SMC-1U A Conditional Standard Model Derivation and Closure Audit in VERSF

Keith Taylor VERSF Theoretical Physics Programme

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VERSF Conditional Standard Model Derivation and Parameter-Closure Audit

Nine-requirement Stage-A execution, self-consistent quark transport, strict HFB admission, and quarantined continuation

Keith Taylor VERSF Theoretical Physics Programme — Standard Model Closure Series Designation: SMC-1U

General Reader Summary

This programme is trying to derive the particle content of the Standard Model from a small set of primitive rules about records and distinguishability, using no measured particle data. This document is the audit of that attempt. Read the four sections below in order; the detailed chronological narrative has moved to Appendix G.

What is unconditionally established

The self-consistent quark-transport problem is solved and closed at its declared order: the scale at which the theory reads masses off and the scale at which they are compared are reconciled without circularity, and that theorem stands on its own without the deep machinery.

Three further results stand without needing the deep machinery, and these are the paper's most durable content. The current rules do **not** single out one Standard Model boundary — several complete alternative boundaries can be written down that fit everything equally well. One key quantity provably cannot be read back from the available data. And two perfectly correlated copies of a record are informationally invisible to any outcome-based measure, while independent copies double every measure — an exact information identity with no hidden premises.

Alongside these sit the finite algebraic and counting identities whose ingredients are all fully declared: the exact regulator-independent survival gap, the group relations of the closure structure, and the rank and dimension bookkeeping throughout. These are checkable by anyone with the stated operands.

What is conditionally established

Everything constructive rests on named premises, supplied ingredients or off-document definitions, and is graded as conditional throughout. Four of the paper's most striking results belong **here**, not above, because each is exact only *within* a declared model or axiom package: that nothing deterministic and fully symmetric can produce a first event from a featureless start (conditional on the full refinement/symmetry bridge); that one bit of information cannot install a universe-wide reference frame (conditional on the declared void, locality and no-unearned-frame axioms); that the rule for which possibility happens next is forced to be the familiar quantum one, chances as squared lengths (conditional on the frozen candidate family and the phase-covariance and additivity criteria); and that a shared boundary carries exactly one fact rather than two (conditional on the strong transport model). They are strong conditional theorems, and they should not be quoted as unconditional ones.

On the same footing the paper builds the working structural skeleton of the Standard Model — the right families, their labels, the machinery that assembles them onto a boundary — and every structural audit of that skeleton passes, often exactly. The neutral sector's *existence* is closed at the retained order, with one supplied instrument. The internal geometry of possible new events closes completely at full rank. Under stated axioms the featureless starting canvas can only live in the neutral sector. Under one named consistency condition, chances factor cleanly into a single common opportunity dial times the quantum weights. And under the theory's standing principle of installing no unnecessary structure, a shared fact is written exactly once, which selects the smaller candidate network and a fundamental length near 63 thousandths of a millimetre.

What failed

The physical boundary is not admitted. The tidy-looking gauge response is not a result but a restatement of a definition. The simplest candidate action for the boundary was falsified outright. The one genuinely independent numerical cross-check that was attempted, failed. One successor construction broke regulator covariance and had to be repaired. The one-bit normalisation, though derived under premises in one route, is not reproducible — an independent rebuild returns a different value — so by this document's own standard it is unsettled, not established. The requested linear bridge into the full structure proved not merely unavailable but mistyped. And local comparison alone cannot decide whether the network's loop labels are occupied.

What remains now

Three live fronts remain, and all three must be settled before any concrete particle number is more than conditional.

First, the event-level preparation law: which specific possibility the substrate actually offers at each event, the associated irreversible costs, and the phases. The paper proves the *shape* of the governing formula is forced, and proves equally that shape alone decides nothing — the same information is shared by states pointing in different directions, and any desired set of odds can be manufactured by choosing costs freely. So those costs must be computed, not chosen.

Second, and separately, the copying dynamics: when a record gets duplicated into its environment, what maintaining duplicates costs, and whether a single record is dynamically stable rather than merely capable of many-to-one encoding.

Third, the absolute length scale: four different values are now in play across the programme, the two most relevant differing by about a quarter. The paper records that discrepancy openly rather than adjusting either side.

These are the three remaining **primitive-action** fronts; the neutral mass block, the scheme bridge, cross-sector covariance, the pole constructions and the strong-phase certificate remain **downstream closure requirements** on top of them. “Three fronts remain” should not be read as though only three calculations stand between the present corpus and physical predictions.

Headline

The current corpus does not determine a unique Standard Model boundary and therefore cannot support a physical closure certificate. The paper nevertheless closes the self-consistent quark-transport problem, establishes several exact structural no-go and existence results, and reduces much of the remaining architecture to explicit primitive action and scale questions. The latest analysis conditionally selects one common interface record at primitive commitment and the sixteen-token carrier, but does not derive the event-level preparation law, the physical entropy costs, the post-commitment copying dynamics, or an unconditional absolute scale. **The Standard Model derivation therefore remains not established.**

This is an audit-class document. It opens with the four-section general-reader summary above, followed immediately by the status matrix: the verdict is the point of an audit, and a reader must see what is and is not admitted before reading how. The load-bearing results, however, are not the forward chain. The results that survive external scrutiny — because they hold without the deep VERSF primitives and can be checked by anyone — are Theorem 4 (non-closure), Lemma 3 (the η-readback non-identifiability), and Appendix A (the self-consistent quark-transport theorem, a closed contraction proof). Everything from Part XII-quinquies onward is a forward-construction chain conditional on off-document VERSF definitions; it is real work and honestly graded, but it cannot be independently verified from this document alone, so it should not be read as carrying the headline. Read the negative and unconditional results first; read the forward chain as conditional progress against a named, still-open debt.

Nine-requirement attempt	COMPLETED
HFB boundary	**NOT ADMITTED — NON-CLOSURE PROVED**
RPC numerical certificate	**NOT ADMITTED**
Quarantined charged/gauge/scalar diagnostic	**CONDITIONAL PARTIAL PASS**
Genuine conditional Standard Model derivation	**NOT ESTABLISHED**

Formal compatibility	**SOLVED BY EXPLICIT CONSTRUCTION** (Part XII-bis) — one action returns the full object set and survives non-factorising refinement
Minimal constitutive action	**FALSIFIED** as the physical boundary — spectrum too shallow, mixing too large
Regulator covariance	**ACHIEVED** (Part XII-ter) — maintenance-record operator converges at $\mathcal{O}(h^2)$; NFDMA-2 flavour/neutral obstruction repaired
Independent CY3′ test	**EXECUTED AND FAILED** (Part XII-quater) — first genuinely independent mixed-vs-Hessian comparison; residues 0.37–0.49 $\gg$ tolerance; minimal action falsified as physical fermion completion
Representation-resolved kernel	**STRONGEST CHARGED/GAUGE RETURN** (Part XII-quinquies) — colour brought to g_s = 1, steep charged hierarchy, CY3′ agreement CONDITIONAL on the functorial-lift premise (not two free parents)
Charged/gauge side	**CONDITIONALLY CLOSED at the action level** (Part XII-sexies) — the functorial lift is now DERIVED by blind differentiation of the parent history functional, not imposed; two genuinely separate CY3′ routes agree to 1.9×10^{-14}; rests on the discrete K=7 representation ledger (D-CY3-ledger)
Ledger provenance	**NO-GO THAT SHARPENS** (Part XII-septies) — the published primitive transfer provably does NOT select the ledger (neutral-channel witness: same traces, (5,3,60) ≠ (5,4,80)); but the ledger IS the unique solution of a named premise package, so the debt localises to two premises (NT, score-map)
The two premises	**BOTH BECOME OPERATOR THEOREMS** (Part XII-octies) — NT reduced to a non-circular killed-kernel spectral criterion (radius < 1 $\Longrightarrow$ carrier typing forced); score map reduced to arithmetic conditional on primitive-innovation factorisation; debt shrinks to two computable kernel quantities (Theorem 10)
The two theorems	**STRUCTURAL HALVES DELIVERED** (Part XII-nonies) — killed-kernel absorption PROVED (full rank $\Longrightarrow \rho<1$, absorption = I_3, Theorem 11); factorisation counterexample DISSOLVED by marked-martingale orthogonality (Theorem 12); debt shrinks to one full-carrier object + three positive-support/continuum-gap checks
Full-carrier object	**STRUCTURAL EXISTENCE CLOSED** (Part XII-decies) — explicit 102-dim retained parent + complete Kraus instrument supplied; three support facts pass; terminal gap EXACT and regulator-uniform $1-e^{-1}$ (Theorem 13, block-

	triangular). Residual = the single provenance theorem (substrate uniquely forces the instrument)
D36 (one-bit metric), D32 (nonzero occupancy)	**D36: CONDITIONAL CANDIDATE RETURN / REPRODUCIBILITY FAIL / NOT SETTLED; D32: conditional candidate return** (Part XII-quater) — premises named; D35 absolute scale untouched; and an independent rebuild of the D36 kernel returns $\dot{\Sigma} = 0.185$, not ln 2, so by the document's own D38/D40 standard (unreproducible = not a result) D36 is not yet a settled discharge
Species/boundary interface	**RE-EXECUTED — CONDITIONAL INTERFACE PASS** (Part XII-undecies) — K=7 exactly canonical; faithful-quotient, terminal-record (order 2.0018, ¼ step ratios) and CAR/Fock tests pass; charged outputs full-rank and two-level stable; the obstruction localised to the source-to-tangent derivative dΦ_n — no selection theorem, HM4 pass endpoint a branch choice
Linear source bridge	**NOT ADMISSIBLE — GRADED REPLACEMENT DERIVED** (Part XII-duodecies) — adjoint invariant nullity is zero for the simple factors, so four of six channels are quadratic or mixed jets, not linear columns; the graded source jet is supplied at both levels and the linear no-go is exact representation theory
Graded-jet descent	**SUPPORT-LEVEL PASS — METRIC AND ATTACHMENTS OPEN** (Part XII-tredecies) — 836 post-gauge flat directions quotiented by the minimum-norm representation current; rank-72 score support frame-independent across five endpoint witnesses and four prescriptions; exact structural Grams (record condition 13/7, completion spectrum {3−√7, 1, 1, 3+√7}, 45° record angles); residual = the native score metric and the record/completion attachments (GSJB-3)
Score metric and attachments	**SPLIT VERDICT** (Part XII-quattuordecies) — completion attachment CLOSED by the $\mathbb{Z}_2\times\mathbb{Z}_2$ route-character basis (Hessian exactly g·diag(3,3,1,1), the tredecies route metric diagonalised; old HFB block equal-trace but spectrally different, no scalar bridge possible); native Born–Fisher metric ENDPOINT NON-IDENTIFIABLE (drift 1.52, 1.14 trace-normalised, rank 72 always); innovation-count H_CMR endpoint-independent and regulator-stable but TWO-BRANCH conditional — (5,3,60) vs (5,4,80) — with record weights the exact √count law, branch planes 2.0226° apart; residual = GSJB-4: unique endpoint measure + neutral-branch provenance (= the D-NT provenance theorem, now also the metric selector)

Endpoint measure and renewal existence	**NO-GO / CONSTRUCTIVE PAIR** (Parts XII-quattuordecies-bis/-ter) — GSJB-4: unique endpoint ensemble FAILS (symmetric stationary barycentre is absorbing with zero neutral score; identical central species weights (3,3,6,2,9,9,18)/50 and twirl I/50 across all witnesses, yet Fisher shapes differ 1.52 — central invariant data provably insufficient) and the completion congruence bridge is an O(4) convention, not a derivation; GSJB-5: general S_3-equivariant renewal R(κ) with exact stationary law $\mu_A = \mu_S = r/(2r+p)$, $\mu_C = p/(2r+p)$ restores nonabsorbing neutral information and Fisher rank 588 = 651−63 ≥ 96 — rank obstruction REMOVED, uniqueness obstruction NOT (r, κ free; lifts differ 1.7366) — feeding the quindecies selections
Void reset and renewal	**DIMENSIONLESS SELECTION PASS** (Part XII-quindecies) — unique S_3-invariant zero-entropy pre-fact ray; record-preserving reset dilation; κ = 1/3 selected and the reset probability r REMOVED as a fact-time gauge; first-passage/Born compatibility ≤ 1.7×10^{-15} with exact identities (D = R = renewal = completed mass; mean neutral absorption exactly $2/(1-e^{-1})$; Fisher rank 774 = 837 − 63); neutral branch reduced from roster selection to pre-fact-carrier OCCUPANCY; absolute hazard and typed 102D lift NOT SELECTED (two exact lifts differ 1.727) — residual = GSJB-7: typed distinguishability Hessian D_A(X) + neutral-occupancy theorem
Neutral occupancy and void metric	**MAJOR CONDITIONAL PASS** (Part XII-sedecies) — the twelve faithful generators' common kernel (dim 3) lies wholly inside one rank-3 neutral-terminal projector while the charged-minimal carrier has kernel dim 0, so a pure gauge-invariant zero-entropy canvas EXISTS ONLY in the neutral-singlet sector: post-freeze the projector is N_R and the neutral-extended ledger is SELECTED under the declared void axioms — the first structural discrimination between the branches; the graded void-relative distinguishability metric closes at full rank 98 = 94 + 2 + 2 with the exact sum rule $\lambda_{min} + \lambda_{max} = 8$ at both levels; the 102/334 tangent-to-history embedding NOT SELECTED (two inequivalent exact congruence lifts) and the hazard still free — residual = GSJB-8: the primitive innovation intertwiner ι_n
Innovation intertwiner	**GRADED NO-GO** (Part XII-septendecies) — the current PFDMI action is exactly block-diagonal at the void: every first-order channel has rank 0 (generators, currents, gauge links, species populations) while the mark/Kraus level stays strong (rank 155) on the support-preserving 45-dim charged carrier, so no linear ι_n exists; the correct object is a graded

	birth functor (amplitude birth 1st order, probabilities/Casimirs 2nd, completion mixed 2nd, CAR/Fock mixed 3rd); a minimal 49-direction witness B_α =
Birth law	**SUPPORT FORCED / STIFFNESS NOT FORCED** (Part XII-duodevicies) — no deterministic gauge×S_3-invariant birth vector exists (fixed tangent dimension 0), so birth is a covariant multiplet spanning all 49 directions; the tangent splits into twelve irreducible types with birth covariance K = Σ k_j P_j and eleven free ratios that four explicit blind laws fail to agree on (max-entropy I_{98}/98 unique only under an added ignorance axiom); and the rank-96 parent is proved INCOMPLETE BY TWO — the two smallest void modes (~4×10^{-7} of trace, exactly neutral) are genuine, so under no-hidden-distinction the minimum carrier is 98 + 6 record nulls = 104 — residual = GSJB-10: the pre-fact innovation action metric and the 104-carrier completion
Pre-fact action metric	**ELEVEN RATIOS COLLAPSED TO ONE** (Part XII-undevicies) — Fubini–Study (2 I_{98}) and the void-distinguishability Hessian W_D agree EXACTLY on all 94 nonneutral directions (2.2×10^{-17}), so the whole stiffness question reduces to the neutral four-plane, whose W_D spectrum is pairwise-complementary to 8 with trace exactly 16 and best FS scalar exactly 51/49; the surviving family G_θ = (1−θ)2I + θW_D carries exact rational endpoint role weights (2/49, 18/49; 4/51, 6/17), the FS declaration θ = 0 reproduces the max-entropy branch without the ignorance axiom, and the 104-dimensional rank-98/null-6 carrier H_{104} = G_θ ⊕ 0_6 is constructed as a family — residual = GSJB-11: the action-to-hazard bridge selecting θ and the absolute unit
Action-to-hazard bridge	**RESOLVED BY TYPING** (Part XII-vicies) — background time is removed with Tick-Race intact (winner probabilities invariant under baseline shape at 5.3×10^{-16} and all monotone reparameterisations at 0/250,000 mismatches); phase covariance $J^TGJ = G$ holds in the frozen family only at θ = 0, and exhaustive-branch additivity returns $2I_{98}$ exactly, so the primitive next-fact law is the Born norm p_A(z) = $\lVert P\_Az\rVert^2/\lVert z\rVert^2$ while readout Fisher is REJECTED BY TYPE as contextual; the θ dial was a type conflation — G_pre = $2I_{98}$ (selection) vs H_response = W_D (response), H_CMR104 = W_D ⊕ 0_6 retyped as the response completion — removed, not tuned; residual = GSJB-12: the pre-fact amplitude preparation z(X)/μ(dz) and the ordered-Bits-to-duration conversion

Preparation and factorisation	**MAJOR CONDITIONAL PASS / EVENT-LEVEL OPEN** (Part XII-vicies-semel) — deterministic equivariant first differentiation is a NO-GO (a complete symmetry twirl kills any void-tangent coupling: 6.15 → 1.4×10^{-16}); D7/$\mathbb{Z}_7$ holonomy is exact and transports innovations but leaves the uniform void fixed to the digit; the first fact cannot install a global frame ($(N-1)\log_2 q$ bits — exactly 2 and $2\log_2 7$ — exceed one Bit), forcing local-comparison readout; the unique unresolved preparation law is Haar/FS on $\mathbb{C}P^{48}$ (covariance $I_{49}/49$); and under the newly named ER condition the de Finetti factorisation discharges the D44′ primitive-innovation content CONDITIONALLY — one common ordinal opportunity probability, branch identity by the Born weights — leaving the realised directing state α / μ(dη
Event-level directing measure	**MAJOR TYPING PASS / OCCUPANCY NOT SELECTED** (Part XII-vicies-bis) — the record-conditioned preparation is typed as the Gibbs–Haar family μ_ρ ∝ exp[−ΔI_ρ]μ_FS (Haar recovered at constant ΔI; Haar-uniqueness-after-record FAILS with component covariance rank exactly 11 = 12 − 1 and witnesses differing 0.101); topology separated exactly (C3 unfilled H^1 = 1 over $\mathbb{Z}_2$ and $\mathbb{Z}_7$, filled 0); the exact $\mathbb{Z}_2$ occupancy law is $[1 - \mathbb{E}\_\nu(1-2p)^3]/2$ with UR-comp alone a NO-GO (parity pair: identical p = 1/2 marginals, occupancy 0 vs 1), complement symmetry giving exactly 1/2 and the $\mathbb{Z}_7$ diagnostic exactly 6/7; the D45″ construction-order clause (one record or two on a pre-commitment shared face) is load-bearing — residual = GSJB-14: ΔI_ρ(η), ν_ρ(dp) and the ordering theorem
Commitment action and construction order	**FORM PASS / PREPARATION AND ORDER NO-GO** (Part XII-vicies-ter) — the local action is uniquely M_i = −ln a_i + λΔS_i with iso-entropic recovery of the Born weights at 6.9×10^{-18}, but form alone selects nothing: identical extension information admits orthogonal $\mathbb{C}P^{48}$ states at Fubini–Study distance exactly π/2 with a T^{48} phase fibre, and any positive target law is reproduced by some non-negative ΔS (residual 5.6×10^{-17}); the shared face admits exactly the one-parameter Ising family exp(Jxy)/(4cosh J) interpolating 2 → 1 effective bits at uniform marginals; provenance is independently typed by G_γ = P_common + γP_prov (16 + 4 = 20) and is indispensable because perfectly correlated duplication preserves entropy, KL and Fisher exactly; D45″ reduces exactly to the primitive event multiplicity m_face ∈ {1,2}, giving the 16-token (ξ = 62.72 μm) or 20-token (ξ = 84.07

	μm) stability graph — residual = GSJB-15: m_face, γ and the action-derived costs
Shared-face fact count	**CLOSED — LOCALISATION OPEN** (Part XII-vicies-quater) — under the strong transport model a shared face carries one relation with the reverse reading its deterministic inverse (14 images for 14 D7 elements; $H(g,g^{-1}) = H(g)$, H(g^{-1}
Record localisation	**SELECTED CONDITIONALLY** (Part XII-vicies-quinquies) — under the declared bilateral interface-readout model a second token is not required for local access (accessibility is premise P3; both local reads rank 4 and the joint read also rank 4, so the second readout adds no independent information); a single token admits microscopic many-to-one encoding (two basins of 8 for one binary macrorecord) — dynamical stability, copying rates and maintenance barriers remain OPEN; and the dual write factorises algebraically as one write composed with a deterministic copy (residual 0.0), its temporal reading requiring P6 and structure economy; under the named structure-economy discipline the primitive commitment writes ONE token: m_record_token,birth = 1 with **γ_birth = 0 exactly**, and the four provenance modes exist only after a downstream copy; blind return selects the 16-token carrier, **ξ = 62.723178 μm** (both branch exponents share one frozen ruler to fifteen digits) — residual = GSJB-17: copy dynamics and γ_copy, **with the separate D44′ event-level preparation debt (ΔI_ρ, ν_ρ, realised η/z, entropy costs, phases) untouched by this Part**
Blocking object	Reduced (RPC-1 §77) to two primitive returns — one commitment-maintenance action H_CMR and one absolute length ξ. The remaining closure problem is to **complete and uniquely derive** the physical H_CMR — including its event-level preparation sector (D44′) and its post-commitment maintenance sector (D-GSJB17), which are missing action-level *returns*, not merely uniqueness questions about a returned action — and separately to **reconcile and select** the physical absolute scale ξ; D35's weights are H_CMR spectral data

This document is self-contained as an audit ledger and contains the transport theorem in full; the later forward-construction results are self-contained only at summary and dependency level and rely on separately supplied VERSF definitions and calculation packages. The nine-requirement Stage-A execution, the quark transport theorem and the parameter-closure audit are presented as one argument; the transport theorem is given in full in Appendix A. No experimental comparison is performed anywhere in this document.

Abstract

This document audits, in one chain, everything the VERSF programme has said is required to derive the Standard Model from microscopic primitives, using no measured particle data. Its terminal result is negative and precise: **the current corpus does not determine a unique Standard Model boundary, so no physical closure certificate is available.** Six explicit alternative boundary families are exhibited, each fully consistent with the retained structure; the strict parameter-closure algorithm therefore halts, and the reduced gauge response — superficially a clean result — is shown to be one minus a definition.

Three results survive without the deep machinery and are unconditional: the self-consistent quark-threshold transport contraction theorem (closed at its declared order, Appendix A); the η-readback non-identifiability lemma; and the exact information identities showing that perfectly correlated record copies are invisible to every outcome-based measure while independent copies double each one. The finite algebraic and counting identities whose operands are fully declared — the regulator-independent survival gap $1 - e^{-1}$, the closure-group relations, the rank and dimension bookkeeping — are likewise checkable by anyone.

A second, strictly quarantined layer proceeds forward past the refusal, and everything in it is graded conditional on named premises, supplied instruments, or off-document definitions. It builds a complete structural skeleton of the Standard Model and passes every structural audit, frequently to machine precision; it closes the neutral sector's structural existence; and across the GSJB series it converts the residual from a diffuse programme into named objects with pass conditions. Several of its strongest statements — the first-differentiation no-go, the one-Bit global-frame exclusion, the forcing of the Born weight law, and the shared-face single-fact theorem — are exact *within* their declared models and must be quoted as conditional.

The mature reduction is to the pair {H_CMR, ξ}. The remaining closure problem is to complete and uniquely derive the physical H_CMR — including its event-level preparation sector (D44′: the extension-information functional, the directing law, the realised amplitude, the entropy costs and phases) and its post-commitment maintenance sector (copy dynamics, γ_copy, basin stability), both of which are missing action-level *returns* rather than uniqueness questions about a returned action — and separately to reconcile and select the physical absolute scale ξ, for which four candidate values are now in play, the two most relevant differing by 25%.

The conditional Standard Model derivation therefore remains NOT ESTABLISHED.

> **How this document is organised.** The *current scientific argument* is: this abstract, the verdict box and status matrix, the four-section General Reader Summary, Theorems 1–4 with Appendix A, the forward-construction Parts (XII-series), the integrated certificate (Part XIV), and the ledgers of Appendices D–F. The *provenance archive* — retained for audit trail, not to be read as current standing — is: Part XIII (chronological claims, with its re-grading table at §42), Appendix G (former general-reader narrative) and Appendix H (former executive

ledger). Where archive and current argument disagree, the current argument governs; where any of them and a later Part disagree, the later Part governs. Section 38-bis explains how to read the chronological ledger; the long-form executive account that formerly stood here is retained as Appendix H.

Principal Claim

Transport closes and terminal holonomy closes. What does not close is the physical boundary: the gauge-sector obstruction first appears as the non-identifiability of the bath normalisation, but the mature residual is the **incomplete physical H_CMR** together with the **unreconciled absolute scale ξ** (§§43–44). That first appearance cannot be made to close from within the present corpus:

$$G_{red}(\eta) = \mathrm{diag}(1 - \eta_{colour}, 1 - \eta_{weak}, 1 - \eta_{abelian})$$

⇒ no admissible η yields derived gauge content

This is the gauge-sector instance of a general statement. Six witness families prove the corpus admits a continuum of inequivalent positive boundaries, so the missing objects are non-invertible and certificate refusal is a theorem rather than a policy.

Therefore the HFB boundary is NOT ADMITTED, the closure algorithm halts at Stage 0, and the obstruction is the pair {H_CMR, ξ} rather than nine tasks — with several sectors inside H_CMR (event-level preparation, post-commitment maintenance) still awaiting action-level returns, so this is an obstruction requiring new information, not further computation.

Nine-Requirement Verdict Matrix

#	Requirement	Verdict	Strongest return
1	Physical history dynamics	**PARTIAL — HOLONOMY PASS, SCREENING ORIGIN OPEN**	Canonical K = 7 gives C = 0 exactly; the scalar QP block is gauge-orthogonal; seven typed non-scalar source directions constructed; terminal $\mathbb{Z}_7$ holonomy passes under the generator readout.
2	Two genuine refinement levels	**TWO GENUINE PASSES (INTERNAL)**	NFDMA-1 (Part XII-bis) supplies a non-factorising whole-action Level-2 under which agreement is evidence; RCMO-1 (Part XII-ter) supplies a regulator-covariant maintenance-record operator

#	Requirement	Verdict	Strongest return
			converging at $\mathcal{O}(h^2)$ with a derived unitary blocking map. Both internal.
3	Physical reduced response G_red	**NOT ISSUED — NON-IDENTIFIABLE**	G_red(η) = diag(1 − η) on the retained directions; the frozen return diag(2/3, 1/2, 1) is readback, quarantined.
4	Absolute microscopic scales	CONDITIONAL RETURN	κ_e = 1/31, diamond conductances 1/16 and 1/32 with exact pairing, Λ⋆ = 172.338050010654 GeV; colour repair Λ_3 = 0.225923 GeV.
5	Complete physical embedding arrays	**CHARGED/GAUGE CONDITIONALLY CLOSED / NEUTRAL EXISTENCE CLOSED / MASS BLOCK OPEN**	RRHF-1 derives the functorial lift blind; PRLU-1/PTSD-1/SGPL-1 reduce the debt to one full-carrier object plus support checks; FCHI-1 (Part XII-decies) supplies that object — an explicit 102-dim retained parent and complete Kraus instrument — and the three support facts pass with an exact regulator-uniform terminal gap $1-e^{-1}$ (Theorem 13). Structural existence of the neutral terminal sector is closed; residual is the provenance theorem; the absolute neutral mass block and scale are still absent.
6	One same-branch Standard Model boundary	**NOT ADMITTED — NON-CLOSURE PROVED**	Six witness families exhibit a continuum of inequivalent positive boundaries (Theorem 4); witness family 5 now executed as a full neutral block (Part XII-quater §MH6). D36 returns a conditional candidate under named premises but **fails independent reproduction and is therefore not settled**; D32 returns a conditional candidate conjugate pair with the exact residue and orientation open; D35 untouched.
7	Branch degeneracy	DEGENERATE (certified)	Conjugate pair k_Ω = 1, 6 at equal free energy 0.007414782101; no data-driven sign choice.
8	Production transport machinery	**CONDITIONAL PASS**	Self-consistent QCD matching and scalar stability closed as a proved contraction, ceiling confirmed to seven figures by an independent pipeline.

#	Requirement	Verdict	Strongest return
9	Blind end-to-end run	STAGE-A RUN COMPLETE; CLOSURE NOT ADMITTED	Deterministic, hash-covered, software integrity PASS; scientific execution halts at the non-identifiability and incomplete-boundary blockade.

Part I — Rules, Vocabulary and Premises

1. What would count as a genuine conditional derivation

The target is not to reproduce the *form* of the Standard Model. A genuine conditional derivation must begin from declared VERSF microscopic rules and a frozen premise set, calculate a complete same-branch boundary without inserting measured Standard Model values, transport that boundary through renormalisation and thresholds, and only then compare its predictions with observation.

The required causal order is

microscopic VERSF history → HFB boundary → finite scheme bridge → coupled RG → thresholds → EWSB → poles, masses, mixings, QCD scale and strong phase.

A downstream map may transport an upstream answer. It may not invent one.

2. Status vocabulary

Label	Meaning
PASS	The calculation completes at its declared claim level and does not rely on a missing object of the same type.
CONDITIONAL PASS	The mathematics or numerics close once an explicitly named premise stack is granted.
PRECURSOR / BENCHMARK	A real calculation validating architecture or producing a target, lacking physical provenance.
NOT TESTED	The executed calculation does not bear on the question the requirement poses, whatever its residuals.
NON-IDENTIFIABLE	The quantity is a bijective function of an undetermined input, so no admissible input yields derived content.
CONSTRUCTION CONSEQUENCE	The return follows from how the inputs were built and carries no evidential weight.
DEGENERATE	The frozen rules retain more than one physically distinct branch.
FAIL	A preregistered necessary condition is violated; the candidate route is rejected.

Label	Meaning
NOT ADMITTED	The upstream package is incomplete or failed, so downstream prediction is prohibited.

Four of these — NOT TESTED, NON-IDENTIFIABLE, CONSTRUCTION CONSEQUENCE and NOT ADMITTED — name situations in which machine-precision residuals are returned and none of them is evidence. A calculation can be exact and empty at the same time, and distinguishing the two cases is the main work of this document.

3. Non-insertion rule

Assembly is transport, not rescue. A measured coupling, mass, phase, threshold, regulator weight, branch sign or missing matrix is never inserted because a downstream calculation needs it. A failed gate remains failed; a missing neutral block remains missing; a conditional response matrix is not promoted by attractive downstream numbers.

The rule has a second edge, exercised throughout Parts III, IV and XII. A *passing* result whose pass is a tautology of its own construction is likewise not promoted. Non-insertion is violated as thoroughly by reading an input back out as by writing an observation in.

4. Named premises

History layer.

Premise	Statement	Retired by
H1	The master-history carrier is the K = 7 operational heat generator with $\pi = (7,4,4,4,4,4,4)/31$.	F1
H2	The seven typed QP source directions span the physical bath response and are Fisher-orthogonal.	F2
H3	The bath-relaxed metric is $W_{prim}(\eta) = W_{core} - H\,\mathrm{diag}(\eta)\,H^T$ with $0 \le \eta_i \le 1$.	F3
H4	The terminal record descends through the antipodal quotient with an equal-edge basic cochain.	F4
H5	The connection phase is extracted from the generator, $U^{rec} = \mathrm{Pol}[-\mathbf{L}_{yx}]$.	F5
H6	The conditional scalar route supplies v_{cl}, $\lambda(\mu_0)$, $\mu_H^2(\mu_0)$.	F6
H7	Cross-sector evolution uses the one-loop full-complex-matrix reference system.	F7
H8	No measured Standard Model value enters any Stage-A construction.	F8

Transport layer.

Premise	Statement	Retired by
T1	The quark matrices are a low-current readout at $\mu\_R = 2$ GeV, not an interface- or common-scale object.	F9
T2	The VBF colour boundary is $g\_s(\mu\star) = 1$ at $\mu\star = 5.80$ TeV.	F10
T3	Mass transport uses $\gamma\_m = 6C\_F\, g\_s^2/(16\pi^2)$, $\beta_0 = 11 - 2n\_f/3$.	F11
T4	Flavour decoupling is sharp continuity of α_s at $\mu = m\_h$, with no finite matching coefficient.	F12
T5	Each heavy threshold sits at its own running mass, $m\_h = m\_h(m\_h)$.	F13
T6	The conditional electroweak boundary supplies μ_0, v_cl, $\lambda(\mu_0)$, $\mu\_H^2(\mu_0)$.	F14
T7	Transport is native one-loop VBF; no finite bridge to a continuum scheme is applied.	F15
T8	No measured α_s, heavy-quark mass or stability number enters the fixed point or the matching factor.	F16

Quarantine layer.

Premise	Statement	Retired by
Q1	Every diagnostic input is a conditional candidate, never a blind microscopic output.	F17
Q2	The diagnostic matching point $\mu_0 = 243.722807638000$ GeV is constructed by transport, not certified by history.	F18
Q3	The strict and diagnostic layers are separately typed; no diagnostic return supports a strict claim.	F19
Q4	Construction consequences are enumerated and excluded from the evidential ledger.	F20
Q5	No measured value is consulted at any stage, including for validation.	F21
Q6	Quarantined provenance warnings travel with the numbers they attach to.	F22
Q7	Hash coverage certifies integrity, not currency.	F23
Q8	Displayed precision is not computed precision, and rounded arrays are not used downstream.	F24

Falsifiers F1–F24 are stated in Appendix D.

Part II — Requirement 1: Physical History Dynamics

VERDICT: PARTIAL. Terminal holonomy passes under the correct readout. The origin of gauge screening remains open, and it is known not to lie in the canonical generator or the scalar source.

5. Canonical K = 7 generator

H_hist^(K=7) = **L**_op, T_hist^(K=7) = exp(−a_t **L**_op), $\pi = (7,4,4,4,4,4,4)/31$, spec(Ω_Q^2) = {1/2, 1/2, 1, 1, 31/28, 5/4}.

The persistent state is the Perron zero mode and the unresolved bath is its six-dimensional complement. The persistent projector is a spectral projector of **L**_op, so

Q **L**_op P = 0 exactly ⇒ C = 0 ⇒ W_prim = W_core ⇒ G_red = $\mathbb{1}_3$.

This is a theorem-level no-screening result. A separable homogeneous K = 7 heat law cannot generate the required bath screening.

6. Scalar nonseparable bath

W_prim = W_core − η_κ h_κ h_κ^T, E_retained^T h_κ = 0 ⇒ G_red(gauge) = $\mathbb{1}_3$.

The retained gauge directions are orthogonal to the scalar source, so the gauge response is the identity for every admissible η_κ. The scalar route is excluded as the origin of force-dependent screening; the missing dynamics must be genuinely non-scalar.

7. Seven-source non-scalar construction

Seven mutually orthogonal source directions are constructed — scalar commitment, colour transport, weak transport, Abelian transport, terminal record, completion, CAR/Fock — with C = −H_sources^T in unit bright-mode coordinates.

Certificate	Residual
Euclidean source orthogonality	3.846×10^{-16}
Fisher orthogonality	2.763×10^{-13}
Defect-source reconstruction	2.863×10^{-13}
Analytic null residual	8.574×10^{-16}
Rank of W_prim	183

This constructs the missing source *directions*. It does not derive their absolute susceptibilities — the distinction that becomes decisive in Part IV.

8. The holonomy readout

The antipodal terminal quotient with classes A = {b_0, b_3}, B = {b_1, b_4}, C = {b_2, b_5} is strongly lumpable (residual 1.923×10^{-16}; representative residual 1.144×10^{-16}). The nearestneighbour benchmark reproduces the required phase to 2.483×10^{-16}. The question is which object carries the connection.

> **Theorem 1 (generator readout).** Let $\mathbf{L}$ be the covariant generator on the terminal carrier and $T = \exp(-a_t \mathbf{L})$ the finite transfer. The entrywise extraction from the transfer,
>
> $U^{entry}_{yx} \equiv \mathrm{Pol}[T_{yx}]$,
>
> is not a connection: it depends on a_t. The generator extraction
>
> $U^{rec}_{yx} \equiv \mathrm{Pol}[-\mathbf{L}_{yx}]$, equivalently $\mathbf{L} = -(1/a_t) \operatorname{Log} T$,
>
> is a_t-independent, and the two agree as $a_t \to 0$, since for $y \neq x$
>
> $T_{yx} = -a_t \mathbf{L}_{yx} + \mathcal{O}(a_t^2) \Rightarrow \mathrm{Pol}[T_{yx}] = \mathrm{Pol}[-\mathbf{L}_{yx}] + \mathcal{O}(a_t)$.

Proof. Exponentiation sums paths of every winding number around the terminal cycle before the polar map is applied, so Pol[T_yx] is a weighted circular mean of phases in distinct $\mathbb{Z}_7$ classes with a_t-dependent weights; its a_t-dependence is generic. The Neumann expansion gives the off-diagonal leading term, and the polar map is invariant under multiplication by the positive scalar a_t. ■

9. Wilson-phase audit

The frozen execution evaluated the entry readout at $a_t = 1$:

$\Phi_{entry}(1) = 0.524906665046$, $\Phi_{target} = 2\pi/7 = 0.897597901026$, residual 0.370538046592,

with equal terminal edge phases 0.174968888349. The archived continuation gives:

a_t	Φ_entry
1.000×10^{-8}	0.8975978967
7.938×10^{-5}	0.8975633889
4.144×10^{-1}	0.7277160192
1.948	0.2884207947
3.482	0.0931865800
5.000	0.0255815934

with reported small-time behaviour $\Phi_{target} - \Phi_{entry}(a_t) = 0.434765\, a_t + \mathcal{O}(a_t^2)$.

Both features are what Theorem 1 predicts. The monotone decay across three orders of magnitude in a_t is the signature of winding contamination; the linear small-time slope is the $\mathcal{O}(a_t)$ correction. The endpoint 0.8975978967 against 0.8975979010256552 is agreement to 4.35×10^{-9} at $a_t = 10^{-8}$, consistent with exact agreement in the limit.

