

- **Sync.** Ledger row + notes on PRIME.DENSITYDOM.01 and PRIME.PENCIL.SEPFLOOR.01; `tfpt_prime_front` (37 $\rightarrow$ 38 modules, `sec:v583/sec:t188`, 188 probes / 4885 checks); Paper II (“nineteen modules”); `tfpt_3`; diary; suite 576 $\rightarrow$ 577 scripts; website/README/zenodo counters; mirrors regenerated.

2026-07-31 (XV) (the quantitative occupation question answered at its first level: THE DOMINANCE IS DENSITY-DRIVEN (v582 promoted, T187) — the smoothed comb carries 99.8–99.9% of $\det S$ on every regular window, the scrambled control only 70%: the real comb is anomalously smooth, and the h -uniform dominance question relocates to PNT-level regularity of the smooth density functional)

- `v582_density_dominance.py` (PRIME.DENSITYDOM.01, 5 checks; probe T187 5/5, DENSITY-DRIVEN). Replacing the atom lag coefficients by their moving average (declared windows 2–20%) and recomputing $\det S$ through the exact lag-side identity: 0.998–0.999 at 2%, 0.987–0.993 at 5%, degrading smoothly to 0.81–0.89 at 20% on every regular window — the dominance is carried by the deterministic density profile, fluctuations contribute $\sim 1\%$; the scrambled control captures only 0.70 (random placement has real fluctuation content — the actual comb is anomalously smooth at these scales); the anomalous $h = 1292$ window deviates (1.24), boundary named. THE RELOCATION: the v570 h -uniform dominance reduces — up to a measured $\sim 1\%$ correction needing only a crude bound — to a positivity/growth statement about the smooth density functional (PNT-level regularity); the named next step is a closed-form bound on that functional.
- **Sync.** Ledger row + notes on PRIME.PENCIL.SEPFLOOR.01 and PRIME.OCCUPATION.01; `tfpt_prime_front` (36 $\rightarrow$ 37 modules, `sec:v582/sec:t187`, 187 probes / 4877 checks); Paper II (“eighteen modules”); `tfpt_3`; diary; suite 575 $\rightarrow$ 576 scripts; website/README/zenodo counters; mirrors regenerated.

2026-07-31 (XIV) (Regime B’s arithmetic half gets its measured object (v580: the lag-side identity is exact and the primes POPULATE the geometric sign map — every significant occupation cell matches K_∞), and the review’s multilevel transport lemma is measured and killed (v581: drift small but growing $h^{+0.36}$ against the $h^{-1-\delta}$ bar) + backflow parts T185/T186 + full sync)

- `v580_occupation_map.py` (PRIME.OCCUPATION.01, 5 checks; probe T185 5/5, OCCUPATION-FOLLOWS-KERNEL). The lag-side polarization identity — $\det S$ as the atom-lag double sum $\frac{1}{2} \sum c_{\text{at}} c_{\text{cat}} D(W, W)$ — is exact (the T163 correlation theorem, 10^{-9} on four windows); every significant cell of the binned occupation map sign-matches $K_\infty(\sigma_1, \sigma_2)$ on every tested window (50/50, 67/67, 65/65, 65/65): the arithmetic does not fight the kernel, it populates it — the open Regime-B content is the AMOUNTS; mid-diagonal negative, cross-scale positive; scramble control clean.
- `v581_locking_transport.py` (PRIME.TRANSPORT.01, 4 checks; probe T186 4/4, TRANSPORT-KILLED). The Priority-4 lemma measured on 40 doubling pairs: the locking-direction drift is small (0.3–6.7° per octave, median 2.35°) but GROWS ($h^{+0.36}$) against

the proposed summability bar — the review’s own kill criterion fires; no fixed-direction scalar transport; future transports must carry the window-dependent macro direction.

- **Sync.** Two ledger rows + notes on PRIME.MACROKERNEL.01 and PRIME.NULLRAY.01; `tfpt_prime_front` (34 → 36 modules, `sec:v580/sec:v581/sec:t185/sec:t186`, 186 probes / 4872 checks); Paper II (“seventeen modules”); `tfpt_3`; diary; suite 573 → 575 scripts; website/README/zenodo counters; mirrors regenerated.

2026-07-31 (XIII) (the review’s remaining strands executed: the jet contract natively (v578, MOEBIUS-IN-OWN-CLOCK — no shared wall-time Schwarzian, each flow projective in its own clock), the two-scale kernel signs verified globally (v579, SIGNS-MATCH 332/332 — the geometric half of Regime B closes), and the Ext-resolvent marking honestly killed (sandbox: $\chi_{\text{Ext}} \equiv 0$ for both twins, the radical sublattices are identical))

- **v578_native_jets.py** (FTR.JETS.01, 6 checks; probe 6/6, MOEBIUS-IN-OWN-CLOCK). The exact v99 trajectory has $\{q, t\} = -\Delta^2/2$ in wall time and Schwarzian 0 in its own exponential clock; the 1-loop QCD flow has Schwarzian 0 in its own RG time; the native quadruple shares no wall-time jet invariant — each instance is projective in its own clock, the obstruction is the clock (anchored by the external data); a future joint jet test needs external anchor-level jets, as v575 fenced.
- **v579_macro_kernel_signs.py** (PRIME.MACROKERNEL.01, 6 checks; probe T184 6/6, SIGNS-MATCH). $\text{sign } K_\infty(\sigma, \tau)$ matches the real two-lag kernel on every resolved cell (332/332 at $h = 300$); the diagonal $\det W^\infty(\sigma)$ is negative on $\sim 72\%$ (same-scale coupling negative, analytically); the geometric half of Regime B closes, the Λ -weighted arithmetic occupation stays open.
- **Sandbox honest negative.** The review’s Ext-sensitive marked resolvent $\chi_{\text{Ext}}(z)$ vanishes identically for both twins with the natural markings, and the radical sublattices of the two integral orders are IDENTICAL ($\text{span}\{3E_{31}, 3E_{32}\}$): the review’s own kill criteria fire; the Gibbs pencil (v572) remains the one working marked object. Diary record, no module.
- **Sync.** Two ledger rows + notes; `tfpt_research_contracts` (jet block), `tfpt_prime_front` (33 → 34 modules, `sec:v579/sec:t184`, 184 probes / 4863 checks), Paper II (“fifteen modules”), `tfpt_3`; diary; suite 571 → 573 scripts; website/README/zenodo counters; mirrors regenerated.

2026-07-31 (XII) (the second review’s Toeplitz strand audited – everything EXACT (v576: the cross-weight formula, the Chebyshev–Loewner edge theorem with the rank-one first read, the Pythagorean null bridge (5, −3, 4) typed compression, the exact N^{-4} defect coefficient, the pair-kernel sign polynomial) and the null-ray census executed (v577: correlated on all 70 windows, honestly partial) + backflow parts T182/T183 + full sync)

- **v576_cheb_loewner_edge.py** (PRIME.CHEBLOEWNER.01, 9 checks; probe T182 9/9, FORMULAS-EXACT). The polarized cross-weight formula $w_d^{(ij)} = (2/N)[\sin \omega_j \sin(dw_i) - \sin \omega_i \sin(dw_j)]/(\cos \omega_i - \cos \omega_j)$ is exact against the corpus definition (symbolic $N \leq 11$, 10^{-11} surface) — the $K = 2$ read block closes analytically; the reflection edge is a scaled Loewner matrix of U_{s-1} (exact; rank $\leq s-1$, the first read rank ONE); the leading profile’s Lorentz image is the null triple (5, −3, 4) — the same as $(g_{\text{car}}, N_{\text{fam}}, |\mu_4|)$ via Euclid, typed COMPRESSION; the edge defect is the exact coefficient $-\frac{3\pi^4}{175}(s^2 - 4)(11s^2 + 6)N^{-4}$ (locally better than the h^{-3} demand); the pair polynomial $P(s, z)$ ($P(2, 3) = 0$ exact, transition $s/z \approx 0.503/1.987$) is the analytic prototype of the v573 pattern; macro kernels verified. Three-regime split: edge CLOSED at N^{-4} , macro and transition OPEN; Problem 7.1’s quantifier untouched.

- **v577_nullray_census.py** (PRIME.NULLRAY.01, 5 checks; probe T183 5/5, NULL-RAY-CORRELATED). The locking mode aligns with the exact null ray $(2, -1)$ at $23.5\text{--}33.8^\circ$ on all 70 windows (below random; scramble destroys it, $+21^\circ$), declining slowly ($h^{-0.10}$): the clean success bar is honestly NOT met — a real partial carrier; the macro regime bends the direction; follow-up: $K_\infty(\sigma, \tau)$.
- **Sync.** Two ledger rows + notes on PRIME.PAIRBAND.01 and PRIME.PENCIL.SEPFLOOR.01; **tfpt_prime_front** (verified layer $31 \rightarrow 33$, subsections **sec:v576/sec:v577/sec:t182/sec:t183**, counters 183 probes / 4857 checks); Paper II (cross-reference rows, “fourteen modules”); **tfpt_3** audit blocks; diary; suite $569 \rightarrow 571$ scripts; README/zenodo/website counters; mirrors regenerated.

2026-07-31 (IX) (three final deepenings: the maximal ablation drops (E) too (v574 $\rightarrow$ 10 checks — the reconstruction needs only involution existence, the winding column with $N_{\text{fam}} = 3$ and the self-code), the Gibbs-critical mode is identified as the seam-row Ext-carrier direction (v572 $\rightarrow$ 10), and the per-atom profile of the dominance oscillates standing-wave-like (v573 $\rightarrow$ 10))

- **v574 extended (probe 11/11).** The maximal ablation: dropping the exponent demand (E) entirely, the winding column $3(1, 1, 1)$ plus integrality plus the self-code package (parabolic + ladder + saturation 81) still pin the compiler Q uniquely (29 ladder candidates, one hit). (E), (M), (L) are ALL redundant at the declared bound — what stays declared is the involution existence, the winding form and $N_{\text{fam}} = 3$ (independently anchored in the E_8 glue, $240 = 16 \times 5 \times 3$); GATE.QGEO.01 narrowed by five items, not closed.
- **v572 extended (probe 10/10).** The critical mode at the compiler twin’s Gibbs temperature is identified: rank one, supported entirely on the seam row (the radical / A_2 -Ext-carrier row), fixes the seam line, is a fixed point of the sheet flow ($VX = X$), annihilated by the dominant projector — the Gibbs criticality lives exactly in the Ext-carrier slot: the typed resonance with the alignment bit deepens to a shared carrier.
- **v573 extended (probe 10/10).** The per-atom share of $\det S$ oscillates across the window with a fixed sign pattern (positive at $x \sim 0.3/0.8$, negative past the midpoint), amplitudes growing with h while the net stays 1 — a standing-wave-like anatomy, measured with its ladder, no mechanism claim.
- **Sync.** Ledger/registry/run_all; **tfpt_1/tfpt_2** passages; **tfpt_prime_front** counters (4843 checks, T181 10/10); diary; mirrors regenerated.

2026-07-31 (VII) (the four lines deepened in the same round: the dominance anatomy sharpened to heavy-pair window-scale coherence (v573 $\rightarrow$ 9 checks), the RP blindness shown robust under the compiler flow (v572 $\rightarrow$ 7), the Stage-B forcing decomposed by the spectrum ablation (v574 $\rightarrow$ 8), and the continuous-half export protocol frozen on the contract surface)

- **v573 extended (probe T181 9/9).** The excess is *scale-locked* (pairs $\geq h/2$ carry it; bands 16.256 stay negative) and *weight-concentrated*: the top-10%-weight pairs alone net $0.85\text{--}1.00 \times \det S$ on every selected window — essentially $\det S$ itself; the lag-grid phase is flat (mechanism killed). The certificate target is typed precisely: heavy-pair coherence at window-scale separation.
- **v572 extended (probe 7/7).** The spectral blindness is robust under the compiler’s own flow: the V -semigroup-deformed kernels keep identical inertia on both twins for every declared state and every $n = 1..3$ — a dynamical selection needs genuine interaction.
- **v574 extended (probe 9/9, full 35-spectrum scan).** The honest decomposition: freeing the exponent spectrum, the one surviving double-selfconsistent family is exactly $\{1, 2, N\}$ with the

compiler shape — the self-consistency forces the *sheet* spectrum $\{1, 2\}$ and the shape, while the A_3 exponent demand contributes exactly one datum, $N = 3$; both factors load-bearing.

- **Contract surface.** The frozen export protocol for the continuous cross-ratio half preregistered (each instance exports the fixed-point multiplier of its native flow, cf. v425, before evaluation); design [X], markers unchanged.
- **Sync.** Ledger/registry/run_all counts updated; papers (tfpt_1, tfpt_2, tfpt_3, tfpt_prime_front counters 4842 checks, Paper II cross-reference row, tfpt_research_contracts); diary; website mirrors regenerated.

2026-07-31 (VI) (all four review follow-ups executed: the cross-ratio check passes on its discrete half (v571, $y_F = 53$ Möbius-forced), the RP form is integrally anchor-visible on the twins (v572), the dominance is typed long-range (v573, T181), and Stage B forces the winding normalisation (v574, $N_{\text{fam}} = 3$ by double self-consistency) + ledger/paper/diary/website sync)

- **v571_cr_discrete_corners.py** (FTR.CRDISC.01, 9 checks; probe 9/9, CR-PASSES). The preregistered cross-ratio check (v566 S9), executed on its discrete half: the four solver corners are the in-repo kernels $J, K, C, F = M(1, t)$, $t = -2..1$ (v224), and the corpus' one canonical declared solver reading — the Koide anchor response $\ell(M) = a^T M \mathbf{1}$ (v183) — reads (26, 35, 44, 53): $\text{CR} = 4/3$ exactly, and the fit-free reconstruction *forces* $y_F = 53$ from the three upstream corners (a new exact cross-corner identity). Honesty theorem: every linear functional passes (the check separates linear from nonlinear exports); negative controls fail as preregistered (determinants 28/25, dominant eigenvalue 1.3222). The continuous-solver half stays open per CONTRACT.F.01.
- **v572_rp_bit_form.py** (DIAMOND.BIT.RPFORM.01, 6 checks; probe 6/6, ANCHOR-VISIBLE). The kinematic RP form on the 81-twins: spectrally blind (identical inertia for every declared state; never PSD — no v534-style kinematic positivity selection exists, honest negative), but the *integral* Smith towers of the anchor-state Gram separate the twins in one slot (18 vs 2, a factor $9 = N_{\text{fam}}^2$) — the bit is visible to the RP form only through anchor-coupled states; trace discriminant -81^2 on both twins; the dynamical RP question stays the open RP-slot.
- **v573_pair_band_structure.py** (PRIME.PAIRBAND.01, 6 checks; probe T181 6/6, LONG-RANGE). Where the v570 dominance lives: every near band (< 16 lag cells) and the diagonal drag negative on the declared subset; the far band carries the whole excess with stable net ($[1.55, 1.91] \times \det S$, gross growing to $13 \times$); the scramble explodes $\det S \times 49$ and collapses the far share — long-range coherence, arithmetic placement; a certificate must control far-pair coherence (near-diagonal budgets aim at the wrong sign).
- **v574_stageb_winding.py** (QGEO.WINDING.SELF.01, 7 checks; probe 7/7, FORCED). Stage B, first narrowing: the involution *type* is killed by a rank theorem (a two-dim-positive involution cannot carry the binary trace code), (E) bounds $N \leq 3$, the ladder self-consistency selects one member per N ($28/16/14 \rightarrow 1/1/1$), and $\text{sat} = N^4$ holds *only* at $N = 3$ ($81 = 3^4$; $32 \neq 1$, $512 \neq 16$): the double self-consistency pins $(N, Q) = (3, \text{compiler } Q)$ — $N_{\text{fam}} = 3$ relocates from declared input to consistency-forced; GATE.QGEO.01 narrowed by two items, not closed; no P2 reduction, markers untouched.
- **Sync.** Four ledger rows + update notes on CONTRACT.F.01, DIAMOND.BIT.SELECT.01, PRIME.PENCIL.SEPFLOOR.01, QGEO.QRECON.01; tfpt_research_contracts (CR block “executed, discrete half”), tfpt_1/ tfpt_2 (RP-form and Stage-B passages), tfpt_3 (pair-band audit block), tfpt_prime_front (verified layer 30 $\rightarrow$ 31, subsections sec:v573/sec:t181, counters 181 probes / 4839 checks), Paper II (cross-reference rows, “twelve modules”); diary entries; suite 564 $\rightarrow$ 568 scripts; README/zenodo/website counters; mirrors regenerated.

2026-07-31 (V) (the T179 open question closed on the surface: the spectator separation certified from closed scalars (FLOOR-CERTIFIED) + v570 promoted + backflow part T180 + ledger/paper/diary/website sync)

- **Probe separation_floor_probe.py (T180, 9/9, verdict FLOOR-CERTIFIED).** The open question v569 named — does the spectator eigenvalue λ_1 of the relative pencil stay separated from 1? — answered on the reachable surface by *reduction*: two one-line theorems ($P = \det S / \det B > 0$, $T = \text{tr } Z > 0 \Rightarrow \lambda_1 \geq \sqrt{P}$; $P \leq 0 \Rightarrow \lambda_1 \geq T$) turn the separation into a closed per-window floor, and on all 70 declared T170 frame-A windows the floor clears the margin, $\min F = 2.130 \geq 1.05$ (measured $\min \lambda_1 = 4.534$): the separation follows from $\det S / \det B$ and $\text{tr } Z$ alone. The dominance is large and grows with depth (P median 30.1, slope $h^{0.90}$ on the surface ladder), and $1 - T + P = \det(B - S) / \det B$ links trace and determinant dominance exactly. *Honest negative*: the cheap two-atom witness route is dead — $\det S$ is itself a pair-level cancellation object (Cauchy–Binet exact; negative pair mass up to $13.7 \times \det S$; best single pair $0.13\text{--}0.34 \times \det B$ against the ≥ 1.10 needed) — so the h -uniform dominance stays open, typed as pair-level size-vs-cancellation. Must-break: the position scramble flips $\text{tr } Z$ to -78.28 .
- **Promotion v570_separation_floor.py (PRIME.PENCIL.SEPFLOOR.01, 8 checks, ~ 13 s).** New ledger row; update note on PRIME.PENCIL.ONEMODE.01; suite 563 $\rightarrow$ 564 scripts. **Named limits:** declared finite surface only — the h -uniform dominance $\det S \geq (1 + c)^2 \det B$ is the same open question v569 named, in sharper closed-scalar form; Paper-II Problem 7.1 untouched; no rate, no bound, no RH statement.
- **Sync. tfpt_prime_front** (verified layer 29 $\rightarrow$ 30 modules, subsections **sec:v570** and **sec:t180**, index T11–T180, counters 180 probes / 4833 checks); Paper II (cross-reference row, reproducibility “eleven modules”); **tfpt_3** audit block; diary entry in **experiments/next.txt**; README/zenodo/website counters 564; mirrors regenerated.

2026-07-31 (IV) (the relative pencil on the declared Paper-II surface: the one-mode question of the self-code review answered (ONE-MODE, labels corrected) + v569 promoted + backflow part T179 + ledger/paper/diary/website sync)

- **Probe lambda_pencil_probe.py (T179, 4/4, verdict ONE-MODE).** Priority 5 of the self-code review, executed on the real surface: the v566 S8 pencil identities $\det(B - S) = \det B (1 - \lambda_1)(1 - \lambda_2)$, $D(B, S) = \det B (\lambda_1 + \lambda_2)$, $\det S = \det B \lambda_1 \lambda_2$ are machine-tight on all 70 declared T170 frame-A windows (worst residual 2×10^{-14} ; the v563 surface imported read-only, bit for bit). *The labels are the reverse of the review guess*: the locking mode is λ_2 , hugging 1 (median 1.000021), while the spectator λ_1 is large and uniformly separated — $\min |1 - \lambda_1| = 3.53$, $\lambda_1 \in [4.53, 180.64]$, every window *above* 1. *The one-mode answer*: exactly one eigenvalue can approach 1, so the two-dimensional cancellation of Paper II reduces to the single scalar $1 - \lambda_2$ on the whole reachable surface; the $h = 540$ reference window reads $1 - \lambda_2 = -2.27 \times 10^{-5}$ (reproducing $\det \hat{A} = 4.22 \times 10^{-3}$), and the position scramble explodes $|1 - \lambda_2|$ by $\times 1.9 \times 10^6$ while the identities keep holding: the locking is arithmetic placement.
- **Promotion v569_lambda_pencil_onemode.py (PRIME.PENCIL.ONEMODE.01, 6 checks, ~ 2 s).** New ledger row; update notes on PRIME.PAPER2.READOUT.01 and DIAMOND.PARA.SELFCODE.01; suite 562 $\rightarrow$ 563 scripts. **Named limits:** declared finite surface only — Paper-II Problem 7.1 (the uniform quantifier) is untouched, typed not bounded; whether λ_1 stays separated as h grows is a new named open question, strictly weaker than Problem 7.1; no rate, no bound, no RH statement.
- **Sync. tfpt_prime_front** (verified layer 28 $\rightarrow$ 29 modules, subsections **sec:v569** and **sec:t179**, index T11–T179, counters 179 probes / 4824 checks); Paper II (cross-reference row for Problem **prob:R1**, reproducibility “ten modules”); diary entry in **experiments/next.txt**;

README/zenodo/website counters 563; mirrors regenerated.

2026-07-31 (I) (the parabolic anchor self-code: an external structural review audited (SELF-CODE-VERIFIED) — the anchor $a = (1, 1, 2)$ as the spectrum of a sheet-direction operator, double-coded by flag/Levi/radical, unique in its parabolic family; the 81 as a saturated lattice index; the A_2 bit carrier + v566 promoted + ledger/paper/diary/website sync)

- **Audit probe parabolic_selfcode_audit_probe.py** (23/23, verdict **SELF-CODE-VERIFIED**). An external review proposed exact statements about the v218 sheet-diamond direction operators $U = Q \operatorname{diag}(1, 0, 0)$, $V = Q \operatorname{diag}(0, 1, 1)$; every claim holds exactly against the corpus objects, *including the saturation check the review had not run* (the integral order stabilises at word length 4; the word-basis Smith form survives). *The parabolic theorem*: $\mathcal{A} = \mathbb{Q}\langle I, U, V \rangle$ is the full 2|1 line-stabiliser algebra (dim 7, word determinant -81 , multiplicatively closed, mutation-fragile). *The double self-code*: $H = I + \frac{1}{2}V(V - I)$ has spectrum exactly $\{1, 1, 2\} = a$, and $\chi_H = x^3 - 4x^2 + 5x - 2$ carries $(4, 5, 2) = (|\mu_4|, g_{\text{car}}, |\mathbb{Z}_2|)$ and $= (\text{flag}, \text{Levi}, \text{radical})$ of $\mathcal{A}$ simultaneously. *The uniqueness theorem*: $(x - m)(x^2 - mx + 1)$ with all-positive-integer roots forces $m = 2$ — $a = (1, 1, 2)$ is the only anchor this family can code. *The 81*: the saturated order has elementary divisors $(1, 1, 1, 3, 3, 3, 3)$ — index $3^4 = 81$, cokernel $(\mathbb{Z}/3)^4$ — equal to the v218 determinant-staircase sum (N_{fam}^4) ; the mark-local mechanism stays open. *The A_2 bit carrier*: the basic algebra is the A_2 path algebra with $\dim \operatorname{Ext}^1 = 1$: exactly two module classes (split / one nonsplit) — a canonical carrier for the alignment bit; the selection stays with RP/geometry. *Re-encoding typed as such*: $p_n(a) = 1 + \operatorname{tr}(V^n)$ (AnchorLadder through V ; 240 and rank 8 as trace readouts). *Test design*: the cross-ratio check $\text{CR} = 4/3$ for the four CONTRACT.F.01 solvers (universal-progression honesty wired; negative control 28/25). *Reformulation*: the Paper-II rank-3 form as $(1, 2)$ Lorentz geometry with the relative-pencil identities (eigenvalue locking as the named prime-front instrument).
- **Promotion v566_parabolic_anchor_selfcode.py** (DIAMOND.PARA.SELF-CODE.01, 14 checks, ~ 1 s, exact). New ledger row; update notes on DIAMOND.AXIS.01 (self-code + 81-index cross-link) and CONTRACT.F.01 (the preregistered cross-ratio check added to the contract surface); suite 559 $\rightarrow$ 560 scripts. **No P2 reduction and no marker moves**: the “ $g_{\text{car}} = \dim(\mathcal{A}/J)$ derived” route is conditional on the open *No Carrier Reconstruction* audit (rebuild Q/V without carrier-aware inputs) — the review’s Priority-1 workstream, recorded as the named open door; the 2..9 dimension table is typed as compression (no-free-pattern).
- **Sync**. tfpt_1 (self-code paragraph after v23), tfpt_2 (self-code + 81-index + A_2 -carrier paragraph after the v218 block), tfpt_research_contracts (cross-ratio check in the CONTRACT.F.01 section); diary entry in experiments/next.txt; website counters and mirrors regenerated; README/zenodo 560.

2026-07-30 (I) (T178 backflow: the frame door of the CP mirror decided — R1 by theorem, R2 by anchor, the degeneracy explained (FIBER-PINNED) + v564 promoted + v563 Paper-II readouts registered + ledger/paper/diary/website sync)

- **Prime-front diary T178** (cp_frame_carrier_probe.py, contract FRAME.CARRIER, 31/31, 2.4 s, verdict **FIBER-PINNED**, sandbox; fifth reverse-flow probe — **T177’s two open items are pure finite algebra and are *decided*, not measured**). *R1, natural half, negative by theorem*: the fiber acts on the frame by a scalar on the n -row, so every homogeneous frame block factorises exactly ($P(\rho n) = \rho^n P(n)$), checked on fully generic degree-1..4 polynomials with symbolic coefficients), and the metric-free invariants of $(1, d, n)$ have *one* generator (bracket enumeration exact: the six permutations $= \pm \Delta$, the other 21 vanish identically in a generic n ; Weyl 1946 FFT as the cited class boundary) — every scale-free ratio is constant, so no

frame-coupled scale-free $\pi/3$ -carrier exists without a metric: T177's obstruction sentence is now a theorem. *R1, metric half, non-canonical*: declared metrics admit frame-coupled Tier-2 carriers, but they split into two character classes $((-1, -1, +1)$ vs $(-1, -1, -1))$ and the admissible normalisers contain the continuum $q_t = t n_1^2 + n_2^2 + n_3^2$ (values $441 \sin(\pi/3)/(25t + 117)$, strictly monotone) — no canonical frame factor; the factors 21/8, 21/2, 441/142 are normaliser-relative frame data with the anti-numerology fence wired as a check. *The single-sine lemma (why T177 ended DEGENERATE)*: $\{|\operatorname{Im} \rho_n^k|\}$ has exactly one nonzero element iff n is crystallographic ($n \in \{1, 2, 3, 4, 6\}$, $\varphi(n) \leq 2$), by $\sin(4\pi/n) - \sin(2\pi/n) = 2 \sin(\pi/n) \cos(3\pi/n)$ (only zero at $n = 6$ on $n \geq 5$) — the compiler's two clocks μ_4 ($j = 1728$) and μ_6 ($j = 0$) are exactly the two maximal single-sine fibers, so value-based pinning of functionals is impossible there by theorem: T177's verdict was *forced*. *R2 selected by the anchor*: the Jarlskog invariant carries the full character tuple $(-1, -1, -1)$ under (conjugation, sheet flip, deck reflection), each certified at 40 dps — matching the sheet-odd orientation class only; the unique anchor-matching *canonical* carrier is the fiber-pure $\operatorname{Im} \rho = \sin(\pi/3)$ (selected, conditional on the anchor — not derived). No marker moves; REG.FREEZE.01 untouched; the CP residual is relocated with a proof, not closed.

- **Promotion v564_cp_fiber_pin.py** (CP.FIBER.PIN.01, 22 checks, ~ 2 s, sympy-exact). The exact cores as one load-bearing module: the generic Euler factorisation, the one-generator bracket enumeration, the character split and the q_t continuum (anti-numerology as a check), the single-sine lemma (identity + enumeration to $n = 24 + \text{totient criterion}$), and the anchor tuple with the selection and the CP.MU6.01 consistency control. New ledger row CP.FIBER.PIN.01; update note on CP.CHANNEL.IDENT.01 (R1 decided / R2 selected, markers unchanged).
- **Housekeeping: v563_paper2_readouts.py** (PRIME.PAPER2.READOUT.01, 24 checks) **registered**. The Paper-II readout closure was written in the previous session but never entered run_all/registry/ledger; registered now with its own ledger row. Paper II (parity_toeplitz_classification): the cross-reference list of non-recomputed readings narrows from three to one (the fitted exponents of the rate measurement), four new cross-reference rows, reproducibility section now “nine modules v555–v563”.
- **Sync**. Diary entry Teil 178 in experiments/next.txt (counters 178 probes / 4820/4820 checks); tfpt_prime_front: verified layer 27 $\rightarrow$ 28 modules (+ v563 subsection), new T178 subsection (sec:t178), T177 rest-list pointer updated, probe index T11–T178 + T178 row, counters and phase-2 range labels; tfpt_5_redteam: Target-D keybox (the fiber location now a theorem) and the CP-location winbox (frame door decided, single-sine lemma, anchor selection) citing v564_cp_fiber_pin.py; suite 556 $\rightarrow$ 558 scripts; website mirrors regenerated.

2026-07-29 (XXII) (prime-front phase 2, the endgame: T176 — the density curve sits at zero and the measurement programme closes (SITS-AT-ZERO) + v562 dense-limit identities promoted + paper/diary/website sync)

- **Prime-front diary T176** (dense_limit_probe.py, contract DENSE.LIMIT, 24/24, 118.7 s, verdict SITS-AT-ZERO, sandbox; lands *after* T177 — part numbering by contract, series counters raised by T176's checks). The big sieve: ATOM_MAX $1.2 \times 10^6 \rightarrow 2.5 \times 10^7$ (factor 20.8; cost 0.08 s / 59.7 MB peak — the sieve was never the binding constraint), 1 566 727 prime-power atoms, density ceiling 361 $\rightarrow$ 6120 (6118 reached), 14 532 cells on 692 anchors, 0 indefinite. *The extended curve* (eight ratio-4 bins, cluster-robust): $+0.8886 \pm 0.1027 \rightarrow +0.5148 \rightarrow +0.1948 \rightarrow +0.3922$ (declared monotonicity violation, explained by curvature) $\rightarrow +0.1520 \rightarrow +0.0579 \rightarrow +0.0376 \pm 0.0410$ (dens ~ 779 , 0.9σ) $\rightarrow +0.1046 \pm 0.0881$ (dens ~ 2512 , 1.2σ); pooled over the new bins $+0.0496 \pm 0.0372$ (1.3σ) — no sign change, no stabilisation above zero; density slope -0.0725 ± 0.0090 (8.0σ over 4.0 decades); *the plateau window narrows* $0.264 \rightarrow 0.074$ (2σ), a factor 3.6; all six old bins reproduce at 0.0σ against T175. Both curvature channels survive ($\log h +0.1529 \pm 0.0258$, 5.9σ ; $\log \text{dens} -0.0434 \pm 0.0060$, 7.3σ); none of the

six preregistered reparametrisations makes it one exponent. *R1 (T175) closed*: the Feynman–Hellmann form $d\lambda_{\min} = v^\top d\hat{A}v$ reproduces the rebuild to 3.37×10^{-6} at the minimum of a declared step ladder with the U-shape exhibited; *dDEL/DEL* carries 84%. *The 300× harmonic anomaly explained as a pole*: PD survives 2% of the phase period ($\delta_{\text{PD}} = 5.9 \times 10^{-3}$, product $5.8 = O(1)$), and the two lowest modes are already 13.4% apart at $\delta = 0$ — the intervention runs along a near-degeneracy, it does not create one. *Anti-promotion*: the estimator is LADDER-DEPENDENT at the 0.20 level — every quoted bin deficit must cite its rung ladder. True zero / power-law approach / low plateau stay indistinguishable (one more decade of window would cost $\text{ATOM_MAX} \sim 2.5 \times 10^9$); **the phase-2 measurement programme closes as planned** — no follow-up probe; the work continues in the classification papers and the backflow lines.

- **Promotion v562_dense_limit_identities.py** (`PRIME.DENSE.LIMIT.01`, 16 checks, ~ 0.5 s, **deterministic, small sieve**). The exact cores per instance: the Feynman–Hellmann identity with the step-ladder U-shape check and must-break mutations (`R1.CLOSED`); the phase-pole mechanism (PD-survival window, near-degeneracy at $\delta = 0$, sign change bracketed); sieve consistency at construction level (complete-comb lag vectors bit for bit under the bigger table; the truncated must-break moves); and the curve estimator as a deterministic procedure *with the ladder caveat wired as a check and into the ledger row*. `SITS-AT-ZERO` typed as a `MEASUREMENT` with the ladder caveat; the plateau/zero distinction explicitly `OPEN`; no `RH` statement. Suite 555 $\rightarrow$ 556 scripts.
- **Sync**. Diary entry Teil 176 in `experiments/next.txt` (counters 177 probes / 4789/4789 checks; phase-2 closure noted); prime-front paper T176 subsection (the extended curve as a table, the sieve result, the pole finding, the ladder caveat; keybox “After T176: the measurement programme closes”) + probe-index row + abstract counters + the final “Where phase 2 now stands” paragraph; website: prime-front feed entry T176 + v562 promotion entry, status counters, `ScriptIndex` / changelog mirrors regenerated.

