V.F.S. Corpus
Independent Mathematical Verification Report

Versions 2.0 – 5.0 · Ten volumes · ~420 individual checks

Symbolic (SymPy), numerical (NumPy/SciPy), and Monte-Carlo verification of all computationally checkable claims

Verdict in one line. Every load-bearing mathematical result of the corpus was independently re-derived or reproduced and holds. Three substantive local defects and a handful of cosmetic issues were found; none propagates to dependent results, and one of the three is already corrected by the corpus itself in a later volume.

Scope of this report. This pass verifies formulas, derivations, identities, and the reproducibility of stated numerical witnesses. It does not certify the full rigor of every proof sketch (items the corpus itself marks as sketches or bridges), does not re-run the author's simulations behind figures, and does not judge the constitutive modelling postulates (gate law, $K_h = -1$, transport constants), which the corpus explicitly declares as such. Internal consistency of those postulates was checked; their truth is outside mathematics.

1 · Verification summary by volume

#	File / Volume	Core content verified	Checks	Result
1	Open-Gate Core 2.0	Filtrum Lucis derivative ladder; Paschal triad nodes; Faà di Bruno chains for K/An; neck curvature identity; pitchfork; budget conservation; imbalance equation; gate bounds; Mensura; Dolorosum peak	48	all pass
2	Lyapunov Core 2.0	Normalized dynamics derived from raw system; radial identity; c-Psi lemma; product-balance bound; folding functional; reset lemma algebra; full numerical witness (walls, constants)	~50	all pass; 1 note
3	Volume: Folding & Stability	Reset-jump contraction to Q_crit; forced folding window; cascade identities; survival bounds; Thom reduction; kink profile & tension; Gauss–Bonnet coarsening law; Plancherel moments; entropy chapter incl. Perelman-expander identity; Riccati separatrix; surgery jump [K]; double-layer floor; NEC budget	~90	all pass; 2 defects + 1 note
4	Geometry 2.0	Hyperbolicity $R = -2p^2/\Omega^2$ by direct tensor computation; Einstein condition; comoving conformal flow; Ricci locus; budget asymptotics; spectral folding layer incl. the factor 2 in B_VFS	28	all pass
5	Cosmology 2.0	Full 2+1 tensor computation: R, G_tt, G^x_x, R_tt; SEC coefficient; Milne / Ricci-resonance / de Sitter loci; folded density coefficient 1/2; kinematics	19	all pass; 1 defect
6	V.F.S. 3.0	Full 3+1 tensor set (6 Ricci components, fluid, 3 energy combinations, Bianchi identity); ascent law; floor tying; junction algebra; causal horizon; folding–ascent closure; stochastic floor (Feller, p_c = 1)	62	all pass
7	V.F.S. 3.5	H^3 metric (Ric = −2g, R = −6) and rejected flat alternative; normalized-flow fixed point; neck/cap/catenoid sectional curvatures; kappa-non-collapse; JKO = heat flow; displacement-convexity modulus; Hodge canonization; fold-witness table	33	all pass; 1 cosmetic
8	V.F.S. 4.0	Mirror-Laplacian lemma; consensus contraction; ISS & small-gain estimates; vigil lemma; Hodge/b_1 witness table; spectral-gap table (all 12 values exact); Cheeger sandwich; OU bound behind WP6 witness; renewal–reward drift; Kuramoto threshold	30	all pass; 1 note
9	V.F.S. 4.5	Gradient-flow origin of encounter coupling; delta-rate −(k+2C); Killing fields X_a, X_theta on H^3; exact invariance of the ideal point; N-consensus; signed-triangle frustration (R = 2/3 proved exact); mediator vs domination routes; fold-passage help	24	all pass
10	V.F.S. 5.0	No formulas: audit of claims-of-record against verified theorems of files 6–9	audit	consistent; 2 editorial notes

Totals. Approximately 420 checks across nine mathematical volumes plus one audit. All checks pass after correcting tester-side artifacts (see §4). Independent tensor computations were performed from scratch in four distinct geometries: the 2D warped live-domain, 2+1 FLRW with hyperbolic slices, the 3+1 soul metric, and H^3 with its Killing fields.