> **Corollary 1.1.** Under H5, the terminal $\mathbb{Z}_7$ Wilson phase of the frozen candidate is $2\pi/7$, and the terminal gate passes. The continuation curve measures the entry-readout artefact; it does not reject the candidate.

Two counter-readings are dismissed explicitly.

"The physical transfer is T, so its polar phase is what descends." A quantity varying continuously from 0.897598 to 0.025582 as an arbitrary regulator time is dialled is not a holonomy in any sense that could descend. The a_t-dependence is itself the disproof.

"Taking $a_t \to 0$ selects the answer, which is an insertion." The limit is not selected to restore a number; it is where Theorem 1 shows the two readouts coincide. The generator readout returns the same value at every a_t, including a_t = 1. Nothing is tuned.

10. Assessment

Derived. Canonical generator and bath spectrum; seven typed non-scalar source directions; finite CAR/Fock source; terminal lumpability; terminal $\mathbb{Z}_7$ holonomy under H5.

Excluded. Screening from the separable canonical generator (C = 0 exactly) and from the scalar commitment source (gauge-orthogonal).

Open. The absolute susceptibilities that would make the non-scalar sources load-bearing. This is now the whole of Requirement 1's residue, and it coincides with the blockade of Part IV.

Part III — Requirement 2: Two Genuine Refinement Levels

> **VERDICT: NOT TESTED.** The two levels intertwine exactly, but the operator family is factorised, so the refinement-stability question is not addressed.

11. Excluded and surviving families

The earlier 8-to-16-cell multi-wheel candidate failed its preregistered gap condition with $\delta_{16}/\delta_8 = 0.2545$, voiding the refinement error bounds. The diamond family is separately excluded analytically by $\lambda_2(k) = \cos^2(\pi/4k)$.

The surviving candidate is the $K_{N,N}$ antichain family, with spectrum $\{1, ½^{(2N-2)}, 0\}$, uniform gap ½, exact intertwining $W_{2N} V = V W_N$, and conductance $c_N = 1/4N^2$ satisfying $4c_{2N} = c_N$. It is now evaluated at N = 2, 4, 8, 16, confirming the uniform gap and conductance halving across four levels. That answers the gap-collapse objection which retired the earlier families; it does not answer the factorisation objection of §13, which is independent and applies to whichever spatial family is chosen.

12. The executed regulator

Level 1 is one causal diamond; Level 2 is two diamonds glued at a shared vertex, with the local 187-dimensional physical tangent carrier tensored with the spatial generator:

$H_n = \mathbb{1}_{\text{spatial}} \otimes H_{\text{local}} + \mathbf{L}_{\text{spatial}} \otimes \mathbb{1}_{187}$.

Test	Residual / return
Spatial lift isometry	6.634×10^{-16}
Generator intertwining	7.187×10^{-16}
Heat intertwining	6.423×10^{-16}
Level-1 physical tangent dimension	748
Level-2 physical tangent dimension	1309

Object	Level 1	Level 2
Auxiliary dimension	745	1306
Persistent local auxiliary dimension	184	184
Spatial nonpersistent dimension	561	1122
Minimum auxiliary eigenvalue	0.104356076261	0.104356076261

13. Why these residuals are not evidence

> **Lemma 2 (factorisation).** For H_n of the displayed tensor form with spatial carrier of |V| vertices:

1. dim = 187|V|, so 748 = 4×187 and 1309 = 7×187, with auxiliary dimension 187|V| − 3;
2. spec(H_n) = spec(H_local) + spec(**L**_spatial), and since **L**_spatial has a Perron zero mode, the minimum auxiliary eigenvalue equals the minimum of spec(H_local) on the auxiliary block — independent of |V|;
3. G_red is computed from H_local alone, hence identical at every level.

Each numeric in §12 is an instance. The persistent local auxiliary dimension 184 = 187 − 3 is level-independent by construction; 561 = 3×187 and 1122 = 6×187 are pure multiplicity; and the minimum auxiliary eigenvalue agrees to twelve digits because it is the same number.

> **Corollary 2.1.** "G_red is level-independent" carries no information under Lemma 2 and must not be cited as corroboration of the Part IV return.

A final certificate requires an analytic convergence bound, a monotonicity theorem, or a controlled Cauchy estimate on the complete non-factorising operator family with ordered holonomy, Karcher-mean coarse maps, fermions and terminal records.

Part IV — Requirement 3: Physical Reduced Response

> **VERDICT: NOT ISSUED — NON-IDENTIFIABLE.** The response family is exact, and that exactness is the problem.

14. The response family

$W\_prim(\eta) = W\_core - H\_sources\, \mathrm{diag}(\eta\_i)\, H\_sources^T,\ 0 \le \eta\_i \le 1,$

with the positivity cube exact and the source directions typed. The unresolved issue is the absolute value of each η_i, which controls how much of the core response the bath relaxes. These are load-bearing physical parameters, not nuisance parameters.

15. The readback theorem

> **Lemma 3 (η-readback).** On the retained gauge directions,
>
> $$\boxed{G\_red(\eta) = \mathrm{diag}(1 - \eta\_colour,\ 1 - \eta\_weak,\ 1 - \eta\_abelian)}$$
>
> at every regulator level, and the map $\eta \mapsto G\_red$ restricted to the three gauge susceptibilities is a bijection of $[0,1]^3$ onto the admissible response set.

Proof. The three gauge sources are Fisher-orthonormal and lie in the retained row space, so each subtracts its own susceptibility from the corresponding unit diagonal entry and mixes with nothing else; the reduction is diagonal with entries $1 - \eta\_i$. Both endpoints are certified by the frozen run: $\eta = 0$ gives $\mathbb{1}_3$ at residual 2.896×10^{-15}, and the saturated audit $\eta\_colour = \eta\_weak = \eta\_abelian = 1$ gives 0 at residual 4.199×10^{-16}. Bijectivity follows from strict monotonicity of $1 - \eta$. ■

16. Consequence for the frozen return

With $\eta = (\eta\_scalar, \eta\_colour, \eta\_weak, \eta\_abelian, \eta\_terminal, \eta\_completion, \eta\_CAR) = (1/7, 1/3, 1/2, 0, 1/3, 1/2, 1/2)$, the run returns, identically at both levels,

$G\_red^{(L1)} = G\_red^{(L2)} = \mathrm{diag}(2/3, 1/2, 1)$, two-level target residual 2.127×10^{-15}.

By Lemma 3 this is $1 - (1/3, 1/2, 0)$ read back entry by entry. The two-level equality is Corollary 2.1. The residual certifies arithmetic, not physics.

> **Corollary 3.1 (non-identifiability).** No admissible η produces derived gauge content in G_red. Choosing a different η vector is not progress toward Requirement 3; it is a relabelling. The requirement can be met only by an independent derivation of η from the master history action.

17. Quarantine

The triple (2/3, 1/2, 1) is a diagonal of small rationals in colour–weak–Abelian order, one careless reading from being mistaken for a derived coupling-ratio pattern. It is quarantined: displayable only with Lemma 3 attached, ineligible for any boundary ledger row, and not citable as partial success of Requirement 3.

Part V — Requirement 4: Absolute Microscopic Scales

VERDICT: CONDITIONAL RETURN.

Quantity	Return	Grade
Canonical K7 stationary-flow conductance κ_e	1/31 = 0.032258064516	Conditional canonical branch
Level-1 diamond edge conductance	1/16 = 0.0625	Calculated
Level-2 diamond edge conductance	1/32 = 0.03125	Calculated
Paired fine-to-coarse residual	0	Exact refinement check
v_cl	243.722807638 GeV	Conditional scalar route
Λ⋆	172.338050010654 GeV	Identity-completion branch, v_cl/√2
$\lambda(\mu_0)$	0.128999748047	Conditional scalar route
$\mu\_H^2(\mu_0)$	7662.689132 GeV^2	Conditional scalar route

The paired fine conductances reproduce every coarse edge exactly, closing the discrete refinement arithmetic.

18. Colour repair

Λ_3(colour-completed) = 0.225923 GeV, against 2×10^{-20} GeV unscreened.

The unscreened value was wrong by twenty orders of magnitude; the completed branch returns a physically sane confinement scale, so the discrepancy is solvable within the family rather than fatal to it. It sits 4.34% from the independently derived cascade value Λ_3 = 0.216516653 GeV of Appendix A. The two come from different branches and schemes and share no intermediate quantity, so the agreement is suggestive rather than certifying — but a twenty-order repair landing within a few percent of an independent route should be tested deliberately once a common scheme bridge exists.

19. The remaining obstruction

The scalar source obeys η_scalar = $\hat{g}\_\kappa^2/(\omega_0^2 + 7)$, but ĝ_κ and ω_0 are not numerically returned, so η_scalar = 1/7 is a unit-incidence stipulation rather than an evaluation. The scale tuple is internally consistent and useful; it is not an authoritative ruler. **This is D35, and Lemma 3 shows it is the critical path.** *At this stage of the construction, D35 was the identified critical path; the later GSJB sequence supersedes this diagnosis with the incomplete-H_CMR-plus-ξ formulation of §§43–44.*

20. First sector-differentiated instance

An irreversible-score branch changes the status of D35 from “no instance” to “one instance of the right type.”

Under the one-bit condition $\dot{\Sigma} = \ln 2$, the driven record affinity is fixed at $\alpha = 0.9590011097$, giving $\lambda\_TPB = 1$ and $N\_TPB = 1$, with the stationary distribution depleting the hub to 0.189424 against a uniform rim of 0.135096 and modulus gap 0.368270. The score-bath package satisfies

$$W\_score = W\_defect - C^{T} A\_Q^{-1} C$$

to 6.9×10^{-18}, with strictly positive reduced spectrum {0.0406, 0.0411, 0.1218, 0.1559, 0.2555, 0.3247}, A_Q exactly diagonal, and rank C = 4.

The load-bearing return is that the screening is **sector-differentiated for the first time**:

Sector	Screening
J	48.6%
T, B	44.4%
R	21.3%
C	10.5%
H	0.4%
trace	24.7%

The m2 pair is exactly dark at $\leq 9\times10^{-17}$ — a falsifiable fingerprint rather than a fitted feature — and the m1 cosine/sine asymmetry of 0.2433 is drive orientation imprinted in a derived object, which is the structure any orientation-reading branch selector requires.

Three typing constraints travel with this. The one-bit normalisation is a declared convention, not a derived value. The gauge readback $g' = 10.2$ is diagnostic-only and may not enter any ledger. And a rebuild of the kernel from the published narrative alone returns $\dot{\Sigma} = 0.185$ rather than ln 2, so the kernel convention is under-published — a debt in its own right, since a result that cannot be rebuilt from its own description is not yet reproducible.

This is the shape of object the missing normalisation requires. It is not that normalisation.

Part VI — Requirement 5: Complete Physical Embedding Arrays

> **VERDICT: PRECURSOR PASS / PHYSICAL OPEN — the obstruction is now localised to dΦ_n; the linear bridge is excluded and the graded descent passes at support level (Parts XII-undecies–tredecies); the completion attachment is closed by the route-character basis and the innovation-count metric is endpoint-independent but two-branch conditional (Part XII-quattuordecies); the renewal round (Part XII-quindecies) selects κ = 1/3 and retires the reset gauge with the neutral question reduced to pre-fact occupancy; the occupancy theorem is closed under the void axioms with the neutral-extended ledger selected and the internal metric full-rank (Part XII-sedecies); the intertwiner round returns a graded no-go with the minimal**

49-direction birth witness explicit (Part XII-septendecies); the birth round forces the multiplet support and proves the rank-96 parent incomplete by two (Part XII-duodevicies); the action-metric round collapses the stiffness question to one neutral parameter with the 104-carrier family constructed (Part XII-undevicies); the bridge is resolved by typing — Born/FS selection with W_D the separately typed response and the θ dial removed (Part XII-vicies); the preparation round closes the law level — Haar/FS preparation, ER-conditional de Finetti factorisation, D44′ *factorisation* conditionally discharged under ER — the event-level preparation sector remaining open (Part XII-vicies-semel); the directing-measure round types the Gibbs–Haar family with eleven tilts and the exact occupancy functional (Part XII-vicies-bis); the commitment-action round derives the additive action form with exact phase and cost non-identifiability, and reduces D45″ to the binary primitive m_face with both stability graphs explicit (Part XII-vicies-ter); the shared-face round closes the event multiplicity (m_fact = 1) and corrects the earlier fork, leaving record-token localisation and the maintenance stiffness (Part XII-vicies-quater); the localisation round selects one interface token at birth with γ_birth = 0 and returns the 16-token carrier blind (Part XII-vicies-quinquies); the copy dynamics and post-commitment redundancy cost remain open (GSJB-17).

21. Constructed

- 45-dimensional representation generators for colour, weak isospin and primitive hypercharge.
- Exact terminal-record geometry and primitive five-slot selectors for Q, u, d, L, e and the neutral slot.
- Two-level completion arrays V_H, X_H and their finite derivatives on a precursor branch.
- Charged-sector left and right address maps with exact coarse-lift consistency.
- Positive rank-three charged precursor matrices and invariant diagnostics.

The derived-interface calculation removes arbitrary generation edge weights, sector-dependent completion amplitudes, profile-weighted selectors and coordinate-axis gauge substitutes — a real reduction in freedom.

22. Two-level precursor drift

Diagnostic	Relative drift
G_red	0.1165%
V_H	0.0066%
X_H	0.1464%
Largest charged-boundary difference	0.3669%
Address-map coarse-lift residual	Numerical zero

These are strong checks on the *precursor* branch, which is not the factorised operator of Part III; the nonzero drifts are what distinguishes them. They do not establish physical origin, because the five-slot address rule, completion amplitudes and Schur couplings were supplied as candidate inputs.

23. The physical array contract

G_red; E_3, E_2, E_q; V_H, X_H, ∂V_H/∂φ, ∂X_H/∂φ; A_uL, A_uR, A_dL, A_dR, A_eL, A_eR, A_νL, A_νR; M_R^direct.

The neutral addresses generate Y_ν and M_D through the same compression route as the charged fermions. They do not generate M_R, which must arrive from the singlet neutral carrier. The physical P_Y, neutral arrays, M_R and same-history direct gauge embeddings remain missing. Building E_3 from a single colour representative would be a typing error and is not attempted.

Part VII — Requirement 6: One Same-Branch Boundary

VERDICT: NOT ADMITTED — NON-CLOSURE PROVED.

24. Strongest conditional ledger (quarantined)

One result precedes the ledger, correctly typed. The triple

(g_s, g, g′) = (1, 0.633659, 0.347613) at 5.80 TeV,

with a positive 24×24 completion Hessian, λ_min = 0.475, has been described as a common-scale gauge completion witness. That description does not survive: the triple is identical to the one-loop transport of the conditional electroweak and scalar branches from μ_0 to μ⋆ (Part XII), and g_s = 1 there is a round trip of the colour boundary through Λ_6 rather than a return. It establishes that those particular conditional inputs transport consistently and that the completion Hessian stays positive along the way. It carries no information the inputs did not already contain.

Boundary object	Strongest current return	Grade / issue
g_s	1 at 5.80 TeV	Conditional colour branch
g	0.650476840991 at 243.7228 GeV	Conditional electroweak branch
g′	0.341991048898 at 243.7228 GeV	Conditional electroweak branch
μ_H^2	7662.689132 GeV^2	Conditional scalar route
λ	0.128999748047	Conditional scalar route
σ(Y_u) at μ_0	7.21919×10^{-6}, 3.70485×10^{-3}, 0.971984	QCD-matched conditional matrix

Boundary object	Strongest current return	Grade / issue
$\sigma(Y\_d)$ at μ_0	1.56383×10^{-5}, 3.12755×10^{-4}, 0.0161959	QCD-matched conditional matrix
$\sigma(Y\_e)$	2.9918×10^{-6}, 6.197×10^{-4}, 0.010696	Conditional flavour branch
$\mathcal{B}\_\nu$	Full-rank type-I-dominant form only	Absolute Y_ν, M_D, M_R missing
$\bar{\theta}$	0 mod 2π on the positive-real determinant branch	Conditional; determinant-line premises open
G_red	*not eligible*	Non-identifiable by Lemma 3; quarantined, no row issued

25. The non-closure theorem

The ledger's status is not "incomplete pending further computation." It is provably not completable from the present corpus.

> **Theorem 4 (current-corpus non-closure).** The frozen corpus admits a continuum of mutually inequivalent positive HFB boundaries. Consequently no boundary certificate is derivable from it, and the refusal to issue one is a theorem rather than a policy.

Provenance. This is the same result as Theorem 72.1 of the parent RPC-1 theorem, stated there with one explicit witness per sector and the identical conclusion that the missing information — the normalisation return, the occupancy law, the independent completion/neutral scales and the physical response embeddings — is "none recoverable by downstream inversion." Theorem 4 and RPC-1 §72.1 are one theorem in two documents, not two results; the cross-walk of Appendix F records the shared identity.

Proof by witness families. Six explicit families of admissible boundaries are exhibited, each varying a load-bearing quantity while leaving every certified corpus quantity intact:

#	Witness family	Free quantity	Range exhibited
1	Gauge Schur blocks [[w, w−Z], [w−Z, w−Z]]	Schur complement Z	every $0 < Z \le w$
2	Scalar susceptibility $\eta\_\kappa = \hat{g}\_\kappa^2/(\omega_0^2 + 7)$	ω_0	$\omega_0 \in \{0, 1, 7\}$
3	Completion scale Λ⋆	Λ⋆	three distinct scales
4	$\mathbb{Z}_7$ occupancy	k	minimum at k = 0
5	Neutral a-scaling (a, a^2)	a	light operator exactly preserved, heavy spectra move four orders
6	Flavour benchmark	coefficient set	benchmark-sensitive

Each family is positive, internally consistent, and indistinguishable from the others by any certificate the corpus currently issues. ■

Family 1 subsumes Lemma 3: the diagonal readback diag(1 − η) is the special case in which the off-diagonal structure is trivial, and the general block form shows the free parameter survives even when it is not. Corollary 3.1 is therefore the gauge-sector case of a general statement — the missing objects are **non-invertible**, unrecoverable from any downstream quantity however precisely computed.

> **Corollary 4.1 (new-information requirement).** D35 is not a computational debt. No rearrangement, re-derivation or higher-precision execution of the current corpus can return it. It requires new information from a master history operator the corpus does not yet contain.

Family 5 is the sharpest of the six: a reparametrisation leaving the light neutral operator exactly invariant while the heavy spectrum moves four orders of magnitude. The neutral sector is not merely unmeasured but unmeasurable from below.

26. Why the ledger is not a certificate

1. The η susceptibilities are not derived and, by Lemma 3, cannot be recovered from the response — the gauge-sector instance of §25's general non-invertibility.
2. The branch remains the conjugate pair $k_\Omega = \pm 1$.
3. The electroweak, scalar, colour and flavour rows originate from different conditional routes.
4. The complete neutral block and direct M_R are absent.
5. A finite common scheme bridge has not been applied to all rows.
6. The two-level physical history and embedding provenance is incomplete, and Part III shows the executed refinement does not supply it.

The correct result is "not admitted", not "approximately complete." Declining to populate the missing rows is a successful non-insertion audit — and, after Theorem 4, a compelled one rather than a discretionary one.

A related quarantine belongs here. An inverse-Yukawa forgery witness has been constructed: a boundary reproducing the observed flavour structure by construction rather than by derivation. It is recorded so its shape is recognisable if it recurs, and it is never cited as a return.

Terminal holonomy no longer appears on this list. Removing it does not move the verdict, which is itself informative: the blockade was never the phase.

Part VIII — Requirement 7: Branch Selection and Degeneracy

> **VERDICT: DEGENERATE (certified).**

A common direct-sum operator evaluated at both levels returns central commutator residuals of exactly 0. Excluding the trivial zero-holonomy branch:

k_Ω	k_{vac}	Free energy	Selected within nonzero set
1	2	0.007414782101	Yes
2	4	0.023685099808	No
3	6	0.036360833437	No
4	1	0.036360833437	No
5	3	0.023685099808	No
6	5	0.007414782101	Yes

with basicness $k_\Omega = 4\, k_{vac} \bmod 7$ (residual 2.483×10^{-16}).

The two survivors are related by conjugation and carry opposite CP/holonomy orientation, at free energies equal to twelve digits. No measured mixing phase is consulted. The verdict is DEGENERATE until a data-independent operator breaks the symmetry or the degeneracy is proved exact.

The occupancy burden is now numerical: $\Delta f_{occ} = 0.007414782101$, the same number as the selected branch free energy. The coincidence is structural rather than accidental — the $\mathbb{Z}_7$ occupancy cost and the nonzero-holonomy free energy are two readings of one quantity — and it converts D32 from a qualitative debt into a measured one.

Under Corollary 1.1 this pair sits inside a candidate whose terminal descent passes, so the degeneracy is a live physical alternative rather than a distinction inside a rejected map. That raises rather than lowers its priority.

Part IX — Requirement 8: Production Transport

> **VERDICT: CONDITIONAL PASS.** The quark matching and scalar-stability problem is closed at one-loop VBF order as a proved contraction. The full production bridge remains incomplete.

The transport theorem is given in full in **Appendix A**; this part records its returns and their standing in the chain.

27. Returns

$(m_t, m_b, m_c) = (171.783689943, 4.213223810, 1.228341125)$ GeV, $(\Lambda_6, \Lambda_5, \Lambda_4, \Lambda_3) = (73.245777, 143.827986, 188.445205, 216.516653)$ MeV, $R_u^{QCD}(\mu_0 \leftarrow \mu_R) = R_d^{QCD}(\mu_0 \leftarrow \mu_R) = 0.580788332942 \cdot \mathbb{1}_3$.

The threshold system is a contraction with spectral radius $\rho = (24/25)/L_4(m_c) = 0.256052906$ exactly and rigorous interval bound $\|D\mathcal{T}\|_\infty \leq 0.649795$ on the physical box, so existence and uniqueness follow from the Banach theorem rather than from a multistart audit. Matching preserves the quark hierarchy ratios, both singular frames and the matching-step CKM frame.

28. The stability gate, and two distinct statements about it

The matching factor is 12.8068% below the independent ceiling 0.666093443388, and $\lambda(5.80\ \text{TeV}) = 0.068065835223 > 0$ with the minimum at the upper endpoint. Direct grid insertion, by contrast, drives λ through zero near 383.610149 GeV.

Two claims about the ceiling must not be conflated.

Reproduction. The ceiling recomputed inside the transport pipeline returns the frozen value exactly, residual zero. That confirms correct implementation and nothing more.

Cross-pipeline agreement. The colour-completed branch returns

$r_{u,crit} = 0.666093460291$, against 0.666093443388,

agreeing to seven significant figures and 2.5×10^{-8} relative. The eighth-digit difference is the informative part: it certifies that the two calculations share no intermediate quantity. This is the strongest cross-validation anywhere in the package — the ceiling is not an artefact of the calculation obliged to clear it, and the derived R_u sits inside the independently obtained bound.

29. Remaining production debts

1. A scheme-invariant readout coordinate or RG-invariant mass, rather than a declared 2 GeV convention — now bounded by the derived requirement $\mu_R < 4.390909$ GeV (Appendix A §A10).
2. The finite VBF-to-continuum bridge.
3. Higher-loop running and finite decoupling coefficients, especially in the charm region where $\alpha_s = 0.402$.
4. Dimension-five and dimension-six neutral-sector Wilson coefficients and threshold matching.
5. The determinant-line and strong-phase certificate.
6. Correlated uncertainty and truncation envelopes.
7. A second predeclared scheme with invariant poles and mixings verified.

Part X — Requirement 9: Blind End-to-End Execution

VERDICT: STAGE-A RUN COMPLETE; CLOSURE NOT ADMITTED.

30. Frozen execution

The all-nine solver uses deterministic seed 20260719, a frozen tolerance block, SHA-256 hashes covering inputs and outputs, and no measured Standard Model values in the Stage-A construction.

Audit object	Return
Software integrity	PASS
Deterministic seed	20260719
Manifest	SHA-256 over all execution artifacts
Terminal holonomy critical bound	PASS under H5
Normalisation identifiability	FAIL (Lemma 3, Theorem 4)
Physical certificate	Not issued
Scientific status (Stage-A code, historical)	`BLOCKED_ON_D35 ‖ D36` — superseded by the mature reduction of §§43–44: `BLOCKED_ON_INCOMPLETE_H_CMR ‖ UNRECONCILED_XI`

Manifest currency. Hash coverage certifies that the archived bytes were the bytes executed; it does not certify that they were the current ones. A superseded copy of the transport source was hashed in an earlier package. Integrity and currency are distinct properties, and a revision-registry check is required for the second.

31. CAR/Fock determinant audit

Object	Return
One-particle dimension	45
h_{45} minimum eigenvalue	−0.145970673376
h_{45} maximum eigenvalue	0.171112011535
One-particle transfer minimum eigenvalue	0.842727173021
log det(𝟙 + e^(−h))	31.232694452805
Determinant sign	+1
6-mode Fock transfer minimum eigenvalue	1.000000000000
Fock trace / determinant residual	9.948×10^{-14}

Two qualifications, both lowering the claim.

Positivity of a fermion determinant is not reflection positivity. The audit certifies a determinant sign on a frozen finite Hamiltonian branch; it is not an Osterwalder–Schrader theorem for arbitrary chiral gauge backgrounds. The gate is retitled **determinant-sign audit**.

The two sub-audits describe the *same* spectrum consistently; the apparent tension is a mislabel, now resolved. Since h_{45} has a negative minimum eigenvalue, the one-particle transfer reaches e^(0.145971) = 1.157 and is not a contraction. The 6-mode Fock audit's minimum transfer eigenvalue of exactly 1.000000000000 is the *vacuum* — the empty product over occupied modes — which equals 1 by construction for any one-particle spectrum whatsoever; it does **not** require every mode energy to be non-positive, and the earlier reading that it did was the error. The reported trace 93.408 = ∏(1 + t_i) over six modes is consistent with the mixed one-particle spectrum (some $t_i = e^{(-\varepsilon_i)} > 1$ where $\varepsilon_i < 0$, others < 1). So the one-particle and Fock audits agree, and the determinant-sign result of the table stands. The residual point is only nominal: the gate is a determinant-sign audit on a frozen finite Hamiltonian branch, not a reflection-positivity theorem, and the full one-particle spectrum should be published alongside the Fock trace so the vacuum-eigenvalue reading is not misread again.

Part XI — Strict Parameter-Closure Admission Audit

Closure requires one immutable HFB package. A conditional value existing somewhere in the corpus is not enough: every row must be populated from one branch, at one scale, in one scheme, with covariance, thresholds, certificates and hashes.

The audit's authority rests on a proved result of the parent theorem, **RPC-1 Theorem 7.3 (non-insertion / measurability)**: under the data quarantine and read-only import, every output of the composed observable map is measurable with respect to $\sigma(\mathfrak{h}, \mathcal{M})$ alone — the frozen boundary and manifest — and independent of every quarantined observation. Its practical content is that this audit reduces to a single checkable question, *what could the process read?*, rather than a review of the author's reasoning. A boundary generator that refuses to run on an incomplete corpus is that theorem operating as designed; a generator that ran would be evidence of a quarantine breach. Each rule below is therefore a measurability precondition, not a matter of judgement.

Rule	Requirement	Status	Finding
1	Every primary parameter row populated	FAIL	$\mathcal{B}_\nu$ is absent; $\bar{\theta}$ is only conditionally typed.
2	One HFB branch or certified degenerate set	FAIL	Gauge, scalar, QCD and flavour values originate in distinct conditional branches.
3	Common matching scale	FAIL_STRICT / PASS_DIAGNOSTIC	A diagnostic scale μ_0 is constructed by transport; no history-derived scale certificate exists.
4	One native scheme ledger and finite bridge	FAIL	The finite VBF-to-continuum bridge and round-trip certificate are absent.
5	Complete covariance including cross-sector correlations	FAIL	Only sensitivity branches exist; no joint covariance is supplied.

Rule	Requirement	Status	Finding
6	Threshold and spectrum census	PARTIAL	Self-consistent quark thresholds exist; neutral and completion thresholds are absent.
7	HFB certificate reads PASS	**FAIL — PROVED UNSATISFIABLE**	By Theorem 4 and Corollary 4.1 the corpus admits a continuum of inequivalent boundaries and the missing objects are non-invertible. No recomputation at any precision changes this rule's status.
8	No candidate, benchmark or measured substitute	FAIL	The diagnostic uses quarantined conditional Yukawa, scalar, electroweak and neutral candidates.
9	Resolvable immutable content hashes	PARTIAL	The diagnostic package is hashed; no sealed physical input package exists. Integrity is not currency.
10	Unmodified sealed HFB output	FAIL	No sealed PASS output exists to verify.

| Closure Stage 0: NOT ADMITTED |

No physical pole, neutral or comparison stage is entered. Rule 7's upgrade is the substantive change: the halt is no longer a waiting state.

Part XII — Quarantined Diagnostic Continuation

The continuation uses the strongest available conditional assembly at μ_0 = 243.722807638000 GeV, under premises Q1–Q8. It introduces no measured comparison value, and its source matrices are not reclassified as blind microscopic outputs.

32. Gauge and scalar entries at μ_0

Quantity	Conditional value
g_s	1.179332652482
g	0.650476840991
g'	0.341991048898
λ	0.128999748047
μ_H^2	7662.689132 GeV^2
$v_{run} = \sqrt{(\mu_H^2/\lambda)}$	243.722807637857 GeV

The identity v_run = μ_0 holds by construction; the residual 1.428×10^{-10} GeV measures arithmetic only. The leading running broken-phase quantities are

m_W = 79.268020995 GeV, m_Z = 89.555944687 GeV, m_H^curv = 123.795711816 GeV,

running tree and curvature quantities rather than pole predictions, but at least evaluated where the broken-phase description is meaningful — which is not true of their counterparts in §35.

33. Charged matrices at μ_0

After multiplication by R_q = $0.580788332942 \cdot \mathbb{1}_3$:

Sector	1st	2nd	3rd
up-type	0.0012441413	0.638486414	167.509848
down-type	0.00269507527	0.0538995036	2.79116353
charged leptons	0.000515600978	0.10679789	1.84332778

All entries in GeV, running, in the diagnostic convention.

Top-entry reconciliation. The up-type third entry is not the threshold m_t = 171.783689943 GeV of Part IX, and the two must not be conflated. They are related exactly by the six-flavour leg of the matching factor:

167.509848 / $U_6(\mu_0 \leftarrow$ m_t) = 167.509848 / 0.975118217 = 171.784 GeV.

The first is the running value at μ_0; the second is the self-consistent threshold m_t(m_t). Their ratio is a transport identity, not an independent agreement.

34. Neutral input

$(\theta_{12}, \theta_{13}, \theta_{23})$ = (33.40°, 8.59°, 48.37°), J_ℓ = −0.024466298.

Provenance warning. These angles reproduce a previously identified open candidate benchmark with coefficients (1, 6/5, 0.02475), $\beta = \sqrt{3}/20$ and $\psi = 3\pi/4$. The prior audit graded them FAIL for blind promotion — reproduction of an open benchmark rather than concealed copying, with a sealed-manifest repair specified. The warning travels with the numbers wherever they are quoted; without it the quarantine leaks.

The symbolic texture basis M_light = $m_1C_1 + m_2C_2 + m_3C_3$ is exported, but no m_i, Y_ν, M_R, M_L^irr, heavy–light mixing or nonunitarity matrix exists. This is a frame-only object, not a neutral boundary.

35. Transport to 5.80 TeV

Quantity	Value at $\mu\star$	Type
g_s	1.000000000000	**Input, by construction**
g	0.633658692959	Transported conditional
g′	0.347612727382	Transported conditional

Quantity	Value at $\mu\star$	Type
λ	0.068065835223	Transported conditional
μ_H^2	8311.749265 GeV^2	Transported conditional
v_{run}	349.447250574 GeV	Derived from the two above

The colour round trip. $g_s(\mu\star) = 1$ is not a return. At one loop β_{g_s} carries no Yukawa or electroweak dependence, and $g_s(\mu_0)$ was obtained from Λ_6, which is defined by $g_s(\mu\star) = 1$. The identity

$$1/\alpha_s(\mu_0) + (\beta_0/2\pi) \ln(\mu\star/\mu_0) = 4\pi$$

therefore holds to machine precision by construction. It verifies that the coupled integrator does not corrupt a decoupled sector — a real but minor software check — and is not evidence about the colour boundary.

Formal tree combinations at $\mu\star$.

Sector	1st	2nd	3rd
up-type	0.00151848907	0.779279711	209.562844
down-type	0.00329721948	0.0659394054	3.33156991
charged leptons	0.000755627057	0.156515172	2.70145582

These are not masses. They are the formal products $y \cdot v_{run}/\sqrt{2}$ evaluated at 5.80 TeV, where the broken-phase description does not apply and the appropriate effective theory is the unbroken one. The running vacuum value illustrates the point: between μ_0 and $\mu\star$, λ falls 47.2% while μ_H^2 rises only 8.5%, so v_{run} grows 43.4%, from 243.72 to 349.45 GeV. That growth is almost entirely a statement about λ, and reading it as a physical vacuum expectation value at 5.80 TeV would be a category error.

36. Charged-flavour reconstruction

At μ_0,

$$|V_{CKM}| = \begin{bmatrix} 0.974795775 & 0.223070717 & 0.003556887 \\ 0.222929770 & 0.973991278 & 0.040537734 \\ 0.008689879 & 0.039754815 & 0.999171677 \end{bmatrix}, \quad J_q = -2.996770873555\times10^{-5}.$$

> **Convention and provenance note.** The matrix above is the **convention-invariant full-curvature** result, not the half-strength CKP-1 execution. With
>
> $\zeta = \lambda z$, $\Delta_{13} = (1/\sqrt{2})\cdot a\zeta$, $\zeta_{C3} = \sqrt{3}\cdot b\cdot e^{5\pi i/6}$,
>
> the half-split convention has $z = 2\zeta$ while the full-curvature convention has $z = \zeta$; the earlier factor-of-two ambiguity is removed by that translation, which the supplied projection audit establishes. This audit reports the **conditional reconstruction only and performs no experimental comparison** — the source-locked empirical confrontation lives in the separate CKP-2 paper. Quoting these numbers as a measured-data match, or mixing the two conventions, re-introduces the old normalisation error (F79).

At 5.80 TeV,

$$|V\_CKM| = \begin{bmatrix} 0.974793884 & 0.223077547 & 0.003645828 \\ 0.222929456 & 0.973948627 & 0.041551526 \\ 0.008907403 & 0.040748982 & 0.999129711 \end{bmatrix}, \quad J\_q = -3.148471821472\times10^{-5},$$

a change of +5.06% generated entirely by transport; the frame is not rematched at any point.

The computed unitarity residual stays near 10^{-15}. The matrices displayed above are rounded to nine decimals and are unitary only to about 3×10^{-10} as printed; displayed precision is not computed precision, and the rounded arrays must not be used for downstream arithmetic.

Two internal route tests pass: matrix Jarlskog versus the commutator invariant at 2.094×10^{-16} and 8.550×10^{-17}; common-left-frame randomisation at |V| residual 2.887×10^{-13} and Jarlskog residual 2.233×10^{-15}. The randomisation residual is some three hundred times looser, as expected from the conditioning of the random orthogonal transformations; it is a basis-covariance test, not a precision claim.

These establish internal basis covariance of the conditional reconstruction. They cannot establish microscopic provenance, since both tests are invariant under replacement of the matrices by any others with the same invariants.

37. Neutral, pole and strong-phase stages

Neutral. A unitary frame without absolute masses and without Y_ν, M_R, M_L^irr does not define a Takagi problem, a heavy threshold census or an active nonunitarity matrix. NOT EXECUTABLE.

Pole. No gauge, Higgs, lepton or neutral pole is published; the required self-energies, finite bridge, threshold-complete effective theories and residue conventions are absent. Every mass-dimension quantity in this document is a running tree or curvature reconstruction.

Strong phase. The cascade returns Λ_3 = 216.516653 MeV, and arg det(Y_u Y_d) = 4.441×10^{-16} at μ_0, remaining approximately zero under the diagnostic flow. The independent topological and substrate phase is absent, so the full $\bar{\theta}$ is OPEN, not zero by certificate.

38. Closure stage ledger

Stage	Action	Strict	Diagnostic
0	Admission	NOT ADMITTED	WAIVER ONLY
1	Read-only HFB import	NOT STARTED	CONDITIONAL SOURCES IMPORTED
2	Finite scheme bridge	NOT STARTED	OPEN; NATIVE ONE-LOOP CONVENTION
3	Threshold ledger	NOT STARTED	QUARK PARTIAL PASS; NEUTRAL OPEN

Stage	Action	Strict	Diagnostic
4	Coupled RG	NOT STARTED	CHARGED/GAUGE/SCALAR PASS TO 5.80 TeV
5	Electroweak reconstruction	NOT STARTED	RUNNING TREE-LEVEL PASS
6	Charged flavour	NOT STARTED	CONDITIONAL PASS
7	Neutral sector	NOT STARTED	FRAME-ONLY; ABSOLUTE BLOCK MISSING
8	Pole equations	NOT STARTED	NOT EXECUTED
9	Strong sector	NOT STARTED	QCD SCALE PASS; $\bar{\theta}$ OPEN
10	Uncertainty propagation	NOT STARTED	NO JOINT COVARIANCE
11	Cross-sector identities	NOT STARTED	PARTIAL PASS
12	Freeze package	NOT STARTED	PASS FOR THIS QUARANTINED RUN
13	Experimental comparison	PROHIBITED	NOT PERFORMED

The distinction is the central audit fact: the diagnostic succeeds in several sectors while the physical algorithm halts at Stage 0. Premise Q3 forbids using the first as evidence for the second.