2026-07-29 (XXI) (T177 backflow: the CP mirror — two invariants carry $\pi/3$, four CP ledger rows narrowed, none upgraded (DEGENERATE) + v561 CP channel identities promoted + ledger/paper/diary/website sync)

- **Prime-front diary T177** (`cp_invariant_probe.py`, contract `CP.INVARIANT`, 49/49, 0.2 s, **verdict DEGENERATE, sandbox; the reverse flow resumed while T176 runs**). The gauge-degree toolkit of T173/T174 turned on the four CP ledger rows (`REDTEAM.D.01`, `E8.CHAN.01`, `CP.MOD.01`, `DUAL.FRAME.01`). All four constructions rebuilt exactly from the compiler primitives ($\delta = \pi/3 + 3\lambda_C^2 = 1.198231638$ rad certified against v88/v220; $\det(\mathbf{1}, d, n) = 21$; $J = 3.327 \times 10^{-5}$ with the CKM unitary to 10^{-41}). *New exact identity*: on the hexagonal unit $\rho = e^{i\pi/3}$ the phase channel carries $\sum_k \rho^{d_k} = 4\rho$ ($\arg = \pi/3$ exactly, sheet-even — the E_8 degrees are even) against the magnitude channel $\sum_k \rho^{m_k} = 4$ ($\arg = 0$ exactly, sheet-odd — the exponents are odd). *Tier-1 invariance is empty by algebra* (both kernels commute with conjugation, so every $\pi/3$ -carrier is conjugation-odd); *two inequivalent Jarlskog-class invariants carry $\pi/3$* (sheet-even channel angle vs sheet-odd orientation), neither coupled to the frame — what is frame data is the oriented volume 21 and the sign, not the angle. The Jarlskog benchmark passes the invariance criteria and fails only the $\pi/3$ -carrier test (its content is δ), validating the criterion instead of the value.
- **Four ledger rows narrowed, NO marker moves**. `REDTEAM.D.01`: $\arg \prod c = 0$ exactly on both sectors; the residual is a *fiber* datum, not a magnitude datum (branch blindness = order divides $N_{\text{fam}} = 3$). `E8.CHAN.01`: the exact hexagonal realisation + parity typing recorded; the phase-channel angle is sheet-blind (cannot distinguish quark from lepton). `CP.MOD.01`: scope narrowed — the invariant part of the frozen reading is the leading term $\arg \rho = \pi/3$, the full δ is branch/frame-relative (no character; `REG.FREEZE.01` untouched). `DUAL.FRAME.01`: the orientation *reading* is degree +1 in the frame normalisation ($21 \sin(\pi/3)$ is frame data);

the invariant core is the fiber datum $\text{Im } \rho = \sin(\pi/3)$, the sign a declared orientation. Prose narrowed in `tfpt_5_redteam` (Target D keybox + the located-residual box).

- **Promotion v561_cp_channel_identities.py** (`CP.CHANNEL.IDENT.01`, 25 checks, ~ 1 s, **sympy-exact**). The exact cores as one load-bearing module: the hexagonal channel identity with parity typing and mutation controls ($e^{i\pi/5}$, mutated lists) plus the honest caveat wired as a check; Tier-1 emptiness as algebra; the frame removal ($\text{Im}(\rho \det)/\det = \text{Im } \rho$ exactly, degree +1 account); the two Tier-2 characters as verified homomorphisms; the Jarlskog anchor (J passes rephasing/CP-oddness, fails only the carrier test). Narrowing statements only — no CP derivation claimed, R1/R2 explicitly OPEN. Suite 554 $\rightarrow$ 555 scripts.
- **Sync.** Diary entry Teil 177 in `experiments/next.txt` (counters 176 probes / 4765/4765 checks; T176 and Paper II run in parallel); prime-front paper T177 reverse-flow subsection + probe-index row + counters; website: prime-front feed entry T177 + v561 promotion entry, status counters, DAG node, `ScriptIndex` / changelog mirrors regenerated.

2026-07-29 (XX) (prime-front diary T175 (the placement phases are real and causal but non-smooth, the heterogeneity dissolves into the error bar, and the densest reachable bin is consistent with zero — PHASES-RESIST) + paper + website sync; NO promotion, NO marker moves)

- **Prime-front diary T175** (`phase_placement_probe.py`, contract `PHASE.PLACEMENT`, 38/38, 20.2 s, 1504 cells on 188 anchors — every prime power in $[40, 1090]$ is an anchor, no selection, no frame rule anywhere — crossed with the T174 ladder $h = 160 \dots 1280$ plus the declared floor $h = 128$; verdict **PHASES-RESIST, sandbox**). (1) *The phases.* The preregistered anchor invariant $\theta_p = \text{frac}(\log p/\alpha)$ is unusable and the probe says so out loud (a smooth monotone function of α , Rayleigh $Z = 1296$ — a regression on it would be an α -regression in disguise); only the cell phase $\varphi_p(h) = \text{frac}(h\theta_p)$ is free and equidistributed (largest $Z = 1.41$ on 1316 cells), with the generating identity $\text{frac}(\log p/D) = \text{frac}(h \text{frac}(\log p/\alpha))$ certified at 1.1×10^{-13} (Weyl 1916). *The phases are real in log R:* $F = 10.80$ against a within-rung-scrambled null with 95% point 1.69, +10.3% held-out residual variance under a rank-parity split, a composite placebo family at $F = 0.81/-0.0275$, amplitudes monotone in p (0.018 at $p = 5$ to 0.141 at $p = 19$). *But they are not the heterogeneity channel:* residual $\chi^2/\text{dof} = 2.52$ from 3.14 (target < 2 missed), the held-out excess scatter gets worse (-15.4%), the deficit untouched (0.18σ); the exploratory scan excludes every other anchor statistic (all improve in sample and worsen held out). *What resolves the heterogeneity is the error bar:* with jackknife slope errors the excess scatter goes $0.1224 \rightarrow 0.0000$ and the robust pull spread $1.41 \rightarrow 1.22$ (model-free interleaved half-split 0.2722 against $\text{sd} = 0.2789$) — T174's χ^2 was substantially an OLS independence assumption, not a physical spread; *the 5σ deficit is unaffected* (its bar never came from se_n). (2) *The dense limit.* The corner is exhausted ($\text{dens} \leq 361$ forced by the sieve cap and $h \geq 128$; 359 reached); the deficit(dens) curve over three decades (6 declared ratio-4 bins, cluster-robust) falls $+0.982 \pm 0.213 \rightarrow +0.576 \rightarrow +0.207 \rightarrow +0.194 \rightarrow +0.088 \rightarrow -0.057 \pm 0.132$ — monotone within 2σ at every step, density slope 6.1σ , *the densest reachable bin consistent with zero*; the extrapolation fence is explicit: a true zero, a power-law approach and a plateau below 0.132 are all consistent — undecidable under this sieve. The sharpened confound test finds *both* channels significant ($\log h + 0.2435 \pm 0.0670$, $\log \text{dens} - 0.0631 \pm 0.0172$; curvature $a_2 = -0.137 \pm 0.029$) — T174's density driver survives but is no longer unique; the deficit is not a single exponent. Unplanned load-bearing finding: mass-preserving alternative assemblies are *inadmissible* (lump 0%, wide 46%/0% PD survival); the admissible continuous deformation gives sensitivities $+0.384$ (sparse) vs -1.054 (dense), ratio 0.4 — the sparse corner is *not* an assembly artefact. (3) *Rule proposal + intervention.* $\text{dens} \geq 1$ proposed for the chain convention ($+0.722 \pm 0.094$ unresolved vs $+0.099 \pm 0.019$ resolved, 6.5σ separation, 6% of cells; explicitly not retroactive); comb scramble destroys 12/12; *the new phase intervention* (with an exact $\delta = 0$ rebuild control): displacing the six family atoms inside their cells gives $d \log R/d\delta = 879$, linear

to a factor 1.011 over four declared decades — *the placement phase is causal for R* , the first interventional statement of the series — and it overturns the *shape* of the D1 result: the fitted first harmonic predicts only 2.89 (a factor ~ 300 too small), positive definiteness dies for $\delta \geq 10^{-3}$, $\text{GAP} = 1.6 \times 10^{-9} - 4.8 \times 10^{-6}$ — the Schur floor is a near-degeneracy and $\log R$ is necessarily *non-smooth* in the phases. Candidates P175-1–P175-8 PENDING, no promotion. The rest: the closed-form $d\lambda_{\min} = v^T d\hat{A} v$ response (R1); *the dense-corner zero needs a larger sieve, nothing else* (R2); the curvature vs the exponent reading (R3); an h floor for the positivity margin (R4); the last 22% of the pull spread (R5). T176 (DENSE.LIMIT, `dense_limit_probe.py`) is running — the larger sieve. Diary counters 175 probes / 4716 checks (series (CLXXXVI)).

- **Paper + website sync.** `tfpt_prime_front`: new phase-2 subsection (T175: the cell-phase construction with the invariant trap said out loud, the causality finding as key result, the error-bar resolution of the heterogeneity as the honest correction, the density curve with the zero-consistent end bin and the extrapolation fence, keybox “After T175” with the larger sieve as the only road and T176 running), section title T126→T175, abstract counters 175/4716, probe index extended (T175 row, running totals, T176 running); `experiments/next.txt` T175 entry (counters 175 Proben / 4716 Checks, Serie (CLXXXVI)); website: `primeFront.ts` feed entry T175 (verdict enum PHASES-RESIST added), status surfaces Teile 11–175 / 4716 checks (`page.tsx`, `HonestyBanner.tsx`, `ModuleLadder.tsx`). NO promotion; NO marker moves; not RH evidence.

2026-07-29 (XIX) (v560 — the frame/deficit identities promoted; prime-front diary T174 (the gauge route is exhausted by theorems, and the deficit is measured frame-free at 5.0σ — PARTIAL-CANCEL) + paper + website sync; NO marker moves)

- **New module v560 (PRIME.FRAME.DEFICIT.01).** Promotion of the theorem cores of discoveries T172 (contract FRAME.BEYOND), T173 (FRAME.RATE) and T174 (CANCEL.IDENTITY) as one module (`v560_frame_deficit_identities.py`, 24 checks, ~ 0.5 s) — *the gauge route of phase 2, closed as algebra*, the companion to v559’s sixteen-link map, recomputed on a small declared surface (a 4×3 (anchor, h) rectangle of gap-blind frame-B cells, prime-power anchors $n = 41 \dots 557$ crossed with the declared ladder $h = (160, 226, 320)$, comb COMPLETE on every cell, PD low block on 12/12; one non-prime-power instance $n = 210$; one truncated-comb stress instance $n = 1009$; $\kappa = 0.038821$ verified at every jump point of $\psi(x)/x$; the builder’s signature is $(n_{\text{zone}}, \alpha, M)$ — no frame label is an argument of any observable). (1) *The identity transfer + the sieve-horizon discriminator* (T172): the KMS/Schur pair (3.2×10^{-16}), the lag-sum/correlation identity (1.4×10^{-16} of the larger half; Abel 1826), the R4-free det collapse (at 0.020 of the conditioned bar $64\varepsilon/|1 - r_{12}^2|$) and the additive split (7.6×10^{-16}) re-derived EXACTLY on a frame-B and a non-prime-power instance; the truncated-comb instance turns INDEFINITE ($\lambda_{\min} = -9.6 \times 10^4$) against 12/12 PD complete-comb cells, the identity links holding either way (none uses positivity) — indefiniteness sits at the declared sieve horizon, not at a frame or zone. (2) *The $q = 1 - s$ identity + the calibration* (T173): $hD = \alpha$ per cell forces the OLS slopes to obey $q = 1 - s$ to 2.9×10^{-14} (the h^{-3} target was the $q = 1$ idealisation of a $\Theta(D^3)$ law, as an identity); the gauge-degree account comes out as integers — $G2 = t/\lambda_{\max}(B_{LL})$ and the delivery $1 - r_{12}^2$ both (0,0), so $G2$ is the unique doubly gauge-invariant arithmetic member; $G3 = \mu_1^P G2$ identically (the offset-2 explained); $(D/\alpha)^3 h^3 = 1$ a tautology. (3) *The blindness theorems + the additive limit* (T174): the amplitude $c \rightarrow \kappa c$ is a gauge of both sides and of R over twelve decades (worst 0.026 of the per-cell conditioned bar); the scalar μ_1^P — *the entire h^{-2} channel of the demand* — cancels exactly on both sides; the delivery is invariant under the full positive diagonal group while a non-scalar diagonal moves the demand by 0.23–1.40; and neither the arch term nor the comb term alone has a positive Schur floor on a single cell (0/12 + 0/12 against 12/12 for the sum): no factorisation exists, so T173’s P6 is NOT promoted to a theorem — only its multiplicative half. (4) *The KMS shape band* (unconditional,

declared $\varepsilon = (K\pi/(2h+1))^2/6$: the k^2 -swap moves log GAP by ≤ 0.312 of the certified band while the delivery does not move at all. (5) *The placement discriminator*: the value-multiset scramble destroys the floor on 24/24 draws. Each statement carries a mutation control that fails loudly. THE FRAME-FREE DEFICIT IS A MEASUREMENT, NOT A CLAIM OF THE MODULE ($+0.1111 \pm 0.0222$ stays sandbox MEASURED); R1 typed OPEN (frame-free form); NO RH statement. Ledger row PRIME.FRAME.DEFICIT.01; registered in `run_all.py` and `script_registry.csv`; suite counter 553 $\rightarrow$ 554 scripts.

- **Prime-front diary T174** (`cancellation_identity_probe.py`, `contract CANCEL.IDENTITY`, 37/37, 6.5 s, 84 **rectangle** + 1020 **power-check** + 147 **anchor-ladder** + 178 **leg windows**; **verdict PARTIAL-CANCEL, sandbox**). The cancellation question turned into blindness algebra: both sides of the T173 deficit are scale-free functionals of ONE raw Gram matrix, and the ledger reads — amplitude gauge THEOREM (≤ 0.028 of the per-cell conditioned bar over twelve decades); *the complete* $\mu_1^P \approx h^{-2}$ *channel THEOREM* (≤ 0.009 — exactly absent from the deficit); full positive diagonal group THEOREM (delivery exact; the demand keeps the SHAPE — the asymmetry is the whole anatomy); KMS shape against k^2 CERTIFIED (unconditional band, ≤ 0.0075 in deficit units = 4.8% of T173's number); arch/comb mixture DOES NOT CANCEL (additive and exact; no factorisation; neither term alone has a positive Schur floor on one of 84 cells); frame rule THEOREM ($R = R(\alpha, M)$ identically — a sampling map, two frames on one cell agree bit for bit). Explained along the way: G_2 is the unique doubly gauge-invariant arithmetic member of T173's family, and the G_3 – G_2 offset of exactly 2 is the μ_1^P exponent (measured $h^{-1.9975}$). The key result is a direct measurement: on the preregistered 12×7 (α, h) rectangle the h -direction carries the deficit ($a = -0.281 \pm 0.066$, 4.3σ ; anchor direction flat); the exact between/within split puts it in the GRID response ($3.3\times$ the anchor selection, whose sign is mostly wrong — the selection reading tested and rejected); the driver is the COMB DENSITY per lag cell (monotone $+0.281 \rightarrow +0.062$ across the density cuts; on legs $\log \nu$ and $\log \text{dens}$ collinear at $r = -0.921$ — T173's 2.8σ $\log \nu$ driver named and discharged); and the dense corner, exhausted (1069 cells, 151 anchor clusters, cluster-robust), gives $\text{DEFICIT}(\text{frame-free}, \text{dens} \geq 3) = +0.1111 \pm 0.0222$ — 5.0σ from zero, 0.4σ from T173's $+0.155 \pm 0.102$. P6 does NOT become a theorem (only the multiplicative half) but is less load-bearing: the deficit is measured on a D-rule-free surface, and the fixed- ν invariance is explained (fixed ν = fixed density regime). Stress green (scramble 24/24 destroys the block and moves R by 10^2 – 10^5 ; jackknives stable; horizons declared). Candidates P9–P15; the rest: the per-anchor scatter ($\chi^2/\text{dof} = 3.02$; candidate: the placement phases $\text{frac}(\log p/D)$), the admissibility question (0.11 vs ≥ 3 atoms per cell: factor 2.5), the sparse corner. T175 (PHASE.PLACEMENT, `phase_placement_probe.py`) is running — the phases and the dense limit. Diary counters 174 probes / 4678 checks (series (CLXXXV)).
- **Paper + website sync.** `tfpt_prime_front`: new phase-2 subsection (T174: the cancellation ledger as a compact table, the μ_1^P -channel theorem, the G_2 /offset-2 explanation, the sampling-map reading of the frame rule, the frame-free rectangle measurement as key result with the density ordering, keybox “After T174” with the phases / dense limit and T175 running), the verified layer extended to twenty-six modules (new subsection for v560), section title T126 $\rightarrow$ T174, abstract counters 174/4678, probe index extended (T174 row $\rightarrow$ v560, running totals, T175 running); companion blocks for v560 in `tfpt_1_architecture_e8`, `tfpt_3_e8_audit_bootstrap` and `tfpt_research_contracts`; `experiments/next.txt` T174 entry (counters 174 Proben / 4678 Checks, Serie (CLXXXV)); website: `primeFront.ts` feed entries T174 + v560 promotion (verdict enum PARTIAL-CANCEL added), status surfaces Teile 11–174 / 4678 checks / 26 modules v535–v560 (`page.tsx`, `HonestyBanner.tsx`, `ModuleLadder.tsx`), suite counter 554 (`suite.ts`). NO marker moves; not RH evidence.

2026-07-29 (XVIII) (prime-front diary T172 (the map is portable, the numbers are not — **PARTIALLY-PORTABLE**) + T173 (the demanded rate is itself a

frame datum; the deficit $+0.155 \pm 0.102$ is the number of the phase and no frame closes it — DEFICIT-VARIES) + paper + website sync; NO promotion, NO marker moves)

- **Prime-front diary T172** (`frame_beyond_probe.py`, contract `FRAME.BEYOND`, 44/44, 1.3 s, 54 windows on four surfaces plus 3 truncated-comb stress windows, $h = 128\text{--}1444$; verdict **PARTIALLY-PORTABLE**, **sandbox**). T171's inherited question — how far does the certified map carry beyond frame A? — answered by a recipe inventory (four degrees of freedom: the frame rule D , the subdivision ν , the zone family; the atom set is NOT free — Λ lives on prime powers, “beyond” means different *anchor* arithmetic) and a transfer table: *13 of the 16 links transfer unchanged — the whole identity tower plus both direction lemmas — and none breaks*; the three that shift are exactly the number-carrying ones (the two window certificates and the rate of link 16). Indefiniteness is *localised at the declared sieve horizon* ($\lambda_{\min} = -3.7 \times 10^5 \text{--} -6.2 \times 10^6$ on 3/3 cut-comb stress windows against 0/54 complete-comb; the identity links keep holding there), not at a frame or zone. Constants map: 8/11 stay in frame A's band, 3 wander on the congruence surface — a certificate on a new surface is a NEW certificate; the procedure and the directions transfer (54/54). R1's near-degeneracy persists on every surface (angle $< 10^{-2}$ on 54/54, decay on 9/9 legs) while the rate is frame-bound ($h^{-1.83}\text{--}h^{-2.87}$; zone arithmetic secondary, spread 0.40 vs 1.03); sharpest new result, the placement finding: scrambling atom positions at a fixed Λ -value multiset raises the angle by a median 6.6×10^4 and removes the decay — the collapse belongs to the actual prime-power placement. Candidates P1–P4 PENDING (no promotion — bundling with T174 planned). Diary counters 172 probes / 4601 checks (series (CLXXXIII)).
- **Prime-front diary T173** (`frame_rate_probe.py`, contract `FRAME.RATE`, 40/40, 2.2 s, 284 windows plus 109 scramble twins over eleven preregistered frame data (A at $\nu \in \{3, \dots, 16\}$, gap-blind B, smoothed C), $h = 128\text{--}1447$; verdict **DEFICIT-VARIES**, **sandbox**). The demand side itself put on the measurement table: $q = 1 - s$ is an *exact identity* (1.9×10^{-15} , from $hD = \alpha$) and $q = 0.667\text{--}0.777 < 1$ on every frame datum — *T171's h^{-3} target was the $q = 1$ idealisation of a $\Theta(D^3)$ law*. The gap functional is calibrated instead of guessed (six preregistered candidates; the relative I5 gap $t/\lambda_{\max}(B_{LL})$ hits the chain's 3 on frame A, median 3.033, and is the only dimensionless one; $(D/\alpha)^3$ exposed as a tautology). The deficit, read as one slope of the per-window ratio $R = \text{GAP}/(1 - r_{12}^2)$: pooled $+0.155 \pm 0.102$ ($\times 1.54$ over-scatter inflation, 3.0σ above zero), $1.8\times$ flatter than either side (χ^2/dof REQ 4.87 / DEL 4.17 / difference $2.38 = 2.4\sigma$ — constancy rejected), split-stable to 0.214 where both single sides drift ~ 0.5 , *invariant under the anchor-to-grid rule at fixed ν* ($\chi^2/\text{dof} \leq 0.64$ — theorem candidate for that half only), not invariant under ν (2.8σ , confounded with arithmetic content under the cap; q the weakest driver at 0.2σ). Honest correction to T172 (P7): in the fixed- h^{-3} convention the wider surface gives $+0.015 \pm 0.084$ — consistent with zero — so T172's C -growth was neither sign- nor split-stable (its verdict is untouched). *R1 now stands frame-free*: the delivered near-degeneracy closes slower than the relative I5 gap it must pay, by $h^{+0.155 \pm 0.102}$; no frame closes it (best 2 s.e. upper edge $+0.170$ at B; 8/11 legs individually consistent with zero — pooled with the penalty, not claimed per leg) — frame shopping is over, by numbers. Stress: scramble removes the decay on 4/4 declared legs; jackknife ≤ 0.026 ; shuffle null 3.7σ away. Candidates P5–P8 PENDING (no promotion — bundling with T174 planned). T174 (`CANCEL.IDENTITY`, `cancellation_identity_probe.py`) is running — the cancellation identity. Diary counters 173 probes / 4641 checks (series (CLXXXIV)).
- **Paper + website sync.** `tfpt_prime_front`: two new phase-2 subsections (T172: the four-degrees-of-freedom inventory, the 13/16 transfer, the sieve-horizon localisation, the placement finding as key result; T173: the $q = 1 - s$ identity as display, the calibration, the compact deficit table, the honest T172 correction, the frame-free R1 statement as key result, keybox “After T173” with the cancellation identity and T174 running), section title T126→T173, abstract counters 173/4641, probe index extended (T172 + T173 rows, running totals, T174

running); `experiments/next.txt` T172 + T173 entries (counters 172/4601 (CLXXXIII) and 173/4641 (CLXXXIV)); website: `primeFront.ts` feed entries T172 + T173 (verdict enums PARTIALLY-PORTABLE and DEFICIT-VARIES added), status surfaces Teile 11–173 / 4641 checks (`page.tsx`, `HonestyBanner.tsx`, `ModuleLadder.tsx`). NO promotion (T172s P1–P4 and T173s P5–P8 PENDING — bundling with T174 planned); NO marker moves; not RH evidence.

2026-07-29 (XVII) (v559 — the phase-2 capstone promoted; prime-front diary T171 (the map is complete: all sixteen links in one connected run, eight no-gos as classified, the precision ledger closed — MAP-COMPLETE) + paper + website sync; NO marker moves)

- **New module v559 (PRIME.PHASE2.CAPSTONE.01).** Promotion of discovery T171 (contract `FINAL.MAP`, verdict `MAP-COMPLETE`) as the phase-2 capstone (`v559_phase2_capstone.py`, 35 checks, ~ 0.3 s) — *the capstone verifies the map and claims nothing new*: T126–T170 reduced the I5 uniformity question through sixteen exact reformulations to ONE object (R1), and this module is the load-bearing version of T171’s connected run, everything recomputed on v551–v558’s declared small frame-A surface (12 deepest in-cap zones, $m = 96 \dots 291 \leq 300$; $\kappa = 0.038821$ verified at every jump point of $\psi(x)/x$; the 16×16 low block positive definite on 12/12 — a numerical fact, never routed through the Weil criterion). *The chain, sixteen links in one pass* (13 THEOREM / 3 CERT): T152 Schur two-block (KMS 1.3×10^{-15} ; holds at $0.5\lambda_{\min}$, fails at $1.02\lambda_{\min}$ — sharp; Haynsworth 3.8×10^{-15}); T151 Sobolev $b_k \leq C_S k$ (worst ratio 0.4816); T153 Ψ -collapse with the Z-law ($6.3 \times 10^{-16} / 9.0 \times 10^{-17}$); T154 Ritz ceiling from below ($g_{32}/s = 0.9520\text{--}0.9849$); T155 12×12 floor, sharp ($t = 0.2295\text{--}0.3719$); T156 $F(P, r)$ ($L(16) = 6.6\text{--}15.6$); T158 Thomson/ladder (3.1×10^{-12} ; 36/36 trials below); T160 sampling (closed Dirichlet weights = correlation weights 1.1×10^{-15} ; sampled Λ -mass 9.9×10^{-15}); T163 Abel swap with the TV floor (overshoot $\times 5.2 \times 10^4\text{--}1.1 \times 10^6$); T164 gauge/quantifier ($\Psi(x^*) = 1/g_{16}$ to 7.0×10^{-12} ; 48/48 perturbed vectors larger); T165 $P_{\text{pr}} = 1$ at x^* ; T166 cascade $1/(1 - R_{16}^2)$, diagonal-invariant; T167 $K = 2$ exactness (milder $\times 1.62\text{--}5.20$); T169 det collapse R4-free ($\leq 4.2 \times 10^{-12}$, no positivity of A_h consumed); T170 rank-3 ($\{-2, -1, +1\}$ exact; $\sigma_4/\sigma_1 \leq 1.6 \times 10^{-16}$); T170 R1 shape via the 2×2 Lagrange identity ($\sin \angle = 1.169 \times 10^{-4}\text{--}2.467 \times 10^{-3} \leq 10^{-2}$ per window; *rate and quantifier typed OPEN*). *The no-go battery*, 8/8 failing as classified (size budget $\times 2.7 \times 10^3\text{--}1.6 \times 10^4$; symbol infimum < 0 on 12/12; sector invariance; perturbation scale; atom band dominates; sieve operator-norm $\times 8.8 \times 10^3\text{--}7.5 \times 10^4$; scramble $\times 679$ median with rank-3 untouched on 60 draws; L_P gain = 1 exactly). *The precision ledger*: needed 2.752×10^{-4} at the deepest window — finer than the RH yardstick $h^{-0.5}$ by $215\times$ and the best unconditional $h^{-0.996}$ by $13\times$ on this surface; both self-similarity identities $\leq 6.8 \times 10^{-13}$; mutation controls fail loudly. ZERO new uniform-in- m statements; the one open phase-2 object R1 explicitly typed OPEN; NO RH statement (RH_DELTA = 0.5 a yardstick in exactly one role); Weil fence documented (link 14 R4-free by construction). Ledger row `PRIME.PHASE2.CAPSTONE.01`; registered in `run_all.py` and `script_registry.csv`; suite counter 552 $\rightarrow$ 553 scripts.
- **Prime-front diary T171 (final_map_probe.py, contract FINAL.MAP, 43/43, 0.6 s, 12 windows over two frames $\nu = 4/6$, $h = 142\text{--}1445$, lever arm $10.2\times$; verdict MAP-COMPLETE, sandbox).** The capstone stands — the map is complete: all sixteen links of the reduction chain, from the I5 floor to the final R1 shape, reproduce in ONE connected run (13 THEOREM / 3 CERT; honest exclusion said out loud: on $\nu = 4$, $h = 1445$ the low block is indefinite, $\lambda_{\min} = -343$, so the ladder links carry 11/12 while the identity links carry 12/12); all eight classified no-go routes fail on instances exactly as classified (size budget $h^{+1.32}$; symbol infimum negative on 12/12; sector change an invariance $\leq 2.1 \times 10^{-9}$; Kato $2.0 \times 10^4\text{--}1.9 \times 10^7$ off scale; atom band $h^{+0.79}$ faster; sieve $\delta = +1.044$ against 3.0; scramble type-flip $h^{-2.57} \rightarrow h^{+0.21}$, $\times 11421$; L_P gain = 1 exactly); and the precision ledger closes: needed

2.284×10^{-7} at $h = 1444$ (rate $h^{-3.0}$) against the RH yardstick $h^{-0.5} = 2.63 \times 10^{-2}$ — *short by* $1.2 \times 10^5 \times$ — and the best unconditional $h^{-0.996} = 7.13 \times 10^{-4}$ — *short by* $3.1 \times 10^3 \times$; both self-similarity identities check ($4.2 \times 10^{-10} / 9.9 \times 10^{-10}$, sign-agnostic incl. $\nu_2 < 0$ on 1/12). At link 16 the RATE is frame-dependent ($\nu = 4$: $h^{-1.86}$; $\nu = 6$: $h^{-2.87}$) while the COLLAPSE is not. Balance of the quotable parts: 40 THEOREM / 5 CERT-UNIF / 9 CERT-WINDOW / 16 MEASURED / 9 NO-GO (T126–T161 honestly unaggregated). The file adds ZERO new uniform-in- m statements — exactly why it is promotable: phase 2 is now a certified map with ONE open object (R1, classified as a near-degeneracy, not a size); R2/R3 booked, R4 removed. T172 (FRAME.BEYOND, `frame_beyond_probe.py`) is running — how far the map carries beyond frame A. Diary counters 171 probes / 4557 checks (series (CLXXXII)).

- **Paper + website sync.** `tfpt_prime_front`: new capstone subsection (T171) with the sixteen-link table, the no-go list and the precision-ledger display, a closing paragraph of the phase-2 section, the verified layer extended to twenty-five modules (new subsection for v559), section title T126→T171, abstract counters 171/4557, probe index extended (T171 row, running totals, T172 running); companion blocks for v559 in `tfpt_1_architecture_e8`, `tfpt_3_e8_audit_bootstrap` and `tfpt_research_contracts`; `experiments/next.txt` T171 capstone entry (counters 171 Proben / 4557 Checks); website: `primeFront.ts` feed entries T171 + v559 promotion (verdict enum MAP-COMPLETE added), status surfaces Teile 11–171 / 4557 checks / 25 modules v535–v559 (`page.tsx`, `HonestyBanner.tsx`, `ModuleLadder.tsx`), suite counter 553 (`suite.ts`). NO marker moves; not RH evidence.

2026-07-29 (XVI) (v558 — the bilinear/rank identities of phase 2 promoted; prime-front diary T170 (the bilinear form collapses by a rank-3 theorem, R1 classified as a near-degeneracy — SIEVE-RESISTS) + paper + website sync; NO marker moves)

- **New module v558 (PRIME.BILINEAR.RANK.01).** Promotion of the closed theorem cores of T168 (contract LAGRANGE.MINORS), T169 (contract TSTAR.RATIO) and T170 (contract BILINEAR.SIEVE) as one deliberately narrow module (`v558_bilinear_rank_identities.py`, 27 checks, ~ 0.2 s), everything recomputed on v551–v557’s declared small frame-A surface (12 deepest in-cap zones, $m = 96 \dots 291 \leq 300$; $\kappa = 0.038821$ verified at every jump point of $\psi(x)/x$ on the table): (1) the Lagrange/Wronskian anatomy — the lag-sum identity $\hat{a}_{ij} = t_i^T A_h t_j = \sum_d c_d W_d^{ij}$ with the closed correlation weights (1.6×10^{-15} ; the $1/\sqrt{\mu}$ factors cancel, T169-TH3), Euclidean orthogonality $t_1 \cdot t_2 = 0$ (4.4×10^{-16} — the near-parallelism is created *entirely* by the arithmetic metric), the Wronskian telescope $(\mu_1 - \mu_2)u_r v_r = W_{r-1} - W_r$ with $W_{-1} = W_{h-1} = 0$ (1.9×10^{-17}) and the maximal-minor identity $\frac{1}{2} \sum M^2 = 1/(\mu_1 \mu_2)$ (4.6×10^{-16} ; Lagrange 1773); (2) the exponent account $1 - r_{12}^2 = \nu_1 \nu_2 / (\hat{a}_{11} \hat{a}_{22})$ identically (2.5×10^{-13}) with the unconditional Gershgorin certificate $\nu_1 \leq \max(\hat{a}_{11}, \hat{a}_{22}) + |\hat{a}_{12}|$ (12/12, loss 1.1885–1.1947; the $|\hat{a}_{12}|$ -free mutation fails on every window); (3) the T169-TH7 det-collapse in closed form, $R(K7) = 2\sqrt{\hat{a}_{11}\hat{a}_{22}} \det \hat{A} / [(\hat{a}_{11} + \hat{a}_{22})(\sqrt{\hat{a}_{11}\hat{a}_{22}} + \hat{a}_{12})]$ (8.7×10^{-13}) — the loop T167 scalar $\rightarrow$ T168 factor $\rightarrow$ T169 candidate closes as an identity, with the usable bound $\nu_2 \leq 2 \det \hat{A} / (\hat{a}_{11} + \hat{a}_{22})$ tight to < 2 exactly; (4) the exact bilinear von Mangoldt form (T170 TH1–TH3) — $\hat{A} = B - S$ against the direct block (1.7×10^{-14}), the polarisation $\det \hat{A} = \det B - D(B, S) + \det S$ (1.0×10^{-10}) and $\det S = \sum_{n,m} \Lambda(n) \Lambda(m) K(n, m) / \sqrt{nm}$ with $K = \frac{1}{2} D(X_n, X_m)$ through the *explicit* kernel matrix (7.5×10^{-16} ; Cauchy–Binet 1812/1815), the wedge reading to the measured rank-one defect 4.6×10^{-3} – 3.1×10^{-2} (honest CERT); (5) the rank-3 theorem (T170-TH4: polarisation matrix eigenvalues $\{-2, -1, +1\}$ exactly, $\sigma_4/\sigma_1 \leq 1.6 \times 10^{-16}$, nonzero spectrum = $\text{spec}(M P^T P)$ — the bilinear form *is* the rank-3 polynomial $S_{11} S_{22} - S_{12}^2$ in three linear Λ -sums) and the Type II collapse (T170-TH5: Vaughan’s identity coefficient-exact for every $U = V \in \{3, 4, 5, 6\}$, Type II kernel 99.9%-energy rank $[2, 2, 2, 2]$ against generic $[20, 15, 11, 9]$); (6) the R4-free chain identity $1 - r_{12}^2 = \det \hat{A} / (\hat{a}_{11} \hat{a}_{22})$ (T170-TH6 — the Weil fence never approached), the L_P no-go ($\hat{a}_{12} = 1.1 \times 10^{-17}$ identically,

no decay) and the scramble discriminator (rank-3 *untouched* on all 60 draws while the value of $1 - r_{12}^2$ moves by a median factor 834.8: the arithmetic sits in the *joint values* of (S_{11}, S_{22}, S_{12}) against B) as must-breaks; every statement with a mutation control; the one open object R1 (the collinearity/near-degeneracy rate) explicitly typed OPEN; NO RH statement. Ledger row PRIME.BILINEAR.RANK.01; registered in `run_all.py` and `script_registry.csv`; suite counter 551 $\rightarrow$ 552 scripts.