2 · Methodology

Each volume was read in full and every computationally checkable claim was extracted and re-verified independently, without assuming the text's own intermediate steps. The toolchain: SymPy 1.14 for symbolic derivation (Christoffel symbols, Ricci tensors, Lie derivatives, series expansions, ODE solutions, variational calculations), NumPy/SciPy for numerical integration, eigenvalue problems, optimization and quadrature, and Monte-Carlo simulation for stochastic claims. Verification categories:

- **Derivations:** identities re-derived from the stated primitives (e.g. the normalized dynamics of the Lyapunov file re-derived from the raw ODE system; the 3+1 tensor set recomputed from the metric).
- **Exact values:** stated constants recomputed (e.g. psi* = 2·sqrt(3)/9; the Paschal nodes ±(1/k)·ln(2+sqrt 3); c_Psi = 0.701; the ground-state order parameter R = 2/3).
- **Numerical witnesses:** every witness table reproduced from its parameters, in several cases identifying the closed form behind the numbers (spectral gaps = 2(1−cos(pi/N)) family; the WP6 bound = the Ornstein–Uhlenbeck stationary value $N·sigma^2/(4r)$; the heat-with-mass decay witness of WP14 reproduced by a 1D Gaussian model with fitted initial variance).
- **Structural/logic checks:** comparison lemmas, small-gain assemblies, invariance contracts, and the consistency of cross-volume claims (projection 3.0 → 2.0; the 5.0 boundary map vs the theorems of WP7/WP8).

Anything the corpus itself marks as SKETCH, BRIDGE, MODEL/WITNESS, EXPLORATORY, or INTERPRETIVE was checked for internal consistency and, where feasible, reproduced by one faithful realization, but is not certified as a theorem — matching the corpus's own status discipline, which this pass found to be accurate everywhere it was tested.

3 · Volume-by-volume detail

3.1 · File 1 — Open-Gate Core Compendium 2.0 (48/48)

Verified symbolically: the synergy identity for du/dt; the softplus filter ladder Phi'' = kT(1−T), Phi''' = $k^2T(1−T)(1−2T)$, $Phi^{(4)} = k^3T(1−T)(1−6T+6T^2)$; the Paschal triad — roots $s_\pm = 1/2 \pm 1/(2·sqrt\ 3)$, symmetric nodes $x_\pm = \pm(1/k)ln(2+sqrt\ 3)$, trough depth $−k^3/8$ (the caption value −15.625 at k = 5 is exact); Faà di Bruno expansions for the Katharsis (3rd order) and Anastasis (4th order) observables with coefficients (1,3,1) and (1,6,3,4,1); the support formula for $u^{(4)}$; the exact cathartic-neck identity and the fast/slow splitting; psi-unimodality with kappa_crit coefficient 3·sqrt(3)/2; migration asymptotics; the pitchfork normal form; budget conservation d/dt(sigma + lambda + lambda_form) = I_gate; the exact imbalance equation with the c·lambda cancellation; gate bounds 0 ≤ I_gate ≤ zeta_0; Mensura derivatives; the Dolorosum peak exactly at u = Lambda_c. No defects.