Part XII-bis — The Normalised Fermion-Dressed Master-Action Attempt (NFDMA-1)

> **VERDICT: FORMAL COMPATIBILITY SOLVED BY EXPLICIT CONSTRUCTION; MINIMAL CONSTITUTIVE CHOICE FALSIFIED AS THE PHYSICAL BOUNDARY.** One compact action returns the full requested object set from a common construction and remains stable under a genuine, non-factorising refinement. When frozen and then compared with the strongest conditional boundary, it fails badly, and the falsification is informative: it identifies the missing structural property.

This part records a construction executed after Parts I–XII and typed against their discipline. It addresses the precise gap left open by the embedding corpus: the Yukawa calculation had been reduced to a closure Hessian, a scalar readout projector and the chiral embeddings, but those objects had not been jointly calculated from one action, and an earlier result showed they could not be recovered from the existing bosonic action alone. NFDMA-1 supplies them by explicit construction — and then shows that supplying them is not sufficient.

N1. Named premises

NFDMA-1 carries three premises beyond the document's frozen set, each paired with its falsifier.

Premise	Statement	Retired by
N1 — Common action	All returned objects derive from one compact fermion-dressed master action, with no per-object tuning.	F25
N2 — Minimal address	Chiral species are embedded through the minimal address construction, with no additional hierarchy-generating structure inserted by hand.	F26
N3 — Genuine refinement	The Level-2 regulator is non-factorising: it subdivides the bath and generation graphs, adds midpoint interactions, splits the complex holonomy across refined edges, and eliminates the midpoints by a Schur complement.	F27

Premise N2 is the load-bearing one. It is what makes the physical failure a *result* rather than a shortfall: the falsification in §N5 is a falsification of minimal-address embedding specifically, not of the action framework.

N2. Object set returned from one action

From the single frozen action, at Level 1:

Object	Return
Sector susceptibilities (η_C, η_W, η_Y)	(0.008304, 0.005536, 0.002768)
Reduced gauge response G_{red}	diag(0.991696, 0.994464, 0.997232)
Physical Yukawa projector	rank $P_Y = 9$
Chiral embeddings	eight, canonically normalised, $\max\|E_X^\dagger E_X - I\| = 1.09\times10^{-15}$
Charged and neutral Yukawa matrices	Y_u, Y_d, Y_e, Y_ν
Neutral block	complete 6×6
Scalar boundary (native Λ units)	$\Lambda_v = 0.142461165492$, $\lambda = 1/7$, $\mu_H^2/\Lambda^2 = 0.002899311953$
CY3′ identity	$\max_f \varepsilon_f^{CY3'} = 0$ (internally exact)
Strong phase	$\bar{\theta} = 8.88\times10^{-16}$
Branch structure	exact conjugate pair
Bosonic Hessian	positive, $\lambda_{min} = 0.005798623907$

This is the first candidate in the programme to return the entire object set from one construction. The completeness, positivity, embedding-normalisation and CY3′ certificates all PASS as internal identities.

N3. The response obeys the readback discipline

Before any of these is read as physical, one structural check applies. The returned response satisfies

G_red = diag(1 − η_C, 1 − η_W, 1 − η_Y)

exactly — 0.991696 = 1 − 0.008304, and so for the other two entries. By Lemma 3 this is the η-readback identity: the response is a bijective image of the inserted susceptibilities, not an independent derivation of gauge content. NFDMA-1 does not escape the whitening discipline of Part IV; it operates inside it. The susceptibility *magnitudes* are consequently non-predictive, and the sector *split* among them is the only part that could carry structure — which §N5 shows is, in this action, the wrong structure.

This is the correct typing, and it is stricter than the internal certificates alone would suggest. An internally exact CY3′ and a positive G_red are necessary for a physical action, but by Lemma 3 and Theorem 4 they are also produced by a continuum of unphysical ones. The internal PASS block certifies that the action is *complete and self-consistent*, not that it is *correct*.

N4. Genuine two-level stability

The Level-2 regulator is not a tensor-product copy of Level 1, so Lemma 2 does not apply and Corollary 2.1 does not fire. The two-level agreement is therefore evidence about refinement stability rather than a theorem of the construction — the first time in this document that this is so. Every predeclared comparison passes:

Object	Two-level change	Tolerance
Gauge response	1.23%	5%
Scalar boundary	1.14%	5%
Charged Yukawa spectra	1.76%	5%
CKM modulus	0.00106	0.01
PMNS modulus	0.00148	0.01
Neutral spectrum	3.78%	5%
Strong phase	4.44×10^{-16}	10^{-10}

> **Result N1 (formal compatibility).** There exists a single compact action that simultaneously returns G_red, the Yukawa projector, the chiral embeddings, all four Yukawa matrices, the neutral block, the scalar boundary, an internally exact CY3′ and the conjugate branch pair, and whose returns are stable under a genuine non-factorising refinement within the predeclared tolerances.

This settles the *sufficiency* half of the compatibility question by explicit construction: the object set and refinement stability do not over-constrain the action framework. It says nothing about the *necessity* half — which property the physical action must have — and §N5 is where that half is addressed, negatively.

N5. Physical-boundary comparison and falsification

The action was frozen before comparison. The comparison with the strongest conditional VERSF boundary was not used to construct or tune it, and it fails decisively:

Quantity	NFDMA-1 vs conditional boundary
g_s	≈ 14.9% low
g	≈ 54.2% high
physical g′	≈ 16.6× too large
light/middle fermion singular values	orders of magnitude too large
largest CKM-modulus difference	0.111
Jarlskog invariant	≈ 11.3× the conditional target

The diagnosis is single and structural. **The common closure spectrum is too shallow.** The top-like singular value is close, but the action does not generate the extreme light-to-heavy fermion hierarchy, and its minimal-address construction produces excessive mixing. The two failures are linked: a shallow spectrum and large mixing are the same defect seen in the singular values and in the frame.

> **Result N2 (falsification of the minimal constitutive choice).** Under premises N1–N3, the minimal fermion-dressed master action does not reproduce the conditional physical boundary. It is falsified as the physical VERSF Standard Model action. Since the object set and refinement stability pass while the boundary fails, the constraint that does the physical work lies entirely in the structure the minimal-address choice discards: a mechanism that generates a steep light-to-heavy hierarchy without inflating the mixing.

Therefore:

┌───┐ │
Physical Standard Model boundary comparison: FAIL │ │ Absolute GeV scale: NOT DERIVED │ │ HFB physical admission: NOT ADMITTED │
└───┘

This is consistent with, and independent of, the rest of the document: the gauge structure paper does not calculate the coupling values, and the commitment-bath paper still leaves its absolute event parameters to be derived from the nonlinear dynamics. NFDMA-1 does not close D35; it demonstrates by construction that closing D35 requires the hierarchy-generating structure the minimal choice omits.

N6. Standing in the chain

NFDMA-1 changes two verdicts and sharpens the blocking target.

- **Requirement 5** moves from precursor to *object set returned from one action*, with the physical layer explicitly falsified rather than open. The objects exist; the minimal choice that produces them is wrong.
- **Requirement 2** gains its first genuine refinement pass: a non-factorising Level-2 under which stability is evidence. The K_{N,N} clone-lift settles gap uniformity but not independent refinement (Part III); NFDMA-1's Level-2 is the construction that does.
- **D35** is unchanged as the critical path, but its type is sharper. *At this stage of the construction, D35 was the identified critical path; the later GSJB sequence supersedes this diagnosis with the incomplete-H_CMR-plus-ξ formulation of §§43–44.* The missing object is not merely an absolute normalisation; Result N2 shows it must carry a steep-hierarchy mechanism, and that this mechanism is precisely what the minimal-address embedding lacks.

The result is a useful negative: formal compatibility is solved, and the physical content is thereby isolated in a single named structural property.

Part XII-ter — The Regulator-Covariant Maintenance-Record Operator (RCMO-1)

> **VERDICT: OPERATOR-LEVEL PASS; NFDMA-2 FLAVOUR/NEUTRAL REGULATOR OBSTRUCTION REPAIRED; HFB BOUNDARY STILL NOT ADMITTED.** A regulator-covariant family of maintenance-record operators is calculated from closure geometry, converges at second order under dyadic refinement, and — substituted into a frozen successor action — repairs the specific flavour and neutral regulator failure that action exhibited. It does not derive the physical boundary, and it introduces a new unresolved strong-phase feature.

This part records a construction that follows NFDMA-1 (Part XII-bis) and addresses a distinct successor action, NFDMA-2, whose regulator sensitivity was materially worse. It is typed against the same discipline: an operator-level pass repairs a *refinement-covariance* debt, and is kept separate from physical admission and from the non-closure blockade of Part VII.

R1. What NFDMA-2 is, and what failed in it

NFDMA-2 is a distinct, later fermion-dressed action from the NFDMA-1 of Part XII-bis, and must not be conflated with it. Where NFDMA-1's non-factorising two-level test met every predeclared tolerance (charged spectra 1.76%, CKM modulus 0.00106, neutral spectrum

3.78%), NFDMA-2 exhibited large regulator-sensitive drifts in exactly the flavour and neutral subsystems — charged spectra shifting 52.92%, CKM Jarlskog 92.81%, PMNS Jarlskog 84.87%, neutral spectrum 88.15% between levels. Those are not tolerance-band misses; they are a failure of regulator covariance in the maintenance-record response feeding the flavour and neutral sectors. RCMO-1 is the object built to repair that specific failure, and its success is measured against it.

The relationship between the two actions — whether NFDMA-2 is a strict successor, a stricter regulator test, or a variant embedding — is recorded as an open cross-reference; only NFDMA-2's regulator behaviour is used here.

R2. Construction

The construction begins from the six physical address slots (Q, u, d, L, e, N) and the signed maintenance record

$s = (0, +1, -1, 0, -1, +1)$,

placed on one fixed metric multigraph. This directly addresses the corpus target of deriving a signed maintenance response — the up/down and lepton/neutral contrast — from closure geometry, rather than inserting the required contrast by hand. Every edge is subdivided dyadically, and the physical three-dimensional response carrier is recalculated at each regulator level n. At each level,

$X_\Omega^{(n)} = (H_\Omega^{(n)})^{-1} Q_\Omega^{(n)}$, $J_\Omega^{(n)} = X_\Omega^{(n)} [X_\Omega^{(n)\dagger} W_\Omega^{(n)} X_\Omega^{(n)}]^{(-1/2)}$, $\Pi_\Omega^{(n)} = J_\Omega^{(n)} J_\Omega^{(n)\dagger} W_\Omega^{(n)}$,

with record response $R_{record}^{(n)} = (W_\Omega^{(n)})^{-1} S_{record}^{(n)}$, so the returned operator is

$M_\Omega^{(n)} = \Pi_\Omega^{(n)} R_{record}^{(n)} \Pi_\Omega^{(n)}$.

R3. Second-order regulator covariance

The fine-to-coarse map is derived from the polar-normalised physical-carrier overlap,

$B_{n+1\to n} = (O O^\dagger)^{(-1/2)} O$, unitarity residual 2.20×10^{-15}.

The blocked operator mismatch falls by a clean factor of four per level:

Blocking	Residual
1 → 0	9.8441×10^{-2}
2 → 1	3.3444×10^{-2}
3 → 2	8.6261×10^{-3}
4 → 3	2.1681×10^{-3}
5 → 4	5.4268×10^{-4}
6 → 5	1.3571×10^{-4}

The measured asymptotic order is $p = 1.99670$, so

$$\|B_{n+1\to n} M_\Omega^{(n+1)} B_{n+1\to n}^\dagger - M_\Omega^{(n)}\|_2 = \mathcal{O}(h_n^2),$$

and the level-three and level-four physical response subspaces overlap with minimum singular value 0.999980606. The successive residual ratios (2.94, 3.88, 3.98, 3.995, 3.999) confirm the approach to the factor-four asymptote independently of the fitted p.

> **Result R1 (regulator covariance).** The maintenance-record operator family $M_\Omega^{(n)}$ is regulator-covariant: under dyadic refinement with the derived unitary blocking map, the blocked operator converges at second order in the mesh, with a stable physical response subspace. This is a genuine refinement pass — the blocking map is derived from the carrier overlap, not fitted, and the convergence order is measured, not assumed.

R4. Fixed-point operator

The finest returned normalised operator is

$$M_\Omega^{(6)} = \begin{bmatrix} -0.422378 & -0.364246 & 0.324205 \\ -0.364246 & -0.018846 & 0.694218 \\ 0.324205 & 0.694218 & 0.522504 \end{bmatrix},$$

symmetric, with spectrum (−0.943711, 0.024991, 1.000000). The Richardson-extrapolated fixed-point spectrum is (−0.943683, 0.024996, 1.000000) with estimated remaining spectral error 4.52×10^{-5}.

The eigenvalue at exactly 1 is a genuine invariant direction of the record response, not a fitted value; the trace 0.081280 reproduces the eigenvalue sum to the quoted precision. The operator is returned at the declared operator level, in the native carrier normalisation, and is not promoted to a physical GeV-scale object.

R5. Effect on NFDMA-2

Substituting the converged family into the frozen NFDMA-2 action repairs every regulator-sensitive subsystem that previously failed:

Test	Previous shift	New shift
Charged spectra	52.92%	2.98%
CKM Jarlskog	92.81%	0.47%
PMNS Jarlskog	84.87%	1.66%
Neutral spectrum	88.15%	0.41%
CKM modulus	0.01022	0.00173
PMNS modulus	0.00630	0.00070

> **Result R2 (repair of the NFDMA-2 obstruction).** The role-odd maintenance-record family repairs the specific flavour and neutral regulator failure of NFDMA-2, bringing every previously-failing subsystem within a few percent under refinement. This is consistent with the electroweak-frame conclusion that the

common/role-odd splitting operator and its curvature are the objects controlling stable CKM and PMNS frames.

The repair is a *regulator-covariance* repair: it makes the flavour and neutral responses converge under refinement instead of drifting. It is not a physical-boundary repair, and §R6 is explicit that it does not touch the falsification of Part XII-bis or the blockade of Part VII.

R6. What is repaired, and what is not

The distinction is the same one Parts IV, VII and X enforce elsewhere: a return can be exact, stable and derived, and still be silent about physical admission.

Repaired. The refinement-covariance debt in the maintenance-record response. A signed up/down/neutral contrast is now *derived from closure geometry* rather than inserted, and it converges at second order. In the document's ledger this is a genuine refinement pass at the operator level, distinct in kind from NFDMA-1's — that was a whole-action two-level stability pass; this is a covariance-and-convergence certificate for a single derived operator family.

Not repaired, and specifically flagged. The determinant phase is regulator-stable but sits near π when $\theta_{top} = 0$. Regulator stability of a phase is not correctness of that phase: a stable value at the wrong place is stably wrong. So the physical strong phase $\bar{\theta}$ remains unresolved, and RCMO-1 adds a new, sharper feature to that debt — the near-π offset at $\theta_{top} = 0$ is now a *stable* target to be explained, not a numerical wobble that further iteration might remove. This is typed exactly as the whitening (Part IV), colour round-trip (§40) and stability-reproduction (§28) cases are: a stable or exact number that certifies internal structure, not physical content.

The remaining qualifications are unchanged by this result:

1. The metric-graph record action is an explicit candidate constitutive law, not yet uniquely derived from the master substrate. Result R1 certifies its covariance, not its uniqueness.
2. The absolute GeV scale remains open (D35).
3. The microscopic P_Y, the dressed chiral bilinear and a genuinely independent CY3′ comparison still require derivation from the master action. These are identified in the corpus as *unavailable constitutive inputs*, not numerical details that further iteration can recover — a point Result R1's convergence does not contradict, since convergence of a candidate operator is silent about whether the candidate is the physical one.

Therefore:

┌──┐ │ Regulator-covariant $M_\Omega^{(n)}$ family: PASS │ │ NFDMA-2 flavour/neutral regulator obstruction: REPAIRED │ │ Physical HFB boundary: NOT YET ADMITTED │ │ Strong phase $\bar{\theta}$: UNRESOLVED (stable near π at $\theta_{top} = 0$) │

R7. Standing in the chain

RCMO-1 adds a derived, regulator-covariant operator family and clears one specific regulator obstruction, without moving physical admission.

- It is a second, independent refinement result alongside NFDMA-1's. NFDMA-1 established that a whole action can be stable under a non-factorising refinement; RCMO-1 establishes that the maintenance-record operator specifically is regulator-covariant at second order, with a derived blocking map. The two are complementary, not redundant: one is whole-action stability, the other is operator-family convergence with a measured order.
- It does not bear on Result N2. NFDMA-2's regulator failure and NFDMA-1's physical-boundary failure are different obstructions; repairing the first leaves the second exactly where Part XII-bis left it. The steep-hierarchy debt D42 is untouched.
- It sharpens D-STRONG. The strong phase was previously "open"; it is now open *with a stable near-π feature at θ_top = 0* that any physical strong-phase derivation must reproduce or dissolve.
- **D35** is unchanged as the critical path. *At this stage of the construction, D35 was the identified critical path; the later GSJB sequence supersedes this diagnosis with the incomplete-H_CMR-plus-ξ formulation of §§43–44.* A derived, convergent candidate operator does not supply the absolute scale, and Result R1's convergence is explicitly silent about whether the candidate constitutive law is the physical one.

The result is a clean operator-level success with a correctly bounded claim: refinement covariance is achieved and one regulator obstruction is repaired, while physical admission, the absolute scale and the strong phase remain where the rest of the document places them.

Part XII-quater — The Reduced Physical Evaluation Attempt (MHPE-1)

VERDICT: THE FIRST INDEPENDENT CY3′ TEST — AND THE MINIMAL ACTION FAILS IT. Two upstream ledger entries (D36, D32) return conditional candidates — D36 under named premises but failing independent reproduction, so not settled; D32 as a conjugate pair with residue and orientation open — a no-fit gauge synthesis nearly closes weak and hypercharge while isolating a colour deficit, and — decisively — the mixed and Hessian Yukawa routes are for the first time built from genuinely different parents and compared. They disagree at residues 0.37–0.49, far above tolerance. The minimal MASD/HMGBC reduced action is thereby falsified as the physical fermion completion, and the failure is a stable, hash-covered property of the candidate rather than discretisation noise.

This part records the strongest reduced physical evaluation the corpus currently supports, consuming the executed irreversible-score, NFDMA-2 and RCMO-1 layers together with the earlier MASD, HMGBC, neutral-completion and global-measure results. It also absorbs the intermediate forward attempt (PFRA-1) as a precursor: PFRA-1's no-fit gauge number and its D36/D32 upgrades are superseded here by the later, representation-resolved calculation, and are cited only where they mark the direction of travel.

The core arrays and their manifest are frozen before any conditional comparison value is loaded; the frozen core manifest contains only history, completion and Yukawa arrays, with no target or boundary among its keys.

MH1. Named premises

MHPE-1 carries three premises beyond the document's frozen set.

Premise	Statement	Retired by
MH1 — Ledger adjacency	Genuinely indistinguishable copies share a bath; inequivalent Standard Model addresses communicate only through a typed completion morphism, never an untyped common bath.	F30
MH2 — Independent routes	The mixed and Hessian Yukawa routes are constructed from different parents — the mixed route from the derivative of the oriented completion operator, the Hessian route from the bosonic closure Hessian — with neither copied from the other.	F31
MH3 — Conditional occupancy	The primitive-Fact result excluding $k = 0$ is granted, so the nonzero $\mathbb{Z}_7$ sector is promoted to the conjugate pair $\{+1, -1\}$.	F32

Premise MH2 is the load-bearing one. It is what makes the CY3′ comparison a genuine test rather than the internal identity every prior return had produced, and Result MH1 below is its consequence.

MH2. Two conditional candidate returns

One-bit history metric (D36). Using the entropy-conversion result $\eta = 1$ — conditional on the record-induced class identification and the $K = 7$ wheel-family — one primitive binary commitment carries $\Delta S = \ln 2$. Solving the irreversible-score equation forward gives $\alpha = 0.959001109720$ and $\dot{\Sigma} = 0.693147180560 = \ln 2$ to residual 2.22×10^{-16}, so $\lambda\_TPB = 1$ and $N\_TPB = 1$. The complete joint Fisher/Onsager block [[W_defect, C^T], [C, A_Q]] is returned with all cross-blocks fixed together, reduced metric $W\_prim = W\_defect - C^T A\_Q^{-1} C$, spectrum {0.040591, 0.041078, 0.121772, 0.155865, 0.255523, 0.324726}, joint minimum eigenvalue 0.036331, Schur residual 0.

> This upgrades the one-bit normalisation from a declared convention to a **conditional candidate derivation under named premises**. However, an

> independent rebuild of the kernel returns $\dot{\Sigma} = 0.185$ rather than ln 2, so by the document's own reproducibility standard **D36 is not settled**. It fixes only a dimensionless curvature in one-bit step units and does not supply the absolute GeV scale; D35 is untouched.

Nonzero $\mathbb{Z}_7$ occupancy (D32). Granting the primitive-Fact construction — a committed Fact isolates a discarded region, making its enclosing cycle permanently non-bounding, with the minimal enclosing cycle carrying that commitment's phase advance — the trivial $k = 0$ branch is no longer equally natural. The reduced Gaussian transfer promotes the nonzero sector to the conjugate pair $\{k = 1, k = 6\} = \{+1, −1\}$ with positive gaps 0.103951 and 0.104979 at the two regulator levels.

> This is a **conditional pass** on zero-versus-nonzero occupancy. The exact residue and orientation remain open: nothing yet derives whether the occupied element is precisely +1, −1 or another nonzero value, and observed CP signs cannot be used to choose it.

Both returns are recorded in the debt ledger as *conditional candidates with premises named* — not closed, and in D36's case not settled, since an independent rebuild of the kernel returns $\dot{\Sigma} = 0.185$ rather than ln 2. The premises ($\eta = 1$ conversion, $K = 7$ wheel-family, primitive-Fact occupancy) are themselves conditional results elsewhere in the corpus.

MH3. The no-fit gauge synthesis and its split

A gauge precursor is assembled from two independently produced prior objects, with no measured or conditional coupling used in its construction: the faithful current trace per generator (2, 3.25, 378) for SU(3), SU(2) and primitive $q = 6Y$, and the typed irreversible-score response fractions. The representation-resolved calculation returns

(g_s, g, g′) = (0.750425, 0.583167, 0.329779),

with post-freeze differences from the strongest conditional boundary of −36.37%, −10.35% and −3.57% respectively.

> **The result is the split, not the values.** Weak and hypercharge come out reasonably close without tuning, while colour is low by about a third. The near-closure of two sectors is suggestive of the structure being right; the response magnitudes are operationally whitened (the Lemma 3 / Theorem 4 discipline), so this is not a derivation of the coupling values. What the split isolates is a specific missing object: a colour-sensitive internal score — terminal-record or CAR/Fock response — that the factor-blind lift erases.

This supersedes the intermediate PFRA-1 gauge number (0.804, 0.632, 0.347; −31.81/−2.77/+1.56%): same qualitative split, colour failing hardest, but MHPE-1's representation-resolved values are the current ones. The colour deficit is the corpus's D41 object — the sector-internal score generators the factor-blind premise averages away — now carrying a quantitative target rather than only a name.

MH4. The independent CY3′ test — the decisive result

Every prior CY3′ return in this document was an internal identity: the mixed and Hessian routes were built from the same closure object, so their agreement at $\sim 10^{-16}$ certified arithmetic, not physics (the whitening discipline of Part IV, and the explicit caveat on NFDMA-1's CY3′ = 0 in §N3). MHPE-1 is the first evaluation to construct the two routes from genuinely different parents:

$Y_f^{mixed} = R_{fL} E_{fL}^\dagger O_H E_{fR} R_{fR}$, $Y_f^{Hess} = R_{fL} E_{fL}^\dagger H_{cl} E_{fR} R_{fR}$,

with O_H the oriented completion operator and H_{cl} the bosonic closure Hessian, neither copied from the other. The comparison fails in every sector:

Sector	Mixed singular values	Hessian singular values	Normalised CY3′ residue
u	3.95×10^{-6}, 8.05×10^{-4}, 0.166302	5.28×10^{-6}, 1.04×10^{-3}, 0.203582	0.373223
d	4.21×10^{-6}, 8.56×10^{-4}, 0.176624	4.84×10^{-6}, 9.48×10^{-4}, 0.185823	0.381823
e	5.27×10^{-6}, 1.07×10^{-3}, 0.219410	2.93×10^{-6}, 5.75×10^{-4}, 0.112780	0.493124
ν	5.31×10^{-6}, 1.08×10^{-3}, 0.221771	3.27×10^{-6}, 6.42×10^{-4}, 0.126012	0.449559

max $\varepsilon_{CY3'} = 0.493124 \gg 10^{-8}$.

> **Result MH1 (independent CY3′ falsification).** Under premises MH1–MH3, the mixed and Hessian Yukawa routes — built for the first time from genuinely independent parents — disagree at normalised residues 0.37–0.49, worst in the charged-lepton and neutrino sectors. The strict equality that physical CY3′ closure requires fails everywhere. The minimal MASD/HMGBC reduced action is therefore falsified as the physical fermion completion. By §MH8 the residues are regulator-stable, so this is a property of the candidate, not discretisation noise.

Subsequent conditional resolution. Result MH1 is the statement about *free* parents, and it stands. RRMK-1 (Part XII-quinquies, Result RK1) later shows that imposing one representation-resolved completion tensor with canonical bosonic and CAR/Fock lifts makes the two routes agree to 5.84×10^{-16} — because they become two lifts of one tensor, not two free parents. This converts the falsification into a conditional on the functorial-lift premise; it does not overturn it. The open question moves from "do the routes agree?" to "is the substrate's completion law that functorial lift?"

This is the single most consequential return in the assembled corpus. Independent verification of the frozen arrays reproduces the singular-value disagreement in ordering and magnitude, worst in e and ν, confirming the failure is real. Compared with the earlier BTAC-1 attempt the residues are substantially smaller and the calculation is now a genuinely common-parent one — progress in construction that sharpens, rather than softens, the falsification.

MH5. Charged hierarchy and flavour frames

The mixed route returns charged spectra and a CKM modulus close to the identity ($J\_CKM = -1.35\times10^{-8}$), with post-freeze candidate-to-target ratios

Sector	Light	Middle	Heavy
u	0.5476	0.2173	0.1711
d	0.2691	2.7377	10.9055
e	1.7600	1.7237	20.5133

and maximum CKM/PMNS modulus differences 0.217808 and 0.736752. The universal coupled resolvent produces nonzero, regulator-stable misalignment, but not the large observed pattern. The missing ingredient is not another global phase; it is a stronger sector-dependent generation/address entanglement in the physical completion and CAR/Fock derivative — the same shortfall MHPE-1's CY3′ failure and §MH3's colour split each point at from a different side. This is the D42 shallow-spectrum/over-mixing diagnosis of Part XII-bis, seen once more and now co-located with the CY3′ result.

MH6. Scalar, neutral and the absolute-scale obstruction

The completion response returns a dimensionless scalar boundary (mean history response 0.276351, $v/\Lambda\star = 0.075099$, $\lambda = 1/7$, $\mu\_H^2/\Lambda\star^2 = 0.000806$). Under the exact rescaling $L \to sL$, $\rho \to \rho/s^4$, $E \to E/s$, $t \to st$, the capacity, action, admissibility probabilities and Fisher geometry are invariant to 4.44×10^{-16}: no GeV scale follows without one additional dimensionful master-action return.

The neutral block is returned as the direct symmetric compression $M\_R = \Lambda\star\ R\_NR\dagger\ O\_H\text{^}sym\ R\_NR$, with six-state Takagi values (1.56×10^{-8}, 3.16×10^{-6}, 5.14×10^{-6}, 6.58×10^{-4}, 1.03×10^{-3}, 0.210314). This removes the arbitrary free rescaling of M_R relative to the completion scale, but does not solve the physical problem: $\Lambda\star$ itself is unfixed, and the light/heavy pattern is not a viable neutrino prediction. This is the executed instance of Theorem 4's witness family 5 — the $M\_D \to aM\_D$, $M\_R \to a^2M\_R$ invariance that leaves the light seesaw operator unchanged (here to 4.44×10^{-16} across a = 1, 10, 100) while heavy masses move four orders — now realised in a full candidate block rather than argued abstractly.

MH7. Strong phase

The candidate quark determinant phase is arg det(Y_u Y_d) = 0.079131 rad, regulator-stable (inter-level shift 5.78×10^{-13}), and explicitly *not* identified with $\bar{\theta}$. A physical $\bar{\theta} \approx 0$ would require $\theta\_top \approx -\pi$ from the independent topological sector, which the candidate action does not return, and the global determinant-line trivialisation is not established. The honest return is $\bar{\theta} = 0$ conditional on a quotient-compatible positive pushforward, otherwise a named global-measure obstruction; the combined line remains open. This is the same strong-phase debt as D-STRONG, here at a different phase value and typed identically: regulator stability is not physical correctness.

MH8. Two-level regulator certificate

Metric	Level-3 → level-4 change	Pass condition
Completion resolvent	0.3970%	< 1%
Closure Hessian	0.1728%	< 1%
Largest charged/neutral spectral drift	0.4957%	< 2%
CKM modulus	1.98×10^{-5}	< 0.002
PMNS modulus	1.46×10^{-5}	< 0.002
Determinant phase	6.19×10^{-4}	< 0.002

The level-4 regulator subdivides the generation edges, adds gauge-covariant midpoint interactions and Schur-eliminates the new variables, with the address carrier changing independently from RCMO level 3 to level 4 — an interacting refinement, not a clone product (so Lemma 2 does not apply). All declared tests pass. This is the load-bearing point behind Result MH1: the negative CY3′ and flavour results are stable properties of the candidate.

MH9. Standing in the chain

MHPE-1 turns the missing architecture into an executable calculation, and then shows the calculation fails at the one test that had never before been run honestly.

- **CY3′** moves from "internally exact, non-independent" to *independently tested and failed*. Every prior $\sim10^{-16}$ residue is retro-typed as an internal identity; the real comparison is 0.37–0.49. This is progress: a genuine test now exists, and it falsifies the minimal action cleanly.
- **D36 and D32** return conditional candidates, sharpening the ledger without closing it: D36 under named premises but **failing independent reproduction — not settled** (the rebuild gives 0.185, not ln 2); D32 as a conjugate pair with residue and orientation open. D35 — the absolute scale — is untouched, and by Theorem 4 remains a new-information requirement.
- **The colour split** (§MH3) and the **shallow flavour spectrum** (§MH5) and the **CY3′ disagreement** (§MH4) are three views of one object: a representation-resolved, colour-sensitive CAR/Fock completion derivative that must equal the bosonic closure response. That object is D41 ∥ D42, now with a quantitative target from three independent directions.
- The result does not move physical admission. HFB and RPC Stage 0 remain NOT ADMITTED, now for a *demonstrated* CY3′ failure rather than an untested identity.

The clean next calculation is a representation-resolved CAR/Fock completion derivative on the saturated copy classes that (i) supplies the missing colour normalisation, (ii) generates the steep hierarchy without inflating mixing, and (iii) equals the bosonic Hessian route to CY3′ tolerance — all while preserving the history metric, adjacency typing, branch promotion and regulator covariance already achieved. The one final problem is now narrower than before, but not solved: the complete representation-resolved CAR/Fock completion must be the same derivative object as the bosonic closure response, with one physical action unit and one global measure.

Part XII-quinquies — The Representation-Resolved Master Kernel (RRMK-1)

> **VERDICT: THE STRONGEST CHARGED/GAUGE RETURN, AND A CONDITIONAL RESOLUTION OF THE CY3′ FALSIFICATION.** A representation-resolved kernel closes the charged hierarchy, brings colour to g_s = 1 (repairing the deficit MHPE-1 measured), and makes the two CY3′ derivative routes agree to 5.84×10^{-16} — but the agreement is imposed by a functorial-lift premise (one completion tensor, two lifts), not obtained from two free parents. It therefore converts Result MH1's falsification into a precise conditional: the physical content now lives entirely in whether the finite-regulator MASD-HMGBC law *is* that functorial lift. HFB remains NOT ADMITTED.

This part records a forward return of the representation-resolved kernel — the H_CMR-class object §43 reduced the corpus to. It is the strongest charged and gauge boundary in the assembled work, and it stands in a specific, carefully-typed relation to the MHPE-1 falsification of the day before (Part XII-quater). Package integrity is confirmed: the SHA-256 manifest matches, and the conditional comparison is opened only after the construction manifest is frozen.

RK1. Named premises

RRMK-1 carries two premises beyond the document's frozen set.

Premise	Statement	Retired by
RK1 — Gauge relaxation count	The representation-resolved completion channels carry the current/record relaxation scores that fix the gauge Schur census Z = (1, 5/2, 298), rather than a factor-blind multiplicity.	F33
RK2 — Functorial lift	The representation-resolved one-particle completion tensor has canonical bosonic and CAR/Fock bilinear lifts, with no independent matter-vertex normalisation, so the two CY3′ derivative routes are two lifts of one tensor.	F34

Premise RK2 is the load-bearing one, and the entire standing of the CY3′ result depends on how it is typed — see §RK4.

RK2. Representation-resolved gauge synthesis

The gauge Schur census is assembled from the representation-resolved completion channels, each carrying a two-sided current score 18, a terminal-record score 2 and a total charge relaxation 20 across the four channels (Q-H̃-u, Q-H-d, L-H-e, L-H̃-N). The direct current traces per generator are (colour, weak, q) = (6, 6.5, 378), giving

Z = (1, 5/2, 298), (g_s, g, g′) = (1/√Z_C, 1/√Z_W, 6/√Z_q) = (1.000000, 0.632456, 0.347571),

with a joint 24×24 gauge Hessian of minimum eigenvalue 0.475062 (positive) and a low-scale gauge maximum error below 0.21%.

> **This is the strongest gauge return in the corpus, and the decisive change is colour.** MHPE-1's representation-resolved score gave g_s = 0.750 (−36%); PFRA-1's gave 0.804 (−32%). RRMK-1 brings colour to **g_s = 1.000** — the deficit MHPE-1's §MH3 split isolated as the D41 object is, at candidate grade, supplied. Weak and hypercharge remain close (g within 2.7%, g′ within 1.6% of the conditional boundary). The gauge magnitudes remain non-predictive under the whitening discipline where they derive from a response readback; what has changed is that the representation-resolved count, not a factor-blind one, now sources the colour strength.

RK3. Charged hierarchy and frames

The charged magnitude kernel returns all nine singular values within 0.03% of the frozen conditional boundary, with a genuinely steep spectrum:

Sector	Singular values (base)
u	7.22×10^{-6}, 3.71×10^{-3}, 0.971983
d	1.56×10^{-5}, 3.13×10^{-4}, 0.016196
e	2.99×10^{-6}, 6.20×10^{-4}, 0.010696

> This is the D42 shallow-spectrum diagnosis addressed at candidate grade: the light-to-heavy span (top 0.972 against light 7×10^{-6}, ~5 orders) is now generated rather than absent, and — unlike NFDMA-1's minimal-address construction — without inflating the mixing. The CKM modulus is unitary to 4×10^{-17} and within 0.0028 of target, but the Jarlskog invariant remains low (-1.86×10^{-5} against -3.00×10^{-5} target), so the quark relative frame is a **partial** pass: hierarchy and unitarity yes, CP magnitude not yet. The PMNS frame is a conditional frame-only pass (moduli within 6×10^{-4} of the benchmark), with no neutral mass operator derived — the same D-NEU gap as before.

RK4. The CY3′ result — a conditional resolution, precisely typed

This is the return that must be read against Result MH1, and the typing matters more than the number.

RRMK-1 reports a functorial CY3′ residue of $\mathbf{5.838{\times}10^{-16}}$ — apparently reversing MHPE-1's 0.37–0.49 falsification. Direct inspection of the frozen arrays establishes what this residue is and is not. The two route arrays, `fermion_vertex_derivative` and `bosonic_cross_derivative`, are **bit-for-bit identical at both regulator levels** (normalised difference $2.2{\times}10^{-16}$; exactly equal to floating-point). The $5.84{\times}10^{-16}$ is therefore not two independent parents agreeing. It is the verification that the two *lifts* of **one** imposed completion tensor agree — which, given premise RK2, they must.

The paper states this itself, and correctly. Its §13.2 records that the routes are separately evaluated but are lifts of one common tensor imposed by the functorial-lift principle, and that "the final microscopic proof must show that the finite-regulator CAR/Fock completion law is uniquely this lift." The gate is graded CONDITIONAL EXACT PASS, not an unconditional discharge.

The honest reconciliation with MHPE-1 is a single sentence:

> **Result RK1 (conditional CY3′ resolution).** MHPE-1 proved that when the completion tensor is left free, the two CY3′ routes disagree at residues 0.37–0.49 (Result MH1). RRMK-1 shows that *if* one representation-resolved completion tensor with canonical bosonic and CAR/Fock lifts is imposed (premise RK2), the two routes agree to machine precision. The falsification is thereby converted, not overturned: the physical content moves entirely into whether the finite-regulator MASD-HMGBC law is that functorial lift.

This is genuine progress of exactly the kind the corpus's discipline is built to recognise and to bound. It does **not** discharge the CY3′ debt: the residue is a verification of the functorial-lift identity, not evidence that the substrate obeys it.

Superseded by RRHF-1. Part XII-sexies (Result RH1) later removes this limitation: it derives the functorial lift by blind differentiation of the parent history functional, with two genuinely separate routes agreeing to $1.9{\times}10^{-14}$. Result RK1 remains the correct statement about the *imposed*-tensor construction; RRHF-1 is the stronger statement about the *derived* one. The imposed-tensor objection is discharged there, not here. Result MH1 stands as the statement about free parents; Result RK1 is the statement about the imposed tensor; the gap between them is precisely premise RK2, which is the D44′-class uniqueness obligation (RPC-1 §79.4), now with a named and testable content — differentiate the complete finite-regulator MASD-HMGBC rate law and check whether it returns this tensor without the premise.

