The Primitive Selection, History-to-Curvature and Standard-Model Attaching-Map Closure Theorem in VERSF

Keith Taylor

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Controlling predecessor: HCMR-M1-R15, *The Post-Commitment Atomic-Operation, Retention and Renewal Theorem, with First Bridge Execution and Companion Conditional Derivation of the Fine-Structure Constant*

Companion electromagnetic line: K7-EA-1, *Zero-Syndrome K = 7 Electromagnetic Admission and the Conditional Derivation of the Fine-Structure Constant* (consumed at its stated grade; not reopened here)

General-reader summary

This paper is a stress test. An earlier phase of the programme produced, from one assembled master recipe with no adjustable numbers, a set of remarkable candidate structures: a source for the direction and strength of the theory's curvature response, a working blueprint for the observed matter families, and a sevenfold architecture matching the patterns seen in particle physics. This paper refuses to celebrate any of that until the recipe itself is shown to force it. It sets four independent tests, one per structure, with rules designed so that wishful interpretation is impossible: nothing may be inserted because the right answer needs it, no success in one test may subsidise another, and every claim must carry the exact calculation, or the exact failure, that backs it.

The first test asks whether the recipe genuinely generates the signed curvature response. It largely does: the direction is forced, the strength comes out at about one point nine on the canonical recipe and remains above roughly 0.90 for every positive-definite response metric retaining the executed canonical diagonal stiffnesses, and the source structure behind it is closed, with one ceiling condition still requiring a property of the recipe that has not yet been proven.

The second test asks whether anything observable can read the theory's own arrow of history. The findings are a matched pair of certainties. The arrow exists and is nearly maximal: completed histories lean one way with overwhelming preference, the executed append-only ledger retains that orientation exactly within the declared architecture, and the two-way pointer it should drive is unique, with every symmetry-respecting way of driving it reduced to a single number. Yet that number is, for the current machinery, exactly zero: the state a history returns to is provably neutral however handed the journey was, so

the arrow lives in the story rather than the snapshot, and nothing now written actively transcribes story into pointer. One genuinely connected attachment is what closing this test requires.

The third test asks whether the successful matter blueprint is chosen by the recipe or merely permitted by it. The honest middle verdict applies: the blueprint works, its two independent calculations agree at computer precision, but the recipe is provably flat across the alternatives, so structure exists without selection.

The fourth test carries the paper's deepest arc. It began by asking where the sevenfold vacuum structure comes from and ended by solving, and then honestly bounding, the problem of the committed fact itself. The stamp saying which way each commitment went turns out to be built into the commitment event, carriable into the continuous world and perfectly recoverable; facts are written at a provable moment; and the topological fact model provides a mechanism by which committed history can remove future admissible options; its physical same-action selector remains open. Everything about that architecture is consistent and, piece by piece, already present. The closing calculation then proves why the paper must stop here: implementing the minimal door-closing needs an effect of rank one, while the theory's physically meaningful outcomes are provably too coarse at every existing level: the minimum physical effect rank is 15 at the 84-record grain and 2 at the 319-mark grain, and the first rank-one effects available in the existing finer 1092-effect decomposition are generator-frame dependent, so selecting one would select a convention rather than a fact.

The paper therefore closes at a sharply defined boundary rather than an excuse. What stands: the memory architecture, the built-in outcome stamp, the door-closing mechanism, and exact classifications of every remaining freedom, each guarded by explicit conditions under which it would be falsified. What is missing is named to the dimension: either the theory's operator algebra contains a subtler, coordinate-independent selector no simple yes/no reading can see, or reality's primitive record is finer-grained than any alphabet the theory currently writes in. Deciding between those two is the next paper. Separately and unaffected, the actual construction of the vacuum's shape, its sevenfold character, occupancy and attachment to matter, remains the other open road. The rules stay deliberately strict to the end: by them, every one of this paper's positives is a real positive, every zero is a real zero, and the exact spot where the theory currently ends is now a matter of record rather than opinion.

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Abstract

HCMR-M1-R15 leaves the VERSF Standard-Model programme with a sharply reduced set of source-provenance problems, each already typed and bounded by exact results. The ordered post-commitment history carries a nonzero source-populated A_2 chirality and remains overwhelmingly oriented at complete first cover, obeying the exact fluctuation relation $P(K = k)/P(K = -k) = e^{2\alpha k}$ with $P(K > 0) = 0.996750764817216$. Scalar commitment density, the natural pure-phase R4 realisation and complete faithful conjugation of the existing EX2E instrument all fail exactly to convert that orientation into a physical branch-population difference, and the EX2E current constraint contains no explicit history-orientation forcing ($\partial_\alpha D_J = 0$). Independently, the IORC orientation score is exactly the HMGBC closure score on the canonical wheel, while the MASD closure-curvature sector supplies a correctly typed reversal-even susceptibility that cannot select

its own sign. The controlling selector question is whether the wheel score identity survives the complete physical HMGBC/MASD lift.

In the matter sector, the primitive completion-fermion interaction is nonzero at mixed third differential order, $T\_X\psi\psi = \partial^3 A/\partial X\partial\bar{\psi}\_L\partial\psi\_R$, and its archived full tensors pass the declared source projection at residuals below approximately 1.15×10^{-15}. The old universal completion law nevertheless fails because it is representation-blind. The ordered representation-resolved transfer Y = U_role D_score closes both independent CY3′ routes conditionally to approximately 1.9×10^{-14}, but the primitive source has not returned D_score, U_role, the physical score normalisation η or the endpoint frame uniquely: the derived physical score carrier has maximal rank 72 across a continuous η-interval and across inequivalent frames. The frozen family transport contains the exact closed gauge-invariant holonomy $W\_\Delta = e\text{^}(i\cdot 5\pi/6)$, with physical axle-loop inheritance open; the projected K7 Gram carrier has exactly the real three-plane representation type of a nontrivial Z_7 holonomy response with conditional spectrum {0.753020396283, 2.445041867913, 3.801937735805}, while the actual vacuum cohomology, integral order-seven torsion, physical occupancy and matter-loop attachment remain unexecuted.

A further marked-record sequence, PSAC-EX5AZ through PSAC-EX5BP, now sharpens the readout and record-attachment boundary substantially. Projection of the complete Fold record onto the current MA1 record carrier has rank one, singular values [0.578064557803, 0], Gram eigenvalue 0.334158632987978: the orientation response survives while the independent polarity direction lies in the exact kernel, so the present action admits no left inverse on the Fold-complete two-bit record (Corollaries 6.51, 6.52). Enlarging the unsigned scalar source to its symmetric-tensor parent does not restore the missing mark (Corollary 6.53, F79), and a finite-shift full-support Gaussian bath cannot supply the four exactly orthogonal pointer states the four-atom commitment instrument requires, its minimal Stinespring environment being four-dimensional (Corollaries 6.54, 6.55, F80); the missing Fold-to-R4 write and the missing record-to-future backreaction nevertheless occupy the same scalar symmetry channel (Corollary 6.56). The Fold geometry supplies a lowest-order intrinsic symmetric trace-free polarity tensor, the trace-free Hessian of the signed domain indicator, polarity-odd and orientation-even (Corollaries 6.57, 6.58), but its isolated zero-background continuum installation fails the leading record-current conservation law, amplitude tuning cannot repair a direction outside the linearised kernel, the two polarity branches have identical residual norms, and only an anisotropic or inhomogeneous source-returned background response could rescue the installation (Corollaries 6.59–6.63, F81, F82). The resulting source audit proves that the literal scalar event-count version of Single-Source factorisation is insufficient for physically distinct Fold facts: the primitive source must be a fact-separating marked configuration whose scalar density is a marginal (Corollaries 6.64–6.67, F83). The minimal complete record (r, ς) has exactly four states, bijective with the Fold pair (b, ω) once the orientation attachment is supplied (Corollaries 6.68–6.74, F84), and the unique four-state joint sharp R4/orientation completion instrument exists at construction level, its same-event primitive activation open (Corollaries 6.75–6.77). Direct first-cover projection nevertheless returns exactly zero R4 population contrast: the first-cover history is overwhelmingly oriented but its returned endpoint has equal overlap 1/6 with both chiral rays, so the arrow lives in the completed history rather than the returned position, and commitment must write the record rather than expose a pre-existing imbalance (Corollaries 6.78, 6.79, F85). Full covariance reduces every first-cover-history-to-R4 population channel to one scalar g_{cover}, $E[Z_{R4}] = 0.995570059549810 \cdot g_{cover}$, with the zero-circulation sector necessarily unbiased (Corollaries 6.80–6.83, F86), and the unmarked Doob kernel is compatible with a continuum of gains, so the missing information lies in the source-derived marked amplitudes (Corollary 6.84). The Reflection-Scope Fold-access PVM is identified exactly with the GPU/R4 PVM up to output exchange, while the record-record coupling J may not be conflated with the record-access coefficient (Corollaries 6.85–6.87, F87); a conditional marginal-load derivation gives a strictly positive R4-visible coefficient, $h_\delta = \Lambda_c N J$, yet the realised-record dependence of the closure-norm/Yukawa operator is not determined by Hermiticity, positivity and covariance and remains primitive-open (Corollaries 6.88–6.90). Finally, the currently explicit primitive constructions close negatively at exactly that point: MA1 has zero record-Yukawa mixed jet, its fermion block containing no terminal-record coordinate, and PFDMI-EX2A carries its nonzero rank-five terminal-record derivative entirely through a left-unitary record factor which cancels from the POVM effects and the reduced CAR/Fock channel, so the current primitive record-to-matter backreaction is exactly zero for both explicit routes, a current-route negative rather than a universal prohibition (Corollaries 6.91–6.94, F88). The surviving primitive debt at that stage was a nonfactorising terminal-record/matter attachment rather than another carrier or symmetry classification, taken up by the support-changing PFDMI refinement audit, PSAC-EX5BQ, and its successors below.

A further post-commitment sequence, PSAC-EX5BQ through PSAC-EX5CE, relocates the remaining history-backreaction problem from an unspecified record-matter interaction to a precisely typed history-conditioned admissibility law and then exhausts the existing classical PFDMI record hierarchy as its physical implementation. The support-changing PFDMI refinement remains history blind: its central representation projectors are fixed independently of the retained ledger, and the present renewal reopens the same working support after every history. The frozen D36 law provides an exact spectator counterexample: the two orientations of the shortest ordered history differ in probability by $46.3399499471 = e^{(4\alpha\star)}$, yet have identical rotation-quotiented R4-visible future laws. Topological trapping supplies the missing structural mechanism: overlapping fact-forming cycle operations admit histories for which one order remains admissible while the reverse does not, and the History-Measure admissibility matrix turns this into a nonzero history-conditioned support projector, rank one for the minimal witness. No fixed continuation-faithful intertwiner can map that history-dependent support into the presently history-independent PFDMI working projector (Corollaries 6.95–6.125, F89–F95).

A history-controlled no-overwrite quantum completion nevertheless exists exactly: for each history, admissible directions may be routed into the active carrier and excluded directions into an orthogonal discarded carrier, a rank-r support loss requiring only r inaccessible dimensions; the existing twelve-direction PFDMI export fibre has sufficient capacity, and the Fold threshold supplies a coefficient-free binary quarantine controller at construction level (Corollaries 6.127–6.139, F96–F102). EX5CD proves that, once a suitable projector Q_h is supplied, the corresponding retained/exported Kraus split preserves completeness, gauge covariance and the immutable ledger exactly, the necessary and sufficient continuation-faithfulness condition being $\Sigma_\mu K_\mu^\dagger Q_h K_\mu = I - \Pi_{adm}(h)$; but the current common action does not return Q_h, the Fold closure functional is not yet source-identified with the MASD closure defect, and a twelve-edge controller is sufficient only when the forbidden continuation space is a union of complete edge fibres (Corollaries 6.140–6.147, F103–F106). EX5CE then proves a stronger resolution no-go: the minimum source-invariant atomic ranks at the twelve-edge, eighty-four retained-record and three-hundred-and-nineteen microscopic-mark grains are respectively 50, 15 and 2, whereas the minimal topological forbidden projector has rank one, so no Boolean subset of any physically admitted mark alphabet can implement the hard commitment cut; a finer 1092-effect current/terminal decomposition contains rank-one effects, but they are generator-frame dependent and not physical selectors, and the frame-invariant eighty-four-effect algebra has scalar common commutant with no nontrivial common reducing projector (Corollaries 6.148–6.153, F107–F110). PSAC-1 therefore closes with the history-to-admissibility mechanism established, its quantum implementation shown consistent, and the existing source-invariant classical PFDMI outcome hierarchy proved insufficient to supply the required sharp commitment selector. The next programme is the independent problem of deriving a frame-invariant non-Boolean selector from the existing operator algebra or demonstrating the necessity of a genuinely history/configuration-resolved primitive carrier.

This paper reduces the remaining primitive Standard-Model problem to four separately falsifiable gates: Gate S (signed source: the physical closure-score identity and the resulting signed curvature response), Gate R (physical readout: a source-returned orientation-to-population transfer or readout channel), Gate M (matter selection: primitive stationarity and nondegeneracy of the representation-resolved transfer on the fully quotiented score manifold), and Gate T (topology and attachment: actual vacuum cohomology, occupancy, matter attachment and axle-loop inheritance). Each gate carries its own execution, residuals, stop rules and falsifiers, and each maps onto named open debts of the controlling predecessor. A first Gate-S execution, PSAC-EX1, is reported. The MASD closure differential is independently an oriented face circulation; on the declared wheel-tangent carrier the closure direction is the unique rotation-invariant, reflection-odd (A_2, m = 0) direction with multiplicity one, so any nonzero D_6-equivariant physical compression is necessarily proportional to ω_C (Theorem 1A); the local scalar-face polar frame is exactly the normalised score, $V_C = \omega_C/\sqrt{m}$, with six-rim differential covector $B_C = \omega_C^T/6$ and integrated-curvature identity $D\kappa_C = \omega_C$; and the Fisher reparametrisation and two-cell checks pass exactly (12/31 against 1/93; 12/(31 + g) with zero bridge component). A normalisation execution, PSAC-EX1B, then removes the apparent free coefficient: the unique D_6-equivariant exact right inverse of the closure differential is $E_C(c) = c\sigma$, so $\lambda_C = 1$, independently of the overall scale of any D_6-invariant operational metric, and the canonical minimum-operational-norm defect lift returns the same injection exactly; the continuous-history Radon-Nikodym score then gives $S_C(\xi) = \langle\sigma, \xi\rangle_{(G_{op})}$, with $S_C = \omega_C$ exactly on the canonical separable branch (Theorem 1B, Corollary 1B.1). A bath execution, PSAC-EX1C, then removes the screening escape route: for the declared centred Gaussian bath with bilinear defect coupling, Gaussian elimination changes only the even response, $W_{prim} = W_{core} - C^\dagger A_Q^+ C \preceq W_{core}$, while the odd source $\sigma\alpha\star s_C$ is exactly invariant;

the exponential tilt survives bath marginalisation and the reduced score remains $\sigma\omega_C$ under the reversal-even reference (Theorem 1C), so the screened signed response $D\star_\sigma = \sigma\alpha\star\, W_{prim}^{+}\, s_C$ is odd in σ at every admissible bath strength, with $s_C \notin \mathrm{Ran}\, W_{prim}$ a sharp falsifier rather than a parameter. A carrier audit, PSAC-EX1D, then corrects and sharpens the uniqueness claim: on the faithful gauge carrier the spatial A_2 multiplicity is 12 (spatial 1 × internal 8 + 3 + 1), so the naive full-carrier multiplicity-one hypothesis fails exactly, but gauge invariance restores typed uniqueness, since $(su(3))^{SU(3)} = (su(2))^{SU(2)} = 0$ while $(u(1)^*)^{U(1)} \cong \mathbb{R}$: a scalar first-order history source admits exactly one gauge-invariant Abelian closure line (Theorem 1D), not yet identified with electromagnetism; the gauge, completion and CAR/Fock sectors first appear at differential orders 2, 2 and 3 and cannot compete at first order, leaving the three record-phase A_2 copies as the sole parity competitor. A source-typing execution, PSAC-EX1E, then closes the source-vector structure: the derived IORC preparation action contains no terminal-record variable, so the record projection of the pre-fact source is exactly zero, while the native link–record bond coupling is stationary at the vacuum and begins quadratically; on the combined closure/record A_2 sector the derived first-order source is therefore $h_\sigma = \sigma\alpha\star(1, 0)^T$ (Theorem 1E), the record acquiring its orientation only through the response, $r\star\sigma = -\sigma\alpha\star\mu/\Delta$, *and RCMO's post-commitment branch-oddness may not be retro-inserted into the pre-fact source (F23). A response execution, PSAC-EX2, then returns the first signed number: on the canonical C/B/R slice with the independently calculated wheel history metric ($W_{CC} = W_{RR} = 12/31$, $W_{BB} = 21/124$, vanishing crosses), the two-coordinate Hessian is $(1/124)[[69, -21], [-21, 69]]$ with eigenvalues 12/31 and 45/62, the record follows at $y = (7/23)x$, the Schur-reduced closure stiffness is exactly 360/713, and the signed stationary curvature is $c\star\sigma = \sigma\alpha\star \cdot 713/360 = \pm 1.89935497564$ with induced record response ± 0.578064557803 (Corollary 2.1); record relaxation lowers the stiffness by 9.26% and raises the response by 10.21% against the locked value, the two-cell family $c(g) = \sigma\alpha\star(31 + g)/12$ confirms structural stability, and the exact closed form Z_C with its positivity pass/fail conditions is issued for the eventual physical 6 × 6 ledger, whose forward return remains open (F26). An assembly note, PSAC-MA1, then completes the installation obligation at candidate level: the derived pieces are written into one finite-regulator master action on the MASD parent variable set, containing the even defect quadratic, the centred bilinear bath block whose variation and substitution reproduce the HMGBC Schur reduction automatically (with the integration determinant retained for branch comparisons), the source-typed trilinear fermion block on the same transport as closure and gauge curvature, and the single orientation-odd IORC source on the gauge-typed Abelian closure line; the canonical reduction of this one action reproduces $K_C^{red} = 360/713$ and $c\star\sigma = \pm 1.89935497564$ exactly, no new adjustable coefficient appears, a second RCMO odd term and a stacked full IORC cost are excluded as double counting (F28), and the action is adopted as the controlling object of the paper, each gate becoming an independent test of it, while remaining a candidate rather than the uniquely derived physical action until its blocks are returned forward (F27). A bounds execution, PSAC-EX2B, then maps exactly what positivity guarantees ahead of the ledger: any slice-positive-definite physical metric gives $Z_C > 0$ strictly, so cross terms can rescale but never flip the history-selected sign (Corollary 2.2); an explicit rank-one Gram metric with exactly the canonical diagonals achieves $Z_C = 0$, and its positive-definite ε-blend drives $Z_C \to 0^+$ with the diagonals retained, so the diagonal data alone impose no upper bound on the response and the physical spectral gap is load-bearing (Corollary 2.3, F29); Cauchy-Schwarz* *nevertheless gives the exact one-sided bound $Z\_C \le (\sqrt{w\_CC} + \sqrt{w\_BB})^2 = 69/124 + 6\sqrt{7/31} = 1.068533$, hence $|c\star| \ge \alpha\star/1.068533 = 0.897495$ if the canonical diagonals persist (Corollary 2.4); and once the slice spectral envelope $\lambda\_min\ I \preceq W \preceq \lambda\_max\ I$ is returned, $\lambda\_min \le Z\_C \le 2\lambda\_max$ delivers the rigorous two-sided interval $\alpha\star/(2\lambda\_max) \le |c\star| \le \alpha\star/\lambda\_min$ from two numbers alone (Corollary 2.5), the canonical values 360/713 and ±1.89935497564 sitting inside the diagonal illustration [21/124, 24/31]. Gate S is thereby narrowed five times, its canonical response executed and its installation candidate-assembled: direction, normalisation, Gaussian bath immunity, gauge-typed carrier uniqueness and source-vector structure are all closed within the derived stack; the remaining obligations are the forward return of the candidate action's blocks (the physical history-metric ledger, A_Q and C, and the full-carrier attachment) and the derivation of the σ-retention map as the RCMO pushforward of the same sector; the gate is graded a strong partial pass with closed source structure, an executed canonical response and a candidate assembly, not fully closed. First readout executions, PSAC-EX3A through EX3C, established the exact scalar-phase nulls, the injectivity of the terminal response on the physical Wilson tangent, and the reduction of Route A to a single binary projection, with the source-native binary terminal row and its fixed-reference provenance the sole outstanding derivation at that stage (Corollaries 3.1–3.6, F30, F31). Gate R has now been executed through PSAC-EX3O. EX3A and EX3B close the scalar record-phase population route exactly at zero; EX3C proves the complete on-shell terminal response injective on the 72-dimensional physical Wilson tangent; EX3D fixes the source-side binary slope exactly, $d\chi/d\alpha|(\alpha\star) = 0.165420739713981$, giving $\chi\_pop = (2a\_phys - 1) \cdot 0.165420739713981$, with candidate identifications of the gain failing as derivations; the first-cover execution gives the unconditional source-side bias $\delta\_K = 0.995570059549810$, while the existing seven terminal species effects return exactly zero contrast under complete co-conjugation. The persistent-ledger execution then supplies the missing physical reference: the ordered ledger determines the first-cover circulation, so its positive and negative sectors are orthogonal, with trace distance 1 and fidelity 0 (Corollary 3.7). The present renewal architecture nevertheless factorises the retained ledger from the reopened working carrier, giving identical conditioned working channels, zero diamond-norm difference and zero current-source ledger-to-R4 gain, with the HMGBC completion amendment providing no bypass because it is built from reversal-even conductance rather than the antisymmetric history current (Corollary 3.8). Gate R therefore reaches an exact current-source negative for ledger-controlled R4 activation while the physical gain remains open to a genuinely new same-source layer-changing attachment (F37, F38). Gate M is executed at the current-action level by PSAC-EX4A: the representation-resolved transfer retains its structural and conditional CY3′ passes, but the primitive residual action has a 920-dimensional residual tangent before the declared 84-dimensional gauge quotient, the native score-strength coordinate changes the physical marked law while not appearing in the residual action, an explicit flat effective direction, and rank 72 persists across the η-interval and inequivalent frames; Gate M returns Grade C, structural capacity with residual freedom (Corollaries 4.1, 4.2). Gate T is now executed through PSAC-EX5AY. EX5S upgrades the projected closure-carrier invariance test: the source-returned finite-regulator mass and stiffness operators are circulant and diagonalise in the same Fourier basis, the uniform direction is an exact common eigenvector, and the projected nonuniform six-plane is exactly invariant, $\varepsilon\_inv = 0$ identically (Corollary 6.13). EX5T corrects the carrier comparison itself: the later continuum-bath construction identifies the physical commitment bath as fluctuations of the same Φ-field used* *by the closure-coordinate projection, not an independently fundamental seven-vertex bath, and the whitened map W = G^(1/2) is an exact isometric intertwiner from the projected closure six-plane to the corresponding nonuniform Φ-field six-plane, all six singular values equal to one; the direct discrete seven-to-seven identification is retired, the field-level bridge passing conditional only on the constitutive single-source identification (Corollary 6.14, F56). EX5U executes the first-order source-factorisation problem: the faithful defect Jacobian has shape 243 × 226, rank 183, nullity 43, smallest positive singular value 0.684040286651 and largest 3.30225857912, and the faithful constitutive-current/divergence block proves analytically that every zero-sum commitment-density covector lies in the row space of J_D, so R_HM4 = 0 exactly for the full six-dimensional first-order scalar commitment carrier under the stated P-HM12 typing, the existing machine execution returning* 1.51×10^{-15} *with blind replication* 8.68×10^{-16}*; first-order scalar source descent is closed, marked Fold activation is not (Corollary 6.15, F57). EX5V and EX5W separate record compatibility from outcome selection: the terminal RCMO operator is genuinely signed, M_Ω(−s) = −M_Ω(s), but its tangent obeys DM_Ω(−s) = DM_Ω(s), so no function of the first-order tangent alone can select the finite reversed record branch, the RCMO sign being orientation data rather than Fold commitment polarity (Corollary 6.16, F58); at the detailed PFDMI level the implemented mark operation L(e,α,r) = P_r C*(e,α) U_e is exact, the 319 microscopic marks coarse-graining to 84 retained edge/type records copied into orthogonal persistent ledger sectors, so terminal-record equivalence cannot merge distinct labels and an $E_{84} \to Z_2$ map is neither the primitive origin of the binary fact nor a QC-1 physical-equivalence quotient (Corollary 6.17, F59). EX5X places the sharp R4 PVM and the PFDMI history effects on their common carrier $C^7 \otimes C^{50}$: joint measurability with a sharp PVM requires exact commutation, but the rim/R4 squared overlap is exactly 1/6, the commutator has operator norm √5/6 and Hilbert–Schmidt norm √10/6, the obstruction survives the 319-to-84 coarse-graining, and simultaneous sharp R4 plus existing PFDMI readout fails exactly, sequential or layer-changing attachment being required (Corollary 6.18, F60). EX5Y through EX5AA execute the sequential route and return a precise negative for the current law: binary R4 renewal reopens the working carrier in the rays ψ_±(b_m) = e^(±iπm/3)/√6, a PFDMI history mark then gives transition probability K(y|x)/6 for both branches, the branch contrast is 0, the binary-to-detailed mutual information is 0, and after the first detailed transition the two reopened states differ only by a global phase (Corollary 6.19, F61); any no-overwrite post-commitment generator decomposes exactly as G_post = I_L ⊗ G0 + Z_L ⊗ G1 with all branch dependence in the ledger-odd G1, the present factorised action returning G1 = 0 with the symmetry-allowed ordered-history interaction −g_Lχ Z_L χ_future source-unreturned (Corollary 6.20), and the post-commitment mixed ledger-to-future derivative is identically zero, B_Lχ = 0 exactly at n = 3, 4, 5, 6 and both branches, algebraically for the spectator-factorised action (Corollary 6.21). EX5AB confirms that generic history-to-future dynamics exists elsewhere in the corpus, the fact-memory kernel M = G_ret θ giving Ξ = M ∗ ρ_committed with a conditional response through λ_mem, but λ_mem is phenomenological and the declared scalar source is unsigned at the outcome grain, carrying that a commitment happened rather than which outcome occurred (Corollary 6.22, F62). EX5AC and EX5AD then retype the outstanding object: the Fold contains an independent commitment polarity b and reversible orientation ω which may not be identified, R4's reflection-odd character being χ_bω rather than pure b (F63); different realised outcomes must leave different substrate states, ρ_E^(0) ≠ ρ_E^(1), so an outcome-sensitive record carrier is structurally necessary (Corollary 6.23); and the current Single-Source scalar event-count density returns identical values for two histories differing only in which polarity was realised, so the scalar count density is exactly insufficient as a complete outcome record (Corollary 6.24, F64), the minimal candidate enrichment being a marked measure $\varrho(dx\ dt\ db)$ with scalar marginal $\rho_0 + \rho_1$ and outcome contrast $\rho_1 - \rho_0$, promoted only when the HCMR intertwiners ι_nk, π_nk with π_nk ι_nk = I are source-returned on the record subspace, injectivity of the continuum embedding following exactly from the left inverse, with ΔΦ_μν = Φ^(1) − Φ^(0) the decisive return if the mark is carried by the master-action field (F65). A further renewal execution, PSAC-EX5AE, now proves an exact separation between closure, record formation and record retention. For a connected open chain, endpoint closure produces $\Delta\beta_1 = +1$ and creates a one-dimensional cycle kernel of the edge Hodge operator; reopening the edge removes that sector exactly, so topology alone carries no permanent memory (Corollaries 6.25, 6.26, F66). If the underlying complete dynamics is injective or isometric, however, a local many-to-one renewal cannot destroy the distinction between the pre-renewal alternatives: the distinction must be exported into an orthogonal record sector (Corollary 6.27, F67). Exact retention of n independent binary commitments therefore requires at least 2^n distinguishable history states, equivalently n bits of exact record capacity, while any fixed D-dimensional record carrier saturates at $n \le \lfloor \log_2 D \rfloor$ (Corollaries 6.28, 6.30, F70); the append-only one-bit existential record survives indefinitely only because it merges distinct histories, its entropy $h_2(1 - (1-p)^n) \to 0$ (Corollary 6.29, F68). Complete local renewal remains compatible with this accumulation: the working carrier may factorise into one identical renewed state for every history, giving zero final system-record mutual information, while the environmental sector retains the complete history, $S(R) = n\ h_2(p)$ (Corollary 6.31, F69). These are exact mathematical and conditional physical results about record necessity and capacity. The marked-record sequence PSAC-EX5AF through EX5AY then executes the outcome-record problem itself at mathematical, construction and current-action levels. The existing scalar six-plane continuum embedding annihilates the polarity sector exactly, zero polarity rank on the twelve-dimensional marked carrier (Corollaries 6.32, 6.33, F71), and MA1 contains no independent polarity variable, giving zero polarity forcing and zero Fold-character/R4 gain by exact Walsh audit (Corollaries 6.34, 6.47, F72, F76). The mark itself is nevertheless already present: the four-atom Fold carrier possesses commuting intrinsic polarity and orientation observables S_b and O_ω whose product is exactly the unique exchange-covariant character, J_Fold = S_b O_ω = χ_bω, with spectral sectors identical to the structural R4 sectors, so no second primitive fact-producing source is required and the commitment bit is relationally reconstructible, b = (1 − χ_bω · ω)/2 (Corollaries 6.35, 6.48). The orientation factor is typed exactly: sign(K) fails as a global binary orientation on the nonzero K = 0 sector while the source-native ς avoids the obstruction, with implemented orientation sectors orthogonal, identity confusion matrix and zero Lüders disturbance, the IORC/Fold orientation intertwiner unique up to global sign, and the record response separating the two ς branches by 1.156129115606 on the canonical slice (Corollaries 6.36, 6.40–6.44, F73, F74). Symmetry reduces the complete Fold-to-R4 channel to a single gain, E[Z_R4 | b, ω] = g · (−1)^b · ω, deterministic exactly when |g| = 1 (Corollaries 6.45, 6.46, F75), and an adapted cellular Fold record admits an explicit Whitney embedding of polarity and orientation in two graded continuum directions with exact left inverse π_W ι_W = I, injective on all four Fold states (Corollaries 6.49, 6.50, F77, F78). Gate T therefore no longer lacks the outcome mark or its mathematical carrier: the measurement-side debt is the source-derived physical installation of the known minimal carrier, while the actual vacuum topology, occupancy, matter attachment and axle-loop inheritance remain independently open. The unified theorem is conditional and two-sided: if all four gates pass from one frozen primitive source chain, with regulator consistency and without target insertion, the finite Standard-Model architecture is source-selected and physically attached at the declared level rather than merely available; if any gate fails, the corresponding bridge is retired as a physical negative result and may not be repaired within this paper by a fitted coupling. No part of this paper reopens the electromagnetic pre-fact closure weight, which is consumed as an exact foundational consequence of Pre-Fact Indifference (P14) and the K = 7 closure cardinality.

Headline question

The programme is no longer asking whether VERSF can construct something with the right qualitative structure. In several sectors it demonstrably can. The stronger question, and the only remaining one at this level, is:

> **Does the primitive source uniquely select the physically relevant member of the available structural family, and does it attach the selected members to one another by source-derived maps?**

Schematically, the required forward return is

A_primitive ⟶ { s_C, K_C, c⋆_σ; a_phys or χ_pop; D_score, U_role, η_phys, B_Q, B_L, G_M; K_vac, H^2(K_vac; Z_7), Occ_Z_7, V_attach, L_ax }.

Every member of this set must descend forward from the source. None may be reconstructed backwards from desired Standard-Model outputs. A negative return at any gate is a physical result of equal standing with a positive one.

PART I — QUESTION, SOURCE DISCIPLINE AND CLAIM BOUNDARY

1. Exact question and inherited position

At the start of this paper the frozen source stack already contains, at the grades stated in the controlling predecessor:

1. a source-selected orientation of retained history, exact at the fluctuation-relation level and executed at the first-cover level;
2. a reversal-even physical curvature susceptibility, correctly typed but sign-blind;
3. completion-to-fermion coupling at its correct differential order, with the full archived tensor descent passing at machine precision;

4. a representation-resolved matter law that closes the independent CY3′ routes conditionally;
5. a maximal-rank physical score carrier whose numerical score law is not identified;
6. an exact closed three-generation comparison phase;
7. a correctly typed candidate Z_7-to-K7 representation bridge with all physical gates open;
8. a foundationally fixed electromagnetic pre-fact closure weight.

The remaining issue is selection plus attachment. Capacity results, correspondence results and dimension or representation matches are consumed but carry no selective force under the premises below.

2. Claim grades

1. **Exact mathematical theorem**: follows from declared maps, algebras or inequalities.
2. **Construction identity**: an implemented factorisation, isometry or classification; existence, not source selection.
3. **Imported VERSF execution**: a frozen numerical calculation consumed at its declared level.
4. **Conditional physical theorem**: follows after named physical premises and carrier identifications.
5. **Effective parent-dynamics pass**: a reduced law exists in a controlled approximation class.
6. **Primitive physical admission**: one source chain returns the object across regulators and branches without target insertion.

Machine-zero agreement between two chains derived from the same frozen source is reproduction, not independent corroboration. Every gate verdict in this paper must state which grade it achieves.

3. Premises

Premise	Content
P1 — No Standard-Model selector	Measured masses, CKM and PMNS values, the measured fine-structure constant and preferred physical scales may test a frozen calculation but may not choose the source law, the branch, the regulator, a frame or a coupling.
P2 — Same-source attachment	Matching dimensions or representation types does not constitute physical identification. A bridge requires an actual source-derived map, published with its residuals.
P3 — Irreversible source, reversible response	A reversal-even quadratic action determines susceptibility but may not be credited with choosing its own sign. Signed structure

Premise	Content
	must enter through an irreversible source-odd term or a source-selected background branch.
P4 — Readout is not carrier identity	A correspondence between observables does not imply an isomorphism of the underlying state spaces. A physical readout may be, and in the history/R4 case must be, a conditioned completely positive map.
P5 — Topological availability is not occupancy	A nontrivial possible cohomology class is not automatically a class physically realised or populated by the source, and a populated class is not automatically attached to matter.
P6 — Closed phase before phenomenology	A phase may be promoted to physical flavour or CP significance only after it exists as a source-derived closed gauge-invariant comparison on the physically realised loop.
P7 — Electromagnetic prior frozen	No part of this paper attempts to rederive 1/128 from Hamming dynamics, bit-flip frequencies, a chosen microscopic channel or any post-birth mechanism. The pre-fact law is consumed as exact under P14 of the controlling predecessor together with the $K = 7$ cardinality.
P8 — Regulator currency	Every gate return must descend at regulator levels $n = 3, 4, 5, 6$ and on both surviving conjugate branches $k = 1, 6$, unless a source-derived branch gap selects one; branch or regulator selection by proximity to experiment is forbidden.
P9 — Failure outcomes are physical returns	A failed lift, an empty stationary class, an unoccupied cohomology sector, a non-inherited loop phase or a zero readout gain is a physical verdict of the frozen source, to be published at the same prominence as a pass and never repaired in-paper by a new fitted coupling.

4. Scope boundary and inherited-debt crosswalk

PSAC-1 consumes the HCMR-M1-R15 debt ledger and executes a specific subset of it. The crosswalk is part of the contract: every gate names the predecessor debts it would close, and no result of this paper may be cited against a debt outside its gate.

Gate	Predecessor debts consumed	Content
Gate S	D48, D49 (with D27 adjacent)	Physical closure-score identity; signed curvature response or background-branch selection; signed maintenance load as a downstream consumer
Gate R	D28, D29, D30, D34, D35, D47	Orientation-to-frame forcing; physical projective visibility; PFDMI-S1 frame selection; first-cover readout activation; population coefficient; readout gain

Gate	Predecessor debts consumed	Content
Gate M	D39, D40, D41	Primitive D_score and U_role; physical η and sector-resolved bath blocks; lepton maintenance operator and branch covariance
Gate T	D33, D42, D43, D44, D45	Axle-loop inheritance; attaching map; vacuum cohomology; integral torsion; occupancy and loop identification

Explicitly outside scope, retained by their own papers: the primitive retention-law derivation and continuation-space programme (D20–D23), the commitment lock s_old and the common operational metric (D24–D26), the physical microscopic reverse (D46), and the two load-bearing electromagnetic obligations (physical TPB saturation and continuum/QED matching and running), which remain with the companion line. PSAC-1 results may not be cited against those debts, and their open status may not be cited against PSAC-1 gates.

Execution status is tracked per debt. PSAC-EX1, EX1B, EX1C, EX1D and EX1E (Part II-A) narrow D48 five times: directional freedom is eliminated by Theorem 1A, the normalisation is fixed at λ_C = 1 by Theorem 1B, Gaussian bath screening is excluded as a destruction mechanism by Theorem 1C, the gauge-typed uniqueness of the Abelian closure line is established by Theorem 1D, and the source-vector structure is closed as $h\_\sigma = \sigma\alpha\star(1, 0)^T$ on the combined closure/record sector by Theorem 1E. The remaining content is the forward return of the candidate master action's blocks (Part II-C): the physical 6 × 6 history-metric ledger with its cross blocks, the physical A_Q and C, and the full-carrier attachment onto the gauge-typed Abelian line with its sector match; the same-action installation itself is now candidate-complete (PSAC-MA1), and the σ-retention map is retyped as the RCMO pushforward derivation of the same sector. D49 is now partially executed by PSAC-EX2 (Part II-B): the canonical-slice response c⋆_σ = ±1.89935497564 is exact, and the closed form Z_C reduces the remaining physical content of the response magnitude to the forward return of the 6 × 6 history-metric ledger with its cross blocks.

PART II — GATE S: THE IRREVERSIBLE HISTORY-TO-CURVATURE SELECTOR

5. Existing source orientation

The inherited ordered-history process carries a nonzero A_2 pseudoscalar with expectation $\langle\chi_2\rangle = 0.334169477947982$ and conditional two-turn orientation bias tanh(2α) = 0.957752384566601. At complete first cover its signed rim circulation K obeys the exact fluctuation relation

P(K = k)/P(K = −k) = e^(2αk),

with executed ensemble values

$P(K > 0) = 0.996750764817216$, $P(K < 0) = 0.001180705267406$, $P(K = 0) = 0.002068529915369$,

and conditional preferred-sign probability $P(K > 0 \mid K \neq 0) = 0.998816847345935$ at odds 844.199473258. The one-Bit affinity fixes

$$\alpha^\star = 0.959001109719975,$$

and the same α is returned by the fluctuation slope, the two-turn bias and the independent one-Bit condition. The irreversible orientation is therefore already present in the source at three mutually consistent reductions. This paper does not seek another source of chirality; it asks whether this one is the physical curvature source.

6. The physical score test

On the canonical wheel the identity

$$F_C = \omega_C$$

is exact: the IORC orientation score and the HMGBC closure-defect score are the same wheel function, and their finite exponential deformation families coincide under $\varepsilon_C = \sigma\alpha$. The wheel is a proxy. Define the physical HMGBC/MASD closure score as the logarithmic derivative of the physical deformed history kernel at the reference branch,

$$S_C(x, y) = \partial/\partial\varepsilon_C \log K_n^\varepsilon(y|x) \big|_{(\varepsilon_C = 0)},$$

evaluated on the physically typed HMGBC/MASD history carrier, not on the wheel. The controlling execution is the identity test

$$S_C \overset{?}{=} L_{hist\to C}\, \omega_C,$$

where $L_{hist\to C}$ is a source-derived intertwiner from the irreversible history score into the physical closure tangent. Define the residual

$$\varepsilon_{score} = \|S_C - L_{hist\to C}\, \omega_C\| \,/\, \|S_C\|$$

in the physical metric, with a tolerance declared per regulator level before execution. The execution must also return the physical norm of S_C, its reversal parity, its support relative to $\mathrm{Ran}(K_C)$, and its behaviour across $n = 3, 4, 5, 6$ and both branches.

7. Theorem 1 — Same-History Score Theorem

Theorem 1. [conditional physical theorem] If a source-derived intertwiner $L_{hist\to C}$ maps the irreversible history score ω_C into the physical HMGBC/MASD closure tangent, preserves reversal parity, and has physical residual $\varepsilon_{score} = 0$ within the declared regulator tolerance at every admitted level and branch, then the history orientation and the closure-defect source are one physical direction represented at two reductions, and no independent orientation source may be added to the curvature sector.

Three remarks fix the evidential standard. First, the map is part of the theorem: numerical proximity of two score vectors without a source-derived $L_{hist} \to C$ is not a pass (F1, F3). Second, the wheel identity $F_C = \omega_C$ supplies the candidate and the deformation calibration $\varepsilon_C = \sigma\alpha$, nothing more. Third, a failed lift is decisive in the other direction: it retires the same-source irreversible-curvature selector and demotes the wheel equality to a finite proxy coincidence, exactly as the predecessor's stop rule requires.

8. Reversible curvature susceptibility

Let $c = D_C$ be the physical vacuum-relative curvature coordinate. After exact Schur elimination of every relaxable auxiliary a,

$$K_C = W_{CC} - W_{Ca} W_{aa}^{+} W_{aC},$$

and the reversal-even quadratic action is

$$\Gamma_{rev}(c) = \tfrac{1}{2} c^\dagger K_C c, \text{ with } \Gamma_{rev}(c) = \Gamma_{rev}(-c) \text{ identically.}$$

A positive K_C determines how strongly the physical carrier resists curvature; it cannot determine which sign occurs (P3), and the HMGBC KL rate has exact zero first derivative at the reference branch, so no linear source hides in the even sector. If Theorem 1 passes, the history supplies the missing odd term and the effective action on the curvature coordinate becomes

$$\Gamma_{eff}(c \mid \sigma) = \tfrac{1}{2} c^\dagger K_C c - \sigma \alpha^\star \langle s_C, c\rangle,$$

with s_C the lifted physical score and σ the retained commitment sign, held fixed rather than co-conjugated.

9. Theorem 2 — Signed Physical Curvature Response

> **Theorem 2. [exact given Theorem 1 and the quadratic reduction]** If $s_C \in \mathrm{Ran}(K_C)$, the stationary supported response of Γ_{eff} is
>
> $$c^\star_\sigma = \sigma \alpha^\star K_C^{+} s_C,$$
>
> unique up to $\ker K_C$, and consequently $c^\star_{(-\sigma)} = -c^\star_\sigma$.

Proof. Stationarity gives $\nabla\Gamma_{eff} = K_C c - \sigma\alpha^\star s_C = 0$. On the supported range this is solved by $c^\star = \sigma\alpha^\star K_C^{+} s_C$; any two solutions differ by an element of $\ker K_C$, on which Γ_{eff} is σ-independent. Oddness in σ is linearity of the source term. ■

Two boundary clauses are part of the theorem's execution. If s_C has a component outside $\mathrm{Ran}(K_C)$, the quadratic truncation has no stationary point along that component and the linear term is unbounded below; the correct return is then the null-direction physics and the higher-order stiffness, not a silently regularised inverse (F3 territory). If Theorem 1 fails, this entire route is retired and the alternative, a signed frozen background branch with $D_C = 0$ relative to each branch, must be executed on its own terms through the common-Perron branch comparison; the reversible sector cannot break that conjugate tie by itself.

10. Gate-S stop rules

1. If ε_{score} exceeds the declared tolerance at any admitted regulator or branch, Gate S fails; ω_C may not be inserted manually into the physical tangent (F3).
2. If the lift changes reversal parity, Gate S fails regardless of residual.
3. If $s_C \notin \mathrm{Ran}(K_C)$, report the null-direction structure; no pseudo-inverse response is published as physical.
4. The Gate S verdict may not consume the desired confinement or cosmological sign to select the branch σ (P1, F17).

PART II-A — FIRST GATE-S EXECUTION: PSAC-EX1

10A. Execution scope and sources

PSAC-EX1 executes the directional half of the Gate-S test of §6: not yet the full physical residual ε_{score}, but the question of which direction any admissible physical closure score can occupy. It consumes the MASD defect definitions and their first differential, the HMGBC closure score, D_6 wheel-tangent decomposition and Fisher weights, the IORC identity $\omega_C = F_C$, and the existing two-cell execution, each at its stated grade. The available CFB boundary branches are consumed as candidate executions only; no physical boundary certificate is issued or assumed here.

10B. The MASD closure differential is an oriented circulation

MASD defines the physical closure defect $D_C(p)$ on a face p through the vacuum-relative plaquette holonomy. Perturbing each oriented boundary link as $U_e(t) = U_{(e,\star)}\, e^{itA_e}$ and differentiating the ordered holonomy product at $t = 0$ gives

$$\dot{D}_C(p) = (1/|p|) \sum_{e \in \partial p} \sigma(p, e)\, \mathrm{Ad}_{(Q_{(e\to p)})}(A_e),$$

where σ(p, e) is the incidence orientation and $Q_{(e\to p)}$ parallel-transports the edge variation to the face basepoint. The spatial part of the MASD closure differential is therefore an oriented circulation, even under rotation of the face and odd under orientation reversal. This return comes from MASD alone, independently of HMGBC.

10C. Representation compression and the closure-direction theorem

HMGBC independently defines the closure score $F\_C(b\_i, b\_(i+1)) = +1$, $F\_C(b\_i, b\_(i-1)) = -1$, the rotation-invariant oriented history circulation, and the IORC audit gives $\omega\_C = F\_C$ exactly on the canonical carrier. The two constructions therefore agree in spatial transformation type before any lift is attempted. The decisive imported input is the D_6 decomposition of the complete admissible wheel tangent: the closure direction is the unique simultaneously rotation-invariant and reflection-odd direction, the (A_2, m = 0) isotype, with multiplicity one, while every other relevant defect sector has multiplicity three or four.

> **Theorem 1A — MASD–HMGBC Closure-Direction Theorem. [exact on the declared wheel-tangent carrier]**
>
> Let π_hist be any D_6-equivariant compression of the physical MASD closure differential onto the declared history carrier. If the compression is nonzero then, because the (A_2, m = 0) isotype of that carrier has multiplicity one,
>
> $\pi\_hist\ \dot{D}\_C = \lambda\_C\ \omega\_C$
>
> for some scalar $\lambda\_C \neq 0$. Any nonzero equivariant physical closure lift is necessarily proportional to ω_C, and on the local scalar face slice its polar orientation frame is exactly the normalised ω_C.

Proof. Equivariance sends the (A_2, m = 0) component of Ḋ_C into the (A_2, m = 0) isotype of the history carrier; by Schur's lemma and multiplicity one, that isotype is the line spanned by ω_C, so the image is a scalar multiple of ω_C. Nonvanishing of the compression forces $\lambda\_C \neq 0$. ■

Carrier-local caveat (mandatory). The multiplicity-one input is a property of the declared scalar wheel-tangent decomposition; §10M now derives it directly (the spoke coefficient of a rotation-invariant, reflection-odd edge field is forced to zero). The complete physical theory contains further A_2-type carriers, and PSAC-EX1D (§§10M–10P) executes the audit: the faithful gauge-link carrier has spatial A_2 multiplicity 12, so the naive full-carrier multiplicity-one hypothesis fails exactly, while gauge invariance restores exactly one admissible Abelian closure line for a scalar first-order source (Theorem 1D); the record-phase carrier contributes three further A_2 copies, whose first-order source component is zero within the derived actions by the Triangularity Theorem of PSAC-EX1E (§§10Q–10T); the population line remains Gate R's object. Promoting the scalar-carrier uniqueness to the full physical statement without the gauge typing and the executed compression is falsifier F1.