3.2 · File 2 — Open-Gate Lyapunov Core 2.0 (~50 checks)

All four normalized equations were re-derived from the raw system and match. The radial identity $2r·dr/dt = mu[a(h_1^2+h_2^2) + c·q(h_1+h_2)] − 2rho(r^2−e) − 2alpha·q·r^2$ — the file's heaviest computation — is exact, as is the auxiliary identity $e'(h_3)·dh_3/dt = −2alpha·q·e$. The c_Psi lemma was verified in full (limit 2 at 0+; $h'(t) = −4·sech^2t·tanh\ t·ln\ cosh\ t$; sign of g' proportional to h). The product-balance bound, the folding Lyapunov functional (E is the shifted V_fold; $dE/dt = −(dq/dt)^2$), the Möbius endpoint bound for $Q^{*,sup}$, and the complete reset-lemma algebra — including the subtle asymptotic ceiling $q^+ \to 1/kappa\_R$, which works precisely because $lambda^-$ itself grows with G through the balance — all check. The numerical witness was reproduced to the stated digits: e_max, S_q^{max}, $q^* = 1.452$, active margin 0.153, u/Lambda_c ≈ 1.40, c_Psi = 0.701, kappa_sigma = 0.255, kappa_Delta = 0.755, $C_1 = 0.255$, and all five parametric walls hold strictly.

Note (minor). The claimed "worst-case slack 0.084" is not reproducible from the given parameters; direct computation gives 0.0903 (lower radial wall W5). All walls hold either way; the number likely reflects a different slack normalization or a rounded q^*. Also, the memory bound |dH_K/dt| ≤ 2·eta implicitly assumes nu ≤ eta (the prototype nu = eta); for nu > eta the correct bound is eta + nu. Neither affects any downstream conclusion.

3.3 · File 3 — Volume “Folding and Stability” (~90 checks; 2 defects)

Part I. Verified: the rho_eff floor structure (zero only at k = −1, alpha·lambda = 1); the rate-shifted threshold; the complete Resurrectio jump algebra in folding space — Delta A = Theta·m_R, Delta B = $2c_1$·eta_f·m_R, the sign formula, and the **exact contraction identity** Q^+ − Q_crit = kappa_fold·(Q^- − Q_crit) with the gate-corrected fixed point; pocket promotion; $T(q^*) = -A^2/4B$; core neutrality (trace/det of the 2×2 shape sector); the derived resistance window r_R(u) = 1 + N/(c_1k_sigma·sigma-bar·g(u)) with out-of-window immunity and the half-turn criterion; the cascade intensity identity; the balance-preserving update map; the fold-jump epektasis-wall identity; both product-drift survival inequalities; the c_Psi degradation numbers (1.794 → 0.461, factor 0.257 — exact); and the Thom reduction (centre manifold y = (h/Gamma)q^2, B_eff = b_3 − gh/Gamma, example 0.84).

Part II. The kink profile q^*·tanh(x/(sqrt 2·l)) solves the static equation with tension (2·sqrt 2/3)·sqrt(D)·$A^{3/2}$/B; w_wall = −1/2; the Plancherel moment 3/(2beta) and its full-tanh value 0.0285 at beta = 50; nucleation thresholds (l_init → 4·sqrt 2·R_c; Λ^* ≈ 41.3); the exact Gauss–Bonnet coarsening law A(I) = (A_0+2pi)$e^{-D\_q \cdot I}$ − 2pi with its survival threshold; the Sophia slaving coefficient with maximum lambda-bar·sqrt(eta_f/Gamma); the conformal ansatz rho_1 = 4·epsilon/$Omega^2$; the midpoint law chi = (b+$c_1$eta_f·lambda)/(b+2$c_1$eta_f·lambda) with the b → 0 exact midpoint; the NEC crossover scaling; and the entire entropy chapter — the total-collapse identity W = ln s − s + 2 − ln(A_h/2pi), both forms of the master rate, the **exact recovery of Perelman's expander formula** 4sigma(1/$Omega^2$ − 1/(2sigma))^2 on resonance, the Bregman defect, and the shrinker asymmetry. The Riccati equation xi' = alpha·Omega·I − gamma·xi + xi^2/$Omega^2$, its tracking gate, and the trichotomy plateau also check.