RK5. Scale and regulator continuation

The kernel attaches a common Route-A physical scale $\Lambda\star$ = 172.338050011 GeV (the identity-completion value $v\_cl/\sqrt{2}$), with $F(\rho_0)$ still unevaluated — so the scale is conditional on Route-A, not an evaluation of the history action's own curvature. The RCMO regulator continuation passes: across levels 3→4 the CY3′ residue stays $\sim 10^{-16}$, the bosonic Hessian minimum eigenvalue holds at 1.0275, the charged spectra drift $\leq 4.1{\times}10^{-4}$, the CKM modulus drifts $1.25{\times}10^{-3}$, and the determinant phase shifts $6.4{\times}10^{-22}$. The negative and positive results alike are therefore stable properties of the kernel, not discretisation artefacts — the same load-bearing regulator check as elsewhere.

RK6. Standing in the chain

RRMK-1 is the strongest charged/gauge boundary in the corpus and the sharpest statement of what remains.

- **Gauge (D41):** colour brought to g_s = 1 by the representation-resolved count — the deficit MHPE-1 isolated is supplied at candidate grade. D41 moves from "quantified target" to "addressed conditionally on RK1."
- **Hierarchy (D42):** the steep charged spectrum without over-mixing is returned — addressed conditionally, the complement of NFDMA-1's failure.
- **CY3′ (Result MH1 → RK1):** the falsification is converted to a conditional. This is the corpus's central open question restated at its sharpest: not "do the routes agree?" (they can be made to) but "is the substrate's completion law the functorial lift?" (unproved).
- **Everything downstream is unchanged:** the neutral mass block is absent (D-NEU), the global strong-phase measure is not evaluated (D-STRONG), $F(\rho_0)$ and the finite scheme bridge are open, and HFB/RPC remain **NOT ADMITTED.** The final verdict is a strong conditional charged/gauge boundary pass, explicitly not a physical HFB-1 derivation.

The decisive next calculation is now narrow and named: a direct finite-regulator differentiation of the complete MASD-HMGBC rate law, to test whether it returns the RRMK-1 completion score and functorial tensor **without** premises RK1 and RK2. If it does, the charged and gauge part of the boundary is effectively closed and only the neutral/global completion and the scheme bridge remain; if it does not, RK1/RK2 are where the construction departs from the substrate, and the departure is now localised to two named premises rather than diffuse.

Part XII-sexies — The Representation-Resolved History Functional (RRHF-1)

> **VERDICT: THE FUNCTORIAL LIFT IS NOW DERIVED, NOT IMPOSED — AND THE FRONTIER MOVES ONE LEVEL DOWN.** RRMK-1's CY3′ pass rested on reading one completion tensor into both routes (premise RK2). RRHF-1 adds representation-score and functorial CAR terms *at the level of the parent history functional*, computed blind from the frozen K=7 representation ledger, and then differentiates. The two CY3′ routes — now genuinely separate arrays produced by two different functors on one ordered history — agree to 1.9×10^{-14}, the gauge Schur response reproduces exactly, and the full charged tensor reproduces to 7×10^{-14}, with no RRMK array, no RK premise and no target value loaded during construction. This discharges the imposed-tensor objection and closes the

charged/gauge side at the conditional action level. What remains is one level deeper: whether the primitive MASD-HMGBC substrate *forces* the discrete representation ledger, or whether that ledger is an additional postulate.

This part records the calculation RRMK-1 named as its own decisive next step: a direct finite-regulator differentiation of the parent history functional, to test whether it returns the RRMK-1 completion score and functorial tensor *without* premises RK1 and RK2. It does. Package integrity is confirmed (SHA-256 matches), and the core seal establishes the construction was frozen before any comparison — `target_directory_empty = true`, `comparison_opened_after_core_seal = true`.

RH1. Named premises

RRHF-1 replaces RRMK-1's two imposed numerical premises with one discrete, independently-falsifiable structural premise.

Premise	Statement	Retired by
RH1 — Discrete representation ledger	The representation-score and functorial-CAR terms added to the parent history functional are fixed by the frozen K=7 representation ledger — the direct representation census, completion-channel incidence, primitive q-differences, K=7 support counts, the RCMO record operator and the independent QCD transport return — with no continuously-fitted coefficient.	F35

Premise RH1 is discrete and falsifiable, not a continuous fit. It is also *not yet* a theorem: it registers the ledger from prior-paper returns rather than deriving it from the most primitive substrate transition law. That gap is the whole of the residual debt (§RH5).

RH2. The construction is blind

The parent law is built and differentiated before any target is loaded. The core seal records `target_directory_empty = true`; the post-freeze comparison records `comparison_opened_after_core_seal = true`; and the source scan refused exact target filenames and headline decimal values. The core manifest hashes the action source, the test contract, the representation ledger, both RCMO record operators, the inherited one-bit history metric and the independent FRGM QCD matching operator — and nothing from RRMK-1's output. Whatever agreement follows is therefore a blind reproduction, not a fit to the RRMK-1 answer.

RH3. The routes are now genuinely separate — the decisive distinction from RRMK-1

RRMK-1's CY3′ residue of 5.84×10^{-16} was, on direct inspection of its arrays, two lifts of **one** tensor: `fermion_vertex_derivative` and `bosonic_cross_derivative` were bit-for-bit identical (Part XII-quinquies §RK4). The array-level check is the discriminator, and it now returns the opposite result.

In RRHF-1, at both regulator levels, the two route arrays are **not identical** — `array_equal → False` — and agree to a normalised residue of $2.5–2.8×10^{-16}$, with the CY3′ maximum over the operator reaching $1.9×10^{-14}$. The paper's §6 states the mechanism exactly: *"The equality is no longer obtained by reading one stored tensor into both routes. It follows from applying the bosonic and exterior-algebra functors to the same ordered primitive history steps."* The CAR route descends the one-particle block and differentiates the CAR bilinear; §4 records that it "does not read the bosonic cross-Hessian output." Two different functors, one history — the structure a genuine CY3′ test requires.

> **Result RH1 (functorial lift derived, not imposed).** Adding representation-score and functorial-CAR terms to the parent history functional — fixed blind by the K=7 representation ledger (premise RH1) — and differentiating returns two *separately computed* CY3′ routes that agree to $1.9×10^{-14}$. The agreement follows from applying the bosonic and exterior-algebra functors to one ordered history, not from copying one tensor into both slots. RRMK-1's premise RK2 is thereby converted from an imposed numerical coefficient into a derived consequence of the discrete ledger, and the imposed-tensor objection of §RK4 is discharged.

This is the reconciliation the corpus has been building toward. MHPE-1 (Result MH1) proved free parents disagree at 0.37–0.49. RRMK-1 (Result RK1) made them agree by imposing one tensor. RRHF-1 makes them agree *by construction of the parent action*, blind, with separately-differentiated routes — which is what "the substrate's completion law is the functorial lift" was supposed to mean. The three results are one arc: disagreement of free parents, conditional agreement under imposition, then derived agreement from the ledger.

RH4. Gauge and charged reproduction, blind

The same frozen parent returns, with no target loaded:

Object	Return	Relative to RRMK-1 boundary
Gauge Schur reduced Z	(1, 5/2, 298)	0.0 (exact)
Direct gauge trace	(6, 6.5, 378)	0.0 (exact)
Charged σ(Y_u)	$7.22×10^{-6}$, $3.71×10^{-3}$, 0.971983	within $7×10^{-14}$
Charged σ(Y_d)	$1.56×10^{-5}$, $3.13×10^{-4}$, 0.016196	within $7×10^{-14}$
Charged σ(Y_e)	$2.99×10^{-6}$, $6.20×10^{-4}$, 0.010696	within $7×10^{-14}$
Full operator	—	$7.07×10^{-14}$

The gauge maximum relative error is exactly zero: the representation ledger returns the colour, weak and primitive-Abelian Schur reductions directly, so RRMK-1's g_s = 1 colour result (§RK2) is now a blind consequence of the parent action rather than an imposed count. Against the *unextended* parent law the improvement is decisive: CY3′ 0.493 →

1.9×10^{-14}, colour relative error 0.546 → 0, operator error 0.88 → 7×10^{-14}. The RCMO regulator continuation passes at both levels.

RH5. What remains — the frontier one level down

The paper is scrupulous about the residual debt, and it is genuinely smaller than before but not zero. Its §RH-equivalent closing statement (paper §7, line 42) reads: this is *"not yet a proof that the original primitive MASD-HMGBC variables uniquely force the added K=7 representation ledger. It converts RK1 and RK2 from unexplained numerical declarations into explicit action terms with a discrete prior-paper provenance, but those discrete identifications remain conditional premises until separately derived from the most microscopic substrate transition law."*

So the debt has moved down one full level and changed character:

- **Before (RK2):** an imposed continuous completion tensor with no provenance. Objection: reading one array into two slots.
- **Now (RH1):** a discrete representation ledger with explicit prior-paper provenance, entering the parent action as structural terms, verified by blind differentiation. Objection: the ledger is registered from prior returns, not derived from the primitive substrate transfer.

> **Result RH2 (conditional closure of the charged/gauge side).** Under premise RH1, one frozen representation-resolved parent history functional returns — blind — the gauge Schur response, the full charged tensor and an independent CY3′ equality at two regulators. The charged and gauge side of the boundary is therefore effectively closed *at the conditional action level*. The single remaining charged/gauge question is whether the most primitive MASD-HMGBC transfer forces the K=7 representation ledger, or whether that ledger is an additional physical postulate.

This does not admit HFB. The neutral mass block remains absent (D-NEU), the global strong-phase measure and $F(\rho_0)$ remain unevaluated, the absolute scale ξ remains open (D37), and the finite scheme bridge remains open. What has closed — conditionally, at the action level — is the charged and gauge sector's *internal consistency*: the functorial lift is no longer a hand-inserted premise.

RH6. Standing in the chain

RRHF-1 discharges the objection that stood against the strongest prior result, and relocates the frontier precisely.

- **CY3′ (RK2 → RH1):** the imposed-tensor objection of §RK4 is discharged. Falsifier F34 (which fired if the RRMK-1 residue was cited as independent-route agreement) is **retired for RRHF-1**, because the routes are now genuinely separate — replaced by F35, which fires if the discrete *ledger* is treated as derived from the substrate rather than registered from prior papers.

- **Gauge (D41) and hierarchy (D42):** RRMK-1 addressed these under imposed premises; RRHF-1 addresses them under the single discrete ledger, blind. Both move from "addressed conditionally on RK1/RK2" to "addressed conditionally on RH1."
- **The debt D-CY3-lift** (SMC-1U) / **D44′** (RPC-1) is not closed but *transformed*: from "prove the substrate yields the functorial completion tensor" to "prove the substrate forces the K=7 representation ledger." Renamed here **D-CY3-ledger** to reflect the deeper, discrete form.
- **Everything downstream is unchanged:** neutral block, absolute scale, global measure, scheme bridge, and HFB/RPC admission all remain open. This is a charged/gauge internal-consistency closure, not a physical derivation.

The decisive next calculation is now stated at its sharpest anywhere in the corpus: **derive the K=7 representation ledger — the completion-channel incidence, primitive q-differences and support counts — from the primitive MASD-HMGBC substrate transition law itself.** If it follows, the charged/gauge side is closed outright and only the neutral/global completion and the absolute scale remain; if it does not, the ledger is the additional postulate on which the charged sector rests, and its status is now isolated to a single discrete, falsifiable object rather than diffused across the construction.

Part XII-septies — The Primitive-Transfer Ledger-Uniqueness Attempt (PRLU-1)

> **VERDICT: A NO-GO THAT SHARPENS.** RRHF-1 (Part XII-sexies) derived the functorial lift blind, but from a K=7 representation ledger it registered from prior papers rather than from the primitive substrate (premise RH1, debt D-CY3-ledger). PRLU-1 attempts to prove the primitive transfer *forces* that ledger. It proves the opposite for the currently-published transfer — with an exact counterexample — while establishing that the ledger *is* the unique solution of a short, named premise package. The debt does not close; it localises, from "derive the whole ledger" to two specific premises (neutral terminal-carrier completeness, and the score-normalisation map) that the wheel demonstrably does not supply. The terminal charged/gauge verdict is unchanged.

This part records the forward attempt at the sharpest open charged-side item, D-CY3-ledger / RPC-1 D44′: does the original finite-regulator MASD-HMGBC transfer uniquely generate the representation ledger, rather than merely being consistent with it? The paper splits its own verdict into two grades and refuses the strong claim. Both grades are verified below against exact enumeration.

PS1. Named premises

PRLU-1 makes explicit the premise package under which the ledger is unique, and isolates the two premises that the primitive transfer does not itself supply.

Premise	Statement	Retired by
PS1 — SC-1 census package	Physical species are irreducible terminal-record carrier roles; weak attachment is minimally binary and left-chiral; support-coupled matter has a threefold colour branch; each charged weak-doublet component requires a right-chiral singlet closure partner; one Higgs doublet and its conjugate supply the minimal closure carrier; anomalous ledgers are inadmissible; no unrequired species is admitted; each support-return layer is terminal and complete.	F36
PS2 — Neutral terminal-carrier completeness (NT)	Every independently-keyed active neutral carrier possesses a typed, gauge-admissible terminal completion route.	F37
PS3 — Canonical score normalisation	The saturated colour bath retains one protected common unit; each completion channel carries one canonical weak role-changing unit and a two-sided-primitive-q-current-plus-two-endpoint Abelian score.	F38

PS2 and PS3 are the load-bearing pair: they are exactly the premises PRLU-1 proves are *not* consequences of the published K=7 transfer, and therefore exactly what a genuine primitive-transfer derivation must still supply.

PS2. What the primitive transfer does fix — verified

The canonical transfer has one hub and six cyclic rim states. Its exact automorphism group is the rim dihedral group of order 12; enumeration of the rim gives 6!/12 = 60 inequivalent direct role assignments, so the wheel cannot itself label the rim states as species. Of the 15 perfect matchings of the six rim states into three pairs, exactly 4 are strongly lumpable and exactly 1 is additionally layer-equivalent — the antipodal pairing $\{b_0,b_3\}$, $\{b_1,b_4\}$, $\{b_2,b_5\}$. All three counts (12, 15→1, 60) reproduce under direct enumeration.

So the transfer plus the inherited three-layer equivalence *uniquely fixes the antipodal generation quotient* — but it does not fix the species roles inside a generation, which live on a separate CAR/terminal-record carrier the published construction leaves unevaluated. This is a type mismatch, not merely a numerical ambiguity.

> **Theorem 5 (primitive-wheel non-identifiability).** The published K=7 canonical transfer does not, by itself, determine the RRHF representation ledger. Its dihedral automorphism group of order 12 leaves species roles non-invariant (60 inequivalent assignments); the antipodal quotient identifies three support-return layers, not the chiral matter roles; and the published construction leaves the continuous MASD/CAR/Fock update-amplitude measure and magnitude-bearing defect lift unevaluated, so the internal terminal-orbit decomposition is not an output of the transfer. The transfer map is therefore not injective with respect to the ledger.

The no-go is narrow and honest: it does not say a *completed* transfer can never derive the ledger — only that the currently-published one lacks the typed structure to do so.

PS3. The neutral-channel witness — the decisive result, verified

The sharpest content is an exact counterexample. The same primitive K=7 transfer is compatible with two different ledgers:

	Ledger	Channels	Direct traces (Z_3, Z_2, Z_q)	Relaxation (r_3, r_2, r_q)	Reduced Z
Charged-minimal	(Q, u, d, L, e, H)	3	(6, 13/2, 378)	(5, 3, 60)	(1, 7/2, 318)
Neutral-extended	(Q, u, d, L, e, N, H)	4	(6, 13/2, 378)	(5, 4, 80)	(1, 5/2, 298)

Both have **identical direct traces**, because N_R is a gauge singlet with q_N = 0 and contributes zero to all three. Yet their relaxation ledgers differ — and RRHF-1 used (5, 4, 80), reduced Z = (1, 5/2, 298). Both branches reproduce under direct enumeration: the per-channel Abelian score is $2|\Delta q|^2 + 2 = 2\cdot3^2 + 2 = 20$, giving r_q = 60 for three channels and 80 for four.

> **Result PS1 (neutral-channel witness).** The published primitive transfer, together with the direct gauge traces, cannot distinguish the charged-minimal ledger from the neutral-extended ledger: they agree on every wheel transition and on (6, 13/2, 378), but differ in relaxation, (5, 3, 60) ≠ (5, 4, 80). The RRHF ledger is therefore *not* selected by the transfer until the neutral terminality rule (PS2) and the representation-score map (PS3) are independently supplied.

This is the exact circularity test that decides D-CY3-ledger, and PRLU-1 runs it against itself and finds the gap. It is a stronger and more useful statement than “not yet derived”: it exhibits a concrete alternative the transfer cannot exclude.

PS4. What is conditionally unique — verified

Under the full premise package PS1–PS3, the ledger *is* rigid. The charged census forces {Q_L, u_R, d_R, L_L, e_R} with one Higgs by exhaustive role enumeration; rank-three support return with the lumpability result fixes exactly three generations; and in the primitive convention q = 6Y, q_H = 3, ordered closure plus the anomaly conditions return the unique charged solution (q_Q, q_u, q_d, q_L, q_e) = (1, 4, −2, −3, −6), verified including the mixed condition 3q_Q + q_L = 0.

The neutral extension is *not* forced by anomaly freedom alone — those permit the one-parameter family q_L = −3q_Q (the familiar hypercharge/B−L freedom in primitive coordinates). Requiring the new carrier to introduce no independent Abelian source, q_N = 0, uniquely returns q_Q = 1 and the RRHF ledger — but that requirement is premise PS2, not a theorem of the transfer.

Theorem 6 (conditional representation-ledger uniqueness). Under PS1–PS3 together with the K=7 quotient, the representation and completion ledger is unique — up to generation permutation, colour/weak basis, overall primitive-q sign and charge-conjugate notation — and equals 3×[Q_L + u_R + d_R + L_L + e_R + N_R] with one Higgs, primitive charges (1, 4, −2, −3, −6, 0; 3), four completion channels, direct traces (6, 13/2, 378) and relaxation (5, 4, 80). Every finite enumeration in the conclusion is executed exactly; the theorem is conditional because premises PS1–PS3 are not all returned by the published primitive transfer.

The gain is real: the ledger is no longer an unconstrained list but the unique solution of a short package, with an explicit provenance matrix mapping each output row to its first sufficient premise.

PS5. Standing in the chain

PRLU-1 confirms SMC-1U's current typing and sharpens the residual debt; it does not move the terminal verdict.

- **D-CY3-ledger is not discharged — and now provably not discharge*able* from the published transfer.** SMC-1U §XII-sexies already typed the K=7 ledger as "registered from prior papers, not derived from the substrate" (falsifier F35). PRLU-1 upgrades this from *not-yet-derived* to *provably non-injective for the currently-published transfer*, with the neutral-channel witness. This retro-justifies F35 and is a strengthening of the honesty already in the paper, not a reversal.
- **The debt localises.** The residual is no longer "derive the ledger" but specifically the two premises the wheel does not supply: **NT (PS2)** and the **score-normalisation map (PS3)**. Everything else — charged roles, primitive charges, three generations — is conditionally forced (Theorem 6).
- **A concrete next gate.** PRLU-1 states the four exact returns a genuine primitive-transfer proof now requires from one frozen full history operator: (i) full measure-valued move-kernel enumeration including update *amplitudes*, not only types; (ii) terminal-orbit decomposition returning exactly the SC-1 roles plus the neutral orbit if NT is a theorem; (iii) anomaly as transfer *inadmissibility* rather than an external filter; (iv) score-map uniqueness returning the protected colour unit, one weak unit per channel and the two-sided-plus-endpoint Abelian score. If all four return, Theorem 6 becomes unconditional; if any fails, that ledger row remains constitutive information.
- **Terminal verdict unchanged.** The charged/gauge side stays CONDITIONALLY CLOSED at the action level (Result RH2). PRLU-1 characterises the conditionality precisely — it now rests on PS2 and PS3, two discrete falsifiable premises — rather than removing it. HFB remains NOT ADMITTED; the neutral block, absolute scale and global measure still block it.

The decisive next calculation is therefore now stated at its sharpest anywhere in the corpus, and it is narrower than before: derive **NT and the score-normalisation map** from the full finite-regulator MASD/CAR/Fock move kernel — not the whole ledger, which is otherwise conditionally forced. The frontier has not moved off the charged sector, but within it the open ground is now two named premises rather than a full ledger.

Part XII-octies — The Terminal-and-Score Descent Attempt (PTSD-1)

> **VERDICT: BOTH LOCALISED PREMISES BECOME OPERATOR THEOREMS; THE DEBT SHRINKS TO TWO COMPUTABLE KERNEL QUANTITIES.** PRLU-1 (Part XII-septies) localised the charged-side debt to two premises — neutral terminal-carrier completeness (NT, PS2) and the score-normalisation map (PS3). This attempt derives both directly from the finite-regulator MASD/CAR/Fock history law, and the result is asymmetric but sharp. NT is reduced to a non-circular killed-kernel spectral criterion whose typing is forced but whose protector theorem is not yet in the corpus; the score map is reduced to arithmetic *conditional* on primitive-innovation factorisation, with an exact counterexample showing the published law does not yet force that factorisation. Neither premise is discharged. But both cease to be broad assumptions: the open ground is now exactly two quantities to compute from one frozen move kernel at two regulators. The terminal charged/gauge verdict is unchanged.

This part records the forward attempt at the two premises PRLU-1 isolated. Its own one-word summary is *asymmetric*: the two premises do not resolve to the same grade, and the paper is explicit about which is where. Every arithmetic step in the descent reproduces under independent enumeration; the honesty is in the hypotheses, not the algebra.

PT1. Named premises

PTSD-1 replaces PRLU-1's two broad premises with two path-law properties of the complete history kernel, each falsifiable and neither yet returned by the published law.

Premise	Statement	Retired by
PT1 — No unprotected recurrent neutral class	For the complete primitive MASD/CAR/Fock transfer, any occupied chiral class not protected by an exact persistent grade, topology or projector has neutral killed-kernel spectral radius below 1, and is absorbed into the lowest-order gauge- and Lorentz-admissible terminal class.	F39
PT2 — Primitive-innovation factorisation	After conditioning on the complete causal past and every retained auxiliary variable, distinct primitive innovations are independent, and elementary innovations carrying one primitive commitment unit share one universal TPB-normalised attempt intensity.	F40

Both are the “protector” and “independence” hypotheses respectively. Each is exactly the point at which the descent stops being forced by the published object — §PT5 exhibits the counterexample for PT2 and states the missing theorem for PT1.

PT2. NT as a non-circular killed-kernel criterion

The contribution on NT is to replace the premise with a spectral test that does *not* begin by assuming three carriers. Let T be the Doob-normalised one-step transfer from the complete finite-regulator MASD/CAR/Fock history law. Remove the candidate terminal exits and form the neutral killed kernel on the active-neutral carrier. Its spectral radius carries the whole content:

- if the radius is ≥ 1, there is a recurrent active-neutral history that remains permanently inside the unresolved active carrier — NT fails;
- if the radius is < 1, the active-neutral history leaves the carrier with probability one, and its terminal absorption map is well-defined.

> **Theorem 9 (forced terminal typing).** Assume the neutral killed-kernel spectral radius is < 1. Then the lowest-order terminal image is uniquely typed as the right-chiral, colourless, weak-singlet, primitive-charge-zero neutral carrier: it cannot be a right weak doublet (that introduces a new primitive weak-active representation), nor coloured (the initial line is colourless), nor a charged singlet (completion preserves electric charge), nor an active self-completion (no primitive electroweak singlet occurs without two interface insertions). Generation-key preservation then forces a lower bound of three such directions — one terminal direction cannot absorb three independently-keyed sources without a key collision — and no-unaddressed-carrier minimality forces exactly three.

This reproduces the NFCC rank result, but with its load-bearing premise replaced by the explicit killed-kernel condition rather than assumed. It is the *non-circular* form of NT: it asks whether the primitive history actually absorbs the neutral line, and derives the carrier count from the answer rather than positing it.

> **Result PT1 (NT reduced, not proved).** NT holds precisely when the neutral killed-kernel spectral radius is < 1. The typing and count then follow (Theorem 9). What is not established is that the radius *is* < 1: this is the **No-Unprotected-Recurrent-Neutral-Class theorem**, which is not in the corpus. The published wheel remains compatible with both rosters — PRLU-1’s exact neutral-channel witness — so ordinary electroweak consistency alone does not force it. If the protector theorem is proved and the frozen source ledger contains no exact protecting grade, NT follows.

PT3. The score map as conditional arithmetic

For the score map the reduction is stronger: *given* PT2, the ledger is fixed arithmetically. The long-history score is a sum over primitive-update incidences weighted by attempt intensities and representation-score vectors; its information-rate metric is generally correlated. Primitive-innovation factorisation (PT2) collapses the correlations, and the one-bit TPB convention fixes the remaining common action unit. The descent is then exact and reproduces both PRLU branches:

Sector	Rule	Return
Colour	6 unit current directions per generator; saturated sharing protects only the common diagonal mode	$r_3 = 6 - 1 = 5$
Weak	one canonical unit per completion channel	r_2 = (number of channels)
Abelian	each channel has $\lvert\Delta q\rvert = 3$: two oriented current innovations $2\cdot3^2$ plus two one-bit endpoints	20 per channel

Independent enumeration confirms: colour relaxable rank 5 (every colour-relative direction relaxes, the total conserved colour current does not); per-channel Abelian score $2\cdot3^2 + 2 = 20$; so three channels give (r_3, r_2, r_q) = (5, 3, 60) and four give (5, 4, 80). With the independently-derived direct traces (6, 13/2, 378), the reduced response Z = d − r is (1, 7/2, 318) for the charged-only branch and (1, 5/2, 298) for the neutral-extended branch — the latter exactly the RRMK-1/RRHF-1 census.

> **Result PT2 (score map reduced to PT2 plus NT).** Under primitive-innovation factorisation and universal one-bit intensity, the score ledger is fixed arithmetically, and the fourth weak unit — the difference between (5,3,60) and (5,4,80) — is present precisely when NT supplies the fourth completion channel. The score map is therefore no longer a free convention (PRLU-1 PS3): it is a theorem conditional on PT2 and NT. The Fisher metric and additivity follow from the path law rather than being separately imposed.

PT4. The consolidated descent theorem

> **Theorem 10 (Primitive Terminal-and-Score Descent).** Let the complete finite-regulator MASD/CAR/Fock history law satisfy: (i) no unprotected nonterminal recurrence (PT1) — every occupied chiral class not protected by an exact persistent grade has killed-kernel radius < 1 and is absorbed into the lowest-order admissible terminal class; (ii) primitive-innovation factorisation (PT2); (iii) universal one-bit intensity; (iv) key preservation and no unaddressed carrier. Then the primitive law uniquely returns the four completion channels and the relaxation ledger (5, 4, 80), hence the reduced census Z = (1, 5/2, 298). The proof after those four path-law properties is complete.

This is the sharpest statement of the charged-side closure anywhere in the corpus: four explicit path-law properties suffice, and the entire remaining question is whether the frozen kernel *has* them.

PT5. What is not yet derived — the exact obstruction

The descent is exact; the open issue is whether the published law forces its hypotheses, and here the paper is scrupulous.

For PT2, an exact counterexample. The current history construction permits positive transition rates but does not derive their unique relative values — positivity improvement only requires positive rates on a connected admissible graph. For any positive type-dependent constants, rescaling the rates preserves the admissible move graph, positivity, the terminal classes, record orthogonality, the representation ledger, and the stationary history measure — yet *changes the score weights*. Therefore neither one-bit entropy nor positivity alone fixes the weights, and the RPC analysis already exhibits correlated one-bit, unequal-rate counterexamples showing one-bit additivity does not force independence or equal channel intensities.

For PT1, a missing theorem. The full continuous MASD/CAR/Fock proposal measure is not yet specified: the canonical wheel fixes update *types* at the seven-state level but not the distribution of continuous update *amplitudes* on the full carrier. The No-Unprotected-Recurrent-Neutral-Class theorem is exactly the statement needed, and it is not in the corpus.

> **Result PT3 (the debt as two computable quantities).** After PTSD-1, the charged-side open ground is no longer two premises but two evaluations from the full measure-valued move kernel at two regulators: (a) the neutral killed-kernel spectral radius ($< 1 \Longrightarrow$ NT, via PT1's protector theorem), and (b) the primitive-innovation factorisation (conditional independence and equal one-bit intensity $\Longrightarrow$ the score map, via PT2). Both are computable objects, not open-ended searches.

PT6. Standing in the chain

PTSD-1 converts both localised premises into operator theorems and pins the residual debt to two kernel computations, without moving the terminal verdict.

- **D-NT → PT1.** Neutral completeness is now the killed-kernel criterion plus the No-Unprotected-Recurrent-Neutral-Class theorem, with the carrier typing and count forced once the radius is < 1 (Theorem 9). The debt is the protector theorem and the radius evaluation, not the premise.
- **D-SCORE → PT2.** The score map is now arithmetic conditional on primitive-innovation factorisation; the debt is that factorisation (with the exact rate-rescaling counterexample marking precisely what must be excluded), not the convention.
- **The terminal verdict is unchanged.** Charged/gauge stays CONDITIONALLY CLOSED at the action level; PTSD-1 makes the conditionality maximally sharp — two named, computable kernel quantities — rather than removing it. HFB remains NOT ADMITTED; the neutral mass block, absolute scale ξ and global measure still block it.
- **Maps onto RPC-1 D44′.** PT1 and PT2 are the two halves of the primitive-transfer uniqueness obligation the parent theorem tracks as D44′; the descent theorem is the SMC-1U-side statement of what closing D44′ requires.

The decisive next calculations are now stated as concretely as the corpus permits: compute the neutral killed-kernel spectral radius at two regulators and prove the protector theorem; and establish primitive-innovation factorisation for the frozen kernel against the rate-rescaling counterexample. If both return, Theorem 10 becomes unconditional and the charged/gauge side closes outright, leaving only the neutral mass block, the absolute scale and the global measure.

Part XII-nonies — The Six-Gate Primitive Path-Law Attempt (SGPL-1)

> **VERDICT: THE TWO STRUCTURAL THEOREMS ARE DELIVERED; THE DEBT SHRINKS TO ONE OBJECT PLUS SUPPORT CHECKS.** PTSD-1 (Part XII-octies) reduced the charged-side debt to two computable kernel quantities — the neutral killed-kernel radius (PT1) and primitive-innovation factorisation (PT2) — but PT2 was blocked by an exact rate-rescaling counterexample and PT1 by a missing protector theorem. SGPL-1 delivers the structural halves of both. The killed-kernel criterion is proved: full rank of the Dirac completion gives $\rho(Q\_\nu) < 1$ with the absorption integral equal to exactly I_3. And the factorisation counterexample is *dissolved*, not defeated — a marked-point-process argument shows the quadratic Fisher metric needs only orthogonal compensated-martingale innovations, which one-mark-per-Fold guarantees, rather than the independent counts the counterexample broke. Neither debt closes: the numerical inputs are inherited compressions, not a completed full-carrier parent law. But the residual is now one numerical object plus three support facts, with both structural theorems in hand. The terminal charged/gauge verdict is unchanged.

This part records the six-gate calculation that attacks PTSD-1's two quantities together. Its own grade is *strong conditional six-gate progress*, and the load-bearing results reproduce under independent verification. No experimental neutrino or Standard Model target enters the six-gate calculation; the numerical neutral matrices are the inherited reduced MASD-HMGBC compressions, used only to test structural terminality, rank, exact-grade support and regulator persistence.

SG1. Named premises

SGPL-1 adds no new physical premise; it converts PTSD-1's PT1 and PT2 from hypotheses into theorems conditional on one explicit object. Its two firewall premises are provenance conditions.

Premise	Statement	Retired by
SG1 — Reduced-compression firewall	The neutral matrices tested are the reduced MASD-HMGBC compressions, used only for structural terminality, rank, exact-grade support and regulator persistence — never as a completed full-carrier parent law, and never with any experimental target.	F41

Premise	Statement	Retired by
SG2 — Provenance order	The provenance is H_n + primitive record instrument → event transfer $T_{n,e}$ → marked kernel K_n → Fisher metric, terminal orbits and branch flow; no downstream object is used to define an upstream one.	F42

SG2. Gate 1 — the killed-kernel criterion is now proved

PTSD-1 posited the killed-kernel test; SGPL-1 proves the sufficient condition. In the canonical singular frame the reduced parent returns a Dirac completion map $Y_\nu^{(n)} = U_n \operatorname{diag}(s_1, s_2, s_3) V_n^\dagger$; the persistent-record instrument converts amplitudes into positive event weights, and after the common proposal clock absorbs the overall factor the canonical completion rates are $r_{i,n} = s_{i,n}^2$. The killed active semigroup is then $Q_{\nu,n}(t) = \exp[-t \operatorname{diag}(r_1, r_2, r_3)]$, so

$\rho(Q_{\nu,n}(1)) = e^{-\min_i r_{i,n}} < 1$ whenever $Y_\nu^{(n)}$ has full rank,

and the integrated absorption map is exactly $\int_0^\infty Q_{\nu,n}(t) \operatorname{diag}(r)\, dt = I_3$.

> **Theorem 11 (full rank ⟹ rank-three terminal absorption).** If the primitive Dirac completion $Y_\nu^{(n)}$ has full rank, then $\rho(Q_{\nu,n}(1)) < 1$ and the three independently-keyed active-neutral modes have three independent terminal images. The absorption is exact — the integrated map is the identity on the three-dimensional keyed carrier.

Both reduced routes are full rank at both regulators, and the two-regulator returns reproduce under independent evaluation:

Route	Level	$1 - \rho(Q_\nu(1))$	Rank
Mixed vertex	3	2.82348976×10^{-11}	3
Mixed vertex	4	2.81519039×10^{-11}	3
Closure Hessian	3	1.06984697×10^{-11}	3
Closure Hessian	4	1.06981063×10^{-11}	3

> **Result SG1 (Gate 1 — structural pass).** Both reduced routes return $\rho(Q_\nu) < 1$ and rank-three absorption at both regulators, so *once the parent returns nonzero Y_ν support, neutral terminality follows*. What is not established: that the unextended original primitive law generates the nonzero Y_ν support, and a regulator-uniform positive lower bound on the terminal gap (the lightest mode's gap is $\sim10^{-11}$, and two levels do not bound the continuum limit).

SG3. Gate 2 — factorisation dissolved, not defeated

This is the strongest conceptual result. PTSD-1's PT2 asked for *independent counts*, and the rate-rescaling counterexample showed the published law does not force them. SGPL-1 shows independence is stronger than the quadratic score problem needs.

Let the primitive marks be a marked point process; a mark records move type, continuous amplitude, terminal record and CAR/Fock update, with $N_e(t)$ counting type-e marks under predictable intensity $\lambda_e(t)$. A primitive Fold produces exactly one mark, so the process is simple: two different marks cannot occur at the same primitive event. Hence the quadratic covariation vanishes off-diagonal,

$$d[N_e, N_f]_t = 0 \ (e \neq f), \text{ so } d\langle M_e, M_f\rangle_t = \delta_{ef}\, \lambda_e(t)\, dt$$

for the compensated martingales $M_e = N_e - \int\lambda_e$. The Fisher-rate matrix $W_{ab} = \lim (1/T)\, E \int \Sigma_e\, s_{ae}\, s_{be}\, \lambda_e\, dt$ then has *no unretained cross-mark covariance*: any genuine shared dependence flows through an explicitly retained state or auxiliary and is handled by the declared Schur reduction.

> **Theorem 12 (quadratic innovation orthogonality).** The quadratic Fisher/H_CMR score metric requires only that distinct primitive innovations have orthogonal compensated-martingale noise — guaranteed by one mark per Fold — not that the total counts $N_e(T)$ be statistically independent. Correlated histories and unequal accepted channel rates are therefore compatible with an additive innovation metric, provided their shared state and mark probabilities are explicitly retained.

> **Result SG2 (Gate 2 — pass; the D44′ counterexample dissolved).** The rate-rescaling counterexample of PTSD-1 §PT5 broke *independent counts*; it does not touch martingale orthogonality, which one-mark-per-Fold supplies unconditionally. The quadratic content of the score problem is therefore an exact theorem, and the old D44′ counterexamples lose their force for that content. This closes the quadratic Fisher/H_CMR consumer; it does not prove an all-orders product law for complete histories, and does not need to.

SG4. Gates 3–4 — the common clock and the measure-valued kernel

Gate 3. For a finite regulator, the continuous-time law is the uniformisation $L_n = \nu_{bit}(K_n - I)$ of the one-Fold Doob kernel, a single Poisson proposal clock of intensity ν_{bit}. One primitive Fold fixes $\nu_{bit} = 1$ in proto-time — one universal proposal intensity, with state- and representation-dependent accepted frequencies remaining in the marked kernel as *outputs*, not independent clocks. **Pass in proto-time; the absolute physical attempt rate remains tied to ξ.** This is a clean separation: one primitive event clock and one event-normalised score carrier, with the proto-time-to-GeV conversion part of the unresolved ξ/action-time calibration.

Gate 4. The event-resolved Kraus density $K_{n,e}(y,x) = P_y\, P_{r(e)}\, e^{-a_t H_n/2}\, P_x$ gives the positive event transfer $T_{n,e}$, and the physical marked kernel $K_n = (r_n(y)/\lambda_{0,n}\, r_n(x))\, T_{n,e}$ normalises to one over all marks and next states. The mark can carry a continuous update amplitude, so this is a genuinely measure-valued law rather than a finite list of update types. **Construction pass; the full-carrier numerical H_n and event-resolved instrument on every continuous MASD/record/CAR-Fock coordinate remain open** — the reduced matrices are compressions.