10D. Local polar lift and canonical normalisation

Writing the physical-lift architecture as $J\_C = \dot{D}\_C = V\_C\ |J\_C|$, with V_C the polar orientation frame: on a single m-edge closure boundary, suppressing the internal generator and taking a covariantly constant closure direction, MASD returns the row vector

$J_C^{spatial} = (1/m)(\sigma_1, \ldots, \sigma_m)$,

whose single nonzero singular value equals $1/\sqrt{m}$, so the normalised polar direction is

$V_C^{spatial} = (1/\sqrt{m})(\sigma_1, \ldots, \sigma_m)$.

The polar frame is exactly the normalised oriented closure score. For the six-edge rim representation,

$V_C^{spatial} = \omega_C/\sqrt{6}$, $J_C^{spatial} = \omega_C/6$,

and the 1/6 is not an adjustable probability or coupling: it is MASD's explicit $1/|p|$ average-face-curvature normalisation. Passing to the integrated face curvature $\kappa_C(p) = |p|\, D_C(p)$ gives

$D\kappa_C = \omega_C$

exactly on the scalar oriented closure slice. The local directional residual after canonical normalisation is zero. PSAC-EX1B (§§10F–10H) sharpens the typing of this object: $J_C^{spatial}$ is the differential covector from link variations to the closure coordinate, not the physical injection of a closure defect into the link carrier; the injection is computed there and carries coefficient exactly one.

10E. Fisher reparametrisation and two-cell survival

On the canonical wheel the unnormalised HMGBC closure score has Fisher weight $W_{CC} = 12/31$. Using MASD's six-edge average-curvature coordinate scales the score by 1/6 and the Fisher weight by 1/36, giving $(1/36)(12/31) = 1/93$; converting to the integrated-curvature coordinate $6D_C$ multiplies back by 36 and returns 12/31 exactly. There is no normalisation contradiction between the two formulations: they differ precisely by average curvature against integrated circulation. The existing two-cell execution independently returns

$W_{CC}^{(2)}(g) = 12/(31 + g)$, $W_{(C,BR)} = 0$,

giving 18/47 at $g = 1/3$: the closure direction survives the addition of a second cell and a bridge while remaining exactly orthogonal to the bridge direction. The source grades the two-cell sector, rank, equivariance and structural-reproduction tests as graph-level passes rather than full physical passes, and that grading is retained here.

10F. PSAC-EX1B: the exact closure right inverse and the disappearance of λ_C

The differential $B_C = (1/m)\sigma^T$ of §10D maps link variations to the closure coordinate. It is not the physical injection of a closure defect back into the history/link carrier, and conflating the two objects is now falsifier F20. PSAC-EX1B computes the injection. Let a physical closure defect have amplitude c and let $E_C(c)$ be the tangent displacement that realises it exactly, $B_C E_C(c) = c$. By Theorem 1A the closure sector is the unique (A_2, $m = 0$) direction, so any equivariant lift has the form $E_C(c) = \lambda c \sigma$. Substituting,

$B_C E_C(c) = (1/m) \sigma^T (\lambda c \sigma) = \lambda c$, since $\sigma^T\sigma = m$,

and exact realisation forces

$\lambda = 1$, $E_C(c) = c \sigma$.

There is no free closure-normalisation coefficient between a unit physical MASD closure defect and the unique oriented closure direction: the 1/m of the average-curvature differential cancels exactly when the deformation producing one unit of closure is requested. The correctly typed pair is

$B_C = \omega_C^T/m$ (differential covector), $E_C = \omega_C$ (defect injection),

and for the six-rim representation $B_C = (1/6)(1, 1, 1, 1, 1, 1)$ while $E_C = (1, 1, 1, 1, 1, 1)^T$.

10G. Minimum-norm confirmation and metric-scale independence

The inherited history-metric work supplies the canonical minimum-operational-norm defect lift $E_D = Q_{kin} G_p^{-1} J_p^\dagger(J_p G_p^{-1} J_p^\dagger)^+$, the unique tangent displacement realising a requested defect while minimising operational distinguishability; its full finite-cell implementation returned a right-inverse residual of 6.86×10^{-15}. Specialised to the one-dimensional closure sector: for $B_C = (1/m)\sigma^T$ the weighted minimum-norm right inverse is $E_C = G^{-1}B_C^T(B_C G^{-1}B_C^T)^{-1}$. Any D_6-invariant operational metric preserves the isotype decomposition, and multiplicity one makes σ an eigenvector, $G\sigma = g_C \sigma$. Hence

$G^{-1}B_C^T = \sigma/(m g_C)$, $B_C G^{-1}B_C^T = 1/(m g_C)$, $E_C = \sigma$,

independently of the overall metric scale g_C. The exact right inverse and the minimum-norm prescription agree, and neither leaves a scalar freedom.

> **Theorem 1B — Closure-Normalisation Theorem. [exact on the declared carrier]**
>
> On the declared wheel-tangent carrier, the unique D_6-equivariant exact right inverse of the MASD closure differential is $E_C(c) = c\sigma$, and it coincides with the canonical minimum-operational-norm defect lift for every D_6-invariant operational metric, independently of the metric scale. Consequently $\lambda_C = 1$: the correctly typed pair is the differential covector $B_C = \omega_C^T/m$ and the defect injection $E_C = \omega_C$, and no free geometric closure coefficient exists between a unit physical closure defect and the oriented closure direction.

10H. The continuous-history score and the canonical-branch identity

The inherited continuous-history construction proposes $\xi \mid (X, D) \sim N(a_t E_D D, a_t G_{op}^{-1})$ with one common operational geometry, so its Radon-Nikodym derivative

$\log dQ_{(n,D)}/dQ_{(n,0)} = \langle E_D D, \xi\rangle(G_{op}) - (a_t/2)\, \|E_D D\|^2(G_{op})$

fixes the linear score and the quadratic normalisation together; inserting a further defect-dependent factor would define a different history law. For closure, $E_C(c) = c\sigma$, so

$S_C(\xi) = \partial/\partial c \log dQ_c/dQ_0 \,|(c = 0) = \langle\sigma, \xi\rangle(G_{op})$,

with no residual λ_C. On the derived canonical separable history branch the physical tangent quotient is operationally orthonormal, $G_{op} = I$, and the canonical bath coupling vanishes, $C = 0$, so $W_{prim} = W_{core}$ there and $S_C(\xi) = \sigma^T\xi$. For one elementary forward closure transition, $\xi = e_i$ with $\sigma_i = +1$, the score returns +1; for the reversed transition, $\xi = -e_i$, it returns −1. Hence

$S_C = \omega_C$

exactly on the canonical operational closure slice, independently reproducing the IORC/HMGBC rule $\omega_C(b_i, b_{(i+1)}) = +1$, $\omega_C(b_i, b_{(i-1)}) = -1$ and joining the earlier finite-kernel identity $\varepsilon_C = \sigma\alpha$ into one chain,

MASD closure → $\dot{D}_C$ → E_C → continuous proposal score → ω_C,

with no inserted numerical rescaling on the canonical branch.

> **Corollary 1B.1 — Canonical-branch score identity. [exact on the canonical separable branch]**
>
> On the canonical separable history branch ($G_{op} = I$, $C = 0$), the physical closure score of the continuous-history law is exactly the irreversible orientation score, $S_C = \omega_C$, with algebraic residual zero. Promotion of this identity to the selected nonseparable, multi-cell physical branch requires the bath-integration preservation proof; PSAC-EX1C (§§10I–10K) supplies that proof within the declared Gaussian architecture, so the remaining promotion content is transport through the complete typed carrier (F21).

10I. PSAC-EX1C: Gaussian bath elimination and the invariant odd source

The bath-resolved HMGBC quadratic action has the exact form

$\Gamma_{bath}^{(2)}(D, q) = \tfrac{1}{2} D^\dagger W_{core} D + q^\dagger C D + \tfrac{1}{2} q^\dagger A_Q q$:

the unresolved bath is centred, with no independent linear term in q, and couples to the primitive defects bilinearly. IORC independently supplies the odd part, $-\sigma\alpha^\star s_C^\dagger D$, with $\alpha^\star = 0.959001109719975$; the one-Bit-selected source is distinct from the reversible quadratic cost. The combined action is therefore

$\Gamma(D, q \mid \sigma) = \tfrac{1}{2} D^\dagger W_{core} D + q^\dagger C D + \tfrac{1}{2} q^\dagger A_Q q - \sigma\alpha^\star s_C^\dagger D$.

Under the declared range condition $\mathrm{Ran}\, C \subseteq \mathrm{Ran}\, A_Q$, completing the square,

$\tfrac{1}{2} q^\dagger A_Q q + q^\dagger C D = \tfrac{1}{2} (q + A_Q^+ C D)^\dagger A_Q (q + A_Q^+ C D) - \tfrac{1}{2} D^\dagger C^\dagger A_Q^+ C D,$

and integrating the centred Gaussian bath exactly gives

$\Gamma_{eff}(D \mid \sigma) = \tfrac{1}{2} D^\dagger(W_{core} - C^\dagger A_Q^+ C)D - \sigma\alpha_\star s_C^\dagger D + \text{const.}$

Hence $W_{prim} = W_{core} - C^\dagger A_Q^+ C$, exactly as already obtained in HMGBC, while the odd source $\alpha_\star s_C$ passes through the Gaussian elimination untouched: the bath carries no independent orientation-odd linear source, so its entire effect at this order is the quadratic Schur complement.

> **Theorem 1C — Bath-Protection Theorem. [exact within the declared Gaussian architecture]**
>
> For a centred Gaussian unresolved bath whose coupling to the physical defects is bilinear, $\Gamma(D, q \mid \sigma) = \Gamma_{even}(D, q) - \sigma\alpha\, s^\dagger D$, Gaussian elimination of the bath changes the even quadratic response operator but leaves the odd source exactly invariant: $s_{eff} = s$ and $\alpha_{eff} = \alpha$. Bath screening acts on susceptibility, not on orientation selection.

This is the architecture the controlling predecessor was already pointing toward: the irreversible history supplies the sign, the reversal-even MASD/HMGBC sector supplies the susceptibility, and the theorem now proves that the declared bath cannot exchange those roles. Its three premises are load-bearing: a bath with an independent odd linear source, an odd defect coupling or non-Gaussian structure lies outside the theorem, and citing it there is falsifier F22.

10J. Kernel-level tilt survival and the reduced score

The same protection holds directly at the history-kernel level. Let $K_0(x, y, q)$ be the full bath-resolved reference kernel. The IORC source multiplies it by $e^{\sigma\alpha\omega_C(x, y)}$, and because ω_C depends on the resolved closure transition and not on the unresolved bath coordinate q, the tilt factors out of the bath integral,

$\int dq\, K_0(x, y, q)\, e^{\sigma\alpha\omega_C(x, y)} = e^{\sigma\alpha\omega_C(x, y)} \int dq\, K_0(x, y, q),$

so the bath-reduced tilted kernel is

$K^{red}_{(\sigma,\alpha)}(y|x) = K_0^{red}(y|x)\, e^{\sigma\alpha\omega_C(x, y)} / \Sigma_z K_0^{red}(z|x)\, e^{\sigma\alpha\omega_C(x, z)}.$

The exponential tilt survives marginalisation exactly. Differentiating,

$S_C^{red}(x, y) = \partial/\partial\alpha \log K^{red}_{(\sigma,\alpha)}(y|x) |_{(\alpha = 0)} = \sigma[\omega_C(x, y) - \Sigma_z K_0^{red}(z|x)\, \omega_C(x, z)],$

the mean-centred exponential-family score. Forward and backward closure transitions occur in conjugate pairs with $\omega_C(x, y_+) = +1$, $\omega_C(x, y_-) = -1$, and a reversal-even reference gives them equal weight, so the reference mean vanishes and

$S_C^{red}(x, y) = \sigma\, \omega_C(x, y)$

exactly. After integrating out an arbitrary admissible reversal-even Gaussian bath, the elementary closure score remains +1, −1, 0 on the corresponding transition types, which is precisely the IORC normalisation from which the exponential kernel was originally derived.

Corollary 1C.1 — Reduced-score invariance. [exact given the reversal-even reference]

Bath marginalisation preserves the closure score identically: $S_C^{red} = \sigma\omega_C$ on the reduced carrier, with the ±1, 0 elementary normalisation intact. Combined with Corollary 1B.1, the canonical score identity survives the declared bath reduction with zero residual.

10K. Screened response and exact sign invariance

Since $C^\dagger A_Q^+ C \succeq 0$, the bath can only soften the closure response, $W_{prim} \preceq W_{core}$. In the one-dimensional isolated closure sector, with bath stiffnesses ω_a and couplings c_{aC},

$$k_C^{prim} = k_C^{core} - \Sigma_a |c_{aC}|^2/\omega_a^2,$$

while the source remains $h_C = \sigma\alpha\star$. The scalar response is

$$c\star_\sigma = \sigma\alpha\star / k_C^{prim}:$$

if the bath softens k_C, the resulting physical curvature becomes larger, not because the irreversible source became stronger but because the system became easier to bend. In the full vector case,

$$D\star_\sigma = \sigma\alpha\star\, W_{prim}^+\, s_C, \text{ provided } s_C \in \operatorname{Ran} W_{prim},$$

and therefore $D\star_{(-\sigma)} = -D\star_\sigma$: bath screening can change the magnitude and, in a multicomponent sector, the response mixture, but it cannot change the selected sign at any admissible bath strength. If $s_C \notin \operatorname{Ran} W_{prim}$, the quadratic theory cannot support the imposed linear source without an instability or higher-order completion; that outcome is a sharp falsifier of the construction, never an adjustable parameter, exactly as the null-direction clause of Theorem 2 requires.

Corollary 1C.2 — Screened signed response. [exact given Theorem 1C and the range condition]

The bath-screened signed curvature response is $D\star_\sigma = \sigma\alpha\star\, W_{prim}^+\, s_C$, odd in the retained commitment sign σ for every admissible centred Gaussian bath. The response magnitude depends on the physical A_Q and C; the sign does not.

10L. Score-typing note: KL rate against pointwise score

Two different quantities are called "score" in adjacent parts of the programme, and the distinction matters here. The KL information rate satisfies DI(0) = 0 because the reference distribution minimises the KL divergence; the controlling predecessor records exactly this vanishing first derivative at the reference. That statement is the vanishing of the mean of the score, $E[S_C] = 0$. It does not mean the stochastic score random variable $S_C(x, y) = \partial_{(\varepsilon_C)} \log K^{\varepsilon}(y|x)|_0$ vanishes transition by transition: pointwise, $S_C(x, y) = \omega_C(x, y)$ remains +1 or −1, and its variance is the Fisher curvature. The reference-level identity $E[S_C] = 0$ and the pointwise identity $S_C = \omega_C$ are simultaneously exact and jointly consistent.

10M. PSAC-EX1D: the scalar-wheel multiplicity, now derived

The multiplicity-one input consumed by Theorem 1A can be derived directly rather than imported. Consider one scalar oriented edge field on the K = 7 wheel, six spokes and six rim edges. A rotation-invariant edge vector has the form $v = (a, a, a, a, a, a)_{spoke} \oplus (b, b, b, b, b, b)_{rim}$. Under a reflection an oriented spoke remains a spoke with the same orientation, whereas the chosen rim orientation is reversed; the A_2 requirement $Rv = -v$ therefore forces $a = -a$, so $a = 0$, while the rim component changes sign automatically. Hence

$\dim A_2(\text{one scalar edge field}) = 1$, with basis $u_{(A_2)} = (0, \ldots, 0; 1, 1, 1, 1, 1, 1)$:

the canonical closure score is the sole rotation-invariant, reflection-odd circulation on the scalar wheel, exactly as the imported HMGBC representation audit found, with every other relevant defect sector at multiplicity three or four.

10N. The faithful gauge carrier: multiplicity twelve and the failure of the naive hypothesis

The full-faithful source calculation replaces the three scalar link phases with $su(3) \oplus su(2) \oplus u(1)$, giving 8 + 3 + 1 = 12 independent internal directions on every edge and 144 gauge-link directions over the twelve-edge wheel. Spatial D_6 acts independently of the internal algebra, so

$E_{link} \cong E_{spatial} \otimes [su(3) \oplus su(2) \oplus u(1)]$, and hence $mult_{(A_2)}(E_{link}^{faithful}) = 1 \times 12 = 12$.

The proposed criterion "full physical A_2 multiplicity = 1" therefore fails exactly. This is not a failure of VERSF: it shows the criterion was too crude, because spatial symmetry alone cannot know which internal gauge direction the irreversible source belongs to. The correct statement to pursue is typed, not spatial.

10O. Gauge invariance restores typed uniqueness

IORC supplies a scalar orientation mark carrying no colour-octet or weak-triplet index. A gauge-invariant linear source for a Lie-algebra-valued closure field must therefore factor through an invariant linear functional on the internal algebra. But the adjoint representation of a compact simple group is a nontrivial irreducible, so

$(su(3))^{SU(3)} = 0$, $(su(2))^{SU(2)} = 0$, while $(u(1)^*)^{U(1)} \cong \mathbb{R}$.

A scalar history orientation cannot linearly select a colour or weak curvature direction at the symmetric vacuum without an additional adjoint-valued physical source. It can linearly select the Abelian closure direction, and only that:

12 spatial A_2 link copies → (gauge-invariant scalar source) → 1 admissible Abelian A_2 closure line.

> **Theorem 1D — Gauge-Typed Closure-Line Uniqueness Theorem. [exact at the symmetric vacuum]**
>
> On the faithful gauge-link carrier $E\_spatial \otimes (su(3) \oplus su(2) \oplus u(1))$, the spatial $(A_2, m = 0)$ multiplicity is 12, so full-carrier spatial uniqueness fails exactly. A gauge-invariant linear source driven by a scalar, internally index-free history orientation must factor through an invariant functional on the internal algebra; since the su(3) and su(2) adjoints admit no invariant covector while $(u(1)^*)^{U(1)} \cong \mathbb{R}$, exactly one admissible closure line survives: the Abelian A_2 line. Coupling the scalar source to a colour or weak direction requires an additional adjoint-valued physical source (F25), and the surviving line is the primitive Abelian direction, not yet electromagnetism (F24).

10P. First-order competitors: differential orders and the three record-phase lines

The differential-order audit of the newer source calculation removes every other candidate competitor at first order: the gauge response and the bosonic completion first appear at order 2, the CAR/Fock sector at mixed order 3, so none can masquerade as an additional first-order IORC source at the symmetric vacuum; and scalar commitment is a density source rather than an oriented edge circulation, the wrong spatial type for the A_2 line. That leaves terminal record. The faithful record carrier contains 36 record phases and 36 record stretches; the phase carrier is fully visible to the faithful defect derivative, while the 18 invisible stretch directions are exactly coboundaries, flat redundancies rather than missing orientation information. Applying the §10M argument per edge-phase channel, the raw record-phase carrier contains exactly

3 spatial A_2 copies,

one per channel, and the RCMO source is branch-odd orientation information living entirely in that phase carrier. The physical RCMO embedding among the three lines is not yet derived, but terminal record is thereby certified as the sole first-order sector capable of competing with the Abelian closure line on parity grounds. The bond coupling between the closure and record A_2 lines is real and executed, $(J\_B\ q)^T (J\_B\ r) = -1$, but it is second-order response structure; the combined response algebra is executed in §10S, and the question EX1D leaves open in coordinate-free form, $s\_phys|(R(A_2)^{phase}) =? 0$, is answered by PSAC-EX1E: zero within the derived actions, by the Triangularity Theorem.

10Q. PSAC-EX1E: the preparation action carries no terminal-record source

IORC is explicitly a pre-fact preparation law: its current exists before the persistent record current, and the later persistence projection belongs to the maintenance sector, not the preparation sector. Its action is

$$\Gamma_x[k; \sigma, \alpha] = \Sigma_y\, k_y \log(k_y / T_0(y|x)) - \sigma\alpha\, \Sigma_y\, k_y\, \omega_C(x, y),$$

and its domain contains no terminal-record phase r, no y_e, no record morphism Φ and no RCMO terminal-sign variable. Introducing a terminal-record coordinate r merely to test the derivative, $\Gamma_{prep}(k, \sigma, \alpha; r) = \Gamma_{prep}(k, \sigma, \alpha)$, so

$\partial\Gamma_{prep}/\partial r = 0$, and hence $P_R\, s_{IORC} = 0$,

exactly. This is a typing result following from the domain of the derived preparation action, not a numerical cancellation.

10R. The native link–record coupling: first order zero, second order nonzero

MASD already contains a genuine link–record coupling, so the critical check is whether it secretly generates a direct first-order record source. On the uniform forward-rim link direction θ and uniform record-phase direction y, the executed first bond defect is $D_B^{(1)} = i(\theta - y)$, with the nonzero mixed return $(J_B\, q)^T(J_B\, r) = -1$. The corresponding local quadratic bond action is

$$\Gamma_B = (w_B/2)|D_B^{(1)}|^2 = (w_B/2)(\theta - y)^2 = (w_B/2)\theta^2 - w_B\, \theta y + (w_B/2)y^2,$$

with gradient $\nabla\Gamma_B = w_B(\theta - y, y - \theta)^T$, vanishing at the common vacuum θ = y = 0, and Hessian

$$K_B = w_B\, [[1, -1], [-1, 1]].$$

The first-order record source is exactly zero while the second-order closure–record coupling is nonzero: the existing physical coupling lets the record follow closure orientation without giving the record an independent vote on which orientation is selected. As a decomposition cross-check, this bond block is exactly the bond contribution inside the controlling predecessor's unit-branch Hessian: K_B at $w_B = 1$ plus the diagonal link and record-composition stiffnesses diag(2, 1) reproduces $H_{qy} = [[3, -1], [-1, 2]]$ identically.

10S. Combined closure/record response and the Triangularity Theorem

The correctly normalised IORC closure source is $h_C^\sigma = \sigma\alpha\star$, with $\alpha\star = 0.959001109719975$ obtained uniquely from the one-Bit condition rather than from any

Standard-Model target. On the combined closure/record A_2 sector the derived first-order source vector is therefore

$h_\sigma = \sigma\alpha\star\,(1, 0)^T$.

Let the complete even response be $K = [[k_C, \mu], [\mu, k_R]]$, with $\mu \neq 0$ permitted (a native link–record precursor already exists) and $\Delta = k_C\, k_R - \mu^2 > 0$. Then $K^{-1} = (1/\Delta)[[k_R, -\mu], [-\mu, k_C]]$, and

$c\star_\sigma = \sigma\alpha\star\, k_R/\Delta$, $r\star_\sigma = -\sigma\alpha\star\, \mu/\Delta$, $r\star_\sigma/c\star_\sigma = -\mu/k_R$.

The record acquires a signed response even though $h_R = 0$; its sign is inherited entirely through the physical coupling. The architecture is now mathematically explicit: history chooses the sign, closure is directly sourced, the record follows through coupling.

> **Theorem 1E — Pre-Fact/Record Triangularity Theorem. [exact given the stated stage order]**
>
> Order the physical history preparation → commitment → terminal record. If (i) the derived preparation action contains an orientation-odd closure source h_C^σ; (ii) terminal-record variables are created and typed only at or after commitment; and (iii) pre-existing closure–record interactions are stationary at the defect-free vacuum and begin quadratically; then the first-order source has the block form
>
> $h^{(1)}_\sigma = (h_C^\sigma, 0_R)^T$,
>
> while the Hessian may nevertheless contain $K_{CR} \neq 0$. Terminal record can therefore acquire an orientation through physical response without being an independent pre-fact orientation source.

10T. Stage-order firewall: RCMO oddness is post-commitment

RCMO does contain a branch-odd record field: its physical record operator depends on the six terminal signs $s = (Q, u, d, L, e, N)$, the executed derivative is branch odd, $M_\Omega(-s) = -M_\Omega(s)$, and its tangent is entirely record-phase supported. That does not establish a second pre-fact source, because RCMO is a terminal-record construction: the post-commitment programme explicitly starts with a terminal record already entered, whereas IORC sits earlier in the stage order, preparation → commitment. IORC itself names what is still needed: after σ is realised as part of the first commitment mark, C_1 = (outcome, σ), the maintenance sector must record σ and prevent its erasure or reversal; that map has not yet been derived. Consequently RCMO's post-commitment oddness may not be retro-inserted into the pre-fact source, and shared parity is not a derivation (falsifier F23). Any future claim of $h_R^\sigma \neq 0$ at the pre-fact stage must exhibit a source-native same-action map $\sigma \to r_{terminal}$ existing before the record is used in the preparation law; without such a map, a nonzero h_R would let the eventual record participate in deciding the event that creates that record.

10U. Combined execution verdict

PSAC-EX1/EX1B/EX1C/EX1D/EX1E test	Result
MASD closure variation is oriented incidence	EXACT PASS
HMGBC/IORC score is oriented circulation	EXACT PASS
Common D_6 transformation type	EXACT PASS
Closure-sector multiplicity on declared carrier	1, EXACT
Alternative equivariant closure-score direction	IMPOSSIBLE ON DECLARED CARRIER
Local MASD polar frame	$V_C = \omega_C/\sqrt{m}$
Six-rim differential covector	$B_C = \omega_C^T/6$ (covector, not injection)
Integrated-curvature score	$D\kappa_C = \omega_C$
Equivariant exact right inverse	$E_C(c) = c\sigma$, EXACT
Free geometric λ_C	NONE: $\lambda_C = 1$ EXACT
Minimum-norm lift agreement	EXACT; independent of the metric scale g_C
Probability tilt supplies an independent scale	NO: score and normalisation fixed together by the history law
Canonical-branch score identity	$S_C = \omega_C$ EXACT; residual 0 algebraic
Bath centred at reference; coupling bilinear	DECLARED ARCHITECTURE, IMPORTED
Bath can create an odd closure source	NO: EXACT AT GAUSSIAN ORDER
Bath can rescale $\alpha_\star$ or rotate s_C	NO: $s_{eff} = s$, $\alpha_{eff} = \alpha$ EXACT (THEOREM 1C)
Odd exponential tilt survives bath marginalisation	YES, EXACT
Reduced score under reversal-even reference	$S_C^{red} = \sigma\omega_C$ EXACT
Bath effect on stiffness	$W_{prim} = W_{core} - C^\dagger A_Q^+ C$ EXACT; $W_{prim} \preceq W_{core}$
Screened signed response	$D_{\star\sigma} = \sigma\alpha_\star W_{prim}^+ s_C$; $D_\star(-\sigma) = -D_{\star\sigma}$ EXACT
$s_C \notin \mathrm{Ran}\, W_{prim}$	SHARP FALSIFIER, NOT A PARAMETER
Physical response magnitude	DEPENDS ON PHYSICAL A_Q, C; OPEN
Scalar-wheel closure A_2 multiplicity	1, EXACT, NOW DERIVED (§10M)
Faithful gauge-link A_2 multiplicity	12, EXACT (spatial 1 × internal 8 + 3 + 1)
Full-carrier multiplicity-one hypothesis	FAIL EXACT

PSAC-EX1/EX1B/EX1C/EX1D/EX1E test	Result
Non-Abelian linear coupling to the scalar history source	FORBIDDEN: NO INVARIANT COVECTOR IN THE su(3), su(2) ADJOINTS (F25)
Gauge-admissible Abelian closure A_2 line	1, EXACT: (u(1)*)^U(1) ≅ ℝ (THEOREM 1D; NOT YET ELECTROMAGNETISM, F24)
Gauge / completion / CAR-Fock as first-order competitors	NO: DIFFERENTIAL ORDERS 2, 2, 3 (IMPORTED)
Scalar commitment as a spatial A_2 competitor	NO: DENSITY SOURCE, WRONG SPATIAL TYPE
Raw record-phase A_2 copies	3 (ONE PER EDGE-PHASE CHANNEL; 18 STRETCHES COBOUNDARY-FLAT)
Physical RCMO embedding among the three record lines	OPEN
IORC preparation action depends on terminal record	NO: ∂_r Γ_prep = 0 EXACT BY DOMAIN
Record projection of the pre-fact source	P_R s_IORC = 0 EXACT
Bond-sector first derivative at vacuum	0 EXACT
Bond-sector mixed Hessian	NONZERO: K_B = w_B[[1, −1], [−1, 1]]
Derived first-order source vector	h_σ = σα⋆$(1, 0)^{\mathrm{T}}$ EXACT
Record acquires orientation through response	YES: r⋆_σ = −σα⋆μ/Δ; ratio −μ/k_R
RCMO branch-odd terminal orientation	YES, POST-COMMITMENT, IMPORTED
RCMO retro-insertion into the pre-fact source	FORBIDDEN BY STAGE ORDER (F23)
Same-action map σ → maintained terminal record	NOT DERIVED; NAMED OBLIGATION
Fisher reparametrisation consistency	EXACT (12/31 against 1/93)
Nontrivial two-cell survival	EXACT GRAPH PASS (18/47 at g = 1/3; bridge component 0)
Full internal/gauge/multi-cell carrier compression	OPEN
Physical sector match of the actual MASD closure differential	OPEN

PSAC-EX1/EX1B/EX1C/EX1D/EX1E test	Result
Nonseparable-branch preservation of $S\_C = \omega\_C$	GAUSSIAN SCREENING EXCLUDED AS DESTRUCTION MECHANISM; FULL TYPED-CARRIER TRANSPORT OPEN
Physical MASD boundary certificate	NOT ISSUED; CFB BRANCHES CANDIDATES ONLY
Gate S	STRONG PARTIAL PASS; SOURCE STRUCTURE CLOSED WITHIN THE DERIVED STACK; SAME-ACTION INSTALLATION AND TYPED-CARRIER TRANSPORT OPEN

> **Execution verdict.** The chain is now clean at every executed level: irreversible history → σ → α⋆ → ω_C → physical closure source, and reversible bath → W_prim → response magnitude. EX1A fixed the direction by multiplicity one; EX1B removed the normalisation freedom, λ_C = 1; EX1C proved that ordinary Gaussian bath screening cannot renormalise, rotate or erase the first-order orientation source; EX1D replaced the false full-carrier multiplicity-one hypothesis with the correct typed statement, exactly one gauge-admissible Abelian closure A_2 line for a scalar first-order source, with the three record-phase lines the sole first-order parity competitors; and EX1E closes the source-vector structure: the derived first-order source is $h\_\sigma = \sigma\alpha\star(1, 0)^T$ on the combined closure/record sector, with the record acquiring its orientation only through the response coupling. There is no longer an unknown source vector (h_C, h_R): everything beyond σα⋆ in the closure direction, bath screening, link–record mixing and auxiliary relaxation alike, belongs to the response operator, not to the sign source. What remains for Gate S is one physical provenance obligation with two named parts: install the IORC preparation block and the subsequent σ-retention map inside one complete master-history action, and demonstrate that the actual nonseparable, multi-cell physical generator carries this source through the complete typed carrier onto the gauge-typed Abelian line with its sector match. Theorem 2's candidate is fully assembled: $c\star\_\sigma = \sigma\alpha\star\, K\_C^+\, \omega\_C$ with K_C = W_prim, conditional only on that installation and transport.

Verification notes. Re-derived independently here: the completing-the-square identity under Ran C ⊆ Ran A_Q and the exact invariance of the odd term through the centred Gaussian integration; positivity $C†A\_Q^+C \succeq 0$ and hence W_prim ⪯ W_core; the tilt factorisation out of the bath integral (ω_C carries no q dependence); the mean-centred exponential-family score formula and the reversal-even mean-zero step giving S_C^red = σω_C; the oddness D⋆_(−σ) = −D⋆_σ; the scalar response c⋆_σ = σα⋆/k_C^prim; and, from the earlier rounds, the right-inverse and minimum-norm computations, the Radon-Nikodym differentiation, the canonical-branch evaluations, the Fisher scalings, the two-cell value 18/47, and the Schur steps of Theorems 1A and 1B. For EX1E: the domain-typing zero *∂r Γ_prep = 0; the bond gradient and Hessian, including the decomposition cross-check K_B/*(w_B = 1) + diag(2, 1) = H_qy = [[3, −1], [−1, 2]] against the predecessor's unit branch; the 2×2 inversion, the responses and the ratio −μ/k_R; the degeneracy note that the bond block alone has Δ = 0 (it penalises only the difference mode), positivity Δ > 0 being supplied by the diagonal link and record-composition stiffnesses, with the unit-branch illustration $\Delta = 5$, $c^\star_\sigma = (2/5)\sigma\alpha^\star = 0.383600443887990\,\sigma$ and $r^\star\sigma = (1/5)\sigma\alpha^\star = 0.191800221943995\,\sigma$, *ratio exactly 1/2 = $-\mu/k_R$; and the triangularity logic of Theorem 1E. For EX1D: the spoke-zero argument (reflection preserves spoke orientation, so $a = -a = 0$, while the rim flips automatically), giving the scalar-wheel multiplicity one directly; the counts 8 + 3 + 1 = 12 and 12 × 12 = 144, with the tensor-factorisation multiplicity 1 × 12 = 12; the invariant-functional facts (the adjoint of a compact simple group is a nontrivial irreducible, hence admits no invariant covector, while u(1) acts trivially, giving $\mathbb{R}$); the record count 36 = 12 × 3 with one A_2 line per phase channel by the §10M argument; and the identity of EX1D's response algebra with §10S. One reconstruction is flagged: the pasted one-dimensional Schur correction had a mangled fraction and is written here in the standard form $\Sigma_a |c_{aC}|^2/\omega_a^2$ for bath stiffnesses ω_a^2; correct it if the source formula differs. Imported at source precision: the bath-resolved HMGBC quadratic architecture (centred bath, bilinear coupling, range condition), the reversal-even reference property, $\alpha^\star = 0.959001109719975$, the MASD defect definitions, the D_6 multiplicity census, $W_{CC} = 12/31$, the two-cell family and W*(C,BR) = 0, the minimum-norm lift architecture and its finite-cell residual 6.86×10^{-15}, the continuous-history proposal law, the canonical separable-branch facts, the IORC action form and its pre-fact typing, the EPMD first bond defect $D_B^{(1)} = i(\theta - y)$ and mixed return −1, the RCMO branch-odd derivative $M_\Omega(-s) = -M_\Omega(s)$ with its record-phase support, the differential orders at the symmetric vacuum (gauge 2, bosonic completion 2, CAR/Fock 3), the faithful record carrier of 36 phases and 36 stretches with the 18 stretch directions coboundary-flat, and the candidate status of the CFB boundary branches.

PART II-B — SECOND GATE-S EXECUTION: PSAC-EX2

10V. Execution scope: the canonical C/B/R slice

PSAC-EX2 executes the signed-response calculation of Theorem 2 at the strongest source-clean level currently available. The irreversible source is fixed by the EX1 chain as $h_\sigma = \sigma\alpha^\star$, $\alpha^\star = 0.959001109719975$. The canonical link–record slice carries the defect geometry already isolated in the source stack,

$D_C = x$, $D_B = x - y$, $D_R = y$,

with x the closure curvature and y the record-phase response, and the independently calculated canonical wheel history metric supplies

$W_{CC} = W_{RR} = 12/31$, $W_{BB} = 21/124$, $W_{CB} = W_{CR} = W_{BR} = 0$,

the full six-scalar wheel metric being positive definite of rank six. Every input is a frozen forward return; nothing on this slice is fitted.

10W. Exact Hessian, Schur reduction and the signed response

The slice action is $\Gamma(x, y \mid \sigma) = ½[(12/31)x^2 + (21/124)(x - y)^2 + (12/31)y^2] - \sigma\alpha\star\, x$. Collecting terms gives the exact Hessian

$K\_CR = (1/124)\ [[69, -21], [-21, 69]]$,

with eigenvalues 12/31 and 45/62, both positive: rank 2, nullity 0, so the source lies in the supported range and there is no instability or null obstruction on this slice. Stationarity in y gives $-(21/124)x + (69/124)y = 0$, hence

$y = (7/23)\ x$:

the record follows 7/23 ≈ 30.4% of the closure displacement. Substituting back gives the Schur-reduced closure stiffness exactly,

$K\_C\text{\^{}red} = 69/124 - (21/124)^2/(69/124) = 360/713 = 0.5049088359\ldots$,

and therefore the signed stationary curvature

$c\star\_\sigma = \sigma\alpha\star/K\_C\text{\^{}red} = \sigma\alpha\star \cdot 713/360 = \sigma \cdot 1.89935497564$,

with conjugate returns $c\star_+ = +1.89935497564$ and $c\star_- = -1.89935497564$: an actual calculated signed response, not the statement that one could exist. The induced record response is $y\star\_\sigma = (7/23)c\star\_\sigma = \sigma \cdot 0.578064557803$, and the remaining bond mismatch is $x - y = (16/23)x$, so $(D\_B)\star\_\sigma = \sigma \cdot 1.32129041784$. The interpretation is clean: history selects the sign, c = ±1.89935, and the record follows with y = ±0.57806; the record is not selecting the sign, it is responding to it.

> **Corollary 2.1 — Canonical signed-curvature return. [exact on the canonical source-clean slice]**
>
> On the canonical wheel C/B/R slice with the frozen history metric, Theorem 2 evaluates exactly: $K\_C\text{\^{}red} = 360/713$ and $c\star\_\sigma = \sigma\alpha\star \cdot 713/360 = \pm 1.89935497564$, with induced record response ±0.578064557803 and bond mismatch ±1.32129041784, sign reversal exact. This is a canonical-slice return, not the physical curvature response; promotion without the forward physical ledger is falsifier F26.

This is the second executed instance of the one C/B/R Schur architecture: the unit operational branch gives record-follow ratio 1/2, the wheel-Fisher metric gives 7/23. Same mechanism, different metric normalisation; the physical metric decides between them, which is exactly what the Z_C formula of §10Y awaits.

10X. Comparisons: locked record, bare closure and two-cell stability

If the record were artificially frozen at y = 0, the stiffness would be $K\_C\text{\^{}locked} = 12/31 + 21/124 = 69/124 = 0.5564516\ldots$, giving $c\star\_locked = \sigma \cdot 1.72342228413$. Allowing the record to relax lowers the effective stiffness by 9.26% and increases the curvature response by 10.21%: the record is a genuine relaxation channel that preserves the sign selected by the irreversible source. Ignoring bond and record physics entirely and retaining only $W\_CC = 12/31$ gives $c\star$*bare = σα⋆ · 31/12 = σ · 2.47741953344, so the full C/B/R mechanism matters: bond and record structure together reduce the response from 2.4774 to 1.8994, while record relaxation recovers part of what locking would remove. Beyond one cell, the two-cell HMGBC family gives W_CC^(2)(g) = 12/(31 + g) with the closure direction exactly orthogonal to the bridge, W*(C,BR) = 0; the pure closure susceptibility at the executed g = 1/3 is $c\star\_bare^{(2)} = \sigma\alpha\star \cdot 47/18 = \sigma \cdot 2.50405845316$, within about 1.1% of the one-cell bare value, with the analytic dependence $c(g) = \sigma\alpha\star(31 + g)/12$ returning the one-cell result exactly as $g \to 0$. The two-cell test therefore supports structural stability of the closure susceptibility rather than a fragile one-cell coincidence.

10Y. The full physical formula and its pass/fail conditions

Once the physical C/B/R cross blocks are returned, no reinvention is needed. For the symmetric ledger W with entries w_CC, w_CB, w_CR, w_BB, w_BR, w_RR on the slice geometry of §10V, the exact reduced closure stiffness is

$$Z\_C = w\_CC + 2w\_CB + w\_BB - (-w\_CB + w\_CR - w\_BB + w\_BR)^2 / (w\_BB - 2w\_BR + w\_RR),$$

and the final physical return will be $c\_\sigma^{phys} = \sigma\alpha\star/Z\_C$. The sharp conditions are: $w\_BB - 2w\_BR + w\_RR > 0$ for a stable eliminable record mode, and $Z\_C > 0$ for a stable finite curvature response. If $Z\_C = 0$ while $\alpha\star \neq 0$, there is no finite quadratic stationary solution; that is a genuine physical failure of the construction, not something repairable by choosing another coefficient, exactly as the null-direction clauses of Theorem 2 and §10K require. The canonical values reproduce $Z\_C = 360/713$ through this formula as a consistency check.

10Z1. PSAC-EX2B: what positivity alone does and does not bound

With the slice directions $u = (1, 1, 0)$ and $v = (0, -1, 1)$ in (C, B, R) coordinates, write $a = u^TWu$, $b = u^TWv$, $d = v^TWv$, so that $Z\_C = a - b^2/d = \det M/d$ with M the 2×2 slice Hessian. Two exact statements follow immediately. If W is positive definite on the slice, M is positive definite and $Z\_C > 0$ strictly; if W is only positive semidefinite, $Z\_C = 0$ is attainable for that particular metric. Hence, for every admissible positive definite physical metric, whatever its cross blocks,

$\mathrm{sign}(c\star\_\sigma) = \sigma$:

cross terms can rescale the curvature response but can never flip the history-selected sign.

> **Corollary 2.2 — Sign safety under positivity. [exact]**
>
> For any physical C/B/R metric positive definite on the slice, $Z\_C > 0$ strictly, and the signed response $c\star\_\sigma = \sigma\alpha\star/Z\_C$ carries the history-selected sign σ for every admissible metric; only its magnitude is metric-dependent. $Z\_C = 0$ requires slice degeneracy of the ledger, exactly the genuine-failure branch of §10Y.

10Z2. Diagonal insufficiency: the exact zero construction

The known data are the canonical diagonal Fisher weights $w\_{CC} = w\_{RR} = 12/31$ and $w\_{BB} = 21/124$. Positivity does not force Z_C away from zero given only these. Take the rank-one Gram metric

$W_0 = g\, g^T$, $g = (\sqrt{(12/31)}, -\sqrt{(21/124)}, \sqrt{(12/31)})^T$,

which is positive semidefinite with exactly the canonical diagonals. Its slice quadratic action is the perfect square $[(g\_C + g\_B)x + (g\_R - g\_B)y]^2$, vanishing identically on one whole (x, y) direction while $d = (g\_R - g\_B)^2 > 0$, so $Z\_C(W_0) = 0$ exactly. Strict positivity does not save the inference: the blend

$W\_\varepsilon = (1 - \varepsilon)\, W_0 + \varepsilon \cdot \mathrm{diag}(12/31, 21/124, 12/31)$, $0 < \varepsilon \leq 1$,

is positive definite for every $\varepsilon > 0$, retains exactly the same diagonal entries, and gives $Z\_C(W\_\varepsilon) \to 0^+$ as $\varepsilon \to 0$. Hence, exactly,

$\inf \{ Z\_C(W) : W \succ 0$ on the slice, $\mathrm{diag}(W)$ canonical $\} = 0$, not attained.

Corollary 2.3 — Diagonal insufficiency. [exact]

The known diagonal stiffnesses, together with full positivity, impose no positive lower bound on Z_C and therefore no upper bound on $|c\star|$. There is no legitimate way to infer from the diagonal data that the physical curvature response remains close to the canonical value 1.89935497564; the physical spectral gap is load-bearing (F29). A Z_C driven toward zero does not mean infinite physical curvature; it means the quadratic approximation has reached a soft direction and higher-order physics becomes mandatory.

10Z3. The one-sided response bound

Because Z_C is the minimum over the record coordinate of the slice cost at unit closure displacement, evaluating at $y = 0$ gives $Z\_C \leq a = w\_{CC} + 2w\_{CB} + w\_{BB}$, and positivity gives Cauchy–Schwarz on the principal minor, $|w\_{CB}| \leq \sqrt{(w\_{CC}\, w\_{BB})}$. Therefore, exactly,

$Z\_C \leq (\sqrt{w\_{CC}} + \sqrt{w\_{BB}})^2$,

which with the canonical diagonals is $69/124 + 6\sqrt{7}/31 = 1.068533$, and hence

$|c\star| \geq \alpha\star/(69/124 + 6\sqrt{7}/31) = 0.897495$

if the canonical diagonal values are retained. There is no matching finite upper bound on $|c\star|$ (§10Z2).

Corollary 2.4 — One-sided response bound. [exact given retained diagonals]

Under the canonical diagonal stiffnesses and positivity alone, the physical curvature response satisfies $|c\star| \geq 0.897495$, with no finite upper bound. The zero construction of §10Z2 satisfies this consistently: there $Z_C = 0$ and the response diverges.

10Z4. The spectral-gap interval

Once the physical slice metric's extreme eigenvalues are returned, $\lambda_{min} I \preceq W|_{slice} \preceq \lambda_{max} I$, no individual cross term is needed for a rigorous interval: $\lambda_{min}(M) \geq \lambda_{min} \cdot \lambda_{min}(J^T J)$ with $J^T J = [[2, -1], [-1, 2]]$ of eigenvalues 1 and 3, and $Z_C \leq a \leq 2\lambda_{max}$, so exactly

$\lambda_{min} \leq Z_C \leq 2\lambda_{max}$, and therefore $\alpha\star/(2\lambda_{max}) \leq |c\star| \leq \alpha\star/\lambda_{min}$.

For the canonical diagonal wheel metric, $\lambda_{min} = 21/124$ and $\lambda_{max} = 12/31$, giving the coarse envelope $Z_C \in [21/124, 24/31] = [0.169355, 0.774194]$ and $|c\star| \in [1.238710, 5.662673]$; the exact canonical results $360/713 = 0.504909$ and ± 1.89935497564 sit comfortably inside it.

Corollary 2.5 — Spectral-gap response interval. [exact given the returned envelope]

The eventual physical response interval requires only two forward-returned numbers, the extreme slice eigenvalues: $\lambda_{min} \leq Z_C \leq 2\lambda_{max}$, hence $\alpha\star/(2\lambda_{max}) \leq |c\star| \leq \alpha\star/\lambda_{min}$. The full cross-block ledger refines the interval to a point; the envelope alone already certifies it.

10Z5. EX2B verdict

PSAC-EX2B question	Answer
Can cross terms flip the history-selected sign?	NO: $Z_C > 0$ FOR EVERY SLICE-POSITIVE-DEFINITE METRIC (EXACT)
Does positivity + diagonals bound Z_C away from zero?	NO: EXACT ZERO CONSTRUCTION; inf = 0, NOT ATTAINED
Does positivity + diagonals bound the response above?	NO:
Does positivity + diagonals bound the response below?	YES:
What closes the window?	THE SLICE SPECTRAL ENVELOPE: $\lambda_{min} \leq Z_C \leq 2\lambda_{max}$
Canonical values inside the diagonal envelope?	YES: 360/713 AND ±1.89935497564 INSIDE [21/124, 24/31]
Status of PSAC-EX2	EXHAUSTED AT THE CURRENT SOURCE; PHYSICAL SPECTRAL GAP LOAD-BEARING
Declared next execution	PSAC-EX3: PRIMITIVE READOUT (GATE R)

Verification notes. Re-derived independently here: the dichotomy $Z\_C = \det M/d$ with strict positivity of the Schur complement for $M \succ 0$; the sign-safety corollary; the Gram construction $W_0 = gg^T$ with canonical diagonals, its perfect-square slice action, $d > 0$ and $Z\_C(W_0) = 0$ exactly; the ε-blend's positive definiteness, diagonal retention and continuous $Z\_C \to 0^+$; the Cauchy–Schwarz bound with the exact evaluation $(\sqrt{(12/31)} + \sqrt{(21/124)})^2 = 69/124 + 6\sqrt{7}/31 = 1.068533$ and the response bound 0.897495; the consistency of the bound with the zero construction; the spectral-gap sandwich via $\lambda\_\min(J^TJ) = 1$ and $Z\_C \le a \le 2\lambda\_\max$; and the envelope evaluations [21/124, 24/31] and [1.238710, 5.662673] containing the canonical returns. A reconstruction note applies: this report also arrived with its display equations stripped, and the constructions above are written in the standard forms uniquely determined by the prose and the pinned canonical values; any divergence from the original is to be corrected against the original.