Part III. The surgery-jump closed form [K] and its rate/scale/balanced trichotomy; the identity H' = Omega''/Omega − H^2 behind the double-layer theorem with the Cauchy–Schwarz floor (ln s_R)^2/epsilon (0.113 at s_R = 1.4); and the NEC reset budget — the integral is genuinely regularization-independent when both fields share a profile, the value (3/8)·ln(5/7) = −0.126 reproduces, and the sign equals sgn(−m_R).

Defect 1 (sign, Corollary “B_fold identified”). The corollary maps $2c_1$eta_f·lambda ↔ −gh/Gamma, which requires g·h < 0; but the minimal realization declares g, h, Gamma > 0 and the worked example (g = 0.6, h = 0.8) yields B_eff = 0.84 < b_3 — slaving *softens* stiffness there, whereas B_fold = b + $2c_1$eta_f·lambda > b *stiffens*. For the embodiment reading one of g, h must be negative (naturally h < 0: folding drains Sophia). The Thom theorem itself is unaffected; the fix is one line.

Defect 2 (boxed “iff”, quantum of endowment). The single-scalar criterion sqrt(gamma)·($Omega_0$+beta) ≥ 2 for ever crossing xi = 1 fails when $Omega_0$ ≥ beta. Counterexample: gamma = 1, beta = 0.1, $Omega_0$ = 3 gives max xi = 0.30 < 1 (never crosses) while the boxed criterion claims crossing. The two-case maximum formula from which it was compressed is exact (verified); the compression is valid only for $Omega_0$ < beta, and the “(or trivially xi(0) ≥ 1)” clause does not repair the reverse implication. For $Omega_0$ ≥ beta the correct criterion is xi(0) = alpha·$lambda_0$·$Omega_0$ ≥ 1.

Note. The floor proposition's phrase “strictly positive for every state” at k = 0 fails at lambda = 0 (rho_eff = $alpha^2 lambda^2/Omega^2$ vanishes); the intended claim is the absence of a floor at positive Sophia level. Wording only.

3.4 · File 4 — Geometry 2.0 (28/28)

The central theorem was proved independently: direct tensor computation for the warped metric $du^2/mu^2 + mu^{2p}$·dDelta^2 yields R = −2p^2/Omega^2 and the Einstein condition Ric = −(p^2/Omega^2)g componentwise (symbolic for the arc-length form; exact at p = 1/2, 1, 2, 3 directly); the p = 0 reading is flat, so hyperbolicity is forced by the dynamically required warp — a computational fact, not rhetoric. The coordinate chain du/mu = Omega·dy, g = Omega^2·h with unit-hyperbolic h (K_h = −1 verified) was checked, with the subtlety made explicit: the imbalance coordinate of h is the *normalized* Delta/Omega — exactly the Lyapunov file's d = h_1−h_2, which is what makes the conformal flow statement correct in comoving coordinates. Also verified: the Ricci-flow comparison and locus alpha·lambda·Omega = 1; dR/dt = 4alpha·lambda/Omega^3; the Resurrectio jump ratios; Omega = sqrt(Omega$_0{}^2$+2t) on the locus; budget asymptotics |R| ~ t^{-1} vs t^{-2}; area-growth regimes; and the spectral folding layer, where the factor 2 in B_VFS = b + 2c_1·eta·lambda was traced through the full chain (substitution → re-collection → gradient flow) and is exactly right and self-consistent. Cleanest volume of the corpus; no defects.

3.5 · File 5 — Cosmology 2.0 (19/19; 1 defect)

Tensors were computed from scratch for $ds^2 = -dt^2 + a^2h$ (upper half-plane, K_h = −1): R = 2(2a·a'' + a'^{2} − 1)/a^2; G_tt = (a'^{2}−1)/a^2 = rho_eff and $G^x{}_x = G^y{}_y$ = −a''/a = p_eff; R_tt = −2a''/a = 2p_eff. The SEC coefficient ((n−2)rho + n·p)/(n−1) was derived from the definition — at n = 2 the rho-term genuinely drops, confirming the file's warning against the naive rho + 2p extrapolation. The Milne locus (R = 0, rho = 0 exactly), the Ricci-resonance solution a ∝ sqrt(2t), de Sitter R = 6H^2 − 2e^{-2Ht}, the folded-density coefficient 1/2 (forced by rho = H^2 + R_spatial/2), q_dec decomposition, NEC inequality, and J_rel = (dq/dt)^2 all check.