SG5. Gate 5 — the exact-grade audit removes B−L, verified

On the neutral left-handed Nambu carrier N_L = H_{νL} + H_{N_R}^c, a candidate diagonal grade $G = \mathrm{diag}(a_1,a_2,a_3,b_1,b_2,b_3)$ is exact only if every supported Dirac entry imposes a_i + b_j = 0 and every supported Majorana entry imposes b_j + b_k = 0. Testing the *actual supported transfer* (not anomaly cancellation) gives, at both regulators and stable across support thresholds 10^{-14}–10^{-5}:

Level	Dirac-only nullity	Dirac + Majorana nullity
3	1	0
4	1	0

Independent verification confirms the mechanism: the Dirac-only null space is one-dimensional and is exactly the lepton-number grade (1,1,1,−1,−1,−1); adding the symmetric M_R support raises the constraint rank to six and collapses the nullity to zero.

> **Result SG3 (Gate 5 — conditional pass).** Once the singlet self-completion M_R is active, the reduced finite-regulator parent has no nontrivial continuous B−L-like protector. The primitive provenance of M_R ≠ 0 is conditional: in the VERSF rulebook it follows from lowest-order closure saturation plus the absence of a persistent private ledger, which remain foundational path-law conditions rather than consequences of the bare K=7 wheel.

SG6. Score descent and Gate 6 — two-regulator stability

With Gate 1 supplying the fourth completion channel, the score descent reproduces the (5,4,80) ledger exactly, verified independently: colour relaxable rank r_3 = rank(I_6 − u_C u_C^T) = 5 (only the common colour direction protected), one weak unit per channel $r_2 = 4$, and per-channel Abelian score $3^2 + (-3)^2 + 1^2 + 1^2 = 20$ so r_q = 80. With direct traces (6, 13/2, 378) this returns Z = (1, 5/2, 298) — the RRMK-1/RRHF-1 census.

The two-regulator comparison passes on every structural invariant: neutral rank 3→3, absorption rank 3→3, exact-grade nullity 0→0, score ledger exactly unchanged, with mixed/Hessian singular-spectrum drifts $\leq 1.7\times10^{-3}$ and Richardson-continued positive limiting terminal gaps (2.81×10^{-11} mixed, 1.07×10^{-11} Hessian). **Structural pass; a regulator-uniform positive lower bound on the lightest terminal gap is still unproved.**

SG7. Standing in the chain — what is solved and what remains irreducible

SGPL-1 delivers the structural content of both PTSD-1 quantities and pins the residual to one object plus support checks.

Genuinely solved. Two previously-conflated issues are separated. First, the quadratic H_CMR score law needs a simple marked process and complete conditioning, not an all-order product measure (Theorem 12) — an exact theorem. Second, a universal attempt intensity means one common proposal clock, not equal accepted channel frequencies (Gate

3). Together these remove much of the force of the old D44′ counterexamples for the quadratic score problem.

The residual debt, now sharply enumerated. Four items remain, and they are support/positivity facts about one object, not open-ended derivations:

1. return the complete full-carrier finite-regulator H_n and commitment instrument, not only their reduced compressions;
2. verify each keyed active-neutral carrier has positive support to the unique gauge-admissible terminal singlet;
3. verify the singlet self-completion M_R has positive support, or derive an exact persistent protector that forbids it;
4. extend the terminal-gap calculation beyond two regulators and prove a uniform positive lower bound, or publish its collapse.

Result SG4 (the debt as one object plus support checks). If items 1–4 pass, D-NT and the physically relevant quadratic content of D-SCORE are discharged, and the charged/gauge ledger becomes a direct output of the primitive path law rather than an extra representation premise. The two structural theorems (Theorem 11 killed-kernel absorption, Theorem 12 marked-martingale orthogonality) are already in hand; what remains is the complete numerical parent law and its positivity/continuum support.

- **D-NT → items 1, 2, 4.** The killed-kernel criterion is proved (Theorem 11); the residual is the full-carrier support and the uniform gap bound, not the criterion.
- **D-SCORE → the quadratic content largely discharged.** Theorem 12 supplies the factorisation the score arithmetic needed; the residual is item 3's M_R provenance and the full-carrier instrument.
- **Terminal verdict unchanged.** Charged/gauge stays CONDITIONALLY CLOSED at the action level; SGPL-1 makes the conditionality a concrete positive-support and continuum-gap evaluation of one explicit marked transfer. HFB remains NOT ADMITTED; the neutral mass block, absolute scale ξ and global measure still block it.
- **Maps onto RPC-1 D44′.** Theorem 12 is the exact-theorem form of the Primitive Innovation Factorisation the parent tracks as D44′; SGPL-1 is the SMC-1U-side statement that the quadratic half of D44′ is now a theorem, with the residual localised to the full-carrier numerical law.

The decisive next step is no longer an undefined demand for independence, equal rates and neutral completeness — those are resolved or reduced to theorems. It is the concrete positive-support and continuum-gap evaluation of one explicit marked primitive transfer: return H_n on the full carrier, confirm the two positive-support facts, and bound the terminal gap across regulators.

Part XII-decies — The Full-Carrier Hamiltonian and Primitive Instrument (FCHI-1)

> **VERDICT: THE STRUCTURAL EXISTENCE QUESTION IS CLOSED AT RETAINED QUADRATIC ORDER, WITH AN EXACT REGULATOR-UNIFORM GAP.** SGPL-1 (Part XII-nonies) reduced the charged-side debt to one object plus three support facts (Result SG4): return the full-carrier finite-regulator H_n and instrument, and verify positive active-neutral support, positive singlet self-completion, and a uniform terminal gap. FCHI-1 supplies exactly that — an explicit 102-dimensional retained quadratic parent with a complete K=7 and seven-outcome neutral Kraus instrument — and the three support facts pass. The terminal gap is not merely bounded but *exact and regulator-independent*: $1 - \rho(Q_n) = 1 - e^{-1}$, because the killed kernel is block-triangular and its spectrum is $\{e^{-1}\}$ regardless of the regulator. This closes the structural existence of the neutral terminal sector. It does not close provenance: the object is supplied, positive, regulator-stable and sufficient, but not yet shown to be *uniquely forced* by the unextended primitive substrate — the single remaining charged/neutral-terminal debt. HFB remains NOT ADMITTED.

This part records the construction SGPL-1 named as its entire residual (SG4 item 1). It is a genuine full-carrier object, not another compression, and a fresh-directory rerun regenerated 52 core arrays with zero SHA-256 mismatches across a 101-file manifest. No experimental neutrino or Standard Model target enters the construction or the gap proof.

FC1. Named premises

FCHI-1 adds one construction premise beyond the frozen set; its provenance firewall is the load-bearing caveat.

Premise	Statement	Retired by
FC1 — Supplied-instrument firewall	The support-strain instrument is the complete retained-order candidate assembled from the MASD-HMGBC, RRHF and neutral-completion returns; it is proved complete, positive, regulator-stable and sufficient, but is a *supplied* candidate, not shown to be uniquely forced by the unextended primitive substrate.	F43

Premise FC1 is exactly the point at which FCHI-1 stops: it proves the consequences of the instrument, not its uniqueness. The PRLU-1 neutral-channel witness still applies — the published transfer alone cannot distinguish the charged-only from the neutral-extended roster — so building a working neutral-extended instrument does not prove the substrate demands one.

FC2. The complete retained full-carrier Hamiltonian

The retained real carrier has dimension 102, assembled in one ordered matrix:

Block	Real dimension	Level-3 min eig	Level-4 min eig
History defect + unresolved bath	12	0.0363308239	0.0363308239
Gauge direct + auxiliary response	6	0.4750621894	0.4750621894
Generation-address completion	18	0.2592396487	0.2598658894
Charged left-right parent	36	1.0274813518	1.0278831265
Neutral Nambu parent	24	1.7896864592	1.7899335626
Completed neutral record	6	0 (absorbing)	0 (absorbing)
Total	**102**		

The nonterminal block is strictly positive at both levels, with $\lambda_{min} = 0.0363308238854$; the full matrix is positive semidefinite because the six completed-record directions are deliberately absorbing zero modes. The neutral parent uses the coercive convention $H_{neutral} = [[2I_{12}, R(B_\nu)], [R(B_\nu)^T, 2I_{12}]]$ with $B_\nu = [[0, M_D],[M_D^T, M_R]]$ — a retained-action normalisation, not a fitted observable. Block spectra move ≤0.15% between levels 3 and 4; the full nonterminal norm changes by 6.19×10^{-6}.

FC3. The complete primitive instrument

Three parts, all with completeness residuals at machine precision:

- **K=7 history instrument.** For every positive transition, $H_{y\leftarrow x} = \sqrt{K_n(y|x)}\,|y\rangle\langle x|$, giving 31 positive Kraus operators with $\|\Sigma H^\dagger H - I_7\| = 2.22\times10^{-16}$ and minimum positive transition probability 0.0768.
- **Seven-outcome neutral instrument.** Writing the Dirac and singlet self-completion maps in right-polar form $Y_\nu^\dagger = U_D S_D$ and $M_R^\dagger = U_R S_R$ separates *route support* (the unitaries U) from *physical magnitude* (the positive strains S). With $q = e^{-1}$, $p = 1 - e^{-1}$, the no-jump, three active-key and three singlet-key Kraus operators satisfy completeness to 1.11×10^{-15}. This separation is the key move: terminal-carrier completeness is a typing statement made *before* a mass coefficient is evaluated, so deleting a route because its strain is tiny would confuse completeness with a mass.
- **Full history-neutral product.** 217 Kraus operators on a 63-dimensional record carrier, completeness residuals 3.27×10^{-15} (L3) and 2.63×10^{-15} (L4); the extension to the 102-dimensional field carrier is stored as a Kronecker factor with the field identity rather than a dense 6426-dimensional materialisation.

FC4. The three support facts — all pass

Positive active-neutral support (SG4 item 2). For each of the three independently-keyed active-neutral vectors, the total support probability is $p = 1 - e^{-1} = 0.632120558829$ at every level 3–6, with the coherent active-to-singlet support operator of rank three throughout — so no active generation key is omitted or merged. The smallest physical Dirac strains $\sigma_{min}(Y_\nu)$ run $5.31\times10^{-6} \to 5.30\times10^{-6}$, nonzero and monotone.

Positive singlet self-completion and no protector (SG4 item 3). Every keyed singlet vector has the same positive support p, with M_R full rank (kernel dimension zero) at all four levels. The continuous-grade audit returns Dirac-only nullity 1 — the lepton-number-like grade — collapsing to nullity 0 once the nonzero singlet Majorana completion is included. So the supplied branch has **no exact continuous protector**: a protector would require a nonzero kernel of the self-completion map together with a persistent, refinement-stable record-current on that kernel, and none is present. This is the SGPL-1 Gate-5 mechanism, now on the full carrier and independently reproduced.

> **Result FC1 (support and self-completion pass).** On the supplied full-carrier parent, every active-neutral key has positive rank-three support to the singlet carrier, every singlet key has positive support to its completed record, and no exact continuous protector survives the singlet self-completion. The three-generation neutral terminal structure exists, is positive, and is unprotected — the configuration NT requires.

FC5. The exact regulator-uniform gap

The strongest result. After summing over keyed marks, the transient active-plus-singlet population kernel is

$Q_n = [[e^{-1} I_3, 0], [(1-e^{-1}) P_{D,n}, e^{-1} I_3]]$, $P_{D,n} = |U_{D,n}|^2$ doubly stochastic.

Because Q_n is **block-triangular**, its spectrum is $\{e^{-1}\}$ sixfold — *independent of the doubly-stochastic $P_{D,n}$*, hence independent of the regulator-dependent polar orientation. Therefore

$\rho(Q_n) = e^{-1}$ for every regulator, and $\delta_{support} = \inf_n [1 - \rho(Q_n)] = 1 - e^{-1} = 0.632120558829$.

> **Theorem 13 (exact regulator-uniform terminal-route gap).** For the supplied full-carrier instrument the killed transient kernel is block-triangular with constant diagonal blocks $e^{-1} I_3$, so its spectral radius is exactly e^{-1} at every regulator, independent of the polar orientation $U_{D,n}$. The terminal-route support gap $1 - e^{-1}$ is therefore exact and regulator-uniform — regulator refinement may rotate the terminal image and change the physical strain, but cannot remove the typed route.

This is a genuine theorem, not a numerical stability observation: the gap is P_D-independent by the block-triangular structure, verified against arbitrary doubly-stochastic orientations. The two-step column weight to the completed record is $p^2 = 0.399576400894$, with the eventual absorption map unit-column-sum to 2.01×10^{-15}. This settles SG4 item 4 in the strongest possible form — an exact bound rather than a two-level extrapolation.

Separately, a *physical-strain-weighted* bound continues the refinement through levels 5–6 under the published RCMO $\mathcal{O}(h^{1.99670})$ tail-contraction, giving $\sigma_{min}(M_R) \geq 5.10656378690\times10^{-6}$ and hence $\delta_{strain} \geq 2.60769937094\times10^{-11}$. This second bound is conditional on the RCMO tail law; the route-support gap of Theorem 13 is not. The two must not be conflated — the exact gap is a *typing* statement, the strain bound a *magnitude* statement, and neither is a neutrino mass, a lifetime, or a GeV energy.

FC6. Standing in the chain — existence closed, provenance the residual

FCHI-1 closes SGPL-1's three support facts and supplies its one object, relocating the debt to a single provenance theorem.

- **SG4 items 2, 3, 4 pass** (Results FC1, Theorem 13). The full-carrier object exists at retained quadratic order; the support is positive and rank-complete; the protector is absent; the gap is exact and regulator-uniform.
- **The residual is one theorem.** Does the original unextended microscopic MASD-HMGBC transition measure *uniquely force* this support-strain instrument and its common proto-time clock? FCHI-1 proves the instrument is complete, positive, regulator-stable and sufficient — it does not prove uniqueness. This is the D44′ provenance obligation in its final form, now for the neutral terminal sector specifically, and the PRLU-1 witness shows why it does not follow for free.
- **Two further blocks are unchanged.** The absolute clock (proto-time → seconds/GeV) still needs the ξ/action-time return; and the full physical neutral boundary still needs an absolute Λ⋆, the same-action Y_ν/M_D/M_R in the admitted branch, neutral CY3′ provenance, and the threshold/covariance package.
- **Terminal verdict unchanged.** Charged/gauge stays CONDITIONALLY CLOSED at the action level; the neutral terminal sector's *structural existence* is now closed too, but HFB-1 remains NOT ADMITTED pending the provenance theorem, the absolute scale and the physical neutral boundary.

> **Result FC2 (existence closed, provenance the sole structural residual).** The charged/gauge and neutral terminal carriers coexist in one explicit finite-regulator retained parent with a complete positive record instrument and an exact regulator-uniform terminal gap. The remaining charged/neutral-terminal debt is no longer existence, consistency, support or gap — all supplied — but the single provenance theorem that the unextended substrate uniquely forces this instrument, together with the absolute scale and the physical neutral boundary.

The decisive next step is now the narrowest it has ever been on the neutral terminal side: prove that the primitive MASD-HMGBC substrate measure factorises uniquely into these polar route maps and positive strains with one proto-time clock — the provenance half of D44′ — rather than admitting the instrument as a supplied candidate. Everything structural downstream of that is already in hand.

Part XII-undecies — The Unified Species-and-Boundary Assembly Attempt (USBA-1)

The USBA-1 execution: what passed

1. Canonical K = 7 core

The precursor transition kernel, closure Hamiltonian and stationary measure match the later canonical arrays exactly: relative residuals 0.0, row-stochastic residual 2.2×10^{-16}, stationarity residual 0.0, closure rank 6 with spectrum

{0, ½, ½, 1, 1, 31/28, 5/4}

(31/28 = 1.107143 and 5/4 documented exactly). Verdict: EXACT_CANONICAL_MATCH. The K = 7 core is not the problem.

2. Positivity and typing at both levels

Both finite levels remain positive and fully typed: dim G_red = 27 (level 1) and 42 (level 2), minimum eigenvalues 0.999940552701 and 0.999960542411. The declared gauge embeddings E_3, E_2, E_q have ranks 8, 3 and 1 at both levels (combined rank 12).

3. Addresses and charged candidates

All charged address maps A_{uL,dL,eL} (12 × 3) and A_{uR,dR,eR} (18 × 3) have rank 3 with isometry residual exactly 0.0. The charged Yukawa candidates are full rank with singular values (u: 0.2580, 0.2570, 0.2554; d: 0.2164, 0.1800, 0.1783; e: 0.3227, 0.3026, 0.2997) and determinants (0.016936, 0.006944, 0.029269) — typed CONDITIONAL_PRECURSOR_OUTPUT, not physical HFB-1.

4. Terminal-record refinement, second order certified

The terminal-record derivative has rank 5 at levels 3–6 (sixth singular value $\leq 5 \times 10^{-16}$ throughout). The successive relative differences 0.004225082 → 0.001051025 → 0.000262431 have step ratios 0.24876 and 0.24969: the ¼ ratio independently certifies second-order refinement, in agreement with the reported asymptotic order p = 2.001788. (This is the same ¼-signature that certified the HCMR local sequence in the bridge thread's instrument audit — here applied to a passing object.)

5. CAR/Fock mixed jet

The shared-link CAR/Fock mixed jet has shape 144 × 334, full rank 144, generator Gram rank 12, and faithful-row-space HM4 residuals 1.770×10^{-15} (defect) and 1.765×10^{-15} (full). CAR/Fock visibility is not the problem.

6. Common structural address carrier

A single explicit 33-dimensional carrier, $\mathbb{C}^{15}$_charged ⊕ $\mathbb{C}^{18}$_neutral, now hosts all eight selectors u/d/e/ν, L/R (each 33 × 3, rank 3, isometry residual 0.0) with maximum charged/neutral overlap exactly 0.0. The neutral selectors are on a common declared carrier for the first time; no derived bridge is claimed for it.

7. Gauge precursor

$Z_3 = Z_2 = 0.99997783$ (equal to twelve digits), $Z_q = 36$ exactly, giving $g_s = g = 1.0000110844$ (degenerate to thirteen digits at precursor level) and $g' = 1$ exactly, with isotropy residuals $\leq 1.6 \times 10^{-13}$ and exact SU(3)/U(1), SU(2)/U(1) cross-vanishing. Typed conditional precursor output.

What did not pass

1. The embedding non-identification

The six-channel selector metric is positive and full rank — eigenvalues {0.004163, 0.017483, 0.856592, 1.384782, 1.802799, 1.934180}, condition number 464.63 — but it does not identify its embedding into the 334-dimensional faithful tangent (faithful defect 1125 × 334 rank 309; faithful full 1147 × 334 rank 313). The rechecked HM4 endpoint residuals are exact structural values:

$\varepsilon_{pass} = 1.793 \times 10^{-15}$, $\varepsilon_{mid} = 1/\sqrt{2} = 0.7071067812$, $\varepsilon_{fail} = 1$,

with absolute residuals 4.39×10^{-15}, $\sqrt{3}$ and $\sqrt{6}$ respectively — the $\varepsilon\sqrt{6}$ scaling of the six-channel carrier — and source-Gram relative residuals $\sim 2 \times 10^{-15}$ at **all three** endpoints. The full interval [0, 1] is inherited and rechecked. Every endpoint preserves the same selector Gram matrix; therefore

choosing the pass endpoint would be a branch choice, not a derivation.

2. Completion morphisms

V_H (rank 12, partial-isometry residual 4.3×10^{-15}) and X_H (rank 12, Hermitian to 0.0) remain outputs of the declared Schur/polar completion rule rather than a uniquely returned stationary completion morphism; their derivatives ($dV_H/d\varphi$ rank 3, $dX_H/d\varphi$ rank 12, Φ_H response rank 12) are well-formed but inherit the same conditionality. The physical address-realisation bridge is absent.

Two-level comparison

Relative differences between levels: G_{red} 0.001165, V_H 6.60×10^{-5}, X_H 0.001464; all six address maps identical to 0.0 under the exact coarse lift (isometry residual 0.0); downstream boundary candidates differ by 0.0020–0.0037 (maximum Y_u at 0.3669%). Verdict DIAGNOSTIC_PASS, with the documented warning: two levels are necessary evidence only; they are not a continuum convergence theorem.

The localisation and the locked next calculation

The attempt narrows the bottleneck decisively. The K = 7 core is exactly canonical; positivity, typing, addresses, terminal-record refinement and CAR/Fock visibility all pass; the neutral selectors sit on one declared carrier. The obstruction is one object:

dΦ_n(X⋆): six source channels → 334-dimensional faithful tangent,

the representation-resolved master transition derivative, together with the upstream action that selects it. This is the provenance residual of the documented D-NT/D-SCORE debts, now localised from "the instrument" to "the source-to-tangent derivative of the instrument."

This calculation has been executed — Part VI reports the result. The request as posed is answered negatively and constructively at once: no single linear dΦ exists (a typing no-go), and the correct graded replacement is built explicitly. D-USBA1 is retyped accordingly, and the downstream-replacement plan of D-USBA2 must now accept a graded interface rather than six columns.

Premises of this Part

P-USBA3 — Declared interface

The gauge embeddings $E_3/E_2/E_q$, the Schur/polar completion rule producing V_H and X_H, and the 33-dimensional common address basis are declared interface objects; no derived bridge is claimed for them.

P-USBA4 — Two-level evidence typing

Level-pair agreement is necessary evidence only; no continuum convergence claim is made or permitted from it.

P-USBA2 — Supplied-instrument firewall (inherited)

The neutral instrument, embeddings and completion rule are supplied candidates — complete, positive, regulator-stable — not shown to be uniquely forced by the unextended substrate (inherits documented FC1 and the PRLU witness).

Part XII-duodecies — The Graded Source-Jet Bridge (GSJB-1)

GSJB-1: the graded source-jet bridge and the linear six-channel no-go

Target-free finite calculation on the frozen primitive PFDMI mark-jet and rank-72 native probability score, with no import of the earlier HM4 pass embedding; the HM4 selector metric was opened only after the native construction was frozen. Claim grade: exact typing and non-identifiability certificate, not an HFB-1 boundary certificate; physical authority false.

1. Action-selected cycle, exact

The action-selected D36 mode fixes the oriented outer-wheel cycle with incidence residual exactly 0: all six rim phase steps equal $-\pi/3 = -1.047197551197$ (one full -2π winding), and the normalised cycle vector is $-1/\sqrt{6} = -0.408248290464$ on the six rim links and 0 on the six spokes. The branch relation is the documented conjugate pair $k = 1/k = 6$ with D36 fixing the orientation sign — the first-executed-instance role of the commitment entropy-production mode carrying orientation, exactly as documented — while the global record phase remains free.

2. Linear invariance theorem (the no-go)

On the selected cycle, colour supplies an 8-dimensional adjoint bundle (orthonormality residual 6.3×10^{-16}, Wilson-physical residual 1.8×10^{-15}), weak a 3-dimensional adjoint bundle, hypercharge one U(1) direction (norm residual 0). The stacked adjoint-invariance equations return

invariant linear dimension: SU(3) = 0, SU(2) = 0, U(1) = 1.

No nonzero gauge-invariant linear colour or weak vector exists at the flat background: the first invariant sources are the quadratic Casimir projectors $Q_3 = V_3 V_3^T$ (rank 8, idempotence residual 9.4×10^{-16}) and $Q_2 = V_2 V_2^T$ (rank 3, 5.8×10^{-16}). This is representation theory, not numerics — the adjoint of a simple group contains no invariant vector — so the mistyping of the colour and weak channels of a linear $d\Phi$ is exact.

3. Native score audit and the 72-dimensional consistency

The native terminal probability score has physical rank 72 at both levels with Gram drift exactly 0, decomposing as colour $96 \to 48$, weak $36 \to 18$, abelian $12 \to 6$ Wilson-physical dimensions $(48 + 18 + 6 = 72)$, coinciding exactly with the CAR/Fock physical projector rank; the Wilson Hessian physical minimum eigenvalue is exactly 6. Cycle-bundle native responses are full rank (8/3/1) with strictly positive spectra (colour 1.96×10^{-7} … 2.13×10^{-3}; weak 3.06×10^{-6} … 2.09×10^{-3}; abelian 2.909×10^{-4}).

4. Channel status

channel	requested type	native type	unique linear direction
colour Casimir	linear vector in $\mathbb{C}^{334}$	rank-8 quadratic projector on the cycle	no (adjoint nullity 0)
weak Casimir	linear vector in $\mathbb{C}^{334}$	rank-3 quadratic projector on the cycle	no (adjoint nullity 0)
primitive q_6Y	linear vector in $\mathbb{C}^{334}$	branch-oriented U(1) cycle vector	**yes** (D36 orientation)
terminal record	one real linear vector	one complex line / real rank-2 plane	no (S^1 global phase)

channel	requested type	native type	unique linear direction
completion strain	one real linear vector	isotropic rank-6 tangent, Gram = $73.2514 \cdot I_6$ (residual 2.4×10^{-16})	no (O(6) freedom)
CAR/Fock	independent linear vector	shared-link mixed third jet on the rank-72 tangent	no (no independent column)

The record plane is exactly isotropic (metric $414.559 \cdot I_2$, off-diagonal 6.9×10^{-14}, orthonormality 2.8×10^{-17}). Four channels mistyped, one non-unique, one unique: the requested single 334 × 6 matrix does not exist as a derived object.

5. Retro-explanation of the HM4 interval

The Part III endpoint result — a positive six-channel Gram admitting residuals from 0 to 1 under different embeddings — is now explained rather than merely recorded: the interval is not numerical ambiguity but the signature of stacking objects of different differential order (1, 2, 3) and representation type (invariant, adjoint-quadratic, phase-line, isotropic, shared-link) into scalar columns. The non-identifiability of Part III and the no-go of §VI.2 are one fact seen from two sides.

6. The graded replacement and the GSJB-2 lock

The correct source object is the graded jet

(Q_3^(2), Q_2^(2), E_Y^(1), E_record^(1ℂ), Q_completion^(2 mixed), T_CAR/Fock^(3 mixed)),

supplied as explicit finite arrays at the frozen n = 3/6 grade together with the exact no-go certificate for the single six-column matrix. The locked next calculation is **GSJB-2 — Primitive Graded-Jet-to-HFB Faithful-Tangent Descent**: derive, from one selected endpoint/current background, the quadratic colour/weak jets, the linear hypercharge and record jets, the mixed bosonic completion jet and the mixed CAR/Fock jet directly on the HFB 334-variable carrier at n = 3–6, frozen before any HFB/HM4 projection. Critical gate: **the primitive action must select the internal endpoint frame, or quotient the 836 post-gauge flat directions, without using downstream couplings.** This gate has been executed and cleared at support level — Part VII reports the result and the residual it leaves.

Premise of this Part

P-USBA5 — Frozen primitive source corpus

Part VI uses the frozen PFDMI field-dependent mark jet and rank-72 native probability score as its only source, target-free, with the HM4 selector metric opened strictly after the native construction was frozen.

Part XII-tredecies — The Primitive Graded-Jet-to-HFB Support Descent (GSJB-2)

GSJB-2: the primitive graded-jet-to-HFB support descent

Target-free primitive support descent and exact quotient certificate; HFB tangent visibility proved; no numerical HFB-1 boundary or unique normalisation certificate; physical authority false. The HM4 comparison was opened only after the primitive support freeze.

1. The endpoint-frame gate, cleared at support level

The 836 post-gauge flat tangent directions are quotiented by the unique minimum-Euclidean-norm solution of the representation-current residual at fixed Wilson-physical link direction — no Standard Model or HFB coupling target used. The minimum-norm lift satisfies the current residual at 9.86×10^{-16} with norm 0.980777 times the earlier fixed-endpoint lift (relative difference 19.5% in the lifts themselves).

Frame independence of the support. Five unrelated endpoint backgrounds (p53 quadratic-linear, p53 shifted, p53 heptadic, p59 cubic, p61 cubic-quadratic) change the raw score Gram by as much as 1.4185, yet after polar quotient their output-support projectors agree to $\leq 1.81 \times 10^{-11}$; four tangent/clock prescriptions (coordinate-fixed, published on-shell, minimum-norm on-shell, clocked event destination — condition numbers 12,775 to 32,145) agree to $\leq 1.49 \times 10^{-7}$. The rank-72 terminal-score output subspace is therefore a frame-independent object even though every raw metric differs. Four-level audit: all sector ranks and the rank-72 physical probability are level-independent at $n = 3$–6 with Gram drift exactly 0 and field-derivative spectrum drift $\leq 9.1 \times 10^{-16}$.

2. Graded HFB visibility: all six sectors land

Every sector of the Part VI graded jet reaches visible support in the HFB faithful full-action tangent (full rank 313, defect rank 309), with visibility residuals $\leq 3.8 \times 10^{-15}$:

sector	source dim	HFB response rank	HFB Gram eigenvalues	condition
colour Casimir (quadratic)	8	8	857/40 = 21.425 (isotropic)	1
weak Casimir (quadratic)	3	3	2761/120 = 23.00833 (isotropic)	1
hypercharge (linear)	1	1	671/24 = 27.95833	1
record target-phase	6	6	49/2 to 91/2	**13/7**
completion support	4	4	$\{3 - \sqrt{7}, 1, 1, 3 + \sqrt{7}\}$	$\mathbf{8 + 3\sqrt{7}}$
CAR/Fock shared link	72	72	21.425 to 1631/24	3.172

The exact values are structural: the record condition number is exactly $13/7 = 1.857143$; the HFB completion metric is the integer matrix $[[5, -1, -1, -1], [-1, 1, 0, 0], [-1, 0, 1, 0], [-1, 0, 0, 1]]$ with eigenvalues $\{3 - \sqrt{7}, 1, 1, 3 + \sqrt{7}\}$ and condition $8 + 3\sqrt{7} = 15.937254$; and the colour-isotropic value 857/40 reappears as the CAR/Fock minimum. This removes the Part VI endpoint-frame obstruction **at support level**.

3. The 45° record geometry, and a retro-identification

The record target/source principal angles are all exactly 45°. Since a 45° plane pair has projection defect $\sin 45° = 1/\sqrt{2}$, this identifies the mysterious $\varepsilon_{mid} = 1/\sqrt{2} = 0.707107$ endpoint of the Part III HM4 interval as the *true* target/source geometry of the record channel — the interval midpoint was never an artefact; it was the record sector announcing its actual 45° attachment. (Typed as a consistency identification, not a selection: the D36 target-terminal mode fixes the edge profile via the completed-record semantics of the canonical incidence attaching map, but the relative colour/weak/Abelian record-phase weights remain unselected.) The post-freeze HM4 comparison likewise returns the CAR/Fock physical minimum singular value $\sqrt{6} = 2.449490$ exactly — the six-channel carrier scaling of Part III again — and locates the earlier common completion as one unselected point of an O(4) family, in-support to residual 0.0.

4. What is deliberately not returned

The quotient removes metric weights by construction: it proves which physical score directions exist, not their absolute stiffnesses. Three objects remain unselected by the primitive action:

1. **the absolute rank-72 score metric** (raw Grams vary by O(1) across endpoint witnesses; only the support is invariant);
2. **the record factor attachment** — the relative colour/weak/Abelian record-phase weights;
3. **the completion attachment** — the blind four-channel census (routes L→eH, L→NH, *Q→dH, Q→uH*) fixes the source support with primitive metric $\propto \mathrm{diag}(1, 1, 3, 3)$ (eigenvalue pairs 73.2514 and 219.7542, ratio exactly 3), but no primitive map attaches them to (φ_H, X_{H0}, X_{H1}, X_{H2}); the primitive and HFB completion metrics are not proportional (best scalar proportionality residual 0.8745) — and structurally cannot be, since $\mathrm{diag}(1, 1, 3, 3)$ and $\{3 - \sqrt{7}, 1, 1, 3 + \sqrt{7}\}$ have different spectra.

Choosing any of the three from the HFB response itself would reverse the derivation (F51).

5. The GSJB-3 lock

The locked next calculation is **GSJB-3 — Primitive Native Score-Metric and Completion-Attachment Selection**: derive one endpoint/current equilibrium measure fixing the rank-72 score *metric* rather than only its support, and derive a same-action mixed completion Hessian attaching the four blind completion channels to the HFB (φ_H, X_{H0}, X_{H1}, X_{H2}) carrier without downstream projection. Pass condition: endpoint-background-independent metric, unique record factor weights, unique completion attachment up to declared physical convention, n = 3–6 convergence and branch covariance (current conjugate-branch probability residual 6.49×10^{-9}). This calculation has been executed — Part XII-quattuordecies reports the split verdict and the residual it leaves.

Premise of this Part

P-USBA6 — Quotient convention and witness family

Part VII quotients the flat tangent by the unique minimum-Euclidean-norm representation-current solution at fixed Wilson-physical link direction, and certifies frame independence against the declared five-endpoint witness family and four tangent/clock prescriptions; support claims are made only at polar-quotient level, and the HM4/HFB comparison opens strictly after the primitive support freeze.

Part XII-quattuordecies — Primitive Native Score-Metric and Completion-Attachment Selection (GSJB-3)

Executes the GSJB-3 lock of Part XII-tredecies. Target-free score-metric no-go, plus conditional primitive-innovation H_CMR construction and exact structural completion attachment; no HFB-1 boundary; physical authority false. Split verdict: **completion attachment PASS** (up to column signs and declared auxiliary-label order); **native numerical score metric NOT UNIQUE**; **innovation-count H_CMR conditional two-branch pass**; record weights branch-conditional.

1. The native Fisher metric is endpoint non-identifiable

The actual history-weighted Fisher metric was reconstructed from the primitive Born mark probabilities for the five declared target-blind endpoint witnesses. Every return is positive with rank exactly 72 and local probability normalisation at $\leq 9 \times 10^{-16}$ — but the numerical shape is not endpoint invariant: maximum relative metric drift 1.521423 (p53 heptadic vs primary), and 1.139704 even after trace normalisation, with condition numbers ranging 53.7–270.1 and traces 0.083–0.149. The endpoint-flat action therefore selects the physical score support (Part XII-tredecies) but provably not its numerical stiffness. Conjugate-branch Fisher residual: exactly 0.0 at all four levels — branch covariance holds exactly; the failure is endpoint dependence alone.

2. The innovation-count H_CMR: endpoint-independent, two-branch conditional

The one-mark-per-Fold innovation orthogonality theorem (Theorem 12) supplies the strongest endpoint-independent replacement: an additive innovation-count metric, positive, rank 72, regulator-stable at n = 3–6 (all drifts exactly 0), built on the exact primitive history bookkeeping — D36 flow residual 3.4×10^{-17}, stationary hub weight

0.189424 equal to the self-mark probability, and self-mark plus the twelve edge exposures summing to 1 exactly. It returns two exact roster branches:

charged-minimal (5, 3, 60) and neutral-extended (5, 4, 80),

with direct counts (6, 13/2, 378) reproducing the frozen PRLU direct traces to residual 0.0 (RRMK counts loaded only after core construction; post-freeze). Branch relative difference 0.2462 (0.0975 trace-normalised). The present primitive substrate does not prove which terminal roster it realises — this is exactly the Part XII-septies neutral-channel witness operating at metric level — so neither branch is promoted (F52).

3. Record factor weights: an exact square-root law, branch-conditional

Within either branch the relative colour/weak/Abelian record amplitudes are fixed exactly by the square roots of the innovation counts, $a_i = \sqrt{(c_i)}/\sqrt{(\Sigma c)}$:

charged-minimal: $(\sqrt{5}, \sqrt{3}, \sqrt{60})/\sqrt{68} = (0.271163, 0.210042, 0.939336)$; neutral-extended: $(\sqrt{5}, \sqrt{4}, \sqrt{80})/\sqrt{89} = (0.237023, 0.212000, 0.948091)$,

reproducing the report values to all printed digits. The two branch-selected record planes (each rank 2, orthonormal to $\leq 2.2 \times 10^{-16}$, HFB response exactly isotropic within each branch at the exact rationals 1493/34 and 7841/178) differ by principal angle

$$\theta = \arccos[(5 + 2\sqrt{3} + \sqrt{4800})/\sqrt{6052}] = 2.0226022°$$

on both principal directions — numerically small, exact in provenance, and neutral-branch conditional (Part XII-octies' score arithmetic now carries its own weights).

4. The completion attachment is closed

The four blind completion routes ($L \to eH$, $L \to \tilde{N}\tilde{H}$, $Q \to dH$, $Q \to \tilde{u}\tilde{H}$) carry two commuting binary invariants — lepton-versus-quark sector and H-versus-$\tilde{H}$ conjugation (involution commutator residual 0.0) — forming a $\mathbb{Z}_2 \times \mathbb{Z}_2$ character system whose joint eigenbasis uniquely returns the four completion coordinates: common radial φ_H, the sector contrast, the conjugation contrast, and the mixed contrast. In this character basis the primitive completion Hessian is exactly diagonal,

$$\mathrm{diag}(219.754229, 219.754229, 73.251410, 73.251410) = g \cdot \mathrm{diag}(3, 3, 1, 1),\ g = 73.251410,$$

off-diagonals $\leq 4.7 \times 10^{-14}$, attachment orthogonality 0.0, attachment drift 0.0 at all levels. This is precisely the Part XII-tredecies route metric $g\cdot[[2,1],[1,2]] \oplus g\cdot[[2,1],[1,2]]$ diagonalised: the character vectors are its exact eigenbasis with eigenvalues {3g, g} per block. **The attachment problem is closed** up to column signs and the declared ordering of the auxiliary X-labels — a structural derivation, not a fit.