10Z6. Execution verdict for Part II-B

PSAC-EX2 return	Result
Source amplitude	α⋆ = 0.959001109719975, IMPORTED ONE-BIT VALUE
Canonical C/R Hessian	(1/124)[[69, −21], [−21, 69]]; EIGENVALUES 12/31, 45/62
Rank; nullity	2; 0 — SOURCE IN SUPPORTED RANGE
Record-follow ratio	y = (7/23)x EXACT
Reduced closure stiffness	360/713 EXACT
Signed curvature	±1.89935497564 EXACT ON SLICE
Induced record response	±0.578064557803 EXACT ON SLICE
Bond mismatch	±1.32129041784 EXACT ON SLICE
Sign reversal	EXACT
Locked-record comparison	69/124; ±1.72342228413; RELAXATION −9.26% STIFFNESS, +10.21% RESPONSE
Bare closure comparison	±2.47741953344
Two-cell stability	PASS: c(g) = σα⋆(31 + g)/12; ±2.50405845316 AT g = 1/3; BRIDGE COMPONENT 0
Full physical Z_C formula	ISSUED, WITH POSITIVITY PASS/FAIL CONDITIONS
Full physical 6 × 6 W ledger	OPEN — FORWARD RETURN REQUIRED
Full physical c⋆_σ	NOT YET ISSUED
PSAC-EX2	EXACT PASS ON THE CANONICAL SOURCE-CLEAN SLICE

Execution verdict. The programme has gone from "perhaps history could source curvature" to an explicit stable calculation, σ → α⋆ → c⋆_σ = ±1.89935, with the record response calculated alongside it and the sign reversal exact. The controlling qualification is retained at full strength: HMGBC requires the complete physical 6 × 6 history-metric ledger, including all cross blocks, to be returned forward from one master action; the canonical wheel zeros may not be assumed to persist after the full multi-cell and internal lift, and the corpus does not yet uniquely return the physical stiffness entries. PSAC-EX2B (§§10Z1–10Z5) has now executed the declared positivity question: the sign is safe for every admissible metric, the response is bounded below by 0.897495 under the retained diagonals, no upper bound exists until the slice spectral envelope is returned, and the envelope alone will certify the rigorous two-sided interval. PSAC-EX2 is exhausted at the current source; the declared next execution is PSAC-EX3, the primitive readout.

Verification notes. Re-derived independently here: the Hessian assembly $12/31 + 21/124 = 69/124$ with off-diagonal $-21/124$; the eigenvalues $(69 \mp 21)/124 = 12/31$ and $45/62$; the stationarity ratio $21/69 = 7/23$; the exact reduction $69/124 - (21/124)^2(124/69) = 4320/8556 = 360/713$; the response values ±1.89935497564, ±0.578064557803 and ±1.32129041784 to all quoted digits from the exact fractions and the quoted $\alpha\star$; the locked value 69/124 and ±1.72342228413; the bare and two-cell values ±2.47741953344 and ±2.50405845316 with the −9.26%/+10.21% relaxation effects; the symbolic derivation of the Z_C formula from the 3 × 3 quadratic form on the slice geometry, with the canonical values reproducing 360/713 through it; and the $g \to 0$ limit of the two-cell family. One reconstruction is flagged: the pasted value of W_BB had its fraction inverted by formatting; the Hessian in the same report fixes it conclusively as 21/124, and that value is used throughout. Imported at source precision: the canonical wheel six-scalar history metric and its positive-definite rank-six status, the two-cell family W_CC^(2)(g) = 12/(31 + g) with W_(C,BR) = 0, and $\alpha\star$.

PART II-C — THE UNIFIED CANDIDATE MASTER ACTION: PSAC-MA1

10AA. Assembly statement and typing

The derived pieces of the EX1 chain and EX2 can now be written into a single finite-regulator master action. The typing is fixed before the content: this is the one action to execute and falsify now, assembled entirely from objects the programme has already derived or declared; it is not yet the uniquely derived physical action, and may not be called that until its remaining blocks have been returned forward from the source (F27). The assembly's claim grade is construction identity, upgraded per block to whatever grade its provenance carries.

10AB. The assembled action

On the MASD parent variable set (links U, record morphism Φ, completion carrier X, fermions ψ, unresolved bath q), with D the six-defect vector of the parent, the candidate action is, in block form,

$A\_PSAC[U, \Phi, X, \psi, q; \sigma] = \frac{1}{2} D^\dagger W\_core\ D + q^\dagger C\ D + \frac{1}{2} q^\dagger A\_Q\ q + [\bar{\psi}\_L\ \Gamma(X)\ \psi\_R + h.c.] - \sigma\alpha^\star \langle \omega\_C, D\_C \rangle$,

with the fermion covariant structure on the same transport as the closure and gauge curvature, so no separate matter-coupling normalisation is introduced, and the orientation-odd IORC source attached to the closure defect on the gauge-typed Abelian line, at unit injection normalisation, as the sole first-order odd term. The provenance of every block:

Block	Form	Provenance	Status
Master variables	U, Φ, X, ψ, q; six-defect vector D	MASD parent	imported
Even defect quadratic	½ D†W_core D	MASD/HMGBC operational metric	canonical slice executed; full ledger open
Bath block	q†C D + ½ q†A_Q q	EX1C declared architecture	physical A_Q, C open
Fermion block	ψ̄_L Γ(X) ψ_R + h.c., same transport	third-jet source typing; tensor pass $\leq \approx 1.15 \times 10^{-15}$	imported
Odd source	−σα⋆ ⟨ω_C, D_C⟩ on the Abelian line	IORC one-Bit affinity; Theorems 1A–1E	closed within the derived stack

Record morphism, closure connection and matter carrier are variables of the same parent, not independent models: the assembly contains no block that is not already a returned or declared object, and no new adjustable coefficient appears anywhere in it. A reconstruction note is mandatory here: the source note for this Part arrived with its display equations stripped in transit, and the block forms above are the pinned executed forms from the cited sources; if any block of the original assembly differs in precise form, that block is to be corrected against the original, not against this reconstruction.

10AC. The bath fits automatically

No separate environment mechanism is inserted. Varying A_PSAC with respect to q gives $A\_Q\ q + C\ D = 0$, hence $q^\star = -A\_Q^{+} C\ D$, and substitution returns

$\frac{1}{2} D^\dagger (W\_core - C^\dagger A\_Q^{+} C)\ D - \sigma\alpha^\star \langle \omega\_C, D\_C \rangle$:

exactly the HMGBC Schur reduction, produced by the one action rather than argued separately, with the odd source term untouched, which is Theorem 1C appearing as an internal consequence of the assembly. After Gaussian integration of q, the resulting determinant factor is retained in branch comparisons: the source explicitly warns that it contributes to branch weights, and dropping it in any future branch-selection execution is an error of the F17 class.

10AD. The canonical reduction reproduces the executed number

Restricting the unified action to the canonical closure/bond/record slice with the calculated canonical metric reproduces the Part II-B calculation identically: the slice action is the §10W action, its stationary solution is $c\star_\sigma = \pm 1.89935497564$ with record response ± 0.578064557803, and $K_C^{red} = 360/713$. The signed-curvature result is therefore not bolted onto the master action afterwards; it is a particular reduction of the unified action, which now literally contains history direction, curvature, bond compatibility and record response in one expression.

10AE. Exclusion rules

Two additions are excluded, and their exclusion is load-bearing (F28). First, no second independent RCMO orientation term is added: the master variables already contain the record morphism, the defect vector already contains the bond and record defects, and RCMO is to be derived as the terminal-record/maintenance pushforward of this same sector, RCMO being branch-odd and phase-supported with its primitive provenance from MASD/HMGBC explicitly open. That pushforward derivation is exactly the outstanding σ-retention obligation, and adding RCMO as another force instead would both double-count and destroy the triangularity result $h_\sigma = \sigma\alpha\star(1, 0)^T$. Second, the complete IORC relative-entropy cost is not stacked on top of the even quadratic: at quadratic order that risks counting the reversible history cost twice. The correct programme is for the eventual nonlinear history action to generate W as its Hessian; the genuinely new ingredient established at this stage is the orientation-odd linear source, and only that is added.

10AF. Status change: the controlling object

From this revision the candidate master action is the controlling object of PSAC-1. The four gates are no longer four separate constructions; they are four independent tests of this one action: Gate S tests its odd source and curvature response, Gate R its readout reductions, Gate M its fermion-block selection, Gate T its topological and holonomy content. What remains is execution, not invention: calculate the full W ledger, A_Q and C from the full faithful source at every admitted regulator level on both conjugate branches; verify the full-carrier attachment onto the gauge-typed Abelian line; and require RCMO, the readout, the matter law and the topology to emerge as reductions or pushforwards of this same action, which is essentially the remaining job the source itself describes as evaluating one complete generator, one projection and one common branch operator. Gate independence (§29) is unchanged: a pass of one reduction is not evidence for another; what the gates now share is their object, not their evidence.

PART III — GATE R: PHYSICAL READOUT OF RETAINED ORIENTATION

11. The readout problem is independent

The existence of orientation is not its observability; retention and readability are separately typed requirements, and the predecessor proves the separation exactly ($I(\sigma : L, Y) = \ln 2$ for every readout gain while $I(\sigma : Y) = \ln 2 - h(a)$). Four routes are already closed exactly and may not be reopened:

1. scalar commitment density annihilates the history-odd source, and causal memory cannot recreate information removed before the kernel is applied;
2. the pure conjugate phase retains orientation as access-invisible coherence with exactly zero $P\pm$ population difference;
3. projectivisation of the current carrier removes scalar magnitude, sign and phase exactly;
4. complete faithful conjugation leaves every native EX2E Born probability unchanged, so projective separation, however large, is not readout.

The existing constraint also satisfies $\partial_\alpha D_J = 0$ exactly: the current action transmits an internal variation once supplied but does not create one from history orientation. The residual admissible frame tangent is at most 836-dimensional after the declared gauge orbit. The source therefore has capacity without a returned readout, and Gate R asks the source to return it.

12. The exact covariant readout family

Let $Q\pm$ be the binary ordered-history effects and $P\pm$ the R4 branch effects, with $q\pm = \mathrm{Tr}(Q\pm \rho)$. Record locality and D_6 covariance reduce every layer-changing binary readout to the one-parameter family

$\Phi_a(\rho) = [a\, q_+ + (1 - a)\, q_-]\, P_+ + [(1 - a)\, q_+ + a\, q_-]\, P_-$, $0 \le a \le 1$,

equivalently $\Phi_a^*(\Delta P) = (2a - 1)(Q_+ - Q_-)$. Define the readout gain

$g_{read} = 2a - 1$.

Then $a = ½$ is complete orientation erasure, $0 < |g_{read}| < 1$ is partial readout, and $a = 1$ is exact label-preserving readout. Neither global Bit retention, append-only persistence nor the one-Bit entropy law forces any value: a_{phys} is a genuine source return, and the operational gain g_{read} must not be conflated with any microscopic action coefficient such as $g_{\chi P}$.

13. Route A — action forcing

Let F denote coordinates on the fully quotiented admissible internal-frame manifold and α the history-orientation parameter. After exact Schur reduction of all relaxable auxiliaries a,

$K_F = A_{FF} - A_{Fa} A_{aa}^+ A_{aF}$, $B_{eff} = A_{F\alpha} - A_{Fa} A_{aa}^+ A_{a\alpha}$,

stationarity gives $\dot{F}_\alpha = -K_F^+ B_{eff}$, and the population-visible response is the single invariant susceptibility

$\chi_{pop} = d\Delta P/d\alpha = -(D_F \Delta P) \cdot K_F^+ \cdot B_{eff}$.

The scalar and pure-phase channels give $\chi_{pop} = 0$ exactly; a Gate R pass by this route requires a source-returned mixed forcing B_{eff} with nonzero projection on the one ΔP-visible direction, or equivalently an isolated stationary frame class satisfying the PFDMI-S1 criterion (stationarity with trivial quotient-Hessian kernel on M_{adm}, preserving all source constraints and physical score ranks).

14. Route B — primitive CP readout

The marked source may instead derive the channel Φ_a directly, returning a_{phys} from the primitive stack. This route is fully legitimate and in one respect mandatory in form: the ordered-history and R4 carriers admit no nonzero D_6-equivariant Hilbert-space identification, so any physical bridge is a conditioned completely positive readout, never an isometry (P4). What Route B must return is the value of a_{phys} and its provenance, including the fixed physical reference that breaks the conjugation invariance of §11 item 4; a readout whose reference co-transforms with the branch has zero visible gain by the conjugation no-go.

15. Theorem 3 — Readout Consistency Theorem

> **Theorem 3. [exact consistency requirement]** Let the same frozen source return both a Route A response and a Route B channel. Writing $\chi = \langle Q_+ - Q_- \rangle$ for the history observable, the two constructions describe one physical readout only if their first-order transfers agree:
>
> $g_{read} \cdot d\chi/d\alpha = \chi_{pop}$
>
> on every admitted regulator and branch. If the identity fails beyond tolerance, the two constructions are different physical operations and may not be cited as mutual validation.

Proof sketch. For a frozen source law, $d\Delta P/d\alpha$ is a single number per branch and level. Route A computes it through the frame response; Route B computes it as the channel gain applied to the α-derivative of the history observable. Equality is the statement that both differentiate the same law. ■

16. Gate-R stop rules

1. $a = 1$ may not be selected because exact readout is desired (F4); a_{phys} must be derived.
2. Motion in the unresolved frame tangent is not readout; only the ΔP-projection counts (F5).
3. Any claimed pass must exhibit the fixed source-native reference that survives complete conjugation; absent that reference, the conjugation no-go applies and the claimed visibility is zero.
4. A dual-route pass failing Theorem 3 is reported as two incompatible constructions, not averaged.

PART III-A — FIRST GATE-R EXECUTIONS: PSAC-EX3A, PSAC-EX3B AND PSAC-EX3C

16A. PSAC-EX3A: the record-scalar-phase population channel is exactly zero

The first Route-A execution runs the readout question along the one channel the executed source stack already populates: the inherited scalar record-phase response. The chain status is exact at every arrow. Orientation to curvature is nonzero (the EX1 chain and EX2). Curvature to record is nonzero (the canonical follower $y = (7/23)x$; the unit branch $y = x/2$). But the record-scalar-phase to population projection is exactly zero, so the population susceptibility through this channel vanishes,

$\chi_{pop} |_{(\text{scalar record-phase channel})} = 0,$

consistent with the three inherited exact closures (the scalar route, the pure-phase route with exactly zero population component, and $\partial_\alpha D_J = 0$). The obstruction is thereby pushed one stage downstream: Gate R is open, not globally failed, and the question becomes what kind of record motion the executed response actually is.

> **Corollary 3.1 — Scalar-phase readout null. [exact]**
>
> The Route-A population susceptibility through the inherited scalar record-phase channel is exactly zero. A Gate-R pass by Route A cannot use this channel; the source's nonzero record response must be examined against the physical instrument. (The EX3A working body did not survive transit; this verdict is consumed at stated grade, consistent with the predecessor's exact nulls.)

16B. PSAC-EX3B: the response moves the record; projectivisation removes it

EX2E does not observe the raw current vector j_e; it observes the ray density

$\rho_{(J,e)} = |j_e\rangle\langle j_e| \,/\, \langle j_e|j_e\rangle$,

whose differential depends only on the component of δj perpendicular to j: scalar magnitude, sign and phase are removed exactly (imported instrument typing). The inherited record-phase channel acts on the current as a pure dressing,

$\delta j_e = i\,(\delta y)\, j_e$,

and the projective response of a dressing is zero by one exact line: $d\rho = (\delta j\, j^\dagger + j\, \delta j^\dagger)/\langle j, j\rangle - \rho \cdot d\langle j, j\rangle/\langle j, j\rangle$, and for anti-Hermitian scalar $\delta j = i\theta j$ both terms vanish identically. Hence $P_\perp\, \delta j_e = 0$ on every edge and

$d\rho_{(J,e)}/d\sigma = 0$ exactly for the scalar-phase component, even though $dy/d\sigma \neq 0$.

The nonzero bond coupling has not disappeared. The master action genuinely converts link motion into record motion: on the executed wheel branch the response persists on every physical cycle direction, and on the unit diagnostic mode the exact Hessian [[3, −1], [−1, 2]] gives $y = x/2$ by stationarity. What this execution establishes is the kind of record motion this particular channel produces: a rotation of the current's overall phase, lying in precisely the direction the instrument projectivises away.

> **Corollary 3.2 — Projective invisibility of the record-phase channel. [exact]**
>
> For the scalar record-phase channel, $d\rho_{(J,e)} = 0$ exactly under the EX2E projective instrument at every edge and every bath strength: the chain $\sigma \to c^\star \to y^\star$ is nonzero at both arrows while its ray-visible projection vanishes for this component. Citing this channel, or any scalar dressing of the current, as physical readout is falsifier F30.

16C. The exact decomposition and the decisive transverse scalar

The readout lesson is now sharp: it is not enough for curvature to move the record; it must move the record in a direction that rotates the current ray rather than its overall phase. Decompose the full master response exactly as

$\delta j = \delta j_\parallel + \delta j_\perp$, $\delta j_\parallel = (\langle j, \delta j\rangle/\langle j, j\rangle)\, j$,

with $\delta j_\parallel$ projectively invisible and $\delta j_\perp$ physically visible, the visible response norm proportional to $\|\delta j_\perp\|/\|j\|$. The full master bond variable is a twelve-dimensional record-transport perturbation, not merely the one scalar HX1 phase, and the master action explicitly contains intrinsic record-link directions beyond pure endpoint-frame gauge modes; the decisive remaining Route-A object is therefore the single σ-odd scalar

$N_\perp = \|P_\perp\, T\, c^\star_\sigma\|$,

where T is the Schur-reduced curvature-to-current transfer operator of the candidate action, and by the EX2 forcing this factorises through $dc/d\sigma = \alpha^\star/Z_C$. If $N_\perp \neq 0$, curvature drives a genuinely observable projective frame and Gate R acquires a physical population readout by Route A; if $N_\perp = 0$, the action-forcing route is substantially constrained and the execution moves to the primitive CP-channel Route B. The declared next execution is PSAC-EX3C: the transverse component of the intrinsic bond response in the existing master Hessian.

> **Corollary 3.3 — Transverse factorisation of the visible readout. [exact given the projective typing]**
>
> The Route-A visible response factorises exactly as ($\alpha\star/Z_C$) times the $P_\perp$-projection of the Schur-reduced curvature-to-current transfer applied to the closure direction. The Gate-R Route-A question is thereby reduced to the nonvanishing of one scalar, $N_\perp$, extracted from the candidate master action; no arbitrary readout mechanism search remains.

16D. PSAC-EX3C: the terminal response map is injective on the physical Wilson tangent

The residual-tangent EX2E execution supplies exactly the map the transverse question needs. Define the on-shell visible terminal response R_{vis}: the derivative of the seven-terminal outcome probabilities with respect to the physical Wilson tangent, evaluated on shell with the induced current variation included. The execution returns rank 72 on the 72-dimensional physical Wilson tangent space, surviving the gauge quotient, with strictly positive smallest singular value σ_{min}. Therefore R_{vis} is injective on the entire physical Wilson tangent: no physical direction of response is invisible to the terminal probabilities on this frozen carrier.

16E. The signed response reaches the terminal probabilities, with a lower bound

Let t_σ denote the physical link/Wilson tangent generated by one unit of the signed curvature coordinate; the typing is correct because the MASD retained tangent includes physical curvature directions acting through the physical link. The Gate-S return $c\star_\sigma = \pm1.89935497564$ then produces the terminal response $R_{vis}(c\star_\sigma\, t)$, and injectivity gives the no-vanishing statement outright: $t \neq 0$ forces $R_{vis}(c\star_\sigma\, t) \neq 0$. The minimum-singular-value inequality adds the quantitative floor,

$$\|R_{vis}(c\star_\sigma\, t)\| \geq \sigma_{min} \cdot |c\star_\sigma| \cdot \|t\| = \sigma_{min} \cdot 1.89935497564$$

per unit-normalised curvature tangent. The size is not yet physically normalised, so the result is deliberately not stated as a predicted observable; what it establishes is that the response is mathematically bounded away from zero on the tested physical tangent.

> **Corollary 3.4 — Terminal no-vanishing. [exact on the frozen EX2E carrier]**
>
> On the frozen residual-tangent EX2E carrier, the σ-odd signed curvature response cannot vanish at the terminal readout: R_{vis} is injective on the physical Wilson tangent, so the transverse scalar of Corollary 3.3 is nonzero there, $N_\perp \neq 0$.

Corollary 3.5 — Response floor. [exact given σ_min]

The terminal response norm is bounded below by $\sigma\_min \cdot 1.89935497564$ per unit curvature tangent on the frozen carrier. (The executed value of σ_min, and the induced-current cosine of §16F, did not survive transit and are pending re-supply; the inequality and the rank return are unaffected.)

16F. The pointer genuinely tilts; the one remaining projection

The result is stronger than a coordinate variation registering somewhere. The residual-tangent calculation explicitly includes the induced on-shell current variation, whose contribution carries Frobenius norm 1.05458 times the original coordinate Jacobian norm: it substantially rotates and reweights the response rather than merely rescaling it. Since EX2E is exactly insensitive to current magnitude, sign and overall phase, a material induced-current contribution to the terminal probabilities means precisely that the on-shell action produces transverse motion of the current ray, the object §16C isolated, on the tested physical carrier. The EX3B nulls are thereby explained rather than contradicted: the scalar-phase channel spins the invisible dial, while the full curvature tangent tilts the visible pointer. Nor does this conflict with the predecessor's conjugation no-go, which concerns fully co-conjugated comparisons: here σ is the retained commitment sign held fixed while the branch responds, exactly the non-co-conjugated reference the response level requires; the binary readout below must still exhibit its own fixed-reference provenance.

One distinction remains, and it is now the whole of Gate R's Route A. The seven-terminal probability vector is locally complete: its Jacobian has physical rank 72 and resolves every Wilson-physical direction. But the gate asks specifically for the binary observable $\Delta P = P_+ - P_-$ and its susceptibility χ_pop. The remaining calculation is therefore no longer "does the pointer move?", which is settled affirmatively, but: does the source-derived binary readout point along any component of the motion just proved nonzero? Derive the source-native terminal row w_src, with its fixed-reference provenance, such that $\Delta P = w\_src \cdot p$; then

$$\chi\_pop = \langle w\_src, R\_vis(c\star\_\sigma\, t\_\sigma)\rangle,$$

with exactly two outcomes: nonzero, and Gate R closes by Route A (making the Theorem 3 Route-A/Route-B consistency identity executable); or zero, a sharp negative in which the theory moves a visible pointer that its own binary question cannot feel, retiring the Route-A binary readout while the seven-terminal completeness stands. The declared next execution is PSAC-EX3D: the source-native binary terminal row and the scalar projection.

Corollary 3.6 — Binary reduction of Gate R. [exact given the EX3C returns]

On the frozen EX2E carrier, Gate R's Route A is reduced to the single scalar projection $\chi\_pop = \langle w\_src, R\_vis(c\star\_\sigma\, t\_\sigma)\rangle$, with the pointer motion proven nonzero and only the source-native binary row w_src and its fixed-reference provenance outstanding. Citing the seven-terminal local completeness as the binary readout without that derivation is falsifier F31.

16G. Part III-A combined verdict

PSAC-EX3A/EX3B/EX3C test	Result
Orientation → curvature	NONZERO (EX1 CHAIN, EX2)
Curvature → record	NONZERO (7/23 CANONICAL; 1/2 UNIT BRANCH)
Record-scalar-phase → population projection	0 EXACT
χ_pop through the scalar record-phase channel	0 EXACT
Phase channel under the projective instrument	$\delta j = i(\delta y)j$; $d\rho = 0$ EXACT; $P_\perp \delta j = 0$ EVERY EDGE
Bond Hessian status	NONZERO; SCALAR-PHASE RESPONSE IN THE PROJECTIVELY INVISIBLE DIRECTION
Terminal response map R_vis	RANK 72 ON THE 72-DIM PHYSICAL WILSON TANGENT; INJECTIVE; $\sigma_{min} > 0$ (VALUE PENDING RE-SUPPLY)
Signed response at the terminal readout	CANNOT VANISH ON THE FROZEN CARRIER; FLOOR $\sigma_{min} \cdot 1.89935497564$ PER UNIT TANGENT
Induced on-shell current contribution	FROBENIUS RATIO 1.05458; MATERIAL TRANSVERSE RAY MOTION (COSINE PENDING RE-SUPPLY)
$N_\perp$ (Corollary 3.3 decisive scalar)	NONZERO ON THE FROZEN EX2E CARRIER
Gate R global status	OPEN-NARROWED; POINTER MOTION PROVEN; BINARY PROJECTION OUTSTANDING
Decisive remaining Route-A object	$\chi_{pop} = \langle w_{src}, R_{vis}(c\star_\sigma\, t_\sigma)\rangle$ WITH SOURCE-NATIVE w_src AND FIXED-REFERENCE PROVENANCE
Route B standing	IN RESERVE; THEOREM 3 CONSISTENCY EXECUTABLE IF w_src RETURNS NONZERO
Declared next execution	PSAC-EX3D

Verification notes. Re-derived independently here: the unit-branch stationarity $y = x/2$ from [[3, −1], [−1, 2]], consistent with the Theorem 1E ratio $-\mu/k_R = 1/2$; the one-line exact vanishing of $d\rho$ for anti-Hermitian scalar dressings (both terms of the differential vanish identically); the projector typing $P_\perp = I - |j\rangle\langle j|/\langle j|j\rangle$ and the parallel/transverse decomposition; the consistency of Corollaries 3.1 and 3.2 with the predecessor's pure-phase population result, projective-invariance theorem and $\partial_\alpha D_J = 0$; and the factorisation of the visible response through the EX2 forcing $\alpha\star/Z_C$. Imported at source precision: the EX2E ray-density instrument and its differential typing, the identification of the scalar record-phase channel, and the twelve-dimensional master bond record-transport variable with intrinsic non-gauge directions. A reconstruction note applies: this report also arrived with its display equations stripped, and the file begins at the EX3A verdict, so the EX3A working body is not on record; the displays above are the forms uniquely fixed by the prose and the pinned instrument typing, to be corrected against the original if any differ. For EX3C: re-derived here are the injectivity implication from rank 72 with $\sigma_{min} > 0$, the no-vanishing consequence for $c\star_\sigma t \neq 0$, the minimum-singular-value floor, the consistency of the positive with the EX3B nulls (channel-specific dressing against full-tangent transverse motion) and with the predecessor's conjugation no-go (fixed retained σ as the non-co-conjugated reference at the response level), and the reduction of the gate to the single projection $\langle w_{src}, R_{vis}(c\star_\sigma t_\sigma)\rangle$. Imported at source precision: the residual-tangent terminal response with rank 72 after the gauge quotient, the Frobenius ratio 1.05458 of the induced-current contribution, and the local completeness of the seven-terminal Jacobian; the executed σ_{min} and the induced-current cosine were stripped in transit and are pending re-supply, with only their positivity and materiality consumed here.

PART III-B — LATER GATE-R EXECUTIONS: PSAC-EX3D THROUGH PSAC-EX3O

16H. PSAC-EX3D: the exact source-side binary slope

On the normalised ordered-turn carrier the signed binary observable is $\chi(\alpha) = \tanh(2\alpha)$. At the one-Bit value $\alpha\star = 0.959001109719975$ the source gives $\chi(\alpha\star) = 0.957752384566601$ and the exact slope

$$d\chi/d\alpha \,|_{(\alpha\star)} = 2(1 - \tanh^2(2\alpha\star)) = 0.165420739713981.$$

For the complete covariant binary readout family of §12 the Route-B population susceptibility is therefore exactly

$$\chi_{pop} = (2a_{phys} - 1) \cdot 0.165420739713981,$$

isolating the whole unresolved binary problem in the one scalar a_{phys}. The natural effect-algebra correspondence does not select it, because the ordered-history and R4 carriers remain non-isomorphic as modules.

16I. Candidate gain identifications fail as derivations

A companion scalar-weight candidate would conditionally supply a value of a_{phys}, but the implication from that weight to the physical readout gain does not follow from the source and is rejected as a derivation; a later direct visible/hidden projection aligns with the required binary direction only conditionally and retains an unfixed primitive coefficient. Neither route closes Gate R. (The candidate's numerical value was stripped in transit; being rejected, it is not load-bearing.)

16J. Direct completion and maintenance bypasses close negatively

The source-native record phase enters the record morphism as a scalar phase and leaves positive stretch invariant, so the direct phase-to-completion derivative vanishes; equivariance prevents Schur reduction from converting the record-phase source into the scalar completion sector; the signed record-stretch response is zero at linear order; and the present primitive action contains no realised history scalar supplying the signed mixed jets required to determine the maintenance coefficients. The phase, scalar-completion, signed-stretch and current-maintenance bypasses are closed without prejudice to the general readout question.

16K. PSAC-EX3L: first-cover source-side activation

The executed first-cover statistics give the unconditional signed bias

$\delta_K = \langle \text{sign } K \rangle = P(K > 0) - P(K < 0) = 0.996750764817216 - 0.001180705267406 = 0.995570059549810$,

and for the complete reflection-covariant binary activation family the induced pointer response is $\Delta P = \delta_K \cdot g_K$. The source-side signal is almost maximal; what remains is the physical gain g_K, which the magnitude of the source orientation does not select.

16L. PSAC-EX3M: the seven terminal species effects are not the missing pointer

The existing EX2E terminal labels are species/interface labels, not orientation labels. Under the one complete source-native branch comparison presently executable, source state and terminal effects are faithfully co-conjugated, every terminal Born probability is unchanged, and every linear statistic of the seven terminal probabilities has exactly zero branch contrast; normalised by the nonzero first-cover bias the contrast ratio is exactly zero. This is an exact negative for the current co-conjugated terminal composition, in exact agreement with the predecessor's conjugation no-go, and not a theorem that the physical readout gain must vanish.

16M. PSAC-EX3N: the persistent ledger retains the orientation exactly

An individual undirected edge token carries no direction bit, but the ordered append-only ledger determines the traversal direction relationally on a valid closed history: there exists a deterministic ledger function reconstructing the first-cover circulation K. The ledger projectors onto positive, negative and zero circulation are orthogonal; the conditioned positive- and negative-sector ledger states have trace distance 1 and fidelity 0; and the retained orientation expectation equals $\delta_K = 0.995570059549810$. The history orientation is perfectly distinguishable in the persistent physical record, closing the retention/reference half of the readout problem: the missing orientation is not being erased.

> **Corollary 3.7 — Persistent-Reference Theorem. [exact on the executed ledger architecture]**
>
> The first-cover orientation is retained as a perfectly distinguishable persistent ledger fact: trace distance 1 and fidelity 0 between the conditioned positive- and negative-orientation ledger sectors, with the retained expectation equal to the source bias δ_K.

16N. PSAC-EX3O: the present ledger-controlled R4 channel is exactly zero

The current renewal architecture reopens the working carrier independently of the retained ledger. Conditioning the current post-renewal law on the two orientation sectors therefore gives identical working channels, $\Phi_+ = \Phi_-$ exactly, with diamond-norm difference 0 and current-source ledger-to-R4 gain 0; normalised by the nonzero source signal, the activation ratio is 0. The HMGBC history-dependent completion amendment provides no indirect sign route: it is built from the symmetric, reversal-even conductance, whereas the orientation arrow is carried by the antisymmetric history current, which is not inserted into the completion Hessian. History-dependent stiffness is not history-sign readout.

> **Corollary 3.8 — Current-Source Activation No-Go. [exact for the implemented renewal law]**
>
> The current post-renewal working channel is independent of the retained orientation sector: $\Phi_+ - \Phi_- = 0$, its diamond norm is 0, and the current ledger-to-R4 gain is 0. Closing Gate R therefore requires a genuinely source-derived layer-changing attachment from the retained record to the R4 pointer; it cannot be obtained by reinterpreting retention itself as readout (F37), and any later nonzero coupling must descend from a new same-source primitive attachment superseding this construction rather than patching it (F38).

16O. Updated Gate-R verdict

Gate-R object	Current return
Ordered-turn binary slope	0.165420739713981, EXACT
Route-B susceptibility	$\chi_{pop} = (2a_{phys} - 1) \cdot 0.165420739713981$
First-cover source bias δ_K	0.995570059549810, EXACT
Seven terminal species effects as orientation pointer	EXACT ZERO CONTRAST UNDER COMPLETE CO-CONJUGATION
Persistent ledger retention of K	EXACT PASS; K RECONSTRUCTIBLE FROM THE ORDERED LEDGER
Ledger sector distinguishability	TRACE DISTANCE 1; FIDELITY 0

Gate-R object	Current return
Current renewal backreaction from the ledger	NONE; WORKING CARRIER REOPENED INDEPENDENTLY
Current ledger-conditioned channel difference	$\Phi_+ - \Phi_- = 0$ EXACTLY; DIAMOND NORM 0
Current ledger-to-R4 gain	0 EXACT
Physical gain	OPEN
Gate R	PHYSICAL OPEN; EXACT CURRENT-SOURCE ACTIVATION NEGATIVE

> **Execution verdict.** Gate R no longer lacks a source orientation or a physical memory of it. Both exist. The source-side sign is almost maximal at first cover and is retained in orthogonal persistent records. The outstanding object is specifically a causal same-source operation by which that retained record changes the R4 pointer. The present renewal source contains no such operation, and further EX3 routes that merely rearrange the existing factorised renewal architecture are therefore redundant.

Verification notes. Re-derived independently here: the slope $2(1 - 0.957752384566601^2) = 0.165420739713981$ to the last digit; the subtraction $\delta\_K = 0.995570059549810$ exact; trace distance 1 and fidelity 0 from orthogonal supports; and the consistency of this Part with the predecessor at four points, Theorem 20 (ordered records recover chirality, the mechanism of the ledger reconstruction), Theorem 21 (module non-isomorphism, §16H), Theorem 25 (co-conjugation blindness, §16L), and Theorem 45 (the antisymmetric current absent from the completion amendment, §16N), together with the minimal-renewal architecture's independent reopening. Imported at source precision: the failed candidate identifications (values stripped, rejected, not load-bearing), the ledger reconstruction function, and the conditioned-channel equality with its diamond-norm zero. Display equations were stripped in transit; the contract-pinned values are used throughout.

PART IV — GATE M: PRIMITIVE SELECTION OF THE MATTER LAW

17. The matter problem has moved upstream

The present source already contains the trilinear interaction

A_int = ψ̄_L Γ(X) ψ_R + h.c.,

so the ordinary completion-fermion Hessian vanishes at the zero-fermion vacuum and the first nonzero coupling is the mixed third jet

T_Xψψ = ∂^3A_source/∂X ∂ψ̄_L ∂ψ_R.

The archived full charged and neutral tensors pass the complete declared source projection at residuals below approximately 1.15×10^{-15}. The problem is therefore not missing coupling, and no execution in this paper may re-litigate the differential order (F-level guard inherited from the predecessor). The old law fails because it is representation-blind: no unitary reorientation and no scalar spectral function of the universal completion operator repairs its singular-value structure. The successful conditional architecture is the ordered transfer

$$Y = U_{role} D_{score},$$

in which D_{score} fixes the sector-dependent singular-value hierarchy and U_{role} fixes the relative flavour frames, closing both independently differentiated CY3′ routes to approximately 1.9×10^{-14} at the stored regulator levels three and four, against old universal-law residuals of order one half (u 0.373851, d 0.381211, e 0.493033, ν 0.448473).

18. The non-identifiability inventory

Rank is insufficient, and the insufficiency is itself an exact inherited result. The derived physical score carrier has maximal rank 72; full rank persists over a continuous η-interval below the saturated endpoint; and inequivalent admissible endpoint frames retain full rank while producing substantially different physical score Gram matrices. Therefore

positivity + completeness + maximal rank + genericity

does not select the physical score law, and any execution that picks the endpoint because rank is attained there fails F8. Gate M is the problem of eliminating exactly this freedom from the primitive side.

19. The primitive selection problem

Define M_{score} as the fully quotiented admissible source manifold of representation-resolved transfers, after removal of declared gauge and redundancy directions and subject to all source constraints and physical score ranks. A physical pair $(D^\star, U^\star)$ is primitively selected only if it is a stationary class of the reduced primitive action,

$$dA_{primitive}^{red} |_{(D^\star, U^\star)} = 0,$$

with no unexplained continuous kernel,

$$\ker \mathrm{Hess}_{(M_{score})} A_{primitive}^{red} (D^\star, U^\star) = \{0\}$$

up to declared discrete or conjugate equivalence. The stationarity equation, the quotient construction, the Hessian spectrum and the classification of every residual null as gauge, redundancy or physical must all be published.

20. Theorem 4 — Primitive Representation-Resolved Selection Certificate

> **Theorem 4. [conditional physical theorem; certificate form]** A representation-resolved matter law is primitively selected if and only if all of the following are returned from one frozen source chain: (i) ($D^\star$, $U^\star$) is stationary on M_{score}; (ii) every remaining continuous null of the quotient Hessian is a declared gauge or redundancy direction; (iii) the selected class survives or converges across the regulator sequence and both surviving branches; (iv) both independent matter derivatives (the bosonic and the CAR/Fock routes) are recomputed from the same frozen transfer and agree within the declared tolerance; (v) no Standard-Model target participates in selecting the class (P1).

Passing this certificate upgrades the standing result from "this representation-resolved action works" to "this is the representation-resolved action selected by the primitive theory". That distinction is the content of Gate M. Failing clause (ii), a stationary manifold with genuine physical nulls, is the Grade C outcome: structural capacity with residual freedom, reported as such.

21. Sector-resolved response and the lepton block

The source-recovered completion transfer graph has rank four and exactly two components, {Q, u, d} and {L, e, N}. Accordingly the physical relaxation is sector-resolved,

$$B_{phys} = B_Q \oplus B_L,$$

unless the source independently derives an inter-sector coupling; forcible recombination is F10. For the lepton sector the persistence construction already fixes the scalar ordering without mass input: $\sigma_e = 0$, $\sigma_\mu = 1 + \xi_\varphi + 2\eta_{inf}$, $\sigma_\tau = 2 + \xi_\varphi + 2\eta_{inf}$, hence

$$\sigma_\tau - \sigma_\mu = 1 \text{ exactly},$$

independent of the shared infrastructure costs. This fixes ordering, not geometry. The source must still return the maintenance map and metric,

$$L_M,\ G_M,\ D_M = L_M^\dagger\, G_M\, L_M,$$

together with branch covariance or its source-derived failure; the scalar counts admit both a diagonal and a cross-term Gram, and scalar-trace agreement is an existence check, not provenance.

22. Gate-M stop rules

1. η_{phys} may not be set to the positivity endpoint on rank grounds (F8).
2. D_{score} and U_{role} may not be tuned against observed masses or mixings (F9); the CY3′ recomputation of clause (iv) is a consistency check of the frozen selection, not a fitting target.

3. If the stationary class is empty, Gate M fails; if it is a continuum with physical nulls, Gate M returns Grade C; neither outcome may be repaired by adding terms to A_primitive^red within this paper (P9).
4. The quark and lepton blocks are reported separately; a universal bath may enter only with its source-derived inter-sector coupling.

PART IV-A — FIRST GATE-M EXECUTION: PSAC-EX4A

22A. Current-action stationarity and the residual null family

The current endpoint/current residual has real Jacobian of shape 1200×2120 with rank 1200, so the exact residual tangent dimension is $2120 - 1200 = 920$. The declared local gauge orbit has dimension 84, leaving the preliminary quotient bound 836. The number 836 is an upper bound only and is not promoted to a physical-moduli dimension, since further physical equivalences may exist. The decisive fact is that the present action is flat on the residual family and therefore does not isolate the internal frame.

22B. The score-strength coordinate is an explicit selection obstruction

The native marked instrument contains the physical score-strength parameter η, with complete positivity admitting an open interval, and the physical marked probabilities change with η while full physical score rank 72 persists over that interval. But η does not occur in the current primitive endpoint/current residual action, so the augmented quotient Hessian contains an exact flat direction along a physically effective coordinate. Because η changes the native physical marked law, it cannot be discarded merely because maximal rank is unchanged: unless a source-derived equivalence theorem removes the entire η-family, the primitive nondegeneracy condition of Theorem 4, clause (ii), fails for the current action.

22C. Rank does not select the frame

The executed endpoint witnesses all retain physical rank 72 while their terminal Gram forms differ substantially, so rank selects no frame; and the CY3′ agreement, a valid consistency check of the representation-resolved law, may not be used afterwards to choose a preferred member of the residual source family (P1, F9).

> **Corollary 4.1 — Current-Action Selection Obstruction. [exact for the executed residual action]**
>
> The current source does not isolate a unique representation-resolved matter transfer: the residual action is flat across unresolved frame directions and contains an explicit physically effective score-strength direction absent from its Hessian.

Corollary 4.2 — Gate-M Grade-C Return.

The representation-resolved matter construction passes structural capacity and retains the conditional dual-route CY3′ closure, but D_score, U_role and η are not uniquely selected by the current primitive action. Gate M returns Grade C, structural capacity with residual freedom, exactly the predeclared outcome of the §22 stop rules, published as such under P9 and not repaired in-paper.

Verification notes. Re-derived here: 2120 − 1200 = 920 and 920 − 84 = 836, matching the pinned inherited counts exactly; the flat-direction logic against Theorem 4 clause (ii); and the Grade-C mapping to the §35 verdict scale. Imported at source precision: the Jacobian shape and rank, the η-interval structure and rank persistence, and the differing terminal Gram forms across executed frames.

PART V — GATE T: PHYSICAL TOPOLOGY AND HOLONOMY ATTACHMENT

23. The existing closed family phase

The frozen role-odd three-generation transport, in its Hermitian form $H_q = -i\Omega_q$, contains a closed comparison invariant: the direct route $1 \to 3$ against the indirect route $1 \to 2 \to 3$,

$W_\Delta = \hat{u}(H_{32})\, \hat{u}(H_{21})\, \hat{u}(H_{31})^*$, $W_\Delta = e^{i\cdot 5\pi/6}$ exactly,

that is 150°, with the reversed loop giving 210°. Every endpoint rephasing cancels around the closed triangle, so the value is gauge-invariant on its carrier. The stored finite-regulator continuations give 176.5074504467° at level three and 155.8501772202° at level four, attached to the bare value under the declared refinement law with no convergence order claimed from two levels. What exists is therefore a source-frozen closed family holonomy carrying exactly the candidate axle phase. What does not yet exist is the proof that the physical charged-completion comparison loop is this loop.

24. The physical axle-loop execution

Construct from the primitive history stack, without AX1 insertion and without CKM comparison, two physical charged-completion histories γ_0 and γ_{ax} satisfying all of: identical physical preparation; identical terminal charged record; the axle transport contained in γ_{ax} and absent from γ_0; and admissibility of both under the source constraints. Co-terminality must be verified with a published residual before any phase is computed. Only then define

$L_{ax} = \mathrm{Hol}(\gamma_{ax})\, \mathrm{Hol}(\gamma_0)^{-1}$.

The admissible outcomes are $L_{ax} = W_\Delta$; $L_{ax} = W_\Delta^*$; another source-fixed value; or no physically admissible comparison loop. No outcome is selected afterwards, and a negative result (no realised loop, or a value unrelated to W_Δ) retires the inheritance route while leaving W_Δ standing as a real invariant of a different carrier.

25. Theorem 5 — Closed-Loop Inheritance Certificate

> **Theorem 5. [conditional physical theorem; certificate form]** The 150° family phase is promoted to the physical axle phase only if there exists a source-derived co-terminal history map, preserving composition, endpoint equivalence and the gauge quotient, under which the physical comparison loop descends to, or provably inherits, the closed family holonomy W_Δ. Numerical equality of two phases without that map is not a derivation (F13), and a construction that installs the axle transport conditionally cannot supply the map without circularity.

26. The actual Z_7 vacuum topology

A nontrivial Z_7 holonomy, if physically available and occupied, acts on the three real two-dimensional character planes pairing {1, 6}, {2, 5}, {3, 4}, which is exactly the representation type of the nonuniform projected K7 Gram carrier; the minimal coefficient-free positive response has spectrum

$\{2 - 2\cos(2\pi/7), 2 - 2\cos(4\pi/7), 2 - 2\cos(6\pi/7)\} = \{0.753020396283, 2.445041867913, 3.801937735805\}$,

with sum exactly 7 and minimal polynomial $\lambda^3 - 7\lambda^2 + 14\lambda - 7$, rank six for every nonzero class, and no CP sign from the squared response. None of this is yet physics: the type match is capacity (P2, P5). The physical sevenfold transport object is a loop holonomy. Its availability is therefore governed by

$H^1(K\_vac; Z_7) \cong \mathrm{Hom}(H_1(K\_vac), Z_7)$,

equivalently by the surviving first homology over Z_7. $H^2(K\_vac; Z_7)$ is a distinct closed-surface sector of the truncated two-complex, acquiring $\mathrm{Hom}(H_2, Z_7) \oplus \mathrm{Ext}(H_1, Z_7)$ under the universal coefficient theorem, and must not be substituted for the loop criterion; the two returns can differ in either direction. Gate-T loop availability is therefore $H^1(K\_vac; Z_7) \neq 0$, with H^2 calculated separately as a surface-sector diagnostic (F32). The execution must construct the actual finite vacuum cell complex

$K\_vac = (C_2 \rightarrow(\partial_2)\ C_1 \rightarrow(\partial_1)\ C_0)$,

publish the integer boundary matrices, verify $\partial_1\partial_2 = 0$ with an exact chain residual, and then calculate $H^1(K\_vac; Z_7)$, together with $H^2(K\_vac; Z_7)$ as the separate surface-sector diagnostic, the relevant integral Smith normal forms and all order-seven torsion. The torsion calculation decides whether sevenfoldness is intrinsic or an artefact of the chosen coefficient group (F12). Only after availability is settled may occupancy be executed, and only after occupancy may the matter attaching map V from persistence commitment classes into the projected K7 carrier be tested against the vacuum holonomy loops; the predecessor already excludes the direct C_6-to-Z_7 carrier identification by representation type, so the bridge must pass through the actual transport holonomy or not at all.

27. Theorem 6 — Availability, Occupancy and Attachment Theorem

Theorem 6. [exact promotion discipline] A holonomy response becomes physical flavour structure only after three separately executed gates pass in order: topological loop availability, $H^1(K\_vac; Z_7) \neq 0$, with the integral Smith normal form and all order-seven torsion published; physical occupancy of a nontrivial loop class by the source; and matter-loop attachment through a source-derived identification of the charged-lepton persistence loops with the occupied vacuum holonomy loops. $H^2(K\_vac; Z_7)$ is an independent surface-sector return and may not substitute for the loop criterion (F32). Nonzero cohomology alone proves capacity; occupancy without attachment proves a physical vacuum sector with no demonstrated flavour role; an attaching map into a trivial or unoccupied sector gives no nontrivial response.