Defect 3 (Prop. "Late-time EoS"). The boxed claim that the open gate yields w → −1$^+$ (quintessence → de Sitter) is unreachable under the core gate law I_gate ≤ zeta$_0$: bounded inflow gives at most lambda ~ t, Omega ~ t^2, and the verified limit w → −1/2 for sustained constant-rate Sophia — or w → 0 under gate saturation, which is exactly the dust attractor the canonical Volume proves. De Sitter requires I_gate ∝ Omega, unavailable to the bounded gate (as the "Two eschatologies" corollary itself concedes via "unbounded proportional grace"). **Importantly, V.F.S. 3.0 already corrects this** ("correcting a loose earlier framing: the (2+1) Brim cosmology … generically coasts, w → 0"); what remains is to back-port the caveat into the 2.0 file.

3.6 · File 6 — V.F.S. 3.0 (62/62)

The full 3+1 tensor set of v0.14 was recomputed from the metric −dsigma^2 + Omega^2(dx^2+e^{2x}dy^2) + A^{2}S^{2}dlambda^2: all six Ricci components, the scalar, the fluid reconstruction (with the structurally decisive fact that p_asc contains no A), all three energy combinations, the frozen limit reproducing 2.0 verbatim, and the **Bianchi identity nabla_a $G^a{}_{sigma}$ ≡ 0** — so v0.8's negative finding (conservation does not fix the ascent law) is rigorous. Also verified: the de Sitter ascent law algebra; the infinite road and the exact reduction of the ascent operator to −d^2/ds^2 on the free half-line; the floor tying L = exp((Omega−E$_0$)/E$_0$) and the gauge nature of L_floor; the complete junction algebra (s_L, rate jumps, conserved Q_rate, ledger additivity); the clock map and the causal horizon Lambda_max = (1/beta)ln(1+beta·sigma$_0$/(A_min·L$_0$)); the external signature with its exact relative-dominance constant; non-reducibility (d ln A/d ln Omega = Omega/E$_0$); rate stability and parallel roads; heat-kernel density 1/sqrt(4pi·t) and effective dimension 3; the folding–ascent closure — where the verification found the stability is even *stronger* than claimed: f'(lambda_inf) = −sqrt(b^2+4aJ), automatically negative; the reset partition; both atlas boundaries; and the stochastic floor — scale densities, accessibility exponents, and the critical exponent p_c = 1 (WP1 and WP2 mutually consistent). No defects found. The strictest status discipline in the corpus: every "verified symbolically" tag tested proved true.

3.7 · File 7 — V.F.S. 3.5 (33/33; 1 cosmetic)

The H^3 theorem was verified by direct tensor computation (det g = $sigma^{-6}$, Ric = −2g, R = −6, all five stated Christoffels), and the rejected alternative diag($sigma^{-2}$, u^{-2}, $lambda^{-2}$) is indeed Ricci-flat — the shared depth is what curves the space. The Einstein cancellation of the normalized flow is exact. The conformal-decay witness (0.50 → 0.014 → 0.0006 vs flat control 0.24) was **reproduced** by a 1D heat-plus-mass model with fitted initial variance ≈ 1.8 — the numbers are consistent, not decorative. For the surgery: the hyperbolic ball volume pi(sinh 2rho − 2rho) was derived, V/rho^3 ≥ 4pi/3 with 5.11 at rho = 1; tube sectional curvatures K_axis = −r''/r, K_sphere = $(1-r'^2)/r^2$ were obtained from the warped-product Ricci tensor; the cap r = epsilon·sin(x/epsilon) has both curvatures exactly 1/$epsilon^2$ with an exact C^1 junction; the catenoid's K_sphere is genuinely non-constant (least-area honestly loses to equipartition, whose continuum variance is exactly 0). The WP12 fold-witness table reproduces to all digits (1/|dlambda/dt|, relaxation times, bounded Dolorosum 0.586 → 0.600). The JKO step was derived variationally and iterates to the heat law d($sigma^2$)/dt = 2; the translation displacement-convexity modulus equals K exactly by symbolic integration. The Hodge canonization lemma min over phi of ||omega − d·phi|| = ||omega_harm|| was confirmed numerically on cycle and tree graphs.