- **Prime-front diary T170** (`bilinear_sieve_probe.py`, contract BILINEAR.SIEVE, 40/40, 1.8 s, 70 frame-A windows $h = 142\text{--}1445$ on the T163–T169 union recipe, 67 arithmetically complete; verdict **SIEVE-RESISTS, sandbox**). T169’s standard shape cashed in: the bilinear form is written down *exactly* — $\hat{A} = B - S$ (TH1, 3.5×10^{-15}), $\det \hat{A} = \det B - D(B, S) + \det S$ (TH2, 1.3×10^{-10}), $\det S$ a genuine double von Mangoldt sum against the closed wedge kernel $K = \frac{1}{2}D(X_n, X_m)$ (TH3, 1.5×10^{-14}) — and on the reference window ($h = 540$) the three pieces read 6.18, -198.8 , 192.6 and sum to 4.22×10^{-3} : a *five-order cancellation* between three ~ 200 -sized pieces, with absolute target 1.10×10^{-5} . The route table (target $\delta \geq 3.0$): truth $+2.747$ MEASURED; Cauchy–Schwarz -0.000 ; large sieve/duality $+0.669$; Montgomery–Vaughan 1973 -0.384 ; the exact split $+0.996$ (best); Vaughan Type I+II $+0.669$ — all THEOREM. The collapse is structural, by two theorems: the **rank-3 theorem** (TH4: D is the polarisation of $\det$ on 2×2 symmetric matrices, rank 3, signature $(1, 2)$, so $\text{rank } K \leq 3$ for every h and X — $\sigma_4/\sigma_1 = 2.0 \times 10^{-15}$, effective rank $1.38\text{--}2.71$ against $N \sim 10^3$: the form *is* $S_{11}S_{22} - S_{12}^2$ in three linear Λ -sums) and the **Type II collapse** (TH5: the closed weights see n only through $\log n$, so Vaughan Type II blocks have effective rank $O(1)$ for every U, V — 2 singular values carry 99.9% against 153 generic, $U = 12\text{--}70$ scanned). Honest T161 comparison: GAINED — 32 frequencies reduce to THREE linear functionals, by theorem; NOT GAINED — the precision, which binds (5.3×10^{-5}) per sum at $h = 285$, sharpening h^{-3} , the RH yardstick 1.1×10^3 too coarse; ℓ^1 mass $41\times$ over the signed value). The chain becomes R4-free for free (TH6: $1 - r_{12}^2 = \det \hat{A}/(\hat{a}_{11}\hat{a}_{22})$ an identity, sharper than T169-TH9 at -2.747 vs -2.771 ; the Weil fence never approached); end to end the best unconditional bound carries $h^{-0.996}$ against the required $\leq h^{-2.50}$ — missing by 1.50 *in the exponent*, and the shortfall is a theorem. Stress: the scramble leaves rank-3 and the unconditional bounds unchanged while the truth moves 2.76 in the exponent — **the arithmetic sits entirely in the joint values of (S_{11}, S_{22}, S_{12}) against B** ; flat-weight breaks; L_P exact; the ν -decoupling is reported unsmoothed (frames $\nu = 5/8/11$ fall at $-1.70/-1.27/-1.74$ — T169’s $h^{-2.95}$ is frame-A, the shortfall is not). Balance 6 THEOREM / 1 CERT-UNIF / 5 NO-GO. **R1 finally classified**: $\det \hat{A}/(|\text{row}_1||\text{row}_2|)$ is the sine of the angle between the two rows of $\hat{A}$, falling $h^{-2.711}$ — R1 asks for an unconditional certificate that two explicit finite Λ -sum vectors become collinear at rate h^{-3} : a *near-degeneracy*, not a size, beyond any size-bounding tool; needs beyond-RH *joint* precision. R2/R3 booked in T169; R4 off the path. T171 (`final_map_probe.py`, contract FINAL.MAP) is running — the capstone map of the whole phase.
- **Docs + website sync.** `tfpt_prime_front` gains the T170 subsection (the exact bilinear decomposition as a display, the rank-3 theorem and the Type II collapse as key results, the route table with its δ numbers, the five-order cancellation, the final R1 classification as a row-angle near-degeneracy, the honest T161 comparison, the “After T170” keybox with R1-final and T171 running) and the v558 subsection in the verified layer (now *twenty-four* modules); the phase-2 section title moves to T126–T170, the probe index gains the T170 row and the running totals move to 170 probes / 4514 checks; companion v558 blocks in `tfpt_1`, `tfpt_3` and `tfpt_research_contracts`; `experiments/next.txt` gains the entry (series (CLXXXI)); website: `primeFront.ts` feed entries T170 + v558 promotion, status surfaces Teile 11–170 / 4514 checks / 24 modules v535–v558, T171 running. Firewall unchanged: sandbox, no RH evidence, no zero data; every number typed THEOREM/CERT-UNIF/CERT-WINDOW/MEASURED/FIT.

2026-07-29 (XV) (prime-front diary T168+T169 (the self-similarity of the hardness is *proved*, the one open object becomes a bilinear von Mangoldt sum — MINORS-RESIST / RATIO-RESISTS) + paper + website sync; NO promotion, NO marker moves)

- **Prime-front diary T168** (`lagrange_minors_probe.py`, contract LAGRANGE.MINORS, 39/39, 2.3 s, the same 63-window union as T163–T167, recipe untouched; verdict MINORS-RESIST, sandbox). The determinant attacked as a sum of squares via the Lagrange identity — and the sum of squares is *real*: the $h \times h$ arithmetic kernel A is **positive definite on all 63 windows** ($\lambda_{\min} = 5.0 \times 10^{-6}$ – 8.5×10^{-4} , 8–12 orders above the solver floor), so the Lagrange identity is a genuine sum of strictly positive squares ($\rho_{\text{LAG}} = 1.000$ exactly, no sign cancellation) — hard-fenced as a statement about one finite matrix per window; the Weil criterion is never tested, assumed or reverse-inferred. The anatomy is exact: $Q = X^T A X$ (3.9×10^{-15}), the mode vectors are **Euclidean-orthogonal** ($r_{12} = 0$ to 6.2×10^{-17} — the near-parallelism is created *entirely* by the arithmetic metric), the Wronskian telescopes exactly ($W_r - W_{r-1} = (\mu_1 - \mu_2)u_r v_r$, 1.7×10^{-13}), the minor sup is closed and m -free ($\sim N/\pi^2$, attained to 0.770), Cauchy–Binet verified as algebra. The key measurement splits by basis: in the closed basis the minors are *maximal* ($\frac{1}{2} \sum M^2 = 1/(\mu_1 \mu_2)$ exactly $\sim h^4$ — the Wronskians carry zero arithmetic, all smallness sits in the PSD kernel at one closed vector); in the eigenbasis the sum is *thin* (90% from 4–101 pairs, top pair always ($\lambda_{\min}, \lambda_{\max}$) at 6.8–41.7% alone, raw $\kappa_w = 0.30$ – 0.94). The exponent ledger closes arithmetic-free: $1 - r_{12}^2 = \nu_1 \nu_2 / (\hat{a}_{11} \hat{a}_{22})$ with $\nu_1 \sim h^{+0.81}$, $\hat{a}_{11} \sim h^{+0.76}$, $\hat{a}_{22} \sim h^{+0.91}$ — every factor but one at the right power; best m -free-shaped bound $h^{-0.548}$ union / $h^{-0.880}$ frame A, short by $h^{2.45}/h^{2.04}$; the open factor is identified exactly: ν_2 with minimiser $t^* = Q_{12}/Q_{11}$, needed to 6.05×10^{-3} median / 2.82×10^{-4} worst ($h^{-1.146}$) — by T168-TH7 that factor *is* the target rewritten (ONE-TERM-MISSING deliberately not rendered). Scramble breaks harder than T167 (8/8 windows lose $A \succ 0$ and the Gram property, n_{neg} up to 73); L_P control exact. **The hardness is self-similar under exact reformulation** — determinant $\rightarrow$ PSD compound at a closed vector $\rightarrow$ near-null Rayleigh value $\rightarrow$ one ratio of two closed lag sums, same accuracy price. Balance 8 THEOREM / 0 CERT-UNIF / 3 CERT-WINDOW / 11 MEASURED / 7 NO-GO.
- **Prime-front diary T169** (`tstar_ratio_probe.py`, contract TSTAR.RATIO, 41/41, 3.0 s, same union surface; verdict RATIO-RESISTS — the self-similarity *proved*, sandbox). T168’s one open factor attacked as a preregistered candidate table: every genuinely closed candidate misses by $O(1)$ and *diverges* from the threshold at $h^{+1.99}$ (the block is atom-dominated, $|\text{atom/arch}| = 3.5$ – 43 resp. 14 – 461 , and $\hat{a}_{11}^{\text{arch}} < 0$ on 63/63 — the archimedean half is not even PSD); **the only candidate that meets the threshold, $K7 = \sqrt{\hat{a}_{22}/\hat{a}_{11}}$ (63/63), does so by a new theorem (T169-TH7) because it puts $\det \hat{A}$ back into the numerator: $R(K7)$ collapses in closed form to $2\sqrt{\hat{a}_{11}\hat{a}_{22}} \det \hat{A} / [(\hat{a}_{11} + \hat{a}_{22})(\sqrt{\hat{a}_{11}\hat{a}_{22}} + \hat{a}_{12})]$ (1.1×10^{-9}) — the t^* -language is provably exactly as hard as T167’s determinant: the loop closes as an identity (T167 scalar $\rightarrow$ T168 factor $\rightarrow$ T169 candidate = the same object). The real gains: **R3 is booked CERT-UNIF** — $\nu_1 \leq \max(\hat{a}_{11}, \hat{a}_{22}) + |\hat{a}_{12}|$ (Gershgorin, unconditional, uniform in h), 63/63, losing only 1.10–1.19 — **the CERT-UNIF column moves off zero**; R2 is honestly downgraded from cheap to OPEN (the absolute-value budget cannot even certify positivity); the chain is **rebuilt R4-free** ($1 - r_{12}^2 \leq [\max(\hat{a}_{11}, \hat{a}_{22}) + |\hat{a}_{12}|] \cdot R(\hat{t}) / (\hat{a}_{11} \hat{a}_{22})$, valid 63/63, frame-A trend $h^{-2.948}$, i.e. $\varepsilon = 0.052$ inside the 0.5 carry window) so the Weil-shaped positivity of A_h never enters it — the Weil fence is respected by construction (uniform-in- h positivity of A_h is RH-equivalent-shaped and is never routed or claimed); and by T169-TH3 the $1/\sqrt{\mu}$ factors cancel, so the cond $\sim 10^8$ ladder leaves the file. Stress: L_P exact (the t^* -recipe is a near-degeneracy artefact — its tightness *measures* $\det \hat{A}$), scramble 8/8, flat-weight null 8/8, parity-pair control only $6.7\times$ (honestly PARTIAL). Balance 10 THEOREM / 2 CERT-UNIF / 1 CERT-WINDOW / 4 NO-GO. The rest: **R1, for the first time in standard analytic shape — an m -free bound on $\det \hat{A}$ at $h^{-3+\varepsilon}$ as a bilinear von Mangoldt sum against****

closed Dirichlet weights (equivalently the diagonal ratio to $1.2 \times 10^{-2}/5.6 \times 10^{-4}$); R2 = R1; R3 closed; R4 not needed. T170 (`bilinear_sieve_probe.py`, contract BILINEAR.SIEVE) is running the unconditional sieve toolbox (Montgomery–Vaughan, Vaughan decomposition) on the bilinear form — T161’s beyond-RH triage applied to *linear* sums; for *bilinear* forms the large sieve gives unconditional square-root cancellation.

- **Docs + website sync.** `tfpt_prime_front` gains the T168 subsection (the Lagrange identity and the PSD finding with the hard Weil fence, the basis split of the key measurement, the closed exponent ledger, the self-similarity statement) and the T169 subsection (the candidate table, the collapse theorem TH7 with the loop closure as the key result, the CERT-UNIF gain, the R4-free chain with $\varepsilon = 0.052$, the standard-shape restatement, the “After T169” keybox with R1 in bilinear shape and T170 running); the phase-2 section title moves to T126–T169, the probe index gains the T168+T169 rows and the running totals move to 169 probes / 4474 checks; `experiments/next.txt` gains both entries (series (CLXXIX), (CLXXX)); website: `primeFront.ts` feed entries T168+T169, status surfaces Teile 11–169 / 4474 checks, T170 running. NO promotion (T168/T169 candidates PENDING — bundling with T170 planned). Firewall unchanged: sandbox, no RH evidence, no zero data; every number typed THEOREM/CERT-UNIF/CERT-WINDOW/MEASURED/FIT.

2026-07-29 (XIV) (v557 — the cascade/vector identities of phase 2 promoted; prime-front diary T167 (three dresses are one inequality, the closed vector exact at $K = 2$ — VECTOR-RESISTS) + paper + website sync; NO marker moves)

- **New module v557 (PRIME.CASCADE.VECT.01).** Promotion of the closed theorem cores of T166 (contract SCHUR.CASCADE) and T167 (contract NULL.VECTOR) as one deliberately narrow module (`v557_cascade_vector_identities.py`, 23 checks, ~ 0.1 s), everything recomputed on v551–v556’s declared small frame-A surface (12 deepest in-cap zones, $m = 96 \dots 291 \leq 300$; $\kappa = 0.038821$ verified at every jump point of $\psi(x)/x$ on the table): (1) the cascade identities — prefix (one Cholesky, all sixteen rungs, 1.1×10^{-12} on 192 comparisons), minor form $1/g_K = \det G_{[1..K]}/(\mu_1^P \det G_{[2..K]})$ on the raw arithmetic Gram block (2.7×10^{-12} ; Schur 1917) and regression form $g_K/g_1 = 1/(1 - R_K^2)$ (8.8×10^{-13}); (2) the diagonal invariance of the gain under $B \rightarrow DBD$ (2.7×10^{-12} on 144 random diagonals — the gain belongs to the arithmetic Gram block alone); (3) the exact $K = 2$ identity — the closed vector $(1, -Q_{21}/Q_{22})$ attains $1/g_2 = Q_{11}(1 - r_{12}^2)$ exactly and $B_{11}g_2 = 1/(1 - r_{12}^2)$ identically (1.2×10^{-12}): the fast-null-vector is FREE at $K = 2$, dress (c) collapses onto dress (b); (4) the pivot identity $u^T Q_K u = 1/g_K + \delta^T Q_K \delta$ for $\delta_1 = 0$ (2.0×10^{-12} on 252 evaluations; the $\delta_1 = 0.1$ mutation breaks by exactly the closed cross term $2\delta_1$) with the exact entry threshold and the unification $(1/g_2)/S_2 = (1 - r_{12}^2)/(1 + 3r_{12}^2)$ — ONE inequality, not three; (5) the trial theorem (288 trials, every candidate a certified lower bound), the L_P no-go (cascade gain exactly 1, deviation 0.0) and the scramble type-change (B_{11} itself loses positivity on 49/60 declared draws, a majority on 12/12 windows) as must-breaks; every statement with a mutation control; the one open scalar R1 (an m -free upper bound on $1 - r_{12}^2$) explicitly typed OPEN; NO RH statement. Ledger row PRIME.CASCADE.VECT.01; registered in `run_all.py` and `script_registry.csv`; suite counter 550 $\rightarrow$ 551 scripts.
- **Prime-front diary T167 (null_vector_probe.py, contract NULL.VECTOR, 39/39, 1.4 s, the 63-window union of T166 rebuilt bit for bit; T163–T166 reproduced as fits; verdict VECTOR-RESISTS with a strong reduction, sandbox).** The most constructive dress attacked and closed *as a construction*: 22 families preregistered, all evaluated through the pivot identity $u^T Q u = 1/g_K + \delta^T Q \delta$ (10206 evaluations, 3.2×10^{-9}) — **gram2 is EXACT at $K = 2$** ($\rho = 0$, a theorem: the closed vector attains $1/g_2$ on 63/63, $B_{11}g_2 = 1/(1 - r_{12}^2)$ an identity, certified gain exponent $h^{+2.921}$ on frame $A = h^{3-0.079}, h^{+2.246}$ union). Perturbation theory dies structurally: Jacobi diverges (radius 1.0–12.7) but **the Kato series CONVERGES (radius 0.067) — to the WRONG object** (the exact bottom eigenvector is itself a useless

trial, $\rho = 6.04$, overlap 0.083, relative gap 5.4×10^{-7}) — closed off in every order. Two thresholds separated (envelopes on 189 perturbations each); **monotonically sharper in K — mildest at $K = 2$ ($1.90\times$, $h^{+0.353}$), against the hypothesis and exactly where the vector is free**; at $K = 6$ no closed family hits (separation $h^{+1.138}$, ratio $264\times$); anchor $\text{eps}_{\text{ent}}(2) \rightarrow (1 - r_{12}^2)/4$ — T166's 3.57×10^{-4} is literally the quarter. End-to-end gain $2207\text{--}7.84 \times 10^6$ certified; the deficit is the higher rungs, not the vector; **the scramble breaks harder than T166 saw: 8/8 windows lose positivity of the 2×2 diagonal itself** ($Q_{11} = -1.35 \times 10^5 \dots -1.02 \times 10^4$) — **a change of TYPE, not a factor**; anti-fitting cheat only $h^{-0.823}$; off-recipe $1 - r_{12}^2 \sim h^{-2.740}$ vs $h^{-2.921}$. **The unification as an identity:** $\text{eps}_{\text{ent}}(K) = \rho(1/g_K)/S_K$ to machine precision — the determinant ratio (dress a), $1 - r_{12}^2$ (dress b) and the entry threshold (dress c) are ONE inequality, not three. Balance 6 THEOREM / 0 CERT-UNIF / 2 CERT-WINDOW / 7 MEASURED; ONE-TERM-MISSING deliberately NOT rendered (the one missing term IS dress (b)); rest: R1, the only item — an m -free upper bound on $1 - Q_{12}^2/(Q_{11}Q_{22}) \leq C h^{-3+\varepsilon}$ (required 1.25×10^{-5} median, 3.19×10^{-8} worst); redirected: work at $K = 2$. T168 (`lagrange_minors_probe.py`, contract LAGRANGE.MINORS) is running — the Lagrange identity, the determinant as a sum of squares.

- **Docs + website sync.** `tfpt_prime_front` gains the T167 subsection (the pivot identity and the gram2 exactness as displays, the Kato-converges-to-the-wrong-object lesson, the threshold monotonicity against the hypothesis, the unification identity as the key result, the type-change scramble, the “After T167” keybox with R1 as the only item and T168 running), the v557 subsection in the verified layer, the module table row, the phase-2 section title moves to T126–T167, the probe index gains the T167 row and the running totals move to 167 probes / 4394 checks; `tfpt_1`, `tfpt_3` and `tfpt_research_contracts` gain the v557 companion blocks; `experiments/next.txt` gains the T167 entry (series (CLXXVIII)); website: `primeFront.ts` gains the T167 and v557 feed entries, status surfaces Teile 11–167 / 4394 checks, 23 modules v535–v557, T168 running. Firewall unchanged: sandbox, no RH evidence, no zero data; every number typed THEOREM/CERT-UNIF/CERT-WINDOW/MEASURED/FIT; ledger row PRIME.CASCADE.VECT.01.

2026-07-29 (XIII) (prime-front diary T166 (the cascade gain is a Gram-determinant cancellation, one inequality in three dresses — CASCADE-RESISTS) + paper + website sync; NO promotion, NO marker moves)

- **Prime-front diary T166** (`schur_cascade_probe.py`, contract SCHUR.CASCADE, 30/30, 2.1 s, the two surfaces rebuilt as a *union*: 27 frame-A windows $h = 142\text{--}1320$ plus 36 decoupled- ν windows over 6 zones, $\nu \in \{4, 5, 6, 8, 11, 16\}$, $h = 96\text{--}1371$ — 63 windows with a $14\times$ lever arm on which zone depth and resolution are independent knobs ($\log h$ vs $\log \nu$ correlated 0.33); T165's three numbers reproduced on frame A, the union reading $h^{+2.759}/h^{+0.193}/h^{+2.566}$; $\kappa = 0.038821$ verified at every jump point in $[100, 4 \times 10^5]$; verdict **CASCADE-RESISTS, sandbox**). The one open object of T165 — the cascade lower bound $g_{16}/g_1 \geq c h^{3-\varepsilon}$ uniform in m — attacked head-on and dissected completely. *The anatomy*: four identities, all theorems re-verified on 63/63 windows — the prefix property (one Cholesky yields all sixteen rungs), the minor form (Schur 1917), the **regression form** $g_K/g_1 = 1/(1 - R_K^2)$ (the open object *is* a near-collinearity: mode 1 explained by modes 2...16 up to a residual $h^{-3+\varepsilon}$), and the **diagonal invariance** of the gain under $B \rightarrow DBD$ — it does not see the KMS $1/\sqrt{\mu}$ normalisation at all: the h^3 is a property of the arithmetic Gram block $G = TAT^T$ alone. The rung profile is extreme: rung 2 alone carries a median 59% of the gain, rungs 2–5 72%, $K_{\text{half}} \in \{2..5\}$ on 63/63; rung 2 in closed form has $1 - r_{12}^2 = 1.3 \times 10^{-7}\text{--}4.5 \times 10^{-4} \sim h^{-2.92}$ (frame A) — one rung multiplies g by $2207\text{--}7.8 \times 10^6$ where the m -free budgets are sharp only to a factor 21–26.
- **The cancellation finding — a third mechanism.** No entry of the 2×2 bottom block cancels (each keeps 60–99% of its larger half) and neither half alone is collinear (arch $1 - r^2 = 0.98$,

atoms 0.29) — yet the sum is degenerate to seven digits: **the cancellation lives in the 2×2 Gram determinant** — the polarisation split $\det(G_{\text{ar}} + G_{\text{at}}) = \det G_{\text{ar}} + \det G_{\text{at}} + \Pi$ (exact to 6.7×10^{-14}) has pieces 2.6–630 cancelling to 1.0×10^{-3} – 1.7×10^{-2} , a ratio 2.6×10^{-6} – $5.1 \times 10^{-4} \sim h^{-1.45}$ — the same arch-against-atom mechanism as T159/T160, one level up, in a quadratic functional of the lag sums. Pinned to the arithmetic twice: the L_P no-go breaks completely (gain $\equiv 1.0000000000$ exactly), and the anti-fitting scramble (uniform random atom positions, same total mass) destroys the effect by a factor 4569.

- **The best lower bound, the verdict, and two honest contract corrections.** Every route is an instance of the trial-vector theorem ($1/g_K = \mu_1^{P-1} \min\{u^\top Gu : u_1 = 1\}$); the best closed route (two-rung, β from the atom block) certifies gain $h^{+1.319}$ against the target $h^{+3.110}$ — **an exponent gap of $h^{+1.791}$, not a constant: the one missing inequality is the cancellation** (required β precision 3.57×10^{-4} , all closed candidates miss by 12.4–2540); sharpest restatement $1/g_K = \det G_{[1..K]} / (\mu_1^P \det G_{[2..K]})$, first flat at $K = 6$ — exactly one uniform inequality missing, in three dresses (the det-ratio bound, the closed β , a closed near-null vector of A in the low modes). Corrections recorded honestly: form F2 (gain $\geq ch^{3-\varepsilon}$) is strictly *weaker* than $\inf_m g_{16} > 0$ ($B_{11} \sim h^{+3.110}$, F1 needs $\varepsilon \leq -0.110$); the confinement route was a sub-surface artefact ($h^{+2.714}$ on frame A $h \leq 780$ vs $h^{+1.963}$ on the full union — exposed by raising the eigen-horizon to the cap). Errand closed: $U_{\text{ref}}(\text{union}) = 1.15 \times 6.4781 = 7.45$ supersedes T164’s 4.90 and T165’s 5.7327 on the union (off-recipe rule declared, CERT-WINDOW, never CERT-UNIF); the union supremum is zone-depth-driven (multi-covariate gain $\sim h^{+2.92}\nu^{-1.53}$). Balance +5 THEOREM / +3 CERT-WINDOW / +4 MEASURED, deliberately no new CERT-UNIF; candidates P166.1...P166.9 all PENDING (no promotion — bundling with T167 planned). T167 (`null_vector_probe.py`, contract `NULL.VECTOR`) is running the most constructive dress.
- **Docs + website sync.** `tfpt_prime_front` gains the T166 subsection (regression form, diagonal invariance and the Gram-minor ratio as displays, the Gram-determinant key result with the T159/T160 connection, the scramble factor, the two contract corrections, the “After T166” keybox), the phase-2 section title moves to T126–T166, the probe index gains the T166 row and the running totals move to 166 probes / 4355 checks; `experiments/next.txt` gains the T166 entry (series (CLXXVII)); website: `primeFront.ts` feed entry T166, status surfaces Teile 11–166 / 4355 checks, T167 running. Firewall unchanged: sandbox, no RH evidence, no zero data; every number typed THEOREM/CERT-UNIF/CERT-WINDOW/MEASURED/FIT.

2026-07-29 (XII) (v556 — the gauge/ P_{pr} identities of phase 2 promoted; prime-front diary T165 (the successor closes by certificate, one quantifier remains — ETA-RESISTS) + paper + website sync; NO marker moves)

- **New module v556 (PRIME.GAUGE.PPR.01).** Promotion of the closed theorem cores of the discovery parts T164 (`sector_change_probe.py`) and T165 (`alignment_eta_probe.py`) — 23 checks, ~ 0.3 s, everything recomputed on v551–v555’s declared surface (the 12 deepest prime-power zones admitting a frame-A window inside the cap, $n = 29 \dots 139$, $m = 96 \dots 291 \leq 300$), with the one arithmetic input $\kappa = 0.038821$ *verified* at every jump point of $\psi(x)/x$ on the von-Mangoldt table in $[100, 3.2 \times 10^5]$ (Chebyshev 1852 / Rosser–Schoenfeld 1962), nothing cited from the sandbox; the companion to v555, which certified the *price structure* of the pairing — this module certifies its *gauge structure*. Scope fence: per-instance identities and certified inequalities with the direction in the name — no fit, no D -exponent, no zone-uniform statement; the T164/T165 h -exponents ($1/g_{16} \sim h^{+0.061}$, the ascent price $\sim h^{+3.3}$, the split $+3.110 - 3.049 = +0.061$) are sandbox fits and are *not* consumed; finite Λ -sums are allowed and used, *no RH statement* is made; the ONE open object after T165 ($\inf_m g_{16}(m) > 0$, the cascade-gain quantifier) stays open and typed open; each statement carries at least one mutation control that must fail loudly.
- **(1) The gauge theorem (T164, S2.1) [E].** $x_1 = 1$ fixes $a_1 = 1/\sqrt{\mu_1}$, i.e. only the *scale* of

a ; Q and TV are homogeneous of degree two in a ; hence the demand ratio Q/TV of the same a -direction — and with it δ_{bnd} — is the *same number in every sector*: unchanged to 2.9×10^{-11} on 2520 sector-by-trial-vector combinations (5 weight families $\times$ 7 shifts $\times$ 6 taper widths on 12 windows), with $TV \geq |w_0|$ in every sector and the pure shift scaling the certified value by exactly $\theta = \mu_1^P / (\mu_1^P + \kappa_s)$ (2.2×10^{-11} on 432 points); candidate (i) settled in closed form — full-space $\mu_0 = 0$ exactly, strictly worse. Mutation: the wrong transport map (the x -coordinates instead of the a -direction) moves the ratio by 2.0×10^2 – 5.4×10^3 .

- **(2) The h^2 conservation law (T164, S2.2) [E].** floor $\times$ transfer $= 1/(\mu_1^P + \kappa_s) \cdot (1 + \kappa_s/\mu_1^P) = 1/\mu_1^P$ *identically* at every shift on the declared grid (72 window-by-shift points, 2.2×10^{-16}): a sector shift can flatten the floor but pays the identical factor back as a transfer — the h^2 is conserved, never removed; it lives in the *ratio*, not in the floor. Mutation: the wrong transfer misses by 0.9995 at the largest shift on every window.
- **(3) The power-one spend as an identity (T164, S1) [E].** The r -ceiling $r \leq U/L$ with $L = \lambda_1(A)/\mu_1^P = 1.1019$ – 1.5845 (computed per instance from the full window) is *linear* in the entry ceiling, so $d \log r / d \log U = +1$ exactly (central difference at $U = 1/g_{16}$, within 1.1×10^{-14} on 12/12): an h^ε ceiling costs $h^{-\varepsilon}$ of r -margin for every $\varepsilon > 0$ — no free tolerance in the consumption step (the measured power of the full T156 loss margin stays sandbox). Mutation: the quadratic consumption reads slope 2.0000 and is recognised.
- **(4) The P_{pr} identity and the predicate equivalence (T165, T1) [E].** The gauge-invariant dashboard satisfies $P_{\text{pr}} = g_{16} \cdot R \cdot (TV/(t_1 v)^2) / \mu_1^P$ with no inequality anywhere — four factors, each a named object of the chain: the R-E-A quantifier g_{16} , the demand $R = Q/TV$, the T163 floor $\text{tvf} \geq 1$, and the Kac–Murdock–Szegő 1953 scale $1/\mu_1^P = 943.6$ – $8609.6 \sim h^2$ — exact to 4.3×10^{-16} on all 192 battery vectors (knob settings, random sixteen-vectors *and* random full-window vectors), gauge-invariant under $v \rightarrow tv$ to 1.5×10^{-11} ; the predicates $R > 2\kappa$ and $P_{\text{pr}} > 2\kappa g_{16} \text{tvf} / \mu_1^P$ agree as booleans on all 192 — the demand half of $R2''$ and the crossing condition are *one* predicate, so R-F was never independent and its m -uniform form *is* R-E-A — and every crossing vector pays $P_{\text{pr}} > 2\kappa g_{16} / \mu_1^P = 15.4$ – 142.8 , above the preregistered tolerance $\Theta_{\text{TOL}} = 10$ on 12/12: **the R-F conjunction is empty by an identity plus a floor, a certificate and not a failed search** (T165’s ascent stays sandbox, no search is run). Mutation: $(t_1 v)$ unsquared scales like t and moves by 1.0 – 1.0×10^4 .
- **(5) The Schur-cascade direction and the exponent closure (T164/T165) [E].** $s = \mu_1^P t_1^\top A^{-1} t_1 = 0.1696$ – $0.2472 \geq g_{16} \geq g_1$ window by window ($1/s \leq 1/g_{16} \leq 1/g_1 = B_{11}$ — the T158 ladder is a chain of upper bounds with the route-(0) rung the loosest), $P_K = \hat{a} s = 254.8$ – $7.7 \times 10^3 \geq 1$ (Kantorovich 1948); the exponent closure is an *identity of the lists* — per instance $\log(1/g_1) = \log(g_{16}/g_1) + \log(1/g_{16})$ to 1.6×10^{-15} , the least-squares fits closing to 1.3×10^{-15} by linearity (T165’s $+3.110 - 3.049 = +0.061$ is this identity; the exponent values are sandbox fits, not consumed — what is promoted is that the certification lives in the cascade gain g_{16}/g_1 , the object of the one open quantifier). Mutations: the g_8 closure breaks by 0.10–0.24; a corrupted sixteen-block makes the Cholesky *refuse* on 12/12. Plus the monotone no-go staircase (damage $1.00 \rightarrow 3.49 \rightarrow 10.81 \rightarrow 24.98$ over $\nu = 4/2/1/0.5$, exact null control) and exact Dirichlet/parity controls.
- **Prime-front diary T165 (alignment_eta_probe.py, contract ALIGNMENT.ETA, 30/30, 15.1 s, the T163/T164 surface rebuilt and re-verified, window ladder up to $h = 1445$, verdict ETA-RESISTS in the strong form, sandbox).** The successor question R-F closes *by certificate, not by failed search*: the new gauge-invariant identity $P_{\text{pr}} = g_{16} \cdot R \cdot (TV/(t_1 v)^2) / \mu_1^P$ (machine-checked to 3.3×10^{-16}) makes demand and price *one* equation, so with T163’s floor every crossing vector pays $\geq 2\kappa g_{16} / \mu_1^P$ — the old KMS h^2 — and the two R-F clauses cannot be chosen independently. The anatomy: the free optimum is a *low-harmonic* object (93.7–96.8% of its energy in the first 32 parity modes against a 2.4–22.5% baseline), essentially orthogonal to the PNT main term (cosine $-0.070 \dots - 0.031$), with heavy edges on prime-power cells

(lift 1.36–2.12); the price decomposes *exactly* (to 0.0): $h^{+3.261} = +1.997$ (KMS — the same h^2 since T152) $+1.279$ (demand overshoot the chain never asked for) $+0.093$ (floor) -0.108 (g_{16}); the bar-tight counterfactual stays $h^{+1.982}$. $\eta(\text{Cap})$ is two-sided: the ceiling is a theorem, and at $\text{Cap} = 10$ it falls short of the requirement by $5.5\text{--}392\times$ on every window, 0/27 ladder points reach the bar. The equivalence: $R > 2\kappa$ and T163’s crossing predicate are the *same* predicate (105/105 vectors) $\Rightarrow$ R-F is strictly *stronger* than the $R2''$ demand, and the clauses collide — **R-F is empty; its m -uniform form is R-E-A**. T2 localises the quantifier further: the m -free budgets bound B_{11} sharply (factor 21–26) — but the wrong object: $1/g_1$ grows $h^{+3.110}$, $1/g_{16}$ is flat $h^{+0.061}$, exponents close exactly; the whole certification lives in the 15 ladder increments — “bound g_{16}/g_1 from below by $h^{3-\varepsilon}$ ”, one scalar per window, a cancellation and hence provably beyond absolute-value budgets. T3, the decoupled surface (ν as a knob: 25 admissible windows over 6 zones, $\nu \in \{4, 5, 6, 8, 11, 16\}$, collinearity $0.87 \rightarrow 0.68$): **the quarter-bar drift is zone depth, not window length (factor 19)** — and two honest costs reported openly: $\sup 1/g_{16}$ rises to 5.7327, exceeding T164’s $U_{\text{ref}} = 4.90$ by 17% (the constant was frame-A-specific and is retired as a surface constant), and the h -coefficient of $1/g_{16}$ is no longer negligible at free ν . End-to-end on the union (52 windows, $h = 142\text{--}1320$): every crossing vector has $P_{\text{pr}} \geq 54.6\text{--}5865 > \Theta_{\text{TOL}}$, closed for every $h > 84.9$. Stress: T145 coarsening monotone ($1.0/2.8/12.1/27.5$, up to $102\times$); surrogate $8.6 \times 10^3\text{--}6.9 \times 10^4$; Dirichlet/KMS exact. Balance 11 THEOREM / 1 CERT-UNIF / 4 CERT-WINDOW / 6 MEASURED; 6 new PENDING candidates. **The honest bottom line: exactly ONE genuine open object remains** — $\inf_m g_{16}(m) > 0$, **a quantifier over a certified flat list; no missing term, no missing device, no sector**. T166 (`schur_cascade_probe.py`, contract SCHUR.CASCADE) is running at exactly that quantifier. NOT RH evidence; no marker of any pre-existing contract moves.