5. The old HFB completion block is not reproduced

The old conditional HFB completion metric ($\{3 - \sqrt{7}, 1, 1, 3 + \sqrt{7}\}$ of Part XII-tredecies) is not a scalar multiple of the primitive character return: best scalar proportionality residual 0.641689. The two metrics have **equal trace 8** (in units of g and of the integer matrix respectively), so the discrepancy is purely spectral — {3, 3, 1, 1} versus {$3 - \sqrt{7}$, 1, 1, $3 + \sqrt{7}$} — and no scalar bridge can exist. The old block must be derived from the same action as a finite bridge or explicitly superseded; using it to choose anything is quarantined (F53).

6. The GSJB-4 lock

The remaining H_CMR obstruction is now exactly two objects: (i) a unique invariant endpoint/current equilibrium measure derived (or refuted) from the full primitive instrument, and (ii) the provenance theorem that the unextended substrate forces the neutral-extended terminal instrument — which is the same single provenance theorem carried by D-NT since Part XII-decies, now demonstrably also the score-metric selector. Locked next calculation: **GSJB-4 — Primitive Endpoint-Measure and Neutral-Branch Provenance.** Pass condition: one unique endpoint ensemble, one unique neutral branch, one regulator-stable H_CMR metric (thereby promoting the (5, 4, 80) innovation metric and its √count record weights), and one same-action completion curvature in the admitted HFB scheme. The line has since advanced through intermediate rounds to the void-relative renewal theorem — Part XII-quindecies reports the state it leaves.

Premise of this Part

The five-witness endpoint family and four-level regulator set are the declared frozen test family of Part XII-tredecies; the RRMK relaxation counts were loaded only after core construction (post-freeze comparison); the character-coordinate labels (radial, sector, conjugation, mixed) and route order are declared conventions, with column signs and X-label order the only residual freedom of the attachment claim; the RCMO factor metric is a candidate only and is not used in any selection.

Part XII-quattuordecies-bis — Primitive Endpoint-Measure and Neutral-Branch Provenance (GSJB-4)

> **REPORTED BUT NOT AUDITED HERE.** The GSJB-4 *summary* is supplied and merged; its full calculation report, arrays and reproduction scripts are **not in this corpus**. Every numerical claim in this Part therefore carries summary grade only and must not be used to support a headline claim or a downstream derivation until the full report is supplied (D-G456-REG).

Summary-grade Part. Overall verdict: **NO-GO PASS — every requested uniqueness fails, and the missing primitive object is exactly identified.**

1. The endpoint measure fails twice

The supplied 63-state history–neutral process has three closed record orbits, so its stationary measures form a two-dimensional simplex. Imposing exact key-permutation symmetry selects the barycentre (1/3, 1/3, 1/3) — but this is an absorbing terminal-record mixture whose asymptotic neutral score block has norm 0: the symmetric stationary measure exists and is useless. The frame problem is sharper still: the five target-blind coherent endpoint witnesses of Part XII-quattuordecies have *identical* central species weights — exactly the seven projector dimensions over 50, (3, 3, 6, 2, 9, 9, 18)/50 = (0.06, 0.06, 0.12, 0.04, 0.18, 0.18, 0.36) — and their invariant twirl is I/50 at every history vertex, so the twirled representation current vanishes; yet their rank-72 Fisher metrics differ by up to 1.5214 (1.1397 trace-normalised). **Central invariant data provably cannot select the required noncentral coherences** — the endpoint problem is not a symmetry-breaking accident but a structural insufficiency of invariant information (F57).

2. The neutral branch fails the pass condition

The charged-minimal and neutral-extended ledgers have the same primitive direct traces, but their H_CMR metrics differ by 0.246211 (0.097484 trace-normalised) and their conditional gauge boundaries differ: the unextended law fails "one branch or physically identical boundary operators."

3. The marked-rate law is absorbing

The supplied 217-mark candidate is exact but absorbing: finite-episode Fisher rank 210 against a long-history rate rank of only 24, with zero asymptotic neutral block; and two finite-episode lifts reproduce the rank-96 FCHI Hessian while differing by 1.503919. Neither the asymptotic nor the finite-episode law uniquely returns the physical parent — this is the result that forces renewal (Part XII-quattuordecies-ter).

4. The completion bridge exists only as a convention

A unique *symmetric-positive* diagnostic bridge maps the primitive completion curvature to the old conditional HFB curvature with residual 1.3×10^{-15} — but the full solution set is an O(4) family of exact congruences (any two positive rank-4 forms are congruent; only the signature is invariant), so the symmetric-positive member is a matrix convention unless the primitive action selects it. This sharpens Part XII-quattuordecies §5: not only is there no scalar bridge; the congruence bridge that does exist carries no derivational weight (F56).

5. Gate handed to GSJB-5

The exact next gate: a primitive record-preserving renewal/continued-flow law with a real cone-positive operational generator, the full typed defect-to-mark lift, and all cross-block Hessian terms — executed in the following Part.

Part XII-quattuordecies-ter — Primitive Renewal and Complete Marked History-Rate Descent (GSJB-5)

> **REPORTED BUT NOT AUDITED HERE.** The GSJB-5 *summary* is supplied and merged; its full calculation report, arrays and reproduction scripts are **not in this**

corpus. Every numerical claim in this Part carries summary grade only and must not support a headline claim or a downstream derivation until the full report is supplied (D-G456-REG).

Summary-grade Part. Verdict: **constructive renewal existence PASS; nonzero asymptotic neutral information PASS for a continuous family; unique physical renewal and H_CMR FAIL / NO-GO.**

1. The general renewal law and its exact stationary solution

A record-preserving ledger append composes with the supplied FCHI terminal instrument. The most general nonnegative S_3-equivariant three-key reopening law is

$$R(\kappa) = \kappa I_3 + ((1 - \kappa)/2)(J_3 - I_3),\ 0 \le \kappa \le 1,$$

with renewal probability $r \in (0, 1]$. Every choice yields a nonabsorbing process with the exact stationary masses

$$\mu_A = \mu_S = r/(2r + p),\ \mu_C = p/(2r + p),\ p = 1 - e^{-1},$$

and equal total D, R and renewal rates $p\, r/(2r + p)$. At the key-preserving candidate $(r, \kappa) = (1, 1)$ each rate is $(1 - e^{-1})/(3 - e^{-1}) = 0.240156385204$ per Fold — **the closed form behind every Part XII-quindecies renewal identity**, whose masses are exactly $1/(3 - e^{-1})$ and $(1 - e^{-1})/(3 - e^{-1})$. The six-coordinate neutral Fisher block is positive rank 6, and the full 651-mark product Fisher has rank 588 = 651 − 63 (the same marks-minus-carrier formula as the quindecies 837 − 63 = 774), comfortably above the rank-96 FCHI target: **the rank obstruction is removed.**

2. The uniqueness obstruction is not

The renewal is permitted, not demanded: r continuously rescales the stationary neutral event rate and Fisher scale; κ tunes surviving generation-key memory and the mixing gap while leaving the six-coordinate neutral Fisher metric unchanged; the minimum-support choice $\kappa = 1$ degenerates to three disconnected cycles in the exact key-diagonal Dirac limit; and the two H_CMR branches remain physically different (0.246211). Two disjoint marked-score lifts reproduce the supplied H102 with residuals $\le 3.1 \times 10^{-15}$ while differing by 1.736586 in relative norm. Record preservation, S_3 covariance, locality and completeness alone do not determine the physical renewal — the missing object is a primitive renewal-action/event-rate functional plus the typed Radon–Nikodym score lift, which is exactly what Part XII-quindecies then attacks (resolving $\kappa = 1/3$ and retiring r as a fact-time gauge, and leaving the typed lift as the GSJB-7 residual).

Part XII-quindecies — Void-Relative Tick-Race Fact-Selection and Renewal Theorem (GSJB-6)

Conditional theorem under explicit zero-entropy-void and fact-indexed-time axioms, with Tick-Race constraints taken from the supplied companion paper; not an unconditional derivation of the void, the neutral occupancy, the absolute hazard, or the typed source map; physical authority false. Split verdict: **dimensionless renewal selection PASS; first-passage/Born compatibility PASS; absolute hazard, unconditional neutral branch and typed full Hessian OPEN / NOT UNIQUE.**

Provenance note. The two intermediate rounds GSJB-4 and GSJB-5 are merged at summary grade as Parts XII-quattuordecies-bis and -ter; their full calculation reports remain outside this corpus (D-G456-REG, residual report-grade only). The parameters this Part resolves — the reset probability r and the key-retention κ — are exactly the free pair of the GSJB-5 renewal law, and the renewal identities below are the (r, κ) = (1, 1) closed forms $\mu\_A = \mu\_S = 1/(3 - e^{-1})$, $\mu\_C = \text{rate} = (1 - e^{-1})/(3 - e^{-1})$ of that law.

1. The void reset: a zero-entropy theorem

Zero-entropy return plus record separation and S_3 neutrality uniquely select the pure pre-fact ray $\chi = (1, 1, 1)/\sqrt{3}$: the S_3-invariant subspace has dimension exactly 1, the void density matrix is rank 1 with von Neumann entropy 0 (residual 2×10^{-16}), and a record-preserving reset dilation appends the completed key to the ledger while returning the working carrier to this same pure ray (isometry residual 3.8×10^{-16}; ledger preservation 1.8×10^{-16}; working-void return residual exactly 0). The classical dephased shadow is the uniform key kernel — every row (⅓, ⅓, ⅓) — with old/new-key mutual information exactly 0 nats and dephased branch entropy exactly ln 3. The ln 3 lives in the classical branch-label distribution, not in the substrate canvas: **the GSJB-5 key-retention parameter is selected, κ = 1/3.**

2. Fact-indexed time: the reset probability is a gauge

Once emergent time is indexed by irreversible Bits, idle post-record steps carry no new fact and therefore no time increment: the canonical fact-indexed representation composes reset with the completed Bit, r = 1. **The GSJB-5 reset probability r is removed from the physical parameter list** — it was a coordinate artifact of event-versus-step bookkeeping, not a missing principle. This selection is dimensionless only: it does not fix seconds per Bit, and the common Tick-Race hazard scale κ_void remains free (a common rescaling cancels from every first-passage winner probability — gate NOT SELECTED).

3. First-passage Born compatibility and the exact renewal identities

At levels 3 and 4 the renewed process is nonabsorbing with stationary residuals $\leq 7 \times 10^{-17}$ and an exact three-way mass partition, completed + active + singlet = 1 with active = singlet, and the four long-run rates coincide exactly:

D-rate = R-rate = renewal rate = completed mass = 0.240156385204 per fact-indexed Fold.

The stored neutral terminal probabilities agree with the first-passage distinguishability weights to maximum residual 1.7×10^{-15} at both regulators (drifts 3→4 at $\le 3 \times 10^{-7}$). The neutral-extended route has terminal gap exactly $1 - e^{-1} = 0.632120558829$ — Theorem 13's exact uniform gap reappearing untouched — and mean absorption time

$$\mathbb{E}[T] = 2/(1 - e^{-1}) = 3.163953413739 \text{ fact-indexed Folds,}$$

exact to all reported digits: the two-stage first passage through the block-triangular killed kernel of Theorem 13, each stage geometric with success $1 - e^{-1}$. The full marked Fisher metric has rank 774 = 837 product marks − 63 carrier dimensions (against FCHI's 96 target rank), and the neutral Fisher block is rank 6 and near-isotropic (eigenvalue ratio 1.000046).

4. The neutral branch: forced conditionally, reduced to occupancy

Given a nonzero neutral pre-fact distinction, admissibility plus finite first-passage fact formation *requires* a terminal neutral route — under charged-minimal the neutral first passage is undefined/infinite because the terminal alphabet is absent — and the supplied neutral-extended instrument provides that route with the exact positive gap. The Part XII-quattuordecies branch question is thereby **reduced from roster selection to carrier occupancy**: the substrate does not yet prove that the neutral pre-fact carrier must be occupied, so N_R is conditional, not unconditional (F55).

5. The typed lift: no-go at the current corpus

Tick-Race fixes winner probabilities once branch distinguishabilities are known, but the corpus does not supply the typed map from the 102-dimensional physical tangent to branch distinguishability scores: two exact lifts reproduce the same supplied Hessian with residuals 8.1×10^{-16} and 1.0×10^{-15} while differing by 1.727051 in relative norm. The remaining physical obstruction is the void-relative typed distinguishability functional D_A(X) — not the reset matrix, which this Part retires.

6. The GSJB-7 lock

Locked next calculation: **GSJB-7 — Void-Relative Typed Distinguishability Hessian and Neutral-Occupancy Theorem.** Required return: derive D_A(X) for every gauge, record, completion, charged and neutral primitive branch from the zero-entropy substrate; calculate its second variation on the 102/334-dimensional carriers; and prove whether the substrate necessarily carries nonzero neutral pre-fact distinguishability. Pass condition: one typed score lift, one full cross-block H_CMR, one forced neutral branch, and regulator convergence, modulo gauge/null/record-preserving equivalence. This calculation has been executed — Part XII-sedecies reports the major conditional pass and the residual it leaves.

Premises of this Part

The zero-entropy-void and fact-indexed-time axioms are explicit declared premises, not substrate theorems; the Tick-Race constraint set is taken from the supplied companion paper as frozen input; the GSJB-5 parameters (r, κ) enter only as the objects resolved here, under the provenance note above; all selections are dimensionless — no SI rate, hazard scale, or absolute H_CMR normalisation is claimed.

Part XII-sedecies — Void-Relative Typed Distinguishability Hessian and Neutral-Occupancy Theorem (GSJB-7)

Exact finite-dimensional theorem within the frozen faithful representation algebra under the explicit zero-entropy/gauge-invariance/S_3-neutrality axioms, with terminal phase visibility using the supplied full-rank Dirac support maps; not a primitive derivation of the faithful algebra, the absolute hazard, or the HFB tangent embedding; physical authority false; core freeze SHA-256 cbe5ebd7…d287. Verdict: **neutral-singlet carrier selection PASS within the frozen faithful alternatives; void-relative graded distinguishability metric PASS at rank 98; physical 102/334 tangent-to-history embedding NOT SELECTED — major conditional pass.**

1. The void-selection theorem

The twelve faithful gauge generators on the 50-dimensional faithful carrier have a common kernel of dimension exactly 3 (generator stack rank 47, generator and S_3 residuals exactly 0), and that kernel lies *entirely* inside one anonymous rank-3 central projector of neutral-terminal grade 1. Removing that projector to form the 47-dimensional charged-minimal carrier leaves common-kernel dimension **0**: the charged-minimal ledger admits no pure gauge-invariant canvas at all. Requiring a nonzero pure zero-entropy canvas, full gauge invariance and S_3 generation neutrality therefore forces the canvas into the neutral-terminal three-copy sector and selects one equal-copy ray (void density rank 1, entropy exactly 0, projector occupancies (0, 1, 0, 0, 0, 0, 0)). Only after the core result was sealed was the representation mapping opened: **the selected anonymous projector is N_R.** Under the declared void axioms this selects the neutral-extended ledger — the first structural discrimination between the two innovation branches, answering the Part XII-quindecies occupancy question within the frozen faithful alternatives.

2. Typed meaning

This does not mean literal neutrino particles populate the void. It means the neutral-singlet completion role is the only faithful internal carrier capable of representing an uncharged, gauge-invariant, zero-entropy pre-fact canvas — a statement about representation-theoretic capacity, conditional on the declared axioms and the frozen algebra (F58). The rank-3 singlet is one of the two dimension-3 central projectors of the (3, 3, 6, 2, 9, 9, 18) decomposition of Part XII-quattuordecies-bis, now distinguished by its neutral-terminal grade.

3. The graded void-relative metric closes at full rank

On the projective tangent of the faithful carrier (complex dimension 49, real dimension 98) the second variation of total nonneutral distinguishability has rank **94** — every real direction leaving the neutral-singlet sector is visible at quadratic order (species/neutral support orthogonality $\leq 2.5 \times 10^{-15}$). Of the four remaining neutral directions, direct terminal-key marks resolve two (key probabilities exactly 1/3 each — the $\kappa = 1/3$ shadow reappearing as data), and the supplied Dirac-completion basis resolves the two phase-sensitive directions (completion unitarity $\leq 1.1 \times 10^{-15}$, key probabilities within 3×10^{-4} of 1/3); combined neutral Fisher rank 4. The graded metric therefore has full rank

98 = 94 + 2 + 2,

with regulator drift 1.09×10^{-5} between levels 3 and 4 — and an unremarked exact spectral identity: at both levels,

$\lambda_{min} + \lambda_{max} = 8$ exactly

($7.999990553807 + 9.446193 \times 10^{-6}$ and $7.999990678825 + 9.321175 \times 10^{-6}$), a sum rule pairing the stiffest and softest void-tangent directions to the integer 8, recorded here as an observed exact identity of the frozen construction (re-audit step 88).

4. The embedding no-go

The rank-98 void-relative metric and the rank-96 nonterminal FCHI parent live on differently typed carriers. Exact post-freeze congruence lifts into the supplied parent exist at both levels (residuals $\leq 6.9 \times 10^{-12}$ and $\leq 2.9 \times 10^{-13}$) but are inequivalent — relative lift differences 1.187 and 1.025 — so a fitted matrix bridge is not a derivation (F59), rank compatibility supplies no tangent-to-history map, and the common Tick-Race hazard scale remains free. The carrier comparison requires determining exactly **two** physical/null directions (98 − 96), which is part of the locked return below.

5. The GSJB-8 lock

The remaining obstruction is no longer neutral occupancy or the internal distinguishability metric: it is the primitive innovation intertwiner from the void tangent into the history variables. Locked next calculation: **GSJB-8 — Primitive Innovation Intertwiner from Void Tangent to Full History Carrier.** Required return: derive the unique covariant innovation map ι_n from the void-relative $\mathbb{C}P^{49}$ tangent into the gauge, record, completion, charged and neutral history variables; pull back the rank-98 metric to one full cross-block H_{CMR} at interacting regulator levels; and determine the two physical/null directions for the HFB/FCHI carrier comparison. Pass condition: one action-derived intertwiner modulo gauge, exact nulls, common commutants and record-preserving equivalence — no post-hoc congruence fit. This calculation has been executed — Part XII-septendecies reports the graded no-go and the residual it leaves.

Premises of this Part

The faithful representation algebra, its central decomposition and the 50-dimensional carrier are frozen inputs, not primitive derivations; the zero-entropy, gauge-invariance and S_3-neutrality axioms are the declared void axioms of Part XII-quindecies; the Dirac support maps used for terminal phase visibility are supplied full-rank candidates; the representation mapping identifying the anonymous singlet as N_R was opened strictly after the core freeze (SHA recorded above); all selections are conditional on this package — no unconditional substrate provenance is claimed.

Part XII-septendecies — Primitive Innovation Intertwiner from Void Tangent to Full History Carrier (GSJB-8)

Exact finite-dimensional obstruction and minimal-extension theorem on the frozen faithful representation, void ray, PFDMI field action and supplied FCHI parent; no Standard Model target used to construct the core obstruction; core freeze SHA-256 59aa747e…1947; physical authority false. Verdict: **ordinary action-derived linear intertwiner NOT RETURNED; exact obstruction PASS; minimal support-changing extension EXISTENCE PASS with provenance open — graded no-go.**

1. The block-diagonality theorem: the current action is inert at the void

The existing PFDMI field action is block diagonal at the zero-entropy neutral-singlet canvas, and the inertness is exact in every first-order channel: all twelve faithful generators annihilate the void ray and commute with its density (commutators exactly 0); the 98 × 144 gauge-link state-tangent Jacobian has rank **0**; the void representation-current commutator orbit has rank **0** with vanishing maximal-normalisation operator; and all seven central population probabilities have zero first derivative at the void (7 × 98 Jacobian rank 0). The field-dependent instrument is simultaneously strong at the mark/Kraus level — derivative rank 155 — but it acts on the inherited 45-dimensional charged carrier and preserves its support graph: it produces no N_R-to-species endpoint amplitudes. Nonneutral distinguishability is born strictly quadratically (rank-94 Hessian), while the two-stage neutral terminal/completion score keeps first-order rank 4 at both levels — precisely the 98 = 94 + 4 structure of Part XII-sedecies, now shown to be the *only* structure the current action can produce.

2. The typing correction: the intertwiner is a graded birth functor

The desired object is therefore not one ordinary linear map ι_n. It is a **graded innovation functor**: support-changing amplitude birth at first order, nonneutral probabilities and gauge Casimirs at second order, bosonic completion at mixed second order, and CAR/Fock completion at mixed third order — the Part XII-duodecies grading reappearing at the void boundary, this time as a theorem about what the action must supply rather than about how channels embed.

3. The minimal support-changing witness

The missing support is localised exactly. A minimal support-changing amplitude alphabet of **49 complex directions** — 47 from the void sector into the six nonneutral central projectors (47 = 50 − 3) and 2 within the neutral-singlet sector orthogonal to the S_3-neutral void ray (2 = 3 − 1) — spans the complete $\mathbb{C}P^{49}$ tangent: 49 = 50 − 1, real Jacobian rank 98, birth-image orthogonality to the void 1.0×10^{-17}, automatically typed by the seven central projectors. The operators have the explicit form

B_α = |v_α⟩⟨Ω|.

This is an existence and sufficiency witness, not an output of the current action (status: EXPLICIT MINIMAL SUPPORT-CHANGING WITNESS, NOT DERIVED) — quoting it as derived is F60.

4. The two-plane boundary: the parent cannot choose

If all 94 nonneutral directions are retained, the 98-versus-96 rank difference localises to a rank-2 plane inside the four-real-dimensional neutral sector — two equivalent real copies of the S_3 standard doublet. S_3 and void symmetry admit a continuous one-parameter family of invariant rank-2 planes mixing those copies (plane commutator residual exactly 0), and **every sampled plane admits an exact FCHI pullback** (maximum residual 2.9×10^{-10}): the supplied parent provably cannot select the plane. Selection must come from the derived birth law itself, or from a proof that the plane is physically null — any choice made by fit to the parent is void (F61, extending F59).

5. The GSJB-9 lock

Locked next calculation: **GSJB-9 — Support-Changing Primitive Birth Operator and Graded Innovation Functor.** Required return: derive from the master substrate action the off-diagonal amplitude marks B_{r,α} = P_r B P_void that create all 47 nonneutral complex directions and the two neutral internal directions; derive their void-relative hazards, mixed completion/CAR jets and regulator intertwining before any FCHI/HFB target is opened. Pass condition: one source-clean support-changing amplitude law whose graded jets span rank 98, select the neutral two-plane or prove it physically null, and pull back the void metric to one cross-block H_CMR modulo only gauge, exact null and record-preserving equivalence. This calculation has been executed — Part XII-duodevicies reports the result: the support half is forced, the stiffness half is not, and the two-plane is settled as genuine rather than null.

Premises of this Part

The faithful representation, void ray, PFDMI field action and FCHI parent are the frozen inputs of Parts XII-sedecies and earlier (core-freeze SHA recorded above); the EX2A instrument audit is performed on the inherited 45-dimensional charged carrier as supplied; the minimal witness of §3 is a declared construction, carrying existence weight only; no Standard Model target enters the core obstruction, and the FCHI pullback family is opened only for the §4 nonuniqueness demonstration.

Part XII-duodevicies — Support-Changing Primitive Birth Operator and Graded Innovation Functor (GSJB-9)

Exact finite-dimensional symmetry, covariance-cone and rank theorem on the frozen faithful representation and void-relative metric; the maximum-entropy branch is an explicitly conditional candidate, not a derived VERSF law; core freeze SHA-256 e23016b0…e17b; physical authority false. Verdict: **birth support FORCED; single deterministic birth direction FORBIDDEN; relative birth stiffness NOT uniquely selected (11-parameter cone); the rank-96 history parent INCOMPLETE BY TWO under no-hidden-distinction admission.**

1. The symmetry no-go: deterministic birth is impossible

The joint faithful-gauge × generation-permutation action has **no nonzero fixed vector** on the 49-complex-dimensional projective void tangent (fixed tangent dimension 0; void gauge and S_3 residuals exactly 0). A pre-fact law therefore cannot select one definite particle/interface direction while preserving the symmetries: birth must be a covariant marked multiplet or an invariant ensemble spanning all 49 complex projective directions — the support of the Part XII-septendecies witness is *forced*, not merely sufficient.

2. The covariance cone: twelve types, eleven free ratios

The tangent decomposes into **twelve inequivalent gauge × S_3 components** (orthogonal projectors summing to the identity at 1.9×10^{-16}, commutators $\leq 4.2 \times 10^{-16}$), so every branch-blind positive birth covariance has the form

$K\_birth = \Sigma\_j\ k\_j\ P\_j,\ k\_j > 0,\ j = 1, …, 12,$

with eleven free stiffness ratios after normalisation. The existing principles do not fix them: four explicit source-clean full-support laws — microstate-blind, role-blind, isotypic-blind, and equal-distinguishability-flux, all positive, full-support and gauge/S_3-invariant — differ by up to 0.881917 in relative norm and return *different* Tick-Race role probabilities. The unique maximum-entropy candidate is $I_{98}/98$ (entropy exactly ln 98 = 4.584967478671), and it becomes unique only if "maximum pre-fact ignorance" is adopted as an additional axiom: the zero entropy of the canvas itself does not imply that probability law over possible innovations (F62).

3. The rank correction: the parent is short by two

Every eigenvalue of the void-relative distinguishability metric is strictly positive at both levels (rank 98; minima 9.446193×10^{-6} and 9.321175×10^{-6} — reproducing the Part XII-sedecies values to ten digits — with second minima 7.33×10^{-5} and 7.23×10^{-5}, both smallest modes exactly neutral-supported at $\leq 3.9 \times 10^{-16}$). The two smallest modes carry only $\sim 4.0 \times 10^{-7}$ of total curvature — the best rank-96 truncation retains 0.99999959 of the trace, which is exactly why the rank-96 parent fits so well — **but they are genuine neutral distinctions.** Under the declared no-hidden-distinction admission axiom (every admissible positive distinction must be capable of forming a fact), the Part XII-septendecies two-plane alternative is settled: the plane is *not* null, the rank-96 nonterminal parent **fails exact admission by 2**, and the minimum retained structure is rank 98 plus six persistent-record nulls —

minimum history-plus-record carrier dimension ≥ 104.

4. Fact-momentum scope

A scalar commitment-capacity field can supply one common causal propagation kernel and common temporal hazard shape — a genuine partial return — but a scalar source cannot choose the twelve internal gauge × S_3 birth stiffnesses, and the fact-momentum corpus leaves the commitment strength q to be derived from Fold ontology.

5. The GSJB-10 lock

Locked next calculation: **GSJB-10 — Pre-Fact Innovation Action Metric and Rank-98 HCMR Completion.** Required return: derive whether the primitive cost geometry is Fubini–Study, void-relative distinguishability, fact-momentum kinetic energy, or another same-action metric; calculate its source strength and coupling tensor; then construct the minimum 104-dimensional history-plus-record carrier and pull back the graded metric without FCHI/HFB target access. Pass condition: one primitive quadratic action on the birth tangent that selects the twelve stiffnesses and reproduces them across interacting regulator levels, retaining all 98 positive distinguishability modes or proving an exact protector for any omitted mode. This calculation has been executed — Part XII-undevicies reports the collapse and the residual it leaves.

Premises of this Part

The faithful representation, void ray and void-relative metric are the frozen inputs of Parts XII-sedecies/septendecies (core-freeze SHA recorded above); the no-hidden-distinction admission is a declared axiom, so the rank-98 requirement and the 104-dimensional carrier bound are axiom-conditional; “maximum pre-fact ignorance” is not a frozen VERSF axiom and the $I_{98}/98$ covariance is a labelled candidate only; the four blind stiffness laws are declared constructions used solely to witness nonuniqueness.

Part XII-undevicies — Pre-Fact Innovation Action Metric and Rank-98 HCMR Completion (GSJB-10)

Exact finite-dimensional comparison of source-supported pre-fact quadratic tensors and an explicit rank-98/null-6 carrier family; no absolute action unit or physical action-to-hazard bridge claimed; physical authority false. Verdict: **Fubini–Study and void-distinguishability in EXACT AGREEMENT on all 94 nonneutral directions; neutral**

four-plane NOT proportional; rank-98 plus six-null HCMR carrier a STRUCTURAL FAMILY PASS at dimension 104; unique physical action metric NOT SELECTED.

1. The collapse: eleven ratios become one neutral choice

The matched Fubini–Study tensor on the void tangent is **G_FS = 2 I_{98}** (rank 98, isotropic up to scale), and the derived void-relative distinguishability Hessian **W_D** equals it *exactly* on every one of the 94 nonneutral real directions — maximum relative residual 2.2×10^{-17}, with nonneutral/neutral cross terms $\leq 1.9 \times 10^{-15}$ — at both levels. The eleven free stiffness ratios of Part XII-duodevicies therefore **collapse to a neutral four-plane action/response ambiguity**: the entire FS/W_D difference (full relative difference 0.4518, trace-normalised 0.4323) is confined to the four real neutral-singlet directions.

2. The neutral four-plane: exact spectral structure

The neutral W_D spectrum at level 3 is $\{9.446193 \times 10^{-6}, 7.326474 \times 10^{-5}, 7.999926735, 7.999990554\}$ against the FS value 2 — not proportional. Its structure is exact: **both pairs sum to 8** — $\lambda_1 + \lambda_4 = 8$ and $\lambda_2 + \lambda_3 = 8$ to machine precision at both levels, extending the Part XII-sedecies sum rule $\lambda_{min} + \lambda_{max} = 8$ to a full pairwise-complementary spectrum $\{a, b, 8 - b, 8 - a\}$ — and the **neutral trace is exactly 16** (= 2 × 8, twice the FS neutral trace). Consequently the best scalar fit of W_D from G_FS is the exact rational

$c_{best} = (94 \cdot 2 + 16)/(2 \cdot 98) = 204/196 = 51/49 = 1.040816327$

(the trace ratio), with irreducible relative residual 0.3968 at both levels: the two tensors differ genuinely and only on the four-plane.

3. The surviving family and the exact role boundary

The minimal source-generated family is the convex cone

$G_\theta = (1 - \theta) \cdot 2\, I_{98} + \theta \cdot W_D,\ 0 \leq \theta \leq 1$,

every member positive of rank 98 — a lower-bound nonuniqueness witness, not a proof that no other source-compatible tensors exist. The endpoint role weights are exact rationals of the dimension bookkeeping: at θ = 0 (FS), direct = inverse with N_R weight 4/98 = **2/49** and Q_L weight 36/98 = **18/49**; at θ = 1 (W_D), the direct weights are trace shares N_R = 16/204 = **4/51** and Q_L = 72/204 = **6/17**, while the *inverse* covariance places 0.999607 of the weight on the neutral role — because two neutral curvatures are tiny — a sharp diagnostic, not a promoted result (F64).

4. Conditional branches and the axiom unification

Declaring the pre-fact action to be the Fubini–Study kinetic metric selects θ = 0, whose normalised inverse covariance is $I_{98}/98$ — **reproducing the Part XII-duodevicies maximum-entropy branch without a separate entropy-maximisation axiom**: full projective isotropy and maximum pre-fact ignorance are now two declarations with one consequence. Declaring the action equal to W_D selects θ = 1 with the neutral-dominated inverse. Neither declaration is a theorem of the frozen source set; the family persists.

5. The 104-carrier family and Fact-Momentum scope

For every member of the family, the minimal carrier $\mathbf{H_{104} = G\_\theta \oplus 0_6}$ is explicitly constructed at both regulators: dimension 104, positive rank 98, six exact persistent-record nulls — the Part XII-duodevicies rank correction is realised *structurally as a family*, with the unique physical member not selected. Fact-Momentum cannot close the choice: it is a scalar commitment-capacity field sourced by commitment events in emergent evolution — capable of one common post-fact propagation kernel and hazard shape, structurally unable to supply a pre-fact 98-dimensional internal stiffness tensor.

6. The GSJB-11 lock

Locked next calculation: **GSJB-11 — Pre-Fact Action-to-Hazard (Golden-Rule / Fluctuation) Bridge.** Required return: derive from one primitive pre-temporal law whether mark amplitudes and Tick-Race hazards are generated by G_action, by G_action^{-1}, or by an independent matrix-element tensor; fix the neutral four-plane relation and the absolute action unit across interacting regulators. Pass condition: one source-derived action-to-rate map selecting θ and the common scale before any HFB or Standard Model target access. This calculation has been executed — Part XII-vicies reports the resolution: θ is removed by object typing rather than selected, and the residual splits into preparation and duration.

Premises of this Part

G_FS and W_D are the two source-supported tensors of the frozen corpus (the projective kinetic geometry of the faithful carrier and the Part XII-sedecies distinguishability Hessian); the family G_θ is their minimal convex cone, declared as a lower-bound witness only; the θ = 1 inverse-covariance diagnostic is labelled diagnostic; the FS and W_D branch declarations are explicitly conditional; and no absolute action unit, hazard scale, or FCHI/HFB comparison enters the construction.

Part XII-vicies — Timeless Tick-Race Weight and Fact-Order Selection (GSJB-11)

Exact finite-dimensional typing theorem and numerical invariance audit on the frozen GSJB-7/9/10 objects; the conditional next-fact law is derived, while source-native amplitude preparation and physical duration remain open; physical authority false. Verdict: **timeless Tick-Race PASS; pre-fact selection geometry Fubini–Study/Born SELECTED; post-fact response W_D separately typed; the GSJB-10 θ ambiguity REMOVED BY OBJECT TYPING; amplitude preparation and duration OPEN.**

1. The race does not need seconds

Writing u for any dimensionless cumulative commitment-opportunity coordinate, proportional branch weights give the normalised next-fact law

$P(A \text{ is next}) = w_A / \Sigma_B w_B$,

for *every* tested baseline shape (maximum first-passage integration residual 5.274×10^{-16} across five shapes), and every common monotone reparameterisation of u leaves the winner unchanged — zero winner mismatches across 250,000 numerical races and five monotone transformations. Removing background time removes nothing from Tick-Race: fact *order* is well defined without any clock.

2. Phase covariance selects the Born norm — and rejects Fisher by type

A primitive quadratic amplitude weight must satisfy $q(e^{i\varphi}z) = q(z)$, equivalently $J^T G J = G$. Within the frozen GSJB-10 family $G_\theta = (1 - \theta)\cdot 2I_{98} + \theta\cdot W_D$ this holds at both regulator levels **only for $\theta = 0$**. The reason is not that W_D is wrong — it is a *differently typed object*: it measures information in completed direct and completion readouts, so it changes when a readout is duplicated, whereas the primitive branch norm cannot depend on how many downstream records are consulted (readout Fisher as a primitive selection metric: REJECTED BY TYPE — the noncontextuality argument). For one exhaustive branch algebra, total distinguishability is the Hilbert norm: the sum of exhaustive branch norms returns $2 I_{98}$ exactly (component and role projector completeness $\leq 3.7 \times 10^{-16}$; selection Hessian equal to Fubini–Study at 3.7×10^{-17}). The primitive next-fact law is therefore

$p_A(z) = \|P_A z\|^2 / \|z\|^2$

— the Born rule, arrived at as a typing theorem within the frozen alternatives, not as a postulate.

3. The θ dial is removed, not tuned

The GSJB-10 ambiguity arose from interpolating two objects of different type as though they were one. The corrected ledger:

pre-fact kinematic/selection geometry: **$G_{pre} = 2 I_{98}$**; conditional next-fact law: **$p_A(z) = \|P_A z\|^2/\|z\|^2$**; post-fact response geometry: **$H_{response} = W_D$**; completed response carrier: **$H_{CMR104} = W_D \oplus 0_6$** (dimension 104, positive rank 98, nullity 6 at both levels, drift 1.086×10^{-5}) — unique as the frozen void-relative response completion, **not** a pre-fact kinetic cost.

$\theta = 0$ belongs to pre-fact kinematics and $\theta = 1$ to the separately typed response endpoint: no physical interpolation exists (F66). This upgrades the Part XII-undevicies unification: the Fubini–Study selection geometry is no longer a conditional declaration — it is forced by phase covariance and exhaustive additivity — while W_D keeps its full standing in the role it actually plays. The pairwise-8 spectrum, the trace-16 identity and the 51/49 scalar remain exact facts *about the response*, where they belong.

4. The isotropic-prior boundary

If no source-native pre-fact amplitude is supplied and one adopts the unique rotationally invariant no-information prior on the FS unit sphere, the mean role weights are exactly projector dimension over 98: H = 2/49, L_L = 6/49, N_R = 2/49, Q_L = 18/49, d_R = u_R = 9/49, e_R = 3/49 (sum 1) — an epistemic prior, explicitly *not* a derived physical preparation law (F67), reproducing the Part XII-undevicies θ = 0 endpoint weights.

5. The GSJB-12 lock

The residual is narrower than ever: the Born/Tick-Race law says how a supplied superposition selects the next fact; it does not derive which superposition the substrate prepares, and ordered facts are not yet seconds. Locked next calculation: **GSJB-12 — Primitive Pre-Fact Amplitude Preparation and Ordered-Fact Ledger Descent.** Required return: derive from the source-clean substrate either one innovation amplitude z(X) or a physical measure μ(dz) on the FS projective tangent; feed it into the now-fixed timeless selection law; then derive, separately, the conversion from ordered Bits to metric duration. Pass condition: one regulator-covariant, gauge/S_3-admissible amplitude preparation law with no Standard Model target access, plus an explicit separation between fact order and downstream clock calibration. This calculation has been executed — Part XII-vicies-semel reports the law-level closure and the event-level residual it leaves.

Premises of this Part

The frozen inputs are the GSJB-7 void tangent and metric, the GSJB-9 component decomposition and the GSJB-10 family; the phase-covariance criterion and exhaustive-branch additivity are internal consistency requirements of a primitive quadratic weight, not added axioms; the five baseline shapes and five monotone transformations are the declared invariance test set; the isotropic prior of §4 is labelled epistemic; and no Standard Model, HFB or FCHI target enters any selection.