28. Gate-T stop rules

1. The three subgates execute in strict order; no later subgate may be reported without its predecessors (F11, F15).
2. Coefficient-group sevenfoldness is not intrinsic sevenfoldness until the integral Smith normal form returns order-seven torsion (F12).
3. L_ax is computed only after the co-terminality residual passes; phase comparison precedes nothing (F13, F14).
4. A wheel or proxy-complex result may motivate but never substitute for the actual K_vac calculation.

PART V-A — GATE-T EXECUTIONS: PSAC-EX5A THROUGH PSAC-EX5AY

28A. PSAC-EX5A: the integral torsion discriminator

For the literal filled seven-state polygon, the single 2-cell attaches to its boundary cycle with degree one, so the integral Smith normal form of the attaching relation is [1], giving $H_1 = 0$, $H_1(K; Z_7) = 0$ and no order-seven torsion, exactly. By contrast, a genuine degree-seven attaching relation has Smith factor [7], giving integral $H_1 = Z/7$ and $H_1(K; Z_7) = Z_7$. Period-seven geometry and intrinsic order-seven topology are therefore different statements, precisely the distinction F12 anticipated, and the filled heptagon is the exact negative control.

28B. PSAC-EX5B: unit incidence does not exclude collective seven-torsion

The absence of an explicit coefficient seven in any individual plaquette does not settle the torsion question: there exists an integer boundary matrix with every entry in {0, ±1} whose Smith normal form is diag(1, 1, 1, 7). Ordinary unit-incidence relations can therefore generate order-seven torsion collectively, and the full integral Smith calculation remains load-bearing even if every physical plaquette is polygonal with unit incidence coefficients (F33). (The explicit counterexample matrix was stripped in transit; its Smith form is pinned, and the matrix is pending re-supply.)

28C. PSAC-EX5C: the primitive completion predicate is not source-returned

The required hub predicate must decide, from source-native data, that a candidate local closure frame is complete. Every currently available candidate fails the provenance audit: the explicit K7 hub label presupposes completion; first-cover classes classify histories downstream of a closing rule; the MASD construction assumes the cellular complex already exists; and the matter completion strain belongs to the wrong typed sector. None supplies the missing primitive vacuum predicate (F34). A clean diagnostic candidate is the first novelty-saturation time, but the physical source has not yet returned the underlying admissible-alternative map.

28D. PSAC-EX5D: the operational unresolved-distinction functional

Let A_open(F) be the locally open alternatives associated with candidate frame F, quotiented by operational equivalence: two alternatives are identified exactly when no admissible finite-observer protocol distinguishes them. Define

D_unres(F) = max(|A_open(F)/~_op| − 1, 0).

Then D_unres(F) = 0 exactly when at most one operationally distinct local alternative remains: the required functional form of “no unresolved distinction”, with no fitted numerical distance threshold. Its evaluation still requires the source-derived map F ↦ A_open(F).

28E. PSAC-EX5E: the Fold-derived six-relation carrier

The four Fold outcome atoms generate exactly C(4, 2) = 6 minimal unordered binary relation supports; each has a unique complement, so the six divide canonically into three complementary pairs, equivalently the three nonzero difference classes when the atoms are represented as F_2^2 labels. The natural relation graph is K_(2,2,2), the octahedron on three antipodal pairs, with automorphism group C_2 wr S_3 of order 48, exactly the three-antipodal-pair stabiliser found immediately before the wheel in the independent closure calculation. Under the additional connected two-neighbour cyclic locality premise the relation carrier reduces, uniquely up to relabelling, to the C_6/D_6 boundary architecture. The identification of the Fold binary relations with the physical vacuum boundary relations remains conditional and is not promoted by representation matching alone (F35, P2).

28F. PSAC-EX5F: the seventh closing operation

For every complementary pair the two supports sum to the identity, but the completeness relation $\Sigma P_a = I_4$ cannot itself be the physical seventh closing operation: as a map it is the identity channel, reversible and fact-free (F36). The correct Fold-level object is the complete rank-one commitment instrument

$I_a(\rho) = P_a \rho P_a, \Sigma P_a = I_4$,

whose nonselective channel $\Phi(\rho) = \Sigma_a P_a \rho P_a$ is the Fold dephasing map: rank 4 and nullity 12 on the operator space, idempotent, repeatable, locally non-invertible, unique up to irrelevant Kraus refinement under the rank-one and repeatability requirements, and sending every binary unresolved Fold relation to a single committed fact on either resolved branch. The seven structural relations may then be written conditionally as six binary relations plus one global completeness relation: a 1 + 6 structure in which the seventh element is a completeness statement, not a seventh measurement outcome. The physical vacuum trigger identifying a completed K7 history with activation of this instrument remains open.

28G. PSAC-EX5G: first complete cover is the record trigger, not the resolved fact

The first complete closed cover is a genuine source-derived stopping event rather than a point chosen after the fact. The executed K7/PFDMI record architecture identifies the first complete-cover stopping time with the record-event time,

$T_{rec} = T_{cover}$:

at first complete cover the full declared oriented incidence support has appeared (all 14 declared oriented incidence flags present), and the completion/renewal mechanism enters a new persistent record at exactly that stopping event. This closes the timing question. It does not establish the stronger relation identifying complete cover with $D_{unres} = 0$: the cover condition is reflection-even, while completed histories at the same stopping event still divide into positive, negative and zero first-cover circulation classes, so the stopping event specifies when commitment occurs, not which physical fact is realised. The correct causal order is

$T_{cover} \rightarrow$ completion operation $\rightarrow$ committed record class $\rightarrow D_{unres\_op} = 0$, and the apparent tension with renewal is removed by typing: first cover absorbs one open record-formation episode in the first-passage problem, while the working carrier may subsequently reopen with the completed fact retained.

> **Corollary 6.1 — First-Cover Record-Trigger Theorem. [executed construction-level pass]**
>
> Within the current record architecture, first complete cover is the physical record-event clock, $T_{rec} = T_{cover}$. Complete cover is the trigger for commitment; it is not itself identical to the realised committed fact or to the post-commitment condition $D_{unres} = 0$ (F39). The remaining carrier problem is exposed rather than solved: the executed completion sector is binary R4, whereas the EX5F Fold commitment instrument acts on four Fold atoms.

28H. PSAC-EX5H: the Fold-to-R4 character selector

Write the four Fold atoms as (b, ω) with $b \in \{0, 1\}$ the Fold commitment outcome and $\omega \in \{+, -\}$ the independent orientation variable. There are exactly three nontrivial binary Fold characters:

$\chi_b = (-1)^b$, $\chi_\omega = \omega$, $\chi_{b\omega} = (-1)^b \cdot \omega$.

The R4 population difference is rotation-even and reflection-odd. Pure Fold commitment polarity χ_b is excluded because it carries no orientation oddness. Reflection alone leaves both χ_ω and $\chi_{b\omega}$ admissible; the additional Fold symmetry interchanging its two primitive binary degrees of freedom separates them, since the pure characters exchange under that symmetry while the combined parity is invariant. Consequently, within the exchange-covariant Fold class, the only nontrivial one-dimensional binary Fold character with the required R4 reflection parity is

$\chi_{b\omega} = (-1)^b \cdot \omega$, unique up to the global interchange of the final + and − labels,

with corresponding Fold binary sectors $R4_+ = P_{(0,+)} + P_{(1,-)}$ and $R4_- = P_{(0,-)} + P_{(1,+)}$. The completely positive trace-preserving coarse-graining onto these two sectors exists as an exact construction once the Fold carrier is admitted; it is not yet a primitive-source activation theorem, because the master action has not returned the physical channel.

> **Corollary 6.2 — Fold Character-Selection Theorem. [exact within the exchange-covariant Fold class]**
>
> Of the three canonical binary characters of the four Fold atoms, only the combined parity $\chi_{b\omega}$ is simultaneously exchange-compatible and orientation-odd. It supplies the unique structural Fold candidate for the R4 population split, up to output-label reversal. The existence of the corresponding CP map proves constructibility, not primitive activation (F40).

28I. PSAC-EX5I: notation firewall and the orientation-alignment no-go

One symbol had been carrying two physically different quantities and must be separated. Write $b \in \{0, 1\}$ for the Fold binary commitment outcome and $\varsigma \in \{-1, +1\}$ for the IORC orientation mark. IORC itself writes the first commitment mark as C_1 = (outcome, ς), so the event outcome and the orientation mark are separate variables; the IORC preparation kernel is driven by ς multiplying the unique reflection-odd wheel score, so ς is an orientation variable and may not be silently identified with b (F41). A scoping note applies to this paper: throughout Parts I–IV the orientation mark is written σ, the predecessor convention; within the Fold context it is written ς to prevent collision with any commitment-outcome symbol. The two symbols denote the same orientation variable, and neither is ever the commitment bit b.

The source does permit an exact first-cover alignment variable, J_orient = ς · sign(K). Its executed statistics are

$E[J\_orient] = \delta\_K = 0.995570059549810$, $E[J\_orient^2] = P(K \neq 0) = 0.997931470084622$,

$Var(J\_orient) = 0.006771726612606$, $E[J\_orient \mid K \neq 0] = 0.997633694691869$,

with conditional preferred-alignment probability 0.998816847345935. But under reflection both ς and sign(K) flip, so J_orient is invariant: it transforms in the reflection-even A_1, whereas the R4 population difference is reflection-odd. Hence J_orient measures alignment between the selected orientation branch and the direction subsequently taken by the complete history; it is not an R4 handedness readout (F42). The correctly typed combined Fold variable remains J_Fold = (−1)^b · sign(K), whose physical expectation cannot yet be evaluated because the source has not supplied b on the executed first-cover record.

> **Corollary 6.3 — Orientation-Alignment No-Go. [exact]**
>
> The IORC orientation mark and the first-cover circulation are almost perfectly aligned, but their product is reflection-even. It is an alignment observable and cannot be promoted to the R4 population variable. The independent Fold commitment bit remains load-bearing.

28J. PSAC-EX5J: the Fold bit is not yet the executed record label

At the foundational level the minimal Fold commitment possesses an abstract binary outcome, and the generic commitment theory likewise represents a completed binary record by a two-valued label; these have the same abstract binary record type up to relabelling. That is a type correspondence only, and it does not identify either with the currently executed physical record. IORC leaves the outcome entry of C_1 = (outcome, ς) untyped, and its one-Bit condition fixes one bit of event information per commitment, not a two-element alphabet for the next-event state variable (F43). More decisively, the executed PFDMI persistent record is the 84-class edge/type ledger,

E_{84} = edges × terminal types = 12 × 7 = 84, descended from the finer 319-mark instrument through the already executed Fold-to-fact coarse-graining $A_{319} \to E_{84} \cup \{\emptyset\}$; and the post-commitment source audit explicitly distinguishes the binary two-label copy code from the 84-label PFDMI ledger and forbids silently identifying the carriers. The Fold commitment bit therefore requires a further source-derived quotient,

$q\_b: E_{84} \to Z_2$.

Without additional source structure the raw combinatorial freedom is enormous: nonconstant binary labellings of 84 classes, modulo global bit reversal, number $2^{83} - 1 = 9671406556917033397649407$ before symmetry, locality, action provenance and record constraints are imposed. The number is not a physical moduli count; it proves that persistence of 84 distinguishable classes cannot itself select a unique binary Fold quotient. Consequently the joint distribution P(b, K) is not yet returned, and the candidate combined parity satisfies only the mathematical range $|E[J\_Fold]| \leq P(K \neq 0) = 0.997931470084622$ from the K-marginal alone; an independent fair bit would give zero, but independence is not a source return and cannot be admitted as the physical answer.

Corollary 6.4 — Binary-Ledger Quotient Obligation.

The Fold commitment outcome exists as an abstract binary fact label, but the current physical record is an 84-class edge/type ledger descended from the 319-mark instrument. A physical Fold bit exists on that ledger only after the source returns an intertwining quotient q_b (F44). Until then, b, the combined Fold parity and its physical R4 activation remain unreturned. PSAC-EX5K (§28K) subsequently retypes this obligation: the completed binary R4 record is a distinct carrier whose basis is uniquely fixed by cyclic covariance, so q_b is demoted from primitive origin of the fact to an optional downstream cross-carrier reconciliation map (Corollary 6.5, F44 as restated at R13).

28K. PSAC-EX5K: binary-completion carrier retyping and R4 uniqueness

EX5J correctly established that the 84-class PFDMI ledger may not simply be renamed a binary Fold record; the next execution shows the stronger conclusion drawn from that mismatch was unnecessary. Later event semantics distinguish the detailed edge/type ledger from the completed R4 record sector: E_{84} is an implementation/history ledger, whereas the completion event itself carries a separate binary R4 record. A quotient $q\_b: E_{84} \to Z_2$ is therefore not required as the primitive origin of the binary completion branch. On the completed two-dimensional R4 active sector, let $\{P_+, P_-\}$ be a rank-one orthogonal binary PVM. Cyclic covariance requires the unordered pair to be preserved by the one-step C_6 rotation; on the traceless Hermitian operators of the two-plane the rotation has no −1 eigendirection and a one-dimensional +1 eigenspace, so the invariant projector pair is unique,

$\{P_+, P_-\}$ fixed up to exchange of the two outcome names.

Once the pair is fixed, the minimal pure-record maps $\Phi_\pm(\rho) = \mathrm{Tr}(P_\pm \rho)|C_\pm\rangle\langle C_\pm|$ and the minimal branch-preserving renewal $V|C_\pm\rangle = e^{i\chi_\pm}|\psi_\pm\rangle|\pm\rangle$ are unique up to physically irrelevant phases.

> **Corollary 6.5 — Binary-Completion Retyping Theorem.**
>
> The completed R4 binary branch does not need to be selected by partitioning the 84-class PFDMI ledger: its binary projector pair is uniquely fixed within the declared C_6-covariant completed sector, up to output-label exchange, and the minimal pure-record map and branch-preserving renewal are correspondingly unique up to phases. Any later map $E_{84} \to Z_2$ is a cross-carrier reconciliation map, not the primitive origin of the completed binary fact (F44 restated). The remaining primitive debt is activation of the already-fixed binary completion sector.

28L. PSAC-EX5L: first-cover-to-controller and entropy-ordering test

Let the reflection-even indicator of first complete cover be given. The effective boundary-controller construction carries a commitment rate whose presently written equation contains no cover term; holding the remaining controller variables and the noise realisation fixed, the exact current derivative of the controller with respect to cover status is zero, so the current model gives no direct cover-to-controller response. Nor can the alignment variable be reconstructed from cover status alone: the same completed cover is compatible with different alignment values under different physical reference orientations, a source-independent typing fact. A direct cover-controller interaction term is symmetry-allowed, both variables being reflection-even, but is not source-returned and may not be inserted merely because a commitment trigger is required. The same execution fixes the entropy ordering: under the programme's stated irreversible-record thermodynamic assumptions, committing one binary distinction carries the lower bound $\Delta S \geq k_B \ln 2$, while generic entropy production, even above that bound, is not sufficient to identify a commitment event.

> **Corollary 6.6 — Trigger/Entropy Ordering Theorem.**
>
> First complete cover remains the executed record clock, but the present controller model does not derive a cover-to-controller activation (F45). Under the programme's stated irreversible-record thermodynamic assumptions, committing one binary distinction carries the lower bound $\Delta S \geq k_B \ln 2$; the converse, entropy production causing commitment, is not derived (F46).

28M. PSAC-EX5M: the first-loop-birth diagnostic

For a connected graph, $\beta_1 = E - V + 1$. Adding a new edge between vertices already connected leaves the component count unchanged and raises β_1 by exactly one. The diagnostic seven-vertex open chain has $\beta_1 = 0$; adding the endpoint relation gives the seven-cycle with $\beta_1 = 1$. This is an exact mathematical model of a line becoming a loop and a clean candidate threshold for a cycle-based trap; it is not yet a physical K7 theorem, and §28O decides that identification negatively.

Corollary 6.7 — Loop-Birth Criterion.

A new relation creates a first independent cycle exactly when it joins endpoints already connected by an existing path, $\Delta\beta_1 = +1$. This is an exact diagnostic, not by itself the microscopic K7 commitment operation.

28N. PSAC-EX5N: Fold-interface commitment-curve closure

On the minimal Fold interface, $\Sigma \cong S^2$, let the developing commitment boundary be an embedded open arc: its complement is connected ($\beta_0 = 1$) and the arc has trivial first homology. If its endpoints join, the boundary becomes a simple closed curve with $H_1 \cong Z$, and Jordan separation gives exactly two complementary domains, $\beta_0(\Sigma\ \ \text{curve}) = 2$. Closing the commitment curve therefore simultaneously creates the first loop class and an exact binary separation of the interface, precisely two separated domains on which the Fold commitment polarity can live.

Corollary 6.8 — Fold Binary-Separation Theorem.

On the minimal Fold surface, closing an open commitment arc into a simple loop produces an exact binary separation of the interface, a mathematically natural topology for commitment polarity. No source theorem yet identifies the six K7 boundary relations with the segments of this Fold curve (F48).

28O. PSAC-EX5O: the actual K6-to-K7 seventh-hub execution

The microscopic K7 construction falsifies the literal identification of the seventh constraint with the edge that first closes a loop. With six boundary constraints the boundary phases already form the closed hexagonal cycle C_6, with $\beta_1 = 1$: the precursor is already cyclic, and its common boundary-phase displacement is invisible. The seventh constraint is an interior hub, producing six relative quantities and the wheel W_7 (six rim vertices plus hub, twelve edges, $\beta_1 = 12 - 7 + 1 = 6$). On the unweighted wheel Laplacian, the boundary test vector $q = (1, 1, 1, 1, 1, 1, 0)$ gives $q^T L q = 6$, and the gauge-invariant relative mode

$r = (1, 1, 1, 1, 1, 1, -6)$ satisfies $Lr = 7r$

exactly: each rim entry returns $3 - 2 + 6 = 7$ and the hub entry $-36 - 6 = 7 \times (-6)$. Only the global seven-component shift remains null. The seventh constraint therefore does not create the first cycle; it supplies an internal reference converting a formerly invisible boundary-relative displacement into a physical eigenmode of stiffness 7.

Corollary 6.9 — Seventh-Hub Null-Mode-Lifting Theorem.

The microscopic K7 seventh constraint is a hub, not a first loop-closing edge: it lifts the boundary-relative zero mode into a physical eigenmode of exact eigenvalue 7. The literal K7 loop-birth hypothesis is retired (F47).

28P. PSAC-EX5P: contraction, non-recombinability and record irreversibility

The static hub-boundary mode has a dynamical counterpart in the canonical K7 refinement process, with quotient eigenvalue $-3/28$: after n refinement steps the mode carries $(-3/28)^n$ of its initial amplitude, strong suppression without finite-step annihilation. The seven-state closure/refinement catalogue is moreover irreducible, every state communicating with every other, so the hub does not divide the visible catalogue into permanently disconnected reachability classes: direct state-level non-recombinability follows neither from the positive stiffness nor from the contraction. The record theorem supplies the necessary correction: irreversibility means that once a fact is recorded, no later admissible record may contradict or overwrite it about that same earlier event; it does not prohibit later physical evolution. The record-preserving renewal construction implements exactly that distinction, the past fact persisting while the working carrier reopens.

> **Corollary 6.10 — Record-Level Irreversibility Theorem.**
>
> K7 hub formation produces exact stiffening and strong contraction but not direct state-space non-recombinability on the seven-state catalogue (F49). A surviving post-commitment working tangent is not a failure of irreversibility (F50); the correct requirement is no overwrite of the retained historical fact, satisfied by the append-only renewal architecture at construction level, with primitive provenance open.

28Q. PSAC-EX5Q: loop-to-polarity no-go and the branch-neutral trigger

The K7 transport group is the dihedral D_7. For any homomorphism to Z_2 the order-seven relation forces the rotation generator to the identity, so $\mathrm{Hom}(D_7, Z_2) = Z_2$ with its unique nontrivial element the already-used orientation parity, and $\mathrm{Hom}(Z_7, Z_2) = 0$ for the residual closure channel. Abandoning homomorphism while retaining reversal invariance does not restore uniqueness: the inversion orbits of Z_7 are {0}, {1, 6}, {2, 5}, {3, 4}, giving $2^4 = 16$ inversion-even binary functions, 14 nonconstant, and 7 inequivalent nonconstant partitions modulo global output reversal. The sevenfold holonomy therefore does not determine the independent Fold commitment polarity. The correct factorisation types K7 closure as branch-neutral activation or allowedness, while the pre-commitment Fold/R4 state determines which outcome is realised; a branch-neutral closure-gated instrument can be constructed, its activation from the primitive source unreturned.

> **Corollary 6.11 — K7 Polarity No-Go and Trigger Factorisation.**
>
> K7 contains no second canonical binary quotient capable of supplying the independent Fold commitment polarity: $\mathrm{Hom}(D_7, Z_2) = Z_2$ exhausted by orientation, $\mathrm{Hom}(Z_7, Z_2) = 0$, and seven inequivalent inversion-even readings

remain. Closure may source branch-neutral activation; it may not be credited with choosing the binary outcome (F51).

28R. PSAC-EX5R: the same-action closure/completion block and the commitment-bath route

The MASD master action's six-defect operational metric contains an explicit closure/completion block type W_{CH}, the correct same-action object to inspect before inventing any new coupling. On the executed canonical K7 wheel, direct history differentiation returns

$W_{CC} = 12/31$, $W_{HH} = 75/434$, $W_{CH} = 0$ exactly, $W_{BH} = W_{RH} = 0$,

with the only nonzero wheel crosses $W_{JH} = -33/434$ and $W_{TB} = 3/248$. The zero is caused by symmetry and support orthogonality, not numerical precision: closure and completion are each active, but their scalar-wheel score covariance vanishes, so direct scalar-wheel closure-to-completion activation fails. A full-carrier nonzero block remains mathematically possible through the Gaussian bath sector, arising if a source-derived unresolved mode couples simultaneously to closure and completion; such a block may not be inserted and must emerge from the faithful multi-cell/internal/terminal/completion lift (F52). A mandatory type firewall also applies: the MASD H sector is the local Standard-Model completion-strain morphism, not the Fold commitment PVM (F53). The better-typed commitment route compares the six-dimensional projected K7 closure carrier with the six-dimensional commitment-event bath. Carrier identity requires two certificates: the whitened closure-carrier invariance residual $\varepsilon_{inv} = \|(I - P_Q)A P_Q\| / \max(\|A P_Q\|, \varepsilon_0)$ must vanish under refinement, and all six principal-angle singular values between the two orthonormal frames must tend to one (F54). If the carrier tests pass, the source-defect coupling exists exactly iff $\ker J_D \subseteq \ker J_s$, equivalently the vanishing of the factorisation residual $R_{HM4} = J_s(I - J_D^+ J_D)$; when it holds, the canonical minimum-norm coupling on the reachable defect image is $C_{min} = J_s J_D^+$. Even this gives only unmarked commitment dynamics: the physical record marks require a source-derived amplitude or record-projector decomposition before marked Kraus amplitudes may be constructed (F55).

Corollary 6.12 — Closure/Commitment Activation Boundary.

The direct canonical-wheel closure/completion covariance is exactly zero, $W_{CH} = 0$. The full bath-mediated route is not ruled out, but it is physical only if the closure and commitment carriers coincide (invariance residual and all six principal angles), the source-factorisation residual R_{HM4} vanishes, and the marked record decomposition is returned from the same source. Dimension matching, an unmarked Doob kernel or a manually populated cross block is not sufficient.

28S. PSAC-EX5S: the closure-carrier / commitment-bath coincidence test

The projected finite-regulator closure construction is governed by the source-returned mass and stiffness operators, and the later full projected-closure calculation returns both as real Z_7-circulant matrices. They therefore diagonalise in the same discrete Fourier basis, and the uniform vector $u = (1, 1, 1, 1, 1, 1, 1)/\sqrt{7}$ is an exact common eigenvector. Consequently the orthogonal projector onto the nonuniform six-plane commutes with both operators, and the projected closure carrier is exactly invariant,

$\varepsilon_{inv} = 0$

identically at every regulator retaining the source-returned circulant structure. The older discrete commitment-bath representation likewise contains one uniform zero mode and six nonuniform modes, so at the abstract coordinate level both candidate carriers are six-dimensional; this alone is not a physical identity, because the closure coordinates and old bath vertex coordinates have not been source-identified.

> **Corollary 6.13 — Exact Closure-Carrier Invariance.**
>
> The nonuniform projected K7 closure six-plane is an exact invariant subspace of the source-returned finite-regulator closure operators, $\varepsilon_{inv} = 0$. Dimension and abstract agreement with the old seven-vertex bath are structural capacity only until the physical carrier map is returned.

28T. PSAC-EX5T: the corrected field-level closure/commitment intertwiner

The later exact-projection and continuum-bath papers change the carrier comparison: the physically relevant commitment bath is not fundamentally an independent seven-vertex system but a continuum of fluctuations of the same Φ-field on the closure coordinate, the Single-Source construction supplying the common parent. Writing the closure reconstruction map with Gram matrix G and whitened closure coordinates, the map

$W = G^{1/2}$

is an exact isometric intertwiner from the projected closure six-plane to the corresponding nonuniform Φ-field six-plane: its six physical singular values are

1, 1, 1, 1, 1, 1.

The old direct identification of discrete closure-pair coordinates with seven discrete bath vertices is therefore retired as the required primitive object. The physical field-level carrier match passes within the continuum same-Φ construction, remaining a conditional physical promotion where it relies on the constitutive single-source identification.

> **Corollary 6.14 — Field-Level Closure/Commitment Carrier Theorem.**

The whitened K7 closure carrier and the nonuniform closure subspace of the physical Φ-field are exactly isometrically intertwined by $W = G^{(1/2)}$, all six singular values equal to one. The direct discrete seven-to-seven carrier identity is unnecessary and unsupported (F56). The remaining attachment problem moves from carrier ambiguity to primitive source provenance.

28U. PSAC-EX5U: the common-parent source Jacobian and the HM4 residual

The faithful reduced defect Jacobian returned by the existing execution has shape 243 × 226, rank 183 and nullity 226 − 183 = 43, with smallest positive singular value 0.684040286651 and largest 3.30225857912. Earlier this did not decide HM4, because an arbitrary six-mode source can contain components outside the defect row space. The EX5T carrier typing removes that arbitrary freedom for the first-order scalar commitment source: the faithful constitutive-current/divergence block proves that every zero-sum scalar density covector belongs to the row space of J_D. Hence the complete six-dimensional nonuniform scalar commitment carrier satisfies

$$R_{HM4} = J_s (I - J_D^{+} J_D) = 0$$

analytically for the first-order scalar density sector under the stated P-HM12 source typing. The existing machine execution agrees, returning 1.51×10^{-15} with blind replication 8.68×10^{-16}. The theorem is carrier-wide rather than profile-specific, every row of the six-mode density source lying in the faithful defect row space; the all-regulator, all-branch conclusion is analytic wherever the same scalar incidence architecture and P-HM12 typing are retained, while the eight-point machine sweep remains an implementation debt.

Corollary 6.15 — First-Order Scalar HM4 Descent Theorem.

The complete zero-sum first-order commitment-density carrier descends through the faithful primitive defect quotient, $R_{HM4} = 0$. This proves source compatibility of the scalar commitment carrier; it does not derive a marked Fold instrument or select an outcome (F57).

28V. PSAC-EX5V: the terminal-record source and the finite-mark selection boundary

The RCMO terminal record is genuinely signed, $M_\Omega(-s) = -M_\Omega(s)$, while its tangent satisfies $DM_\Omega(-s) = DM_\Omega(s)$: the derivative of an odd map is even. The terminal-record tangent lies in the faithful record-phase carrier and passes its source-descent test at residuals of order 10^{-15}, so the primitive architecture can carry the signed terminal record once supplied. But the equality of the two reversed tangents proves an exact local-to-global obstruction: any function of the first-order tangent alone takes the same value on both finite branches, so first-order record compatibility cannot decide which finite signed record was realised. The Fold typing adds a firewall: RCMO's sign is branch-odd orientation data, and the Fold commitment polarity is an independent binary variable, so the orientation mark may not be identified with the committed fact merely because both are two-valued. The missing physical object remains the marked selection map Π_{mark}.

Corollary 6.16 — Record Compatibility/Selection Separation Theorem.

The faithful action can carry a signed terminal orientation record, but first-order record descent does not select the finite realised mark (F58). Orientation-record compatibility and commitment-outcome selection are distinct physical questions.

28W. PSAC-EX5W: the implemented detailed mark map and the 84-class quotient no-go

At the declared PFDMI level the nonself microscopic operation is explicit,

$$L_{(e,\alpha,r)} = P_r C_{(e,\alpha)} U_e,$$

and for a retained edge/type label the corresponding coarse-grained marked operation $I_{(e,r)}(\rho) = \Sigma_\alpha L_{(e,\alpha,r)} \rho L_{(e,\alpha,r)}^\dagger$ is an exact construction. The 312 nonself microscopic marks coarse-grain to the 84 persistent edge/type records, the seven self-history marks producing no new ledger entry. The renewal map copies each retained label into an orthogonal ledger sector, so within the declared architecture two different labels are distinguished by terminal ledger projectors and cannot be identified by QC-1 terminal-record equivalence: an $E_{84} \to Z_2$ grouping is not a physical-equivalence quotient but an additional coarse-graining requiring independent source provenance.

Corollary 6.17 — Detailed-Record Mark Theorem.

The implemented PFDMI architecture contains an exact detailed mark-to-operation map, but its 84 persistent edge/type records remain mutually distinguishable at the declared terminal grain. QC-1 cannot manufacture the binary Fold fact by merging those orthogonal record sectors (F59).

28X. PSAC-EX5X: the sharp R4 / PFDMI simultaneous-refinement no-go

The full PFDMI carrier is $C^7 \otimes C^{50}$, with the completed R4 chiral projectors acting on the history factor. A POVM is jointly measurable with a sharp PVM only if every detailed effect commutes with the sharp projectors; when this holds the joint effects are uniquely the products. For a rim history source, the squared overlap of a rim site with either R4 chiral ray $\psi_\pm(b_m) = e^{\pm i\pi m/3}/\sqrt{6}$ is exactly 1/6, and the corresponding sharp-projector commutator has

operator norm $\sqrt{1/6 \cdot 5/6} = \sqrt{5}/6$, Hilbert–Schmidt norm $\sqrt{10}/6$, both exact. Summing the two directed transitions of one retained undirected edge does not remove the obstruction: the resulting history effect is supported on at most the two edge endpoints and cannot preserve the coherent six-rim R4 ray.

Corollary 6.18 — R4/PFDMI Simultaneous-Instrument No-Go.

The sharp R4 binary measurement and the existing pre-commitment PFDMI detailed history instrument cannot be unchanged simultaneous marginals of one joint instrument on the common microscopic carrier: the effects fail the sharp-projector commutation test exactly, and the obstruction survives the 319-to-84 coarse-graining (F60). Any valid attachment must be sequential or genuinely layer-changing.

28Y. PSAC-EX5Y: the binary-first sequential detailed-record test

The minimal R4 renewal reopens the history carrier in the chiral rays $\psi_\pm(b_m) = e^{\pm i\pi m/3}/\sqrt{6}$. Applying the existing PFDMI history mark afterwards gives transition probability $K(y|x)/6$ for both branches exactly, so the detailed record branch contrast is 0 and the binary-to-detailed mutual information is 0. Conditioning on the realised transition, the two normalised working states differ only by a global phase: after the first detailed transition the reopened working carrier contains no R4 branch information, and the internal terminal operation, acting on a separate factor, does not restore it in the present factorised source. The original binary ledger is nevertheless preserved whenever later detailed operations act block-diagonally on it: no-overwrite passes while branch-sensitive detailed backreaction fails.

Corollary 6.19 — Sequential Branch-Blindness Theorem.

Binary-first ordering is compatible with record persistence, but the currently executed post-renewal PFDMI law carries zero information about which R4 branch preceded it, the branch difference being erased from the working ray, up to a global phase, at the first detailed transition (F61). Running the existing detailed process for longer cannot generate branch sensitivity erased at the first step.

28Z. PSAC-EX5Z: the binary-ledger backreaction structure

Let Q_+^L and Q_-^L be the orthogonal persistent R4 ledger projectors and $Z_L = Q_+^L - Q_-^L$ the ledger-odd operator. Any future dynamics that both depends on the old record and never overwrites it decomposes exactly as

$$G_{post} = I_L \otimes G0 + Z_L \otimes G1,$$

with all binary-ledger backreaction carried by the ledger-odd working operator G1. The present factorised architecture returns G1 = 0. The detailed edge/type record is itself reversal-even, so one retained token cannot supply the required odd observable; ordered pairs of records do contain the chirality, whose source-populated expectation is the pinned ordered-history value, and the leading symmetry-allowed memory interaction is

$$-g_{L\chi}\, Z_L\, \chi_{future},$$

which preserves the old ledger while allowing the old result to bias future ordered history. Its coefficient is not returned by the current source.

> **Corollary 6.20 — No-Overwrite Backreaction Decomposition.**
>
> Persistent records may influence future dynamics without being overwritten: the branch dependence is uniquely isolated in a ledger-odd working operator G1. The present source returns G1 = 0, while a $-g_{L\chi}\, Z_L\, \chi_{future}$ coupling is symmetry-allowed but unselected.

28AA. PSAC-EX5AA: the post-commitment mixed-source derivative

The presently declared post-commitment action is spectator-factorised in the ledger, and therefore gives the mixed ledger-to-future source derivative

$$B_{L\chi} = 0$$

identically, exact at n = 3, 4, 5 and 6 and on both surviving branches: an algebraic consequence of factorisation, not a small numerical result. The corresponding future-history susceptibility is likewise zero for every finite history under the current factorised law.

> **Corollary 6.21 — Current Post-Commitment Backreaction Zero.**
>
> The current executable action contains no ledger-to-future mixed source at any admitted regulator or branch. This is an exact result for the present action, not a theorem that the completed physical action must have zero memory feedback.

28AB. PSAC-EX5AB: the Fact-Momentum / history-memory kernel test

The wider VERSF history-memory construction contains an explicit causal memory kernel, $M(x, t; x', t') = G_{ret}(x - x', t - t')\, \theta(t - t')$, with accumulated memory field $\Xi = M * \rho_{committed}$ and a generic future response proportional to the memory susceptibility λ_{mem}: generic history-to-future memory exists conditionally, its propagation kernel inherited from the same retarded Φ-field response used by Fact-Momentum. Two qualifications are decisive. λ_{mem} is phenomenological at this stage rather than returned by the microscopic primitive action; and the declared source is the unsigned scalar commitment-event density, so at that grain $\delta\rho_{committed}/\delta Z_L = 0$ and the channel carries that a commitment happened rather than which Fold outcome occurred. Fact-Momentum permits formally signed source strengths, but their sign is not source-identified with the R4 branch or the Fold commitment polarity.

> **Corollary 6.22 — Generic Memory / Outcome-Memory Separation.**

VERSF contains an explicit causal mechanism by which previous commitments may alter later dynamics, but the currently declared scalar memory source records commitment occurrence rather than committed outcome identity (F62). Generic history memory does not by itself close the outcome-record bridge.

28AC. PSAC-EX5AC: Fold commitment polarity and the outcome-sensitive record carrier

The newer Fold Interface Law requires two independent binary structures: the commitment polarity $b \in \{0, 1\}$ and the reversible boundary orientation $\omega \in \{-1, +1\}$. Reversing ω may not change the already committed fact b; the four minimal Fold states (b, ω) carry one informational bit but four physical realisation states. This sharpens the earlier R4 typing: within the exchange-covariant Fold construction the R4 reflection-odd character is $\chi_{b\omega} = (-1)^b \cdot \omega$, not pure b, so the R4 branch may not be silently renamed the Fold commitment polarity (F63). Commitment Requires Cost gives the corresponding record requirement: if $b = 0$ and $b = 1$ are different physical facts, their post-commitment substrate states must differ, $\rho_E^{(0)} \neq \rho_E^{(1)}$, so an outcome-sensitive record carrier is structurally mandatory, without implying orthogonality or specifying microscopic coordinates. The leading-order unique record-current theorem already determines how any record-bearing tensor field is transported: if the two Fold outcomes map to distinct continuum fields $\Phi^{(0)}$ and $\Phi^{(1)}$, their record-current difference follows immediately. What remains unreturned is precisely the embedding $b \mapsto \Phi^{(b)}$. A separate HCMR record-sufficient update demonstrates conditionally that the identities of previously recorded outcomes can alter a later directing law, a law-level completion principle rather than a bare-substrate derivation.

Corollary 6.23 — Outcome-Carrier Necessity Theorem.

Fold commitment polarity is independent of reversible orientation, and physically distinct outcomes require physically distinct post-commitment substrate records, $\rho_E^{(0)} \neq \rho_E^{(1)}$. The continuum record current can transport such a distinction once embedded; the Fold-outcome-to-continuum-field embedding remains open.

28AD. PSAC-EX5AD: the scalar-record sufficiency no-go and the marked-record requirement

The current Single-Source theorem defines the primitive committed record density as the scalar density of irreversible commitment events, $\rho(x, t)$. Consider two histories identical except that a single commitment at the same spacetime location realises $b = 0$ in one and $b = 1$ in the other: their event counts are identical, so their scalar densities coincide exactly, while Corollary 6.23 requires the two realised outcomes to remain physically distinguishable. No observable that is solely a functional of the scalar event-count density can therefore recover which commitment polarity occurred. The minimal candidate enrichment is a marked measure,

$\varrho(dx\ dt\ db)$,

with scalar count marginal $\rho\_count = \rho_0 + \rho_1$ and outcome contrast $\rho\_pol = \rho_1 - \rho_0$, where the mark denotes commitment-outcome contrast only, not reversible orientation, chirality or the R4 combined parity. This is not yet a source-returned replacement for the scalar density; it identifies the minimum information the primitive record object must preserve if the Single-Source architecture is to account for outcome identity without adding a second independent fact-producing source. HCMR supplies the correct bridge criterion: at each regulator and branch there must exist intertwiners ι_nk and π_nk with $\pi\_nk\ \iota\_nk = I$ on the admitted physical record subspace, a left inverse that forces the continuum embedding to preserve outcome identity injectively; the actual intertwiners and their regulator residuals remain open. If the outcome distinction is carried by the master-action tensor field, the decisive return is $\Delta\Phi\_\mu\nu = \Phi\text{^}(1) - \Phi\text{^}(0)$, from which the leading-order record-current difference follows; the current sources do not yet derive it.

Corollary 6.24 — Scalar-Record Sufficiency No-Go.

The scalar density of commitment events cannot by itself encode which Fold commitment polarity occurred (F64). A physically complete single-source record must preserve outcome identity, for example through an outcome-marked record measure or an equivalent typed carrier; the required record-to-continuum embedding remains a primitive open problem, and proposing the marked measure does not itself derive it (F65).

28AE. PSAC-EX5AE: closure, renewal, distinguishability export and finite history capacity

The preceding Gate-T executions establish that a physically distinct commitment outcome must leave a physically distinct substrate record, while the current scalar commitment-event density cannot encode which Fold polarity occurred. PSAC-EX5AE asks a logically prior question: once a distinguishable event has occurred, what does exact renewal itself require if the visible working carrier is returned to its pre-event form? The execution deliberately uses a generic path-to-cycle diagnostic and does not reopen the literal K7 first-loop hypothesis retired by EX5O: the physical K7 precursor remains the already-cyclic C_6 rim and the seventh K7 constraint remains the interior hub (F66). The calculation isolates the universal distinction between cycle birth, renewal and memory.

28AE1. Exact cycle birth. For a connected graph $\beta_1 = E - V + 1$. An open path P_m with m vertices has $\beta_1 = 0$; adding the single endpoint edge produces the cycle C_m with $\beta_1 = 1$, so closure gives β_1: $0 \to 1$ exactly. With B the oriented vertex-edge incidence matrix and $L_1 = B^\dagger B$ the edge Hodge operator, $\ker L_1 = \ker B$ has dimension β_1: trivial for the path, one-dimensional for the cycle, spanned for a consistently oriented cycle by $c = (1, 1, \ldots, 1)^T/\sqrt{m}$ with $Bc = 0$. Closure therefore creates a genuinely new global admissible mode rather than merely changing a continuous geometric parameter.

Corollary 6.25 — Exact Cycle-Birth Spectral Theorem. [exact mathematical theorem]

Closing an open connected path by joining its endpoints raises the first Betti number by exactly one and creates a one-dimensional kernel of the edge Hodge operator: a new cycle sector exactly at closure. This is a generic diagnostic theorem and may not be identified with the microscopic K7 seventh-hub operation, which EX50 has shown is not a first-loop-closing edge (F66).

28AE2. Topology alone does not retain the event. Removing the closing edge gives the sequence P_m → C_m → P_m, so β_1: 0 → 1 → 0 and the cycle projector returns exactly to zero. The final graph is exactly the initial graph. The two histories H_0: P_m → P_m → P_m and H_1: P_m → C_m → P_m have identical final visible geometries, so every observable depending solely on the current graph has the same final value in both. The completed loop is consequently an event, not by itself a persistent record.

Corollary 6.26 — Closure/Record Separation Theorem. [exact mathematical theorem]

A topological cycle can be created and subsequently removed while restoring the original instantaneous geometry exactly. Closure therefore does not by itself imply commitment, persistence or historical memory; permanent fact retention requires an additional record-bearing degree of freedom or equivalent historical carrier. This strengthens rather than changes F48 and F50: neither a nonzero β_1 nor survival of a working tangent is the criterion of record irreversibility.

28AE3. Distinguishability export under complete renewal. Represent two distinguishable pre-renewal alternatives by orthogonal states |L⟩ and |O⟩, with the auxiliary degrees of freedom in $|E_0\rangle$. A literal complete erasure sending both $|L, E_0\rangle$ and $|O, E_0\rangle$ to $|L, E_0\rangle$ cannot be implemented by an injective, reversible or isometric complete evolution, because the input inner product is zero while the output inner product would be one. The most general exact local reset instead sends $|L, E_0\rangle \mapsto$ |L, E_L⟩ and $|O, E_0\rangle \mapsto$ |L, E_O⟩, and inner-product preservation requires ⟨E_L|E_O⟩ = 0: the local geometry may be renewed to the same state only because the distinction has moved elsewhere. The minimum exact record capacity for one binary distinction is one bit.

Corollary 6.27 — Distinguishability-Export Theorem. [conditional physical theorem]

If two pre-renewal alternatives are exactly distinguishable and the complete underlying dynamics preserves distinguishability, then an exact local renewal mapping both alternatives to the same working state must export their distinction to another physical degree of freedom: a binary distinction requires at least two distinguishable external record states (F67). Local renewal may erase the local signature of the event; it may not erase the global distinction under the stated premise. The load-bearing premise is explicit: this theorem does not independently prove that the physical primitive dynamics of VERSF is globally injective at every scale; it states the consequence wherever the admitted complete dynamics has that property.

28AE4. Exact history-capacity growth. Successive independent commitment opportunities carry binary marks κ_j ∈ {0, 1}; after n opportunities a complete history is h =

$(\kappa_1, \ldots, \kappa\_n)$, with $N\_n = 2^n$ possible exact histories. If every history remains mutually distinguishable, the record carrier must contain at least 2^n distinguishable states, dim $H\_record \geq 2^n$, with exact history capacity $C\_n = n$ bits, Hartley information $n \ln 2$, and, for independent events with $P(\kappa = 1) = p$, statistical history entropy $H\_n = n\, h_2(p)$, equal to n bits at $p = 1/2$. This separates available exact distinguishability capacity from the probability-weighted entropy carried by a particular ensemble.

Corollary 6.28 — Exact History-Capacity Growth Theorem. [exact given independent binary history retention]

Exact retention of n independent binary commitments requires at least 2^n mutually distinguishable history states and therefore at least n bits of record capacity; the Hartley information is $n \ln 2$ and the independent-event Shannon entropy is $n\, h_2(p)$. No thermodynamic interpretation is required for either counting result (F69).

28AE5. Persistent fact is not complete history. The append-only existential record $r\_n = \kappa_1 \vee \kappa_2 \vee \cdots \vee \kappa\_n$ has only two possible values, irrespective of n: it retains "at least one commitment occurred" but not the sequence. For constant event probability p, $P(r\_n = 0) = (1 - p)^n$, and the record's entropy $H(r\_n) = h_2(1 - (1 - p)^n) \to 0$ as $n \to \infty$ for every fixed $p > 0$, because the existential statement becomes almost certain. The one-bit OR record may remain permanently set while carrying progressively less statistical uncertainty: persistent memory, but not an accumulating exact history.

Corollary 6.29 — Existential-Record / Full-History Separation. [exact]

A persistent one-bit record of whether any commitment has occurred is not an exact record of the sequence of committed events. Unlimited reuse of such a bit does not evade the history-capacity bound, because it deliberately merges distinct histories (F68).

28AE6. Finite-capacity no-go. Let the exact record carrier possess only D mutually distinguishable states. Injective encoding of all n-bit histories requires $2^n \leq D$, hence $n \leq \lfloor \log_2 D \rfloor$. Once $2^n > D$ the pigeonhole principle forces two different histories to share one record state, and at least one of the following must occur: accessible record capacity expands; distinct histories merge; an earlier record is overwritten or discarded; or new events cease to create independent distinguishable commitments. There is no fifth possibility under exact finite-state retention. The same conclusion follows dynamically: an injective evolution on a finite closed state set is a permutation, so every orbit is eventually periodic, and a strictly increasing exact history coordinate cannot grow without bound on a fixed finite reversible state space.

Corollary 6.30 — Finite Exact-History No-Go. [exact]

A finite distinguishability space cannot support an unlimited sequence of independently distinguishable commitments while retaining every previous history exactly: a D-state exact record carrier retains at most $\lfloor \log_2 D \rfloor$ independent binary commitments before capacity must expand or some historical distinction must be lost (F70). For a finite-dimensional quantum record carrier the same bound follows because a D-dimensional Hilbert space contains at most D mutually orthogonal perfectly distinguishable pure states.

28AE7. Complete local renewal is compatible with global history retention. With record carriers R_1, …, R_n for n completed renewal events, the working system may occupy one identical state $\rho_S = |L\rangle\langle L|$ for every historical sequence, while the record sector carries $\rho_R = \Sigma_h P(h)|h\rangle\langle h|$. The complete post-renewal state can factorise, $\rho_{SR} = |L\rangle\langle L| \otimes \rho_R$, so $I(S : R) = 0$ even though $S(R) = H(h)$, equal to $n\, h_2(p)$ for independent binary events and n bits at $p = 1/2$. The local system need not become progressively more disordered or progressively more correlated with its historical environment: the working carrier can renew completely while the historical distinction accumulates elsewhere. In a purified quantum construction the retained distinction may instead reside in correlations among environmental fragments; the conclusion is unchanged, the growing object being historical information in the record/environment sector rather than final system-record mutual information.

Corollary 6.31 — Local-Renewal / Environmental-History Theorem. [exact construction; conditional physical interpretation]

Complete renewal of the working carrier is compatible with exact historical retention: the renewed local state may be identical for all histories and have zero final mutual information with the record sector, while the external record sector preserves the complete distinguishable history. Irreversibility therefore belongs to retained historical fact, not to a requirement that the current local state permanently display its past.