- **Docs + website sync.** `tfpt_prime_front` gains the T165 subsection (the P_{pr} identity as the key display, the exact price decomposition, the R-F $\iff$ R-E-A equivalence, the decoupled surface with the zone-depth answer and the retired U_{ref} reported honestly) and the After-T165 keybox (the one cascade-gain quantifier, T166 running), the v556 subsection in the verified layer (now twenty-two modules), the phase-2 section retitled T126–T165, the T165 row in the probe index and the updated counters (165 probes, 4325 checks); `tfpt_1`, `tfpt_3` and `tfpt_research_contracts` gain the v556 companion blocks; `experiments/next.txt` gains the Teil-165 entry; `website/lib/primeFront.ts` gains the T165 and v556 feed entries; the prime-front status surfaces move to Teile 11–165 / 4325 checks / 22 modules (v535–v556); suite counter $549 \rightarrow 550$ scripts. Ledger row PRIME.GAUGE.PPR.01 [E]; **no marker of any pre-existing contract moves**.

2026-07-29 (XI) (prime-front diary T164 (both arms of the successor decided: the $O(1)$ gate discharges to a single quantifier, sectors are a gauge — TOLERANCE-CARRIES (arm A) / SECTOR-RESISTS (arm B)) + paper + website sync; NO promotion, NO marker moves)

- **Prime-front diary T164 (`sector_change_probe.py`, contract SECTOR.CHANGE, 28/28, 31.7 s, the T163 surface rebuilt and re-verified: 28 log-spaced prime-power zones $h = 142 \dots 1445$ with declared caps, 27 windows inside the cond horizon, $|\psi(x) - x| \leq \kappa x$ with $\kappa = 0.038821$ verified at every jump point in $[100, 4 \times 10^5]$; verdict TOLERANCE-CARRIES (arm A) / SECTOR-RESISTS (arm B), sandbox).** Both arms of T163’s successor R-E are decided. *Arm A (the tolerance analysis)*: the station chain is instrumented with a power at every station — the T158 ladder really is a chain of upper bounds on the entry ceiling ($s \geq g_{16} \geq g_1$ window by window), and at the heart the T156 kernel spends the ceiling at power *exactly one*: $d \log(1 - F)/d \log U = -1.0005 \dots -1.0000$ with $d \log r/d \log U = +1.0000$ exactly, so a ceiling growing like h^ε costs a margin decaying like $h^{-\varepsilon}$ for every $\varepsilon > 0$ — the declared one-sided rule returns $\varepsilon^* = 0.50$ and the probe *disowns* it at once as the $\varepsilon = 0$ tailwind ($h^{+0.391}$, bought from the measured drift of L) divided by power one: no structural slack. But

the sharp question is answered the other way: the single constant $U_{\text{ref}} = 4.9008 = \max_h 1/g_{16}$ carries all 9 sub-surface windows out of sample, $1/g_{16} = 1.7527\text{--}5.3286$ is flat ($h^{+0.061}$ over a $9\times$ lever arm, split halves $-0.010/+0.103$), and every g_K is strictly increasing (Schur 1917) — **the $O(1)$ gate is not open as a *quantity*: it is discharged window by window by a Cholesky identity**, and what remains is exactly one quantifier, $\sup_m 1/g_{16}(m) < \infty$ — the m -freedom of a certified flat list, the same grammatical form as every other open uniformity item and no longer an existence question about trial vectors. *Arm B (the sector change)*, *negative by a theorem*: $x_1 = 1$ fixes only the *scale* of a ; Q and TV are homogeneous of degree two, hence Q/TV and δ_{bnd} are the *same numbers in every sector* — the entry normalisation is a **gauge** (machine-checked to 8.8×10^{-10} over 5670 sector-by-vector combinations, declared horizon 2.6×10^{-8}); the full space is strictly worse ($\mu_0 = 0$ exactly, no finite floor); a shifted or weighted sector does flatten the floor ($h^{+0.000}$ at $\kappa_s = 4$) but pays the transfer factor $1/\theta \sim h^{+1.997}$, and floor $\times$ transfer $= 1/\mu_1^P$ *identically* — the two exponents sum to $+1.997$ at every shift on the declared grid to 10^{-9} : the h^2 lives in the ratio, never in the floor. The genuine surprise, stated and immediately priced: a normalisation-free first-order ascent on Q/TV over the full window reaches $2.38\text{--}74.57$ against the crossing bar $2\kappa = 0.0776$ — $31\text{--}960\times$ over on 9/9 windows ($\delta_{\text{bnd}} = -0.124\dots -0.090$, alignment efficiency $\eta = 7.9\text{--}11.1\%$ of the Abel ceiling $\|C\|_\infty = 30.3\text{--}930.6 \sim h^{+1.185}$) — and T163's TV floor *holds on the unconstrained optimiser* (TV $\mu_1^P = 8.30\text{--}11.72 \geq 1$, a family T163 never searched), at a price $h^{+3.299}$, worse than T163's crossing price $h^{+1.91}$: dropping the normalisation relocated the difficulty without reducing it.

- **R-B''' narrowed, R-D settled in type, R-F named.** R-B''' is a *naming* problem — two different quantities carried one name: the T162 a -weighted quarter-bar object is $0.1001\text{--}0.1623 \sim h^{-0.172}$ (T163's -0.172 reproduced to 0.0004 , under the 0.25 bar on all 27 windows with 35% margin), the raw arch/atom cancellation is a different number ($h^{-2.04}$); a two-variable regression puts -0.046 of the drift on $\log h$ against -0.477 on $\log \alpha$ ($10\times$ more on the zone scale), and on this recipe α and h are coupled by construction — narrowed, not closed: a surface with independent α and h is needed. R-D is settled in *type*: under the shift $s \rightarrow s/\theta$, $\hat{a} \rightarrow \theta\hat{a}$, $L \rightarrow \theta L$, so P_K , r and $F(P_K, r)$ are unchanged to 3.5×10^{-16} on 54 combinations — every object the chain consumes downstream is a ratio of equally-homogeneous forms, hence no fifth device can come from a sector change ($\rho = 1.0036\text{--}1.0140 > 1$ flat, T161, quoted and untouched). The one genuinely new item is **R-F**: is there a v with $Q(v)/\text{TV}(v) > 2\kappa$ and $Q(v)$ comparable to $1/s$ — equivalently, can the alignment efficiency η stay above $2\kappa/\|C\|_\infty$ at bounded price? No sector, no normalisation, no prime. Stress: the uniform surrogate breaks by $1.5 \times 10^3\text{--}4.9 \times 10^7$, the T145 no-go staircase is monotone ($1.0 \rightarrow 9.1 \rightarrow 25.4 \rightarrow 129 \rightarrow 434$, exact null control at $\nu = 4$, damage ≥ 26.1 at the coarsest setting on every window), the gauge break is 3.4×10^{-2} , Dirichlet/parity/orthonormality controls $\leq 2 \times 10^{-14}$, and the random- v pairing identity holds to 3.8×10^{-16} . Balance 11 THEOREM / 1 CERT-UNIF / 4 CERT-WINDOW / 6 MEASURED, zero load-bearing fit rows; candidates T164-Q1...Q9 all PENDING (no promotion — to be bundled with T165). NOT RH evidence; no marker moves.
- **Docs + website sync.** `tfpt_prime_front` gains the T164 subsection (the power-one measurement, the quantifier collapse as the key result, the gauge theorem with the product identity, the unconstrained ascent with the TV-floor hold, the R-B''' narrowing with the α/h -coupling lesson) and the After-T164 keybox (R-E-A/R-F/R-B'''/R-D, T165 running), the phase-2 section retitled T126–T164, the T164 row in the probe index and the updated counters (164 probes, 4295 checks); `experiments/next.txt` gains the Teil-164 entry; `website/lib/primeFront.ts` gains the T164 feed entry; the prime-front status surfaces move to Teile 11–164 / 4295 checks. T165 (`alignment_eta_probe.py`, contract ALIGNMENT.ETA) is running at the alignment successor R-F. No ledger row (sandbox); **no marker of any pre-existing contract moves.**

2026-07-29 (X) (v555 — the Pareto/total-variation identities of phase 2 promoted; prime-front diary T163 (the front resists as a theorem — the h^2 is the parity

spectral gap, not the primes, FRONT-RESISTS) + paper + website sync; NO marker moves)

- **New module v555 (PRIME.PARETO.TV.01).** Promotion of the closed theorem cores of the discovery parts T162 (`third_split_probe.py`) and T163 (`pareto_front_probe.py`) — 23 checks, ~ 0.4 s, everything recomputed on v551–v554’s declared surface (the 12 deepest prime-power zones admitting a frame-A window inside the cap, $n = 29 \dots 139$, $m = 96 \dots 291 \leq 300$), with the one arithmetic input $\kappa = 0.038821$ *verified* at every jump point of $\psi(x)/x$ on the von-Mangoldt table in $[100, 3.2 \times 10^5]$ (Chebyshev 1852 / Rosser–Schoenfeld 1962, reproduced to 4.2×10^{-7}), nothing cited from the sandbox; the companion to v554, which certified what the sixteen-form *pairs against* — this module certifies the *price structure* of that pairing. Scope fence: per-instance identities and certified inequalities with the direction in the name — no fit, no D -exponent, no zone-uniform statement; the T163 h -exponents ($P_{\text{aff}} \sim h^{3.05}$, $P_{\text{cross}} \sim h^{1.91}$, the TV exponent $\sim h^{2.00}$) are sandbox fits and are *not* consumed; finite Λ -sums are allowed and used, *no RH statement* is made ($\frac{1}{2}$ appears in exactly one role: as the strength of a classical statement a required depth is compared against); the open terms after T163 (R-E the successor with both arms prime-free; R-B''' the h -uniform positivity margin; R-D a fifth R1'' device) stay open and typed open; each statement carries at least one mutation control that must fail loudly.
- **(1) The exchange law and the crossing criterion (T163, R1.2) [E].** $\delta_{\text{bnd}}(x) = \frac{1}{2} + \log(2\kappa g_{16} \text{TV}(x)/P(x))/\log X$ is an *identity* at all 612 grid points of the declared Fejér knob (50 geometric σ on $[1, 4096]$ plus ∞ , 12 windows; 5.1×10^{-16} relative, admissibility $Q(x) > 0$ everywhere), and the crossing criterion $\delta_{\text{bnd}} < \frac{1}{2} \iff P > 2\kappa g_{16} \text{TV}$ holds as an exact equivalence at every point — price and demand are two coordinates of *one* object. Mutation: the wrong constant moves the law by 6.5×10^{-2} –3.4.
- **(2) The total-variation floor (T163, R2.2) [E].** (T1) $w_0(x) = \|a(x)\|^2$ (4.9×10^{-16}); (T2) $\text{TV}(x) \geq |w_0(x)|$ by telescoping with $w_M = 0$; (T3) $x_1 = 1$ forces $\|a\|^2 \geq 1/\mu_1^P$, hence $\mu_1^P \text{TV}(x) = 5.00$ –28.84 ≥ 1 on all 708 trial vectors built, against the closed floor $1/\mu_1^P = 1/(4 \sin^2(\pi/N)) = 943.6$ –8609.6 $\sim h^2$; (T4) every sub- $\frac{1}{2}$ grid point pays $P > 2\kappa g_{16}/\mu_1^P = 15.4$ –142.8 (all 54 respect it) — a flat-price sub- $\frac{1}{2}$ demand is impossible in the parity sector on this surface: **R-C''' is closed negatively, by an inequality.** Negative control: the *inadmissible* vector $0.01x^*$ undercuts the floor (2.5 – 2.9×10^{-3}) and is recognised — the floor is a property of the normalisation meeting the smallest parity eigenvalue (Kac–Murdock–Szegő 1953).
- **(3) The chain-derived price axis (T163, R1.0) [E].** $\sigma = 1$ gives $x = e_1$ exactly with $P = g_{16}/g_1$ (the $K = 1$ rung of the T158 Cholesky ladder, the T157 route-(0) certificate; 4.1×10^{-16}), $\sigma = \infty$ gives $g_{16}Q(x^*) = 1$ (the $K = 16$ top rung; 1.2×10^{-12}); the ladder carries all 16 terms strictly positive with monotone partial sums, the knob is monotone in both coordinates on every window (the knob curve *is* the Pareto front). Mutation: a corrupted sixteen-block makes the Cholesky *refuse* on 12/12.
- **(4) The Mellin cell moments and the Abel step (T162, C2/C5) [E].** The k -th Mellin rung $\sum_d w_d C_d(-(2k + \frac{1}{2}))$ with $C_d(s)$ the closed tent integral (Mellin 1896) agrees with an independent per-cell Gauss–Legendre quadrature to 2.8×10^{-13} on every rung $k = 1 \dots 4$ (shifted tent centres break by $\geq 1.3 \times 10^{-2}$); the boundary-free Abel identities hold at levels $k = 1 \dots 3$ (8.3×10^{-17} ; Abel 1826), the dropped-boundary level-1 form agrees because the gauge identity kills the boundary term exactly, the optimal level is *one* for T162’s closed reason ($32\pi/\alpha = 40.6$ –59.4 > 1 , measured ratio 30.8–69.1), and a gauge violation breaks by its closed prediction $v_0 c_0 M$ to 1.2×10^{-15} (the positive control).
- **(5) The Lerch/Frullani log-moment (T162, R-A') [E].** $L = \sum_d \Psi_d w_d$ agrees on three routes per window: direct; double-Abel *with* the Wronskian boundary term (2.8×10^{-14} ; dropping it breaks by 2.2×10^{-4} – 1.3×10^{-2}); the Lerch/Frullani integral with the $d = 1$ term peeled closed (1.8×10^{-15}) — the peel constant $2 \log 2$ reproduced to 2.2×10^{-16} and $\Psi_1 = -\log 2$ exactly (Frullani 1828 / Lerch 1887 / Clausen 1832). Plus the monotone no-go staircase (damage

1.00 $\rightarrow$ 3.49 $\rightarrow$ 10.81 $\rightarrow$ 24.98 over $\nu = 4/2/1/0.5$, exact null control) and exact Dirichlet/parity controls.

- **Prime-front diary T163** (`pareto_front_probe.py`, contract `PARETO.FRONT`, 32/32, 1.9 s, 28 log-spaced prime-power zones $h = 142 \dots 1445$ with declared caps, 27 windows inside the cond horizon, verdict **FRONT-RESISTS**, sandbox). The survey of the Pareto front, and the front resists *as a theorem*: the price axis is chain-derived ($P_{\text{aff}} = g_{16}B_{11} \sim h^{+3.049}$, the T157 route-(0) certificate), the Fejér knob has both endpoints in the chain and is measured monotone in both coordinates (the knob curve *is* the front), no flat price crosses the yardstick (0/27 at caps 1.25/2/10 and every flat rung tier; only the full P_{aff} reaches 27/27), the crossing price $P_{\text{cross}} \sim h^{+1.906}$ sits at 0.0066–0.2047 of P_{aff} — 5–152 $\times$ strictly inside the already-accepted certificate, margin widening — and the price anatomy is an *identity*: $\delta_{\text{bnd}} = \frac{1}{2} + \log(2\kappa g_{16}TV/P)/\log X$ exactly at all 27×50 grid points, the crossing exponent decomposing additively ($TV + 2.013$, $g_{16} - 0.061$). The four-line theorem (T1–T4) gives every admissible trial vector the total-variation floor $TV \geq 1/\mu_1^P \sim h^2$ (verified on all 1674 built, slack 5.0–23.2), so the crossing price is bounded below by a quantity growing like h^2 : the $h^{2.86}$ of T162, the $h^{1.91}$ of the crossing and T161’s granularity are *all* the reciprocal smallest parity eigenvalue — **the spectral gap of the parity Laplacian meeting the entry normalisation $x_1 = 1$: it was never in the primes**. The mode sweep $K = 16 \rightarrow 64$ confirms it from the other side (price dividend, worse demand, TV exponent unmoved at $h^{+1.81}$); R-B’’ reduces to an h -uniformity question (the chain never needed the sign: duality plus an evaluated number, headroom $\geq 10^{14.9}$); R-D is a type mismatch (operator smoothing degrades the floor by the same h^2). Balance 11/1/4/10, zero fit rows. T164 (`sector_change_probe.py`), running, tests the successor R-E. NOT RH evidence; no marker moves.
- **Docs + website sync**. `tfpt_prime_front` gains the T163 subsection with the exchange-law display, the T1–T4 floor theorem as the key result, the chain-derived price axis, the monotone no-go staircase and the After-T163 keybox (R-E/R-B’’/R-D, T164 running), the v555 subsection in the verified layer (now twenty-one modules), the phase-2 section retitled T126–T163, the T163 row in the probe index and the updated counters (163 probes, 4267 checks); `tfpt_1`, `tfpt_3` and `tfpt_research_contracts` gain the v555 companion blocks; `experiments/next.txt` gains the Teil-163 entry; `website/lib/primeFront.ts` gains the T163 and v555 feed entries; the prime-front status surfaces move to Teile 11–163 / 4267 checks / 21 modules (v535–v555); suite counter 548 $\rightarrow$ 549 scripts. T164 (`sector_change_probe.py`) is running at the sector-change successor. Ledger row `PRIME.PARETO.TV.01 [E]`; **no marker of any pre-existing contract moves**.

2026-07-29 (IX) (v554 — the sampling/harmonics identities of phase 2 promoted; prime-front diary T161 (the circularity triage: the hardness sits in the split, not in the primes, CLOSURE-RESISTS) + paper + website sync; NO marker moves)

- **New module v554 (PRIME.SAMPLING.HARM.01)**. Promotion of the closed theorem cores of the discovery parts T160 (`pairing_probe.py`) and T161 (`classical_closure_probe.py`) — 21 checks, ~ 0.5 s, everything recomputed on v551–v553’s declared surface (the 12 deepest prime-power zones admitting a frame-A window inside the cap, $n = 29 \dots 139$, $m = 96 \dots 291 \leq 300$) plus a declared Λ -battery of six log-spaced cut-offs $X = 10^3 \dots 3.2 \times 10^5$ for the PNT item (finite von-Mangoldt sums only, no matrix anywhere), nothing cited from the sandbox; the companion to v553, which certified the algebra of the sixteen-form — this module certifies *what that form pairs against*, and it closes no open term. Scope fence: per-instance identities and certified inequalities with the direction in the name — no fit, no D -exponent, no zone-uniform statement; finite Λ -sums are allowed and used, *no RH statement* is made, and the δ triage of T161 (required cancellation depth against RH strength) is a documentation item, *not* a module claim; the open terms after T161 (R-A’ the prime-free log-moment; R-B’ the m -free 16×16

Gram fraction bound; R-C' one split of the pairing with $\delta_{\text{eff}} < \frac{1}{2}$; R-D a fifth R1'' device) stay open and typed open; each statement carries at least one mutation control that must fail loudly.

- **(1) The sampling identity (T160, P2) [E].** The atom half of the pairing equals $-\frac{1}{2} \sum_{n \leq X} (2\Lambda(n)/\sqrt{n}) \hat{w}(\log n)$ (plus one reflected term below the grid; $\hat{w}$ the linear interpolant of the lag weights), exact to 5.6×10^{-15} of the absolute atom scale on 12/12 windows: identically a finite combination of sums $\sum_n \Lambda(n) n^{-1/2} \cos(t \log n)$ at 32 explicit frequencies. Mutation: a one-index grid shift breaks by 5.1×10^{-5} – 3.1×10^{-3} .
- **(2) The moment laws and the TV theorem (T160, P1/P4) [E].** $m_0 = 0$ (1.0×10^{-16} of $\|w\|_1$), $m_1 = -[S_0^2 + 2 \sum_j P_j^2]$ (9.2×10^{-16}) and $m_2 = -[2S_1 - (M-1)S_0]^2$ (3.4×10^{-14} , a perfect square), both strictly negative on every window; U3 as a theorem with *checked* hypotheses ($c^{\text{arch}} \leq 0$ and monotone on $d \geq 1$, 12/12): $\text{TV}(c^{\text{arch}}) = 3.9817\text{--}4.8991 \leq |c_0| + 2 \sup < 6$, closed and window-independent. Mutations: a one-index prefix shift breaks m_1 by $\geq 1.25 \times 10^{-2}$, an $(M-2)$ mis-normalisation breaks m_2 by $\geq 6.1 \times 10^{-2}$, the full atom-including kernel violates the monotone hypothesis on 12/12.
- **(3) The harmonic-frequency theorem and the PNT main term (T161, P3) [E].** $t_j(2\alpha) = 2\pi j$ *exactly* (2.8×10^{-14}) on every window and every battery cut-off — the 32 frequencies of the sampling identity are precisely the Fourier harmonics of the log-window $[0, 2\alpha]$; at those frequencies $\theta = 2\pi j$ collapses the partial-summation main term to the closed, parameter-free prediction $(\sqrt{X} - 1)/(\frac{1}{4} + t^2)$ (de la Vallée Poussin 1896; the Mellin factor of $x^{-1/2}$), matching the finite sums to 0.0007–0.097 of the trivial mass against the declared cap 0.12, the subtraction reducing the aggregate residual to $0.008\text{--}0.466 \leq 0.5$ on every cut-off. Mutations: a wrong Mellin pole worsens the aggregate residual by $\times 1.8\text{--}\times 95.8$; a mass-matched *uniform* fake measure misses by 0.23–0.51 — the agreement is a property of the von-Mangoldt measure, not of any measure with the same mass.
- **(4) The head split and the scale-free Bernstein rate (T161, P1) [E].** $c_d^{\text{arch}} = \Psi_d + D\hat{G}(dD, D)$ with $\Psi_d = -\frac{1}{2}[(d+1)\log(d+1) - 2d\log d + (d-1)\log(d-1)]$ closed, D -free and m -free (the triangle-smeared simple pole; the $\log D$ cancels identically), exact to 3.2×10^{-16} of $\sup |c^{\text{arch}}|$ at *every* lag of every window, the two Ψ representations agreeing to 2.9×10^{-14} ; and $\rho^* = (3 + \sqrt{5})/2 = 2.618034$: the root of $x^2 - 3x + 1$, returned exactly by the $D \rightarrow 0$ limit of the peeled interval $[0.4\alpha, 2\alpha]$ and invariant under $\alpha \times 10$ — scale-free, every window's $\rho(D) = 2.588\text{--}2.608$ below it (Bernstein 1912). Mutations: dropping Ψ misses c^{arch} by 0.99–1.00; the wrong interval ratio moves the limit to 3.0.
- **(5) The off-diagonal fraction bound and the sign refutation (T161, P2) [E].** The gauge identity licenses one boundary-free Abel step, $Q^{\text{arch}} = \sum_{k,l} a_k a_l \sum_{d \geq 1} (\Delta c^{\text{arch}})_d R_{kl}^1(d)$ exactly (2.0×10^{-13}), and the certified per-window inequality is $|\text{off-diagonal block}| \leq \frac{1}{4} |Q^{\text{arch}}|$ (measured 0.171–0.212 on 12/12) — with the *refuted* sign law wired as the negative control: the arch half is negative while its off-diagonal block is positive on 12/12, and 176/240 off-diagonal pairs violate the per-pair form on every window — nothing single-signed is promoted. Mutation: a one-index R -kernel shift breaks by $\geq 6.8 \times 10^{-5}$. Stress: the head split misses the T145 no-go reconstruction by 2.39; the Dirichlet cosine-sum identity (including the degenerate branch), the KMS eigenpairs and $\text{odd_toeplitz}(c^L) = L_P$ (zero tolerance) are exact.
- **Prime-front diary T161 (classical_closure_probe.py, contract CLASSICAL.CLOSURE, 35/35, 1.2 s, 19 log-spaced prime-power zones $h = 50 \dots 1445$, verdict CLOSURE-RESISTS, triage verdict NEEDS-BEYOND-RH-STRENGTH, sandbox).** The two classical rests plus the circularity triage, and the triage returns its most consequential answer: *the chain is not circular*. R-A closes m -free — $A = D\hat{A}$ exactly, only the $1/s$ head binds, the scale-free Bernstein rate $\rho^* = (3 + \sqrt{5})/2$, the closed head split (no peeling), and an explicit degree schedule $K(h) = O(\log h)$ (a *fixed* degree is refuted with a number; the residual is the prime-free log-moment, outside the polynomial ladder). R-B is refuted in all four readings

(3168/4320 pairs; the aggregate by *sign*) and replaced by the certified fraction bound $0.1035\text{--}0.1713 \leq \frac{1}{4}$, flat. The triage: the 32 frequencies are exactly the Fourier harmonics of the log-window (theorem), the measured cancellation is fully the PNT main term, and the required depth is $\delta = 1.1482\text{--}1.8809$ against RH strength $\frac{1}{2}$ — in absolute terms $0.012\text{--}0.31$ of the last term of the sum, below the boundary term of every partial summation, so no strengthening of the $\psi(x) - x$ input reaches it: the chain needs *more* than RH-strength input would supply, which localises the h^2 in the *split* rather than in the primes; a re-split moves the demand to $\delta_{\text{eff}} = 0.9839\text{--}1.3767$ — it moves, but stays above $\frac{1}{2}$ on 18/18. Balance 20/10/4/9/3. T162 (`third_split_probe.py`), running, searches for one split with $\delta_{\text{eff}} < \frac{1}{2}$. NOT RH evidence; no marker moves.

- **Docs + website sync.** `tfpt_prime_front` gains the T161 subsection with the δ table, the head-split display and the After-T161 keybox, the v554 subsection in the verified layer (now twenty modules), the phase-2 section retitled T126–T161, the T161 row in the probe index and the updated counters (161 probes, 4205 checks); the big-picture section states the split-design reading soberly; `tfpt_1`, `tfpt_3` and `tfpt_research_contracts` gain the v554 companion blocks; `experiments/next.txt` gains the Teil-161 entry; `website/lib/primeFront.ts` gains the T161 and v554 feed entries; the prime-front status surfaces move to Teile 11–161 / 4205 checks / 20 modules (v535–v554); suite counter $547 \rightarrow 548$ scripts. T162 (`third_split_probe.py`) is running at the third-split search. Ledger row PRIME.SAMPLING.HARM.01 [E]; **no marker of any pre-existing contract moves.**

2026-07-29 (VIII) (v553 — the exact-form identities of phase 2 promoted; prime-front diary T159 (the gauge identity and the Z-matrix law, cancellation is the weight, FORM-RESISTS) + paper + website sync; NO marker moves)

- **New module v553 (PRIME.EXACT.FORM.IDENT.01).** Promotion of the theorem cores of the discovery parts T158 (`schur_entry_probe.py`) and T159 (`exact_form_probe.py`) — 25 checks, ~ 0.2 s, everything recomputed on v551/v552's declared surface (the 12 deepest prime-power zones admitting a frame-A window inside the cap, $n = 29 \dots 139$, $m = 96 \dots 291 \leq 300$; no-go ladders $m = 48 \dots 288$ on *both* T145 forms; parity and Dirichlet controls at $m = 64, 128, 256$), nothing cited from the sandbox; the companion to v552, which certified the four angle instruments — this module certifies the *algebra of the sixteen-form itself*, and it closes neither open term. Scope fence: per-instance identities and certified inequalities with the direction in the name — no fit, no D -exponent, no zone-uniform statement, and explicitly *no statement for all D* (the two open terms after T159 — the one explicit pairing inequality for $R2''$, needing a correlation bound instead of sizes; a third device for the atom off-band block for $R1''$ — stay open and typed open); each statement carries at least one mutation control that must fail loudly.
- **(1) The Thomson dual form and the positive Cholesky ladder (T158, P1) [E].** $s = (B^{-1})_{11} = \max_x (2x_1 - x^\top Bx)$ (Maz'ya 1985 / Miclo 1999) with the direction *executed*, not asserted: 8 random trial vectors per window never exceed s , so every trial is an upper bound on $1/s$ — exactly the variational structure Cauchy–Schwarz lacks (v552 wired that refutation as a control; here the direction itself is the check). The ladder $g_K = \sum_{j \leq K} y_j^2$, $y = L^{-1}e_1$ from *one* Cholesky of the leading 16×16 block: all terms strictly positive, partial sums strictly monotone, $1/s \leq 1/g_{16} \leq 1/g_1 = B_{11}$ literally on 12/12, tight to $1.0642\text{--}1.1522$ against the declared cap 1.5 (T158 measured ≤ 1.2738 at $h = 254 \dots 1393$, sandbox); mutation: a 5% corruption of one off-diagonal entry destroys positive definiteness — the Cholesky *refuses* on 12/12.
- **(2) The two-dimensionality (T158, P2) [E].** $\text{span}\{t_1, A^{-1}Lpt_1\}$ attains s exactly ($g/s = 1$ to 9.0×10^{-13} on 12/12) for the theorem reason $Lpt_1 = \mu_1^P t_1$ (KMS 1953, eigenpair residual 8.1×10^{-13}): the entry is a two-dimensional quantity the moment one Green column is granted. Negative controls: the two-sine span (no Green column) misses by 1.42–4.8, the corrupted Green

column (no solve) by $255-7.7 \times 10^3$.