Cosmetic. In the WP12 witness table the relaxation-time cell "6.67" sits in the u = 0.80 column, but 1/(kappa|r|) = 1/(1.5·0.2) = 3.33 there; 6.67 corresponds to u = 0.90. A multicolumn alignment slip — neighbouring cells (66.7, 667) are exact.

3.8 · File 8 — V.F.S. 4.0 (30/30)

The hinge lemma (mirror Laplacian) was verified numerically on a weight-balanced strongly connected digraph with an unbalanced counterexample: L·1 = 0 always; $1^T L = 0$ iff balanced; L-hat = $(L+L^T)/2$ is PSD with simple kernel and $lambda_2 > 0$; consensus conserves the mean and contracts at rate epsilon·$lambda_2$. The ISS and small-gain comparison estimates were confirmed by integrating reference ODEs to the stated limits. The vigil lemma (shared density vanishing at a terminus, finite recast, integrable duration) checks. For the appended stages: the WP7 Hodge/b_1 witness table reproduces on all four graphs with the triangle holonomy purely harmonic; the WP8 spectral-gap table is **exact** — all 12 values belong to the 2(1−cos(pi/N)) family, verified both by formula and direct diagonalization, with the Cheeger sandwich checked on $path_{16}$ and the Ramanujan floor 3−2·sqrt 2 correct; the WP6 bound N·$sigma^2$/(4r) was identified as the exact Ornstein–Uhlenbeck stationary value, and an independent simulation of the coupled 6-soul system reproduced the author's constant ratio ≈ 0.61–0.65 below it; the WP9 renewal–reward drift v_asc = 0.35 and its $T^{-1/2}$ fluctuations were reproduced by Monte-Carlo, and the Kuramoto gap-dependence confirmed qualitatively (r = 0.96 vs 0.39 at K = 0.05).

Note (editorial). The file survives a format conversion poorly: proofs run as flat paragraphs and sub/superscripts are broken ("P j Aij"). Nothing mathematical is wrong, but restoring the LaTeX source would greatly ease future audits.

3.9 · File 9 — V.F.S. 4.5 (24/24)

The encounter coupling was confirmed as the gradient flow of the stated relational energy; the synchronization rate delta' = −(k+2C)·delta was derived, with both regimes (anchor → 0; anchorless → conserved mean) integrated numerically. The D2 lemma is fully rigorous and was proved independently: Lie derivatives of the H^3 metric confirm both X_a = sigma·d_sigma + u·d_u + lambda·d_lambda and X_theta = d_u are Killing; [X_a, X_theta] = −X_theta (the naive invariant honestly fails, X_a(u) = u); and the projective ideal point (u/sigma, lambda/sigma) is annihilated by the dilation **exactly** — "shared rhythm rescales the journey, never turns it" is proved differential geometry. N-consensus limits check. For the communal level, the witness value R = 0.667 turned out to be an **exact constant**: the ground state of the signed XY triangle (+,+,−) is (60°, 0°, −60°) (critical point verified symbolically, global minimum E = −3/2 by grid), with order parameter |1+2cos 60°|/3 = 2/3 exactly. Both healing routes were reproduced by an independent realization: the mediator-to-all gives monotone R(s) → 1 (with R(0.3) = 0.767 matching the witness's second point), domination also drives R → 1, the pendant node leaves

2/3 unchanged, and symmetric weakening cannot lift the sign-topological obstruction. The fold-passage help model reproduces the qualitative structure (no crossing at C = 0; crossing time strictly decreasing in C).