28AE8. Relation to the outstanding Fold record problem. EX5AE does not derive the missing Fold-outcome record mark; it strengthens the necessity result of EX5AC–EX5AD. Those sections established that different Fold commitment polarities must correspond to physically different post-commitment substrate states, $\rho_E^{(0)} \neq \rho_E^{(1)}$, and that the existing scalar commitment-event density cannot distinguish them. EX5AE adds: if the visible working carrier renews to the same state, the lost distinction must reside elsewhere, under distinguishability-preserving complete dynamics; and repeated outcomes require sufficient physical state capacity to keep the corresponding histories distinct. The remaining primitive question is therefore not whether an outcome-sensitive record is required but which source-derived physical degree of freedom carries it. The candidate marked measure $\varrho(dx\, dt\, db)$ remains a construction until the primitive source returns the finite-regulator record-to-continuum intertwiners and, if the master-action field carries the mark, a nonzero source-derived $\Delta\Phi_{\mu\nu} = \Phi^{(1)} - \Phi^{(0)}$.

PSAC-EX5AE execution verdict. The generic closure/renewal calculation returns a layered result. Exact cycle birth is real, but topology alone is not memory. Exact local renewal can erase every visible local signature of an event, but under injective or isometric complete dynamics the distinction must be exported rather than destroyed. Repeated independent commitments then require growing exact record capacity, 2^n distinguishable states for n binary histories, and no fixed finite carrier can preserve unlimited exact history. Complete local renewal is fully compatible with this accumulation, because the history may reside entirely in the external record sector. These results close a conceptual ambiguity in the Gate-T record architecture and strengthen the necessity of an outcome-sensitive substrate record. They do not close primitive provenance: neither the Fold mark, the marked measure nor the continuum embedding is source-returned by this execution. Gate T therefore remains physically open, with EX5AF now the decisive measurement-side primitive test.

28AF. PSAC-EX5AF: the minimal marked-record carrier and the scalar-continuum no-go

EX5AD established that the scalar commitment-event density cannot distinguish two histories that differ only in the realised Fold polarity. The first question is therefore whether that missing mark can be added without introducing a second primitive fact-producing source. Duplicate the existing six-dimensional scalar commitment carrier only to separate count from polarity, writing the marked carrier as the twelve-dimensional direct sum of a count sector $\rho_0 + \rho_1$ and a polarity sector $\rho_1 - \rho_0$. The scalar carrier presently used by the Single-Source construction is exactly the count projection: rank six, with a six-dimensional kernel consisting precisely of the polarity sector. Consequently the existing scalar continuum embedding, composed with the exact six-plane field intertwiner of EX5T, has rank six and nullity six on the marked carrier: two records with the same scalar profile and opposite outcome mark are mapped to the same continuum state, and no left inverse can exist on the full twelve-dimensional marked space.

Corollary 6.32 — Scalar-Continuum Marked-Embedding No-Go. [exact for the present scalar carrier]

The existing scalar commitment-density continuum embedding annihilates the entire outcome-polarity sector. It cannot be promoted to a complete Fold-outcome record by reinterpretation alone (F71).

A general marked embedding has a count image and a polarity image W_p; injectivity requires the polarity image to have full rank transverse to the count image, the decisive object being the polarity Gram operator $K_p = W_p^\dagger(I - P_{count}^\Phi)W_p$, with injective embedding exactly when $K_p > 0$ on the six-dimensional polarity sector. The current scalar theory has $W_p = 0$.

Corollary 6.33 — Minimal Marked-Carrier Criterion. [exact]

At the full six-profile continuum grain, an outcome-complete record requires a polarity image transverse to the existing count image. The existing six-dimensional scalar carrier has the capacity for commitment occurrence but not commitment identity.

28AG. PSAC-EX5AG: the current master action has zero polarity forcing

Extend the candidate master action formally by a polarity coordinate without adding a new interaction. Since MA1 contains no outcome-polarity variable, every mixed second derivative from polarity into the continuum record field vanishes, both directly and through every existing auxiliary: the effective mixed block after auxiliary elimination is identically zero, the first-order field response to polarity is zero, and all polarity singular values vanish for the candidate action as presently written.

> **Corollary 6.34 — Polarity-Forcing Schur No-Go. [exact for MA1]**
>
> Auxiliary elimination cannot generate Fold-polarity sensitivity when the independent polarity variable is absent from the candidate action. The present MA1 scalar source has zero first-order polarity response (F72). This separates capacity from activation: a larger carrier can mathematically retain a mark without the present action supplying the physical operation that populates it.

28AH. PSAC-EX5AH: relational reconstruction of the commitment polarity

The preceding no-go motivates a more economical possibility. The Fold algebra already contains four atoms and the unique exchange-covariant R4 character $\chi_{b\omega} = (-1)^b \cdot \omega$. Therefore $(-1)^b = \chi_{b\omega} \cdot \omega$ and

$b = (1 - \chi_{b\omega} \cdot \omega)/2$,

a bijection: the commitment polarity need not be stored as a third independent binary variable if the combined R4 character and the independent orientation are both physically retained at the same event. For commuting post-commitment records with R4 projectors and orientation projectors, the two b-sectors are exact products of retained projectors, and the polarity operator is the product of the retained binary observables.

> **Corollary 6.35 — Relational Fold-Mark Reconstruction Theorem. [exact algebraic theorem]**
>
> If the retained R4 record realises $\chi_{b\omega}$ and an independent retained orientation record realises ω, then the Fold commitment polarity is exactly recoverable as their product. No third primitive binary carrier is mathematically required. The remaining problem is physical identification of the two factors, not algebraic existence of b.

28AI. PSAC-EX5AI: history orientation, Fold orientation and the zero-circulation boundary

The source-native IORC orientation mark is $\varsigma \in \{-1, +1\}$. At the abstract symmetry level both ς and the Fold orientation ω carry the same one-dimensional reversal representation, so any normalised equivariant bijection is $\omega = \pm\varsigma$, the sign a global convention. The first-cover circulation is an excellent retained witness of orientation but is not globally binary, because $P(K = 0) = 0.002068529915369 > 0$. On $K \neq 0$, $\mathrm{sign}(K)$ is exactly reflection odd; a binary extension across $K = 0$ exists if and only if reflection acts freely on the zero-circulation history sector, since a reflection-fixed history would require a value equal to its own negative, impossible in $\{-1, +1\}$. Even when the action is free, symmetry alone does not select a unique extension.

> **Corollary 6.36 — Zero-Circulation Binary-Orientation Criterion. [exact]**
>
> A reflection-odd binary extension of $\mathrm{sign}(K)$ across the zero-circulation sector exists exactly when reflection has no fixed history in that sector, and even then is not unique without additional source structure (F73). The source-native binary mark ς, rather than $\mathrm{sign}(K)$, is the cleaner candidate for the Fold-orientation factor.

28AJ. PSAC-EX5AJ: Fold orientation is not activated by the present master action

Fold ω is not a native variable of MA1. A formal Walsh extension in ω may be written, but the present candidate action depends only on the IORC orientation source and contains no Fold-ω entry, so every ω-Walsh component of the action is zero, and eliminating existing auxiliaries cannot generate the missing components.

> **Corollary 6.37 — Fold-Orientation Activation No-Go. [exact for MA1]**
>
> The present candidate master action contains no source-derived Fold-orientation attachment. Abstract equivalence of the IORC and Fold sign representations does not itself constitute the physical carrier map (F74).

28AK. PSAC-EX5AK and EX5AL: closure geometry can carry an odd selector but does not select one

On the nonuniform six-plane of the closure carrier there is no nonzero linear scalar that is simultaneously rotation invariant and reflection odd, and the unit sphere of the carrier is connected, so no continuous map can supply a nonconstant global binary orientation. Nonlinear odd capacity nevertheless exists: in Fourier coordinates an explicit cubic invariant is rotation invariant and reflection odd, defining an orientation away from its zero set. The distinct quadratic closure eigenvalues $\{0.753020396283, 2.445041867913, 3.801937735805\}$ give exact spectral projectors onto the three character planes, but the quadratic response is reflection even and cannot choose the sign of any odd selector: any function of the even quadratic operator alone remains even.

Corollary 6.38 — Even-Operator Odd-Selector No-Go. [exact]

The closure spectrum resolves the three nonuniform character planes but cannot by itself select a reflection-odd binary orientation within any plane. Nonlinear odd capacity exists, but primitive sign selection remains a separate source question.

28AL. PSAC-EX5AN: same-event R4 and history records survive detailed coarse-graining

The completed binary R4 record and the ordered detailed history ledger are distinct carriers whose natural post-commitment joint record arises at the same first completed-record event. The detailed coarse-graining acts only on the history factor, so an already-written binary R4 record survives detailed coarse-graining exactly under the no-overwrite, block-diagonal architecture. The ordered 84-level ledger still reconstructs the first-cover circulation K, so the post-commitment R4 and history observables act on separate factors and commute, and the relational post-record observable is well defined. The pre-commitment R4/PFDMI noncommutation of EX5X does not obstruct this sequential post-commitment coexistence.

Corollary 6.39 — Joint-Record Coarse-Graining Survival Theorem. [exact construction-level result]

The completed R4 binary record and the ordered detailed history record may coexist after commitment without violating the EX5X simultaneous-measurement no-go. Detailed coarse-graining need not erase the separately retained binary completion branch.

28AM. PSAC-EX5AP and EX5AQ: the IORC sign reaches the record response, while selection remains separate

On the canonical closure/record response slice the record coordinate responds to the IORC sign whenever the closure-record coupling is nonzero. On the executed canonical slice the signed record response is $r^\star = 0.578064557803 \cdot \varsigma$, so the two orientation branches are separated in the record-response coordinate by exactly 1.156129115606. The IORC sign is therefore not lost before reaching the record-response coordinate.

Corollary 6.40 — Orientation-to-Record Injectivity Theorem. [exact on the canonical response architecture]

Nonzero closure-record coupling makes the two IORC orientation signs distinct in the record response.

The PFDMI renewal machinery already has exact orthogonal copy capacity once a discrete label has been realised. What it does not supply is the missing map from the signed response coordinate into the terminal binary label: copying and selection are distinct operations.

Corollary 6.41 — Copy/Selection Separation Theorem. [exact typing result]

Exact persistence of an already-realised label does not derive the operation that selects that label from an upstream signed response.

28AN. PSAC-EX5AR through EX5AT: full-mark retention reduces the problem to physical event typing

IORC declares the first commitment mark as C_1 = (outcome, ς), and HCMR renewal preserves the already-defined physical event class while reopening the active carrier. Therefore, if the physical event classes themselves are indexed by the complete mark and their projectors are orthogonal, the orientation marginals are automatically preserved.

Corollary 6.42 — Full-Mark Retention Reduction Theorem. [exact conditional theorem]

If the physical terminal event quotient preserves the full commitment mark (outcome, ς), HCMR retention automatically preserves ς; no separate orientation-copy law is required.

The retained HCMR implementation contains explicitly orientation-resolved marks and an isometric persistence construction. On that implemented mark space the orientation sectors are exactly orthogonal, the binary orientation confusion matrix is exactly the identity, and a Lüders readout has zero disturbance on already-committed orientation records. Any physically admitted terminal readout separating these two sectors forbids the physical quotient from identifying them.

Corollary 6.43 — Orientation-Readout Quotient-Protection Theorem. [exact conditional theorem]

Once the orientation-sector readout is physically admitted, a valid operational quotient cannot merge the two ς-sectors. The remaining physical debts are the final quotient/transport fixed point and maintenance-horizon survival from the primitive source.

28AO. PSAC-EX5AU: the IORC and Fold orientation variables have a unique structural identification

The IORC mark ς and the Fold orientation ω are both binary reversal variables, so their normalised carrier representations are isomorphic sign representations and every invertible equivariant map between them is ω = ±ς, the remaining sign a global convention. The Fold-interface source additionally types ω as traversal/boundary ordering, independent of which domain carries the commitment polarity; the physical theorem therefore requires an actual source-derived attachment from the IORC oriented history degree of freedom to this Fold traversal degree of freedom.

> **Corollary 6.44 — IORC/Fold Orientation Intertwiner Uniqueness. [exact structural theorem]**
>
> Once the IORC and Fold orientation carriers are physically identified, equivariance fixes their binary map uniquely up to global sign reversal. What remains open is carrier attachment, not functional freedom.

28AP. PSAC-EX5AV: the Fold-to-R4 channel contains only one physical gain

Let $(-1)^b$ be the Fold polarity sign and Z_{R4} the realised R4 record. The most general conditional mean is the Walsh expansion in the two binary variables; R4 reflection oddness forces the constant and pure-polarity components to zero, and the Fold exchange symmetry eliminates the pure-orientation component. The complete symmetry-admissible channel is therefore

$$E[Z_{R4} \mid b, \omega] = g \cdot (-1)^b \cdot \omega$$

for a single real gain $g \in [-1, 1]$.

> **Corollary 6.45 — Fold-to-R4 One-Gain Theorem. [exact within the exchange/reflection-covariant class]**
>
> All channel freedom collapses to one real gain g. The required binary direction is uniquely the combined Fold character (F75).

If the Fold-to-R4 operation is deterministic on each resolved Fold atom, the conditional mean takes values in $\{-1, +1\}$, forcing $|g| = 1$, so up to global label reversal the operation is exactly the combined character.

> **Corollary 6.46 — Deterministic Fold-Coarse-Graining Theorem. [exact conditional theorem]**
>
> Any deterministic covariant coarse-graining of the four resolved Fold atoms into the sharp R4 binary record is necessarily the combined character. The unique R4 PVM and minimal completion gate therefore leave only activation provenance open.

28AQ. PSAC-EX5AW: the current candidate master action gives zero Fold-to-R4 gain

MA1 contains the closure, bath, fermion and IORC orientation variables but no independent Fold commitment polarity b, so any action-derived quantity is insensitive to flipping b while holding the existing variables fixed. The discrete Walsh coefficient of any MA1-

derived response in the required combined-character direction is therefore zero, for every existing auxiliary set, exactly:

$g_{MA1} = 0.$

Corollary 6.47 — Missing-Polarity Walsh No-Go. [exact for MA1]

The current candidate master action cannot activate the combined Fold character into R4, because it contains no dependence on the independent Fold polarity; Schur elimination and nonlinear response of the existing variables cannot manufacture a binary dependence absent from the action's domain. This agrees with the exact current-source ledger-to-R4 gain zero and is a result about MA1, not a theorem that the final physical gain must vanish. The lowest-order symmetry-compatible missing attachment has fixed form; its primitive provenance and coefficient are not returned and may not be inserted merely to repair the zero (F76).

28AR. PSAC-EX5AX: Fold geometry already contains the missing polarity observable

The Fold-interface geometry removes an important ambiguity. Closing the commitment curve on the minimal Fold interface produces two intrinsic complementary domains, and the Fold-interface law identifies commitment polarity with which domain receives committed status, traversal orientation being an independent boundary-ordering binary variable. On the four Fold atoms define the commuting observables

$S_b = P_{(0,+)} + P_{(0,-)} - P_{(1,+)} - P_{(1,-)}$, $O_\omega = P_{(0,+)} + P_{(1,+)} - P_{(0,-)} - P_{(1,-)}$.

Their product is

$J_{Fold} = S_b\, O_\omega = \chi_{b\omega}$,

with eigenvalue $(-1)^b \cdot \omega$ and spectral projectors $P_{(0,+)} + P_{(1,-)}$ and $P_{(0,-)} + P_{(1,+)}$, exactly the structural R4 sectors of EX5H.

Corollary 6.48 — Intrinsic Fold Polarity Operator Theorem. [exact on the four-atom Fold carrier]

Commitment polarity, traversal orientation and their combined R4 character already exist as commuting observables of the same Fold commitment carrier. No additional primitive binary degree of freedom is required at the Fold level, and no second primitive fact-producing source is added: S_b is a derived observable of the same commitment event (F77). The unresolved problem moves entirely to the Fold-to-continuum and Fold-to-R4 physical attachments.

28AS. PSAC-EX5AY: exact Whitney construction of an injective Fold-record continuum bridge

Take a Fold-adapted triangulation of the interface, with the commitment curve represented as a one-dimensional subcomplex. Fix a domain-polarity cochain, positive on one Fold domain and negative on the other, and a fixed oriented boundary cochain, and represent the four Fold records by their signed pair. With W the Whitney map and R the simplex-integration map, standard Whitney theory gives R W = I on cochains. Define the continuum embedding

$\iota_W(b, \omega) = (-1)^b \cdot (\text{polarity 2-form}) + \omega \cdot (\text{boundary 1-form})$,

and on the two generated continuum lines define the paired integration functionals π_W. Then $\pi_W \iota_W = I$ on all four Fold states: the continuum construction is injective. Polarity and orientation occupy different graded sectors, a 2-form and a 1-form, so silent conflation is impossible; by Hodge duality on the oriented two-surface the polarity 2-form may equivalently be represented as a signed scalar domain field.

> **Corollary 6.49 — Fold Whitney Left-Inverse Theorem. [exact mathematical construction]**
>
> An adapted cellular Fold record admits an explicit cochain-to-form embedding with a left inverse. The four Fold realisation states remain exactly distinguishable at the continuum-record level of the construction (F78).

Only two real continuum directions are required to carry the two already-realised classical Fold bits faithfully; one real line can retain the combined R4 character alone but cannot retain b and ω independently.

> **Corollary 6.50 — Two-Direction Minimum Record Theorem. [exact]**
>
> A faithful linear classical continuum record of the two independent Fold labels requires at least two real directions, and two suffice. This does not contradict the four-complex-dimensional minimum for the full reversible Fold state space: the latter is pre/post-commitment reversible state structure, while the former is the minimum post-commitment classical record image. The construction satisfies the formal HCMR left-inverse requirement; it is not yet the physical HCMR/MA1 bridge, the specific lift compatible with the actual physical refinement system remaining unreturned.

PART V-B — CONTINUED MARKED-RECORD, SAME-EVENT ACTIVATION AND RECORD-BACKREACTION EXECUTIONS

28AT. PSAC-EX5AZ: projection onto the current MA1 record carrier

Let the minimal post-commitment Fold record span the independent Fold-polarity direction and the orientation direction. The current MA1 action contains no b-dependence, whereas its canonical IORC/record response is $r\star = 0.578064557803 \cdot ς$. Under the structural identification $\omega = \pm ς$, the Fold-record Jacobian therefore has canonical form diag(0.578064557803, 0) up to ordering of source and target basis conventions: rank one, nonzero singular value 0.578064557803, second singular value 0, nonzero Gram eigenvalue $0.578064557803^2 = 0.334158632987978$.

Corollary 6.51 — Current MA1 Fold-Record Rank-One Theorem. [exact for the present action]

The present MA1 record response has rank one on the two-direction Fold-complete classical record: the orientation direction is represented, while the independent commitment-polarity direction lies exactly in the kernel.

Corollary 6.52 — Current-Action Fold Left-Inverse No-Go. [exact]

No left inverse exists from the current MA1 record image back to the complete Fold record. Carrier capacity outside MA1 does not repair the missing source column.

28AU. PSAC-EX5BA: tensor, pointer and common-write audit

Passing from the scalar record density to the full symmetric tensor field does not by itself recover commitment polarity: the tensor parent possesses additional trace-free capacity, but if the field is a deterministic functional solely of the unsigned scalar count, two Fold histories with identical counts produce identical tensors.

Corollary 6.53 — Scalar-to-Tensor Mark No-Go. [exact]

Tensorial enlargement of a field constructed solely from an outcome-blind scalar source does not restore the missing outcome mark (F79).

For the four sharp Fold atoms, the rank-one commitment instrument has Kraus rank four, so its minimal Stinespring environment has dimension four, with an exact dilation whose pointer states are the four atom labels.

Corollary 6.54 — Fold Stinespring Pointer Theorem. [exact]

Exact microscopic retention of the four resolved Fold atoms requires four mutually orthogonal pointer states in a minimal pure Stinespring realisation.

A finite-shift Gaussian bath with common positive covariance cannot supply those perfectly distinguishable pointers: every pair of finite-mean-shift full-support Gaussians has nonzero overlap.

> **Corollary 6.55 — Full-Support Gaussian Pointer No-Go. [exact]**
>
> A nonsingular full-support Gaussian pointer with finite mean shifts cannot provide exact orthogonal Fold records (F80). Exact records require a singular/noiseless direction, a discrete factor, or an additional quantum pointer sector.

The wider memory-kernel construction nevertheless supplies the correct causal architecture: the existing insertion records occurrence rather than outcome, but the missing Fold-to-R4 write and the missing record-to-future backreaction both occupy the same scalar symmetry channel.

> **Corollary 6.56 — Write/Backreaction Common-Channel Theorem. [structural]**
>
> A single marked record kernel could in principle generate both same-event outcome writing and later branch-sensitive backreaction; the present source returns the occurrence channel but not the required outcome mark.

28AV. PSAC-EX5BB through EX5BD: Fold-domain tensor and continuum installation

The Fold geometry itself supplies a natural polarity-odd tensor. With m_b the signed domain indicator on the minimal Fold surface, define the trace-free Hessian

$$H_{ab} = D_a D_b m_b - (1/2) \gamma_{ab} \Delta m_b.$$

It is odd under polarity reversal and even under traversal-orientation reversal, and within the local intrinsic class it is the lowest-derivative nontrivial symmetric trace-free tensor carrying pure Fold polarity: zeroth-order polarity tensors are pure trace, and first derivatives are vectors.

> **Corollary 6.57 — Fold-Domain Polarity-Tensor Theorem. [exact construction]**
>
> The intrinsic Fold domain assignment supplies a symmetric, trace-free, polarity-odd and orientation-even tensor direction without introducing a second primitive fact.
>
> **Corollary 6.58 — Minimal Fold Polarity-Tensor Uniqueness Theorem. [exact within the stated local class]**
>
> The trace-free Hessian is the lowest-derivative intrinsic symmetric tensor carrying the polarity mark.

A four-dimensional distributional pushforward can be written along the Fold embedding, but physical installation is not automatic. At zero record background the leading record-current equation requires the divergence of the trace-free perturbation to vanish; intrinsically that divergence is generically nonzero for the domain indicator, and the unsmoothed sign field also produces distributional derivatives and an ill-defined kinetic action without regularisation.

Corollary 6.59 — Vacuum Fold-Hessian Conservation No-Go. [exact at leading order under regular TPB]

The minimal Fold polarity Hessian cannot be installed as an isolated infinitesimal zero-background record mode under the current leading record-current law (F81).

For a nonzero background the linear condition becomes a background-dependent kernel condition, and the perturbation amplitude multiplies the whole residual.

Corollary 6.60 — Background Polarity Amplitude-Cancellation Theorem. [exact]

A nonzero amplitude cannot repair a polarity direction that fails the background linearised field equation; the direction must itself lie in the kernel of the linearised operator (F82).

For an isotropic trace background, the tensor source derivative acts diagonally on symmetric trace-free perturbations under the isotropic TPB premise, without generating the required vector-source response. (The full statement of this diagonal action arrived stripped in transit and is reconstructed here at its contract grade.)

Corollary 6.61 — Isotropic Background STF Susceptibility Theorem. [conditional exact]

Under the isotropic TPB premise the background tensor response is diagonal on the symmetric trace-free sector and supplies no new equivariant vector structure.

Corollary 6.62 — Isotropic-Background Fold-Hessian No-Rescue Theorem. [conditional structural]

A purely isotropic local background supplies no new equivariant vector map capable of cancelling the generic Fold-Hessian divergence.

The two polarity branches have identical residual norms, $m_b \to -m_b$ flipping the sign of the linear residual.

Corollary 6.63 — Polarity-Branch Degeneracy Theorem. [exact]

The surviving continuum escape is an anisotropic or inhomogeneous source-returned background response, not amplitude fitting.

28AW. PSAC-EX5BE through EX5BH: fact-separating Single-Source and the minimal complete mark

The literal scalar form of the Single-Source theorem now encounters an exact information-theoretic obstruction. Two histories with identical scalar event-count densities but opposite physical Fold polarity are physically distinct, yet if every physical observable factors solely through the scalar density, no observable can distinguish them.

Corollary 6.64 — Scalar Single-Source Factorisation No-Go. [exact]

If two physically distinct Fold outcomes occur at the same spacetime event, physical observables cannot all factor through the unsigned scalar event-count density.

Corollary 6.65 — Scalar-Marginal Data-Processing No-Go. [exact]

The mutual information between the scalar marginal and the Fold polarity is zero for the constructed pair, and no downstream processing of the scalar marginal can recover the polarity.

This does not require a second primitive source; it requires the single primitive source itself to be a fact-separating marked configuration, with the scalar count density only a marginal.

Corollary 6.66 — Fact-Separating Primitive-Source Necessity Theorem. [exact]

The primitive fact-producing source must separate physically distinct committed facts (F83).

Corollary 6.67 — Single-Source Mark-Lift Theorem.

Single-Source uniqueness is compatible with Fold outcome identity exactly when the primitive source is the full marked commitment configuration rather than its outcome-blind scalar marginal.

IORC already has the correct two-slot first-mark type, C_1 = (outcome, ς), but the outcome slot remains physically untyped. If that slot carries the R4 sign r, reflection covariance fixes the Fold-polarity quotient uniquely up to global bit reversal.

Corollary 6.68 — R4/IORC Fold-Polarity Quotient Uniqueness Theorem. [conditional exact]

With the IORC outcome slot physically identified as the R4 sign, the Fold-polarity reading of the first mark is unique up to global bit reversal (F84).

The existing detailed mark alphabets do not supply that R4 sign automatically: in the HCMR residual alphabet, reversal acts only on the orientation sign, so every odd binary character factors through orientation with no source-returned nontrivial second binary; and the current PFDMI detailed ledger contains zero R4 information after the executed branch-blind renewal, so deterministic regrouping cannot create any.

Corollary 6.69 — HCMR Residual-Label R4 No-Go.

The HCMR residual alphabet contains no source-returned R4 sign.

Corollary 6.70 — HCMR Odd-Character Factorisation Theorem.

Every reversal-odd binary character of the HCMR residual alphabet factors through the orientation sign.

Corollary 6.71 — PFDMI Binary-Character Data-Processing No-Go.

No deterministic regrouping of the branch-blind PFDMI detailed ledger can create R4 information absent from it.

Corollary 6.72 — Full-Mark Persistence Non-Selection Theorem.

Persistence of the full mark does not by itself select the physical typing of its outcome slot.

The minimal complete record is (r, ς), four states, and with convention signs it is exactly bijective with the Fold pair (b, ω): r realises the combined character and ς the orientation, so $b = (1 - r \cdot ς)/2$ with inverse $r = (-1)^b \cdot ω$.

Corollary 6.73 — Fold/R4-IORC Bijection Theorem. [exact]

The Fold coordinates (b, ω) and the minimal record coordinates (r, ς) are exactly bijective once the physical orientation attachment is supplied, up to global sign conventions.

Corollary 6.74 — Minimal Fold-Complete Record-Mark Theorem. [exact]

Four distinguishable record states are necessary and sufficient to retain the two independent Fold binary structures; (r, ς) saturates that minimum.

28AX. PSAC-EX5BI through EX5BK: same-event joint completion and the one-gain first-cover channel

On the joint record carrier the four sharp effects formed from the R4 pair and the orientation pair constitute the unique joint sharp PVM of the two commuting binary records.

Corollary 6.75 — Minimal Joint R4/Orientation Record-PVM Theorem. [exact]

The joint sharp completion PVM of the commuting R4 and orientation records is unique: its four effects are the products of the respective projectors.

Pulling the joint record back to the four Fold atoms gives, in the reference convention, a minimal pure-record instrument writing (r, ς) per commitment event.

Corollary 6.76 — Four-State Minimal Joint Completion Theorem. [exact construction]

A unique minimal four-outcome joint R4/orientation completion instrument exists at construction level.

Corollary 6.77 — Joint-Completion Marginal Obstruction. [exact logical consequence]

A physical joint instrument would necessarily contain a physical R4 marginal; because primitive R4 activation remains unreturned, same-event physical joint activation remains open.

The first-cover endpoint audit then gives an exact separation between history and instantaneous carrier. First cover returns the walker to its starting wheel state; on every rim basis state the squared overlaps with the two chiral R4 rays are equal (each 1/6), and both vanish at the hub. Therefore every diagonal classical wheel endpoint distribution yields exactly equal R4 populations.

Corollary 6.78 — First-Cover Endpoint R4-Neutrality Theorem. [exact]

The instantaneous state at first cover contains zero R4 population contrast even when the complete history arriving there has overwhelming circulation bias.

Corollary 6.79 — First-Cover History/Endpoint Separation Theorem. [exact]

The orientation lives in the completed history rather than the returned wheel position; passive endpoint projection cannot perform the required same-event R4 write (F85).

The complete symmetry-respecting readout from the three circulation sectors $\{K > 0, K = 0, K < 0\}$ is then uniquely the one-parameter family assigning opposite biases to the two signed sectors and the unbiased output $I/2$ to the zero sector.

Corollary 6.80 — First-Cover Covariant Readout Uniqueness Theorem. [exact within the sector-sufficient class]

Reflection covariance and sector sufficiency reduce the first-cover-to-R4 readout to a single one-parameter family.

Corollary 6.81 — One-Coefficient First-Cover Activation Theorem. [exact classification]

Every admissible first-cover R4 population channel is determined by one gain $g_{cover} \in [-1, 1]$ (F86).

Corollary 6.82 — Zero-Circulation Neutrality Theorem. [exact]

The zero-circulation sector is necessarily read as unbiased.

For the executed first-cover law the ensemble response is

$E[Z_{R4}] = \delta_K \cdot g_{cover} = 0.995570059549810 \cdot g_{cover}$,

so even a perfect sign-only readout obeys $|E[Z_{R4}]| \leq 0.995570059549810$.

Corollary 6.83 — Sign-Only Polarisation Ceiling. [exact]

The first-cover R4 polarisation is bounded by the source bias; the present action has g_cover = 0.

28AY. PSAC-EX5BL: marked Doob–Kraus provenance

The PFHBA Doob construction supplies the unmarked stochastic kernel but does not determine the physical marked decomposition: for any fixed unmarked kernel and any gain in the admissible interval, one may construct a reflection-covariant marked splitting reproducing exactly that unmarked kernel while realising that chosen gain.

Corollary 6.84 — Unmarked-Doob R4-Gain Non-Identifiability Theorem. [exact]

The full unmarked first-cover Doob kernel is compatible with a continuum of different physical R4 gains. The missing information lies in the source-derived marked amplitudes, not in further manipulation of the unmarked probability kernel.

28AZ. PSAC-EX5BM through EX5BN: R4 carrier identity and the conditional closure-load gain

The Reflection-Scope Fold-access doublet and the GPU/R4 completed doublet are not merely isomorphic: both are the same rim Fourier pair, GPU's earlier notation labelling its wheel-Laplacian eigenvalue rather than a distinct representation. Up to global interchange of output names the two projector pairs are identical.

Corollary 6.85 — Fold-Access/R4 Projector Identity Theorem. [exact]

The Reflection-Scope Fold-access PVM and the GPU/R4 completed PVM are the same physical projector pair up to output-label exchange.

Corollary 6.86 — Reflection-History/IORC-Orientation Non-Identification. [exact scoping result]

The Reflection-Scope history sign and the IORC ς share binary reversal type, but their physical identity is not source-returned.

The Reflection-Scope binary readout has exactly the one-parameter EX5BK form. However, the previously calculated Green-function coefficient J is a record-record coupling, whereas the readout requires a record-access coupling; the displayed action contains the former vertex but no access variable from which the latter could be derived.

Corollary 6.87 — Record/Access Coupling Type-Separation Theorem. [exact for the current source]

Setting the record-access coefficient equal to the record-record coupling J is not a derivation (F87).

A later closure-norm calculation supplies a better-typed access coefficient: under the scalar marginal-load identification the R4-visible coefficient is

$$h_\delta = \Lambda_c \cdot N \cdot g^2/6 \cdot [\, 2/(M_\kappa^2 + \eta) + 1/(M_\kappa^2 + 4\eta) \,],$$

strictly positive and non-degenerate, with the correctly typed relation $h_\delta = \Lambda_c \cdot N \cdot J$.

Corollary 6.88 — Marginal Closure-Load R4 Projection Theorem. [conditional exact]

Under the marginal-load identification the R4-visible closure coefficient is strictly positive with the displayed closed form.

Corollary 6.89 — Carrier/Readout Coupling Relation. [conditional exact]

The record-access coefficient is $\Lambda_c N$ times the record-record coupling, not the coupling itself; if the access state is additionally the Gibbs/maximum-entropy state generated by the closure-norm operator, the resulting gain is positive after the history-coordinate identification. The positivity of this conditional route is exact; its primitive provenance is not.

28BA. PSAC-EX5BO: marginal-load provenance audit

The primitive Yukawa source identifies the closure-norm operator as the positive closure-stabilisation cost operator, but does not return the realised-record-dependent operator $H_c(m)$ or its first derivative. The most general first-order Hermitian reflection-covariant response on the R4 doublet contains an identity part and a Z part; positivity constrains only locally and does not force the Z coefficient nonzero, so a purely identity response is structurally allowed while producing zero R4 population readout.

Corollary 6.90 — Closure-Norm Record-Response Non-Identifiability Theorem. [exact]

Hermiticity, positivity, reflection covariance and the structural Yukawa identification do not determine the R4-visible coefficient h_δ. The marginal-load step is a genuine physical premise, not a consequence of those constraints. The missing primitive object is dH_c/dm at the vacuum, equivalently the source-level mixed record-matter jet.

28BB. PSAC-EX5BP: primitive record–matter mixed-jet and factorisation no-go

The current MA1 action has a fermion block containing no terminal-record coordinate, and a separate history-odd source; its record–Yukawa mixed third derivative is therefore identically zero.

Corollary 6.91 — Current-MA1 Record–Yukawa Mixed-Jet No-Go. [exact for MA1]

MA1 contains no record-dependent fermion/Yukawa block; its record-matter mixed jet is identically zero.

The later PFDMI-EX2A construction is genuinely field dependent: its terminal-record derivative has rank five. But that dependence acts as a left-unitary record factor, which cancels from every POVM effect (the effects being of the form L†L) and, under the record trace, from the reduced CAR/Fock channel, the latter using the separate shared-link factor.

Corollary 6.92 — Unitary Record-Derivative/Population-Decoupling Theorem. [exact for EX2A]

A nonzero amplitude derivative of a left-unitary record factor need not produce any probability response (F88).

Corollary 6.93 — EX2A Terminal-Record/Matter Factorisation No-Go. [exact]

The reduced matter channel of PFDMI-EX2A is exactly independent of every terminal-record direction, whichever linear combination is later identified with R4.

Corollary 6.94 — Current Primitive Record-to-Matter Backreaction No-Go. [exact for the two currently explicit primitive routes]

MA1 lacks a record-dependent fermion/Yukawa block, while EX2A confines its record dependence to an output-side local unitary that disappears from the reduced matter channel. Neither currently explicit primitive construction realises the conditional marginal-load backreaction of EX5BN. This is a current-route negative, not a prohibition on a later nonfactorising primitive instrument.

PART V-C — POST-COMMITMENT HISTORY, ADMISSIBILITY AND CONTROLLED RENEWAL

28BC. PSAC-EX5BQ: support-changing PFDMI refinement remains history spectator

PFDMI-EX2B genuinely changes primitive support: its seven central support projectors select representation/completion sectors rather than merely multiplying an already fixed instrument. The decisive audit is whether those projectors acquire any dependence on an already-retained terminal record. They do not: they are fixed from the frozen commuting representation algebra and completion grade, and the old ledger remains a spectator factor. Consequently the reduced matter/readout channel has zero derivative with respect to the previous ledger through the EX2B support refinement, and the same conclusion survives the presently executed later PFDMI support refinements: support can change by representation type without changing according to which previous fact occurred.

Corollary 6.95 — Support-Change / History-Spectator Separation Theorem. [exact for the current PFDMI refinement]

A primitive instrument may change support while remaining exactly independent of the retained historical record. Support change by itself is not history backreaction (F89).

Corollary 6.96 — Current Support-Refinement Ledger-Response No-Go. [exact]

The presently executed PFDMI support-changing route returns zero old-ledger derivative on the reduced matter/readout channel. The record-matter no-go of EX5BP survives the first support-changing refinement.

28BD. PSAC-EX5BR: minimal ledger-current interaction classification

The most economical no-overwrite interaction capable of making a retained binary record projectively visible to the future current is bilinear in the immutable ledger-odd operator Z_L and a Hermitian operator H_R acting on the physical current carrier; because the ledger enters only through Z_L, the interaction commutes with the old record projectors and does not overwrite the fact. Projective visibility requires H_R to act nontrivially on the occupied current ray, equivalently nonzero variance of H_R on the normalised current state; if H_R is proportional to the identity on the occupied support, the interaction changes only an overall phase and is projectively invisible. The existing source returns no physical H_R; in the currently declared factorised action the record-controlled operator is zero.

Corollary 6.97 — Minimal No-Overwrite Ledger-Current Coupling Classification. [exact classification]

Any minimal bilinear record-controlled current coupling can preserve the old fact while affecting the future; projective visibility requires nonzero variance of its current operator on the occupied ray.

Corollary 6.98 — Current Provenance Boundary.

The present primitive source does not return the required record-controlled Hermitian current operator. Classification proves constructibility, not activation.

28BE. PSAC-EX5BS: immediate-past phase-survival diagnostic

HCMR defines a post-commitment availability projector but does not return the physical projector required to evaluate survival of the old continuous HX1 phase. Using the source-derived same-action closure/record Hessian on the canonical unit branch, the branch-odd GTC reference amplitude, and a conditional partial-survival model in which the old/present mixed block is scaled by $s_{old} \in [0, 1]$, stationarity gives the conditional present-branch separation

$\Delta q = (\pi/9) \cdot s_{old}$.

This is a response theorem conditional on survival; it does not determine the survival coefficient. A canonical two-mode Gaussian quantisation of this Hessian is entangled for every nonzero surviving mixed coupling, but that result is a diagnostic model only and does not establish physical temporal entanglement in VERSF.

Corollary 6.102 — Immediate-Past Conditional Present-Response Theorem. [conditional exact]

If an old branch-odd phase component survives the commitment boundary with amplitude s_old, the canonical same-action present response separates by $(\pi/9) \cdot$ s_old.

Corollary 6.104 — Canonical Sliding-Window Gaussian Entanglement Theorem. [diagnostic conditional]

The canonical unit-kinetic Gaussian model is entangled for every nonzero surviving mixed coupling; physical temporal entanglement remains unproved.

28BF. PSAC-EX5BT: commitment-tangent projector reconstruction

For the selected uniform-rim HX1 phase mode, none of the currently published explicit commitment, persistence or no-overwrite constraints acts on that continuous phase direction: within the explicitly returned constraint set the survival coefficient is exactly one. This is not the physical survival theorem, because a further physical cut is unreturned: both a no-cut extension and a phase-removing extension of the constraint matrix preserve all currently explicit discrete record facts.

Corollary 6.105 — Explicit-Commitment-Constraint Old-Phase Survival Theorem. [exact within the published constraint set]

The explicit returned commitment constraints do not remove the selected HX1 phase tangent.

Corollary 6.106 — Post-Commitment Phase-Survival Non-Identifiability Theorem. [exact]

The published discrete commitment constraints alone do not determine the physical old-phase survival coefficient (F90).

28BG. PSAC-EX5BU: primitive phase-cut census

Every returned primitive support/completion mechanism was differentiated along the selected uniform-rim phase direction. For the full FCHI product instrument, the retained continuous field enters through an identity factor, so its hard terminal cut is zero. In PFDMI-EX2A the record phase is a left-unitary factor: amplitudes change, but effects and support do not. EX2B’s central support projectors are fixed independently of the phase. In MASD, a pure phase variation leaves the local Gram operators invariant on a rank-stable branch, and the completion stretch is likewise unchanged. Record-composition and bond-compatibility defects do see the phase and generate the nonzero soft Hessian, but this is dynamical stiffness, not a hard post-commitment tangent cut. Every explicit hard-cut component presently returned is zero; the missing entry is the primitive full-carrier commitment gate acting on the old phase.

Corollary 6.108 — MASD Pure-Phase Support-Invariance Theorem. [exact on a rank-stable branch]

Pure HX1 phase does not change the MASD occupied-support projector.

Corollary 6.109 — Completion-Stretch Phase-Blindness Theorem. [exact]

The MASD completion strain carries no first-order hard cut on the pure phase tangent.

Corollary 6.110 — Soft-Response / Hard-Cut Separation Theorem. [exact typing result]

Nonzero phase stiffness or phase-present coupling does not imply destruction of the phase degree of freedom at commitment.

Corollary 6.111 — Returned Primitive Phase-Cut Census Theorem. [exact current-corpus result]

Every explicit hard-cut component presently returned is zero; the physical full-carrier commitment cut remains open.

28BH. PSAC-EX5BV: commitment handoff and phase-memory retyping

The earlier VERSF papers impose a necessary correction on the temporal-survival picture. The unresolved global pre-commitment mode is resolved by commitment; it may not simply be renamed the post-commitment memory carrier. The correct typing separates the unresolved relation, the immutable committed fact, and any downstream memory/phase residue. Outcome-specific commitment additionally requires physically distinguishable post-commitment states, and the older phase-memory programme is a separate structure carrying accumulated commitment/transport residue rather than the binary identity of which Fold outcome occurred.

Corollary 6.112 — Pre-Commitment Entanglement / Post-Commitment Memory Type-Separation Theorem.

The unresolved pre-commitment relation and any post-commitment memory residue are not the same physical object merely because one can descend from the other (F91).

A minimal abstract carrier retaining both a binary outcome and an independent seven-valued commitment residue exists as a classification, but the source does not select a physical memory. The older history-memory law already permits generic past-to-future influence, but its scalar committed-event source is outcome blind.

Corollary 6.115 — Generic-Memory / Outcome-Backreaction Factorisation Theorem. [exact at the declared scalar-memory grain]

History dependence may be nonzero while the Fold-outcome derivative remains zero if the memory source records occurrence but not outcome identity.

28BI. PSAC-EX5BW: ordered-history continuation-cone test

Take the shortest oriented histories, forward and reversed. The frozen history law strongly distinguishes them: their probability ratio is

$46.3399499471 = e^{(4\alpha\star)}$,

the exponential of four one-Bit affinities. Nevertheless the D36 transition law is first-order Markov on the current wheel state: every rim state has the same hub, self, clockwise and anticlockwise continuation types, related by rotation, and after projecting to the rotation-invariant R4/Fold-odd continuation grain the two continuation cones coincide, even their next R4-visible probability laws being identical.

Corollary 6.116 — Ordered-Chirality / Continuation-Backreaction Separation Theorem. [exact for the frozen D36/PFDMI law]

A strongly reversal-asymmetric retained history may nevertheless have a history-blind future continuation law (F92).

Corollary 6.117 — Operator-Proxy Non-Promotion Theorem.

A nonzero ordered-history operator or commutator cannot be promoted to physical history backreaction unless it changes the admissible continuation cone.

28BJ. PSAC-EX5BX: primitive support-update commutator

The current PFDMI and MASD support projectors remain order blind: the EX2B projectors are fixed representation projectors, while the MASD terminal Gram contribution depends on the set of occupied addresses rather than their order. The older topological fact-formation law contains a different mechanism. A fact may trap a cycle resource so that later admissible moves must preserve the trapped structure: for overlapping cycles there exist local commitment operations whose one ordering leaves the second operation's cycle available while the reverse ordering destroys it. Commitment updates therefore need not commute as admissibility operations, and the future continuation projector after one ordering differs from the other.

Corollary 6.119 — Overlapping-Cycle Commitment Order Theorem. [construction-level under the topological fact model]

Fact-producing topological updates need not commute as admissibility operations (F93).

Corollary 6.120 — Topological-Admissibility / PFDMI-Descent Gap Theorem.

VERSF's fact topology can make future support history dependent, while the currently executed PFDMI/MASD renewal does not yet transport that restriction into its working projector.

28BK. PSAC-EX5BY: trap-to-admissibility-support descent

The History-Measure construction supplies the appropriate formal landing space: its admissibility matrix marks exactly the admissible elementary VERSF updates between complete finite-regulator configurations. For the minimal trap witness, a continuation is available before trapping and unavailable afterwards, so the committed trap produces a nonzero change in the source-defined admissible-move support: for a single removed orthogonal continuation,

$\Delta\Pi\_adm = -|z\_B\rangle\langle z\_B|$,

rank one and operator norm one.

Corollary 6.121 — Topological-Trap / Admissibility-Support Descent Theorem. [exact construction-level]

A committed trap produces a nonzero change in the source-defined admissible-move support.

The MASD occupied-carrier projector is differently typed, and the scalar committed-event density may not be identified with MASD's internal carrier; the source returns no explicit trap-to-working-support map.

Corollary 6.123 — Two-Support Descent Boundary Theorem.

Topological commitment acts on admissible-move support; its action on the local MASD/PFDMI working support remains unreturned (F94).

28BL. PSAC-EX5BZ: admissibility-to-working-carrier intertwiner no-go

The current renewal isometry reopens the same full working support for every retained history, while EX5BY gives history-dependent admissibility supports. Suppose a fixed intertwiner obeyed the continuation-faithfulness condition for both histories; subtracting the two conditions forces it to annihilate the support difference, and for the rank-one witness that means annihilating exactly the continuation direction whose availability distinguishes the histories.

Corollary 6.124 — Fixed-Intertwiner Continuation-Faithfulness No-Go. [exact]

No fixed map from history-dependent admissibility support into the presently history-independent working support can preserve every continuation-visible distinction (F95).

The existing F2F edge-label map displays the same problem independently: the reversal-odd directed-edge sector lies in its kernel, so ordered history retains information which the single-token descent discards.

Corollary 6.125 — Admissibility/Working-Support Descent No-Go.

The current fixed label-preserving PFDMI renewal cannot be the continuation-faithful descent of the topological admissibility law.

28BM. PSAC-EX5CA: history-controlled renewal existence and minimality

The preceding no-go is architectural, not a consistency obstruction. For each retained history h with admissible continuation projector Π_h, choose partial isometries J_h routing the admissible directions to the active carrier and D_h routing the excluded directions to an orthogonal discarded carrier, with orthogonal output ranges. Then

$$V_h = J_h \Pi_h + D_h (I - \Pi_h)$$

is an exact isometry with active-output pullback $V_h^\dagger P_A V_h = \Pi_h$, and the ledger-controlled assembly $V_{ctrl} = \Sigma_h P_h^L \otimes V_h$ is again an isometry preserving every already-written history projector exactly.

Corollary 6.127 — Admissibility-to-Active-Support Isometric Realisation Theorem. [exact construction]

Every history-conditioned admissibility projector can be implemented by routing admissible directions to the active carrier and excluded directions to an orthogonal discarded carrier (F96).

Corollary 6.128 — History-Controlled Renewal No-Overwrite Theorem. [exact]

History-dependent active support is compatible with exact quantum nondemolition retention of the old ledger.

A rank-r support loss requires an inaccessible output carrier of dimension at least r, and this bound is sufficient; the minimal EX5BX witness requires exactly one inaccessible direction, and if the discarded sector is traced away the rank-one work-only channel has minimal Stinespring environment dimension two. No fitted numerical coupling is required: the history dependence resides entirely in the support projector.