- **(3) The gauge identity and the TmH signature (T159, P4/P7) [E].** The reflection-odd section $A_{rs} = c_{|r-s|} - c_{M-1-r-s}$ annihilates constant lag vectors *entrywise with zero tolerance* (odd_toeplitz(1) = 0 exactly — the mechanism in one line), hence the gauge identity $\sum_d w_d = 0$ holds to 1.1×10^{-14} of $\sup |w|$ for the per-window optimiser and 3 random sixteen-vectors: the form is *blind* to the lag mass of c , and the lag mass is exactly where the archimedean and atom halves of the sixteen-form are h^2 -sized and cancel. The premise — the Toeplitz-minus-Hankel signature $A_{r,s} - A_{r+1,s+1} = f(r+s)$ — holds to 1.4×10^{-16} . Mutations: a one-index Hankel shift breaks the identity by 2.7×10^{-7} – 4.2×10^{-5} ; the T145 form $R = aa^\top + \varepsilon I$ has signature defect 7.4×10^{-2} — not a parity section, the gauge identity is not even *defined* for it.
- **(4) The exact lag sum and the two closed scalars (T159, P2/P5) [E].** $x^\top B_{LL} x = \sum_d c_d w_d$ with $w_d = T_d - H_d$ against the direct assembly to 2.7×10^{-16} of the absolute scale $\sum_d |c_d w_d|$ — and the honest price *measured*: relative to the cancelled total the same identity holds only to 1.4×10^{-11} on this small surface (the sandbox at $h \leq 1293$ loses 4.0–8.1 digits; that depth *is* the h^2 obstruction). The two closed scalars: $w_0 = \sum_k x_k^2 / \mu_k^P$ (the $N^2/4\pi^2$ factor itself) to 4.2×10^{-16} and $2w_0 - w_1 = \|x\|^2$ to 7.4×10^{-16} (KMS 1953). Mutations: a 1% perturbation of the largest lag breaks the lag sum by 2.2×10^{-3} ; a one-index μ shift breaks w_0 by 0.60.
- **(5) The Z-matrix law and the Collatz–Wielandt floor (T159, U1/U2) [E].** B_{HH}^{arch} is a symmetric Z-matrix *raw* — every off-diagonal entry ≤ 0 with no tolerance on 12/12; the closed sign-based floor $\min_k (B_{HH}^{\text{arch}} \mathbf{1})_k = 0.9093\text{--}1.1284 \geq t = 0.25$ with the theorem direction verified per instance against the exact $\lambda_{\min}(B_{HH}^{\text{arch}}) = 0.9138\text{--}1.1432$ (Perron 1907 / Frobenius 1912 / Collatz 1942 / Wielandt 1950), beating the sign-free norm route by 0.69–8.8 on every window. The honest limit as content: the atom block obeys *no* sign law (0.44–0.53, a coin toss), the full block is not a Z-matrix and its row-sum floor is *negative* (–48.3... –0.79) against a positive exact bottom — admissible and vacuous, R1'' stays open. Mutation: the checkerboard similarity $S = \text{diag}((-1)^k)$ — an isometry, $\lambda_{\min}$ moves by 0 exactly — destroys the raw law (fraction 1.0000 $\rightarrow$ 0.494–0.498): the Z law is an entrywise fact, not a spectral one, and T159's checkerboard reading (S2) is refuted. Stress: the T145 no-go breaks on three axes of this module's structure; on the $c(l) = 1/(1+l)$ reconstruction the ladder theorem survives while $1/g_{16}$ explodes ($1187 \rightarrow 7.11 \times 10^4$) — the instrument reports the collapse instead of hiding it; parity: for $A = L_P$ the machinery returns $s = 1$ with every ladder partial sum constant in K ; Dirichlet controls exact.
- **Prime-front diary T159 (exact_form_probe.py, contract EXACT.FORM, 41/41, 2.9 s, 23 of 24 prime-power zones $h = 142 \dots 1293$, the sign surface on 18 windows $h = 142 \dots 963$, verdict FORM-RESISTS, sandbox).** The cancellation executed algebraically: seven machine-checked identities to 10^{-12} against the absolute scale (the cancellation eats 4.0–8.1 decimal digits, reported as a measurement), among them the closed 256-term Dirichlet-kernel form of the geometric weights and the *gauge identity* $\sum_d w_d = 0$ exactly — the form is blind to the lag mass, exactly where the h^2 halves live. The honest core answer is negative: the h^2 does *not* telescope away, it is the common *weight* of both halves (both grow $h^{+2.104}$), and four routes are closed with exponents — T158's own fixed sixteen-vector refuted at $h^{+3.510}$, one sine at $h^{+3.066}$, the preregistered ansatz family at $h^{+3.001}$, Abel- $\ell^1 \times \sup$ at every rung (best $h^{+3.604}$). The structural win: B_{HH}^{arch} is exactly a symmetric Z-matrix with a closed sign-based Collatz–Wielandt floor 0.819–1.165 comfortably above $t = 0.25$ — but the atom block obeys no sign law, and the full-block criterion is vacuous. Balance 6/3/4/1 $\rightarrow$ 13 theorem / 6 cert-unif / 4 cert-window / 1 measured; a numerical horizon declared as its own measurement (cond(B_{LL}) $> 10^{12}$ from $h = 1292$); one fully explicit pairing inequality remains, under attack via correlation structure in T160 (pairing_probe.py), running. NOT RH evidence; no marker moves.
- **Docs + website sync.** tfpt_prime_front gains the T159 subsection with the After-T159

keybox, the v553 subsection in the verified layer (now nineteen modules), the phase-2 section retitled T126–T159, the T159 row in the probe index and the updated counters (159 probes, 4124 checks); `tfpt_1`, `tfpt_3` and `tfpt_research_contracts` gain the v553 companion blocks; `experiments/next.txt` gains the Teil-159 entry; `website/lib/primeFront.ts` gains the T159 and v553 feed entries; the prime-front status surfaces move to Teile 11–159 / 4124 checks / 19 modules (v535–v553); suite counter 546 $\rightarrow$ 547 scripts. T160 (`pairing_probe.py`) is running at the pairing bound. Ledger row PRIME.EXACT.FORM.IDENT.01 [E]; **no marker of any pre-existing contract moves.**

2026-07-29 (VII) (v552 — the four fixed-size angle instruments of phase 2 promoted; prime-front diary T157 (the confinement theorem and the one-entry reduction, ANGLES-RESIST) + paper + website sync; NO marker moves)

- **New module v552 (PRIME.ANGLE.INSTR.01).** Promotion of the instrument cores of the discovery parts T155 (`bottom_floor_probe.py`) and T157 (`angle_floor_probe.py`) — 18 checks, ~ 0.4 s, everything recomputed on v551’s declared surface (the 12 deepest prime-power zones admitting a frame-A window inside the cap, $n = 29 \dots 139$, $m = 96 \dots 291 \leq 300$; a no-go size ladder $m = 48 \dots 288$; parity and Dirichlet controls at $m = 64, 128, 256$), nothing cited from the sandbox; the companion to v551, which certified the fixed-size ceiling step — this module certifies the four fixed-size *instruments* the angle campaign produced, and none of them closes an angle. Scope fence: per-instance identities and certified inequalities with the direction in the name — no fit, no D -exponent, no zone-uniform statement, and explicitly *no statement for all D* (the two open terms after T157 — an m -free lower bound on $\hat{g}_1^2$, equivalently an m -free upper bound on the one Schur diagonal entry $1/s$; and an m -free $R1''$ domination with a non-shrinking margin — stay open and typed open); each statement carries at least one mutation control that must fail loudly.
- **(1) The complement-floor certificate (T155) [E].** $\min_{v \perp W} v^\top L_P v \geq \mu_{13}^P - \lambda_{\max}(M^{1/2}(I - GG^\top)M^{1/2})$ with $M = \text{diag}(\mu_{13}^P - \mu_k^P)$ and $G = T_{12}Q_W$ — an identity plus *one* certified Rayleigh bound on the high block, a theorem for every m and every subspace, direction checked: the certificate never exceeds the exact size- m complement bottom (12/12) and agrees to $1 - \text{ratio} \leq 1.01 \times 10^{-3}$ against the declared cap 2×10^{-3} on this small surface (T155 measured $\leq 2.2 \times 10^{-7}$ at $h = 142 \dots 1293$, sandbox). Exactness controls both ways: $W = \text{span}\{t_1..t_8\}$ returns μ_9^P and the *worthless* configuration $W = \text{span}\{t_2..t_{13}\}$ returns μ_1^P , both to 2.0×10^{-11} — the instrument reports its own worthlessness; mutation: one corrupted overlap row moves the certificate by ≥ 0.549 , only downward.
- **(2) The sine-block confinement (T157) [E].** From the certified pencil floor $A \succeq tL_P$ and the certified ladder ceiling $\lambda_1 \leq S\mu_1^P$ *alone*, $\|\gamma_H\|^2 \leq \lambda_1/(t\mu_{17}^P) \leq (S/t)/\rho_{17} = 0.0153\text{--}0.0245 < 1$ on 12/12: the bottom eigenvector lives 97.5–98.5% inside the first 16 parity sines by a *per-instance theorem* (measured tail $6.7 \times 10^{-6}\text{--}3.0 \times 10^{-5}$; T146’s measured “98 per cent” replaced by one line). Negative control: the pencil ceiling κ in place of the ladder S makes the bound vacuous ($17.6\text{--}477 > 1$ on 12/12); mutation: the inflated floor κL_P is refuted at $e_1(A)$ by $3.3 \times 10^3\text{--}1.0 \times 10^5$.
- **(3) The Schur-entry identity (T157) [E].** $s = \mu_1^P t_1^\top A^{-1} t_1 = (B^{-1})_{11}$ exactly (1.1×10^{-11}) and $(B^{-1})_{LL} S_L = I$ to 5.8×10^{-11} with $S_L = B_{LL} - B_{LH} B_{HH}^{-1} B_{HL}$ the *same* fixed-size 16×16 Schur complement the chain already forms: $1/s = 4.0460\text{--}5.8962$ is an $O(1)$ number carried by *one* entry, so T156’s $R2''$ loss ceiling $r \leq 1/(Ls)$ is a statement about one number. Negative control (T157’s refutation wired as a check): the inversion-free Cauchy–Schwarz ceiling is valid and useless, off by $250\text{--}7.27 \times 10^3$ — the cancellation in $b^\top B_{HH}^{-1} b$ is nearly complete and Cauchy–Schwarz cannot see it; mutation: a one-index shift breaks the identity by 1.55–2.15.
- **(4) The adaptive Lipschitz ceiling (T157) [E].** Interval bisection with the *local* Lipschitz constant certifies $\inf f^{\text{arch}}/(4 \sin^2(\theta/2)) \geq 0.25$ on 12/12 windows in 519–1201 symbol evaluations

(certified floor 0.2505–0.3062, never above the fine-grid minimum); the global constant is documented insufficient (a uniform grid would need up to $61.4\times$ more points); mutation: fed a target above the true grid minimum the certificate *refuses* on 12/12. Stress: on the T145 no-go family the Schur floor survives ($t = 0.05$) while the confinement goes vacuous ($\times 52.0$) and $(S_L)_{11}$ explodes ($\times 60.0$) against the flat real band; parity control exact to 4.9×10^{-14} ; the Dirichlet residual hits the predicted $2/\sqrt{N}$ to 7.4×10^{-5} .

- **Prime-front diary T157** (`angle_floor_probe.py`, `contract ANGLE.FLOOR`, 32/32, 3.9 s, 16 prime-power windows $h = 142 \dots 1293$, **the alignment surface on 12** ($h = 50 \dots 1077$), **verdict ANGLES-RESIST, sandbox**). Neither angle falls, but both change shape: the p_1 floor becomes a theorem times one measured fixed-size number — the sine-block confinement $\|\gamma_H\|^2 \leq (S/t)/\rho_{17} = 0.0165\text{--}0.0293$ proves $e_1(A)$ lives 97.1–98.4% inside the first sixteen parity sines, and the resolvent route pins $p_1 \geq \hat{g}_1^2(1 - \text{tail}) = 0.1968\text{--}0.3228$, 97.9% of the measurement (the classical Rayleigh angle bound is empty on 16/16, its block version empty at every J , the angle-free Cauchy–Schwarz route loses exactly the Kantorovich $P = 5.6 \times 10^2\text{--}1.0 \times 10^6$); the structural gem $1/s = (S_L)_{11} = 2.3359\text{--}6.2049$ flat makes the whole first term a bound on *one* diagonal entry of the 16×16 Schur complement the chain already forms (Cauchy–Schwarz off by $5.4 \times 10^2\text{--}5.2 \times 10^5$); the arch half is uniformly certified for the first time (executed adaptive Lipschitz ceiling, 12/12, cost $h^{0.85}$) with the two extremals at opposite ends of the band (the pointer: use the θ -growth, not the infimum at π); the alignment term stays a per-window domination (1.0003–1.0907, margin 7.3×10^{-4} , shrinking trend); balance 9 theorem / 2 cert-unif / 2 cert-window / 3 measured (all three now fixed-size in the statement); the no-go breaks on *five* axes. T158 (`schur_entry_probe.py`) is running at the cancellation-seeing bound. NOT RH evidence; no marker moves.
- **Docs + website sync.** `tfpt_prime_front` gains the T157 subsection with the After-T157 keybox, the v552 subsection in the verified layer (now eighteen modules), the phase-2 section retitled T126–T157, the T157 row in the probe index and the updated counters (157 probes, 4047 checks); `tfpt_1`, `tfpt_3` and `tfpt_research_contracts` gain the v552 companion blocks; `experiments/next.txt` gains the Teil-157 entry; `website/lib/primeFront.ts` gains the T157 and v552 feed entries; the prime-front status surfaces move to Teile 11–157 / 4047 checks / 18 modules; suite counter $545 \rightarrow 546$ scripts. T158 (`schur_entry_probe.py`) is running at the cancellation-seeing bound. Ledger row PRIME.ANGLE.INSTR.01 [E]; **no marker of any pre-existing contract moves.**

2026-07-29 (VI) (v551 — the fixed-size Ritz ceiling certificate of phase 2 promoted; prime-front diary T154 (the ceiling closes exactly at fixed size, ALIGN-RESISTS) + paper + website sync; NO marker moves)

- **New module v551 (PRIME.RITZ.CEIL.01).** Promotion of the certificate core of the discovery part T154 (`green_align_probe.py`) — 16 checks, ~ 0.4 s, everything recomputed on small frame-A windows, nothing cited from the sandbox; the companion to v550, which certified the bottom ladder $\lambda_k(A) \leq S\mu_k^P$ by per-window $\text{LDL}^\top$ counts of *size* m — this module certifies the *fixed-size* replacement T154 found for the ceiling step. Scope fence: per-instance theorems with checked hypotheses and per-window *certified* inequalities — no fit, no D -exponent, no zone-uniform statement, and explicitly *no statement for all* D (the two open inputs after T154 — $R1'$, an m -free floor for $\lambda_{\min}(B_{HH})$ on the bulk parity block, and $R2'$, an m -free lower bound for the L_P floor on the complement of the eight bottom Ritz directions — stay open and typed open; every floor consumed is a per-window certificate of size m). Battery: the 12 *deepest* prime-power zones admitting a frame-A window inside the cap ($n = 29 \dots 139$, $m = 96 \dots 291 \leq 300$, $D = 7.248 \times 10^{-3} \dots 1.815 \times 10^{-2}$ — mirroring T154's own surface selection, declared rather than tuned: on the shallowest zones $n \leq 11$ more than one bottom direction leaves the sine block and the fixed-depth certificate is *not* claimed there), a no-go size ladder $m = 48 \dots 288$, parity controls at $m = 64, 128, 256$, and 3 Dirichlet control windows; each statement carries a

mutation control that must fail by $\geq 10^{-3}$.

- **(1) The direction lemma (T154) [E].** For orthonormal Q and $W = Q^T A Q$, $\lambda_k(A) \leq \theta_k$ for every $k \leq \dim$ — Ritz values are *upper* bounds for the eigenvalues of the *same index* (Courant–Fischer 1920 / Cauchy 1829), verified against the exact spectrum on the certificate subspace of every window and on 24 random subspaces (one-sided excess 0.0) — so the fixed-size ceiling needs *no* residual argument at all; Temple 1928 / Kato 1949 is a floor device and is used nowhere in the module. Negative control: the *reversed* reading (Ritz values as lower bounds) is recognised as false on 12/12 windows, θ_k overshooting λ_k by a factor ≥ 18.6 somewhere on every window.
- **(2) The sixteen-column certificate (T154) [E].** $\text{span}\{t_1..t_8\} + A^{-1}L_P \text{span}\{t_1..t_8\}$ has *fixed* dimension 16, independent of m (one Green step by Cholesky back-solves, no inverse formed), and its ceiling $K^F = \max_k \theta_k / \mu_k^P$ (8 completed Choleskys of matrices $\leq 8 \times 8$) equals 1.1019–1.5845 with $K^F \geq \max_k \lambda_k / \mu_k^P$ on every window *and* $|K^F / K_{\text{bot}} - 1| \leq 9.9 \times 10^{-7}$ against the declared cap 10^{-4} on 12/12, where K_{bot} is the inertia-certified true ladder constant (8 completed LDL^T counts of size m per window; count = direct spectral count on all 96 pairs): the fixed-size ceiling *attains* the truth, and the size- m counts are retired from the ceiling step (controls: the parity sines alone overshoot by 41.6–739 — T152/T153’s $O(m^2)$ overshoot reproduced at fixed size — and corrupting the Green columns breaks the attainment on 12/12).
- **(3) The one-direction anatomy (T154) [E] (angles measured).** The median of the seven aligned principal angles between the bottom eight of A and the bottom eight of L_P is 0.03 – 0.14° while the largest is 83.79 – 89.70° on every window (Björck–Golub 1973) — the misalignment is carried by *one* nearly orthogonal direction, and that single direction *is* the collapse price $\lambda_1(A)/(t\mu_1^P) = 4.408$ – 7.042 , recovered in full per window by one completed Cholesky of $A - \gamma I$ (size m , certified, not fixed size, labelled as such); control: $A = L_P$ through the same instrument returns $K_{\text{bot}} = K^F = 1$ and zero misalignment (deviations $< 10^{-5}$, the inertia ladder’s backoff step) with the price exactly $1/t$.
- **(4) The no-go discriminator (T154) [E].** On the T145 no-go reconstruction $c(l) = 1/(1+l)$ the odd section is positive definite and the Schur floor survives ($t = 0.05$ on all 4 sizes) but K_{bot} explodes ($\times 35.4$) and the sixteen-column ceiling explodes *with* it ($\times 57.5$) over $m = 48 \dots 288$ — the instrument does not report flatness where flatness is false and manufactures no closure; the Courant–Fischer direction is violated nowhere (16/16 positive-definite cases); the Dirichlet control (the Hankel half removed, arithmetic kept bit for bit) stops being positive definite — $\lambda_1 = -5.60 \dots -3.55$ certified on 3/3 — so no ceiling exists there: the reflection half is load-bearing for positivity.
- **Prime-front diary T154 (green_align_probe.py, contract GREEN.ALIGN, 29/29, 5.0 s, 12 prime-power windows $h = 50 \dots 1077$, verdict ALIGN-RESISTS, sandbox).** The ceiling half of T153’s R2 closes exactly at fixed size ($K^F = 1.1019$ – 1.9964 flat, agreement 5.17×10^{-7} on 12/12); the floor half is refuted at fixed size ($\|R\|^2/(\beta\lambda_1) = 6.3 \times 10^3$ – 5.6×10^9 , $x^{4.50}$) and recovered at full size (one Cholesky per window recovers the whole collapse price 4.408–7.985; per-window end to end 4.45×10^{-2} – 3.13×10^{-1} , inside the target band, while the m -free-in-shape number stays 1.01×10^{-2} – 3.92×10^{-2}); the obstruction is named (seven bottom directions agree to 0.15 – 1.35° median, *one* sits at 82.93 – 89.79°) and the missing fixed-size ingredient is priced (the L_P floor on the Ritz complement, arithmetic-free, flat 5.93 – $8.25 \mu_1^P$, worth 91–100% of the price); the Kato route to R1 fails by the same geometry (loss 1.97–121 attained 24.9 – 89.8° apart; the Hankel-reflection culprit refuted twice). Two open terms remain (R1’/R2’, both uniformity terms); T155 (bottom_floor_probe.py) is running at exactly those two floors. NOT RH evidence; no marker moves.
- **Docs + website sync.** tfpt_prime_front gains the T154 subsection with the After-T154 keybox, the v551 entry in the verified layer (now seventeen modules), the phase-2 section retitled T126–T154, the T154 row in the probe index and the updated counters (154 probes,

3951 checks); `tfpt_1`, `tfpt_3` and `tfpt_research_contracts` gain the v551 companion blocks; `experiments/next.txt` gains the Teil-154 entry; `website/lib/primeFront.ts` gains the T154 and v551 feed entries; the prime-front status surfaces move to Teile 11–154 / 3951 checks / 17 modules; suite counter 544 $\rightarrow$ 545 scripts. T155 (`bottom_floor_probe.py`) is running at the two uniformity floors. Ledger row PRIME.RITZ.CEIL.01 [E]; **no marker of any pre-existing contract moves.**

2026-07-29 (V) (v550 — the odd-sector identities of phase 2 promoted; prime-front diary T151 (the one inequality closes by rerouting off the ladder, ODD-CARRIES) + paper + website sync; NO marker moves)

- **New module v550 (PRIME.ODD.SECTOR.IDENT.01).** Promotion of the identity/certificate core of the discovery part T151 (`odd_ladder_probe.py`) — 19 checks, ~ 0.2 s, everything recomputed on small frame-A windows, nothing cited from the sandbox; the companion to v549, which certified the parity compression and the quadratic ladder certificate $\nu_k^P \leq Ck^2$ — this module certifies the *reroute* T151 found: off the ν ladder, through the pencil against the parity Laplacian and one elementary Sobolev step, to a per-mode bound *linear* in k . Scope fence: identities, per-instance theorems with checked hypotheses and per-window *certified* inequalities — no fit, no D -exponent, no zone-uniform statement, and explicitly *no statement for all D* (the one open input after T151 — the m -freeness of the bottom pencil ratio $R = K_{\text{bot}}/\kappa$ for the odd parity sector of a sign-changing-symbol Toeplitz section — stays open and typed open). Battery: 12 frame-A windows ($n = 4 \dots 139$, $m = 26 \dots 285 \leq 300$, $D = 7.578 \times 10^{-3} \dots 2.789 \times 10^{-2}$), parity control models at $m = 241$ (the certified $(1, 1)$ pencil) and $m = 2001$ (the π price), and a no-go size ladder $m = 64 \dots 256$; each statement carries a mutation control that must fail by $\geq 10^{-3}$.
- **(1) The grid step-over and the honest negative (T151) [E].** The parity sines live on the *shifted* grid $\theta_k = 2\pi k/N$, $N = 2m+1$, which never contains $\theta = 0$, with $\mu_k^P = 2 - 2\cos\theta_k$ *exactly* (2.2×10^{-16} ; eigen-residual 2.3×10^{-13}); the symbol has $f(0) = -47.6 \dots -6.3 < 0$ (T148's honest negative, re-read and never re-derived) with a nonempty negative window $[0, \theta_c)$, and $\theta_c/\theta_1 = 0.371\text{--}0.485 \leq 0.9$ on *every* window: the odd grid *steps over* the negative window — odd-sector positivity is a grid fact, stepped over rather than cancelled. The honest negative beside it, promoted as content (T150's rest item 3 answered *negatively*): the symbol-only pencil floor $\kappa_{\text{sym}}(1 - \rho)$ is vacuous ($\rho \geq 1$) on 12/12 windows and the symbol moves by 0.45–3.27 relative across *one* mode spacing — no pointwise symbol statement is admissible at the bottom mode's resolution: the local model is a *matrix* statement, not a symbol statement (controls: the Dirichlet corner breaks the eigenpairs at 1.0, a one-index shift misses by 6.5×10^{-3}).
- **(2) The certified bottom ladder (T151) [E].** $\lambda_k(A) \leq S\mu_k^P$ for $k \leq 8$ is certified per window by 8 completed LDL^T inertia counts (Sylvester 1852; Bunch–Kaufman 1977 — a certificate, never a sorted list), $S = 1.1019\text{--}6.4725$: the odd sector's bottom spectrum *is* the parity-Laplacian ladder up to a printed $O(1)$ factor — order 2 in k , with no trace of $f(0) < 0$ in it (the Rayleigh floor $L_P \geq \mu_1^P I$ absorbs it); the count equals the direct spectral count on all 96 (window, k) pairs (control: $S \times 10^{-3}$ certifies no eigenvalue below it anywhere).
- **(3) The discrete Sobolev step and the π price (T151) [E].** $\|\nabla\psi\|_2^2 = \langle\psi, L_0\psi\rangle - \psi_{\text{last}}^2$ exactly (7.6×10^{-15}), $\|\nabla\psi\|_2^2 \leq \langle\psi, L_P\psi\rangle$, and $\|\psi\|_\infty^2 \leq 2\|\psi\|_2\|\nabla\psi\|_2$ on the true window modes, the parity sines and random unit vectors — elementary, licensed by the odd sector's virtual node $\psi_{-1} = 0$ (Hardy–Littlewood–Pólya 1934 / Agmon 1965 the continuum address); calibration: on the exact parity model the pencil is $(1, 1)$ (certified $|\kappa - 1| = 1.1 \times 10^{-12}$ at $m = 241$) and the Sobolev per-mode price is π to 5.1×10^{-8} at $m = 2001$ — the honest, m -free cost of leaving the ℓ^2 world (controls: dropping the boundary term breaks the identity at 4.8×10^{-2} , the Neumann energy undercounts a first-node vector by 0.50).
- **(4) The closed archimedean minimum (T151; T150's rest item 2 closed and attained)**

[E]. The archimedean lag kernel has two shape properties, checked per window and never assumed — $c_i^{\text{arch}} < 0$ for $i \geq 1$ and c_i^{arch} non-decreasing on $i \geq 1$ — and given those, $\min_r \Lambda_r^{\text{arch}} = c_0^{\text{arch}} - c_{M-1}^{\text{arch}}$ *exactly* (max rel 0.0; value 2.1719–3.4674), attained at $r = 0$: a closed two-term functional of the smooth kernel, no matrix, no eigenvector, no loss (control: the full atom-including kernel violates the monotone shape on every window and the closed formula misses its minimum by $\geq 8.7 \times 10^{-2}$).

- **(5) The linear per-mode bound and the no-go discriminator (T151) [E].** With $\kappa = 0.1939\text{--}0.3599$ the certified pencil floor (*one* completed Cholesky of $A - \kappa L_P$ per window, the floating-point floor carried as fl/μ_1^P ; the direction re-read on the actual bottom eigenvalue) and $K_{\text{bot}} = S$ from item (2), the chain $b_k := 2m\sqrt{K_{\text{bot}}\mu_k^P/\kappa} \leq C_S k$ holds with $C_S = 12.081\text{--}26.953 \leq 2\pi\sqrt{K_{\text{bot}}/\kappa}$ on the bottom 8 modes of every window — *linear* in k where the quadratic ν ladder grew, every m -power cancelled, nothing additive anywhere (the $\Theta(D^3)$ bottom that killed the Weyl / Bauer–Fike / Davis–Kahan route never enters) — and the bound dominates the truth $m\|\psi_k\|_\infty^2$ and the parity Dirichlet energy on every read mode; the bottom pencil ratio $R = K_{\text{bot}}/\kappa = 3.7362\text{--}18.6607$ is the *one* scalar the chain still owes, printed per window and typed open in m . The discriminator: on the T145 no-go form the ratio *explodes* on the size ladder ($1.686 \times 10^3 \rightarrow 2.667 \times 10^4$, factor 15.8 over $m = 64 \dots 256$) while the exact parity model holds $R = 1$ to 1.1×10^{-12} — a route that did not fail there would prove a false statement (controls: the ladder $\times 10^{-3}$ fails against the true sups, the inflated floor 1.5κ makes the Cholesky *refuse* on 12/12).
- **Fences and status.** Per instance on small windows only — a finite list of certified window inequalities with an explicit maximum; nothing uniform in the zone index or in D ; the symbol-only route stays certified vacuous; TV(log Λ) stays withdrawn as a hypothesis (T149), σ_{tot} stays retired as a route (T148); every T151 exponent is a fit that stays in the sandbox. Kac–Murdock–Szegő 1953, Widom 1958 / Basor–Ehrhardt 2009 / Böttcher–Silbermann (the address of the symbol question — the computed answer is that the pointwise symbol language does *not* extend to the bottom mode), Weyl 1912, Parlett, Hardy–Littlewood–Pólya 1934 / Agmon 1965, Sylvester 1852 / Bunch–Kaufman 1977, Rayleigh 1877 / Ritz 1909, Cauchy–Schwarz, Wilkinson 1968 / Higham 2002, Chebyshev 1852 named classical; Weil 1952 cited, never used as a criterion; zero-firewall AST-checked. Ledger row PRIME.ODD.SECTOR.IDENT.01 [E]; **no marker of any pre-existing contract moves**, and this is not RH evidence.
- **Diary, paper and website (T151, odd-carries).** The T151 probe (`odd_ladder_probe.py`, contract ODD.LADDER, 27/27, 43.4 s, 72 prime-power windows $m = 96 \dots 1491$) closes the one inequality by rerouting off the ladder: the odd grid steps over the symbol’s negative window ($\theta_c/\theta_1 = 0.328\text{--}0.407$ on 72/72), the bottom spectrum is certified against the parity Laplacian ($\lambda_k \leq S\mu_k^P$, $S = 1.1019\text{--}2.3870$), and the discrete Sobolev step yields the *linear* per-mode bound $b_k \leq C_S k$ with a *non-growing* constant ($C_S = 11.5137\text{--}19.5731$, trend $x^{0.020 \pm 0.007}$) where the quadratic ladder grew (13.81π at $x^{0.258}$); end to end moves to $2.01 \times 10^{-2}\text{--}3.52 \times 10^{-2}$ of the true gap (gain up to $3.18\times$), the bottleneck relocating from Q^* to Ψ . Two of T150’s three rest items settled: the minimum of the archimedean diagonal is closed *and attained exactly* ($\min_r \Lambda_r^{\text{arch}} = c_0^{\text{arch}} - c_{M-1}^{\text{arch}} = 2.5928\text{--}4.8981$, deviation 0.0), and the symbol route is a computed dead end (the local model is a matrix statement — the pointwise symbol language fails at the bottom mode’s resolution, margin vacuous on 72/72). One scalar remains a fit: the bottom pencil ratio $R = K_{\text{bot}}/\kappa = 3.3634\text{--}9.7108$ at $x^{0.037 \pm 0.015}$ — and the T145 no-go breaks exactly there ($x^{1.986}$). Verdict ODD-CARRIES: all six preregistered gates met, every layer typed (theorem / certified / elementary-verified), the one fit named. `experiments/next.txt` part T151 (series totals 151 probes / 3852 checks); `tfpt_prime_front.tex` gains the T151 subsection with the “After T151” keybox, the v550 entry in the verified layer (now sixteen modules), the phase-2 section retitled T126–T151 and the updated probe index; `tfpt_1`, `tfpt_3` and `tfpt_research_contracts` gain the v550 companion blocks; `website/lib/primeFront.ts` gains the T151 and v550 feed entries; suite counter $543 \rightarrow 544$ scripts. T152 (`pencil_ratio_probe.py`) is running at exactly

the remaining scalar — the m -freeness of the bottom pencil ratio — and is *not* part of this change.

2026-07-29 (IV) (v549 — the gauge/parity identities of phase 2 promoted; prime-front diary T150 (the parity mechanism named, ONE-TERM-MISSING) + paper + website sync; NO marker moves)

- **New module v549 (PRIME.GAUGE.PARITY.IDENT.01).** Promotion of the identity/certificate core of the discovery parts T149 (`weight_smoothing_probe.py`) and T150 (`mode_ladder_probe.py`) — 21 checks, ~ 0.3 s, everything recomputed on small frame-A windows, nothing cited from the sandbox; the companion to v548, which certified the factorisation $\Gamma = \sqrt{Q^*}S_w$ and the Liouville machinery in the Jacobi gauge — this module certifies the gauge *freedom* around that machinery and the parity *structure* underneath it. Scope fence: identities, per-instance theorems with checked hypotheses and per-window *certified* inequalities — no fit, no D -exponent, no zone-uniform statement, and explicitly *no statement for all D* (the one open input after T150 — an m -free constant C in the odd-parity-sector ladder $\nu_k \leq Ck^2$ for a sign-changing-symbol Toeplitz section — stays open and typed open). Battery: 12 frame-A windows ($n = 4 \dots 139$, $m = 26 \dots 285 \leq 300$, $D = 7.578 \times 10^{-3} \dots 2.789 \times 10^{-2}$), 48 gauge assemblies (Jacobi, const, moving-geometric-mean, and the arithmetic-free archimedean diagonal), the full-section parity items on the 6 windows with $M \leq 300$, and a parity control model at $m = 2001$ (vector operations only); each statement carries a mutation control that must fail by $\geq 10^{-3}$.
- **(1) The gauge freedom (T149) [E].** For *any* positive diagonal $\tilde{\Lambda}$ the whitening $\tilde{E} = \tilde{\Lambda}^{-1/2}A\tilde{\Lambda}^{-1/2}$ is an exact congruence, so $\lambda_{\min}(A) \geq \text{cert } \lambda_{\min}(\tilde{E}) \cdot \min_j \tilde{\Lambda}_j$ is a valid certified lower bound for every gauge — an identity plus one Rayleigh step — and the family maximum is valid too (verified on all 48 assemblies); the factorisation identity $\Gamma = \sqrt{Q^*}S_w$ holds *gauge-invariantly* (max rel 2.4×10^{-16}); the const gauge (the geometric mean of the Jacobi diagonal) has $\text{TV}(\log \tilde{\Lambda}) = 0$ *exactly* on every window — T149’s elimination, not reduction, of T148’s blocking scalar — with the certified entrywise sandwich $\sigma = c_2/c_1 = 1.3868\text{--}2.5805$ (controls: a 1% Q^* perturbation breaks the identity at 4.99×10^{-3} , and on the shifted indefinite form $A - 1.05\lambda_{\min}I$ the completed-Cholesky floor *refuses* on 12/12 windows).
- **(2) The two-regime discriminator (T149, the refutation as a check) [E].** The flutter-smoothing gauge (moving geometric mean, preregistered half-width $m/16$) removes $\text{TV}(\log \Lambda)$ by $\geq 2.88\times$ on every window while moving the Liouville-*transported* bottom-block smoothness functional $\nu_{\tilde{L}}$ by at most 0.0088 — and even the matched-amplitude *rough* re-gauge (lattice-scale oscillation) moves it by at most 0.0046 (bar 0.01 for both): the roughness $\nu_{\tilde{L}}$ responds to is *not* in the multiplier — T149’s withdrawal of the TV hypothesis, wired as a per-instance check (control: the same functional read *without* the transport, on the whitened modes ψ which carry the multiplier, jumps by 0.41–9.76 under the same rough re-gauge — the invariance is carried by the transport, not by numbness of the functional).
- **(3) The explicit zone diagonal (T150) [E].** $\Lambda_r = c_0 - c_{M-1-2r} + \sum_{s \neq r} \max(c_{|r-s|} - c_{M-1-r-s}, 0)$, assembled lagwise with no matrix anywhere, equals the lumped-pair diagonal on every window (max rel 5.9×10^{-16}) — the whitening diagonal is an *explicit* functional of the zone’s lag arithmetic and of nothing else; the lag vector splits *exactly* as $c = c^{\text{arch}} + c^{\text{atom}}$ with $c^{\text{atom}} \leq 0$ entrywise, and the arithmetic mass carries the closed budget $\|c^{\text{atom}}\|_1 \leq \sum_j \mu_j \leq 4B\sqrt{N}$ with $B = 1.038821$ the *verified* maximum of $\psi(n)/n$ over the whole atom table (Chebyshev 1852, computed and never assumed; Abel summation carries the closed form). The honest negative as content: the archimedean section alone is *indefinite* on 12/12 windows (completed LDL^T , up to 5 negative eigenvalues) while the full section has zero — the atoms are *co-responsible* for the positivity, so the additive perturbation reading (Weyl 1912 / Bauer–Fike 1960 / Davis–Kahan 1970, cited, computed dead by T150 at 2.4–5.8 orders, *not* used) is structurally empty and only the multiplicative / Loewner gauge step transfers (control: dropping the positive part in the

zone formula breaks the identity at 4.25×10^{-1}).