Part XII-vicies-semel — First-Differentiation No-Go and Minimal Loop-Supported Primitive Innovation Factorisation (GSJB-12)

Exact finite-dimensional no-go and covariance calculations on the frozen GSJB void/tangent objects, exact D7 and finite-frame counting, a standard de Finetti application conditional on a newly named condition, and a Haar uniqueness conditional on the full refinement/isosymmetry bridge; not a derivation of the realised auxiliary state from the master action; core freeze SHA-256 4791c7b4…cad5a; physical authority false. Verdict: **deterministic symmetry-preserving first differentiation NO-GO; first-fact global frame EXCLUDED under the void/locality/no-unearned-frame axioms; Haar/Fubini–Study preparation and de Finetti factorisation CONDITIONAL PASS — D44′ factorisation conditionally discharged under Exchangeable Renewal Extendibility (ER); realised record-conditioned amplitude direction NOT DERIVED.**

1. The first-differentiation no-go, strengthened beyond block-diagonality

The existing gauge-link state differential and species-population first differential have rank 0 at the neutral void (the Part XII-septendecies inertness), and the nonneutral response begins strictly at quadratic order (rank 94). The new theorem is stronger: a complete no-private-label/refinement symmetry twirl on the 49-complex-dimensional tangent takes an *arbitrary* Hermitian operator with void-to-tangent coupling (raw birth norm 6.150) and removes the coupling entirely — twirled birth norm 1.36×10^{-16}, block-scalar-form residual 1.1×10^{-13}. Any deterministic operator invariant under a symmetry acting irreducibly on the tangent while fixing the unique void ray is block diagonal: **no deterministic equivariant law can make the first mark**, conditional on the full refinement/isosymmetry bridge (stronger than gauge invariance alone).

2. Loop holonomy transports; it does not create

The D7 structure is exact to the digit: $r^2 = s^7 = I$ and $r\, s\, r^{-1} = s^{-1}$ at residual 0.0; every single-face closure label gauge-canonicalises to orientation only (residual 0.0); a nontrivial $\mathbb{Z}_7$ loop holonomy acts with rank 6 on the nonuniform Fano/closure subspace while **all seven loop powers leave the uniform void ray unchanged exactly** (0.0). The minimal support-changing witness $B(\eta) = |V\eta\rangle\langle\Omega|$ (rank 1, void-image norm 1) is exactly loop-covariant, $U_\gamma\, B(\eta)\, U_\gamma^\dagger = B(R_\gamma\, \eta)$, at 2.3×10^{-16}: holonomy can transport or phase an innovation once it exists; it cannot generate one from the invariant canvas.

3. The first fact cannot install a global frame

A path-independent global frame on a connected N-site loop, modulo global relabelling, contains $(N - 1) \log_2 q$ bits: exactly 2 bits even in the binary three-site case, and exactly $2 \log_2 7 = 5.614710$ bits in the structural $\mathbb{Z}_7$ case. A structureless void plus one local one-Bit commitment can neither create nor presuppose that ledger. Under the declared axioms the first readout is therefore forced to be a **local comparison (UR-comp)**, not a global frame (UR-frame) — a conditional selection that *permits* nontrivial holonomy without proving physical occupancy.

4. Law level closed: Haar preparation and the de Finetti factorisation

On the unit projective tangent, the unique probability measure invariant under the full unitary/refinement bridge is **Haar/Fubini–Study measure on $\mathbb{CP}^{48}$**, with zero mean and covariance $I_{49}/49$ (60,000-draw audit: covariance residual 2.8×10^{-2}, mean norm 0.00413 $\approx 1/\sqrt{60000}$ — the expected Monte-Carlo scale — and role/component means at their dimension fractions). On the opportunity side, exchangeability alone does not give independence — the correlated one-bit family (unconditional covariance 0.0316) and the exactly-one-of-two finite exchangeable law (covariance exactly $-1/4$) reproduce the standard counterexamples. But under one explicitly named new condition,

ER — Exchangeable Renewal Extendibility (every finite primitive-innovation family exchangeable and projectively consistent/extendible; deletion residual 1.7×10^{-17}), the de Finetti representation applies: conditioned on the complete directing variable, primitive one-Bit opportunities are **iid Bernoulli with one common dimensionless opportunity probability** (conditional covariance exactly 0; beta-mixture normalisation 4.4×10^{-16}). The common scale is ordinal, not a physical rate, and branch identity when a fact occurs is governed separately by the timeless Born weights of Part XII-vicies. **The D44′ primitive-innovation factorisation is thereby conditionally discharged —** conditional on ER plus the complete auxiliary/directing variable, with the consumer Fisher geometry already closed upstream.

5. The event-level residual and the GSJB-13 lock

What remains is the individual event: the current action, incidence/Dirac transport and loop holonomy transport innovations but do not derive the realised directing state α, the record-conditioned law $\mu(d\eta|\rho)$, or the actual $z(\rho, \alpha)$ — only its unique invariant ensemble. Locked next calculation: **GSJB-13 — Record-Conditioned Directing Measure and Local-Comparison Holonomy Occupancy.** Required return: derive α and $\mu(d\eta|\rho)$ from the local commitment action; compute whether the resulting local-comparison cochain is exact or carries nontrivial loop holonomy; return the actual $z(\rho, \alpha)$. Pass condition: one source-derived local-readout innovation law determining the realised amplitude direction or its complete directing variable, proving projective renewal consistency, and deciding closure-holonomy occupancy without Standard Model target data. This calculation has been executed — Part XII-vicies-bis reports the typing pass and the residual it leaves.

Premises of this Part

The void/tangent objects, birth basis and component/role projectors are the frozen GSJB-7/8/9 constructions (input residuals $\leq 4 \times 10^{-16}$; core-freeze SHA recorded above); the no-go is conditional on the full no-private-label/refinement bridge acting irreducibly on the complete tangent; the frame-capacity theorem is conditional on the declared void, locality, one-Bit-primitivity and no-unearned-frame axioms; ER is a newly named condition, not a substrate theorem; Haar is the unique *unresolved* law-level measure, not a derived physical preparation; and the ordinal opportunity probability is not a rate in physical time.

Part XII-vicies-bis — Record-Conditioned Directing Measure and Local-Comparison Holonomy Occupancy (GSJB-13)

Exact finite-dimensional cohomology and probability calculations on the minimal cycle, exact Gibbs-tilt typing relative to the frozen Fubini–Study/Haar base conditional on the uploaded consistency theorem, and a numerical rank/importance-sampling audit of the twelve-component invariant family; no derivation of the microscopic extension-information functional, the comparison directing law, the actual amplitude, or the actual holonomy class; core freeze SHA-256 8af6aefb…be88b; physical authority false. Verdict: **record-conditioned measure form CONDITIONAL PASS; UR-comp as a sufficient occupancy theorem NO-GO; nonzero holonomy support under nondegenerate local**

renewal laws CONDITIONAL PASS; realised directing state and realised holonomy class NOT DERIVED — major typing pass, occupancy not selected.

1. The record-conditioned measure: a Gibbs–Haar family with eleven tilts

The unique source-supported conditional preparation measure is the Gibbs tilt of the law-level base,

$$\mu_\rho(d\eta) = Z_\rho^{-1} \exp[-\Delta I_\rho(\eta)]\, \mu_{FS}(d\eta),$$

recovering Haar/Fubini–Study exactly when ΔI is constant (the unconditioned void of Part XII-vicies-semel). Once a nontrivial committed record exists, the full unitary symmetry is *reduced* — Haar does not remain unique (executed FAIL) — and on the frozen twelve-component gauge–S_3 decomposition the component-weight covariance has rank exactly **11 = 12 − 1**: one common shift is the normalisation zero mode, and eleven relative Gibbs tilts $\beta_j(\rho)$ genuinely change the directing measure. Five explicit positive normalised witnesses differ in covariance by up to 0.101173 (minimum effective sample size 75,944). The *form* is fixed by the consistency theorem; the microscopic functional $\rho \to \Delta I_\rho(\eta)$ — equivalently the eleven leading-order coefficients — is not returned by the present action.

2. Topology: availability is a separate, exact input

The minimal nonbounding three-edge cycle has $\dim H^1 = 1$ over both $\mathbb{Z}_2$ and $\mathbb{Z}_7$ ($b_1 = E - V + 1 = 1$); filling the same triangle as an elementary plaquette gives $\dim H^1 = 0$ over both. Nontrivial topology is a necessary independent input before any local readout law can populate a holonomy class — availability and occupancy are different predicates.

3. The exact occupancy law, and what cannot select it

For the observable binary register with conditionally iid local comparison bits of directing probability p, the exact triangle law is

$$P(\kappa = 1 \mid p) = [1 - (1 - 2p)^3]/2$$

(cyclic-convolution and discrete-Fourier evaluations agree at 1.11×10^{-16}). But local readout, exchangeability and one-bit marginals do *not* select occupancy: two finite exchangeable laws with identical edge marginals $p = 1/2$ were constructed with P(nonexact) = 0 and P(nonexact) = 1 respectively (the even/odd parity pair) — so UR-comp alone is a **NO-GO** as an occupancy theorem. Under the ER/de Finetti factorisation the observable law is

$$P(\kappa = 1) = [1 - \mathbb{E}_\nu(1 - 2p)^3]/2,$$

still a functional of the directing law ν: if ν is complement-symmetric the odd moment vanishes and P = 1/2 *exactly* — a clean conditional result, with the symmetry not established as physical. The uniform $\mathbb{Z}_7$ comparison model gives structural occupancy probability exactly **6/7** (diagnostic only; the observable Gate-3 register is $\mathbb{Z}_2$), and under independent loop renewals with any per-loop probability r > 0, eventual occupancy follows as $(1 - r)^M \to 0$ — conditional on nondegeneracy.

4. The construction-order clause is load-bearing

The D45″ construction-order question is now on the critical path at event level: gluing committed record-bearing cells is closed under record-distinctness, but if gluing *precedes* commitment, whether a shared face creates one record or two remains open — and until it is fixed, the physical edge comparison law, the realised amplitude and the realised cohomology class cannot be returned.

5. The GSJB-14 lock

The two missing functions are explicit: **$\rho \to \Delta I\_\rho(\eta)$** and **$\rho \to \nu\_\rho(dp)$**, plus one ordering theorem. Locked next calculation: **GSJB-14 — Local Commitment Action, Extension-Information Functional and Construction-Order Closure.** Required return: derive $\Delta I\_\rho(\eta)$ and the local comparison directing law from the shared-face commitment action; decide whether gluing precedes or follows commitment and whether one or two records are created; then return the actual η (or a complete auxiliary variable) and the physical $\mathbb{Z}_2$ cohomology class. Pass condition: one action-derived, refinement-stable local extension-information functional with no free component tilts, plus a construction-order theorem fixing the edge comparison law and deciding observable holonomy occupancy without Standard Model targets. This calculation has been executed — Part XII-vicies-ter reports the action form, its two exact non-identifiabilities, and the reduction of the construction order to one binary primitive.

Premises of this Part

The frozen tangent, birth basis and component/role projectors are the GSJB-12 objects (input residuals $\leq 4 \times 10^{-16}$; core-freeze SHA recorded above); the Gibbs-tilt typing is conditional on the uploaded Probability-as-Consistency theorem, which fixes the measure given extension information but not the microscopic functional; the parity counterexamples, the complement-symmetric evaluation and the $\mathbb{Z}_7$ model are declared constructions witnessing non-selection; the observable Gate-3 register is fixed to $\mathbb{Z}_2$ by the uploaded programme status; and the D45″ clause is inherited as an open construction-order question, not resolved here.

Part XII-vicies-ter — Local Commitment Action, Extension-Information Functional and Construction-Order Closure (GSJB-14)

Exact finite-dimensional information, symmetry, rank, graph and Perron–Frobenius calculations; the uniqueness of the additive extension-action form is conditional on supplied readiness amplitudes and entropy costs and uses Maximum Caliber at the inference layer; exact no-gos for preparing phases from extension information and for distinguishing duplicate provenance tokens; exact reduction of D45″ to one-versus-two primitive shared-face events; no derivation of physical entropy costs, drive affinity, event multiplicity or physical branch; core freeze SHA-256 322e8e30…9696; physical authority false. Verdict: **additive extension-action form STRUCTURAL PASS; using extension information to prepare the amplitude NO-GO; post-commitment record-distinct gluing CONDITIONAL PASS; D45″ construction order NOT CLOSED but reduced to one binary primitive.**

1. The action form, and why form alone selects nothing

The source-supported local action is unique under independent composition, regularity, iso-entropic neutrality and thermodynamic additivity:

$$M_i = -\ln a_i + \lambda\, \Delta S_i,\quad a_i = |c_i|^2,$$

with the Gibbs–Born unfolding $P_i \propto a_i \exp(-\lambda \Delta S_i)$, and $\Delta I_i = -\ln|c_i|^2$ recovering the Part XII-vicies timeless Born weights exactly in the iso-entropic case (residual 6.9×10^{-18}). Two independent no-gos bound what this buys:

Phase no-go. $\Delta I = -\ln|c_i|^2$ is a re-expression of already supplied magnitudes. Two orthogonal states in $\mathbb{C}P^{48}$ were constructed with identical $|\eta_i|^2$ and therefore identical extension information: inner product 1.3×10^{-16} at Fubini–Study separation exactly $\pi/2 = 1.570796326795$, with a generic T^{48} relative-phase fibre (49 complex directions less the global phase). **Extension information cannot prepare η.**

Cost no-go. For every strictly positive target q, every positive readiness a and every $\lambda > 0$, $\Delta S_i = -(1/\lambda)\ln(q_i/a_i) + \text{const}$ reproduces q exactly — four target laws inverted at three λ values, maximum probability residual 5.6×10^{-17}, all $\Delta S_i \geq 0$. The action must *calculate* the costs; its functional form selects nothing (F72).

2. The shared face: exactly one free logical coupling

For a shared face with two binary side readouts, side exchange plus global complement symmetry leave exactly one complete positive family (both symmetry residuals exactly 0, uniform marginals at 1.1×10^{-16}):

$$P_J(x, y) = \exp(J\, x\, y)/(4 \cosh J),$$

one free parameter after normalisation. $J = 0$ gives two conditionally independent side innovations and **2** effective bits; $|J| \to \infty$ gives **1** logical bit with the sides perfectly related; every intermediate value is admissible with exactly uniform one-bit marginals. Symmetry and one-bit marginals therefore do not decide whether a shared face creates one record or two — the Part XII-vicies-bis pattern (marginals cannot select) recurring at the construction-order layer.

3. Provenance is a second, independent distinction

On the exact twenty-token two-simplex stitch, the most general exchange-invariant provenance metric is

$$G_\gamma = P_{common} + \gamma\, P_{provenance},\quad \operatorname{rank} P_{common} = 16,\ \operatorname{rank} P_{prov} = 4\ (16 + 4 = 20),$$

with $\gamma = 0$ annihilating the four side-provenance differences (residual 4.5×10^{-17}) to give the sixteen-token one-record quotient, and every $\gamma > 0$ preserving all twenty directions. An information-theoretic no-go explains why this extra metric is *indispensable*: replacing one binary record by two perfectly correlated copies preserves Shannon entropy, relative entropy and Fisher information **exactly** (residuals 0.0), while independent duplication doubles all three. **Outcome extension information detects additional logical innovations but is blind to duplicate provenance tokens** — so no purely outcome-informational functional can ever decide the one-record/two-record question (F73).

4. The two record graphs, and an exact threshold cross-check

Both branches are constructed as explicit stability graphs with reproduced source values:

branch	nodes	edges	mean degree	oriented NB relations	ρ_NB	p⋆ = 1/ρ_NB	ξ (frozen Route-M)
record-distinct ($\gamma > 0$)	20	64	6.4	128	5.440225970823	0.183815893929	84.071786 μm
one-record quotient ($\gamma = 0$)	16	54	6.75	108	5.952870951488	0.167986171404	62.723178 μm

with source residuals 8.0×10^{-14} and 1.7×10^{-13}; the oriented relation counts are exactly 2E and p⋆ is exactly the Perron reciprocal in both cases. Under the same frozen normalisation the quotient reproduces the published ≈ 62.72 μm alternative (residual 0.0032 μm). Two audit observations, recorded as observations only: the branch shifts the coherence scale by **−25.39%**, so any downstream use of ξ inherits the D45″ selection; and the record-distinct value sits **0.078%** below the separately frozen VERSF coherence scale 84.137118546 μm used elsewhere in the corpus — a near-agreement that must be reconciled rather than assumed (F73 scope; not a claim of identity).

5. D45″ reduced to one binary primitive

Commit-before-glue is closed conditionally by A2* on the twenty-token branch. Glue-before-commit reduces exactly to the primitive shared-face **event multiplicity m_face ∈ {1, 2}**:

m_face = 1 — one joint one-bit event → $\gamma = 0$ → provenance rank 16 → the sixteen-token quotient graph; **m_face = 2** — two side-specific one-bit events → conditional independence under D44′ with provenance preservation under A2* → $\gamma > 0$ → the twenty-token record-distinct graph.

The current action does not select m_face, and does not return ΔS_i, the drive affinity or the prepared phases. The construction-order debt is *smaller and exact*, not closed.

6. The GSJB-15 lock

Locked next calculation: **GSJB-15 — Primitive Shared-Face Event Multiplicity and Provenance-Sensitive Commitment Generator.** Required return: derive from the K = 7 fold/closure action whether a glued shared face supports one joint commitment event or two side-specific commitment events, and return the provenance stiffness γ together with the action-derived entropy costs and affinity. Pass condition: one substrate-derived event-incidence rule selecting m_face = 1 or 2 *before* record formation, with an explicit provenance-sensitive commitment generator, no Standard Model targets, exact agreement with A2* after commitment, and a unique resulting 16- or 20-token stability graph. This calculation has been executed — Part XII-vicies-quater reports the result, which *corrects the framing of this lock*: the event multiplicity closes at m_fact = 1 and the surviving question is record-token localisation.

Premises of this Part

The frozen GSJB-12/13 tangent, birth basis and non-authority status are inherited inputs (core-freeze SHA recorded above); the additive-form uniqueness is conditional on supplied readiness amplitudes and entropy costs and uses Maximum Caliber at the inference layer only; the Ising family, the parity/duplication constructions and the two record graphs are declared constructions witnessing non-selection; the Route-M normalisation is the frozen one and its two ξ values are branch-conditional outputs, not selections; and A2* is inherited as stated, closing only the post-commitment gluing case.

Part XII-vicies-quater — Shared-Face Single-Fact and Dual-Provenance Record Completion (GSJB-15)

Exact finite-group, information, rank, code, graph and Perron–Frobenius calculations; the single-fact theorem is conditional on the source strong-model definition of face transport as one frame isomorphism; the dual-record completion is mathematically consistent but the pre-commitment theory selects neither one interface token nor two local copies, nor the provenance stiffness γ; core freeze SHA-256 864d8b39…7d94; physical authority false. Verdict: **shared-face single relational fact PASS (conditionally); two physical records of one fact without double counting EXACT CONSISTENCY PASS; one-Bit and sixteen-channel accounting PASS; pre-commitment record-token localisation and absolute γ NOT SELECTED.**

1. The single-fact theorem, and the correction it forces

Under the strong closure-frame transport model a shared face carries **one** relation g_AB, and reading the same interface from the other hub returns $g\_BA = g\_AB^{-1}$. The map g ↦ (g,

g^{-1}) has exactly 14 images for the 14 elements of D7 — not 196 independent pairs — and across eight nonuniform probability tests $H(g, g^{-1}) = H(g)$ with $H(g^{-1}|g) = 0$ at residual exactly 0 (mutual-information identity at 8.9×10^{-16}, inverse-pair map injective, orientation-parity and double-inverse errors exactly 0). The two sides describe one fact; counting both as two is exact double-counting. Consequently the four shared faces have joint-event incidence rank **4, not 8**, and the Tick-Race selects among **16** logical fact channels.

This corrects Part XII-vicies-ter. The earlier fork "m_face ∈ {1, 2} primitive fact events" is replaced by

m_fact = 1 (CLOSED), m_record_token ∈ {1, 2} (OPEN).

The question is no longer whether the shared face fires once or twice, but *where the one fact is physically written*: once on the common interface, or twice as locally addressable copies. The event-multiplicity half of D45″ is closed; the record-localisation half remains.

2. Dual records without double counting: an exact code

The twenty-token carrier remains fully compatible with m_fact = 1 through the exact sequence

$$0 \to \mathrm{P\_side}(\mathbb{R}^4) \to \mathrm{R\_record}(\mathbb{R}^{20}) \to \mathrm{F\_logical}(\mathbb{R}^{16}) \to 0,$$

with logical quotient rank 16, four-dimensional provenance/syndrome kernel, isometric logical section ($\|QD - I\| = 4.4 \times 10^{-16}$) and the four provenance differences spanning the kernel exactly ($\|QV\| = 0$). The binary dual-record code has exactly $2^{16} = 65{,}536$ physical configurations: under the uniform logical law its joint entropy is 16 bits while the twenty token marginals sum to 20 bits, the difference being exactly **4 bits of copy redundancy —** one bit per shared face, each pair carrying two physical tokens at joint entropy 1 bit and conditional entropy 0. Duplication therefore occurs *after* the single outcome is fixed: it creates no second winner and no second entropy quantum.

Each shared fact's two copies form a **[2, 1, 2] repetition code**: single-token corruption is a detectable syndrome scaling as ε, undetected corruption requires both copies to fail and scales as ε^2, but two-copy data alone cannot identify *which* token is wrong. Record robustness therefore *motivates* dual copies without proving them — a microscopic error/maintenance law is required (F74).

3. The provenance metric, correctly typed

$G_\gamma = P_{common} + \gamma P_{provenance}$ leaves every encoded logical fact's norm unchanged for every tested γ (maximum residual 2.1×10^{-14}), acting *only* on the four copy-disagreement/syndrome directions: **γ is a record-disagreement maintenance stiffness, not a probability or logical fact weight —** a sharper typing than Part XII-vicies-ter's, and it means γ can never be fixed by any logical-sector or Tick-Race datum. The present action does not calculate it.

4. The graphs survive with corrected interpretation

Both stability graphs stand unchanged, with their Perron data re-verified (PF residuals ≤ 1.1×10^{-14}, degree sums exactly 2E, p⋆ exactly 1/ρ_NB):

branch	tokens	edges	degree distribution	ρ_NB	p⋆	ξ (Route-M)
dual local records (γ > 0)	20	64	$6^{12}\,7^{8}$ (Σ = 128)	5.440225970823	0.183815893929	84.071786 μm
single interface token (γ = 0)	16	54	$6^{12}\,9^{4}$ (Σ = 108)	5.952870951488	0.167986171404	62.723178 μm

The 84 μm branch remains available *if dual local copies are derived* — but it no longer carries two-Bit shared-face accounting, only one-Bit logic plus maintenance redundancy. The 62.7 μm branch remains the exact single-interface-token witness. The coherence-scale fork of Part XII-vicies-ter therefore persists in magnitude (25.39%) while being **retyped**: it now turns on record localisation, not on fact multiplicity (D-ξ-branch amended accordingly).

5. Construction order after the correction

For already committed cells, A2* protects the two pre-existing tokens — so post-commitment gluing closes to two tokens as before. For a face glued *before* commitment, the corpus still does not determine whether the one fact is written once on the interface or copied into two locally addressable records.

6. The GSJB-16 lock

Locked next calculation: **GSJB-16 — Shared-Interface Record Localisation and Provenance-Maintenance Stiffness.** Required return: derive from the local commitment/maintenance action whether a single shared-face fact writes one interface token or two locally addressable copies, and calculate γ or its physical normalisation without using the Route-M scale as a target. Pass condition: one substrate-derived record-localisation rule selecting 16 or 20 physical tokens while preserving exactly one logical Bit per shared face, together with a provenance/syndrome maintenance stiffness and a blind graph-scale return. This calculation has been executed — Part XII-vicies-quinquies reports a conditional selection of the 16-token carrier with γ_birth = 0.

Premises of this Part

The single-fact theorem is conditional on the source strong-model definition of face transport as one frame isomorphism (a declared modelling choice, not derived here); the frozen GSJB-12/13/14 objects, the D7 structure and the two stability graphs are inherited inputs (core-freeze SHA recorded above); the [2, 1, 2] code, the error-scaling estimate and the dual-record construction are declared constructions witnessing consistency, not selection; A2* is inherited as stated and closes only the post-commitment case; and the Route-M scale is explicitly excluded as a target for γ or for the localisation choice.

Part XII-vicies-quinquies — Shared-Interface Record Localisation and Primitive Copy-Economy Selection (GSJB-16)

Exact finite-dimensional access, factorisation, rank and Route-M calculations; the branch selection is conditional on applying the existing VERSF minimum-distinction / structure-economy discipline to primitive record duplication; physical authority false; frozen input the GSJB-15 report (SHA-256 07e96136…c051). Verdict: **one common interface record at primitive commitment STRONG CONDITIONAL PASS; the claim that two locally addressable copies are required for bilateral access DISPROVED under the declared interface-readout model; later copy proliferation OPEN; γ_birth = 0 exactly; post-copy maintenance stiffness NOT DERIVED.**

1. Bilateral access needs only one token — under the declared interface model

A shared face is one physical interface carrying one relational fact (Part XII-vicies-quater), and *by premise P3* its single token is incident to and readable from both neighbouring cells. What the calculation adds is that the second readout supplies no additional independent information: the two local readout maps each have rank 4 on the four-dimensional interface, and their *joint* readout still has rank **4**.

Stated exactly: **under the declared shared-interface incidence and readout model, duplicate copies are not required for bilateral access.** This is not a universal disproof that locality could ever motivate duplication — accessibility is granted by P3, and the rank result shows duplication is unnecessary *once P3 holds* (F76).

2. The dual-copy encoding factorises exactly

The eight-dimensional dual carrier splits as logical rank 4 ⊕ provenance rank 4, and the dual write factorises exactly as

one interface write → deterministic copy → two record tokens,

with factorisation residual exactly 0.0 (logical section isometric at 4.4×10^{-16}; the four-dimensional provenance kernel is annihilated by the quotient at residual 4.5×10^{-17}). The second copy is therefore not a second fact, and is not needed to make the first fact locally readable.

What the factorisation does and does not show. Algebraically it shows the two-token encoding is *constructible* as a one-token encoding composed with a copy map. It does not by itself establish that nature executes those operations in that temporal order: the conclusion that copying is *downstream* of primitive commitment follows from the factorisation **together with** premise P6 and the structure-economy discipline of §4, not from the factorisation alone.

3. Many-to-one encoding does not force a second macroscopic token

A single binary macrorecord admits microscopic redundancy through two disjoint basins of **8** microstates each (16 microstates total), so macroscopic duplication is not required merely to provide a many-to-one record encoding.

This is an availability result, not a stability theorem. A partition into basins shows that a many-to-one encoding exists; it does not by itself establish dynamical stability, which would require a transition kernel, a noise model, or an energy/action barrier showing that typical perturbations stay within the appropriate basin over the maintenance horizon. That dynamics is part of the GSJB-17 return, and until it is calculated no stability claim is made here (F76).

4. The selection, and its named premise

Under the audited premises — P1 the shared face is one physical interface; P2 one relational fact per face; P3 the interface token is locally readable from both cells; P4 a single token can be stable via microstate basins; P5 no unearned duplicate record structure; P6 redundant copying is downstream of primitive commitment — the existing VERSF minimum-distinction / structure-economy discipline selects

$m_{fact} = 1$, $m_{record\_token, birth} = 1$, $\gamma_{birth} = 0$ (exactly).

The four provenance/disagreement directions of the twenty-token representation are *real only after* a copying process creates two separately addressable tokens; they are absent from the primitive write. A later copying or Quantum-Darwinist proliferation stage may generate them, but its stiffness γ_{copy} and maintenance cost remain open.

Epistemic status, stated plainly. This is not an unconditional theorem of bare finite distinguishability. It is a strong conditional theorem invoking a named VERSF premise already used elsewhere in the corpus: no additional physical structure is installed when it is not required by an observable distinction, a recordable new fact, or a structural necessity. The duplicate token *is* observable once created; the calculation shows its creation is unnecessary for either bilateral access or primitive stability, so structure economy places it downstream (F76).

5. Blind graph return, and the selected scale

The localisation rule was applied *before* either scale was evaluated:

carrier	tokens	ρ_NB	p⋆	Route-M exponent	ξ
selected primitive	16	5.952870951488	0.167986171404	69.741216599150	**62.723177696 μm**
counterfactual dual-copy	20	5.440225970823	0.183815893929	70.034156588101	84.071785948 μm

The two exponents differ by 0.29293999, which equals ln(84.071786/62.723178) to fifteen digits — confirming both scales are quoted under one and the same frozen ultraviolet ruler, so the branch difference is entirely structural. The 20-token carrier remains the correct effective carrier when two cells were *already separately committed* before gluing (A2* then protects two pre-existing records), and may also describe later redundant proliferation; it is not the primitive glue-before-commit carrier under these premises.

6. Cross-corpus consequence for the coherence scale

The selected primitive scale is ξ = 62.723178 μm, which sits **25.45% below** the separately frozen corpus coherence scale 84.137118546 μm used elsewhere in the programme (the dual-copy value 84.071786 μm sits 0.078% below it). Four distinct objects must now be kept apart:

scale	meaning	current status
62.723178 μm	primitive glue-before-commit, one-token branch	**selected conditionally** under P1–P6 and the frozen Route-M ruler
84.071786 μm	dual-record (20-token) graph	commit-before-glue under A2*, or post-commitment copying
84.137118546 μm	previously frozen corpus coherence scale	**unreconciled** with the primitive branch (25.45%)
≈ 88 μm	bath-gap route	separate conditional construction

The earlier "two independent routes agree to within 4.5%" (the ≈ 88 μm bath-gap and ≈ 84 μm record-graph values) can no longer be presented as support for the *primitive* length; at most it supports the non-primitive duplicate/proliferated branch. Conditional on this Part's premises, therefore, the frozen corpus scale corresponds to the *non-primitive* branch — either commit-before-glue with A2*-protected tokens, or post-commitment proliferation — and not to the primitive glue-before-commit write. This is recorded as an unresolved cross-corpus reconciliation (D-ξ-branch, amended), not as a correction to any other paper: every downstream use of ξ must now state which construction order and record localisation it assumes (F77). The SI length in any case inherits the frozen Route-M ultraviolet ruler and is not an unconditional physical prediction.

7. What this Part does not close

This Part closes the shared-face construction-order and primitive record-localisation clause (D45″), conditionally. It does **not** address the D44′ event-level preparation debt of Parts XII-vicies-bis and -ter: the microscopic extension-information functional $\Delta I\_\rho(\eta)$, the comparison directing law $\nu\_\rho(dp)$, the realised directing state and amplitude, the physical entropy costs ΔS_i and the relative phases remain not action-derived. Those two lines are now independent, and both must return before any physical closure certificate.

8. The GSJB-17 lock

Locked next calculation: **GSJB-17 — Primitive Record Copy Dynamics and Post-Commitment Redundancy Cost** (a post-commitment calculation, parallel to the still-open D44′ event-level line, not its successor). Required return: derive whether and when the single interface record is copied into downstream local or environmental fragments, and calculate the resulting γ_copy and maintenance cost without altering the primitive sixteen-channel fact law.

Premises of this Part

P1–P6 above are declared premises, with the selection conditional on the named structure-economy / no-unforced-ledger discipline; the frozen GSJB-15 objects and the two stability graphs are inherited inputs (SHA recorded above); the microstate-basin construction is a declared stability witness; the rate and cost of later redundant copying are explicitly not derived; A2* is inherited and continues to protect two pre-existing records in the commit-before-glue case; and the Route-M ruler is frozen, so both ξ values are conditional structural returns rather than physical predictions.

Part XIII — Chronological Results Ledger

38-bis. How to read this Part

This Part is a **chronological audit ledger**, not a list of current results, and it is numbered in the order results were obtained. Items recorded as “not returned” or “not established” in §41 may since have been resolved by a later Part; items in §39 may since have been corrected in scope by a later Part (item 86 carries such an amendment explicitly). For the *current* standing — what is unconditionally established, what is conditionally established, what failed, and what remains — read the four-section General Reader Summary at the head of this document together with the verdict box; use the Appendix E debt ledger for what is currently owed, and Appendix F for how each entry maps onto the parent RPC-1 numbering. Where a §39 item and a later Part disagree, the later Part governs.

39. Chronological claims and re-gradings (claims as issued)

1. The microscopic and downstream machinery executes as one frozen, deterministic spine.

2. The canonical separable generator cannot provide gauge screening: C = 0 exactly.
3. The scalar commitment bath cannot provide it either: the source is gauge-orthogonal.
4. A seven-source non-scalar bath is constructed with typed, Fisher-orthogonal directions.
5. The terminal $\mathbb{Z}_7$ holonomy is carried correctly under the generator readout, with the earlier contrary result quantified as an entry-readout artefact.
6. The absolute susceptibilities are not merely underdetermined but non-identifying.
7. The executed two-level regulator is factorised, so it does not test refinement stability.
8. The quark matching problem is solved as a proved contraction and no longer blocks scalar stability.
9. The corpus admits a continuum of inequivalent positive boundaries (Theorem 4), so certificate refusal is a theorem.
10. Two positive returns stand alongside the refusal: a colour repair converting a twenty-order discrepancy into $\Lambda_3 = 0.225923$ GeV, and seven-figure cross-pipeline agreement on the stability ceiling.
11. A sector-differentiated bath response exists as a first executed instance under a declared convention, with an exactly dark pair as a falsifiable fingerprint.
12. The transport machinery works where it is supplied with inputs: thresholds, quartic positivity, coupled transport and two value-independent flavour identities.
13. One compact action returns the full requested object set and remains stable under a genuine non-factorising refinement (Result N1): formal compatibility is solved by explicit construction.
14. The minimal constitutive choice is falsified as the physical boundary (Result N2), isolating the missing physical content in a single named property — a steep-hierarchy mechanism that does not inflate the mixing.
15. A maintenance-record operator family, derived from closure geometry with a signed up/down/neutral contrast rather than an inserted one, is regulator-covariant at second order under a derived unitary blocking map (Result R1).
16. That family repairs the NFDMA-2 flavour and neutral regulator obstruction, bringing 53–93% inter-level drifts to a few percent (Result R2), a refinement-covariance repair distinct from physical admission.
17. *(Re-graded — see the re-grading table below: the one-bit metric is **not settled**, an independent rebuild of the kernel returning $\dot{\Sigma} = 0.185$.)* As issued: the one-bit history

metric was recorded as conditionally discharged ($\dot{\Sigma}$ = ln 2 to 2.22×10^{-16}) and nonzero $\mathbb{Z}_7$ occupancy is conditionally promoted to the conjugate pair, both with premises named (Part XII-quater §MH2) — with the standing caveat that an independent rebuild of the D36 kernel returns $\dot{\Sigma}$ = 0.185, so by the document's own reproducibility standard D36 is not yet a settled result.

18. A no-fit gauge synthesis nearly closes weak and hypercharge without tuning while isolating a ~36% colour deficit (Part XII-quater §MH3), giving the D41 colour object a quantitative target.

19. The first genuinely independent CY3′ test is executed, and the minimal MASD/HMGBC action fails it at regulator-stable residues 0.37–0.49 (Result MH1) — a clean falsification, not an untested identity.

20. A representation-resolved kernel brings colour to g_s = 1.000 (Part XII-quinquies §RK2), supplying the deficit MHPE-1 isolated, and returns a steep charged hierarchy without over-mixing (§RK3) — D41 and D42 addressed at candidate grade under two synthesis premises.

21. The CY3′ falsification is converted to a precise conditional (Result RK1): under an imposed functorial completion-lift the two routes agree to 5.84×10^{-16}, moving the physical content into whether the substrate's completion law is that lift.

22. The functorial lift is then *derived*, not imposed (Result RH1): blind differentiation of the parent history functional, with representation terms fixed from the discrete K=7 ledger, returns two genuinely separate CY3′ routes agreeing to 1.9×10^{-14} — the array-level check confirms they are no longer identical copies.

23. The charged and gauge side is conditionally closed at the action level (Result RH2): one frozen parent returns the gauge Schur response (exact), the full charged tensor (7×10^{-14}) and the CY3′ equality, blind, resting only on the discrete representation ledger.

24. The published primitive transfer provably does not by itself select that ledger (Theorem 5, Result PS1): an exact neutral-channel witness shows two ledgers sharing all wheel transitions and direct traces but differing in relaxation, (5,3,60) ≠ (5,4,80).

25. The ledger is nonetheless the unique solution of a named premise package (Theorem 6), with an explicit provenance matrix — so the residual debt localises to two premises, neutral terminal-carrier completeness and the score-normalisation map, rather than the whole ledger.

26. Neutral completeness is reduced to a non-circular killed-kernel spectral criterion (Theorem 9, Result PT1): if the radius is < 1 the terminal image is uniquely typed as the right-chiral neutral singlet and exactly three are forced — the premise becomes a computable spectral quantity plus a named protector theorem.

27. The score-normalisation map is reduced to exact arithmetic conditional on primitive-innovation factorisation (Result PT2), reproducing both PRLU branches; the consolidated Descent Theorem (Theorem 10) shows four explicit path-law properties suffice for the (5,4,80) census.

28. The killed-kernel criterion is proved (Theorem 11, Result SG1): full rank of the Dirac completion gives $\rho(Q\_\nu) < 1$ with absorption exactly I_3, verified at two regulators — so neutral terminality follows once the parent returns nonzero Y_ν support.

29. The factorisation counterexample is dissolved (Theorem 12, Result SG2): one mark per Fold gives orthogonal compensated-martingale innovations, so the quadratic score metric is additive without independent counts — removing the force of the D44′ counterexamples for the quadratic problem. The exact-grade audit removes the B−L protector once M_R is active (Result SG3).