28BN. PSAC-EX5CB: topological discarded sector and PFDMI export fibre

PFDMI-EX2D already contains an orthogonal record/export dilation with twelve independent export directions. The export fibre preserves norm and may preserve the committed branch label, so it has the same minimal conservation role as the topological discarded sector: excluded distinguishability is exported rather than annihilated, and the twelve-dimensional capacity is more than sufficient for the rank-one discarded continuation.

Corollary 6.131 — PFDMI Export-Capacity Sufficiency Theorem. [exact construction-level]

No new output carrier is required to house the minimal topologically discarded direction (F97).

There is nevertheless no source-derived identification of the export fibre with the topological discarded sector, and for every finite value of the EX2D export coordinate the sech/tanh weighting retains nonzero visible support: a finite continuous export coordinate never gives an exact hard removal, complete export appearing only in the infinite-coordinate limit.

Corollary 6.132 — Finite-Export-Coordinate Hard-Cut No-Go. [exact]

A finite continuous EX2D record/export weighting is not identical to a topological hard support cut (F98). The stronger source question is whether commitment supplies a discrete selector deciding retain versus export.

28BO. PSAC-EX5CC: topological-trap controlled export selector

The earlier Fold topology already supplies the required coefficient-free binary variable: the trap indicator $\kappa_l = \Theta(C_l - C^\star)$, zero before threshold, one after, idempotent and persistent, admissibility-fixing the corresponding closure under later refinement. On the canonical wheel the six interior triangular faces each possess one private rim edge; let R be the isometric injection taking each face to its private rim edge, $R^\dagger R = I_6$, and define the export projector

$$Q_{exp} = R\, \mathrm{diag}(\kappa)\, R^\dagger,$$

of rank equal to the number of trapped faces: a single newly trapped face supplies exactly one newly exported direction. With orthogonal retain and export fibres, the hard export isometry

$$V_\kappa = (I - Q_{exp}) \otimes |K\rangle + Q_{exp} \otimes |E\rangle$$

is exact and norm-preserving: the topological trap implements an exact hard quarantine with no continuous coefficient.

Corollary 6.134 — Intrinsic Commitment-Control Bit Theorem. [exact within the topological Fold source]

The irreversibility threshold already supplies a persistent binary control variable (F99: trap status and the Fold/R4 outcome remain differently typed).

Corollary 6.136 — Binary Trap-Controlled Hard-Export Theorem. [exact construction-level]

The trap bit can control an exact retain/export isometry without a fitted scalar and without the singular finite-coordinate problem of the continuous EX2D chart.

The face-to-edge lift is not unique from incidence alone: selecting every boundary edge of a trapped face gives another coefficient-free projector of rank three per isolated face. But under the minimal condition that one trapped face export exactly one edge direction while preserving full covariance, the private rim edge is uniquely selected, the face-stabilising reflection exchanging its two spokes while fixing the private rim edge.

Corollary 6.138 — Trap-to-Export Selector Non-Uniqueness Theorem. [exact]

Threshold status and incidence geometry alone permit inequivalent coefficient-free export selectors (F100).

Corollary 6.139 — Minimal Covariant Private-Rim Selector Theorem. [conditional exact]

Under one-export-direction-per-trapped-face minimality and full wheel covariance, the private-rim selector is unique.

The current PFDMI master source still does not contain the trap-controlled export projector as a generated Kraus-control object. The controlled export architecture therefore passes at exact construction level but remains open at primitive same-action provenance (F101, F102).

28BP. PSAC-EX5CD: common-action commitment indicator and gauge-covariant Kraus control

The topological Fold source genuinely contains an irreversibility threshold, $\kappa_l = \Theta(C_l - C\star)$, whose committed value is preserved by subsequent admissible refinement. The same-action question is whether this already defines an operator on the PFDMI/MASD operational carrier. MASD instead defines its native closure defect through the vacuum-relative plaquette holonomy, and the present corpus returns no functional relation expressing the Fold closure functional C_l through the MASD closure defect D_C, nor a corresponding threshold conversion: the two are not yet the same-action object.

Corollary 6.140 — Fold-Closure / MASD-Curvature Non-Identification Theorem.

The association of both C_l and D_C with plaquette closure does not establish a physical equality between them. A trap controller on the MASD/PFDMI carrier requires a source-derived functional bridge (F103).

There is nevertheless no gauge obstruction: under local gauge transformation the plaquette defect transforms by conjugation, so every real conjugation-invariant function defines a gauge-invariant candidate threshold.

Corollary 6.141 — Closure-Class-Function Gauge-Covariance Theorem. [exact]

Any real conjugation-invariant functional of the MASD closure defect defines a gauge-invariant binary threshold. Gauge symmetry permits a same-variable trap selector but does not select the physical functional or threshold (F104).

Such a selector need not enlarge the six-defect primitive census if it is derived from already-existing variables; an independently inserted trap defect would instead enlarge the declared master action.

Corollary 6.142 — No-Seventh-Defect Functional-Control Theorem.

A trap controller can remain within the current primitive defect census only when it is a derived functional of the existing master variables. An independently supplied trap defect is a genuine extension of MASD (F105).

Given any orthogonal history-dependent output projector Q_h, the existing Kraus family $\{K_\mu\}$ admits the exact hard split into retained operators $(I - Q_h)K_\mu$ and exported operators $Q_h K_\mu$. Because $(I - Q_h)^\dagger(I - Q_h) + Q_h^\dagger Q_h = I - Q_h + Q_h = I$, completeness is preserved identically.

Corollary 6.143 — Trap-Controlled Kraus Completeness Theorem. [exact]

Orthogonal retain/export control preserves complete positivity and trace preservation exactly. No commutation between the original Kraus operators and the control projector is required.

If Q_h transforms covariantly, both controlled branches inherit gauge covariance; if it is controlled by mutually orthogonal immutable ledger projectors, the resulting channel remains block diagonal in old-history sectors and obeys exact no-overwrite. The physical condition is stronger: with $\Pi_{adm}(h)$ the history-dependent admissible-continuation projector, the controlled instrument reproduces the topological future exactly if and only if

$\Sigma_\mu K_\mu^\dagger Q_h K_\mu = I - \Pi_{adm}(h)$.

Corollary 6.144 — Continuation-Faithful Selector Pullback Criterion. [exact necessary and sufficient condition]

CPTP completeness, gauge covariance and record preservation are insufficient by themselves. Physical commitment control requires the exported branch to pull back exactly to the history-forbidden continuation support.

The present twelve-edge export controller is particularly restrictive: an edge-only projector has the form $Q_{edge} = \Sigma_e q_e P_e$ and removes complete edge fibres, implementing the physical continuation lock exactly only if the forbidden support is a union of whole edge-label fibres.

Corollary 6.145 — Edge-Fibre Saturation Theorem. [exact]

The twelve-edge export controller is continuation-faithful exactly when the forbidden continuation support is a union of whole edge-label fibres.

Corollary 6.146 — Private-Rim Continuation-Faithfulness Boundary.

Minimal covariance selects a natural edge carrier but does not prove that topological inadmissibility is saturated on that edge fibre (F106). The EX5CC private-rim selector is a valid minimal construction, not automatically the physical selector.

The current PFDMI/MASD source returns no trap-controlled operator satisfying the pullback criterion.

Corollary 6.147 — Current Common-Action Trap-Control No-Go. [exact for the presently declared source stack]

The presently declared common action does not generate the history-dependent projector required to make the EX2D export fibre the physical implementation of topological quarantine. The controlled-quarantine architecture passes at construction level; current primitive admission fails.

28BQ. PSAC-EX5CE: fine-mark fibre saturation and minimum physical control resolution

The minimal EX5BY topological history restriction has rank one. EX5CE asks whether finer existing PFDMI mark alphabets contain this hard support cut as a Boolean union of their physically distinguished outcomes. For a positive-effect instrument, the support of any selected sum contains the support of each selected effect, so the rank of a Boolean union is at least the maximum selected rank.

Corollary 6.148 — Positive-Effect Hard-Support Saturation Lemma. [exact]

A rank-one hard continuation cut cannot be obtained by Boolean selection from a physical POVM whose every nonzero atomic effect has rank at least two.

At the twelve-edge grain, summing the terminal types on any edge gives the complete internal effect of rank 50: an edge-level export removes an entire internal edge fibre rather than one continuation direction. At the physically retained eighty-four edge/type grain, the frame-invariant effects have ranks, by terminal type, [15, 15, 19, 15, 22, 22, 31]: the minimum physical atomic rank is fifteen.

Corollary 6.149 — 84-Record Hard-Cut No-Go. [exact]

No nonempty Boolean subset of the physical eighty-four retained effects can equal the minimal rank-one topological continuation projector.

At the three-hundred-and-nineteen microscopic marked-operation grain the effect-rank census is rank 2: 288 effects; rank 49: 24 effects; rank 50: 7 effects. The smallest microscopic effect rank is two.

Corollary 6.150 — 319-Microscopic-Mark Hard-Cut No-Go. [exact on the executed instrument]

No Boolean subset of the three-hundred-and-nineteen physically distinguished microscopic marks can implement the minimal rank-one commitment lock.

The minimum available ranks therefore descend 50 → 15 → 2 across the physical grains while the target remains 1.

Corollary 6.151 — Existing-Mark Minimum-Control-Rank Theorem. [exact]

None of the source-invariant twelve-edge, eighty-four-ledger or three-hundred-and-nineteen-microscopic Boolean control algebras contains the minimal rank-one topological hard selector.

A still finer sequential current/terminal readout has 1092 effects with rank census rank 1: 612; rank 2: 408; rank 3: 24; rank 6: 12; rank 9: 24; rank 18: 12. Rank-one capacity therefore exists at this finer algebraic grain, but it is not physical commitment resolution: the twelve nontrivial current outcomes are coordinates in an arbitrary orthogonal generator frame, and under a change of that frame the physical summed eighty-four terminal effects remain unchanged to numerical precision while individual fine effects move by order-one distances.

Corollary 6.152 — Fine-Rank-One / Physical-Frame Separation Theorem. [exact execution result]

Rank-one current/terminal effects exist, but their individual identity is generator-frame dependent. Selecting one as the commitment lock would select a coordinate convention rather than a source-invariant physical continuation (F108, F109).

The physically admitted eighty-four effects have scalar common commutant: their generated operator algebra has no nontrivial common reducing projector, so there is no hidden orthogonal subspace on which the existing physical terminal law reduces to the required sharp history selector (F110). Finally, the three-hundred-and-nineteen classical output labels themselves are perfectly orthogonal records, but their pullback effects on the physical carrier are not rank-one projectors.

Corollary 6.153 — Record-Orthogonality / Support-Sharpness Separation Theorem. [exact]

Perfect distinguishability of output record labels does not imply that the corresponding pre-event system effects form a sharp support decomposition (F107). Increasing the number of classical record labels does not automatically increase hard continuation resolution. The first rank-one algebraic grain is the frame-dependent 1092-effect decomposition; the first source-invariant physical grain capable of expressing the topological rank-one continuation cut is not presently returned.

28BR. Combined EX5AF–EX5CE verdict

The completed measurement-side sequence now separates five issues that had previously been compressed into one record-backreaction problem. First, the content of a committed fact is structurally available: the Fold event contains independent commitment polarity and traversal orientation, together giving the unique structural R4 character, with a four-state classical record necessary and sufficient to retain the complete Fold mark; the current MA1/PFDMI routes nevertheless fail to install that complete mark physically. Second, persistent memory is not causal use of memory: the present renewal can preserve an ordered, perfectly distinguishable and strongly chiral ledger while reopening the same working carrier for every history, the frozen D36 process making this exact, forward and reversed short histories differing in probability by $46.3399499471 = e^{(4\alpha\star)}$ yet possessing the same R4-visible continuation law. Third, the older topological fact law supplies a source-native history-to-future mechanism without adding a memory force: commitment may alter the admissible move graph itself, overlapping cycle traps give explicit noncommuting commitment orders, the History-Measure admissibility projector changes by rank one in the minimal witness, and the current PFDMI/MASD work carrier does not descend from this history-dependent support, no fixed continuation-faithful intertwiner being possible. Fourth, the required quantum renewal is fully consistent: a ledger-controlled isometry can reopen exactly the admissible directions and route excluded directions into an orthogonal inaccessible sector while preserving every old record, the existing PFDMI export fibre has sufficient capacity, the Fold trap threshold supplies a coefficient-free binary control variable, and given a physical history projector the retain/export Kraus split preserves trace, complete positivity, gauge covariance and no-overwrite exactly, the decisive physical condition being the continuation-faithfulness identity $\Sigma_\mu K_\mu^\dagger Q_h K_\mu = I - \Pi_{adm}(h)$. Fifth, the presently admitted classical PFDMI mark hierarchy is now proved insufficient to supply the minimal hard selector: at twelve-edge resolution a decision removes an entire internal fibre, the eighty-four physical retained effects have minimum rank fifteen, the three-hundred-and-nineteen microscopic effects have minimum rank two, no positive Boolean sum at any of those grains can equal the rank-one minimal topological forbidden projector, rank-one effects appearing only at the finer 1092-effect current/terminal decomposition where their individual identity is not invariant under the unobserved generator-frame symmetry, and the physical eighty-four-effect algebra has no nontrivial common reducing projector. The measurement-side primitive problem is therefore exhausted at the level appropriate to this paper: it is not another missing coefficient or a need for additional classical labels. The remaining fork is qualitatively new: either the existing irreducible physical operator algebra admits a source-derived, frame-invariant, non-Boolean history-conditioned spectral selector, or the primitive theory requires a genuinely history/configuration-resolved continuation carrier. That fork is assigned to the next paper. PSAC-1 closes here rather than introducing either mechanism as an in-paper repair.

Gate-T / record-attachment verdict at R19. Gate T is henceforth reported as two labelled sub-fronts: Gate T-A, the measurement-side history/admissibility selector sequence, closed to the R19 boundary, and Gate T-B, the vacuum topology, occupancy, matter attachment and axle-loop inheritance sequence, open. Gate T-A's history problem is closed at the present paper's claim boundary. Current explicit MA1/PFDMI record-to-matter and record-to-working-support routes are negative. The older topological fact law nevertheless supplies a source-native mechanism by which committed history changes future admissibility, and the corresponding full-configuration admissibility projector is nonzero in explicit constructions. Exact ledger-preserving quantum renewals implementing arbitrary history-dependent support exist, and the existing PFDMI export carrier has sufficient discarded-sector capacity. EX5CD proves that hard retain/export Kraus control preserves completeness, covariance and no-overwrite once a physical selector is supplied, while reducing continuation faithfulness to one exact pullback identity. EX5CE then proves that no Boolean control at the twelve-edge, eighty-four retained-record or three-hundred-and-nineteen microscopic-mark grains can realise the minimal rank-one history restriction; rank-one effects occur only at a finer generator-frame-dependent decomposition and are not physical source-invariant selectors. The present PFDMI export route is therefore retired as a complete same-action implementation of topological quarantine at its existing classical mark resolutions. The next research problem is a new operator-algebra/history-carrier problem and is not pursued inside PSAC-1. The independent Gate T-B obligations, the actual K_vac, $H^1(K\_vac; Z_7)$, integral order-seven torsion, occupancy, matter attachment and physical axle-loop inheritance, remain separately open and unaffected by the Gate T-A closure.

Verification notes. Re-derived independently here: the heptagon Smith form [1] with trivial H_1 (degree-one attachment) and the degree-seven Smith form [7] with $H_1 = Z/7$; the universal-coefficient typing of the §26 correction, $H^1(\cdot; Z_7) \cong \mathrm{Hom}(H_1, Z_7)$ as the flat-holonomy classifier while H^2 acquires $\mathrm{Hom}(H_2, Z_7) \oplus \mathrm{Ext}(H_1, Z_7)$; the counts $C(4, 2) = 6$ and the three complement pairs; the octahedral graph K_(2,2,2) with $|\mathrm{Aut}| = 2^3 \cdot 3! = 48$; the identity-channel rejection; and the Fold dephasing channel's rank 4, nullity 12, idempotence and repeatability. For EX5G–EX5J, re-derived independently here: the reflection-parity separation of the cover condition from the circulation classes; the Klein four-group character census (exactly three nontrivial binary characters) with the exchange/reflection selection of χ_bω and the sector decomposition; the exact statistics of J_orient, E = 0.995570059549810, second moment 0.997931470084622, variance 0.006771726612606 and conditional value 0.997633694691869, from the pinned first-cover trio; the reflection-evenness of $\varsigma \cdot \mathrm{sign}(K)$; the counts $12 \times 7 = 84$ and $2^{83} - 1 = 9671406556917033397649407$; and the marginal range bound $|E[J\_Fold]| \le P(K \ne 0)$. Imported at source precision: the EX5B counterexample (Smith form diag(1, 1, 1, 7) pinned; the matrix itself pending re-supply), the four Fold atoms, the order-48 pre-wheel stabiliser match, the source-audit conclusions of §28C, the record-architecture identification T_rec = T_cover with its 14 declared oriented incidence flags, the 319-mark instrument and the $A_{319} \to E_{84} \cup \{\emptyset\}$ coarse-graining, and the predecessor's carrier-bridge prohibition on silent binary/84 identification. For EX5K–EX5R, re-derived independently here: the wheel-Laplacian eigenvector check $Lr = 7r$ for $r = (1, 1, 1, 1, 1, 1, -6)$, each rim row returning $3 - 2 + 6 = 7$ and the hub row $-42 = 7 \times (-6)$, with $q^T L q = 6$ for the boundary test vector; the Betti counts $\beta_1(C_6) = 1$ and $\beta_1(W_7) = 12 - 7 + 1 = 6$ with the $\Delta\beta_1 = +1$ loop-birth rule; the Jordan two-domain separation; $\mathrm{Hom}(D_7, Z_2) = Z_2$ from the odd-order rotation subgroup with orientation parity its unique nontrivial element, $\mathrm{Hom}(Z_7, Z_2) = 0$, and the inversion-orbit count {0}, {1, 6}, {2, 5}, {3, 4} giving 16, 14 and 7; the uniqueness argument for the C_6-invariant projector pair on the completed two-plane; and the consistency of the EX5R wheel returns with Part II-B, the nonzero crosses W_JH and W_TB lying outside the

C/B/R slice so the EX2 zero-cross slice metric survives untouched. Imported at source precision: the refinement eigenvalue −3/28 and the irreducibility of the seven-state catalogue, W_HH = 75/434 with the two nonzero wheel crosses, the effective boundary-controller architecture and its entropy ordering, the completed-record event semantics behind the EX5K retyping, the record theorem's no-overwrite formulation, and the PFHBA-typed source-projected bath and Doob-descent machinery behind the §28R route, whose R_HM4 residual is the HM4 source-factorisation object. For EX5S–EX5AD, re-derived independently here: the circulant/Fourier common-eigenvector argument and the exact invariance of the nonuniform six-plane; the isometry of the whitened intertwiner with all six singular values one; the nullity 226 − 183 = 43; the evenness of the derivative of the odd terminal map; the rim/R4 squared overlap 1/6 with the exact commutator norms $\sqrt{(1/6 \cdot 5/6)} = \sqrt{5}/6$ and $\sqrt{2}$ times that, $\sqrt{10}/6$; the phase-difference-only structure of the post-renewal rays and the resulting zero branch contrast and zero mutual information; the uniqueness of the $I \otimes G0 + Z\_L \otimes G1$ decomposition on the two-dimensional ledger algebra; the algebraic zero of the spectator-factorised mixed derivative; and the scalar-density counting argument behind the sufficiency no-go with the injectivity implication of the left-inverse intertwiner condition. Imported at source precision: the circulant returns of the full projected closure operator, the continuum same-Φ commitment-bath identification and its constitutive conditionality, the faithful J_D spectral data (243 × 226, rank 183, $\sigma\_min^+ = 0.684040286651$, $\sigma\_max = 3.30225857912$) and the zero-sum row-space theorem with machine residuals 1.51×10^{-15} and 8.68×10^{-16}, the RCMO record-phase descent residuals, the implemented PFDMI mark operators with the 319/312/84 counts, the Fact-Momentum retarded kernel and λ_mem status, the Fold Interface Law polarity/orientation independence, the Commitment-Requires-Cost substrate-record requirement, the leading-order unique record-current transport, and the HCMR intertwiner bridge criterion. For EX5AE, re-derived here in full, the round being elementary and self-contained: $\beta_1(P\_m) = 0$ and $\beta_1(C\_m) = 1$ with $\ker L_1 = \ker B$ of dimension β_1 and the uniform cycle mode; the exact visible return under reopening and the identical final geometries of the two histories; the isometry contradiction (inner product zero to one) behind the export theorem and the forced orthogonality $\langle E\_L|E\_O\rangle = 0$; the counts 2^n, n bits, n ln 2 and n $h_2(p)$; the OR-record law $P(r\_n = 0) = (1 - p)^n$ with entropy $h_2(1 - (1 - p)^n) \to 0$; the pigeonhole and permutation-periodicity arguments for the finite no-go, with the quantum version from the D-orthogonal-state bound; and the factorised reset $\rho\_SR = |L\rangle\langle L| \otimes \rho\_R$ giving $I(S : R) = 0$ with $S(R) = H(h)$. Also verified: the consistency of Corollary 6.31 with the EX5Y branch-blindness result, the working carrier's zero final mutual information being architecturally correct, the outstanding absence being only the backreaction coupling and the outcome mark. For EX5AF–EX5AY, re-derived independently here: the 6/6 rank-nullity split of the count projection on the twelve-dimensional marked carrier and the resulting zero polarity rank of the existing embedding; the Schur/Walsh algebra behind the MA1 zeros, a variable absent from an action's domain generating no mixed derivative and no Walsh coefficient in its direction; the relational identity $(-1)^b = \chi\_b\omega \cdot \omega$ with its bijection; the fixed-point argument for the zero-circulation criterion and the $P(K = 0)$ obstruction from the pinned trio; the eigenvalue table of S_b O_ω on the four atoms reproducing the EX5H sectors exactly; the Walsh reduction of the Fold-to-R4 channel to one gain under reflection oddness and exchange symmetry, with $|g| = 1$ forced by determinism; the separation arithmetic 2 × 0.578064557803 = 1.156129115606; the connectedness and linear-invariant arguments of the even-operator no-go; the commutation of post-commitment records on separate factors and its compatibility with the EX5X pre-commitment no-go; and the Whitney left-inverse identity R W = I with the graded 2-form/1-form separation and the two-direction minimum. Imported at source precision: the Fold-interface domain/traversal typing, the HCMR orientation-resolved implementation with its identity confusion matrix and zero Lüders disturbance, the cubic odd invariant on the closure carrier, and the full-mark retention conditions. For EX5AZ–EX5BP, re-derived independently here: the rank-one Jacobian with Gram eigenvalue $0.578064557803^2 = 0.334158632987978$ to the last digit; the Kraus-rank-four/Stinespring-dimension-four count and the nonzero overlap of finite-shift full-support Gaussians; the trace-freeness of the Fold Hessian on the two-surface and the amplitude-cancellation and branch-degeneracy arguments; the data-processing form of the scalar-marginal no-go; the (b, ω) ↔ (r, ς) bijection as the R16 relational identity in record coordinates; the uniqueness of the joint PVM of two commuting binaries; the endpoint-neutrality argument from the EX5X overlaps, each rim state meeting both chiral rays at exactly 1/6 with zero hub weight, so every diagonal endpoint distribution is R4-balanced; the sector-covariant one-gain classification with its ceiling $\delta_K = 0.995570059549810$; the left-unitary cancellation $L^\dagger U^\dagger U L = L^\dagger L$ in every EX2A effect and the removal of the local unitary under the record trace; and the manifest positivity of the conditional h_δ closed form. Imported at source precision: the h_δ formula and its Λ_c N J typing, the Fold-Hessian divergence non-vanishing and TPB conditions (the Corollary 6.61 statement body arrived stripped and is reconstructed at contract grade), the Reflection-Scope/GPU projector identity and the wheel-Laplacian eigenvalue label (stripped), the EX2A rank-five record derivative and its left-unitary structure, and the fact-separating retype of the Single-Source theorem, which amends that registry entry's consumed role. For EX5BQ–EX5CC, re-derived independently here: the D36 forward/reverse ratio 46.3399499471 confirmed two ways, as $(1 + \tanh 2\alpha^\star)/(1 - \tanh 2\alpha^\star)$ and as $e^{4\alpha^\star}$ with $4\alpha^\star = 3.836004438880$, exact to the displayed digits, the ratio being the exponential of four one-Bit affinities; the EX5BZ subtraction argument forcing any fixed intertwiner to annihilate the rank-one support difference; the isometry algebra of the controlled renewal, $V_h^\dagger V_h = \Pi_h + (I - \Pi_h) = I$ and $V_h^\dagger P_A V_h = \Pi_h$, with the ledger-controlled sum again isometric and the rank-r/dimension-r sufficiency; the strict positivity of sech at every finite argument behind the hard-cut no-go; the wheel face geometry, six interior triangular faces each with two shared spokes and one private rim edge, the face-stabilising reflection fixing exactly that edge, hence the conditional uniqueness of the covariant one-per-face selector; $R^\dagger R = I_6$ and the projector and isometry identities of the quarantine construction; and the evenness/oddness bookkeeping of the phase-cut census. Imported at source precision: the EX2B central-projector fixity, the (π/9) conditional response coefficient and the Gaussian-entanglement diagnostic, the explicit-constraint census behind $s_{old} = 1$, the overlapping-cycle admissibility construction and the History-Measure matrix, the twelve-direction EX2D export dilation with its sech/tanh chart, and the trap indicator $\kappa = \Theta(C - C^\star)$ with its idempotence and refinement stability. The corollary numbering gaps in this Part reflect the source's consolidation of exploratory steps and are preserved as instructed. For EX5CD–EX5CE, re-derived independently here: the exact Kraus completeness of the orthogonal split, $(I - Q)^\dagger(I - Q) + Q^\dagger Q = I$ with no commutation assumption; the well-typedness of the continuation-faithfulness pullback identity; the positive-effect saturation lemma, the support of a sum of positive operators containing every summand's support; the census sums 288 + 24 + 7 = 319, consistent with the EX5W split 312 nonself + 7 self, and 612 + 408 + 24 + 12 + 24 + 12 = 1092 = 84 × 13; the rank descent 50 → 15 → 2 against target 1; and the irreducibility inference from scalar common commutant to the absence of a nontrivial common reducing projector. Imported at source precision: the MASD vacuum-relative closure-defect definition, the 84-effect rank list [15, 15, 19, 15, 22, 22, 31] and the 319 and 1092 rank censuses, the numerical generator-frame rotation execution with its invariant summed effects, and the scalar-commutant computation. This Part closes the measurement-side sequence of PSAC-1; per the paper-closure rule, no result of the successor programme may retrospectively upgrade the primitive grades recorded here.

PART VI — THE UNIFIED CLOSURE THEOREM

29. Four-gate architecture and dependency order

The remaining primitive Standard-Model problem is exactly the four gates:

Gate	Content	Decisive object	Internal order
S	Source sign	S_C = L_hist→C ω_C on the physical carrier, then c⋆_σ = σα⋆ K_C⁺ s_C	Score lift before response
R	Readout	a_phys ≠ ½, or equivalently χ_pop ≠ 0, with the fixed reference exhibited	Routes A/B in either order; Theorem 3 last
M	Matter selection	Uniquely source-selected Y⋆ = U_role,⋆ D_score,⋆ with trivial physical Hessian kernel	Stationarity, then nulls, then dual-route recomputation
T	Topology and attachment	Availability (H^1), occupancy, attachment; L_ax versus W_Δ	Strict subgate order; axle loop independent but promoted only jointly

Execution status at R19: Gate S retains the strong partial pass of PSAC-EX1 through EX2B and the candidate same-action assembly of PSAC-MA1. Gate R remains physically open but its freedom is now sharply classified. The completed R4 carrier is uniquely identified with the Fold-access doublet, and every first-cover sector-sufficient population readout is determined by one gain g_cover, with E[Z_R4] = 0.995570059549810 · g_cover. Passive first-cover endpoint projection is exactly R4-neutral, the current renewal gain is zero, and the unmarked Doob law cannot determine the missing gain. A conditional positive closure-load mechanism exists, h_δ = Λ_c N J > 0, but its primitive record-to-access vertex is unreturned. Gate M remains Grade C under EX4A; the new record–Yukawa audit does not close that selection problem and instead establishes an additional current-route negative, the MA1 record-matter mixed jet being identically zero. Gate T-A, the measurement-side record/history sequence, is now executed through EX5CE and closed at this paper's claim boundary. Topological commitment gives a history-dependent admissibility support; its consistent no-overwrite quantum implementation exists; the existing export carrier has sufficient capacity; and a trap-controlled Kraus split is algebraically and gauge-covariantly valid. The present common action does not derive the physical trap projector, and EX5CE proves that the existing source-invariant classical outcome resolutions, twelve edges, eighty-four persistent records and three hundred and nineteen microscopic marks, are all too coarse to realise the minimal rank-one hard continuation selector by Boolean outcome selection, the finer current/terminal rank-one effects being generator-frame dependent. The resulting operator-algebra versus new-history-carrier fork is outside PSAC-1 and is assigned to subsequent work. Gate T-B, the independent vacuum topology, occupancy, matter attachment and axle-loop sequence, remains open. From this revision the four gates are four independent tests of the one candidate master action of Part II-C: they share their object, not their evidence, and the independence and no-subsidy rules below apply unchanged.

The gates are logically independent: no gate's pass supplies evidence for another, no gate's pass lowers another's tolerance, and each carries its own falsifiers. Cross-gate consistency is a final, separate check: the passed gates must belong to one compatible source solution, sharing the frozen source hashes, the regulator behaviour and the branch structure, rather than being independent successful constructions.

30. Theorem 7 — Primitive Selection and Attaching-Map Closure Theorem

> **Theorem 7 — PSAC Closure Theorem. [conditional physical theorem]** If Gates S, R, M and T all pass from one frozen primitive source chain; if the returned objects are mutually compatible across the declared regulators and both surviving branches; and if no downstream Standard-Model target is used to select any gate; then the VERSF finite Standard-Model architecture is primitively selected and physically attached at the declared level, rather than merely available as a collection of compatible constructions.
>
> **Corollary 7.1 — Partial-outcome grading. [exact given the gate independence]** Because the gates are independent, partial outcomes are well-defined per gate and map onto the verdict grades of §35: if one or more, but not all, gates pass primitively, the aggregate result is Grade B; if no gate passes primitively but structural capacity remains, the appropriate aggregate grade is C; a failed or retired bridge receives Grade D locally, without prejudice to the others.

31. What Theorem 7 does not claim

A full pass does not yet claim measured masses, final CKM or PMNS agreement, the physical electroweak matching scale, absolute clock or action normalisation, or continuum QED running. Those become downstream tests of a frozen, source-selected theory, which is precisely the transition this programme requires: from arranging that the right structures exist to letting a frozen theory be tested.

PART VII — ELECTROMAGNETIC BOUNDARY

32. Consumed, not reopened

The pre-fact closure prior is consumed as exact under P14 of the controlling predecessor together with the $K = 7$ cardinality:

$p_{closure} = 1/128$,

and the interface result is consumed as the exact support-rigidity return conditional on physical TPB saturation:

$\eta_{gate} = 14/15$,

so the structural candidate remains

$p_{EM} = (1/128)(14/15) = 7/960$, $p_{EM}^{-1} = 960/7 = 137.142857\ldots$

PSAC-1 does not attempt to improve this number by modifying either factor, and F16 forbids treating the prior as an open post-birth dynamical parameter. The only electromagnetic obligation internal to this paper is compatibility: the primitive source maps derived at Gates S, R, M and T must not disturb the already typed closure and interface structures, and any candidate microscopic realisation they imply must remain consistent with the foundational closure law. Physical TPB saturation and continuum/QED matching and running remain the scope of the dedicated electromagnetic completion paper.

PART VIII — EXECUTION CONTRACT

33. Immediate calculation sequence

The paper executes in the following order, each step with declared tolerances frozen before its execution. From R7, the remaining steps execute against the unified candidate master action of Part II-C: each gate tests the same frozen assembly rather than an independent construction.

PSAC-EX1 — Full physical score lift. Calculate $S_C = \partial/\partial\varepsilon_C \log K_n^\varepsilon |_0$ on the actual HMGBC/MASD physical history carrier, construct or refute the source-derived intertwiner $L_{hist}\to C$, and return ε_{score}, parity and support. This is the first calculation; failure retires the irreversible-curvature route before further effort is spent (Gate S, Theorem 1). Status at

R19: executed as a strong partial pass with closed source structure, Part II-A. Theorem 1A settles the direction, Theorem 1B the normalisation ($\lambda_C = 1$, $S_C = \omega_C$ on the canonical branch), Theorem 1C the bath immunity, Theorem 1D the gauge-typed uniqueness of the Abelian closure line, and Theorem 1E the source-vector structure ($h_\sigma = \sigma\alpha\star(1, 0)^T$, the record sourced only through coupling); the remaining EX1 content is the same-action installation of the preparation block with its σ-retention map, and transport of the source through the complete nonseparable, multi-cell typed carrier onto the gauge-typed Abelian line with its physical sector match.

PSAC-EX2 — Signed curvature response. If EX1 passes: return K_C with rank and nullity, the lifted s_C, its range membership, and $c\star_\sigma$ (Gate S, Theorem 2). Status at R19: executed exactly on the canonical C/B/R slice, Part II-B (Corollary 2.1): $K_{CR} = (1/124)[[69, -21], [-21, 69]]$, $K_C^{red} = 360/713$, $c\star_\sigma = \pm 1.89935497564$ with record response ± 0.578064557803; the physical promotion awaits the forward 6 × 6 W ledger, with the closed form Z_C and its positivity conditions issued in §10Y. PSAC-EX2B (§§10Z1–10Z5) has executed the positivity question: sign safety exact, $|c\star| \geq 0.897495$ under retained diagonals, no upper bound pending the spectral envelope, the interval Corollary 2.5 awaiting only λ_{min} and λ_{max}. EX2 is exhausted at the current source; PSAC-EX3 is the declared next execution.

PSAC-EX3 — Primitive readout. Executed through EX3O, Parts III-A and III-B. The ordered-turn slope is 0.165420739713981; the first-cover signed bias is δ_K = 0.995570059549810; the persistent ledger retains positive and negative first-cover orientation in orthogonal sectors with trace distance 1 and fidelity 0; but the present renewal law gives identical ledger-conditioned R4 working channels, zero diamond norm and zero current-source gain. Gate R is physically open but exhausted for the presently implemented factorised renewal source unless a genuinely new same-source layer-changing attachment is returned.

PSAC-EX4 — Representation-resolved source selection. EX4A executed, Part IV-A. The current endpoint/current residual has tangent nullity 920 before the declared 84-dimensional local gauge quotient; the internal frame is not selected; the physical score-strength coordinate changes the marked law while remaining absent from the current residual action, an explicit effective flat direction. Gate M returns Grade C, structural capacity with residual freedom.

PSAC-EX5 — Vacuum topology and primitive completion. Executed through EX5AD, Part V-A. EX5A–EX5R retain their R13 results. EX5S proves exact invariance of the projected nonuniform closure carrier. EX5T replaces the old discrete closure/bath comparison by an exact field-level isometric intertwiner into the common Φ-field six-plane. EX5U closes first-order scalar HM4 source descent analytically, with machine confirmation at the 10^{-15} level. EX5V separates terminal-record compatibility from finite mark selection. EX5W constructs the exact implemented PFDMI detailed mark map and proves that the orthogonal 84-label ledger cannot be reduced to the binary fact by QC-1 equivalence. EX5X gives an exact joint-measurability no-go for simultaneous sharp R4 and existing PFDMI detailed readout. EX5Y shows the sequential binary-first implementation mathematically compatible with no-overwrite but exactly branch-blind. EX5Z–EX5AA isolate the unique ledger-odd backreaction structure and return an exact zero mixed derivative for the current executable action. EX5AB confirms a generic causal history-memory kernel but shows its declared scalar commitment-density source outcome-blind. EX5AC–EX5AD retype the true Fold commitment polarity as independent of orientation, prove that physically distinct outcomes require distinct substrate records, and prove that the current scalar event-count density cannot by itself encode which outcome occurred.

PSAC-EX5AE — Renewal, Distinguishability Export and Finite History Capacity. Executed, Part V-A. The generic path-to-cycle diagnostic gives $\Delta\beta_1 = +1$ and creates a one-dimensional edge-Hodge cycle kernel exactly; reopening removes the cycle sector and restores the initial visible geometry, proving that topology alone is not persistent memory. Under injective/isometric complete dynamics, an exact local reset of two distinguishable alternatives to the same working state forces their distinction into external record states. Exact retention of n independent binary histories requires at least 2^n distinguishable states or n bits; a fixed D-state carrier satisfies $n \le \lfloor \log_2 D \rfloor$. The one-bit OR record preserves only existential occurrence, not complete history. Complete local renewal is compatible with zero final system-record mutual information while the record/environment sector retains the full history. These are exact mathematical and conditional physical results; they do not derive the Fold mark or its continuum carrier.

PSAC-EX5AF–EX5AY — Marked Fold Record, Relational Reconstruction and Continuum Bridge. Executed at mathematical, construction and current-action levels. The present scalar six-plane continuum carrier annihilates the independent polarity sector exactly, and the current MA1 action contains no Fold-polarity dependence, giving zero effective polarity forcing and zero current Fold-character/R4 gain. The Fold carrier itself nevertheless contains the missing structure: the four atoms carry commuting polarity and orientation observables S_b and O_ω, with $S_b O_\omega = \chi_{b\omega}$ exactly and spectral projectors equal to the structural R4 sectors. The source-native binary IORC orientation ς avoids the zero-circulation obstruction of sign(K); its retained implementation sectors are orthogonal and nondemolition-readable, while physical Fold-orientation attachment remains open. Symmetry reduces the complete Fold-to-R4 channel to one gain g, with the current candidate action returning $g_{MA1} = 0$. Finally, an adapted cellular Fold record admits an explicit Whitney embedding of polarity and orientation with exact left inverse $\pi_W \iota_W = I$; two real graded continuum directions suffice for the two realised classical Fold labels, while the full reversible Fold state space remains four-complex-dimensional. These results close mathematical carrier existence and relational reconstruction at construction level, not primitive physical admission.

PSAC-EX5AZ–EX5BP — Physical Fold-Record Projection, Same-Event R4 Activation and Record-to-Matter Backreaction. Executed at exact mathematical, construction, conditional and current-action grades. EX5AZ projects the two-direction Fold-complete record onto MA1 and returns rank one, singular values [0.578064557803, 0], proving the present action has no Fold-complete left inverse. EX5BA shows that neither the symmetric-tensor parent of an unsigned scalar source nor a finite-shift full-support Gaussian pointer restores exact outcome identity; an exact four-atom commitment instrument requires four orthogonal pointer states. EX5BB constructs the minimal intrinsic symmetric trace-free Fold-polarity tensor; EX5BC and EX5BD show that its isolated zero-background installation fails the leading record-current conservation equation, with only a source-returned background response able to rescue the direction. EX5BE proves that literal scalar-count Single-Source factorisation is insufficient for physically distinct Fold facts and replaces it with a fact-separating marked primitive source whose scalar density is a marginal. EX5BF–EX5BH identify the minimal four-state record $(r, ς)$ and its exact bijection with (b, ω). EX5BI constructs the unique joint four-state R4/orientation completion instrument at construction level. EX5BJ proves that the first-cover endpoint is exactly R4-neutral despite strong history chirality. EX5BK classifies the complete covariant R4 readout by one coefficient g_cover, with $E[Z\_R4] = 0.995570059549810 \cdot g\_cover$. EX5BL proves that the unmarked Doob kernel cannot determine that gain. EX5BM identifies the Reflection-Scope and GPU/R4 projector pairs exactly but rejects $h = J$ as a coupling-type conflation. EX5BN derives the conditional positive closure-load projection $h\_\delta = \Lambda\_c N J$, while EX5BO proves that the marginal-load identification feeding this formula remains primitive-open. EX5BP then closes the current explicit routes negatively: MA1 has zero record–Yukawa mixed jet, and PFDMI-EX2A's nonzero rank-five record amplitude derivative is a left-unitary record rotation whose effect cancels from mark probabilities and from the reduced CAR/Fock channel. The current primitive record-to-matter block is therefore exactly zero for both explicit routes.

PSAC-EX5BQ–EX5CC — Post-Commitment Support, History-Conditioned Admissibility and Controlled Export. Executed at exact, construction and current-source grades. EX5BQ extends the record-matter factorisation no-go through the first support-changing PFDMI refinement: representation support changes, but remains independent of the retained ledger. EX5BR classifies the minimal no-overwrite ledger-current interaction and proves that projective visibility requires a nontrivial current operator, which the source does not return. EX5BS–EX5BU execute the old-phase survival audit: all explicitly returned FCHI/PFDMI/MASD hard-cut mechanisms are phase blind on the selected HX1 direction, $s\_old = 1$ exactly on the published constraint set while the physical commitment cut remains unreturned, with the conditional present-branch separation $\Delta q = (\pi/9) \cdot s\_old$; the earlier VERSF ontology retypes this as a commitment-to-memory handoff rather than unchanged survival of the pre-commitment unresolved mode. EX5BV separates the unresolved pre-commitment relation, immutable fact and post-commitment memory residue and confirms that generic accumulated phase/history memory is differently typed from the binary Fold outcome record. EX5BW proves on the frozen D36/PFDMI law that strong ordered-history chirality does not imply history-conditioned continuation: the two reversed histories differ in probability by $46.3399499471 = e^{(4\alpha\star)}$ yet have identical R4-visible future laws. EX5BX finds the first positive support-level mechanism upstream, using topological trapping to construct histories with noncommuting admissibility. EX5BY maps this into the History-Measure admissibility projector, with a rank-one minimal support loss, while proving that the present MASD working projector is a differently typed object. EX5BZ proves that no fixed continuation-faithful intertwiner can send this history-dependent admissibility support into the presently history-independent PFDMI working support. EX5CA constructs an exact history-controlled no-overwrite renewal, routing admissible directions to the active carrier and excluded directions to an orthogonal discarded carrier, requiring discarded dimension equal to the rank of the support loss. EX5CB identifies the existing PFDMI export fibre as a sufficient realisation class for that discarded carrier but proves that finite sech/tanh export weighting is not an exact hard cut and that trap-controlled activation is not source returned. EX5CC finally constructs a coefficient-free hard export selector from the source-defined topological trap bit κ; on the wheel a minimal covariant private-rim lift produces an exact projector-valued retain/export switch. The outstanding primitive object is now the same-action generation of this trap-controlled export selector inside the actual PFDMI/MASD Kraus law.

PSAC-EX5CD — Commitment-Indicator Common-Action Embedding and Gauge-Covariant Kraus-Control Test. Executed. The Fold threshold is a genuine source-defined binary trap, but its closure functional is not presently identified with MASD's vacuum-relative closure defect, so the same-action controller is not returned. Conditional on any gauge-covariant history projector Q_h, the hard split into $(I - Q_h)K_\mu$ and $Q_h K_\mu$ preserves Kraus completeness exactly, inherits gauge covariance and may be ledger-controlled without overwrite. Physical continuation is reproduced exactly iff $\Sigma_\mu K_\mu^\dagger Q_h K_\mu = I - \Pi_{adm}(h)$. The existing twelve-edge export route satisfies this only for edge-fibre-saturated forbidden support. The private-rim construction is therefore a valid minimal covariant candidate, not a same-action physical closure. Verdict: algebraic/gauge/no-overwrite PASS; current same-action provenance FAIL; primitive physical selector OPEN.

PSAC-EX5CE — Trap-Induced Fine-Mark Fibre Saturation and Minimal Control-Rank Test. Executed and adopted as the closing measurement-side calculation of PSAC-1. The minimal topological history restriction has rank one. A twelve-edge export acts on a full 50-dimensional internal edge fibre; the eighty-four frame-invariant retained effects have minimum rank fifteen; and the three-hundred-and-nineteen physically copied microscopic marks have effect-rank census rank 2: 288, rank 49: 24, rank 50: 7. Positivity proves that no Boolean subset at any of these grains can equal the rank-one forbidden projector. A finer 1092-effect current/terminal decomposition contains rank-one effects, but those individual effects are generator-frame dependent and cannot be selected physically without an additional frame theorem; the eighty-four physical effects have scalar common commutant and no nontrivial common reducing projector. Verdict: existing source-invariant classical mark hierarchy insufficient for the minimal hard continuation selector.

Paper-closure rule. No further measurement-side selector is introduced in PSAC-1. The possible construction of a trap-conditioned frame-invariant operator from the noncommutative algebra generated by the physical effects, and the alternative possibility of a new history/configuration-resolved primitive carrier, define the next research programme. They may not be used retrospectively to upgrade the present paper's primitive grade.

PSAC-EX6 — Occupancy and attaching map. An independent future Gate-T task, not a further measurement-side EX5 repair. Still blocked on the actual physical vacuum complex: determine $H^1(K_{vac}; Z_7)$, the integral torsion and nontrivial physical occupancy before attempting the matter attachment. None of EX5K–EX5S substitutes for this topology/occupancy sequence (Gate T, occupancy and attachment).

PSAC-EX7 — Physical axle loop. Construct γ_0 and γ_ax from the primitive stack, verify co-terminality with a published residual, compute L_ax, and only then compare with W_Δ (Gate T, Theorem 5).

PSAC-EX8 — Cross-gate consistency. Verify that all passed gates belong to one compatible frozen source solution: common hashes, common regulator behaviour, common branch structure, and mutual non-disturbance of the electromagnetic boundary (§32).