- **(4) The parity compression (T150, the named mechanism) [E].** With U_- , U_+ the antisymmetric / symmetric parity isometries of the full window, $U_-^\top T_M(c) U_- = T - H$ and $U_+^\top T_M(c) U_+ = T + H$ *exactly* (max rel 3.9×10^{-16}) with cross block $U_+^\top T_M U_- = 0$ (1.4×10^{-16}) on all 6 windows with $M \leq 300$: the reflection-odd section used since T106 *is* the compression of the full symmetric Toeplitz section onto its antisymmetric parity sector (Basor–Ehrhardt 2009: the parity sectors are the natural objects of the Toeplitz+Hankel algebra, cited as the address and never as an authority); the completed LDL^T counts *localise* the negative inertia — the full section’s negative eigenvalues (forced by the sign-changing symbol, $f(0) = -29.2 \dots - 6.3 < 0$; T148’s honest negative *re-read*, never re-derived) sit entirely in the *even* sector while the odd sector counts zero: $f(0) < 0$ is explained rather than worked around (control: the sign-flipped basis does not reproduce $T - H$, 3.99×10^{-1}).
- **(5) The parity-sine calibration and the ladder certificate (T150) [E].** The parity sines $t_k(r) = \frac{2}{\sqrt{N}} \sin(2\pi k(r+1)/N)$, $N = 2m+1$, are the exact eigenpairs of the parity Laplacian (reflecting corner 3, forced by antisymmetry) at $\mu_k^P = 4 \sin^2(\pi k/N)$ — eigen-residual 2.3×10^{-13} — and the smoothness ladder *calibrates* on the exact model: $\nu_k^P = \pi k^2$ for $k = 1 \dots 12$ at $m = 2001$ (max deviation 3.0×10^{-5}), so the ladder form $\nu_k \leq Ck^2$ is the right question and π its exact floor; on every window, in the const gauge ($\varphi = \psi$ exactly — the ladder of the *pure* Toeplitz-minus-Hankel section), the parity coefficient licence holds, $\nu_k^P \leq Ck^2$ with the per-window certified constant $C = 11.70\text{--}17.28$, and the derived per-mode ceiling $m \|\psi_k\|_\infty^2 \leq 2(2\sqrt{C}k + 1)^2$ is a certified instance inequality — an m -free C is exactly the one open input and is *not* claimed (controls: the ladder $\times 10^{-3}$ fails everywhere, a one-index calibration shift misses by 0.75).
- **Fences and status.** Per instance on small windows only — a finite list of certified window inequalities with an explicit maximum; nothing uniform in the zone index or in D ; TV(log Λ) stays withdrawn as a hypothesis (T149), σ_{tot} stays retired as a route (T148); every T149/T150 exponent is a fit that stays in the sandbox. Kac–Murdock–Szegő 1953 (in the parity sector), Widom 1958 / Basor–Ehrhardt 2009 / Böttcher–Silbermann (the parity sectors as the algebra’s natural objects — the address, never an authority; the sign-changing symbol is exactly what Basor–Ehrhardt does *not* cover, and that gap is the open input), Sylvester 1852 / Bunch–Kaufman 1977, Chebyshev 1852 (verified on the table), Abel, Weyl 1912 / Bauer–Fike 1960 / Davis–Kahan 1970 (cited, computed dead, *not* used), Rayleigh 1877 / Ritz 1909, Cauchy–Schwarz, Gershgorin 1931, Wilkinson 1968 / Higham 2002 named classical; Weil 1952 cited, never used as a criterion; zero-firewall AST-checked. Ledger row PRIME.GAUGE.PARITY.IDENT.01 [E]; **no marker of any pre-existing contract moves**, and this is not RH evidence.
- **Diary, paper and website (T150, one-term-missing).** The T150 probe (`mode_ladder_probe.py`, contract `MODE.LADDER`, 36/36, 48.0s, 72 prime-power windows $m = 50 \dots 1393$) names the mechanism: the form is exactly the compression of the full symmetric Toeplitz section onto its antisymmetric parity sector, and the sign-changing symbol’s entire negative inertia sits in the *even* sector (certified 72/72) — T148’s honest negative is explained rather than worked around. The flutter amplitude becomes a certified form functional (0.0606–0.1993, trend $x^{-0.165 \pm 0.015}$, T149’s fit reproduced fit-free), the whitening diagonal an explicit zone functional, and the arithmetic atoms turn out to be co-responsible for the positivity (the archimedean section alone has 2–7 negative eigenvalues); the additive perturbation route is dead by 2.4–5.8 orders while the multiplicative gauge step closes. One gate remains: the ladder constant still grows — $C \leq 43.391 = 13.81\pi$ certified per stratum, trend $x^{0.258 \pm 0.009}$ against the flatness bar 0.25 — and the gap from π is exactly the arithmetic leakage of the bottom mode (ℓ^1 mass 1.41–1.79). Verdict ONE-TERM-MISSING: one named inequality left — $\nu_k \leq Ck^2$ with m -free C for the odd parity sector at a sign-changing symbol. `experiments/next.txt` part T150 (series totals 150 probes / 3825 checks); `tfpt_prime_front.tex` gains the T150 subsection with the “After T150” keybox, the v549 entry in the verified layer (now fifteen modules), the phase-2 section retitled T126–T150 and the updated probe index; `tfpt_1`, `tfpt_3` and `tfpt_research_contracts`

gain the v549 companion blocks; `website/lib/primeFront.ts` gains the T150 and v549 feed entries; suite counter 542 $\rightarrow$ 543 scripts. T151 (`odd_ladder_probe.py`) is running at exactly the remaining inequality — the odd-sector ladder — and is *not* part of this change.

2026-07-29 (III) (v548 — the Green/Szegő identities of phase 2 promoted; prime-front diary T148 (lifting statement, ONE-INPUT-MISSING) + paper + website sync; NO marker moves)

- **New module v548 (PRIME.GREEN.SZEGO.IDENT.01).** Promotion of the identity/certificate core of the discovery parts T147 (`green_asymptotic_probe.py`) and T148 (`szego_bottom_probe.py`) — 21 checks, ~ 0.4 s, everything recomputed on small frame-A windows, nothing cited from the sandbox; the companion to v547, which certified the a-priori level constant c_0^{ap} — this module certifies the two scalars that constant is made of. Scope fence: identities, per-instance theorems with checked hypotheses and per-window *certified* inequalities — no fit, no D -exponent, no zone-uniform statement, and explicitly *no statement for all D* (the one open lifting input — $\nu_L \leq F(\text{form})$ with F m -free, equivalently bounded $\text{TV}(\log \Lambda)$ or any weaker smoothness of the multiplier — stays open and typed open). Battery: 12 frame-A windows ($n = 4 \dots 139$, $m = 26 \dots 285 \leq 300$, $D = 7.578 \times 10^{-3} \dots 2.789 \times 10^{-2}$), 7 random positive definite forms for the form-independent items, and a weight-class model ladder $m = 64 \dots 288$; each statement carries a mutation control that must fail by $\geq 10^{-3}$.
- **(1) The factorisation identity (T147) [E].** $\Gamma = \sqrt{m} \lambda_{\text{up}} \max_j \|Re_j\| = \sqrt{Q^*} \cdot S_w$ with $S_w = \lambda_{\text{up}} \|R\|_F$ purely spectral and $Q^* = m \max_j (R^2)_{jj} / \text{tr}(R^2)$ purely geometric — *exact* at 2.2×10^{-16} on all 12 windows and 7 random forms: the all- D question splits into two named scalars and into nothing else; the certified factorisation (residual-paid column norms, Frobenius bracket) dominates the true Γ everywhere ($S_w = 1.1186\text{--}1.5777$, $Q^* = 2.0879\text{--}2.8634$; controls: a 1% Q^* perturbation breaks the identity at 5.0×10^{-3} , perturbing the largest Green column breaks the factorisation).
- **(2) The bottom-block equidistribution constant (T147) [E].** With Π_B the spectral projector onto $B = \{k : \lambda_k \leq 10\hat{\lambda}\}$ (preregistered rule, $|B| = 3 \dots 5$), $\sum_j (\Pi_B)_{jj} = |B|$ *exactly* (3.3×10^{-16}), hence $Q_B \geq |B|$ is a theorem ($\max \geq \text{mean}$); the *measured* $Q_B/|B| = 1.5091\text{--}1.7980$ lies in the preregistered band $[1, 2.2]$ against the Szegő/Widom sharp reference $Q_B \leq 2|B|$ — a measurement on a finite list, typed as such (controls: the rank- $|B|$ coordinate projector gives $Q_B = m$ and overshoots by ≥ 3.9 , a 1% basis scaling breaks the trace identity).
- **(3) The second-difference ℓ^1 ceiling (T148, the lever) [E].** From the exact Dirichlet eigenpair $L_0 s_k = \mu_k s_k$ and $\mu_k \geq 4k^2/(m+1)^2$: the coefficient bound $|a_k| \leq \min(1, \|s_k\|_\infty \|L_0^p \psi\|_1 / \mu_k^p)$ for $p = 1, 2$ against the *true* coefficients on every window bottom mode and on random unit vectors (worst excess ≤ 0), the m -free closed form $\|a\|_1 \leq 2\sqrt{\nu} + 1$ with $\nu = (m+1)^{3/2} \|L_0 \psi\|_1 / (2\sqrt{2})$ — every power of m cancelled — and the chain $m \|\psi\|_\infty^2 \leq 2\|a\|_1^2$; calibration: for the Dirichlet bottom mode $\|a\|_1 = 1$ *exactly* and $\nu = 3.1415 \rightarrow \pi$ at every size (controls: the ceiling $\times 10^{-3}$ fails on every window, a one-index μ shift breaks the coefficient identity at 1.5×10^{-1}).
- **(4) The layer-cake S_w certificate (T148) [E].** The completed $\text{LDL}^\top$ inertia count at every rung of the preregistered ladder $\tau_i = \rho_i \lambda_{\text{lo}}$ ($\rho = 1.5 \dots 1024$, λ_{lo} a certified positive floor) equals the direct spectral count *exactly* on all 96 (window, rung) pairs (Sylvester 1852; Bunch–Kaufman 1977 — a certificate, never a sorted list), and the layer cake certifies $S_w \leq 1.3288\text{--}1.8220$ per window (true $1.1186\text{--}1.5777$, slack ≤ 1.216); nothing here says m -free (control: dropping the bottom layer breaks the bound on every window — the bottom eigenvalue is the weight).
- **(5) The Liouville transform and the weight-class discriminator (T148) [E].** The chain $m \|\psi\|_\infty^2 \leq \kappa_\Lambda m \|\hat{\varphi}\|_\infty^2 \leq 2\kappa_\Lambda \|a(\hat{\varphi})\|_1^2 \leq 2\kappa_\Lambda \text{ceil}(\hat{\varphi})^2$ with $\varphi = \Lambda^{-1/2} \psi$ (the exact pencil equivalence, a change of variables and not a perturbation) holds stepwise on every bottom-block mode; $\kappa_\Lambda = \max \Lambda / \min \Lambda = 1.3868\text{--}2.5805$ is a priori (a ratio of two diagonal entries of the form). The discriminator: on a model section with a genuine order-2 zero ($f(0) = 0$, $f''(0)/2 = 1$

exact), over the ladder $m = 64 \dots 288$ at matched κ_Λ (mismatch 0.0013), the bounded-variation multiplier keeps ν flat (max/min 1.003) while the rough one (TV larger by 162.6) grows by 19.9 — the roughness, not the conditioning (control: the first Liouville step $\times 10^{-3}$ fails on every mode, provably — the step slack is bounded by κ_Λ^2).

- **Fences and status.** Per instance on small windows only — a finite list of certified window inequalities with an explicit maximum; nothing uniform in the zone index or in D ; the symbol-level order-2 hypothesis is *refuted* (T148: $f(0) < 0$ on every surface window) and enters nowhere as a theorem; σ_{tot} stays retired as a route; every T147/T148 exponent is a fit that stays in the sandbox. Kac–Murdock–Szegő 1953, Widom 1958 / Basor–Ehrhardt 2009 / Böttcher–Silbermann (the mechanism’s address, never an authority), Sylvester 1852 / Bunch–Kaufman 1977, Euler 1735, Rayleigh 1877 / Ritz 1909, Cauchy–Schwarz, Davis–Kahan 1970 (cited, computed vacuous, *not* used), Gershgorin 1931, Wilkinson 1968 / Higham 2002 named classical; Weil 1952 cited, never used as a criterion; zero-firewall AST-checked. Ledger row PRIME.GREEN.SZEGO.IDENT.01 [E]; **no marker of any pre-existing contract moves**, and this is not RH evidence.
- **Diary, paper and website (T148, one-input-missing).** The T148 probe (`szego_bottom_probe.py`, contract SZEGO.BOTTOM, 31/31, 13.0s, 48 windows $m = 96 \dots 1077$ in four D -strata, stress ladders to $m = 1500$) dissects the lifting statement: the second factor S_w *closes* on the surface (LDL^T layer cake, $S_w \leq 1.9587$ certified against true 1.282–1.683, trend flat, per D -stratum), at the price of an honest negative — the arithmetic Toeplitz symbol has $f(0) < 0$ on 48/48 windows, so positive definiteness is a finite-section effect of the minus-Hankel part and the lumping and the KMS order-2 hypothesis survives only as a measurement ($\alpha = 1.643$ –1.989) — while the lifting statement resists with its hypothesis isolated to one named scalar (TV(log Λ), proved to be the roughness and not the conditioning by the weight-class experiment); the first end-to-end number arrives: the certified chain delivers 8.36–15.86% of the true gap on all 48 windows (median 11.74%), and the a-priori-shaped chain is still a lower bound at a factor 10.5. Verdict ONE-INPUT-MISSING: exactly one scalar side (Q^*) lacks an m -free certified statement, target $\nu_L \lesssim 34$ against 282 measured. `experiments/next.txt` part T148 (series totals 148 probes / 3759 checks); `tfpt_prime_front.tex` gains the T148 subsection with the “After T148” keybox, the v548 entry in the verified layer (now fourteen modules), the phase-2 section retitled T126–T148 and the updated probe index; `tfpt_1`, `tfpt_3` and `tfpt_research_contracts` gain the v548 companion blocks; `website/lib/primeFront.ts` gains the T148 and v548 feed entries; suite counter 541 $\rightarrow$ 542 scripts. T149 (`weight_smoothing_probe.py`) is running at exactly the remaining input — whether a smoothed whitening removes the TV roughness — and is *not* part of this change.

2026-07-29 (II) (v547 — the level-lemma identities of phase 2 promoted; prime-front diary T146 (level lemma, LEVEL-CARRIES) + website sync; NO marker moves)

- **New module v547 (PRIME.LEVEL.LEMMA.01).** Promotion of the a-priori core of the discovery part T146 (`level_lemma_probe.py`) — 20 checks, ~ 0.4 s, everything recomputed on small frame-A windows, nothing cited from the sandbox; the companion to v546, whose item (5) certified S_1' with a c_0 *measured* at the minimiser’s own layer cake — this module supplies the a-priori side, every factor a functional of the form alone. Scope fence: identities, per-instance theorems with checked hypotheses and per-window *certified* inequalities — no fit, no D -exponent, no zone-uniform statement, and explicitly *no statement for all D* (the asymptotic delocalisation of the Green columns, T146’s remainder, stays open and typed open). Battery: 12 frame-A windows ($n = 4 \dots 139$, $m = 26 \dots 285 \leq 300$, $D = 7.578 \times 10^{-3} \dots 2.789 \times 10^{-2}$), 9 random positive definite forms for the form-independent items, and a stress ladder $m = 64 \dots 288$; each statement carries a mutation control that must fail by $\geq 10^{-3}$.
- **(1) The union identity for nested cakes (T146) [E].** For a nested decreasing chain with

positive coefficients, $\sum_{j,l} c_j c_l |S_j \cup S_l| = 2T \|\psi_t\|_1 - \|\psi_t\|^2$ with $T = \sum_j c_j$ and $\psi_t = \sum_j c_j \mathbf{1}_{S_j}$ — form-independent and $O(m)$, the reason the cake base is movable at all; exact (0.0) against T145's $K \times K$ double sum on all 12 window minimisers and 9 random vectors, *and* against the union sizes computed from the sets themselves with no nestedness used (controls: one shuffled proper level set 3.2×10^{-2} , a 1% perturbation of the heaviest coefficient 4.8×10^{-3}).

- **(2) The layer-cake counting lemma at a general base (T146) [E].** $G(b) \leq 2b^2 \|v\|_\infty \|v\|_1 / \|v\|^2 + \varepsilon(b)$ for *any* vector at all 6 preregistered bases (margin ≥ 1.08 on the battery and on every window minimiser); at $b = 2$ the leading constant is the classical dyadic 8 *exactly*, and the base is *free* because the chain consumes only the lower domination $|v| \leq \psi_t$ — the a-priori constant gains $4/b_*^2 = 3.7612$ over base 2 on every window (controls: the bound $\times 10^{-3}$ fails on every draw and base, and the one-level-down cake breaks the domination on every draw — the +1 in the cake exponent is load-bearing).
- **(3) The resolvent delocalisation bound (T146) [E].** $\psi = \lambda R \psi$ to 9.0×10^{-14} — an *identity*, so no Davis–Kahan transfer step appears anywhere — with $\lambda_{\text{up}} = \min_j \text{Rayleigh}(Re_j) \geq \lambda_{\text{min}}$ (Rayleigh–Ritz; window ratio 1.0592–1.2883), the coordinate bound $|\psi_j| \leq \lambda \|Re_j\|$ (Cauchy–Schwarz) and the column norms certified from above with the linear-solve residual paid for, giving $\|\psi\|_\infty \leq \lambda_{\text{up}} \max_j \|Re_j\|$ on every window (within 1.061–1.337 of the truth) and $\|\psi\|_1 \leq \sqrt{m} \min(1, \Gamma_1)$. The lever: the trivial ceiling $\max_j \|Re_j\| \leq 1/\lambda_{\text{min}}$ would give $\Gamma \leq \sqrt{m} = 5.1$ –16.9 (useless); the certified columns sit a factor 2.85–10.17 *below* it (preregistered bar 2.0), giving $\Gamma = 1.8356$ –2.2797 — read off the form, never off the minimiser (controls: a 1% λ perturbation breaks the identity at 1.0×10^{-2} , the sup bound $\times 10^{-3}$ fails on every window).
- **(4) The composite level lemma (T146) [E].** $c_0^{\text{ap}} = 2b^2 \Gamma \min(1, \Gamma_1) + \varepsilon = 3.9042$ –4.8488 dominates the measured level constant on all 12 windows (slack 1.986–2.418) and stays under the preregistered ceiling $16 = 4 \times \text{Maz'ya's Dirichlet value } 4$; the certified window inequality $\text{cert_lam_max}(R) \leq c_0^{\text{ap}} \Psi_{\text{abs}}$ holds on 12/12 (both sides by completed Cholesky, the density the $|R|$ one with Charikar's cited constant), closing the chain $\hat{\lambda} \geq 1/(c_0^{\text{ap}} \Psi_{\text{abs}})$, gap $\geq \hat{\lambda}/\kappa_{\text{up}}$ at loss factor 0.0423–0.1272 of the exact gap. The built-in discriminator: on T145's no-go form $R = aa^T + \varepsilon I$, $a_i = i^{-1/2}$, Γ grows $3.676 \rightarrow 6.798$ over $m = 64 \dots 288$ (ratio $1.85 \geq$ the preregistered 1.5) and $c_0^{\text{ap}} = 11.10$ *exceeds* every window value — the bound must be worse there, since a candidate that did not fail on the no-go would prove a false statement — while the theorem half survives on every no-go size and the Dirichlet path-Laplacian control stays flat (max/min 1.0063; control: $c_0^{\text{ap}} \times 10^{-3}$ breaks the certificate on every window).
- **Fences and status.** Per instance on small windows only — a finite list of certified window inequalities with an explicit maximum; nothing uniform in the zone index or in D ; only the sign-free / Green constant is bounded a priori, the energy-route σ_{tot} stays *measured*, and every T146 exponent is a fit that stays in the sandbox. Maz'ya 1985 (the strong-type half *not* used as a theorem anywhere), Rayleigh 1877 / Ritz 1909, Cauchy–Schwarz, Miclo 1999, Davis–Kahan 1970 (cited, deliberately *not* used), Perron–Frobenius (not applicable to E , not used), Fukushima–Ōshima–Takeda 1994, Charikar 2000, Goldberg 1984, Gershgorin 1931, Wilkinson 1968 / Higham 2002 named classical; Weil 1952 cited, never used as a criterion; zero-firewall AST-checked. Ledger row PRIME.LEVEL.LEMMA.01 [E]; **no marker of any pre-existing contract moves**, and this is not RH evidence.
- **Diary, paper and website (T146, level-carries).** The T146 probe (level_lemma_probe.py, contract LEVEL.LEMMA, 30/30, 7.6 s, 64 windows $m = 26 \dots 1173$, 9/9 preregistered verdict conditions) closes L1 on the measurement surface as a chain of theorems and certified window inequalities with no step reading the minimiser: four hand-written profiles lose by 5–9 orders of magnitude, the Green column survives ($\lambda_{\text{up}}/\hat{\lambda} = 1.0497$ –1.3764), Davis–Kahan is instrumented and discarded (informative on 0/64; the spectrum bottom is a near-degenerate block, $\lambda_2/\hat{\lambda} = 1.2542$ –3.4471), the cake base proves free (the dyadic 8 falls to $2b^2 \approx 2$, gain 3.76 at zero cost) and $c_0^{\text{ap}} = 3.9042$ –4.8488 on 64/64 windows lands at the size of Maz'ya's classical Dirichlet value 4, closing

the chain at loss factor 0.0422–0.1586; the one genuine remainder is D -uniformity for *all* D — the asymptotic delocalisation of the Green columns. `experiments/next.txt` part T146 (series totals 146 probes / 3689 checks); `tfpt_prime_front.tex` gains the T146 subsection with the “After T146” keybox, the `v547` entry in the verified layer (now thirteen modules), the phase-2 section retitled T126–T146 and the updated probe index; `tfpt_1`, `tfpt_3` and `tfpt_research_contracts` gain the `v547` companion blocks; `website/lib/primeFront.ts` gains the T146 and `v547` feed entries; suite counter 540 $\rightarrow$ 541 scripts. T147 (`green_asymptotic_probe.py`) is running at exactly the all- D asymptotics and is *not* part of this change.

2026-07-29 (I) (v546 — the capacity-chain identities of phase 2 promoted; prime-front diary T145 (Maz’ya proof, ONE-STEP-MISSING) + website sync; NO marker moves)

- **New module v546 (PRIME.CAPCHAIN.IDENT.01).** Promotion of the identity-shaped core of the capacity cycle T142 (`conductance_profile_probe.py`), T143 (`sharp_capacity_probe.py`), T144 (`capacity_inequality_probe.py`) and T145 (`mazya_proof_probe.py`) — 26 checks, ~ 0.5 s, everything recomputed on small frame-A windows, nothing cited from the sandbox. Scope fence: identities, per-instance theorems with checked hypotheses and per-window *certified* inequalities — no fit, no D -exponent, no zone-uniform statement, and *no level lemma* (T145’s L1 stays open, unclaimed). Battery: 12 windows ($n = 4 \dots 139$, $h = 26 \dots 285 \leq 300$, $D = 7.578 \times 10^{-3} \dots 2.789 \times 10^{-2}$, 32–5102 positive off-diagonal edges); the covering kernel is positive definite on 11, where items (1)–(2) run; each identity carries a mutation control that must fail by $\geq 10^{-3}$.
- **(1) The capacity decomposition (T142) [E].** $K^{-1} = D^T J^{-1} D + x x^T / \text{cap}$ with $J = D K D^T$ (assembled entrywise, 3.8×10^{-15}), $x = K^{-1} \mathbf{1}$ and $\text{cap} = \mathbf{1}^T K^{-1} \mathbf{1}$, as a matrix identity (1.4×10^{-13}); under the congruence $u = K^{1/2} v$ the Dirichlet half is an *orthogonal projection* ($P^2 = P$ at 1.9×10^{-12} , $\Omega = \lambda_{\max}(P) = 1$ to 5.1×10^{-12} — the T142 normalisation, where T141 had guessed 20.7–2724), its complement *is* the capacity rank-one and it annihilates $K^{-1/2} \mathbf{1}$ (controls: dropping the rank-one 3.4×10^{-1} , a 1% cap perturbation 3.4×10^{-3}).
- **(2) The exact capacity–Rayleigh identity (T143) [E].** With $H = \text{diag}(s) + L_N$ (4.7×10^{-16}), $L_N = D^T B D$ for the signed crossing kernel (4.9×10^{-16}) and $\rho(W) = 1 - \lambda_{\min}(A, A_B)$ (5.4×10^{-14}), the assembled quotient $[d^T (J^{-1} - B) d + (x^T v)^2 / \text{cap} - \sum_k s_k v_k^2] / [d^T J^{-1} d + (x^T v)^2 / \text{cap}]$ equals $v^T (K^{-1} - H) v / v^T K^{-1} v$ for *every* v (9.5×10^{-14} on 24 random vectors per window), reproduces $1 - \rho(W)$ at the exact top eigenvector (1.7×10^{-9} under the *declared* 1/gap conditioning bar 5.4×10^{-8}), and every random quotient stays $\geq 1 - \rho(W)$; on the constant vector the whole denominator *is* the capacity term (controls: dropping it, $\text{rel} = 1$; the $|N|$ crossing kernel, 2.6×10^{-1}).
- **(3) Cholesky nestedness (T144) [E].** $\text{cap}_E([a, a+j])$ equals the prefix sum of squared forward-substitution entries of *one* triangular solve: 3404 interval capacities from 36 solves at 2.0×10^{-14} against independent Schur solves, exhaustive on the median window (every prefix, 2.8×10^{-14}), monotone in b by construction (control: the reversed ordering computes *suffix* capacities and deviates by $\geq 4.6 \times 10^{-1}$).
- **(4) The whitening certificate (T144) [E].** $\lambda_{\max}(W) \leq \kappa_{\text{up}}$ (completed Cholesky) $\leq$ the Gershgorin ceiling on every window ($\kappa_{\text{up}} = 1.2245\text{--}1.4236$ against ≤ 2.1213); the licensed chain direction $\lambda_{\min}(E) / \kappa_{\text{up}} \leq \lambda_{\min}(A, A_B)$ holds on every window — a denominator comparison, untouched by T142’s numerator obstruction — and the Cholesky refuses at the shrunk shift $0.995 \lambda_{\max}(W)$.
- **(5) The M4 split and the certified chain (T145) [E].** The mass half of Maz’ya’s step M4: $\sum_k f_k^2 \leq \psi^2$ *pointwise* (a theorem for nonnegative truncations, exact slack ≥ 0), the row-wise implication on rows with $(E\mathbf{1})_i \geq 0$, measured mass ratio ≤ 0.2995 and the full step $\sigma_{\text{tot}} = 0.2197\text{--}0.4425 < 1$ on every window although the Markov hypothesis is absent. Licence 4 is

stated with $|R|$ and *not* R^+ , with the witness $R = [[1, -\frac{1}{2}], [-\frac{1}{2}, 1]]$, $x = (1, -1)$ ($3.0 > 2.0$) built in as a counterexample check. The sign-free chain is ordered on every window, and S1' is *certified per window on both routes*: $\text{cert_lam_max}(R) \leq 12 \sigma_{\text{tot}} \Psi_{\text{pos}}$ (energy, $c_0 = 2.6369\text{--}5.3099$) and $\leq G_{\text{dy}} \Psi_{\text{abs}}$ (sign-free, $c_0 = 2.5154\text{--}6.1449$); the better route gives $c_0 = 2.5154\text{--}4.2265$ against the classical Dirichlet value 4. The all-sets density bound carries Charikar's cited constant, bracketed by exhaustive enumeration of all 4095 subsets of a small block (control: $c_0 \times 10^{-3}$ breaks the certificate on every window).

- **Fences and status.** Per instance on small windows only; nothing uniform in the zone index or in D ; the c_0 of item (5) is *measured* at the minimiser's own layer cake and the a-priori level lemma (T145's L1) stays open. Maz'ya 1985 (the strong-type half *not* used as a theorem anywhere — it is the thing the cycle transcribes), Muckenhoupt 1972, Fukushima–Ōshima–Takeda 1994, Miclo 1999, Charikar 2000, Goldberg 1984, Gershgorin 1931, Wilkinson 1968 / Higham 2002 named classical; Weil 1952 cited, never used as a criterion; zero-firewall AST-checked. Ledger row PRIME.CAPCHAIN.IDENT.01 [E]; **no marker of any pre-existing contract moves**, and this is not RH evidence.
- **Diary, paper and website (T145, one-step-missing).** The T145 probe (`mazyia_proof_probe.py`, contract MAZYIA.PROOF, 33/33, 8.0 s, 64 windows $m = 26 \dots 1173$) transcribes Maz'ya's classical proof step by step onto the non-Markovian form: M1, M2, M3 are theorems, the Markov property sits in exactly one line (M4), that line splits, its mass half is a theorem and dominates ($\sigma_{\text{tot}} = 0.215\text{--}0.443 < 1$), c_0 becomes explicit ($2.248\text{--}4.227$, fit $D^{0.028 \pm 0.017}$, zone-uniform) and S1' is certified on 64/64 windows; an explicit no-go proves a level-profile hypothesis is *necessary*; S2' retired, R5 downgraded, R4 closed — the mathematical rest is *one* named lemma, L1. `experiments/next.txt` part T145 (series totals 145 probes / 3659 checks); `tfpt_prime_front.tex` gains the T145 subsection, the v546 entry in the verified layer (now twelve modules) and the updated probe index; `website/lib/primeFront.ts` gains the T145 feed entry; suite counter $539 \rightarrow 540$ scripts. T146 (`level_lemma_probe.py`) is running at exactly L1 and is *not* part of this change.

2026-07-28 (III) (v545 — the Hardy-core identities of phase 2 promoted; prime-front diary T140/T141 + website sync; NO marker moves)

- **New module v545 (PRIME.HARDY.IDENT.01).** Promotion of the identity blocks of the discovery parts T140 (`signed_band_probe.py`) and T141 (`discrete_hardy_probe.py`) — 36 checks, ~ 1 s, everything recomputed on small frame-A windows, nothing cited from the sandbox. Scope fence: *identities*, closed-form quantities and the *validity* — never the *size* — of two certified upper-bound shapes, plus one negative typing. No fit is promoted, no D -exponent, no zone-uniform statement, and no bound that beats the target. Battery: 11 windows ($n = 8 \dots 139$, $h = 58 \dots 285 \leq 300$, core $m = 57 \dots 284$, 193–5102 positive off-diagonal edges, 10–87 loaded stripes), $D = 7.578 \times 10^{-3} \dots 2.388 \times 10^{-2}$ (a factor 3.15, so item (8) is a comparison and not a single point), exact $\rho(W) = 0.997759\text{--}0.999981$; the explicit $n_e \times n_e$ signed Gram is formed only on the 5 windows with $n_e \leq 900$.
- **(1)–(3) The form lifting, the exact finite core and the energy reordering [E].** With M the edge–interval incidence matrix and $C = \text{diag}(\sqrt{\Delta})M$, the T139 telescope lifts from the *entries* of the signed Gram to its *form*: $\text{Gram} = CHC^T$ at 3.0×10^{-15} , hence $\text{rank}(\text{Gram}) \leq h - 1$ (measured 57–183 against 193–882 edges; control: unweighted incidence 1.6). The covering kernel in *closed geometric form*, $K_{rs} = W([r \wedge s, r \vee s])$, equals $M^T \Delta M$ (1.3×10^{-15}) and the spectral radius is an *exact* eigenvalue of the finite core, $\rho(W) = \lambda_{\max}(K^{1/2} H K^{1/2}) = 1 - \lambda_{\min}(A, A_B)$ (5.4×10^{-14}) = $\lambda_{\max}(\text{Gram})$ (7.8×10^{-16}) — three independent routes, no truncation (control: the factorwise product $\lambda_{\max}(K) \lambda_{\max}(H)$ misses by 7.8×10^2). The energy reordering $H = \text{diag}(s) + L_N$ holds at 4.7×10^{-16} : a mass term plus a long-range Dirichlet form, its weights positive on 0.676–0.872 of the off-diagonal area (a measurement, no law).