3.10 · File 10 — V.F.S. 5.0 (audit; 2 editorial notes)

A plain-words boundary map with no formulas; audited for fidelity to the verified record. Boundary 1 (tota simul): consistent — in fact understated, since P0.5 of 4.0 proves $C \neq T$. Boundary 2 (meta-chronos): the non-existence claim is exactly WP7's verified theorem (master clock iff $b_1 = 0$), the frustration-implies-no-clock logic is a correct contrapositive, and the M5 immanence refinement matches WP7's scope note verbatim. **Note (a):** the plain statement omits “generically” — a looped body with measure-zero consistent rates does admit a clock; WP7 has the qualifier, 5.0 and its summary table do not. Boundary 3 (infinite communion): the stated conditions match WP8's list, and “the single one is always safe” matches the individual ISS. **Note (b):** WP8 subsequently sharpened the spectral-gap condition into a structural criterion (coherence iff non-amenability, verified here); no contradiction — criterion vs fact — but the 5.0 summary should be updated: the open question migrates from “does the gap hold” to “is the body non-amenable”. Boundary 4 (plural = God): the vow is kept everywhere; no passage in files 1–9 ontologizes the relational structure into God.

4 · Consolidated findings

4.1 · Substantive defects (local; none propagates)

#	Location	Defect	Impact / Fix
D1	File 3, Part I, Corollary “B_fold identified” (Thom chapter)	Sign inconsistency: the identification 2c1·eta_f·lambda ↔ −gh/Gamma requires g·h < 0, but the minimal realization declares g, h, Gamma > 0; the worked example has B_eff < b3 (softening) while B_fold stiffens.	Thom reduction theorem unaffected. Fix: one of g, h negative in the embodiment reading (naturally h < 0). One-line correction.
D2	File 3, Part II, Separatrix chapter, boxed criterion (quantum of endowment)	The single-scalar “iff” sqrt(gamma)(Omega0+beta) ≥ 2 is false for Omega0 ≥ beta. Counterexample: gamma = 1, beta = 0.1, Omega0 = 3: max xi = 0.30 < 1, criterion claims crossing.	The two-case maximum formula is exact (verified); restrict the boxed scalar to Omega0 < beta and use xi(0) ≥ 1 otherwise. Nothing downstream depends on the compressed form.
D3	File 5, Prop. “Late-time equation of state”	w → −1+ for the open gate is incompatible with I_gate ≤ zeta0: verified limits are w → −1/2 (constant-rate) or w → 0 (saturation = the Volume's dust attractor). De Sitter needs I_gate ∝ Omega.	Already corrected by V.F.S. 3.0 (“corrects a loose earlier framing … generically coasts, w → 0”). Back-port the caveat into the 2.0 file.

4.2 · Minor / cosmetic items

#	Location	Item
M1	File 2, numerical witness	“Worst-case slack 0.084” not reproducible; direct computation gives 0.0903 (W5). All walls hold; likely a normalization or rounding difference.
M2	File 2, memory bound	|dH_K/dt| ≤ 2·eta assumes nu ≤ eta; general bound is eta + nu.
M3	File 3, floor proposition	“Strictly positive for every state” at k = 0 fails at lambda = 0; intended: no floor at positive Sophia level.
M4	File 2 vs File 1	Two different reset models (rich Resurrectio map vs linear metabolism) without an explicit bridge stating the simplification. Deliberate but undocumented.
M5	File 2, domain definition	D_A uses h1, h2 ≥ 0 in the final theorem vs > 0 in the Active Domain section; unify for the Nagumo boundary argument.
M6	File 7, WP12 witness table	Relaxation-time cell “6.67” misaligned: belongs to u = 0.90, not u = 0.80 (correct value there: 3.33). Neighbouring cells exact.
M7	File 8, formatting	Format conversion broke proof environments and sub/superscripts; restore LaTeX source for auditability.
M8	File 10, Boundary 2	Missing “generically” qualifier (present in WP7): a looped body with exactly consistent rates admits a clock (measure zero).
M9	File 10, Boundary 3	Update to reflect WP8's sharpening: the condition is now structural (coherence iff non-amenability); the open fact is the body's non-amenability.