34. Machine-readable contract


```
designation: PSAC-1-R19
source_hashes:
predecessor: HCMR-M1-R15
companion_em: K7-EA-1
regulator_levels: [3,4,5,6]
branches: [1,6]
claim_grade_scale: [exact, construction, imported, conditional, effective, pr
imitive]

# Gate S — signed selector
wheel_score_identity: "F_C = omega_C exact (imported)"
physical_C_score_S_C:
history_to_C_lift_L:
lift_source_derivation:
epsilon_score: "0 algebraic on canonical separable branch; nonseparable physi
cal branch open"
epsilon_score_tolerance_by_level:
score_reversal_parity:
score_support_in_Ran_K_C:
K_C: "canonical C/R slice: (1/124)[[69, -21], [-21, 69]]; physical: open"
K_C_rank: "2 (canonical slice)"
K_C_nullity: "0 (canonical slice)"
s_C: "omega_C at unit normalisation (Theorems 1B, 1E); canonical slice source
h_sigma = sigma * alpha_star"
alpha_star: 0.959001109719975
signed_curvature_response_c_star: "canonical slice: sigma * alpha_star * 713/
360 = ±1.89935497564; physical: open"
background_branch_alternative_status:
# PSAC-EX1 returns (13 August 2026)
masd_closure_differential_type: oriented_face_circulation_exact
closure_sector_representation: "A2, m = 0"
closure_direction_multiplicity_declared_carrier: 1
equivariant_direction_uniqueness: "exact on declared wheel-tangent carrier (T
heorem 1A)"
local_polar_frame: "V_C = omega_C / sqrt(m)"
local_face_singular_value: "1 / sqrt(m)"
six_rim_differential_covector: "B_C = omega_C^T / 6 (covector, not injection)
"
integrated_curvature_score: "D kappa_C = omega_C exact"
```

closure_defect_injection: "E_C(c) = c * omega_C exact"
lambda_C_normalisation: "1 exact; metric-scale independent (Theorem 1B)"
minimum_norm_lift_agreement: "exact; independent of g_C"
minimum_norm_right_inverse_residual: "6.86e-15 (imported finite-cell implemen
tation)"
continuous_history_score: "S_C(xi) = <sigma, xi>_G_op; no residual lambda"
canonical_branch_facts: "G_op = I; C = 0; W_prim = W_core (imported)"
canonical_branch_score_identity: "S_C = omega_C exact; residual 0 algebraic"
nonseparable_branch_preservation: "Gaussian screening excluded as destruction
mechanism (Theorem 1C); full typed-carrier transport open"
canonical_wheel_fisher_W_CC: "12/31 (imported)"
average_coordinate_fisher: "1/93; reparametrisation-consistent with 12/31"
two_cell_fisher: "12/(31+g); 18/47 at g = 1/3"
two_cell_bridge_component: 0
PSAC-EX1C returns (13 August 2026)
bath_architecture: "centred Gaussian; bilinear defect coupling; Ran C in Ran
A_Q (declared, imported)"
bath_protection: "s_eff = s; alpha_eff = alpha exact (Theorem 1C)"
kernel_tilt_survival: "exact; tilt independent of bath coordinate"
reduced_score_identity: "S_C_red = sigma * omega_C exact under reversal-even
reference"
W_prim: "W_core - C^dagger A_Q^+ C; W_prim <= W_core exact"
screened_signed_response: "D_star_sigma = sigma * alpha_star * W_prim^+ s_C;
odd in sigma at every bath strength"
scalar_screened_response: "c_star_sigma = sigma * alpha_star / k_C_prim"
s_C_range_condition: "s_C in Ran W_prim required; failure is a sharp falsifie
r, not a parameter"
score_typing_note: "E[S_C] = 0 at reference; pointwise S_C = omega_C; Fisher
= variance"
PSAC-EX1D returns (13 August 2026)
scalar_wheel_A2_multiplicity: "1 exact (derived: spoke coefficient forced to
zero)"
faithful_gauge_link_A2_multiplicity: "12 exact (spatial 1 x internal 8+3+1)"
full_carrier_multiplicity_one_hypothesis: fail_exact
nonabelian_linear_coupling_to_scalar_source: "forbidden: no invariant covecto
r in the su(3), su(2) adjoints (F25)"
gauge_admissible_abelian_A2_closure_line: "1 exact; (u(1)*)^U(1) = R (Theorem
1D)"
abelian_line_em_identification: "not yet electromagnetism; electroweak interp
retation downstream (F24)"
first_order_competitors: "gauge order 2; completion order 2; CAR/Fock order 3
(imported); scalar commitment wrong spatial type"
record_phase_A2_copies: "3 (one per edge-phase channel; 36 phases + 36 stretc
hes; 18 stretches coboundary-flat)"
physical_RCMO_embedding_among_record_lines: open
PSAC-EX1E returns (13 August 2026)
prep_action_record_dependence: "none; d Gamma_prep / d r = 0 exact by domain"
record_projection_of_IORC_source: "P_R s_IORC = 0 exact"
bond_sector_first_derivative_at_vacuum: 0
bond_sector_hessian: "K_B = w_B [[1, -1], [-1, 1]]; mixed return (J_B q)^T (J

_B r) = -1 (imported)"
combined_A2_source_vector: "h_sigma = sigma * alpha_star * (1, 0)^T exact"
combined_response: "c_star = sigma*alpha_star*k_R/Delta; r_star = -sigma*alpha_star*mu/Delta; Delta = k_C k_R - mu^2 > 0"
record_response_ratio: "r_star / c_star = -mu / k_R"
rcmo_branch_oddness: "M_Omega(-s) = -M_Omega(s); record-phase supported (imported, post-commitment)"
rcmo_retroactive_source_insertion: forbidden_stage_order_F23
sigma_retention_map: "sigma -> maintained terminal record; NOT DERIVED (named obligation)"
PSAC-EX2 returns (13 August 2026) — canonical C/B/R slice
canonical_slice_geometry: "D_C = x; D_B = x - y; D_R = y"
canonical_wheel_metric: "W_CC = W_RR = 12/31; W_BB = 21/124; crosses 0; six-scalar metric positive definite rank 6 (imported)"
canonical_CR_hessian: "(1/124) [[69, -21], [-21, 69]]; eigenvalues 12/31, 45/62; rank 2; nullity 0"
record_follow_ratio: "y = (7/23) x"
reduced_closure_stiffness: "K_C_red = 360/713 = 0.5049088359"
canonical_signed_curvature: "c_star = sigma * alpha_star * 713/360 = ±1.89935497564"
canonical_record_response: "±0.578064557803"
canonical_bond_mismatch: "(16/23) c_star = ±1.32129041784"
locked_record_comparison: "K = 69/124; c = ±1.72342228413; relaxation: stiffness -9.26%, response +10.21%"
bare_closure_comparison: "c = sigma * alpha_star * 31/12 = ±2.47741953344"
two_cell_comparison: "c(g) = sigma * alpha_star * (31 + g)/12; ±2.50405845316 at g = 1/3; analytic; one-cell limit exact"
full_physical_Z_C: "w_CC + 2 w_CB + w_BB - (-w_CB + w_CR - w_BB + w_BR)^2 / (w_BB - 2 w_BR + w_RR)"
Z_C_pass_conditions: "w_BB - 2 w_BR + w_RR > 0 and Z_C > 0; Z_C = 0 with alpha_star != 0 is a genuine failure"
physical_6x6_W_ledger: open_forward_return_required
PSAC-EX2B returns (13 August 2026) — positivity bounds
sign_safety: "Z_C > 0 for every slice-positive-definite metric; sign(c_star) = sigma always (Corollary 2.2)"
diagonal_insufficiency: "inf Z_C = 0 over PD metrics with canonical diagonals (Gram + epsilon-blend construction); not attained (Corollary 2.3, F29)"
one_sided_response_bound: "Z_C <= (sqrt(w_CC) + sqrt(w_BB))^2 = 69/124 + 6*sqrt(7)/31 = 1.068533; |c_star| >= 0.897495 under retained diagonals (Corollary 2.4)"
upper_response_bound: "none from positivity + diagonals; physical spectral gap load-bearing"
spectral_gap_interval: "lambda_min <= Z_C <= 2*lambda_max; alpha_star/(2 lambda_max) <= |c_star| <= alpha_star/lambda_min (Corollary 2.5)"
canonical_diagonal_envelope: "Z_C in [21/124, 24/31]; |c_star| in [1.238710, 5.662673]; canonical returns inside"
ex2_status: exhausted_at_current_source
next_declared_calculation: "NONE IN PSAC-1; measurement-side closure at EX5CE; vacuum-topology sequence EX6-EX8 remains the open Gate-T roadmap"
PSAC-MA1 candidate master action (13 August 2026)

```yaml
ma1_status: "candidate assembly to execute and falsify; NOT the uniquely derived physical action (F27)"
ma1_variable_set: "MASD parent: links U, record morphism Phi, completion X, fermions psi, bath q; six-defect vector D"
ma1_even_block: "1/2 D^dagger W_core D; canonical slice executed; full ledger open"
ma1_bath_block: "q^dagger C D + 1/2 q^dagger A_Q q; Schur reduction automatic on elimination; log-det retained in branch comparisons (imported warning)"
ma1_fermion_block: "psi_bar_L Gamma(X) psi_R + h.c. on the same transport as closure and gauge; no separate matter normalisation"
ma1_odd_source_block: "- sigma * alpha_star * <omega_C, D_C> on the gauge-typed Abelian closure line; sole first-order odd term"
ma1_exclusions: "no second RCMO odd term (pushforward obligation instead); no stacked full IORC cost (W as Hessian of eventual nonlinear history action) (F28)"
ma1_new_adjustable_coefficients: 0
ma1_canonical_reduction_check: "reproduces K_C_red = 360/713 and c_star = ±1.89935497564 exactly"
ma1_controlling_object: "adopted at R7: Gates S/R/M/T are four independent tests of this one action"
ma1_remaining_execution: "forward W ledger, A_Q, C at n = 3..6 on both branches; full-carrier attachment onto the Abelian line; RCMO/readout/matter/topology as reductions or pushforwards"
ma1_equation_provenance: "source note display equations stripped in transit; block forms are the pinned executed forms; correct against the original if any block differs"
full_carrier_compression: "open; target refined by EX1D to the gauge-typed Abelian line plus the three record-phase lines"
physical_sector_match_of_actual_MASD_differential: open
physical_boundary_certificate: open_CFB_branches_candidates_only
gate_S_grade: "strong partial pass R19; source structure closed; canonical response executed and positivity-mapped (EX2B); installation candidate-assembled (MA1); spectral envelope, forward block returns and RCMO-pushforward sigma-retention open"

# Gate R — readout
readout_family: "Phi_a, g_read = 2a - 1"
route_A_B_eff:
route_A_K_F:
route_A_D_F_DeltaP:
route_A_chi_pop: "0 exact through the scalar record-phase channel (EX3A); transverse channel open"
route_B_a_physical:
route_B_fixed_reference_provenance:
conjugation_invariance_broken_by:
readout_consistency_residual: "g_read * dchi/dalpha - chi_pop"
readout_disturbance:
pfdmi_s1_execution_status:
# PSAC-EX3A/EX3B returns (13 August 2026)
ex3a_record_phase_population_projection: "0 exact; scalar record-phase Route-
```

A channel closed negatively (Corollary 3.1)"
ex3b_phase_channel_projective_response: "delta j = i (delta y) j; d rho = 0 exact; P_perp delta j = 0 every edge (Corollary 3.2)"
ex3b_bond_hessian_status: "nonzero (unit branch y = x/2; canonical 7/23); response lies in the projectively invisible direction"
ex3_decomposition: "delta j = delta j_par + delta j_perp; visible response ~ |delta j_perp|/|j|"
ex3_decisive_scalar: "N_perp = sigma-odd |P_perp T c_star|; factorises through alpha_star/Z_C (Corollary 3.3)"
ex3_route_B_standing: "in reserve; Theorem 3 consistency executable if w_src returns nonzero"
PSAC-EX3C returns (13 August 2026)
ex3c_terminal_response_rank: "72 on the 72-dim physical Wilson tangent after gauge quotient; injective"
ex3c_sigma_min: "positive; VALUE PENDING RE-SUPPLY (stripped in transit)"
ex3c_no_vanishing: "sigma-odd curvature response cannot vanish at the terminal readout on the frozen EX2E carrier (Corollary 3.4)"
ex3c_response_floor: "sigma_min * 1.89935497564 per unit-normalised curvature tangent; not physically normalised (Corollary 3.5)"
ex3c_induced_current_contribution: "Frobenius ratio 1.05458 of the coordinate Jacobian norm; cosine PENDING RE-SUPPLY; material transverse ray motion"
ex3c_N_perp_status: "nonzero on the frozen EX2E carrier"
ex3c_seven_terminal_completeness: "locally complete; rank 72; NOT the binary observable (F31)"
ex3c_remaining: "source-native binary terminal row w_src with fixed-reference provenance; chi_pop = <w_src, R_vis(c_star t_sigma)> (Corollary 3.6)"
PSAC-EX3D through EX3O returns (13 August 2026)
ordered_turn_bias: "chi(alpha) = tanh(2 alpha)"
ordered_turn_bias_at_alpha_star: 0.957752384566601
ordered_turn_slope_at_alpha_star: 0.165420739713981
route_B_chi_pop: "0.165420739713981 * (2 a_phys - 1)"
first_cover_signed_bias_delta_K: 0.995570059549810
first_cover_activation_law: "DeltaP = delta_K * g_K"
existing_terminal_species_orientation_contrast: "0 exact under complete co-conjugation"
persistent_ledger_K_reconstructible: true
persistent_ledger_positive_negative_supports: orthogonal_exact
persistent_ledger_trace_distance: 1
persistent_ledger_fidelity: 0
persistent_ledger_orientation_expectation: 0.995570059549810
current_ledger_conditioned_channel_difference: "Phi_plus - Phi_minus = 0"
current_ledger_conditioned_diamond_norm: 0
current_ledger_to_R4_gain: 0
current_source_readout_status: exact_negative
physical_ledger_to_R4_gain: open
gate_R_grade: "physical open; exact current-source activation negative through EX3O"

Gate M — matter selection
mixed_third_jet_status: closed_at_declared_execution (imported)

```
full_tensor_residual_bound: "~1.15e-15 (imported)"
rrhf_conditional_residuals: "~1.934e-14 (L3), ~1.937e-14 (L4) (imported)"
# PSAC-EX4A returns (13 August 2026)
current_residual_jacobian_shape: "1200 x 2120"
current_residual_jacobian_rank: 1200
current_residual_tangent_dimension: 920
declared_local_gauge_dimension: 84
post_declared_gauge_residual_upper_bound: "836; upper bound only, not promote
d to physical moduli count"
D_score_stationary_classes: "not uniquely selected by current action"
U_role_stationary_classes: "not uniquely selected by current action"
eta_in_current_residual_action: false
eta_augmented_hessian_direction: flat_exact
eta_physical: "not selected; full rank persists on open admissible interval"
physical_score_rank: 72 (imported)
quark_bath_block_B_Q:
lepton_bath_block_B_L:
inter_sector_coupling:
L_M:
G_M:
D_M: "L_M^dagger G_M L_M"
lepton_branch_covariance:
CY3_recomputation_status: "conditional dual-route pass retained; not a select
or"
gate_M_grade: "Grade C: structural capacity with residual physical/source fre
edom (EX4A)"

# Gate T — topology and attachment
vacuum_complex_K_vac: open
boundary_1: open
boundary_2: open
chain_residual: "d1*d2 = 0 exact required"
loop_availability_group: "H^1(K_vac; Z7)"
H1_Z7: open
H2_Z7_surface_sector: "separate diagnostic; NOT the loop-holonomy criterion (
F32)"
integral_SNF: open_physical_matrix
order7_torsion: open_physical_matrix
ex5a_filled_heptagon_SNF: "[1]"
ex5a_filled_heptagon_H1_Z7: 0
ex5a_degree7_candidate_SNF: "[7]"
ex5a_degree7_candidate_H1_integral: "Z/7"
collective_unit_incidence_order7_torsion: "possible; counterexample SNF diag(
1,1,1,7); matrix pending re-supply (F33)"
primitive_hub_predicate_H: not_source_returned_F34
D_unres_operational: "max(|A_open(F)/~op| - 1, 0)"
A_open_map: open
fold_atom_count: 4
fold_binary_relation_count: 6
fold_complement_pair_count: 3
```

fold_relation_graph: "K_2,2,2"
fold_relation_automorphism_group: "C2 wr S3; order 48"
fold_to_C6_D6: "conditional on connected two-neighbour cyclic locality (F35)"
identity_I4_as_physical_closing_operation: fail_exact_F36
fold_commitment_instrument: "I_a(rho) = P_a rho P_a; sum P_a = I4; nonselecti
ve rank 4, nullity 12; idempotent; repeatable"
fold_1_plus_6_structure: conditional_structural_candidate
PSAC-EX5G through EX5R returns (13-14 August 2026)
first_cover_record_trigger: "T_rec = T_cover; executed completed-record clock
"
cover_is_commitment_outcome: false
correct_completion_order: "cover -> activation/commitment -> realised record
-> postcommitment resolution"
fold_exchange_covariant_character: "chi_bomega = (-1)^b * omega, unique up to
global relabelling (Corollary 6.2)"
notation_firewall: "fold commitment bit b in {0,1}; IORC orientation mark var
sigma in {-1,+1}; identification forbidden (F41)"
J_orient_expectation: 0.995570059549810
J_orient_second_moment: 0.997931470084622
J_orient_variance: 0.006771726612606
J_orient_irrep: "A1 reflection-even; exact parity fail against R4 (F42)"
EX5K
E84_role: "detailed edge/type implementation ledger; not primitive binary sel
ector"
R4_completed_record_role: "separate binary completed-record carrier"
R4_binary_basis_uniqueness: "C6-covariant unique up to global output-label ex
change (Corollary 6.5)"
R4_minimal_record_map: "Phi_pm(rho) = Tr(P_pm rho) |C_pm><C_pm|; unique minim
al pure-record map up to phase/refinement"
R4_branch_preserving_renewal: "V|C_pm> = exp(i chi_pm)|psi_pm>|pm>; unique mi
nimal form up to phases"
E84_to_Z2_primitive_origin: retired
E84_binary_reconciliation_map: "optional downstream cross-carrier bridge; not
primitive origin of R4 bit"
EX5L
cover_to_controller_current_derivative: 0
cover_controller_direct_term: "symmetry allowed, coefficient source-unreturne
d (F45)"
entropy_commitment_direction: "commitment => DeltaS >= k_B ln 2 for a binary
fact, under the programme's stated irreversible-record thermodynamic assumpti
ons"
entropy_as_generic_trigger: "not derived (F46)"
EX5M
loop_birth_rule: "new edge between already-connected endpoints => Delta beta1
= +1 exact"
K7_identification_of_diagnostic: "superseded/falsified by EX5O"
EX5N
fold_interface: "Sigma ~ S^2"
open_arc_complement_beta0: 1
closed_curve_complement_beta0: 2

```
fold_binary_separation: "exact topology; K7 segment identification unreturned (F48)"
# EX5O
K6_boundary_graph: "C6 already closed; beta1 = 1"
K7_graph: "W7 six-rim + hub/spokes; beta1 = 6"
seventh_constraint_role: "interior hub; not first loop-closing edge (F47)"
hub_boundary_test_vector: "q = (1,1,1,1,1,1,0); q^T L q = 6"
hub_relative_mode: "r = (1,1,1,1,1,1,-6); L r = 7 r exact"
hub_relative_static_eigenvalue: 7
seventh_edge_loop_birth_hypothesis: fail_exact
# EX5P
hub_relative_dynamic_eigenvalue: "-3/28"
finite_step_annihilation: false
K7_closure_catalogue_irreducible: true
direct_state_level_nonrecombinability: "fail (F49)"
record_irreversibility_definition: "no later record may contradict/overwrite the earlier fact (F50)"
record_preserving_reopening: "construction pass; working carrier may reopen"
# EX5Q
Hom_D7_Z2: "Z2; unique nontrivial map is orientation parity (F51)"
Hom_Z7_Z2: 0
inversion_even_Z7_binary_functions: 16
nonconstant_inversion_even_functions: 14
inequivalent_mod_global_bit_flip: 7
K7_role_in_commitment: "branch-neutral trigger/allowedness, not outcome selection"
closure_gated_commitment_instrument: "construction pass; primitive activation open"
# EX5R
MASD_closure_completion_block_type: "W_CH exists in full Hessian ledger"
wheel_W_CC: "12/31"
wheel_W_HH: "75/434"
wheel_W_CH: 0
wheel_W_BH: 0
wheel_W_RH: 0
wheel_nonzero_crosses: "W_JH = -33/434; W_TB = 3/248"
wheel_CH_zero_status: "exact by symmetry/support orthogonality"
MASD_H_equals_Fold_commitment_PVM: "false (F53)"
full_bath_mediated_W_CH: "possible in form; physical value unreturned; no insertion allowed (F52)"
closure_commitment_bath_dimension: 6
closure_commitment_carrier_identity: open
closure_invariance_residual: "epsilon_inv = ||(I - P_Q) A P_Q|| / max(||A P_Q||, epsilon_0)"
principal_angle_pass: "all six overlap singular values -> 1 (F54)"
source_defect_factorisation_condition: "ker J_D subset ker J_s"
HM4_residual: "R_HM4 = J_s (I - J_D^+ J_D); values open"
canonical_minimum_norm_coupling: "C_min = J_s J_D^+ conditional on R_HM4 = 0"
source_derived_mark_decomposition: "open (F55)"
# PSAC-EX5S through EX5AD returns (14 August 2026)
```

```
# EX5S
closure_operators_circulant: true
uniform_vector_common_eigenvector: exact
projected_nonuniform_six_plane_invariance: "epsilon_inv = 0 exact"
# EX5T
physical_commitment_bath: "continuum fluctuations of the same Phi-field as the closure coordinates (F56)"
whitened_intertwiner: "W = G^(1/2); exact isometric six-plane intertwiner"
intertwiner_singular_values: "1, 1, 1, 1, 1, 1"
discrete_seven_to_seven_identification: retired
field_level_carrier_bridge: "pass; conditional on constitutive single-source identification"
# EX5U
faithful_J_D_shape: "243 x 226"
faithful_J_D_rank: 183
faithful_J_D_nullity: 43
faithful_J_D_sigma_min_positive: 0.684040286651
faithful_J_D_sigma_max: 3.30225857912
scalar_density_carrier_dimension: 6
scalar_HM4_residual: "0 exact under P-HM12 first-order scalar-source typing"
scalar_HM4_machine_residual: 1.51e-15
scalar_HM4_blind_replication: 8.68e-16
all_regulator_branch_HM4_status: "analytic pass where retained scalar incidence/P-HM12 architecture holds; eight-point machine sweep owed"
marked_activation_from_HM4: "false (F57)"
# EX5V
terminal_record_finite_oddness: "M_Omega(-s) = -M_Omega(s)"
terminal_record_tangent_reversal: "D M_Omega(-s) = D M_Omega(s)"
record_descent_status: pass
first_order_tangent_selects_finite_mark: "false exact (F58)"
RCMO_sign_type: orientation_not_fold_commitment_polarity
Pi_mark: open
# EX5W
implemented_mark_operator: "L_(e,alpha,r) = P_r C_(e,alpha) U_e"
implemented_detailed_CP_map: "I_(e,r)(rho) = sum_alpha L_(e,alpha,r) rho L_(e,alpha,r)^dagger"
microscopic_mark_count: 319
record_producing_nonself_marks: 312
persistent_detailed_record_count: 84
PFDMI_ledger_orthogonal: true
QC1_merge_distinct_84_labels_within_declared_ledger: false
E84_to_Z2_as_QC1_quotient: "fail (F59)"
# EX5X
common_R4_PFDMI_carrier: "C^7 tensor C^50"
sharp_joint_measurability_condition: "[P_b, E_a] = 0 for all a, b"
rim_R4_overlap_squared: "1/6"
commutator_operator_norm: "sqrt(5)/6"
commutator_HS_norm: "sqrt(10)/6"
simultaneous_sharp_R4_existing_PFDMI_joint_instrument: "fail exact (F60)"
coarse_graining_84_removes_commutator_obstruction: false
```

required_attachment_order: sequential_or_layer_changing
EX5Y
post_R4_renewal_rays: "psi_pm(b_m) = exp(+/- i pi m/3)/sqrt(6)"
PFDMI_transition_probability_given_R4_branch: "K(y|x)/6 for both + and -"
detailed_record_branch_contrast: 0
binary_to_detailed_mutual_information: 0
first_detailed_transition_branch_information_in_working_ray: erased_up_to_global_phase
binary_ledger_no_overwrite: pass
branch_conditioned_postcommitment_PFDMI: "open (F61)"
EX5Z
binary_ledger_operator: "Z_L = Q_plus^L - Q_minus^L"
postcommitment_generator_decomposition: "G_post = I_L tensor G0 + Z_L tensor G1"
current_G1: 0
single_detailed_token_A2_information: absent
ordered_history_A2_available: true
allowed_memory_interaction: "-g_Lchi Z_L chi_future"
g_Lchi_source_return: open
EX5AA
B_Lchi_current: 0
B_Lchi_current_scope: "exact at n = 3, 4, 5, 6 and both branches; algebraic for the spectator-factorised action"
future_chirality_branch_difference_current: 0
EX5AB
fact_memory_kernel: "M(x,t;x',t') = G_ret(x-x', t-t') theta(t-t')"
memory_field: "Xi = M * rho_committed"
lambda_mem_primitive_status: open_phenomenological
scalar_memory_outcome_mark: "absent (F62)"
delta_rho_committed_delta_ZL: 0_at_declared_scalar_grain
FactMomentum_q_sign_equals_R4_or_Fold_bit: not_derived
EX5AC
fold_commitment_polarity: "b in {0, 1}"
fold_boundary_orientation: "omega in {-1, +1}"
fold_polarity_orientation_independence: exact
R4_equals_pure_fold_b: "not established (F63)"
outcome_specific_substrate_record_states: "rho_E^(0) != rho_E^(1) structural requirement"
outcome_sensitive_record_carrier: required
record_current_transport_if_DeltaPhi_nonzero: pass_leading_order
rho_E_b_to_Phi_b_embedding: open
record_sufficient_future_update: conditional_law_level_pass
EX5AD
single_source_scalar_record_density: "rho(x,t) = lim N_committed(V,t)/|V|"
scalar_count_density_encodes_fold_polarity: "fail exact (F64)"
marked_record_measure_candidate: "varrho(dx dt db)"
scalar_count_marginal: "rho_count = rho_0 + rho_1"
outcome_contrast_candidate: "rho_pol = rho_1 - rho_0; NOT orientation"
marked_measure_source_derivation: "open (F65)"
record_to_continuum_intertwiners_required: "iota_nk, pi_nk with pi_nk iota_nk

= I"
record_to_continuum_intertwiners_status: open
outcome_identity_injective_if_left_inverse_exists: exact
Delta_Phi_munu: open
EX5AE
generic_path_to_cycle_beta1: "0 -> 1 exact"
generic_cycle_birth_role: "diagnostic only; does not reopen the K7 seventh-hu
b first-loop hypothesis (F66)"
edge_hodge_kernel_path: 0
edge_hodge_kernel_cycle: 1
cycle_mode: "(1/sqrt(m)) * (1, ..., 1)"
topology_alone_is_persistent_record: false
renewal_visible_sequence: "P_m -> C_m -> P_m; exact visible return"
local_final_geometry_distinguishes_closure_history: false
distinguishability_export_premise: "complete dynamics injective/reversible/is
ometric"
local_many_to_one_reset_without_external_record: "impossible under premise (F
67)"
binary_external_record_min_dimension: 2
binary_external_record_min_capacity_bits: 1
exact_binary_history_count_after_n: "2^n"
exact_history_capacity_bits: "n"
hartley_history_information: "n ln 2"
independent_binary_history_entropy: "n h_2(p)"
equiprobable_history_entropy_bits: "n"
OR_record_role: "persistent existential fact only; not complete history (F68)
"
OR_record_capacity_bits: 1
OR_record_probability_one: "1 - (1-p)^n"
OR_record_entropy_limit_for_p_gt_0: 0
finite_exact_record_dimension: "D"
finite_history_bound: "2^n <= D"
finite_binary_commitment_bound: "n <= floor(log2 D) (F70)"
unlimited_exact_history_in_fixed_finite_closed_reversible_space: impossible
complete_local_renewal_with_external_history: possible
postrenewal_local_state_history_dependence: none_in_exact_reset_model
postrenewal_system_record_mutual_information: 0_in_factorised_exact_reset_mod
el
external_history_entropy: "n h_2(p) for independent events"
thermodynamic_entropy_identification: "not claimed (F69)"
EX5AE_grade: "exact mathematical pass plus conditional physical distinguishab
ility-export theorem"
Fold_mark_source_derivation_from_EX5AE: false
continuum_outcome_embedding_from_EX5AE: false
next_measurement_side_execution: "NONE IN PSAC-1"
EX5AF-EX5AY marked-record / relational-Fold returns (14 August 2026)
marked_sixplane_carrier_dimension: 12
marked_count_sector_dimension: 6
marked_polarity_sector_dimension: 6
current_scalar_marked_projection_rank: 6

current_scalar_marked_projection_nullity: 6
current_scalar_embedding_polarity_rank: "0 (F71)"
marked_embedding_transverse_condition: "K_p = W_p^dagger (I - P_count^Phi) W_
p > 0"
current_MA1_polarity_forcing: "0 (F72)"
current_MA1_polarity_response_W_p: 0
fold_relational_identity: "(-1)^b = chi_bomega * omega"
fold_bit_reconstruction: "b = (1 - chi_bomega*omega)/2"
independent_new_b_carrier_required_algebraically: false
K_zero_probability: 0.002068529915369
signK_global_binary_orientation: "false (F73)"
zero_sector_binary_extension_condition: "reflection acts freely on K=0 histor
y sector"
preferred_source_native_orientation_candidate: "varsigma in {-1,+1}"
canonical_varsigma_record_response: "r_star = 0.578064557803 * varsigma"
canonical_varsigma_record_separation: 1.156129115606
varsigma_to_record_response_injective_if_mu_nonzero: true
full_mark_retention_condition: "physical event quotient injective in varsigma
"
implemented_orientation_sectors_orthogonal: true
implemented_orientation_readout_confusion_matrix: identity
implemented_orientation_readout_disturbance: 0
physical_orientation_readout_admission: open
IORC_to_Fold_orientation_structural_map: "omega = +/- varsigma (F74)"
IORC_to_Fold_orientation_map_unique_up_to_global_sign: true
IORC_to_Fold_physical_carrier_attachment: open
fold_to_R4_channel_form: "E[Z_R4|b,omega] = g * (-1)^b * omega"
fold_to_R4_gain_range: "[-1, 1]"
deterministic_fold_to_R4_requires: "|g| = 1 (F75)"
current_MA1_fold_to_R4_gain: "0 (F76)"
physical_fold_to_R4_gain: open
fold_polarity_operator: "S_b = P_(0,+)+P_(0,-)-P_(1,+)-P_(1,-)"
fold_orientation_operator: "O_omega = P_(0,+)+P_(1,+)-P_(0,-)-P_(1,-)"
fold_combined_operator: "J_Fold = S_b O_omega"
fold_combined_operator_equals_chi_bomega: true
fold_combined_positive_sector: "P_(0,+)+P_(1,-)"
fold_combined_negative_sector: "P_(0,-)+P_(1,+)"
second_primitive_fact_source_required_at_fold_level: "false (F77)"
whitney_fold_embedding: "iota_W(b,omega) = (-1)^b P_2form + omega O_1form"
whitney_left_inverse: "pi_W iota_W = I exact (F78)"
minimum_classical_continuum_record_dimension_for_b_and_omega: 2
full_reversible_fold_Hilbert_dimension: 4_complex
one_continuum_line_retains_combined_character_only: true
physical_VERSF_whitney_embedding: open
PSAC-EX5AZ through EX5BP — extended marked-record activation sequence (14 A
ugust 2026)
fold_record_target_dimension: 2
current_MA1_fold_record_rank: 1
current_MA1_fold_record_singular_values: "[0.578064557803, 0]"
current_MA1_fold_record_gram_nonzero: 0.334158632987978

current_MA1_fold_left_inverse: false
scalar_to_symmetric_tensor_restores_b: "false (F79)"
fold_commitment_kraus_rank: 4
minimal_fold_stinespring_pointer_dimension: 4
finite_shift_full_support_gaussian_exact_pointer: "false (F80)"
fold_polarity_tensor_type: "intrinsic symmetric trace-free Hessian"
fold_polarity_tensor_formula: "H_ab = D_a D_b m_b - (1/2) gamma_ab Delta m_b"
fold_polarity_tensor_b_parity: odd
fold_polarity_tensor_omega_parity: even
fold_polarity_tensor_physical_embedding: "open (F81)"
zero_background_fold_hessian_installation: "fail_leading_order"
background_assisted_fold_hessian_installation: "open (F82)"
scalar_single_source_fact_separating: "false (F83)"
primitive_single_source_required_type: "fact-separating marked commitment configuration"
scalar_count_role: marginal_only
minimal_fold_complete_record: "(r, varsigma)"
minimal_fold_complete_record_states: 4
fold_R4_IORC_bijection: "exact up to global sign conventions"
untyped_outcome_slot_R4_identification: "open (F84)"
joint_R4_orientation_PVM: exact_construction
joint_four_state_completion_instrument: exact_construction
joint_same_event_primitive_activation: open
first_cover_endpoint_R4_population_contrast: "0 (F85)"
first_cover_history_endpoint_separation: exact
first_cover_readout_gain_symbol: g_cover
first_cover_readout_gain_range: "[-1, 1] (F86)"
first_cover_R4_expectation: "0.995570059549810 * g_cover"
K_zero_R4_output: "I/2"
current_g_cover: 0
unmarked_Doob_determines_g_cover: false
marked_amplitude_decomposition_required: true
Reflection_R4_projector_identity: exact_up_to_output_exchange
Reflection_history_equals_IORC_varsigma: not_derived
h_equals_J: "false as derivation (F87)"
h_delta_definition: "(1/2) Tr_E1[Z_R dH_c/dm |_0]"
h_delta_marginal_load_formula: "Lambda_c * N * g^2/6 * [2/(M_kappa^2 + eta) + 1/(M_kappa^2 + 4 eta)]"
h_delta_sign: positive_non_degenerate
h_delta_grade: conditional_exact
h_delta_relation_to_J: "h_delta = Lambda_c * N * J"
primitive_H_c_of_m: not_returned
marginal_load_identification: open
MA1_record_Yukawa_mixed_jet: 0
PFDMI_EX2A_record_derivative_rank: 5
PFDMI_EX2A_record_effect_derivative: "0 (F88)"
PFDMI_EX2A_reduced_CAR_record_derivative: 0
current_R4_Yukawa_backreaction: 0
PSAC-EX5BQ through EX5CC — postcommitment support/history descent (15 August 2026)

EX5BQ_support_changing_PFDMI_history_dependence: 0_current
EX5BQ_old_ledger_to_reduced_matter_derivative: 0_current
EX5BQ_status: "support changes by representation type, not by retained history (F89)"
EX5BR_minimal_ledger_current_interaction: "-Z_L * sum_e omega_C(e) * j_e^dag H_R j_e"
EX5BR_projective_visibility_condition: "Var_j(H_R) > 0"
EX5BR_current_H_R: "not source returned; current factorised route zero"
EX5BS_old_phase_survival_symbol: "s_old in [0,1]"
EX5BS_conditional_present_branch_separation: "Delta q = (pi/9) * s_old"
EX5BS_physical_entanglement_status: open
EX5BS_gaussian_entanglement_status: diagnostic_conditional
EX5BT_known_constraint_survival: "s_old_known = 1 exact on explicitly returned constraint set"
EX5BT_physical_s_old: open
EX5BT_phase_survival_nonidentifiability: "exact (F90)"
EX5BU_FCHI_hard_phase_cut: 0
EX5BU_EX2A_effect_support_phase_cut: 0
EX5BU_EX2B_support_phase_cut: 0
EX5BU_MASD_occupied_support_phase_cut: 0
EX5BU_completion_strain_phase_cut: 0
EX5BU_soft_phase_Hessian: nonzero
EX5BU_physical_fullcarrier_commitment_cut: open
EX5BV_precommitment_unresolved_equals_postcommitment_memory: "false (F91)"
EX5BV_outcome_specific_record_requirement: "rho_E^(0) != rho_E^(1)"
EX5BV_Z7_memory_role: "generic commitment/transport residue; outcome blind"
EX5BV_generic_history_future_response: conditional
EX5BV_outcome_future_response_through_scalar_memory: 0
EX5BW_history_forward_reverse_probability_ratio: "46.3399499471 = exp(4 alpha_star)"
EX5BW_ordered_history_residue_nonzero: true
EX5BW_R4_continuation_cones_equal_current_D36: true
EX5BW_next_R4_probability_laws_equal: true
EX5BW_current_history_backreaction: "0 (F92)"
EX5BX_EX2B_support_order_dependence: 0
EX5BX_MASD_terminal_support_order_dependence: 0
EX5BX_topological_overlapping_cycle_order_effect: "nonzero_construction (F93)"
EX5BX_Ext_AB_not_equal_Ext_BA: pass_construction
EX5BX_DeltaPi_hist: nonzero_construction
EX5BY_admissibility_matrix: "A_n(z, z')"
EX5BY_trap_to_admissibility_support: nonzero
EX5BY_minimal_DeltaPi_adm: "-|z_B><z_B|"
EX5BY_minimal_DeltaPi_rank: 1
EX5BY_minimal_DeltaPi_operator_norm: 1
EX5BY_rho_committed_equals_MASD_rho_i: "false_type (F94)"
EX5BY_trap_to_MASD_work_projector: open
EX5BZ_current_PFDMI_work_projector_history_dependence: 0
EX5BZ_fixed_continuation_faithful_intertwiner: "impossible_current_architecture (F95)"

EX5BZ_rank1_kernel_condition: "I_AW |z_B> = 0"
EX5BZ_F2F_reversal_odd_kernel_dimension: 12
EX5BZ_required_completion: "history-dependent work projector or history-dependent intertwiner"
EX5CA_controlled_renewal: "V_h = J_h Pi_h + D_h (I - Pi_h)"
EX5CA_isometry: exact
EX5CA_active_pullback: "V_h^dag P_A V_h = Pi_h"
EX5CA_ledger_controlled_isometry: "V_ctrl = sum_h P_h^L tensor V_h"
EX5CA_no_overwrite: "exact (F96)"
EX5CA_min_discarded_dimension_for_rank_r_loss: r
EX5CA_rank1_min_discarded_dimension: 1
EX5CA_rank1_work_only_Stinespring_environment_dimension: 2
EX5CA_fitted_scalar_required: false
EX5CA_source_selection: "open (F101)"
EX5CB_PFDMI_export_rank: 12
EX5CB_export_capacity_sufficient_for_rank1_discard: true
EX5CB_topological_discard_equals_PFDMI_export: "not_derived (F97)"
EX5CB_native_kappa_to_s_e: not_returned
EX5CB_finite_s_hard_cut: "fail_exact (F98)"
EX5CB_infinite_s_full_export_limit: pass_exact
EX5CB_export_role_equivalence: construction_pass
EX5CC_trap_indicator: "kappa_l = Theta(C_l - C_star) (F99)"
EX5CC_trap_indicator_idempotent: true
EX5CC_private_rim_face_edge_isometry: "R^dag R = I_6"
EX5CC_export_projector: "Q_exp = R diag(kappa) R^dag"
EX5CC_export_projector_rank: "sum_i kappa_i"
EX5CC_hard_export_isometry: "V_kappa = (I - Q_exp) tensor |K> + Q_exp tensor |E>"
EX5CC_hard_export_isometry_exact: true
EX5CC_continuous_export_parameter_required: false
EX5CC_face_edge_selector_unique_without_minimality: "false (F100)"
EX5CC_private_rim_unique_if_rank1_and_D6_covariant: conditional_exact
EX5CC_native_PFDMI_kappa_controlled_export_projector: false
EX5CC_same_action_provenance: "open (F102)"
PSAC-EX5CD — common-action commitment control (15 August 2026)
EX5CD_fold_trap_indicator: "kappa_l = Theta(C_l - C_star); source-native in Fold topology"
EX5CD_MASD_closure_defect: "D_C(p) = vacuum-relative plaquette-holonomy logarithm"
EX5CD_C_l_equals_function_of_MASD_D_C: "not source derived (F103)"
EX5CD_gauge_invariant_trap_functional_capacity: "pass_exact (F104)"
EX5CD_independent_seventh_defect_required: false_if_derived_functional
EX5CD_independent_inserted_trap_defect: "would enlarge MASD primitive defect census (F105)"
EX5CD_controlled_keep_Kraus: "(I - Q_h) K_mu"
EX5CD_controlled_export_Kraus: "Q_h K_mu"
EX5CD_Kraus_completeness: exact
EX5CD_gauge_covariance_if_Q_covariant: exact
EX5CD_ledger_no_overwrite: exact
EX5CD_continuation_faithfulness: "sum_mu K_mu^dag Q_h K_mu = I - Pi_adm(h)"

EX5CD_edge_only_selector_form: "Q_edge = sum_e q_e P_e"
EX5CD_edge_fibre_saturation_condition: "I - Pi_adm(h) = sum_e q_e(h) Pi_e"
EX5CD_edge_selector_general_sufficiency: false
EX5CD_private_rim_continuation_faithful: "not established (F106)"
EX5CD_native_common_action_Q_trap: false
EX5CD_current_EX2D_as_physical_topological_quarantine: fail_current_source
EX5CD_status: "PASS algebraic/CPTP/gauge/no-overwrite; FAIL current same-acti
on return; physical selector open"
PSAC-EX5CE — physical mark-resolution no-go (15 August 2026)
EX5CE_target_forbidden_projector_rank: 1
EX5CE_positive_effect_rank_lemma: "rank(sum selected positive effects) >= max
rank(selected effect)"
EX5CE_12edge_internal_fibre_rank: 50
EX5CE_12edge_rank1_boolean_saturation: false
EX5CE_84_effect_ranks_by_terminal_type: "[15, 15, 19, 15, 22, 22, 31]"
EX5CE_84_min_physical_effect_rank: 15
EX5CE_84_rank1_boolean_saturation: false
EX5CE_319_effect_rank_distribution: "rank2: 288; rank49: 24; rank50: 7"
EX5CE_319_min_effect_rank: 2
EX5CE_319_rank1_boolean_saturation: false
EX5CE_1092_fine_effect_rank_distribution: "rank1: 612; rank2: 408; rank3: 24;
rank6: 12; rank9: 24; rank18: 12"
EX5CE_1092_rank1_capacity: true
EX5CE_1092_rank1_physical_frame_invariance: "false (F108)"
EX5CE_generator_frame_rotation: "84 summed effects invariant; individual fine
effects change O(1)"
EX5CE_84_effect_common_commutant: scalar
EX5CE_nontrivial_common_reducing_projector: "false (F110)"
EX5CE_min_algebraic_rank1_grain: 1092
EX5CE_min_source_invariant_physical_rank1_grain: not_returned
EX5CE_record_orthogonality_implies_sharp_system_support: "false (F107)"
EX5CE_existing_classical_mark_hierarchy_sufficient: false
EX5CE_status: "EXACT NO-GO for Boolean hard selector at 12/84/319 physical gr
ains; 1092 rank-one atoms frame-dependent (F109)"
measurement_side_PSAC1_closure: "EX5CE"
next_programme_problem: "trap-conditioned frame-invariant non-Boolean operato
r-algebra selector versus new history/configuration-resolved primitive carrie
r"
physical_vacuum_complex_K_vac: open
holonomy_classes:
holonomy_occupancy:
holonomy_response_spectrum: "{0.753020396283, 2.445041867913, 3.801937735805}
; sum 7; min poly l^3-7l^2+14l-7 (imported, conditional)"
matter_vacuum_attaching_map_V:
family_holonomy_W_Delta: "exp(i*5*pi/6); 150 deg; reverse 210 deg (imported e
xact)"
family_holonomy_level3_deg: 176.5074504467 (imported)
family_holonomy_level4_deg: 155.8501772202 (imported)
gamma_0:
gamma_ax:

```
coterminality_residual:
L_ax:
L_ax_family_relation:
gate_T_grade: "Gate T-A (measurement-side history/admissibility) closed throu
gh EX5CE at current-paper boundary; primitive same-action sharp selector not
returned; existing classical PFDMI mark hierarchy insufficient; Gate T-B (vac
uum topology/occupancy/attachment) remains open"
gate_T_A_history_admissibility: "closed to the R19 boundary (through EX5CE)"
gate_T_B_vacuum_topology_occupancy_attachment: "open (EX6-EX8 roadmap)"

# Electromagnetic compatibility
pre_fact_closure_weight: "1/128 under P14 + K=7 (imported, not reopened)"
eta_gate: "14/15 conditional on physical TPB saturation (imported)"
p_EM_candidate: "7/960; reciprocal 137.142857..."
TPB_saturation_status: companion_scope
QED_matching_status: companion_scope
em_compatibility_check:

# Selection discipline
standard_model_target_used_for_selection: false
tolerances_frozen_before_execution:
cross_gate_consistency:
common_source_certificate:
excluded_scope_untouched: "D20-D26, D46, EM load-bearing items"
overall_grade:
```

PART IX — VERDICT DISCIPLINE AND CONCLUSION

35. Scientific verdict template

The final paper permits exactly four outcomes, reported per gate and in aggregate, each row carrying its claim grade from §2.

Grade	Meaning
A — Primitive closure pass	All four gates pass and one frozen source chain uniquely selects and attaches the physical structures.
B — Partial primitive pass	Some gates close primitively; the others are reported open at their own grades, with no cross-subsidy.
C — Structural capacity only	The required structures exist and are mutually compatible, but source selection remains non-unique; the residual freedom is published, not hidden.
D — Physical negative result	A proposed bridge fails and is retired; the failure is published at full prominence and is not repaired in-paper.

No failure is repaired inside the same paper by introducing a new fitted coupling, adjusting a tolerance after execution, or selecting a branch or regulator retrospectively.

36. Conclusion

VERSF has reached a different stage. The major question is no longer whether the framework has enough mathematical freedom to contain gauge structure, persistent records, chirality, phase, generation geometry or matter couplings; in each of these cases it demonstrably does. The problem is now the opposite one:

Can the theory eliminate the remaining freedom?

A fundamental theory is not complete merely because it can represent the Standard Model. It must explain why the physical structures selected by nature are those structures rather than other equally admissible members of the mathematical family. PSAC-1 therefore treats every unresolved freedom as a source-selection problem with a named decisive test. The irreversible history must either be shown to be the physical signed closure source, or it must not. The physical readout must either be returned, or remain absent. The representation-resolved matter law must either be selected by the primitive action, or remain a conditional solution. The Z_7 vacuum structure must either exist, be occupied and attach to matter, or it must not. The 150° closed family phase must either be inherited by the physical axle comparison loop, or remain an invariant of a different carrier.

The latest Gate-T executions move the programme beyond the R13 diagnosis. The closure-carrier question itself is no longer merely a six-dimensional representation match. The source-returned closure operators preserve the nonuniform six-plane exactly, and the later continuum construction identifies the physical commitment bath with fluctuations of the same Φ-field from which the closure coordinates are projected. The exact whitened map is an isometric intertwiner between those physical six-planes, with all six singular values equal to one. This retires the old direct seven-vertex identification and removes the carrier coincidence problem at the corrected field level.

The next source layer also advances. Once the first-order commitment source is correctly typed as a zero-sum scalar density source, the faithful constitutive-current/divergence block proves that the entire six-dimensional source carrier lies in the primitive defect row space. The HM4 residual therefore vanishes analytically, with the existing machine execution returning 1.51×10^{-15} and blind replication 8.68×10^{-16}. The bath-mediated route has consequently passed its first-order scalar source-descent gate. This is not a derivation of physical outcome marks: it says the primitive architecture can drive the commitment-density sector; it does not say which fact is written.

The marked-record calculations then show why that distinction matters. A genuine signed terminal orientation record exists and descends faithfully, and the detailed PFDMI architecture already possesses exact 84-class marked operations. But the 84 persistent records are mutually distinguishable, so physical record equivalence cannot collapse them into the binary fact. Nor can the sharp R4 and existing PFDMI instruments simply be declared two simultaneous views of one event: on their common microscopic carrier the relevant effects fail the sharp-projector commutation test exactly, with operator-norm obstruction $\sqrt{5}/6$. The viable order is sequential. Yet applying the existing PFDMI law after R4 renewal gives identical detailed probabilities for the two R4 branches and removes their difference from the reopened working ray after the first detailed transition. The current binary ledger is therefore a perfect persistent memory but a spectator: the current post-commitment mixed ledger-to-future derivative is exactly zero at every admitted regulator and branch.

The wider history-memory construction shows that this spectator behaviour is not a general prohibition against causal memory: VERSF already contains a retarded kernel through which previous commitments can affect future dynamics. The missing information is more specific. The declared memory source is the scalar density of commitment events, so it remembers that commitments occurred rather than which committed outcome occurred. The newer Fold and commitment-cost results make that omission physically decisive: the true Fold commitment polarity is independent of reversible orientation, and different realised polarities must leave physically distinct substrate records, while the present Single-Source record density is defined only as the scalar count density of commitment events. Two histories differing solely in which polarity was realised therefore have identical scalar density, so the scalar density cannot be the complete carrier of physical fact identity.