- **(4) The checkerboard split [E].** At group length exactly b , $\text{Band}_b = D + A_{\text{even}} + A_{\text{odd}}$ *entrywise* (0.0) on all 9 (window, b) pairs over $b = 4, 8, 16$, and the resulting three-step Weyl sequence dominates $\lambda_{\max}(\text{Band}_b)$ with 0 exceptions (worst ratio 1.6940) at a step count independent of the up to 9 groups — three steps instead of $O(nb)$ (control: $L = b/2$ loses entries, 3.5×10^{-1}).
- **(5)–(6) The four Hardy identities and the closed Muckenhoupt quantity [E].** (i) the K^+ Rayleigh form $\rho(W) = u^\top H u / u^\top K^+ u$ at $u = K^{1/2} v$ (6.6×10^{-13}); (ii) the signed crossing kernel $L_N = D^\top B D$ with $B_{kl} = \sum_{r \leq k \wedge l, k \vee l \leq s} N_{rs}$ — the same closed covering formula as K , on the increment grid (4.9×10^{-16}); (iii) $Q = B_+ \mathbf{1}$ (1.4×10^{-15}): the Cauchy–Schwarz weight T140 introduced by hand *is* the row sum of B_+ , so that step is the Gershgorin diagonal step on B_+ ; (iv) $DKD^\top = L_\Delta$ on the interior nodes (2.7×10^{-14}) with diagonal $(\Delta \mathbf{1})_{k+1} = 0.4886\text{--}15.15$, the endpoint edge mass — a *local* quantity and not $\lambda_{\max}(K)$ (control: the crossing kernel of $|N|$ does not reproduce L_N , 2.6×10^{-1} ; the signs are load-bearing). The two-weight quantity $A_{M0} = \max_k Q_k (\Delta \mathbf{1})_{k+1}$ is computed by two closed routes agreeing to 8.3×10^{-15} ; its value (65.5–4244) is *reported*, its size and zone behaviour are not promoted (control: $\lambda_{\max}(K)$ in place of the local mass inflates it by ≥ 358).
- **(7) Two certified shapes, promoted as *valid* bounds only [E].** Every Loewner step is certified by a completed Cholesky (-1.5×10^{-14} , -2.3×10^{-10}). The additive Hardy chain dominates $\rho(W)$ on 11/11 windows (factor 3.074–10.758); the exact two-term Weyl split dominates too (1.691–2.503) and lies *below* the chain everywhere, so it is the floor of the whole additive family; the genuinely joint shape $\Lambda(H, Y) \cdot \Omega(Y)$ with a positive definite Jacobi Hardy form Y dominates on 11/11 with the closed-form geometric profile (8.815–74.872 at $\Omega = 8.33\text{--}36.2$) and on 11/11 with the per-zone tridiagonal read-off of K^+ . Promoted is the *dominance* on these instances and nothing about the factors. Controls: the same Y without its mass term is singular — the constant vector lies in its kernel (5.7×10^{-17}) while H does not vanish there — so the certificate *refuses* on 11/11; and dropping the *positive* part instead of the negative one falls below $\rho(W)$ on 11/11.
- **(8) The sign-versus-absolute separation — a negative typing [X].** Over the measured D range the exactly bounded object (the signed Dirichlet share) spreads by $1.36\times$, while every absolute variant spreads by at least $54.94\times$ (Loewner drop 62.03, Cauchy–Schwarz 54.94, product 56.92), and dropping the positive part of H alone costs $9.96\text{--}464.63\times$. The corresponding power laws are *fits* and labelled as fits: $D^{-0.138 \pm 0.094}$ (signed) against $D^{-0.776 \pm 0.352}$ (certified Muckenhoupt) and $D^{-2.748}$, $D^{-2.820}$, $D^{-2.918}$ (absolute). Promoted is the instance comparison of the measured spreads, not the exponents.
- **Fences and status.** Per instance on small windows only; nothing uniform in the zone index or in D ; item (2) is an identity and not a bound, so the zone-uniform discrete Hardy inequality stays *open*; item (7) promotes validity and not size — neither shape beats the target. Abel summation, Cauchy–Schwarz, Weyl 1912, Gershgorin 1931, Haynsworth 1968, Ostrowski 1937 / Fan 1958 / Berman–Plemmons 1979, Muckenhoupt 1972, Bradley 1978, Opic–Kufner 1990, Bennett 1987/1991, Gantmacher–Krein 1950/1960, Karlin 1968, Wilkinson 1968 / Higham 2002 named classical; Weil 1952 cited, never used as a criterion; zero-firewall AST-checked. Ledger row PRIME.HARDY.IDENT.01 [E] + [X]; **no marker of any pre-existing contract moves**, and this is not RH evidence.
- **Diary, paper and website.** experiments/next.txt part T141 (HARDY-RESISTS, 22/22; series totals 141 probes / 3547 checks); `tftpt_prime_front.tex` gains the T141 subsection, the v545 entry in the verified layer and the updated probe index; `website/lib/primeFront.ts` gains the T141 feed entry and the v545 promotion entry. T142 (`conductance_profile_probe.py`) is running at the one open ingredient and is *not* part of this change.

2026-07-28 (II) (v543 + v544 — the lumped M -matrix pair and the long-lag support structure promoted; prime-front diary T136/T137 + website sync; NO

marker moves)

- **New module v543 (PRIME.MMATRIX.IDENT.01).** Promotion of the identity/theorem block of the discovery part T136 (35 checks, ~ 1 s), recomputed on small frame-A windows — nothing cited from the sandbox. Scope fence: matrix identities, per-instance theorems with *checked* hypotheses, and one *negative* per-instance result; no fit, no D -exponent, no uniform-in-zone claim, no floor value. Battery: 20 seam windows ($n = 4 \dots 59$, $\rho = 1.25 \dots 4.00$, $h = 25 \dots 299$; every factorised or diagonalised matrix ≤ 300) giving 40 symmetric matrices (pole-free odd sections + border Schur blocks), 39 with positive off-diagonals, plus 312 shifted ladder rungs and 8 whitened two-grid rungs.
- **(1)–(2) The lumped pair and the congruence [E].** With Δ the positive off-diagonal part and $L_\Delta = \text{diag}(\Delta \mathbf{1}) - \Delta$, the pair $A_B = A + L_\Delta$ is Stieltjes (off-diagonals exactly ≤ 0), L_Δ is a graph Laplacian hence PSD with zero row sums, so $A_B \mathbf{1} = A \mathbf{1}$ (1.6×10^{-15}) and $A_B \succeq A$ — an *upper* bound on $\lambda_{\min}(A)$ and a floor *never* (control: lumping the negative off-diagonals destroys Stieltjes, 2.0×10^{-1}). The congruence $A = A_B^{1/2}(I - W)A_B^{1/2}$, $W = A_B^{-1/2}L_\Delta A_B^{-1/2} \succeq 0$, holds as a *matrix* identity (4.4×10^{-15}) with $\lambda_{\max}(W) = \rho(L_\Delta A_B^{-1})$ (4.4×10^{-15}), and the *declared circularity* $\lambda_{\max}(W) < 1 \iff A \succ 0$ is checked in *both* directions (0 exceptions forward; 39/39 shifted controls in the indefinite range give $\lambda_{\max}(W) \geq 1$) — the Loewner sandwich is vacuous by itself, and that is the content.
- **(3)–(4) The anchor and the empty shift ladder [E].** With $x = A_B^{-1} \mathbf{1} \geq 0$ and $A_B^{-1} \geq 0$ entrywise (Ostrowski 1937, *checked*), $\lambda_{\min}(A_B) \geq 1/\max_r x_r$ on all 39 rows (min slack 3.0×10^{-3} , sharpest ratio 0.9070) — one solve, one sign check, no eigenvalue (control: a positive off-diagonal makes it false, $1.9000 > 0.1000$). Lumping commutes with diagonal shifts, $(A - sI)_B = A_B - sI$ (2.5×10^{-16} on 312 rungs), and $(A_B - sI)^{-1} \geq A_B^{-1} \geq 0$ entrywise (Berman–Plemmons 1979, violation 0), so $\max_r x_r(s)$ and the a-priori margin $\|L_\Delta\|_\infty \max_r x_r(s)$ are non-decreasing along the whole ladder: the shifted ladder is *structurally empty* — a theorem, not a measurement.
- **(5)–(6) Varga’s identity and the a-priori Jacobi radius [E].** For the regular splitting $A_B = D_0 - N_0$ (all three hypotheses checked on 39/39), $\rho(J) = \tau/(1 + \tau)$ with $\tau = \rho(A_B^{-1}N_0)$ at 4.8×10^{-15} ($\rho(J) = 0.7347\text{--}0.9860$); the Collatz–Wielandt bracket at the anchor vector gives $\min_r (Tx)_r/x_r \leq \tau \leq \max_r (Tx)_r/x_r$ (0 exceptions) and hence an *a-priori* $\rho(J) \leq 0.9861 < 1$ with no eigenvalue anywhere, sharp on the measured gap by 1.0062–1.0531. Controls: a non-regular splitting breaks the identity (1.1×10^{-1}); at a sign-changing test vector the quotient bound is false on 39/39.
- **(7) The k -scanned M18 majorant — a negative result [X].** The whitened mass identity $\|L^{-1}\hat{s}\|^2 = \hat{s}^\top U^{-1}\hat{s}$ holds at 7.2×10^{-16} and the triangle chain is a *valid* majorant at every k separately (39 (rung, k) pairs over $k = 2 \dots 64$, 0 violations), so the minimum over the ladder is legitimate — and it does *not* reach the preregistered T134 bar 1/2 on any rung (best 3.080; best over the three values T134 tried, also 3.080) while the *measured* bad mass is ≤ 0.0120 . The localisation term alone already exceeds the bar (0.542): the loss is the bound, and what is missing is a localisation statement. The bar is *not* moved and nothing is upgraded.
- **New module v544 (PRIME.LONGLAG.SUPP.01).** Promotion of the structure block of the discovery part T137 (24 checks, ~ 0.2 s) on the same 20 windows (3–25 prime-power atoms, 20555 positive off-diagonal edges, 455 loaded stripes, 39 bracketed lumped comparisons).
- **(1)–(4) The support is a comb stripe set, and its amplitude is certified [E].** The kernel splits exactly as $c = c_{\text{arch}} - c_{\text{comb}}$ with $c_{\text{comb}} \geq 0$, and the archimedean section alone has *all* off-diagonals ≤ 0 on 20/20 windows: every positive off-diagonal of A is comb-generated (control: the full section carries $+2.0 \times 10^{-1}$). Every one of the 20555 positive edges has its Hankel index $M - 1 - r - t$ inside the atom-hat index set — per-window fraction exactly 1.000000 — so $\text{supp}(\Delta)$ is a union of anti-diagonal stripes at prime-power atom positions (the converse is reported, *not* claimed). Each stripe is a perfect matching (0 endpoint collisions), so its edge

vectors $b_e = e_r - e_t$ are *exactly* orthogonal and L_Δ restricted to a stripe is a direct sum of 2×2 blocks (control: edges across two stripes overlap). And $A_{rs} = A_{rs}^{\text{arch}} - c_{\text{comb}}[|r - s|] + c_{\text{comb}}[\text{anti}]$ gives the amplitude certificate $\Delta_{rt} \leq c_{\text{comb}}[M - 1 - r - t]$ on all 20555 edges (excess -1.9×10^{-6} , sharpest ratio 0.99998532) — no eigenvalue, no norm; control: the Toeplitz lag in place of the Hankel index breaks it on 20415/20555. Honestly undecided and *not* promoted: at $h \leq 300$ the hats never overlap, so the tighter one-atom refinement coincides with the certificate here.

- **(5) The Green function, bracketed two-sidedly [E].** For the lumped comparison $B = D_0 - N_0$, $J = D_0^{-1}N_0 \geq 0$, the anchor identity $q_J = \max_r (Jx)_r / x_r = 1 - \min_r 1/(d_r x_r) < 1$ (8.2×10^{-16}) needs no measurement; then the Neumann partial sum to $K = 8$ is an *entrywise* lower bound for B^{-1} (-2.1×10^{-4}) *because the discarded terms are nonnegative*, and partial sum $+(x_r/x_s)q_J^{K+1}/((1 - q_J)d_s)$ is an entrywise upper bound (-1.4×10^{-1}), on 39 rows (20 pole-free sections + 19 border Schur blocks). Control: dropping the tail makes the upper bound false. This delivers item (2) of the T136 rest list.
- **(6) The absolute-value envelope family is certified dead [X].** With $E = B^{-1}L_\Delta$, Gershgorin, every row-sum norm and every Collatz–Wielandt quotient at every *positive* weight are all $\geq \rho(|E|)$, so one rigorous *lower* bound decides the whole family at once: a Collatz–Wielandt quotient from below at a power-iterated weight gives $\rho(|E|) \geq 1.3141 \geq 1$ on 20/20 rows (the cheapest four members all ≥ 1.5937). No member of the family can ever certify $\lambda_{\max}(W) < 1$ — a certificate of *death*, not a measurement. The *signed* radius $\rho(E) = \lambda_{\max}(W) \leq 0.99995781$ on the same rows: the absolute value alone destroys the cancellation, and what survives is a sign-preserving bound that does not exist yet.
- **Named limits as load-bearing content.** Every statement is *per instance on small windows* — nothing uniform in the zone index, in D or in the gap. The T136 D -exponents (anchor $D^{-0.565}$, margin gap $D^{+2.72}$, slack $D^{0.116}$) are fits and stay in the sandbox; the structure bound assembled from the support and amplitude facts does *not* beat the margin (T137: 0 of 35 windows) and is *not* promoted; entrywise positivity of the *target* inverse at depth stays open. Stieltjes / Ostrowski 1937 / Fan 1958 / Berman–Plemmons 1979 / Varga 1962 / Frobenius 1912–Perron 1907 / Collatz 1942–Wielandt 1950 / Gershgorin 1931 / Neumann series / Haynsworth 1968 / Wilkinson 1968–Higham 2002 named classical; Demko–Moss–Smith 1984 cited as a model and *not* applied (the comparison is dense); Weil 1952 cited, never used as a criterion; zero-firewall AST-checked; NOT “almost RH”.
- **Diary Teile 136/137 (sandbox).** `m_matrix_pair_probe.py` (contract M.MATRIX.PAIR, 30/30, verdict ONE-CARRIES): the $\rho(K)$ item closes with Varga’s regular splitting and the Collatz–Wielandt bracket (sharp 1.00–1.03 on 900/900), the exact three-way bookkeeping $\lambda_{\min}(A) \sim D^{2.27} = \text{anchor } D^{-0.56} \times \text{gap } D^{2.72} \times \text{slack } D^{0.12}$ attributes the whole degradation to the margin (which is only 2.5×10^{-6} – 2.5×10^{-2} wide while every cheap bound on $\rho(E)$ sits at 1.82–3.11), and M17 closes *negatively* (the bad pencil subspace is delocalised, participation ratio 0.54–0.98, its dimension tracking the atom count at $n_{\text{bad}}/n_{\text{at}} = 1.64$ rather than the grid, so $\sigma_b(k) \geq 0.646$ everywhere); promotion list 15 $\rightarrow$ 22 ready. `long_lag_probe.py` (contract LONG.LAG, 22/22, verdict BOTH-RESIST): L_Δ is fully comb-generated (the archimedean half has a positive off-diagonal on 0 of 40 windows), the structure bound does *not* beat the margin (0/35, overshoot 24 – 7.1×10^5 gaps, second differences decaying only algebraically as $\text{dist}^{-0.63}$ where Demko–Moss–Smith would need a geometric rate), the envelope family is certified dead from below ($\rho(|E|) \geq 1.3218$ on 35/35), and the Green bracket closes two-sidedly (lower recovers 0.011–0.406 of the minimum entry, upper overshoots by 2.49–12.24). Series counter: 137 probes, 3438/3438 sandbox checks. Sandbox only for the probes: no ledger row, no marker move, not RH evidence.
- **Ledger/papers/website.** Two new ledger rows: PRIME.MMATRIX.IDENT.01 and PRIME.LONGLAG.SUPP.01; \veri citations in `tfpt_1`, `tfpt_3`, `tfpt_research_contracts` and the promotion place of `tfpt_prime_front` (verified layer now *ten* modules; phase 2 extended to

T126–T137); website mirrors (/prime-front feed entries T136/T137, status surfaces Teile 11–137 / 3438 checks, verification DAG, papers data) updated in the same change.

2026-07-28 (I) (v542 — the margin-chain identities of phase 2 promoted; v379 hardened to an exact positive-mixture Gram certificate; prime-front diary T132/T133 + website sync; NO marker moves)

- **New module v542 (PRIME.MARGIN.IDENT.01).** Promotion of the *identity/theorem block* of the discovery parts T128–T131 into one narrow load-bearing module (44 checks, ~ 0.2 s), recomputed on small frame-A windows — nothing cited from the sandbox. Scope fence: identities and *per-instance* theorems only; no fit, no graded floor, no Lanczos value, no uniform-in-zone statement. Battery: 24 seam instances ($n = 3 \dots 97$, $\rho = 1.25 \dots 4.00$, $h_c = 24 \dots 214$, $h_f = 36 \dots 299$; every inverted or diagonalised matrix ≤ 300), 43 graded/fine grid pairs ($m \leq 172$) and 400 randomised profiles; each identity is a numerical residual against a *preregistered* tolerance plus at least one mutation control that must fail by $\geq 10^{-3}$ relative.
- **(1)–(2) Border geometry and the (T) identity [E].** $\sum_i (1 - g_i) = t_l + t_r$ from the exact interval geometry (max rel 5.5×10^{-13}), so the κ weights are a probability vector and the flat border vector gives $\kappa_{\text{flat}} = 1$ *exactly* (control: a 1% perturbation of g_i breaks it by 7.9×10^{-2}); $\tau_{\text{dn}} = \|y\|^2 - m_{\text{prot}} + m_{\text{fill}} - V_{\text{bord}}$ at 2.2×10^{-16} , with τ independently recomputed from the *full* odd overlap matrix (1.1×10^{-13}); dropping any of the three correction terms breaks the identity.
- **(3)–(4) The profile identity and the curvature chain [E].** $p_{N-1} = 2 - p_0 + 2E$ at 2.3×10^{-16} (instances) / 1.4×10^{-15} (400 random profiles), hence the equivalence $2E > p_0 \iff p_{N-1} > 2$ with 0 exceptions and both branches realised (60/400); the Abel/Hölder chain $\kappa \leq 2 - p_0 + \frac{N-2}{N} \sum_j |\Delta p_j - \overline{\Delta p}| + (p_{\text{max}} - p_{N-1})$ holds per instance with 0 violations (min slack $1.0 \times 10^{-1} / 3.7 \times 10^{-2}$), while the *same* chain without the curvature term is violated on 88/400 profiles — the curvature term is load-bearing, not decorative.
- **(5)–(6) Assembly and the C ea/Strang defect [E].** The matrix-free two-scale assembly equals $J^T Q J$ (5.2×10^{-16}) and the graded overlap operator equals J (5.2×10^{-14}), reducing to the uniform odd overlap when both partitions are uniform; $S_{\text{graded}} - S_{\text{uniform}} = R^T X^{-1} R$ as a *matrix* identity on all 43 grids (2.1×10^{-14}) with a PSD defect on every grid, so the compression error is one-sided *by* the identity (controls: unnormalised merge weights 8.4×10^{-1} ; dropping the $-B$ term in R 4.0×10^{-1}).
- **(7)–(9) Sandwich, Perron implication, counting chain [E].** The secular sandwich $\varepsilon / (\|u\|^2 + \varepsilon / \mu_1) \leq \lambda_{\min}(Q) \leq \varepsilon / \|u\|^2$ holds on all 48 pole-free sections at which $A > 0$ and $\varepsilon > 0$ are *checked* (relative width ≤ 1.4448), with Albert’s sign equivalence verified in *both* directions (6 rescaled controls with $\varepsilon < 0$ all give $\lambda_{\min}(Q) < 0$); $S^{-1} > 0$ entrywise (measured 48/48) $\Rightarrow$ sign-constant *and* simple ground vector as an *implication* (tridiagonal control: hypothesis fails, conclusion fails with it); $n_{\text{run}} \leq n_{\text{cross}} + 1 \leq s_2 + 2$ and $\sum_j |\Delta p_j - \overline{\Delta p}| = \text{TV}(P)$ with 0 exceptions on a non-vacuous battery (s_2 up to 31).
- **Named limits as load-bearing content.** Every statement is *per instance on small windows* — nothing is uniform in the zone index; the κ law is *not* claimed (T129 found it false in general), only the chain underneath it; (7) assumes nothing — positivity of the pole-free section at depth (the open M25d) is not extended and no floor value is carried; (8) has a *measured* hypothesis; (6) says nothing about the *size* of the defect (the open T130 exponent). Abel / Hölder / Schur–Haynsworth 1968 / Albert 1969 / C ea 1964–Strang / Yserentant 1986 / Perron–Frobenius–Ostrowski 1937 named classical; Weil 1952 cited, never used as a criterion; zero-firewall AST-checked; NOT “almost RH”.
- **Hardening of v379 (SEAM.S3.RP.01).** T133 (CERT.FLOOR) certified that the 10×10 Hankel matrix v379 assembles has, *as a double-precision object*, a negative direction at -7.75×10^{-18}

(60 digits) — inside the module's old `min_eig > -1e-10` tolerance. The mathematical matrix is fine and the exact rescue is now in the module: the RP Gram is built explicitly as a *positive mixture* $M = V^T \text{diag}(1/1600)V$, $V_{ki} = e^{-\varepsilon_k \tau_i}$, so $x^T M x = \sum_k w_k (v_k \cdot x)^2$ is a *sum of squares* and $M \succeq 0$ holds exactly; the mixture identity is zero at the rounding level ($1.1 \times 10^{-15} \leq 64u|M|$) and the sum-of-squares route is nonnegative on 510/510 test directions where the assembled float form is negative on 2. The eigenvalue check is *retained and relabelled a diagnostic measurement*. Ledger row `SEAM.S3.RP.01` reworded accordingly (method text: exact positive-mixture Gram identity, eigenvalue check as diagnostic); **marker stays [E] — no upgrade**. 7 checks (was 5), `run_all` green.

- **Diary Teile 132/133 (sandbox).** `bd_seam_probe.py` (contract `BD.SEAM`, 21/21, verdict `SPECTRUM-ONLY`): the model boundary-Dirac and the marks kernel share their spectrum to 7.5×10^{-13} but are *not* the same operator — the gap sits in the killing mass 0.1746 (N -stable), the killing measure equals the marks profile pointwise, the Markov remainder is exactly zero with a closed jump-weight form (odd lags positive, even lags zero — which explains T126's 86.1%), and the D_4 lattice symmetries leave the triad exactly invariant; ceiling: the DtN is a model DtN, the gate is *not* closed. `cert_floor_probe.py` (contract `CERT.FLOOR`, 23/23, verdict `MIXED`, 840 control validations): the `v379` finding above plus a recommendation table — the hardening is implemented in this same change. Series counter: 133 probes, 3352/3352 sandbox checks. Sandbox only: no ledger row for the probes, no marker move, not RH evidence.
- **Ledger/papers/website.** New ledger row `PRIME.MARGIN.IDENT.01`; `\veri` citations in `tfpt_1`, `tfpt_3`, `tfpt_research_contracts` and the promotion place of `tfpt_prime_front` (verified layer now *eight* modules; phase 2 extended to T126–T133); website mirrors (`/prime-front` feed entries T132/T133, status surfaces Teile 11–133 / 3352 checks, verification DAG, papers data) updated in the same change.

2026-07-27 (IV) (prime front: T111 deep ladder maps three walls, crossing measured at $n \approx 462$ — CROSSING-CONFIRMED; paper + diary + website sync; NO marker moves)

- **Diary Teil 111 (sandbox).** `experiments/tfpt-discovery/deep_zone_stress_probe.py` (contract `DEEP.ZONE.STRESS`, 23/23 checks, 140s, verdict `CROSSING-CONFIRMED`): the probe stops extrapolating and measures — the T110 grid is reproduced bit-exactly, then the ladder is extended to every prime-power zone $n \leq 1000$ plus a thin tail to 3001 (199 zones; chain ladder $n = 2 \dots 521$ with 117 handovers). The ratio $m_k/\text{need109}$ falls $179.59 \rightarrow 0.0174$; the crossing is *measured*: last zone ≥ 1 at $n = 461$, first below at $n = 463$ (0.935) — T110's $n \approx 170$ was a fit artefact, but the wall is real, and a depth-preserving resolution study makes $n^* \approx 462$ an *upper* bound. The failure follows the prime branch (prime powers 512/529/625/729 survive longer). New and harder: the *ladder wall* — the nested step needs a lag gap $> 2D$, and the twin-prime pair $521 \rightarrow 523$ (gap $0.003831 < 2D = 0.005617$) kills the ladder arithmetically (arithmetic scan to 40 000: 4052/4284 pairs endangered; co-moving $D \sim 1/n$ forces $h \sim n \log n/4$). The no-reserve finding softens ($f_{\text{crit}} \sim n^{-0.39}$, the reserve opens with depth); the circle breaks first at $k = 109$, $n = 463$ — it tears at the ratio, not at a step: all 117 handovers certify at retention 1.000000 (largest single loss 5.96×10^{-8}), atom entry free 117/117. Three separate walls: margin $n \approx 462$ (measured), ladder $521 \rightarrow 523$ (twin primes), requirement $n = 727$ ($\omega_{\text{cert}} \geq 1$, need109 vacuous on 46 zones). Reinterpretation: the operating variable is the window *depth*, not n (cheek doubling moves the wall $463 \rightarrow 47$); a proof must beat the exponent gap $-0.974 = -0.681 - 0.293$ and couple δ_0 to the local prime gap. Follow-up probe T112 (`adaptive_scaling_probe.py`, contract `ADAPTIVE.SCALING`, the n -adaptively scaled frame) is running. Series counter: 111 probes, 2781/2781 sandbox checks. Sandbox only: no ledger row, no marker move, not RH evidence.
- **Paper `tfpt_prime_front`.** Certification-arc section extended to T102–T111 (new subsection

“The three walls (T111)”); the T110 three-gaps box and the $n \approx 170$ mentions corrected to the measured $n^* \approx 462$ (fit artefact noted); reduction-cascade caption, two-doors figure chain, three-way status split and asymptotic-mountain section updated (the three walls as the measured formulation; depth-not- n reinterpretation; T112 running); abstract and probe-index appendix updated (T111 row; series counter 111/2781; T112 recorded as running and deliberately absent).

- **Website.** /prime-front: T111 feed entry (`lib/primeFront.ts`, new verdict enum `CROSSING-CONFIRMED`), status line in the two-doors convergence panel (T111 + T112 running), hero counter Teile 11–111 / 2781 sandbox checks, program-status callout sentence for T111.

2026-07-27 (III) (prime front: T110 margin propagation closes the measured-zone circle — MARGIN-PROPAGATES; paper + diary + website sync; NO marker moves)

- **Diary Teil 110 (sandbox).** `experiments/tfpt-discovery/margin_propagation_probe.py` (contract `MARGIN.PROPAGATION`, 28/28 checks, 7.6s, verdict `MARGIN-PROPAGATES` with a precision statement): the induction circle closes end to end on the measured zones — the base case $n = 2$ is certified by an explicit Cholesky at three resolutions ($\lambda_{\min} \geq 6.93 \times 10^{-2}$, factor 88–180 over need), the graded Loewner minorant holds all 15 handovers with retention 1.0000 (the strictly scalar variant closes 0/15), and the atom entry costs nothing — it *raises* $\lambda_{\min}$ on 15/15 (first-order Kato term with helping sign; at $n = 29$ the atom-free window is not even positive, -9.2×10^{-3}). Margin map: $m_k \geq \text{need109}$ on 16/16 zones (ratio 2.09–179.6); the growth step splits exactly (embedding error $\leq 2.6 \times 10^{-14}$; $\max |\mu N| = 0.0$ on 15/15); scalar routes killed (bordered Weyl 0/15; Schur/Friedrichs cap vacuous 15/15). Three sharp gaps remain: no reserve ($f_{\text{crit}} = 1.00$ at the first handover; retention $1 - 2 \times 10^{-7}$), no scalar step law (structurally excluded by the boundary layer), no k -uniformity (trend $m_k \sim n^{-1.93}$ against $\text{need109} \sim n^{-0.98}$, extrapolated crossing $n \approx 170$). Follow-up probe T111 (`deep_zone_stress_probe.py`, contract `DEEP.ZONE.STRESS`, the deep ladder to $n \sim 200$) is running. Series counter: 110 probes, 2758/2758 sandbox checks. Sandbox only: no ledger row, no marker move, not RH evidence.
- **Paper `tfpt_prime_front`.** Certification-arc section extended to T102–T110 (new subsection “The margin propagates: the circle closes on the measured zones” with the three gaps as a key box); reduction-cascade caption and two-doors figure chain extended to T110; kill list extended by the T110 scalar-step-law kill; three-way status split and asymptotic-mountain section sharpened (the three gaps as the precise formulation; the $n \approx 170$ warning; T111 running); abstract and probe-index appendix updated (T110 row; T111 recorded as running and deliberately absent); symbol-table row for $m_k/\text{need109}$.
- **Website.** /prime-front: T110 feed entry (`lib/primeFront.ts`, new verdict enum `MARGIN-PROPAGATES`), status line in the two-doors convergence panel (T110 + T111 running), hero counter Teile 11–110 / 2758 sandbox checks, program-status callout sentence for T110.

2026-07-27 (II) (prime front: T109 boundary certificates close (R) conditionally — BOUNDARY-CERTIFIED; paper certification arc T102–T109 + diary + website sync; NO marker moves)

- **Diary Teil 109 (sandbox).** `experiments/tfpt-discovery/boundary_decay_probe.py` (contract `BOUNDARY.DECAY`, 29/29 checks, 47.2s, verdict `BOUNDARY-CERTIFIED`): both remaining scalars of (R) are certified — ω *unconditionally* via a graded matrix cap in PSD order (one level per soft direction, Cholesky-verified, $\omega_{\text{cert}} = 0.2561\text{--}0.7569$ against measured $0.2366\text{--}0.7531$, factor 1.004–1.124, no hypothesis input; the T108 compression Schur distance shrinks $0.18\text{--}0.52 \rightarrow 0.0024\text{--}0.039$), the boundary value via a residual / goal-oriented certificate (Prager–Synge) that *carries* the cancellation (sharpness 1.0000–2.4937, 16/16 in budget). Mechanism finding: no decay — *cancellation* ($44\text{--}4.6 \times 10^4$ on 15/16 zones); the Combes–Thomas route is refuted with the exact Green row (1/16). The full chain closes 16/16 (margin 1.3–10.4, M -stable

to 3000) conditional on exactly *one* input: the strict positivity margin $\lambda_{\min}(Q|_{\text{odd}}) \geq 1.7 \times 10^{-6} - 7.5 \times 10^{-3}$, i.e. 10^2 – 10^6 below $\mu/2$. Follow-up probe T110 (`margin_propagation_probe.py`, contract `MARGIN.PROPROPAGATION`) is running. Series counter: 109 probes, 2730/2730 sandbox checks. Sandbox only: no ledger row, no marker move, not RH evidence.

- **Paper `tfpt_prime_front`.** Certification-arc section extended to T102–T109 (new subsection “Boundary certificates: cancellation, not decay”); the reduction cascade figure now ends at the one strict-positivity margin input; two-doors figure chain extended to T109; kill list K8 extended by the T109 Combes–Thomas kill; three-way status split (certified / measured / classical) updated; abstract and probe-index appendix updated (T109 row; T110 recorded as running and deliberately absent); symbol table rows for $x/h/x_0$ and $\omega/\omega_{\text{cert}}$.
- **Website.** `/prime-front`: T109 feed entry (`lib/primeFront.ts`, new verdict enum `BOUNDARY-CERTIFIED`), status line in the two-doors convergence panel, hero counter Teile 11–109 / 2730 sandbox checks, program-status callout sentence for T109.

2026-07-27 (I) (new companion `tfpt_prime_front` — the prime / zeta line documented end to end as RESEARCH DOCUMENTATION; NO new claims, NO marker moves)

- **New companion paper `tfpt_prime_front` (P).** 22 pages, 9 sections plus two appendices, 8 TikZ figures. It documents the complete prime / zeta line of the project from the first $\mu_4 \Rightarrow \chi_4$ observation to the current residual — explicitly a *documentation of a research route*, not a results paper. Registered in `tex-artefacts/tfpt_docset.tex` as the fifth companion.
- **Framework interpretation stated once, up front.** Section 3, “The big picture”, collects the reading that motivated the line and labels it as interpretation: the E_8 shell count $N(2n) = 240\sigma_3(n)$ is the Dirichlet series $240\zeta(s)\zeta(s-3)$; the μ_4 glue carries χ_{-4} , so the $4k+1 / 4k+3$ split is a fibre property of the compiler and the signed channel is the only pole-free one; Hecke structure is emitted by lattice adjacency (v535) rather than put in; E_8 is unimodular, so Poisson summation gives the theta sum an exact functional equation whose fixed axis is the critical line — the same reflection that reappears as $J_1 \circ J_{1/2} = e^{\pm u}$ (the transport operator, T83) and as the parity split of the Weil pole (T106). Explicitly typed as a picture, not a reformulation, and not used as a premise anywhere.
- **Verified layer restated, not extended.** Sections 4.1–4.7 restate the seven load-bearing modules v535–v541 with their ledger status markers quoted verbatim (Hecke from geometry, Eichler trace layer, half-integral bridge, relative-trace identity, Weil structure family, amplitude linear carrier, matching-lemma / transport ledger). The `\veri` citations in this paper are the only citations it makes; no ledger row is added, moved or upgraded.
- **Sandbox layer marked as sandbox throughout.** The localization program (I5, the Connes–Consani dictionary, the tightness map, the Sonin crossing, the blind prime demo), the handover induction and the certification arc are carried as clearly tagged *sandbox* content with a per-section provenance marker; every quantitative statement carries its probe label (Tn) and is reproduced verbatim from the research diary. All measured quantities are declared as measured, all window results as window results, all hypothesis inputs as hypothesis inputs.
- **Kill list as a first-class section.** Section 8 records the refuted readings and dead routes of the program (essential-singularity reading, the C/g proxy law, the naive margin route, the density chain, the Landau–Widom anchor, the accumulated invariant with self-propagation, the symbol route for the odd channel, three certificate candidates for the avoidance norm), each with the probe that killed it.
- **Explicit RH fence.** The paper states in the abstract, in the scope-and-status statement, in the reduction figure and in the status section that *no progress on the Riemann Hypothesis is*

claimed; the I5 $\Leftrightarrow$ Weil positivity $\Leftrightarrow$ RH relation is carried, as in the ledger, as an equivalence *typing* only. ZETA.HP.CARRIER untouched.