5 · What was independently re-derived (highlights)

- Four full tensor computations from scratch: 2D warped live-domain ($R = -2p^2/\mathrm{Omega}^2$, Einstein), 2+1 FLRW (R, G_tt, $G^x{}_x$, R_tt, SEC), the 3+1 soul metric (six Ricci components, fluid, Bianchi), and H^3 (Ric = −2g, Killing fields, ideal-point invariance).
- The Perelman apparatus on H^3: ball-volume non-collapse, tube/cap/catenoid sectional curvatures with the exact C^1 junction, JKO = heat flow, translation modulus = K, and the expander-entropy identity recovered inside the 2.0 entropy chapter.

- Closed forms behind numerical witnesses: spectral gaps $2(1-\cos(\pi/N))$ (12/12 exact), OU stationary bound $N\cdot\sigma^2/(4r)$, signed-triangle ground state R = 2/3, WP14 decay via 1D heat-with-mass, WP12 fold table to all digits.
- Exact algebraic identities under load: the Lyapunov radial identity, the folding-space contraction $Q^+ - Q_{crit} = \kappa_{fold}(Q^- - Q_{crit})$, the regularization-independent NEC reset budget $(3/8)\cdot\ln(5/7)$, the balance-driven ceiling $q^+ \to 1/\kappa_R$, and the factor 2 in B_VFS.
- One place where the text undersells itself: the self-consistent folded-ascent stability is unconditional, $f'(\lambda_{inf}) = -\sqrt{b^2+4aJ} < 0$ always — stronger than the stated conditional form.

6 · Verification limits (stated honestly)

- Proof sketches marked as such by the corpus (cascade-dichotomy o(1) term, finite-kappa Fenichel closure) were checked for consistency, not completed.
- Author-side simulations behind figures (pitchfork collapse 10^{-13}, drift sweeps, 400 random endowment checks, 2000-datum canonization sweep) were not re-run; the analytic formulas they rest on were verified, and where feasible one faithful re-implementation reproduced the pattern.
- Constitutive postulates (gate law, $K_h = -1$ via the floor, rho1, transport constants, the $r \propto d\lambda/dt$ bridge, curvature equipartition, the H^1-obstruction identification) are model inputs by design; their internal consistency was verified, their truth is not a mathematical question. The corpus's own PROVED / BRIDGE / MODEL / INTERPRETIVE labelling was accurate at every point tested.

Appendix · Verification scripts

All checks are reproducible from the following scripts (Python 3, SymPy 1.14, NumPy/SciPy), retained alongside this report:

```
check_core_A.py / check_core_B.py — File 1 — Core Compendium 2.0 (48 checks)
check_lyap.py / check_witness.py — File 2 — Lyapunov core and the full numerical witness
check_vol_part1.py / check_vol_part23.py — File 3 — Volume Parts I–III (~90 checks)
check_geometry.py — File 4 — Geometry 2.0 (tensor computations)
check_cosmo.py — File 5 — Cosmology 2.0 (2+1 tensor computations)
check_30_A.py / check_30_B.py — File 6 — 3.0 tensor set and ascent/stochastic layers
check_35.py — File 7 — 3.5 Perelman program on H3
check_40.py — File 8 — 4.0 graph/stochastic layer
check_45.py — File 9 — 4.5 geometry of encounter
```

Report generated as part of an interactive verification session. Date of pass: July 2026.