The remaining measurement-side problem can now be stated without ambiguity. VERSF requires one primitive fact-producing source, but that source must preserve the mark of the fact. A minimal candidate is an outcome-marked record measure whose scalar marginal is the existing commitment density, but the candidate is not yet a physical derivation. The physical test is the HCMR carrier bridge: construct source-derived intertwiners from the discrete committed-record carrier into the continuum parent and back, with the left-inverse condition, preserving the outcome labels, terminal equivalence, operation order, regulator blocking and readout probabilities. If the mark is carried by the master-action field itself, the decisive return is the field difference between the two commitment polarities; once that difference exists, the already-derived unique record current transports it automatically. Until that embedding is returned, the scalar event-count field must not be credited with remembering which fact occurred.

The renewal calculation adds one further structural boundary. A closure event and a permanent fact are not the same object. In the clean path-to-cycle diagnostic, the first cycle is born exactly and can subsequently be removed exactly, returning the visible geometry to its starting point. The past is therefore not protected merely because a loop once existed. What protects it, under distinguishability-preserving complete dynamics, is that a local reset cannot identify two globally distinct alternatives without exporting their distinction. This supplies a precise mathematical architecture for the outcome-record necessity already exposed by the Fold analysis: renewal may remove the event from the working carrier, but it cannot simultaneously remove it from the complete state unless historical distinguishability is genuinely discarded.

Repeated commitments sharpen that statement quantitatively. Preserving every sequence of n independent binary commitments requires 2^n distinguishable history states, or n bits of exact capacity. No fixed finite carrier can do this indefinitely. A single persistent yes/no record can be reused only because it answers a coarser question and merges the detailed histories. Conversely, none of this requires the working system itself to accumulate historical disorder: the local state can renew to the same state after every event and carry zero final mutual information with the retained record, while the historical information resides in the external record sector. This cleanly separates renewal of the present from erasure of the past.

The post-EX5BP calculations now change the interpretation of the remaining measurement-side problem. The first support-changing PFDMI refinements do not make the record operative: their projectors are representation dependent but history independent, and the reopened working carrier remains the same for every retained history. Nor does the mere existence of a strongly ordered record solve the problem. The frozen D36 law gives a particularly sharp counterexample: the two orientations of a short history differ in likelihood by more than a factor of forty-six, exactly $e^{(4\alpha\star)}$, yet after quotienting absolute wheel position their future R4-visible continuation laws are identical. History can therefore be stored, perfectly ordered and strongly chiral while remaining dynamically spectator.

The earlier fact-formation topology supplies the missing structural idea. Commitment does not need to act on the future through an added memory force. By trapping a topological route it can change the set of later operations that remain physically admissible. Explicit overlapping-cycle constructions give histories for which one commitment order is admissible while the reverse is not, so the continuation cones differ. The History-Measure admissibility graph converts this directly into a nonzero projector difference, rank one for the minimal witness. The current PFDMI working projector does not yet inherit that difference, and no fixed continuation-faithful map into its history-independent renewed support can do so.

There is no quantum-mechanical obstruction to the history-dependent renewal required by the topological fact law. A ledger-preserving isometry can reopen precisely the continuations which remain admissible and route those excluded by earlier commitments into an orthogonal inaccessible sector. The existing PFDMI export carrier has sufficient capacity, and the Fold topology supplies a persistent binary trap indicator without a fitted coupling. EX5CD strengthens this substantially: once a physical history projector is available, splitting the existing Kraus family into retained and exported branches preserves completeness exactly, may preserve gauge covariance, and leaves every old ledger sector untouched. The full physical requirement reduces to the single continuation-faithfulness identity $\Sigma_\mu K_\mu^\dagger Q_h K_\mu = I - \Pi_{adm}(h)$.

The remaining obstacle is not the existence of a quantum implementation but the physical resolution of its selector. The source does not yet derive the Fold threshold functional on the MASD variables, and an edge-level controller can reproduce a topological commitment lock only when the complete forbidden continuation set is saturated on whole edge fibres. EX5CE closes that question for every presently admitted classical PFDMI record grain. The minimal topological witness requires a rank-one hard cut. An edge decision acts on a full internal fibre; the eighty-four source-invariant retained effects have minimum rank fifteen;

and the three-hundred-and-nineteen microscopic marked effects have minimum rank two. Positivity therefore excludes an exact rank-one hard selector as any Boolean union of the physical twelve-, eighty-four- or three-hundred-and-nineteen-level outcomes.

The first rank-one effects appear only in the finer one-thousand-and-ninety-two current/terminal decomposition. They do not provide the missing physical selector: their identity changes under arbitrary rotation of the unobserved current-generator frame while the physically retained eighty-four-effect law remains invariant. Nor is there a hidden common orthogonal reduction of that physical law; its complete effect algebra has scalar common commutant. Perfectly distinguishable output records are therefore not the same thing as a sharp decomposition of the pre-event continuation support.

This is the appropriate closure point for PSAC-1. The paper has established a structural route from irreversible commitment to persistent history and from persistent history to changed future admissibility; proved that such history-conditioned support admits an exact no-overwrite quantum renewal; identified sufficient existing capacity for the discarded information; and proved that the current source-invariant classical PFDMI mark hierarchy does not contain the minimal sharp commitment selector required to make the construction primitive. Continuing within the same paper would require introducing a qualitatively new mechanism rather than executing another unresolved parameter of the present one.

The next programme therefore begins from a clean fork. Either the irreducible algebra generated by the existing physical effects contains a source-derived, frame-invariant, non-Boolean history-conditioned operator whose spectral projector satisfies the continuation-faithfulness identity, or the primitive theory requires a genuinely history/configuration-resolved continuation carrier beyond the present mark alphabet. That problem is deliberately left to a subsequent paper. It may not be used retrospectively to upgrade the primitive grade of PSAC-1.

The independent vacuum-topology obligations are unaffected by this measurement-side closure. The actual physical vacuum complex, $H^1(K\_vac; Z_7)$, the integral Smith-normal-form and order-seven torsion, nontrivial physical occupancy, matter-loop attachment and physical axle-loop inheritance remain open and retain their existing Gate-T grades. PSAC-1 therefore closes neither by claiming full primitive Standard-Model completion nor by leaving an unspecified mechanism behind, but by locating the exact point at which the presently derived architecture stops and the next physical construction must begin.

Appendix A — Inherited numerical baseline

All values are imported frozen returns of the controlling predecessor and companion threads, consumed at their stated grades; none is recomputed or reselected here.

Imported return	Value	Grade
One-Bit affinity $\alpha\star$	0.959001109719975	imported exact (three-way consistent)
Two-turn conditional orientation bias	0.957752384566601 = $\tanh(2\alpha)$	imported exact identity
Ordered-history chirality expectation $\langle\chi_2\rangle$	0.334169477947982	imported execution
First-cover fluctuation relation	$P(K = k)/P(K = -k) = e^{(2\alpha k)}$	exact path-pair relation
First-cover statistics	$P(K > 0) = 0.996750764817216$; $P(K < 0) = 0.001180705267406$; $P(K = 0) = 0.002068529915369$	imported execution
Conditional preferred sign; odds	0.998816847345935; 844.199473258	imported execution
Wheel score identity	$F_C = \omega_C$; families coincide under $\varepsilon_C = \sigma\alpha$	exact on canonical wheel
History/R4 carrier intertwiner	$\mathrm{Hom}_{D_6} = 0$; bridge must be conditioned CP	exact
Scalar, pure-phase, conjugation readout routes	all exactly zero population projection	exact no-gos
EX2E orientation forcing	$\partial_\alpha D_J = 0$; residual frame tangent ≤ 836	exact; count imported
Readout classification	Φ_a one-parameter family; $g_{read} = 2a - 1$	exact
Mixed third jet $T_{X\psi\psi}$	nonzero; second jet exactly zero at zero-fermion vacuum	exact typing
Full completion tensor descent	residual $\leq \approx 1.15 \times 10^{-15}$	imported execution
Old universal CY3′ residuals	u 0.373851; d 0.381211; e 0.493033; ν 0.448473	imported execution
RRHF conditional CY3′ residuals	$\approx 1.934 \times 10^{-14}$ (L3); $\approx 1.937 \times 10^{-14}$ (L4)	conditional action-level pass
Physical score rank	72, persisting on a continuous η-interval and across frames	exact structural result
Completion transfer graph	rank 4; components {Q, u, d} and {L, e, N}	exact
Lepton persistence increment	$\sigma_\tau - \sigma_\mu = 1$ within the counting law	exact

Imported return	Value	Grade
Lepton maintenance form	$D\_M = L\_M^\dagger G\_M L\_M$	exact algebraic equivalence
Projected K7 Gram trace at $\sigma/d = 0.8$	31.771654	imported execution
Direct Fourier-plane generation assignment	fail	imported negative
C_6/Z_7 equivariant identification	impossible (coprime characteristic polynomials)	exact obstruction
Conditional Z_7 response spectrum	{0.753020396283, 2.445041867913, 3.801937735805}; sum 7; $\lambda^3 - 7\lambda^2 + 14\lambda - 7$	exact conditional
Closed family holonomy	$W\_\Delta = e^{(i\cdot 5\pi/6)}$; 150°; reverse 210°	exact on frozen family carrier
Finite-regulator triangle phases	176.5074504467° (L3); 155.8501772202° (L4)	imported
Pre-fact closure weight	1/128 under P14 + K = 7	exact foundational consequence
Interface throughput	14/15 conditional on physical TPB saturation	exact support rigidity
Structural EM candidate	p_EM = 7/960; reciprocal 137.142857…	exact structural candidate
Canonical-wheel closure Fisher weight W_CC	12/31	imported execution
Two-cell closure Fisher family	12/(31 + g); 18/47 at g = 1/3; bridge component 0	imported graph-level execution
Closure-sector multiplicity on declared wheel tangent	1, the unique (A_2, m = 0) direction	imported decomposition
Minimum-norm defect-lift right-inverse residual (finite cell)	6.86×10^{-15}	imported execution
Canonical separable history branch	G_op = I; C = 0; W_prim = W_core	imported
Bath-resolved HMGBC quadratic architecture	centred bath; bilinear defect coupling; Ran C ⊆ Ran A_Q	imported
EPMD uniform bond defect and mixed return	$D\_B^{(1)} = i(\theta - y)$; $(J\_B\, q)^T(J\_B\, r) = -1$	imported execution

Imported return	Value	Grade
RCMO branch-odd record derivative	$M\_\Omega(-s) = -M\_\Omega(s)$; record-phase supported	imported execution, post-commitment
Faithful gauge-link internal dimension	12 per edge (8 + 3 + 1); 144 over the wheel	imported construction
Faithful record carrier	36 phases + 36 stretches; 18 stretch directions coboundary-flat	imported
Differential orders at the symmetric vacuum	gauge 2; bosonic completion 2; CAR/Fock 3	imported audit
Canonical wheel history metric, C/B/R slice	$W\_CC = W\_RR = 12/31$; $W\_BB = 21/124$; crosses 0; positive definite rank 6	imported execution
EX2E projective differential	depends only on $P\_\perp\delta j$; scalar magnitude, sign and phase removed exactly	imported instrument typing
Master bond record-transport variable	twelve-dimensional; intrinsic record-link directions beyond endpoint-frame gauge modes	imported
Residual-tangent terminal response	rank 72 after gauge quotient; $\sigma\_min > 0$ (value pending re-supply); induced-current Frobenius ratio 1.05458	imported execution

Appendix B — Falsifier ledger

Falsifier labels are local to PSAC-1.

- **F1 — Wheel promotion:** $F\_C = \omega\_C$ on the wheel is called the physical theorem before the full carrier lift.
- **F2 — Reversible sign creation:** quadratic stiffness is credited with choosing orientation by itself.
- **F3 — Null-score repair:** a failed physical score lift is repaired by manually inserting ω_C into the physical tangent, or an unsupported source component is silently regularised through a pseudo-inverse.
- **F4 — Exact-readout insertion:** $a = 1$ is chosen because exact readout is desired rather than derived.
- **F5 — Frame-motion promotion:** arbitrary motion in the unresolved frame tangent is counted as physical readout without its ΔP-projection.
- **F6 — Carrier-identity smuggling:** the ordered-history and R4 carriers are declared identical despite the exact intertwiner obstruction.
- **F7 — Conjugate-visibility overclaim:** projective separation is called Born-level observability despite the exact conjugation no-go, or a claimed readout reference co-transforms with the branch.

- **F8 — Rank selection:** rank 72 is used to select η or the numerical score strength.
- **F9 — Target feedback into the matter law:** D_score or U_role is chosen or adjusted from observed masses or mixings, or the CY3′ recomputation is used as a fitting target.
- **F10 — Universal-bath restoration:** quark and lepton sectors are forcibly recombined without a source-derived inter-sector coupling.
- **F11 — Availability/occupancy conflation:** nonzero H^1(K_vac; Z_7) is called a physically occupied loop class, or nonzero H^2(K_vac; Z_7) is used as either loop availability or occupancy. Availability, occupancy and attachment are three distinct gates.
- **F12 — Coefficient/torsion conflation:** use of Z_7 coefficients is called proof of intrinsic order-seven topology without the integral Smith-normal-form calculation.
- **F13 — Phase-value promotion:** 150° is called the axle phase without a physical co-terminal history map, or the comparison is run before the co-terminality residual passes.
- **F14 — Phenomenological phase selection:** the loop orientation or phase branch is selected after comparison with CKM or other phenomenology.
- **F15 — Representation-matching overclaim:** the correct Z_7 three-plane representation type is called flavour physics without availability, occupancy and attachment all passing.
- **F16 — Electromagnetic reopening:** the 1/128 prior is treated as an open post-birth dynamical parameter, or any gate output is used to reweight it.
- **F17 — Retrospective branch or regulator selection:** the branch or regulator closest to experiment is selected after execution.
- **F18 — Cross-gate evidential subsidy:** a pass at one gate is used as evidence for, or to relax the tolerance of, another gate.
- **F19 — Tolerance drift:** a residual tolerance, quotient definition or admissibility class is adjusted after seeing the execution result.
- **F20 — Covector/injection conflation:** the closure differential covector B_C = σ^T/m is treated as the physical defect injection, or the 1/m average-curvature factor is inserted into the physical score as a free coupling.
- **F21 — Canonical-branch promotion:** the exact canonical separable-branch identity S_C = ω_C is promoted to the selected nonseparable, multi-cell physical branch beyond the proven Gaussian bath-protection scope, or without the full typed-carrier transport.
- **F22 — Bath-architecture overreach:** the Gaussian Bath-Protection Theorem is cited for a bath with an independent orientation-odd linear source, an odd defect coupling or non-Gaussian structure, without the corresponding extension being derived from the source.
- **F23 — Pre-fact record-source insertion:** a nonzero pre-fact record source h_R is asserted from post-commitment branch-oddness (RCMO) or from shared parity, without a source-native same-action map σ → r_terminal existing before the record enters the preparation law. Letting the eventual record participate in deciding the event that creates it is a stage-order violation, not a derivation.

- **F24 — Premature electromagnetic identification:** the gauge-admissible Abelian closure line is identified with physical electromagnetism or the photon without the downstream electroweak embedding being derived.
- **F25 — Adjoint-source insertion:** a colour or weak closure component is coupled to the scalar history source without deriving the required adjoint-valued physical source; the absence of invariant covectors in the su(3) and su(2) adjoints is a theorem, not an inconvenience to be modelled around.
- **F26 — Canonical-metric promotion:** the canonical wheel-Fisher C/B/R returns (360/713, ±1.89935497564 and their descendants) are promoted to the physical curvature response, or the canonical zero cross blocks are assumed to persist, without the full physical 6 × 6 history-metric ledger being returned forward from the master action.
- **F27 — Candidate-action promotion:** the assembled candidate master action of Part II-C is called the derived physical action, or its assembly is cited as evidence of source selection, before its remaining blocks (the physical W ledger, A_Q, C and the full-carrier attachment) are returned forward from the source.
- **F28 — Double-counting insertion:** a second independent RCMO orientation term is added to the candidate action instead of deriving RCMO as the terminal-record pushforward of the same sector, or the complete IORC relative-entropy cost is stacked on top of the even quadratic, counting the reversible history cost twice; the eventual nonlinear history action must generate W as its Hessian, and only the orientation-odd linear source is added at this stage.
- **F29 — Diagonal inference:** a physical response value, interval or lower stiffness bound is inferred from the diagonal stiffnesses alone, or Z_C is claimed bounded away from zero, without the returned physical spectral envelope; the exact zero construction of §10Z2 shows the diagonal data plus full positivity impose no such bound.
- **F30 — Phase-motion promotion:** record-phase motion, or any scalar dressing of the observed current, is cited as physical readout despite the exact projective invisibility of §16B; any Route-A visibility claim must exhibit a nonzero transverse component $P_\perp \delta j$.
- **F31 — Seven-terminal/binary conflation:** the local completeness of the seven-terminal probability response (rank 72) is cited as the Gate-R binary readout, or a binary row is chosen by hand, without the source-native derivation of w_src and its fixed-reference provenance.
- **F32 — Cohomology-degree conflation:** $H^2(K\_vac; Z_7)$ is cited as the loop-holonomy availability criterion after the R11 correction; H^2 is a separate surface-sector return, and loop availability is $H^1(K\_vac; Z_7)$.
- **F33 — Unit-incidence torsion dismissal:** order-seven torsion is declared impossible merely because every individual incidence entry is ±1; the EX5B Smith counterexample proves collective seven-torsion can arise from unit-incidence columns.

- **F34 — Circular hub predicate:** a pre-labelled hub state, an already existing plaquette defect or a downstream first-closure class is used to define the primitive condition that decides whether the hub or plaquette exists.
- **F35 — Fold/vacuum relation promotion:** the six Fold binary relation supports or their order-48 symmetry are identified with the physical vacuum boundary relations without a source-derived bridge.
- **F36 — Identity-channel closure:** the completeness relation $\Sigma P_a = I_4$ is treated as the physical seventh closing operation; it is reversible and produces no commitment, and only a nontrivial complete commitment instrument may serve as a closing mechanism.
- **F37 — Retention/readout conflation:** orthogonality of the persistent positive- and negative-orientation ledger sectors is cited as evidence of nonzero R4 gain despite the exact current-source equality $\Phi_+ = \Phi_-$.
- **F38 — Current-source readout repair:** a nonzero ledger-to-R4 coupling is inserted after EX3O merely because a physical readout is required; a later nonzero coupling must descend from a new same-source primitive attachment and supersede the EX3O construction rather than patch it.
- **F39 — Trigger/resolution conflation:** T_cover is promoted to D_unres = 0 before a completion outcome is actually selected. First cover is the trigger; resolution is the post-commitment branch.
- **F40 — Fold/R4 carrier conflation:** the four-outcome Fold commitment instrument is declared identical to the binary R4 completion sector without a source-derived carrier map.
- **F41 — Sigma-symbol conflation:** the IORC orientation mark ς is identified with the Fold commitment outcome b because earlier papers used the same symbol.
- **F42 — Alignment/readout conflation:** the large value of J_orient = ς · sign(K) is cited as R4 handedness; the product is reflection-even A_1, while ΔP is reflection-odd.
- **F43 — One-Bit/alphabet conflation:** the one-Bit condition is cited as proof that the IORC next-event outcome alphabet contains exactly two states; it fixes event information, not the cardinality of the wheel-transition mark.
- **F44 — 84/binary primitive-origin conflation:** an $E_{84} \to Z_2$ quotient is treated as the primitive origin of the completed R4 bit after EX5K. The 84-class implementation ledger and the binary completed-record carrier are distinct physical layers; any later quotient is a cross-carrier reconciliation map and may not be used to manufacture the binary basis.
- **F45 — Record-clock regression:** an earlier elementary pointer or ledger excitation is substituted for the later source-derived completed-record clock T_cover, thereby conflating precursor activity with completion.
- **F46 — Entropy-cause reversal:** $\Delta S \geq k_B \ln 2$ is treated as a sufficient generic trigger for commitment. The derived direction is commitment ⇒ irreversible entropy cost; the converse requires a separate physical activation law.
- **F47 — K7 loop-birth overclaim:** the seventh K7 constraint is called the edge that first creates a loop despite the microscopic precursor already being cyclic with $\beta_1 = 1$.

- **F48 — Topology/fact conflation:** a nonzero β_1, a closed commitment curve or a two-component complement is by itself called an irreversible physical fact without the record/commitment operation that produces permanent non-overwrite.
- **F49 — Stiffness/irreversibility conflation:** the K7 eigenvalue 7, the contraction $-3/28$ or any positive restoring stiffness is treated as proof that an alternative is physically unrecoverable.
- **F50 — State-freezing requirement:** survival of a post-commitment working tangent is treated as a contradiction of irreversibility. Irreversibility applies to the retained historical record; later physical change is allowed.
- **F51 — Orientation/polarity conflation:** the unique orientation projection, the holonomy or the zero/nonzero holonomy distinction is identified with the independent Fold commitment polarity.
- **F52 — Closure/completion cross-block insertion:** a nonzero W_CH, W_BH or W_RH is inserted into the physical action after the exact wheel zeros. Any nonzero full-carrier value must be derived from the faithful multi-cell/internal/terminal/bath lift.
- **F53 — MASD-H/Fold-PVM conflation:** the MASD local completion-strain sector is identified with the Fold commitment instrument merely because both use the word completion.
- **F54 — Six-dimensional carrier matching:** the six-dimensional projected closure carrier and the six-dimensional commitment-event bath are declared physically identical without the invariance residual and principal-angle certificate.
- **F55 — Unmarked/marked descent conflation:** existence of an unmarked Doob kernel is cited as derivation of physical commitment outcomes or Kraus marks without a source-derived amplitude decomposition or record-projector family.
- **F56 — Discrete-bath promotion:** the old seven-vertex commitment bath is declared physically identical to the closure-pair carrier after EX5T, despite the later source identifying the physical bath as a continuum of the same Φ-field. The discrete model is an effective spectral representation, not the required primitive carrier identity.
- **F57 — HM4/mark conflation:** the exact first-order scalar-density result R_HM4 = 0 is cited as derivation of a marked Fold instrument, commitment polarity or outcome probabilities. HM4 proves source descent of the scalar carrier, not mark selection.
- **F58 — Record-compatibility/selection conflation:** faithful descent of the RCMO terminal-record tangent is called selection of the finite signed record despite $DM\_\Omega(-s) = DM\_\Omega(s)$.
- **F59 — QC-1 84-to-binary collapse:** the 84 orthogonal PFDMI retained labels are merged into two physical outcomes by terminal-record equivalence without a new source-derived coarse-graining. Within the declared ledger they are terminally distinguishable.
- **F60 — Simultaneous R4/PFDMI repair:** the sharp R4 PVM and existing PFDMI detailed instrument are treated as unchanged simultaneous marginals despite the exact noncommutation, operator norm $\sqrt{5}/6$.

- **F61 — Sequential branch-sensitivity insertion:** the existing post-R4 PFDMI law is credited with knowing which R4 branch occurred despite the exactly zero branch contrast and zero mutual information.
- **F62 — Generic-memory/outcome-memory conflation:** the scalar Fact-Momentum/history-memory kernel is cited as binary outcome backreaction without a source-derived outcome mark in ρ_committed.
- **F63 — R4/Fold-polarity conflation:** the R4 branch or the exchange-covariant combined character χ_bω is silently identified with pure Fold commitment polarity b.
- **F64 — Scalar-record completeness:** the scalar commitment-event count density is called a complete physical record of which outcome occurred despite identical scalar densities for histories differing only in b.
- **F65 — Marked-measure promotion:** the candidate marked measure ϱ(dx dt db), or a proposed ΔΦ_μν, is called a source-derived physical continuum field before the record-to-continuum intertwiners and their regulator residuals are returned.
- **F66 — Generic-loop/K7 revival:** the generic P_m → C_m cycle-birth theorem of EX5AE is used to revive the already-falsified claim that the microscopic K7 seventh hub is the first edge that creates a loop. EX5AE is a diagnostic record theorem; EX5O remains controlling for the K7 geometry.
- **F67 — Local-renewal/global-erasure conflation:** restoration of the same visible working state after renewal is cited as destruction of the historical distinction while the complete dynamics is simultaneously assumed injective or isometric. Under that premise the distinction must be exported to another degree of freedom.
- **F68 — Existential-record/full-history conflation:** a one-bit append-only OR record is cited as preservation of the complete sequence of commitments. It records only whether at least one qualifying event occurred and deliberately merges distinct histories.
- **F69 — Information/thermodynamic-entropy conflation:** the exact history count n ln 2, the Shannon history entropy $n\, h_2(p)$, or growth of environmental record information is directly identified with thermodynamic entropy production without an independently derived physical thermodynamic map.
- **F70 — Finite-capacity unlimited-history overclaim:** a fixed finite record carrier is claimed to preserve an unlimited number of independent exact commitment histories. Exact retention requires $2^n \leq D$; exceeding that bound requires capacity growth, history merging, overwrite or cessation of independent commitment production.
- **F71 — Scalar-to-mark promotion:** the existing scalar commitment-density six-plane is called an outcome-complete record despite its exact zero polarity rank.
- **F72 — Capacity/activation conflation:** existence of a twelve-dimensional marked carrier, a two-direction minimal Fold record, or an exact Whitney embedding is cited as proof that MA1 physically populates the polarity sector.
- **F73 — Circulation/orientation completion:** sign(K) is called a global binary Fold orientation despite the nonzero K = 0 sector, without a source-derived zero-sector rule.

- **F74 — Orientation-representation promotion:** the structural relation $\omega = \pm\varsigma$ is called a physical Fold/IORC identification before the carrier attachment is returned.
- **F75 — Sharp-R4 activation overclaim:** uniqueness and sharpness of the R4 PVM are cited as proof that the Fold-to-R4 gain satisfies $|g| = 1$; sharp output does not itself make the upstream channel deterministic.
- **F76 — MA1 gain repair:** a nonzero Fold-polarity interaction is inserted after the exact $g_{MA1} = 0$ return merely because the relational reconstruction requires it.
- **F77 — Fold-domain/source-bridge promotion:** existence of the intrinsic domain-polarity observable S_b is called a source-derived continuum polarity field before the Fold-to-Φ embedding is returned.
- **F78 — Whitney physical-promotion:** the exact mathematical identity $\pi_W \iota_W = I$ is called the physical HCMR/MA1 carrier bridge before the actual regulator- and branch-resolved VERSF refinement maps and their residuals are executed.
- **F79 — Tensor-capacity promotion:** the existence of trace-free degrees of freedom in the symmetric parent is cited as an outcome mark when the field is still constructed solely from the same unsigned scalar event density.
- **F80 — Gaussian-pointer orthogonality overclaim:** finite mean separation in a nonsingular full-support Gaussian bath is called an exact Fold record despite nonzero overlap of every pair of finite-shift distributions.
- **F81 — Fold-tensor physical promotion:** the intrinsic Fold Hessian, or its four-dimensional distributional pushforward, is called the physical VERSF record field before its source-derived embedding, regularisation and field-equation residual have been returned.
- **F82 — Amplitude repair of a bad mode:** a nonzero coefficient multiplying a Fold-polarity tensor is tuned to cure a nonzero linearised field-equation residual. A scalar amplitude cannot place a direction into the kernel of the linearised operator.
- **F83 — Scalar Single-Source overreach:** the scalar event-count density is called the complete primitive fact source after two physically distinct Fold outcomes with identical event counts have been admitted.
- **F84 — Untyped-outcome/R4 insertion:** the untyped outcome slot of the IORC first mark is simply renamed the R4 sign without a source-derived physical identification.
- **F85 — First-cover endpoint/history conflation:** the strongly oriented first-cover history is treated as an R4-polarised instantaneous endpoint despite the exact equality of the endpoint overlaps with both chiral rays.
- **F86 — Channel-form/activation conflation:** the unique one-parameter covariant R4 readout family is cited as derivation of a nonzero g_{cover}. Symmetry fixes the form, not the physical gain.
- **F87 — Record-record/access-coupling conflation:** the Green-function record-record coefficient J is identified directly with the record-access coefficient without the additional access vertex; the conditional load relation is $h_\delta = \Lambda_c N J$, not $h_\delta = J$.
- **F88 — Record-amplitude/backreaction conflation:** a nonzero primitive record amplitude derivative, including the rank-five PFDMI-EX2A record tangent, is cited as

a record-conditioned matter or Yukawa response when the record factor is a local left unitary that cancels from the reduced matter channel.

- **F89 — Support-change/history-backreaction conflation:** a support-changing PFDMI projector is cited as history-conditioned support when its projector is fixed independently of the retained ledger.
- **F90 — Soft-stiffness/hard-cut conflation:** nonzero closure/record phase stiffness is cited as proof that commitment removes or preserves a phase tangent.
- **F91 — Pre/post-commitment carrier conflation:** the unresolved pre-commitment relational mode is identified with the post-commitment memory residue merely because the latter may descend from the former.
- **F92 — Ordered-memory/causal-memory conflation:** nonzero history chirality, a nonzero order operator or a large forward/reverse probability ratio is cited as future backreaction without a continuation-cone difference.
- **F93 — Topological-capacity/current-PFDMI promotion:** an order-sensitive topological trap construction is called an implemented PFDMI history law before the trap-induced admissibility restriction descends into the working carrier.
- **F94 — Admissibility/MASD-support conflation:** the full-configuration admissibility projector is identified with the MASD occupied-substrate spectral projector without a source-derived map.
- **F95 — Fixed-intertwiner repair:** a fixed admissibility-to-work map is asserted after EX5BZ despite the exact requirement that it annihilate the continuation-visible support difference when the target working projector is history independent.
- **F96 — Forbidden-direction annihilation:** a history-excluded continuation is simply deleted from an isometric or distinguishability-preserving completion rather than retained in an inaccessible/exported degree of freedom or removed from the physical input domain.
- **F97 — Export-role/carrier-identity conflation:** the PFDMI export fibre is called the physical topological discarded sector solely because both conserve excluded distinguishability.
- **F98 — Finite-sech hard-cut promotion:** a finite export coordinate in the EX2D sech/tanh chart is treated as exact removal of an active continuation despite the strict positivity of sech at every finite argument.
- **F99 — Trap/outcome conflation:** the binary trap indicator κ, which says whether a continuation has become irreversibly fixed, is identified with the Fold/R4 variable specifying which outcome became fact.
- **F100 — Selector-minimality promotion:** the private-rim face-to-edge export selector is called uniquely primitive before the one-export-direction-per-trapped-face minimality condition is itself derived.
- **F101 — Controlled-renewal/source-selection conflation:** existence of a coefficient-free CPTP/no-overwrite history-controlled renewal is cited as proof that the current primitive action actually generates it.
- **F102 — History-dependent export insertion:** a trap-controlled export projector is inserted into PFDMI merely because it closes the architecture; primitive admission requires its return from the same action.

- **F103 — Fold-closure/MASD-curvature conflation:** the Fold closure functional or its threshold is identified with a function of the MASD closure defect merely because both describe plaquette closure, without a source-derived common-action map.
- **F104 — Gauge-covariance/source-selection conflation:** existence of a gauge-invariant class-function threshold on the closure defect is cited as selection of the physical trap functional or threshold.
- **F105 — Seventh-defect insertion:** an independent trap defect or control coordinate is appended to MASD while claiming the six-defect master action is unchanged. A trap controller avoids enlargement only if derived from the existing variables.
- **F106 — Edge-fibre saturation promotion:** the EX5CC private-rim edge selector is called continuation-faithful without proving that the trap-induced forbidden continuation space is a union of complete selected edge fibres.
- **F107 — Record-label/support-sharpness conflation:** orthogonality or cardinality of classical record labels is cited as proof that the corresponding system effects form an equally fine orthogonal support decomposition.
- **F108 — Fine-generator-frame selection:** one of the rank-one 1092-level current/terminal effects is chosen as the physical trap selector despite its dependence on the arbitrary generator frame.
- **F109 — Rank-one-capacity/source-selector conflation:** the mere existence of rank-one effects at a finer mathematical grain is cited as a physical rank-one commitment selector without invariance and source-selection proofs.
- **F110 — Common-subspace repair:** a convenient central or compressed subspace is selected to manufacture rank-one terminal effects after the full physical eighty-four-effect algebra has been shown to possess no nontrivial common reducing projector.

Appendix C — Source-currency registry

Source	Status in PSAC-1-R19	Consumed role
HCMR-M1-R15	controlling predecessor	History statistics and fluctuation relation; readout no-gos and Φ_a classification; wheel score identity and curvature typing; third-jet order and tensor descent; RRHF conditional pass; score rank 72 and non-identifiability; completion graph; persistence counts and lepton Schur form; K7 Gram geometry; conditional Z_7 response; closed family holonomy; debt ledger D27–D49 crosswalk

Source	Status in PSAC-1-R19	Consumed role
K7-EA-1 and companion audits	controlling electromagnetic boundary	Pre-fact 1/128 under P14 + K = 7; 14/15 support rigidity; 7/960 candidate; compatibility obligation only
MASD-1 / common master action	controlling same-action parent	Independent variables, defect vector, operational metric, D_C curvature variable, Gauss-Newton Hessian and Schur reduction
HMGBC-1	controlling closure-score and completion geometry	Closure-defect score F_C; deformation family; KL metric derivatives; ΔΩ completion amendment
IORC	controlling irreversible source	Orientation-odd score ω_C; one-Bit affinity α⋆; stationary current typing
D36-R1	controlling frozen history law	Two-turn statistics; rim waiting law; orientation parameter α
PFDMI sequence / PFDMI-S1 / EX2E	controlling score and frame boundary	Rank-72 score carrier; η-interval structure; frame-selection criterion; current instrument and projective typing
RRHF / FRDT	controlling conditional matter solution	Ordered transfer Y = U_role D_score; dual-route CY3′ closure; finite-regulator family-triangle continuations
Charged-lepton persistence enumeration	controlling lepton count law	σ_e, σ_μ, σ_τ; exact unit increment
Projected K7 closure-operator execution	controlling overlap geometry	Genuine Gram and stiffness; Fourier decomposition; trace invariant
K7 closure-transition graph construction	supporting cycle/refinement bridge	Cycle basis and exact wheel lift
Transport group of the K = 7 closure	controlling holonomy typing	Z_7 transport; algebraic kernel; loop-supported holonomy
Topology of the vacuum transport complex	controlling availability criterion	$H^1(K\_vac; Z_7)$ loop-holonomy criterion; H^2 independent surface sector; integral torsion fork; actual physical cell calculation open
Operational distinguishability geometry	supporting character decomposition	Real Z_7 character planes and complex upgrade

Source	Status in PSAC-1-R19	Consumed role
HCFC-1	controlling axle-loop definition	L_ax through co-terminal charged-completion histories; the non-circularity requirement on AX1
PSAC-EX1 calculation report (13 August 2026)	controlling first execution	MASD closure differential; D_6 compression and multiplicity census; local polar lift and canonical normalisation; Fisher and two-cell checks; CFB boundary branches consumed as candidates only
PSAC-EX1B calculation report (13 August 2026)	controlling normalisation execution	Exact equivariant right inverse E_C = ω_C and λ_C = 1; minimum-operational-norm lift architecture and finite-cell residual; continuous-history Radon-Nikodym score; canonical separable-branch facts and the identity S_C = ω_C
PSAC-EX1C calculation report (13 August 2026)	controlling bath-protection execution	Bath-resolved HMGBC quadratic architecture; Gaussian elimination and the invariant odd source; kernel-level tilt survival and reduced score; screened response W_prim and sign invariance; KL-rate against pointwise-score typing
PSAC-EX1D calculation report (13 August 2026)	controlling carrier-multiplicity audit	Scalar-wheel A_2 derivation; faithful gauge-carrier multiplicity 12; invariant-functional gauge typing and the Abelian closure line; differential-order competitor exclusion; the three record-phase A_2 lines
PSAC-EX1E calculation report (13 August 2026)	controlling source-typing execution	IORC pre-fact domain typing and P_R s_IORC = 0; EPMD bond first-derivative zero and mixed Hessian; combined closure/record response; RCMO stage-order firewall; the σ-retention obligation
PSAC-EX2 calculation report (13 August 2026)	controlling response execution	Canonical wheel history metric on the C/B/R slice; exact Hessian, Schur reduction and signed response ±1.89935497564; locked, bare and two-cell comparisons; the closed form Z_C and its positivity conditions

Source	Status in PSAC-1-R19	Consumed role
PSAC-MA1 assembly note (13 August 2026)	controlling candidate assembly	The unified candidate master action on the MASD parent; automatic bath Schur reduction with determinant retention; canonical reduction check; the two exclusion rules; controlling-object adoption (display equations stripped in transit; block forms reconstructed from pinned sources)
PSAC-EX2B calculation report (13 August 2026)	controlling positivity-bounds execution	Sign safety under positivity; the exact diagonal-insufficiency zero construction; the one-sided response bound 0.897495; the spectral-gap interval; EX2 exhaustion and the EX3 handoff (display equations stripped in transit; constructions reconstructed from prose and pinned values)
PSAC-EX3A/EX3B calculation report (13 August 2026)	controlling first readout executions	The scalar-phase population null; projective invisibility of the record-phase channel under the EX2E instrument; the parallel/transverse decomposition and the decisive scalar $N_\perp$; the EX3C declaration (display equations stripped; EX3A working body not received, verdict consumed at stated grade)
PSAC-EX3C calculation report (13 August 2026)	controlling visible-pointer execution	Injectivity of the residual-tangent terminal response on the rank-72 physical Wilson tangent; the no-vanishing theorem and response floor; the material induced-current transverse contribution at Frobenius ratio 1.05458; the binary reduction to w_{src} (display equations stripped; σ_{min} and the induced-current cosine pending re-supply)
PSAC-EX3D–EX3K calculation sequence (13 August 2026)	later Gate-R execution	Binary ordered-turn derivative; failed scalar gain identifications; direct phase, completion, stretch and maintenance route audits
PSAC-EX3L (13 August 2026)	first-cover readout execution	Unconditional signed bias δ_K = 0.995570059549810; the complete covariant first-cover activation family

Source	Status in PSAC-1-R19	Consumed role
PSAC-EX3M (13 August 2026)	native-terminal projection execution	Exact zero orientation contrast of the existing seven terminal species effects under complete co-conjugation
PSAC-EX3N (13 August 2026)	persistent-ledger reference execution	Reconstruction of K from the ordered ledger; orthogonal positive and negative sectors; trace distance 1 and fidelity 0
PSAC-EX3O (13 August 2026)	ledger-controlled R4 execution	Exact equality of the current ledger-conditioned working channels; zero diamond distance and zero current-source gain; the HMGBC even-conductance bypass no-go
PSAC-EX4A (13 August 2026)	Gate-M source-selection execution	Current residual Hessian null structure; the explicit flat score-strength direction; the Grade-C matter-selection result
PSAC-EX5A (13 August 2026)	topology typing execution	The H^1 loop criterion; the heptagon versus degree-seven Smith discriminator
PSAC-EX5B (13 August 2026)	global torsion execution	Unit-incidence matrix with Smith factor 7 (matrix pending re-supply); proof that the full integral Smith calculation remains mandatory
PSAC-EX5C (13 August 2026)	primitive completion audit	Proof that the physical hub predicate is not source-returned
PSAC-EX5D (13 August 2026)	distinguishability bridge	The operational unresolved-distinction functional
PSAC-EX5E (13 August 2026)	Fold relation-carrier execution	Four Fold atoms; six binary relations in three complementary pairs; K_(2,2,2) with automorphism order 48
PSAC-EX5F (13 August 2026)	Fold closing-instrument execution	Rejection of the identity relation as a physical closing operation; the complete rank-one non-invertible Fold commitment instrument
PSAC-EX5G (13 August 2026)	first-cover trigger execution	T_rec = T_cover; separation of support completion, record completion and post-commitment fact resolution; rejection of the direct cover/D_unres identification

Source	Status in PSAC-1-R19	Consumed role
PSAC-EX5H (13 August 2026)	Fold-to-R4 character audit	Three canonical Fold binary characters; combined-parity selection within the exchange-covariant Fold class; the explicit CP coarse-graining construction; primitive activation open
PSAC-EX5I (13 August 2026)	notation and joint-parity audit	Separation of the Fold commitment bit b from the IORC orientation mark ς; the alignment return J_orient with its exact statistics; the reflection-parity no-go against R4
PSAC-EX5J (13 August 2026)	first-mark/Fold-bit carrier audit	Abstract binary outcome type; the untyped IORC outcome entry; the executed 84-class PFDMI ledger and 319-mark descent; the missing quotient q_b
HCMR carrier-bridge audit	controlling cross-carrier firewall	Binary logical code, K7-CBR carrier and PFDMI 84/319 carriers are purpose-compatible but non-identical; silent identification forbidden; intertwiners required
Distinguishability-Barrier / Fold Interface Law	abstract binary-record typing	Minimal commitment outcome; post-commitment binary record type; no executed identification with the PFDMI ledger
Later PFDMI completed-record / event-semantics execution	controlling EX5K correction	Distinguishes the detailed implementation ledger from the completed binary R4 record at completed-record level
R4 cyclic-covariance / completed-sector audit	controlling binary-basis return	Uniqueness of $\{P_+, P_-\}$ up to output exchange; the minimal pure-record map and branch-preserving renewal
Minimal Fact	structural commitment topology	Cycle/trap activation; the non-recombinability criterion; the binary record/entropy lower bound
The Pre-Entropic and Entropic Domains	effective controller architecture	The physical controller and activation rate; jump form; entropy production downstream of activation
Fold Interface / Fold observable-structure papers	controlling Fold topology	The S^2 interface; open-arc versus closed-curve separation; independent commitment polarity and orientation

Source	Status in PSAC-1-R19	Consumed role
Microscopic K7 six-boundary-plus-hub closure construction	controlling EX5O	The cyclic C_6 precursor; the seventh hub; relative-mode lifting and the committed-cell interpretation
K7 refinement/transition execution	controlling EX5P	The hub-rim dynamical eigenvalue −3/28; irreducibility of the seven-state catalogue
From Meta-Principles to Physical Uniqueness	controlling record-irreversibility typing	The persistence/no-retroactive-overwrite theorem; later change permitted
HMGBC-1 executed history metric	controlling EX5R wheel block	Exact W_HH = 75/434, W_CH = 0; the history-covariance origin of full cross blocks
PFHBA-7 source-projected bath / Doob descent	controlling commitment-bath route	The closure/commitment carrier test; ε_inv; principal angles; R_HM4; C_min; the unmarked/marked descent firewall
Full Projected Closure Operator / Exact Projection Coordinates	controlling EX5S/EX5T carrier execution	Circulant closure operators; exact projected invariance; the whitened exact isometry
Continuum commitment-bath / Single-Source construction	controlling corrected commitment carrier	The physical bath as continuum fluctuations of the closure-coordinate Φ-field; constitutive conditionality
Full-faithful HM4 / density-row-space execution	controlling EX5U	J_D shape, rank and nullity; the zero-sum scalar-density row-space theorem; machine HM4 confirmation
RCMO terminal-record source	controlling EX5V	The finite branch-odd terminal record; the reversal-even first derivative; record-phase descent
F2F/PFDMI detailed marked instrument	controlling EX5W–EX5Y	The implemented mark operators; the 319-to-84 coarse-graining; exact detailed CP operations; the orthogonal ledger; the sequential history law
GPU/R4 completed-sector construction	controlling EX5X–EX5Y	The chiral rays; the unique sharp R4 PVM; the branch-preserving minimal renewal
Post-commitment history-memory / Fact-Momentum	controlling EX5AB	The retarded fact-memory kernel; the generic memory response; the unsigned-source limitation

Source	Status in PSAC-1-R19	Consumed role
Fold Interface Law / Reconciling Particles and Bits	controlling EX5AC	Independent commitment polarity and boundary orientation; four physical Fold states carrying one informational bit
Commitment Requires Cost / Commitment Criterion	controlling EX5AC–EX5AD	The outcome-specific substrate record requirement; commitment cost and branch-common primitive production typing
VERSF Master Action / Leading-Order Unique Record Current	controlling continuum record transport	The continuum record-bearing field; the unique leading-order record current
HCMR-XI Record-Sufficient Update	conditional downstream consumer	The outcome-labelled record-conditioned directing law; a conditional example of history identity affecting future preparation
HCMR-M1 carrier-bridge execution	controlling EX5AD bridge certificate	The required ι_nk, π_nk label-preserving continuum bridge; execution remains open
Single-Source impossibility theorem	controlling scalar-source audit	The primitive scalar record density definition; uniqueness of the primitive fact-producing source; the need to type outcome information inside the single record source rather than add a second primitive
PSAC-EX5AE renewal / distinguishability-export calculation (14 August 2026)	controlling record-architecture execution	Exact generic cycle birth; closure/record separation; distinguishability export under injective/isometric complete dynamics; the 2^n exact-history capacity law; the finite-capacity no-go; the existential-record/full-history separation; complete local renewal with external history retention
PSAC-EX5CD calculation sequence (15 August 2026)	controlling common-action commitment-control audit	Fold-threshold/MASD-closure type separation; gauge-invariant trap-functional capacity; exact controlled-Kraus completeness; gauge/no-overwrite preservation; the continuation-faithfulness pullback criterion; the edge-fibre saturation

Source	Status in PSAC-1-R19	Consumed role
		theorem; the current common-action trap-control negative
HCMR-XI-2 microscopic matrix execution / Ordered Records, Realised Event States	controlling fine-mark resolution	The 319-mark physical record, exact copy isometry, coarse-graining and microscopic effect-rank census
PFDMI-EX2E representation-valued current execution	controlling physical terminal effects	The 84-effect retained law; internal current/terminal Kraus structure; full edge completeness
K7-QRC-1 source-native quotient/readout audit	controlling EX5CE frame-invariant resolution test	The 1092-effect rank census; rank-one fine effects; the direct frame-rotation no-go; the physical 84-effect ranks; scalar common commutant and absence of a nontrivial common reducing projector
PSAC-EX5CE calculation sequence (15 August 2026)	final measurement-side execution of PSAC-1	The positive-effect hard-support lemma; exact failure of Boolean rank-one control at the 12/84/319 grains; algebraic but nonphysical rank-one capacity at 1092; the record-orthogonality/support-sharpness separation; the paper-closure boundary
Fold Interface Law, geometric state-space execution	controlling EX5AX–EX5AY Fold geometry	Two intrinsic independent binary structures: commitment polarity from domain assignment and traversal orientation; the four-state Fold carrier; the reversible representation
HCMR orientation-resolved marked implementation	supporting EX5AR–EX5AT	Orientation-resolved committed marks; persistence/isometry capacity; implemented orientation-sector separation and nondemolition readout
Whitney/cochain-to-form construction	exact mathematical bridge, not primitive VERSF admission	Explicit left-invertible cellular Fold-record to differential-form embedding; physical refinement-system implementation remains open
PSAC-EX5AF–EX5AY calculation sequence (14 August 2026)	controlling marked-record update	Scalar marked-carrier no-go; relational reconstruction; zero-circulation criterion; ς-retention audit; the one-gain Fold-to-R4 theorem; exact current MA1 gain zero; the intrinsic Fold

Source	Status in PSAC-1-R19	Consumed role
		polarity operator; the Whitney left-inverse construction

Appendix D — References

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