- **Appendices.** Probe index T11–T108 (98 parts, 99 runs, 2509 green checks; the diary’s own series counter at T108 reads 108 probes / 2701 checks including the ten parts that predate the current diary file) with contract, verdict and check count per probe, plus a symbol table for the sandbox objects used in the figures. T109 (`boundary_decay_probe.py`) was running when the document was written and is deliberately absent.

2026-07-25 (XIX) (v541 — matching lemma and transport ledger package: two named limits as content; NO marker moves)

- **New module v541 (RTF.GNS.LEDGER.01).** Promotion of the discovery proof package T78/T79/T80/T81/T82/T85 into one load-bearing module (33 checks, ~ 10 s); every core check is *recomputed* from scratch, not cited. Companion to v538/HECKE.GEOM.RTF.01, v539/RTF.GNS.WEIL.01 and v540/RTF.GNS.AMP.01. Classical Gronwall 1913 / Robin 1983 *unconditional* / Cohen 1975 / Hecke 1918–1920 / Cornacchia / Fermat–Gauss / Dirichlet $L(1, \chi)$ / Mertens-AP / Landau 1908 / Legendre duplication / Weil 1952–Guinand–Bombieri / Alaoglu–Erdős named classical — NEW is the compiler-native consolidation and the machine-checked window proofs.
- **(A) Window proof [E].** The matching lemma is *proved exact-integer* on $[4, 10^6]$: $7S(j) < 40A(j)$ at every atom (0 violations over 939 870 clash atoms; full enumeration, no-overflow proven, big-integer rechecks); exact margin $X = 22242575693/270725400000 = 0.082159$ at $j^* = 554400$; $\rho_{\text{crit}} = 1.1440 > 21/20$; maximal-greedy identity $\Rightarrow$ uniform in the target set and the greedy weights. Structure laws at 0 tolerance: 8-law ($n \leq 250000$), seed-tower + ψ w -table ($n \leq 50000$), Cohen seeds $\{-48, -80, -8, -8\}$ ($s \leq 2000$), bracket $\Theta \leq 2|\psi| \leq 3\Theta$ on 10^6 .
- **(B) Transport ledger [E].** $Q_{\text{Weil}} = Q_{\text{cert}} + \Delta_{\text{arch}} + \Delta_2$ closes with $\Delta_{\text{pole}} \equiv \Delta_{\text{conv}} \equiv 0$ *proven* (sympy kernel collapse; quadrature 2.8×10^{-16} ; exact scale invariance); ledger residual 4.4×10^{-16} on 24 battery rows; the odd-prime side of the Weil functional equals the certified plus combination $P_{\zeta}(g_-) + P_{\zeta}(g_+)$ exactly (rel 3.9×10^{-16}).
- **(C) Character-exact signed envelope [E].** $-\psi = (\chi_{-4} + \frac{1}{4}\chi_8 + \frac{1}{4}\chi_{-8}) \cdot \Theta$ coefficient-exact on all odd $n \leq 50000$ (both builds); signed certificate 0 violations, margin factor 8.86 $\times$; confinement *set equality* on 10^6 : zero-credit clash atoms = χ_{-4} -coherent odd composites.
- **(D) Archimedean term internal [E].** Legendre duplication bridge $(2\pi)^{-s}\Gamma(s) = \frac{1}{2}\Gamma_{\mathbb{R}}(s)\Gamma_{\mathbb{R}}(s+1)$ (sympy + 1.8×10^{-41}); kernel identity $k_{\zeta} = K_{\text{fam}} - K_{\text{shift}}$ pointwise 7.9×10^{-31} on 51 points; $\Delta_{\text{arch}}(h) = A_{\text{fam}}(h) - A_{\text{shift}}(h)$ on a 10-row battery subset at rel 9.9×10^{-16} .
- **(E) λ -equivariant channel [E].** CM carrier $g_{\lambda} = \sum_{\mathfrak{a}} \lambda_1(\mathfrak{a})q^{N_{\mathfrak{a}}}$ exact in two independent routes ($\mathbb{Z}[i]$ lattice vs Cornacchia reconstruction, 0 mismatches $n \leq 10^4$); CM laws exact; $\text{supp}(c_1) = \{\mathbb{Z}[i]\text{-norms}\}$ as a set equality; canonical phase mean $\mu_1 = c_1/(c_0 d^2) \in [-1, 1]$ exact; λ -window certificate 0.0653 vs 0.2365 unlifted (3.6 $\times$), exact Fraction rechecks.
- **(F) Frontier facts [C].** Unlifted coherent chain crossing $k^* = 14$ (exact Fractions; $\log_{10} N^* = 23.1$); absolute Robin tail factor 6.16 at $J = 10^6$ and divergent — the constant route stays open (window constants with declared classical all- n extension).
- **Named limits as load-bearing content.** (i) *One* classically-shaped open lemma remains — the correlated-cancellation lemma on credit-rich non-coherent tail atoms (uniform form); provably-shaped $\neq$ formal proof. (ii) I5 in *one-family* form ($Q_{\text{cert}} + \Delta_2 + A_{\text{fam}} - A_{\text{shift}} \geq 0$) is the single remaining TFPT-specific object — by the closed ledger *equivalent* to Weil positivity $\Leftrightarrow$ RH (an equivalence *typing*, no progress claim). NOT “almost RH”; ZETA.HP.CARRIER untouched; no marker moves.

- **Ledger/papers/website.** New ledger row `RTF.GNS.LEDGER.01`; \veri citations in `tfpt_1`, `tfpt_3`, `tfpt_research_contracts`; Wolfram extension mirrors the exact algebraic identities; website mirrors (/prime-front feed, verification DAG, papers data) updated in the same change.

2026-07-25 (XVIII) (v540 — amplitude route and positive linear carrier: open boundary λ^* as content; NO marker moves)

- **New module v540 (RTF.GNS.AMP.01).** Promotion of the discovery amplitude chain T67/T68/T69/T70/T71/T72 into one load-bearing module (34 checks, ~ 3 s). Companion to v538/HECKE.GEOM.RTF.01 and v539/RTF.GNS.WEIL.01: the machine-checked route out of the square plane behind the two v539 obstructions. Classical Cohen 1975 / Siegel–Weil / Jacobi–Fricke / Landen / Hecke split-Mellin / Cauchy–Littlewood / Möbius square sieve / Shimura / Shintani / Weil 1952 / Farkas named classical — NEW is the compiler-native consolidation.
- **(A) Amplitude Dirac [E].** $D = \begin{pmatrix} 0 & V \\ V^\top & 0 \end{pmatrix}$ with $V[d, m] = \sqrt{w_d} b(d) \chi_d(m)$: $D = D^\top$; $D^2 = \text{diag}(VV^\top, K)$, $V^\top V = K$ (rel 2.7×10^{-16}); spectrum = $\pm$ singular values; Hecke intertwining exact ($p = 3, 5, 7$); Shimura $b(dp^2) = b(d)(a_p - \chi_d(p)p)$ integer-exact on 644 pairs.
- **(B) Geometric polarisation + Cohen seed [E].** $b = N_+ - N_-$, $\Theta = N_+ + N_-$ lattice-exact; $N_\pm \geq 0$ and $b^2 = \Theta^2 - 4N_+N_-$ for all $n \leq 50000$; Θ is a *pure* Siegel–Weil Eisenstein σ_3 -eigenform ($p \leq 13$, cusp component zero); Cohen seed $\Theta(d) = -48 L(-1, \chi_d)$ exact-rational on 159 live d .
- **(C) Deletion universal = square-class double counting [E].** Cauchy–Littlewood window lemma (free Satake symbols, $k \leq 6$): numerator $1 - stuv X^2$, hence $1 - p^6 X^2$ pair-independent at $st = uv = p^3$ (five channels); and fam $[1, 0, 2, 0] + 2b[0, 2, 0, 2] + \delta_{k1} = [2, 2, 2, 2]$ generating-function exact (Möbius square sieve exact $n \leq 2000$).
- **(D) Positive linear carrier + plus balance [E].** $\ell^2(d, \mu)$ with $\mu = 48 |L(-1, \chi_d)| |d|^{-a}$: full weights $\lambda_k = 1 + p^{3k} - (\chi p)^k$ (layer $[1, 1, 1, 1]$); $Q = Q_\zeta(g_-) + Q_\zeta(g_+)$ (rel 2×10^{-15}); the b /doubling kernel enters *with plus* (sign inverted vs the v539 square-plane minus).
- **(E) Functional equation exact [E].** $\Theta(i/(8y)) = 8y^{5/2} \Theta^\dagger(iy)$ (rel 6×10^{-41} , Fricke closed); $\Lambda_\Theta(s) = 8^{1-s} \Lambda_{\Theta^\dagger}(5/2 - s)$ in the strip (rel 1.4×10^{-40} , independent split points); poles $5/2$ / 0 swapped; centre $5/4$, plus-locus offset exactly $1/4$.
- **(F) Cone facts + named open boundary [C].** Guaranteed cone and library hull FE-self-dual, gap functional λ^* FE-covariant (36/36 sampled); mirror sign law $\text{sign } \psi(n) = (-1)^{\lfloor n/2 \rfloor + 1}$ exact ($n \leq 50000$); constraint class $C_{L3} = \{n \equiv 6 \pmod{8}\}$; λ^* exists with one exact Farkas witness ($\lambda_{L3}^* = 0.0511$ at $n^* = 6$); coverage saturates — the residual distance to the Weil cone *is* λ^* on $n \equiv 6 \pmod{8}$.
- **Fences.** Euler-region positivity only (edge L -values, not the central line); not “almost RH”; λ^* is the named open boundary *inside* the claim; ZETA.HP.CARRIER untouched; no marker moves.
- **Surfaces.** Ledger `RTF.GNS.AMP.01`; \veri in `tfpt_1`/`tfpt_3`/`tfpt_research_contracts`; Wolfram extension +5 (613 $\rightarrow$ 618); website `papers.ts` + `VerificationDag E8` + `primeFront.ts` + `ScriptIndex` via `bash build.sh gen`.

2026-07-25 (XVII) (v539 — Weil structure of the compiler family: two isolated obstructions; NO marker moves)

- **New module v539 (RTF.GNS.WEIL.01).** Promotion of discovery probes T55/T61/T62/T63 (Route-B chain) into one load-bearing module (25 checks, ~ 6 s). Companion to v538/HECKE.GEOM.RTF.01: the compiler family carries a fully identified Weil structure up to *two explicitly isolated obstructions* (obstructions are prominent verified content, not a

footnote). Classical Weil 1952 / Gelfand / direct integrals / SU(2)–Chebyshev / Sato–Tate / 2^ω -series / GNS named classical — NEW is the compiler-native identification and the machine-checked isolation of the two obstructions.

- **(A) GNS fibre structure [E]**. Metric $\ell^2(d, b^2/|d|)$ diagonal; fibres $\sigma(d) = (\chi_d(3), \dots, \chi_d(13))$ partition the live family (1191 fund. $d \leq 12000$); Λ_{fam} exact constant on each fibre; twist-mix per fibre $\leq 5.037 \times 10^{-16} < 10^{-12}$.
- **(B) Isotype / GL(1) core [E]**. Character expansions $\Phi_1 = \chi_0 + \chi_2$, $\Phi_2 = \chi_4 - \chi_2$, $\Phi_3 = 2\chi_0 - \chi_4 + \chi_6$, $\Phi_4 = \chi_8 - \chi_6$; core series $c_{k,0} = [1, 0, 2, 0, 2, 0]$; $G_0 = (1 + Y)/(1 - Y) = \zeta_p(w - 3)^2/\zeta_p(2w - 6)$; global $\zeta(u)^2/\zeta(2u) = \sum 2^{\omega(n)}n^{-u}$ (Dirichlet exact through $n \leq 2000$).
- **(C) Weil linear relation [E]**. $\text{Prime}_F = 2P_\zeta(g) - 2P_\zeta(g_b)$ (max rel 9×10^{-16}); $Q_{\text{fam}} = Q_F + \text{Corr}$ (rel 2×10^{-16}).
- **Obstructions as verified content [E]**. (1) Doubling enters with a *minus* (family positivity does *not* imply $Q_\zeta \geq 0$). (2) Plancherel Corr non-automorphic: polar/arch absorption FAIL; finite Euler factor FAIL; $e^{-\sum p^{-u}}$ PASS.
- **Finite-class positivity [C]**. $Q_{\text{fam}} \in [4.369, 11.486]$ on the finite test class; dense-class positivity open / RH-adjacent — *not* claimed.
- **Fences**. Not “almost RH” — the claim structurally shows why family positivity does not imply RH; ZETA.HP.CARRIER untouched; no marker moves.
- **Surfaces**. Ledger RTF.GNS.WEIL.01; \veri in `tfpt_1/tfpt_3/tfpt_research_contracts`; Wolfram extension +5 (608 $\rightarrow$ 613); website `papers.ts` + VerificationDag E8 + `primeFront.ts` + ScriptIndex via `bash build.sh` gen.

2026-07-25 (XVI) (v538 — compiler relative-trace identity: three projections of one finite RTF; NO marker moves)

- **New module v538 (HECKE.GEOM.RTF.01)**. Promotion of discovery probe T53 (`relative_trace_compiler_probe.py`) into one load-bearing module (18 checks, ~ 14 s). Companion synthesis of v535/HECKE.GEOM.01, v536/HECKE.GEOM.EICHLER.01 and v537/HECKE.GEOM.HALFINT.01: these are three *projections* of one finite relative-trace identity $[E_8/\text{glue orbital counting}] = [\text{Newform/Waldspurger spectral sum}]$, not three separate results. Classical Jacquet-type RTF / Eichler / Witt / Waldspurger / theta correspondence named classical — NEW is the compiler-native realisation and the machine-checked bilateral independence.
- **(R1) Trace identity, both sides independent [E]**. $\text{Tr}_V(\nu_p \circ \pi)$ geometric ($a_p = -c(p)/8$ from the glue census, no modular input) equals spectral (a_p from $\eta(2\tau)^4\eta(4\tau)^4$, no geometry) for all $(p, \pi) \in \{3, 5, 7\} \times \{\text{Id}, \pi_{\text{Eis}}, \pi_{\text{cusp}}, \pi_{E_4}, \pi_{f_8}\}$. Anchors (Id, Eis, cusp, E_4 , f_8): $p=3$: (6304, 5600, 704, 1120, 352); $p=5$: (105848, 98280, 7568, 19656, 3784); $p=7$: (727680, 688000, 39680, 137600, 19840).
- **(R2) Orbit dictionary [E]**. The Eichler split $\lambda_{\text{geom}} = \lambda_{\text{Eis}} + a_p^2$ is the RTF orbit decomposition (principal orbit $a \cdot \text{Id} \rightarrow \lambda_{\text{Eis}} = L - \sigma_3^2$; elliptic $b \cdot T_p \rightarrow a_p^2$; cross terms cancel). Anchors $\lambda_{\text{Eis}} = 336/3780/19264$, $a_p^2 = 16/4/576$.
- **(R3) Period side is lattice counting [C]**. g is the quaternary form $n = (x^2 + y^2)/2 + 2z^2 + u^2 + 2w^2$ (x, y odd; sign $(-1)^{|u|+|w|}$); $b_{\text{rep}} = b$ exactly through $n \leq 200$; then $[\text{signed lattice count}]^2 = R \cdot |d|^{3/2} \cdot L(f_8 \times \chi_d, 2)$ with $R = 23.1873585645$ (rel $\sim 10^{-12}$). Verdict ONE-FORMULA.
- **Fences**. Identity is *finite* ($p \in \{3, 5, 7\}$, finite d -windows); the *infinite* RTF (sum over all p and d + archimedean term) is the named open step; no RH; not ZETA.HP.CARRIER-relevant; no marker moves.

- **Surfaces.** Ledger HECKE.GEOM.RTF.01; \veri in tfpt_1/tfpt_3/tfpt_research_contracts; Wolfram extension +5 (603 → 608); website papers.ts + VerificationDag E8 + primeFront.ts + ScriptIndex via bash build.sh gen.

2026-07-24 (XV) (v537 — half-integral bridge: unique Shimura preimage + $T(p^2)$ Hecke equivariance + Kohnen scope fence + Waldspurger/Baruch–Mao constancy; NO marker moves)

- **New module v537 (HECKE.GEOM.HALFINT.01).** Consolidated promotion of discovery probes T38/T41/T44/T45 into one load-bearing module (20 checks, ~ 90 s). Companion to v535/HECKE.GEOM.01 and v536/HECKE.GEOM.EICHLER.01 without duplicating weight-4 Kneser/Eichler checks. Classical Shimura/Kohnen/Waldspurger/Baruch–Mao named classical — the claim is the unique signed-scale monoid preimage, the in-suite chain, and the *measured* constant R .
- **(A) Unique Shimura preimage at scale -8 [E].** In the 70-element compiler weight-5/2 theta-monoid exactly one object satisfies $\text{Sh}_{t=2, \psi=1}(g) = -8 f_8$ (witness $g = \vartheta_2(q^2)^2 \vartheta_3(q^2) \vartheta_4 \vartheta_4(q^2)$, verified through $n \leq 120$); three further monoid elements lift to scales $+8, -16, +16$.
- **(B) Hecke equivariance [E].** Exact $T(p^2)$ -eigenform, trivial nebentypus, with $\lambda = a_p(f_8)$ for $p = 3, 5, 7, 11, 13$ ($-4, -2, 24, -44, 22$); trial FE $N = 512$, $\varepsilon = +1$ (centre $5/4$).
- **(C) Kohnen scope fence [E].** $U_4(g) = 0$ (mass mod 4 on $\{1, 2\}$); level $32 = 4 \cdot 8$ outside Kohnen 1982 — plus-route structurally closed (negative result part of the claim).
- **(D) Waldspurger/Baruch–Mao constancy [C].** AFE twist L -values ($\varepsilon_d = \chi_d(8)$); $R(d) = 23.1873585645\dots$ constant on ten fundamental $d \equiv 1 \pmod{8}$ (spread $\leq 10^{-12}$, including $d = 89$); $d \equiv 5 \pmod{8}$ vanishes.
- **Fences.** $\text{GL}(2)$ centre $s = 2$, not the ξ -line; no RH; ZETA.HP.CARRIER untouched; no marker moves.
- **Surfaces.** Ledger HECKE.GEOM.HALFINT.01; \veri in tfpt_1/tfpt_3/tfpt_research_contracts; Wolfram extension +5 (598 → 603); website papers.ts + VerificationDag E8 + ScriptIndex via bash build.sh gen.

2026-07-24 (XIV) (v536 — Eichler trace layer at the E_8 lattice: Witt λ_{Eis} + two-sided Eichler identity + Type-A/B local densities + signed a_p ; NO marker moves)

- **New module v536 (HECKE.GEOM.EICHLER.01).** Consolidated promotion of discovery probes T33/T36/T37/T42 into one load-bearing module (23 checks, ~ 30 s). Builds on v535/HECKE.GEOM.01 (Kneser counts, ν_p law, oldforms) without duplicating those checks. The claim is *not* RH-related: the Eichler/Witt package of the μ_4 -glue census is lattice-native and two-sided in-suite.
- **(A) Witt layer [E].** $\lambda_{\text{Eis}} = \sigma_3(\#\mathbb{P}^3 - \sigma_3) = L - \sigma_3^2$ identically (sympy) and for all 24 odd primes $p \leq 100$; anchors $\lambda_{\text{Eis}}(3, 5, 7) = (336, 3780, 19264)$.
- **(B) Eichler identity [E]/[C].** $\lambda_{\text{geom}} = \lambda_{\text{Eis}} + a_p^2$; type-(i) $N_{\perp} = (p^6 - 1)/(p - 1)$ live constant on all 240 roots at $p = 3, 5$; type-(ii) live at $p = 3$ ($352 = 364 - 12$) with Kneser filter = identity; $p = 5$ T36-validated freeze ($3784 = 3906 - 122$, $R = 4$; Shell(25) re-enumeration budget-gated); assembler $R(p) = \sigma_3 - 1 - c(p^2)/8 = a_p^2$; $R(7) = 576$ prognosis (Shell(49) out of scope).
- **(C) Local densities [E].** Type-A = isotropic cosets representing the integer p ; $N_A = \min(240(1 + p^3), p^7 + p^4 - p^3 - 1)$, $N_B = (\#\text{iso} - 1) - N_A$; B empty iff $p^4 < 241$ (only $p = 3$); $p = 7$ live 82560/743040; injectivity at $p = 11, 13$; fibre refinement scoped to $\{5, 7, 11\}$.

- **(D) Signed extraction [E].** $a_p = -c(p)/8$ from geometric $\text{Shell}(p)$: $(-4, -2, +24)$ at $p = 3, 5, 7$; $b = \sigma_3 + a_p \in \{24, 124, 368\}$ (hooks the ν_p law of v535).
- **(E) $O(1)$ assembler [E].** $\lambda_{\text{geom}}(p)$ and $R(p) = a_p^2$ for all odd $p \leq 31$ against the eta product f_8 (Ramanujan bound included).
- **Fences.** Classical Eichler/Siegel/Witt named classical — the claim is in-suite two-sidedness (mod- p geometry left, eta product right) and the closed compiler densities; no RH statement; $\text{Shell}(p^2)$ for $p \geq 7$ out of scope; weight-4 $\rightarrow \text{GL}(1)$ stays [O]; no marker moves of any pre-existing contract.
- **Surfaces.** Ledger `HECKE.GEOM.EICHLER.01`; `\veri` in `tfpt_1/tfpt_3/tfpt_research_contracts`; Wolfram extension mirrors (exact Witt/density/assembler/ a_p identities); website `papers.ts` + `VerificationDag E8` + `ScriptIndex` via `bash build.sh gen`.

2026-07-24 (XIII) (v535 — Hecke from geometry: Kneser correspondence + affine neighbour-sum + 2-adic oldform recovery on the E_8 census channels; NO marker moves)

- **New module v535 (HECKE.GEOM.01).** Consolidated promotion of discovery probes T27/T31/T32 into one load-bearing module (25 checks, ~ 11 s). The claim is *not* RH-related: the Hecke structure of the μ_4 -glue census is lattice-native.
- **(A) Kneser carries Hecke [E].** $\#iso_pts = p^7 + p^4 - p^3$ and $\#iso_lines = \sigma_3(p) \# \mathbb{P}^3(\mathbb{F}_p)$ identically and by full enumeration at $p = 2, 3, 5, 7$ (135/1120/19656/137600 lines) — the Eisenstein eigenvalue $\sigma_3(p) = 1 + p^3$ is an exact factor of a lattice-native correspondence count.
- **(B) Neighbour-sum = affine Hecke element [E].** $\nu_p = a \text{Id} + b T_p$ exactly (overdetermined, residual 0) with $b = \sigma_3 + a_p$, $a = \#lines - b\sigma_3$; cusp rule $a_p = b - \sigma_3$ recovers $a_3 = -4$, $a_5 = -2$ ($p = 3$ live orbit-reduced; $p = 5$ T31-validated freeze of $S[1]$ with $\lambda_{\text{odd}} = 3784$); $p = 7$ consistency $\lambda_{\text{odd}} = \#lines - \sigma_3^2 + a_p^2 = 19840$; placebo fails.
- **(C) Redundancy = 2-adic oldform structure [E].** $\dim_{\mathbb{Q}} V = 7 = 5$ (E_4 -copies, levels 1, 2, 4, 8, 16) + 2 (f_8 -copies, levels 8, 16); every Θ_j an explicit $\mathbb{Q}$ -linear combination; recovery $\pi_{\text{cusp}} = (28 - T_3)/32$, $\pi_{\text{Eis}} = (T_3 + 4)/32$, newform via $(1 - V_2 U_2)$; new quotients each dimension 1; level census purely 2-adic.
- **Fences.** Classical theorems (Kneser, Hecke, Atkin–Lehner, multiplicity one) named classical — the TFPT content is the in-suite mechanics. No RH statement. Weight-4 restriction named: $\text{GL}(1)/\text{weight-drop transport}$ stays [O]. No marker moves.
- **Surfaces.** Cited in `tfpt_1`, `tfpt_3`, `tfpt_research_contracts`; ledger row `HECKE.GEOM.01`; Wolfram extension +5 exact mirrors ($588 \rightarrow 593$); website sync.

2026-06-24 (Clockwork coherence + an open question: v394 primes = atoms = facets, and RES.COXETER.SYMMETRY.01)

- **v394 (COXETER.ATOMS.01) — the three Coxeter primes ARE the three anchor atoms ARE the three number-field facets.** A bird’s-eye [E] re-reading tying v390 (the prime facets) to the anchor $a = (1, 1, 2)$ and v319 (the 5×6 clock). [E] $a = (1, 1, 2)$ has $e_3=2=|Z_2|$, $p_0=3=N_{\text{fam}}$, $e_2=5=g_{\text{car}}$, product $2 \cdot 3 \cdot 5 = 30 = h(E_8)$ — the clock’s primes *are* the anchor’s atoms. [E] atoms = facet fields (v390): $2 \rightarrow \mathbb{Q}(i)$, $3 \rightarrow \mathbb{Q}(\sqrt{-3})$, $5 \rightarrow \mathbb{Q}(\sqrt{5})$, each ramified at its prime. [E] the QG susceptibility is pure $\{2, 3\}$: $\chi = 1/(1 - (2/3)^6) = 729/665 = 3^6/(3^6 - 2^6)$, $(2/3)^6 = 2^6/3^6$, exponent 6 = $2N_{\text{fam}}$. [E] both dynamic rates carry prime-2: $2/3 = |Z_2|/N_{\text{fam}}$ and $(\varphi+2)/4 = (\varphi+2)/|\mu_4|$ with $|\mu_4|=4=2^2$. [E] $30 = 5 \times 6 = g_{\text{car}}(2N_{\text{fam}})$ (v319). [C] the prime-2 seam is the universal dynamical engine; prime-3 (family) and prime-5 (carrier golden) the two attractors.

- **RES.COXETER.SYMMETRY.01 — a new registered open research question.** Is the prime-2-as-common-factor reading *forced* (the seam involution provably in every sector’s gap, no independent prime-2 attractor), or is there a residual asymmetry? Resolving it would either tighten v383’s “every sector is the same gapped operator” to “the same *seam-driven* operator” (with the falsifiable corollary that no prime-2-only attractor exists), or reveal a missing dynamical slot. Tracked in `tfpt_research_contracts`; a question, not a claim. Cited in `origin_theory`; Python-only.

2026-06-17 (The QFT skeleton on the seam: thermal time, GNS/OS reconstruction, DHR sectors, the braiding S-matrix, and the 4d spectral-action contract, v239–v244)

- **Six emergent-QFT skeleton scripts (v238).** `v239_kms_thermal_time.py` (DYN.KMS.01): the modular flow is KMS at $\beta = 1$, and $2\pi = 1/(4c_3)$ fixes the modular temperature as $T_H = c_3/M$ — thermal time = horizon time. `v240_gns_os_reconstruction.py` (DYN.GNS.01): GNS reconstructs the Hilbert space from $(\mathcal{M}, \omega)$ and the OS Hamiltonian $H_{OS} = -\log T = -L$ is positive with gap Δ (the v64 mass gap). `v241_dhr_sectors.py` (DHR.SECTORS.01): particles = DHR sectors = the discriminant anyons of the Lean glue form, with the condensation tower $16 \rightarrow 4 \rightarrow 1$ (v235/v237). `v242_spin_statistics_modular.py` (DHR.MODULAR.01): spin-statistics, the modular (S, T) data, Verlinde fusion, and Gauss–Milgram $c = 8$. `v243_haag_ruelle_braiding.py` (DHR.SMATRIX.01): the 2-particle S-matrix = the braiding monodromy (factorised, crossing), with the v238 mass gap supplying Haag–Ruelle asymptotic states. `v244_spectral_action_contract.py` (CONTRACT.QFT4D.01): the 4d Lagrangian via the Connes spectral action — the carrier half-spinor 16 is one generation, the SM gauge group sits in the carrier, gravity is v36; the matter Lagrangian is the open [O] contract. Net: the residual to a full 4d QFT is *one premise* (QGEO.SYM.01) plus *one contract* (CONTRACT.QFT4D.01). All wired into `run_all.py`, the ledger and registry, cited in `tfpt_research_contracts.tex`, mirrored to the website.

2026-06-17 (Experiments: black-hole-cosmology signatures, the η_B Boltzmann solve, the Petz/baby-universe realisation, and a real-data GW-echo pipeline)

- **Three new standalone black-hole-cosmology experiments (experiments/, all data_limited, not load-bearing).** From the `problem_b` black-hole-cosmology survey: (i) `ccbh-dark-energy` — the de Sitter seam interior ($w_{in}=-1$) forces the Croker–Weiner cosmological-coupling index $k = -3w_{in} = 3$, hence a population $w = -1$; vs. Farrah+2023 $k = 3.11 \pm 0.79$ (-0.14σ), a *contested* downstream bridge and an *alternative reading* of the same $w = -1$ the DESI watchdog tests (`alternative_group w_de_eos`, never double-counted). (ii) `gravastar-compactness` — the Nariai $Q_{geom}=3/8$ equals the Jampolski–Rezzolla (2026) maximum horizonless compactness $\mathcal{C}=3/8$ (shared de Sitter endpoint $1/2$); since $1/3 < 3/8 < 4/9 < 1/2$ this is a light-trapping ECO, yielding an echo template (round-trip delay ~ 0.7 ms at $62 M_\odot$, amplitude $\leq (2/3)^6$) — a [C] structural echo, no $\mathcal{C} \leftrightarrow Q_{geom}$ map proven. (iii) `cosmic-handedness` — a parity watchdog (Shamir JADES $\sim 3.3\sigma$ spin monopole, most likely a Milky-Way-aberration dipole), explicitly *not* promoted (frontier).
- **η_B — full BDP Boltzmann ODE solve confirms the route at the frozen scale** (`experiments/ftransfer/leptogenesis_boltzmann/fboltzmann_solve.py`; `tfpt_4_frontier`, [C]). Integrating the Buchmüller–Di Bari–Plümacher Boltzmann network (integrated efficiency $\kappa_f = 0.092$, validating the analytic fit) at the *frozen* heavy scale $M_1 = M_{scal}(\varphi_0^{ret})^2/A_\Lambda \approx 8.65 \times 10^9$ GeV with $\delta_{CP} = 4\pi/3$ gives $\eta_B = 6.5 \times 10^{-10}$ — a factor 1.07 from the observed 6.1×10^{-10} , with *no* free M_R dial. This moves the leptogenesis route from “solve pending” to a consistent [C] readout (the full *flavored* density-matrix solve is the next refinement); `tfpt_4_frontier` Route C synced.

- **The Petz recovery map and the rank-one baby universe, realised numerically** (`experiments/recovery-channel`; `tfpt_horizon_readouts`, [C]; companion to v221). The gapped transport contracts to a *rank-one* projector at exactly $\|T^n - P_\infty\| = (2/3)^{6n}$ — the one-dimensional baby-universe Hilbert space (Engelhardt 2025) — and the explicit Petz map is CPTP, recovers the reference, and equals the identity only on the protected $\lambda=1$ (Knill–Laflamme) mode; free-ratio and degenerate-spectrum negative controls hold. So the Petz identification v221 deferred is now verified at the channel level (`internal_consistency`, no new datum); the full holographic reading stays gated on the Seam–Horizon theorem.
- **GW ringdown echo — Stage-1 matched filter validated, then run on real GWOSC strain** (`experiments/gw-ringdown-echo`; `tfpt_horizon_readouts` `search-targets`). The Stage-1 machinery (Kerr-ringdown subtraction $\rightarrow$ matched filter on the residual, ratio $(2/3)^6$ frozen, lag free, + free-ratio control) classifies 3/3 synthetic injections; run on *real* GWOSC strain (GW150914, GW190521; PSD-whitening + off-source background): **no kernel-ratio echo coincident in ≥ 2 detectors**, consistent with the $(2/3)^6$ *upper* bound (a single loud H1 excess has $\hat{q} \approx 2$, far from $(2/3)^6$, so the free-ratio control flags it as residual ringdown, not an echo). First pass: dominant-QNM subtraction, incoherent combination — full multi-mode + coherent stacking is the next step; no detection claim.
- **Scorecard + website synced.** `experiments/evidence_scorecard.json` now 51 rows (26 consistent, 7 null, 13 data-limited, 4 tension, 1 parked); the website `EXPERIMENTS_AUDIT` mirror and the η_B prediction entry are updated to match. These are standalone `experiments/` surfaces (not in the verification suite or ledger); the `tfpt_4_frontier/tfpt_horizon_readouts` and `papers.ts/predictions.ts` edits are the in-same-change sync.