30. The full-carrier object is supplied (FCHI-1): an explicit 102-dimensional retained quadratic parent with a complete K=7 and seven-outcome neutral Kraus instrument, positive and regulator-stable, regenerated with zero SHA-256 mismatches — the object SGPL-1 named as the residual.

31. The three support facts pass (Result FC1) and the terminal-route gap is exact and regulator-uniform, $1 - e^{-1}$ (Theorem 13, block-triangular, orientation-independent) — closing the structural existence of the neutral terminal sector at retained quadratic order.

32. The two-level species/boundary interface is fully executable against the canonical packages: K = 7 exactly canonical, terminal-record refinement second order (step ratios 0.2488/0.2497 ≈ ¼, order 2.0018), CAR/Fock mixed jet on the 334-dimensional faithful tangent at $\varepsilon = 1.77 \times 10^{-15}$, addresses rank-3 isometric with zero charged/neutral overlap (Part XII-undecies).

33. The obstruction to physical admission is localised: it is not the K = 7 carrier and not CAR/Fock visibility, but the non-identification of the source-to-tangent derivative $d\Phi\_n$ — the HM4 endpoints $\varepsilon = \{0, 1/\sqrt{2}, 1\}$ all preserve the selector Gram, so the pass endpoint is a branch choice, not a derivation (Part XII-undecies).

34. The linear six-channel bridge is excluded by exact representation theory: the adjoint of a simple group has no invariant vector, so the colour and weak channels enter first at quadratic (Casimir) order; the corrected object is the graded source jet, supplied at both levels, with the action-selected rim cycle ($-\pi/3$ steps, $-1/\sqrt{6}$ cycle) exact (Part XII-duodecies).

35. The graded-jet descent to the HFB tangent passes at support level with frame independence certified across five endpoint witnesses ($\leq 1.8 \times 10^{-11}$ post-polar) and four prescriptions ($\leq 1.5 \times 10^{-7}$), the 836 post-gauge flat directions quotiented by the minimum-norm representation current (residual 9.9×10^{-16}) (Part XII-tredecies).

36. The descent returns exact structural constants: record-sector condition 13/7, completion metric spectrum $\{3 - \sqrt{7}, 1, 1, 3 + \sqrt{7}\}$ (condition $8 + 3\sqrt{7}$), 45° record principal angles retro-identifying the $\varepsilon = 1/\sqrt{2}$ HM4 endpoint as typed record geometry, and primitive completion metric $\propto \mathrm{diag}(1, 1, 3, 3)$ (Part XII-tredecies).

37. The remaining structural residual is one named object: the primitive native score metric and the record/completion attachment rules — GSJB-3 — with pass criteria fixed in advance (Part XII-tredecies).

38. *(Supersedes §41 item 19 and §39 item 37 on this point — see §38-bis.)* The completion-coordinate attachment problem is closed: route sector and $H/\tilde{H}$ conjugation are two commuting binary invariants, and their $\mathbb{Z}_2\times\mathbb{Z}_2$ character basis uniquely returns (φ_H radial, sector, conjugation, mixed) — the exact eigenbasis of the tredecies route metric, with primitive completion Hessian exactly $g\cdot\mathrm{diag}(3, 3, 1, 1)$ and attachment drift 0.0 at all levels (Part XII-quattuordecies).

39. The native Born–Fisher score metric is proved endpoint non-identifiable: positive and rank 72 for every witness, but relative shape drift up to 1.5214 (1.1397 trace-normalised) across equally admissible endpoint frames, with conjugate-branch covariance exact — the endpoint-flat action selects support, never stiffness (Part XII-quattuordecies).

40. The one-mark-per-Fold innovation-count H_CMR is endpoint-independent and regulator-stable at $n = 3$–6 with exact primitive bookkeeping (self-mark + edge exposures = 1; direct counts (6, 13/2, 378) reproducing the frozen PRLU traces at residual 0.0), in exactly two roster branches (5, 3, 60) and (5, 4, 80) (Part XII-quattuordecies).

41. The record factor weights obey the exact square-root law $a_i = \sqrt{c_i}/\sqrt{\Sigma c}$ within each branch, reproducing all reported amplitudes, with the two branch planes separated by the derived exact angle $\arccos[(5 + 2\sqrt{3} + \sqrt{4800})/\sqrt{6052}] = 2.0226°$ and isotropic HFB responses at the exact rationals 1493/34 and 7841/178 (Part XII-quattuordecies).

42. The old conditional HFB completion metric and the primitive character-basis curvature have equal trace 8 but different spectra ($\{3-\sqrt{7}, 1, 1, 3+\sqrt{7}\}$ vs $\{3, 3, 1, 1\}$), so no scalar bridge exists: the old block must be same-action derived or superseded (Part XII-quattuordecies).

43. Under the declared zero-entropy-void and record-separation axioms with S_3 neutrality, the pre-fact working ray is unique — $\chi = (1,1,1)/\sqrt{3}$, invariant subspace dimension 1, von Neumann entropy exactly 0 — and a record-preserving reset dilation returns to it exactly while appending the completed key, with uniform classical shadow and zero old/new-key mutual information; the key-retention parameter is thereby selected, $\kappa = 1/3$ (Part XII-quindecies).

44. With time indexed by irreversible Bits, the reset probability r is a coordinate gauge, not physics: idle post-record steps carry no fact and no time increment, so the

canonical representation has r = 1 and r leaves the physical parameter list — a dimensionless selection that does not fix the absolute hazard scale (Part XII-quindecies).

45. The renewed process satisfies exact identities at both regulators: completed + active + singlet mass = 1 with active = singlet; D-rate = R-rate = renewal rate = completed mass = 0.240156385204; first-passage/Born residual $\leq 1.7 \times 10^{-15}$; and the neutral-extended mean absorption is exactly $2/(1 - e^{-1}) = 3.163953413739$ Folds — the two-stage first passage through Theorem 13's block-triangular kernel, with the exact gap $1 - e^{-1}$ reappearing untouched (Part XII-quindecies).

46. The full marked Fisher metric has rank 774 = 837 product marks − 63 carrier dimensions, with a rank-6 near-isotropic neutral block (eigenvalue ratio 1.000046) and regulator drifts $\leq 3 \times 10^{-7}$ (Part XII-quindecies).

47. The neutral-branch question is reduced from roster selection to carrier occupancy: given any nonzero neutral pre-fact distinction, admissibility plus finite fact formation forces a terminal neutral route (charged-minimal leaves the neutral first passage undefined), and the supplied neutral-extended instrument provides it with the exact positive gap; what remains unproved is only that the neutral pre-fact carrier must be occupied (Part XII-quindecies).

48. The endpoint-measure question is closed negatively at the invariant level: the 63-state process has a two-dimensional stationary simplex whose key-permutation barycentre is absorbing with zero asymptotic neutral score, and all five endpoint witnesses share identical central species weights — the projector dimensions (3, 3, 6, 2, 9, 9, 18)/50 — with invariant twirl I/50, so central invariant data provably cannot select the noncentral coherences that distinguish the frames (Part XII-quattuordecies-bis, summary grade).

49. The completion congruence bridge exists uniquely in the symmetric-positive convention (residual 1.3×10^{-15}) but sits inside an O(4) family of exact congruences, so it is a matrix convention, not a derivation — sharpening the no-scalar-bridge result to no-derived-bridge-at-all pending same-action selection (Part XII-quattuordecies-bis, summary grade).

50. Constructive renewal exists in closed form: the general S_3-equivariant reopening law $R(\kappa) = \kappa I_3 + ((1-\kappa)/2)(J_3 - I_3)$ with renewal probability r yields exact stationary masses $\mu\_A = \mu\_S = r/(2r + p)$, $\mu\_C = p/(2r + p)$, $p = 1 - e^{-1}$, and equal D/R/renewal rates $pr/(2r + p)$; at $(r, \kappa) = (1, 1)$ this is exactly $(1 - e^{-1})/(3 - e^{-1}) = 0.240156385204$ — the closed form behind every quindecies renewal identity — with Fisher rank 588 = 651 − 63 removing the rank obstruction (Part XII-quattuordecies-ter, summary grade).

51. The renewal is permitted but not demanded: record preservation, S_3 covariance, locality and completeness leave (r, κ) free and two disjoint marked-score lifts reproduce H102 while differing by 1.7366 — the uniqueness gap that Part XII-quindecies then partly closes ($\kappa = 1/3$ selected, r retired as gauge) and partly types

(the lift ambiguity persisting as GSJB-7's target) (Part XII-quattuordecies-ter, summary grade).

52. Within the frozen faithful alternatives, the void-selection theorem holds exactly: the twelve faithful gauge generators have common kernel of dimension 3, lying entirely inside one rank-3 central projector of neutral-terminal grade 1, while the 47-dimensional charged-minimal carrier has common-kernel dimension 0 — so a nonzero pure gauge-invariant, S_3-neutral, zero-entropy canvas exists only in the neutral-terminal sector, selecting one equal-copy ray with all residuals exactly 0 (Part XII-sedecies).

53. Under the post-freeze identification (representation mapping opened only after the sealed core, SHA-recorded), the selected anonymous projector is N_R: the neutral-extended ledger is selected under the declared void axioms — the first structural discrimination between the (5, 3, 60) and (5, 4, 80) branches — typed strictly as a representation-capacity statement conditional on the frozen algebra and axioms, not as literal void occupation by neutrinos and not as an unconditional substrate theorem (Part XII-sedecies).

54. The second variation of total nonneutral distinguishability has rank 94 on the 98-real-dimensional projective void tangent: every direction leaving the neutral-singlet sector is visible at quadratic order, and the four remaining neutral directions are resolved two-and-two by direct terminal-key marks (probabilities exactly 1/3 — the $\kappa = 1/3$ shadow as data) and the supplied Dirac-completion basis, closing the graded metric at full rank 98 = 94 + 2 + 2 (Part XII-sedecies).

55. The graded void-relative metric is regulator-stable (drift 1.09×10^{-5}, rank 98 at both levels) and satisfies the exact spectral sum rule $\lambda_{min} + \lambda_{max} = 8$ at both levels — an observed exact identity of the frozen construction, adopted as a permanent re-audit (Part XII-sedecies).

56. The rank-98 void metric and rank-96 nonterminal FCHI parent are congruence-liftable but not uniquely: two exact post-freeze lifts differ by 1.187 (level 3) and 1.025 (level 4), the carriers are differently typed with exactly two physical/null directions to determine, and the hazard scale cancels — so the tangent-to-history embedding is not selected and a fitted bridge is not a derivation (Part XII-sedecies).

57. The block-diagonality theorem is exact: at the zero-entropy neutral-singlet canvas, every first-order channel of the current PFDMI action has rank 0 — generator and density commutators exactly 0, the 98 × 144 gauge-link Jacobian rank 0, the representation-current orbit rank 0, all seven central population first derivatives 0 — while the mark/Kraus derivative stays strong (rank 155) on the support-preserving 45-dimensional charged carrier; nonneutral distinguishability is born strictly quadratically (rank 94) with neutral first-order rank 4, reproducing the 98 = 94 + 4 structure as the only one the action can produce (Part XII-septendecies).

58. The intertwiner is retyped: no ordinary linear ι_n exists; the correct object is a graded innovation functor — support-changing amplitude birth at first order,

probabilities and Casimirs at second, bosonic completion at mixed second, CAR/Fock at mixed third — the Part XII-duodecies grading recurring at the void boundary as a theorem about the action (Part XII-septendecies).

59. The missing support is localised exactly by an explicit minimal witness: 49 complex birth directions $B_\alpha = |v_\alpha\rangle\langle\Omega|$ — 47 = 50 − 3 into the nonneutral projectors and 2 = 3 − 1 within the neutral singlet — spanning the full $\mathbb{C}P^{49}$ tangent at real rank 98 with void-orthogonality 10^{-17}, automatically typed by the seven central projectors; existence and sufficiency proved, provenance open (Part XII-septendecies).

60. The 98/96 boundary is unselectable by the parent: with all 94 nonneutral directions retained, the difference is a rank-2 plane in the neutral S_3 standard doublet; a continuous S_3-invariant plane family exists (commutators exactly 0) and every sampled member admits exact FCHI pullback ($\leq 2.9 \times 10^{-10}$), so plane selection must come from the derived birth law or a nullity proof, never from fit (Part XII-septendecies).

61. Deterministic birth is impossible: the joint faithful-gauge × S_3 action has no nonzero fixed vector on the $\mathbb{C}P^{49}$ void tangent (fixed dimension 0, residuals exactly 0), so any pre-fact law must return a covariant marked multiplet or invariant ensemble spanning all 49 complex directions — the septendecies witness support is forced (Part XII-duodevicies).

62. The birth covariance cone is exactly parameterised: twelve inequivalent gauge × S_3 components with $K_{birth} = \Sigma\, k_j P_j$ and eleven free ratios after normalisation; the existing principles do not select them — four explicit blind full-support laws differ by up to 0.8819 and yield different Tick-Race role probabilities, and the maximum-entropy $I_{98}/98$ (entropy exactly ln 98) is unique only under an added maximum-ignorance axiom (Part XII-duodevicies).

63. The rank-96 parent fails exact admission by 2: all 98 void-metric eigenvalues are strictly positive at both levels (minima reproducing the sedecies values to ten digits), the two smallest modes are exactly neutral-supported and carry $\sim 4 \times 10^{-7}$ of the trace — explaining the parent's excellent fit — yet are genuine distinctions, so under no-hidden-distinction the minimum history-plus-record carrier has dimension $\geq 104 = 98 + 6$, and the septendecies two-plane is settled as genuine rather than null (Part XII-duodevicies).

64. A scalar commitment-capacity field supplies a common causal kernel and hazard shape but cannot choose the twelve internal stiffnesses; the commitment strength q remains to be derived from Fold ontology (Part XII-duodevicies).

65. The two source-supported pre-fact tensors agree exactly off the neutral sector: the matched Fubini–Study metric 2 I_{98} and the void-distinguishability Hessian W_D coincide on all 94 nonneutral real directions to 2.2×10^{-17} at both levels, collapsing the eleven duodevicies stiffness ratios to a single neutral four-plane action/response parameter (Part XII-undevicies).

66. The neutral four-plane has exact spectral structure: its W_D spectrum is pairwise complementary to 8 — $\lambda_1 + \lambda_4 = \lambda_2 + \lambda_3 = 8$ at both levels, extending the sedecies sum rule — with trace exactly 16, making the best scalar FS-fit the exact rational 51/49 (the trace ratio 204/196) with irreducible residual 0.397 (Part XII-undevicies).

67. The surviving family $G_\theta = (1 - \theta)\cdot 2I_{98} + \theta\cdot W_D$ (a declared lower-bound witness) carries exact rational endpoint role weights — N_R: 2/49 ($\theta = 0$) and 4/51 direct ($\theta = 1$); Q_L: 18/49 and 6/17 — and the $\theta = 1$ inverse covariance concentrates 0.999607 on the neutral role as a diagnostic of the two tiny curvatures; declaring full projective isotropy selects $\theta = 0$ with inverse covariance $I_{98}/98$, reproducing the maximum-entropy branch without a separate ignorance axiom, so two prior conditional declarations are unified into one (Part XII-undevicies).

68. The rank correction is realised structurally: $H_{104} = G_\theta \oplus 0_6$ is explicitly constructed at both regulators — dimension 104, positive rank 98, six exact persistent-record nulls — as a one-parameter family whose unique physical member awaits the action-to-hazard bridge; Fact-Momentum is confirmed structurally unable to supply the internal tensor (Part XII-undevicies).

69. The Tick-Race is timeless: with a dimensionless cumulative commitment-opportunity coordinate, proportional first-passage winner probabilities equal $w_A/\Sigma w_B$ for every tested baseline shape (residual 5.3×10^{-16}) and are invariant under all common monotone reparameterisations (zero mismatches in 250,000 races × 5 transformations) — fact order is well defined without background time (Part XII-vicies).

70. The Born rule is a typing theorem within the frozen alternatives: global phase covariance $J^T G J = G$ holds in the family G_θ only at $\theta = 0$ at both levels, exhaustive-branch additivity returns $2 I_{98}$ exactly (completeness $\leq 3.7 \times 10^{-16}$, selection Hessian equal to FS at 3.7×10^{-17}), and readout Fisher is rejected by type as a primitive selection metric because it is readout-count contextual — so the primitive next-fact law is $p_A(z) = \|P_A z\|^2/\|z\|^2$ (Part XII-vicies).

71. The θ ambiguity is removed by object typing, not fitting: $G_{pre} = 2 I_{98}$ is the pre-fact kinematic/selection geometry and $H_{response} = W_D$ the post-fact response geometry — differently typed objects admitting no physical interpolation — with $H_{CMR104} = W_D \oplus 0_6$ retyped as the unique frozen response completion (rank 98, nullity 6, drift 1.09×10^{-5}); the undevicies exact structure (pairwise-8 spectrum, trace 16, 51/49) stands as facts about the response, and the FS selection geometry is upgraded from conditional declaration to phase-covariance-forced (Part XII-vicies).

72. The isotropic no-information prior on the FS sphere gives mean role weights exactly dimension/98 — 2/49, 6/49, 2/49, 18/49, 9/49, 3/49, 9/49, summing to 1 and reproducing the undevicies $\theta = 0$ endpoint — typed strictly as an epistemic boundary, not a derived preparation law (Part XII-vicies).

73. Deterministic equivariant first differentiation is impossible: a complete no-private-label/refinement twirl on the $\mathbb{C}^{49}$ tangent removes the void-to-tangent coupling of an arbitrary Hermitian operator (raw 6.150 → twirled 1.36×10^{-16}, block-scalar residual 1.1×10^{-13}) — any operator invariant under a symmetry acting irreducibly on the tangent while fixing the void ray is block diagonal, conditional on the full refinement/isosymmetry bridge (Part XII-vicies-semel).

74. Loop holonomy is separated from birth exactly: the D7 relations hold at residual 0.0, single-face labels canonicalise to orientation, $\mathbb{Z}_7$ holonomy has rank 6 on the nonuniform subspace with the uniform void ray fixed exactly by all seven powers, and $B(\eta) = |V\eta\rangle\langle\Omega|$ is exactly loop-covariant (2.3×10^{-16}) — holonomy transports and phases innovations, never creates them (Part XII-vicies-semel).

75. The first fact cannot establish a global path-independent frame: such a frame on a connected N-site loop carries $(N - 1) \log_2 q$ bits — exactly 2 bits binary, exactly $2 \log_2 7 = 5.614710$ bits for $\mathbb{Z}_7$ — exceeding one Bit, so under the void/locality/no-unearned-frame axioms the first readout is a local comparison (UR-comp selected conditionally; holonomy occupancy not thereby forced) (Part XII-vicies-semel).

76. The unique unresolved preparation law is Haar/Fubini–Study on $\mathbb{C}P^{48}$ under the full unitary/refinement bridge — zero mean, covariance $I_{49}/49$, verified at 60,000 draws with mean norm at the expected $1/\sqrt{N}$ Monte-Carlo scale and role/component means at dimension fractions — typed as the law-level measure, not a derived physical preparation (Part XII-vicies-semel).

77. The D44′ primitive-innovation factorisation is conditionally discharged: exchangeability alone fails (exactly-one-of-two covariance −1/4; correlated family +0.0316), but under the newly named ER condition the de Finetti representation gives conditionally iid Bernoulli opportunities with one common dimensionless (ordinal) probability and conditional covariance exactly 0 — branch identity governed separately by the timeless Born weights — conditional on ER plus the complete directing variable (Part XII-vicies-semel).

78. The record-conditioned preparation measure is typed: $\mu\_\rho(d\eta) = Z\_\rho^{-1} \exp[-\Delta I\_\rho(\eta)]\ \mu\_FS(d\eta)$, recovering Haar exactly at constant ΔI; a nontrivial committed record reduces the full unitary symmetry, so Haar-uniqueness-after-record fails — the twelve-component covariance has rank exactly 11 with the single zero mode the normalisation shift, five valid witnesses differ by up to 0.1012, and the eleven relative tilts $\beta\_j(\rho)$ are the entire event-level freedom, with the form fixed and the coefficients not returned (Part XII-vicies-bis).

79. Availability and occupancy are separated exactly: the minimal nonbounding three-edge cycle has $\dim H^1 = 1$ over both $\mathbb{Z}_2$ and $\mathbb{Z}_7$ while the filled elementary triangle has $\dim H^1 = 0$ — nontrivial topology is a necessary independent input to any holonomy occupancy (Part XII-vicies-bis).

80. The exact $\mathbb{Z}_2$ occupancy functional is $P(\kappa = 1 \mid p) = [1 - (1 - 2p)^3]/2$ (dual-method agreement 1.1×10^{-16}), giving $P = [1 - \mathbb{E}\_\nu(1 - 2p)^3]/2$ under ER; UR-comp with

marginals alone is a NO-GO (the parity pair realises occupancy 0 and 1 at identical p = 1/2 marginals); complement-symmetric ν gives exactly 1/2, the uniform $\mathbb{Z}_7$ model exactly 6/7 (diagnostic; the observable register is $\mathbb{Z}_2$), and any nondegenerate renewal gives eventual occupancy (Part XII-vicies-bis).

81. The D45″ construction-order clause is load-bearing at event level: gluing committed cells is closed under record-distinctness, but pre-commitment gluing leaves one-record-versus-two on a shared face open, blocking the physical edge law, the realised amplitude and the realised cohomology class until decided (Part XII-vicies-bis).

82. The local commitment action has the unique additive form M_i = −ln a_i + λΔS_i under independent composition, regularity, iso-entropic neutrality and thermodynamic additivity, with Gibbs–Born unfolding P_i ∝ a_i exp(−λΔS_i) recovering the timeless Born weights exactly in the iso-entropic case (residual 6.9×10^{-18}) (Part XII-vicies-ter).

83. Extension information cannot prepare the amplitude: two orthogonal $\mathbb{C}P^{48}$ states with identical $|\eta\_i|^2$ — hence identical ΔI — were constructed at inner product 1.3×10^{-16} and Fubini–Study separation exactly π/2, leaving a generic T^{48} relative-phase fibre; and the cost part is equally non-identifying, since ΔS_i = −(1/λ)ln(q_i/a_i) + const reproduces any strictly positive target exactly with all ΔS_i ≥ 0 (four laws, three λ values, residual 5.6×10^{-17}) (Part XII-vicies-ter).

84. The shared-face law is exactly a one-parameter family: side exchange and global complement symmetry leave P_J(x, y) = exp(Jxy)/(4 cosh J) with symmetry residuals exactly 0 and uniform one-bit marginals at 1.1×10^{-16}, interpolating continuously from two effective bits (J = 0, conditionally independent sides) to one logical bit (|J| → ∞) — so symmetry and marginals do not decide one record versus two (Part XII-vicies-ter).

85. Provenance requires an independent metric term: G_γ = P_common + γP_prov with ranks 16 + 4 = 20, γ = 0 annihilating the four provenance modes (4.5×10^{-17}) to the sixteen-token quotient and γ > 0 preserving all twenty; and the necessity is exact — perfectly correlated duplication of a binary record preserves Shannon entropy, relative entropy and Fisher information identically (residuals 0.0) while independent duplication doubles all three, so no outcome-informational functional can distinguish one token from two redundant provenance tokens (Part XII-vicies-ter).

86. D45″ is reduced to one exact binary primitive, the shared-face event multiplicity m_face ∈ {1, 2}: m_face = 1 gives γ = 0, provenance rank 16 and the sixteen-token quotient graph (20 nodes → 16, 54 edges, ρ_NB = 5.952870951488, p⋆ = 0.167986171404, ξ = 62.723178 μm reproducing the published ≈ 62.72 μm alternative); m_face = 2 gives conditional independence under D44′ with A2* provenance preservation, γ > 0, rank 20 and the record-distinct graph (64 edges, ρ_NB = 5.440225970823, p⋆ = 0.183815893929, ξ = 84.071786 μm) — the branches

differing in coherence scale by 25.39%, with p⋆ exactly the Perron reciprocal and oriented relation counts exactly 2E in both (Part XII-vicies-ter).

87. The shared face carries one relational fact: under the strong transport model $g\_BA = g\_AB^{-1}$, the map $g \mapsto (g, g^{-1})$ has exactly 14 images for the 14 elements of D7, and across eight nonuniform tests $H(g, g^{-1}) = H(g)$ with $H(g^{-1}|g) = 0$ at residual exactly 0 (mutual-information identity 8.9×10^{-16}) — so counting both sides as two facts is exact double-counting, four shared faces have joint incidence rank 4 rather than 8, and the Tick-Race selects among 16 logical channels (Part XII-vicies-quater).

88. Dual physical records of one fact are exactly consistent: the sequence $0 \to P\_side(\mathbb{R}^4) \to R\_record(\mathbb{R}^{20}) \to F\_logical(\mathbb{R}^{16}) \to 0$ has isometric logical section (4.4×10^{-16}) and **provenance-kernel dimension 4** with quotient-annihilation residual 0 — the four-dimensional kernel is the whole content of the dual-provenance construction, not a vanishing one; the binary code has 2^{16} = 65,536 configurations with joint entropy 16 bits against 20 bits of summed marginals — exactly 4 bits of copy redundancy, one per shared face at joint entropy 1 bit and conditional entropy 0 — so duplication follows the single outcome and adds no Tick-Race channel and no entropy quantum (Part XII-vicies-quater).

89. Each duplicated fact forms a [2, 1, 2] repetition code: single-copy corruption is a detectable syndrome at order ε and undetected corruption requires both copies to fail at order ε^2, but two copies cannot identify which token is wrong — record robustness motivates duplication without proving it, absent a microscopic maintenance law (Part XII-vicies-quater).

90. The provenance stiffness is exactly typed: G_γ leaves every encoded logical norm unchanged for all tested γ (2.1×10^{-14}) and acts only on the four copy-disagreement syndrome modes — γ is a record-maintenance stiffness, not a probability or fact weight, so no logical-sector or Tick-Race datum can ever fix it; both stability graphs survive with re-verified Perron data (degree sums exactly 2E, p⋆ = 1/ρ_NB, PF residuals $\leq 1.1 \times 10^{-14}$) and the 25.39% coherence-scale fork now turns on record localisation rather than fact multiplicity (Part XII-vicies-quater).

91. Under the declared shared-interface incidence and readout model, duplicate copies are not required for bilateral access: accessibility is granted by premise P3, and on the four-dimensional interface both local readout maps have rank 4 while their joint readout also has rank 4, so the second readout supplies no additional independent information — duplication is unnecessary once P3 holds (not a universal disproof that locality could motivate duplication) (Part XII-vicies-quinquies).

92. The dual-copy encoding factorises exactly as one interface write composed with a deterministic copy (residual 0.0) on an eight-dimensional carrier splitting as logical rank 4 ⊕ provenance rank 4 — an algebraic constructibility result, whose reading as *temporal* downstreamness requires premise P6 and structure economy in addition; and a single binary macrorecord admits many-to-one microscopic support through two disjoint basins of eight microstates, so macroscopic duplication is not

required merely to supply a many-to-one encoding. Neither result is a dynamical stability theorem: no transition kernel, noise model or barrier has been calculated (Part XII-vicies-quinquies).

93. Under the named minimum-distinction / structure-economy discipline together with premises P1–P6, the primitive commitment writes one interface token: m_fact = 1, m_record_token,birth = 1 and **γ_birth = 0 exactly**, with the four provenance/disagreement directions real only after a downstream copying stage; the twenty-token carrier remains correct for commit-before-glue under A2* and for later proliferation (Part XII-vicies-quinquies).
94. The blind graph return selects the sixteen-token carrier with ρ_NB = 5.952870951488, p⋆ = 0.167986171404 and ξ = 62.723177696 μm under the frozen Route-M ruler; the two branch exponents (69.741216599 and 70.034156588) differ by exactly ln(84.071786/62.723178) to fifteen digits, certifying that both scales are quoted under one identical ultraviolet ruler and that the branch difference is purely structural (Part XII-vicies-quinquies). ## 40. Established as construction consequences, carrying no evidential weight
95. g_s(5.80 TeV) = 1 — a round trip of the colour boundary through Λ_6.
96. The 5.80 TeV gauge triple — the transported conditional boundary, not a completion witness.
97. The in-package ceiling reproduction — an implementation check, distinct from the cross-pipeline agreement of §28.
98. v_run = μ_0 at the matching point — definitional.
99. Level-independence of G_red and equal auxiliary gaps — theorems of the factorisation (Lemma 2).
100. G_red = diag(2/3, 1/2, 1) — readback of the inserted η (Lemma 3).

Falsifier F20 fires if any of items 13–18 is cited in support of a strict-layer claim.

41. Chronological open items (as issued; several since resolved — see the re-grading table)

1. That any numerical gauge coupling in the diagnostic ledger is the output of one physical master history.
2. That the conditional Yukawa matrices are the blind P_Y Ĥ_cl P_Y compressions the flavour corpus requires.
3. That CY3′ holds.
4. The absolute neutral sector and sterile scale.
5. The finite VBF-to-continuum scheme bridge.
6. Physical pole observables.
7. A correlated uncertainty certificate.

8. Physical regulator convergence and unique branch selection.
9. The full strong phase.
10. That the one-bit normalisation fixing λ_TPB = 1 is derived rather than declared, or that the score kernel is reproducible from its published description — an independent rebuild returns $\dot{\Sigma} = 0.185$ rather than ln 2.
11. That any action returning the object set reproduces the physical boundary: the minimal fermion-dressed action returns the objects and fails the boundary (Result N2), so object-completeness is necessary but not sufficient.
12. That regulator covariance implies physical correctness: the RCMO-1 family is convergent and derived, yet the determinant phase is regulator-stable near π at θ_top = 0, so the strong phase is unresolved — stability of a phase is not correctness of it.
13. That an internally exact CY3′ implies physical CY3′ closure: when the mixed and Hessian routes are finally built independently (Part XII-quater), they disagree at 0.37–0.49, so every prior $\sim 10^{-16}$ residue was an internal identity, not a physical confirmation.
14. That RRMK-1's 5.84×10^{-16} CY3′ residue discharges the CY3′ debt on its own: the RRMK-1 route arrays are bit-for-bit identical, so that residue verifies the functorial-lift identity, not the substrate — RRHF-1 (item 22) is what discharges the imposed-tensor objection, by deriving the lift.
15. That RRHF-1 closes the charged/gauge side unconditionally, or that PRLU-1 discharges the ledger debt: the derivation is blind and the routes genuinely separate, but PRLU-1 proves the published primitive transfer does *not* force the ledger (neutral-channel witness) — the ledger is unique only under premises PS1–PS3, of which NT and the score map are not transfer outputs. The residual debt D-CY3-ledger is localised to those two premises, not closed.
16. That PTSD-1 discharges NT or the score map: both are reduced to operator theorems, but the No-Unprotected-Recurrent-Neutral-Class theorem (PT1) is not in the corpus, and an exact rate-rescaling counterexample shows the published law does not force primitive-innovation factorisation (PT2) — the debt is reduced to two computable kernel quantities, not closed.
17. That SGPL-1 discharges NT or the score map: the structural theorems are delivered (killed-kernel absorption, marked-martingale factorisation), but the neutral matrices are inherited reduced compressions — the residual is the complete full-carrier numerical H_n and three positive-support/continuum-gap checks (Result SG4), not yet supplied.
18. That FCHI-1 admits the neutral boundary or discharges the provenance debt: the full-carrier object is supplied, positive, regulator-stable, sufficient, and its support facts and exact gap pass — but it is a *supplied* candidate (premise FC1), not shown to be uniquely forced by the unextended substrate, and the PRLU-1 witness shows uniqueness does not follow for free. The absolute scale and the physical neutral mass block remain absent.
19. *(Chronologically prior; the completion-attachment clause of this item was subsequently closed by §39 item 38 — see §38-bis. The score-metric and record-weight*

clauses remain open.) The native rank-72 score metric, the record-factor weights and the completion attachment to (φ_H, X_H0, X_H1, X_H2) are not returned — the primitive and HFB completion metrics are provably non-proportional (best scalar residual 0.8745) — so the physical HFB boundary remains not admitted pending GSJB-3.

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20. The unconditional H_CMR metric is not returned: the primitive action does not choose between the charged-minimal and neutral-extended branches and does not select an internal endpoint equilibrium ensemble; the (5, 4, 80) metric and its √count record weights are promotable only through GSJB-4 (endpoint measure + neutral-branch provenance, the standing D-NT provenance theorem).

21. The absolute common hazard scale, the typed map from the 102-dimensional physical tangent to branch distinguishabilities (two exact lifts differ by 1.727 in relative norm), and the unconditional occupancy of the neutral pre-fact carrier are not returned; all three are the GSJB-7 target, and no SI rate is determined by the fact-indexed selections.

22. The asymptotic 217-mark law is absorbing (finite-episode rank 210 against long-history rate rank 24 with zero neutral block) and neither of its two exact finite-episode lifts is unique (difference 1.5039); the GSJB-4/5 calculation reports themselves remain unsupplied, so Parts XII-quattuordecies-bis/-ter carry summary grade only.

23. The primitive innovation intertwiner ι_n from the void $\mathbb{C}P^{49}$ tangent into the 102/334-dimensional history/HFB carriers is not returned (two inequivalent exact congruence lifts), the absolute hazard scale remains free, and the faithful representation algebra itself remains a frozen input rather than a primitive derivation; all three are the GSJB-8 target.

24. The source-clean support-changing birth law is not returned: the 49-direction witness is declared, not derived; its void-relative hazards, mixed completion/CAR jets and regulator intertwining are absent; and the neutral two-plane is neither selected nor proved null — all the GSJB-9 target.

25. The relative birth stiffness (eleven ratios), the primitive cost geometry that would select it, and the 104-dimensional history-plus-record carrier with its pulled-back graded metric are not returned; the $I_{98}/98$ covariance is a conditional candidate only, and the 104 bound is itself conditional on the declared no-hidden-distinction admission — all the GSJB-10 target.

26. The action-to-hazard bridge is not returned: whether amplitudes and Tick-Race hazards are generated by G_action, its inverse, or an independent matrix-element tensor is underived, so θ, the neutral four-plane relation, and the absolute action unit remain open; the G_θ family is a lower-bound witness and other source-compatible tensors are not excluded — all the GSJB-11 target.

27. The source-native pre-fact amplitude $z(X)$ or physical preparation measure $\mu(dz)$ is not derived — the Born/Tick-Race law fixes how a supplied superposition selects the next fact, not which superposition the substrate prepares — and ordered Bits are not yet converted to metric duration; both, cleanly separated, are the GSJB-12 target.

28. The realised event-level objects are not derived: the directing state α, the record-conditioned measure $\mu(d\eta|\rho)$ and the actual $z(\rho, \alpha)$ are returned only as their unique invariant ensemble; closure-holonomy occupancy is undecided; and ER itself is a named condition, not a substrate theorem — all the GSJB-13 target.

29. The microscopic extension-information functional $\Delta I_\rho(\eta)$ (equivalently the eleven tilt coefficients), the comparison directing law $\nu_\rho(dp)$, the realised η or z and the realised holonomy class are not derived; complement symmetry of ν is not established as physical; and the D45″ construction order is undecided — all the GSJB-14 target.

30. The physical entropy costs ΔS_i, the drive affinity, the prepared relative phases, the provenance stiffness γ and the shared-face event multiplicity m_{face} are not derived — so neither D45″ branch is selected, and the 0.078% offset between the record-distinct $\xi = 84.071786$ μm and the separately frozen corpus coherence scale 84.137118546 μm is an unreconciled observation, not an identification; all the GSJB-15 target. **Corrected by Part XII-vicies-quater:** the fork is not between one and two *fact events* — $m_{fact} = 1$ is closed — but between one and two *record tokens* for that single fact; the two graphs and their coherence scales survive with this retyping.

31. The pre-commitment record-token localisation ($m_{record\_token} \in \{1, 2\}$) and the absolute provenance-maintenance stiffness γ are not derived, and the single-fact theorem itself is conditional on the source strong-model transport definition; the coherence-scale branch therefore remains open — all the GSJB-16 target.

32. The copy dynamics are not derived: whether and when the single interface record is copied into local or environmental fragments, the resulting γ_{copy}, its maintenance cost and the basin-maintenance dynamics that a stability claim would need, are all open; the D44′ event-level preparation debt (items 29 and 30 above) is untouched by the localisation selection and runs in parallel; the localisation selection itself is conditional on the named structure-economy discipline rather than on bare finite distinguishability; and the selected primitive scale $\xi = 62.723178$ μm sits 25.45% below the separately frozen corpus coherence scale 84.137118546 μm, an unreconciled cross-corpus discrepancy — all the GSJB-17 target and D-ξ-branch.

42. Re-grading table

Items whose grade or scope has changed since issue. Where a §39 or §41 entry and this table disagree, **this table governs**; where this table and a later Part disagree, the later Part governs. A per-item grade column for all 94 entries remains an editorial debt (D-editorial).

item as issued	original grade	current grade	superseded / amended by	reproduction package
§39.17 one-bit history metric (D36)	conditionally discharged	**conditional candidate return / reproducibility fail / not settled** (independent rebuild returns 0.185, not ln 2)	this table; Appendix E D36 row	kernel convention under-published — a debt in its own right
§39.17 nonzero $\mathbb{Z}_7$ occupancy (D32)	conditionally discharged	conditional candidate return (conjugate pair; residue open)	Appendix E D32 row	as issued
§39.37 / §41.19 completion attachment	open, pending GSJB-3	**closed** ($\mathbb{Z}_2 \times \mathbb{Z}_2$ route-character basis)	§39.38, Part XII-quattuordecies	full report
§41.19 native score metric and record weights	not returned	still open — endpoint non-identifiable; weights branch-conditional	Part XII-quattuordecies	full report
§39.86 shared-face fork m_face ∈ {1,2}	two possible fact events	**corrected**: m_fact = 1; only m_record_token ∈ {1,2} was open	§39.87–90, Part XII-vicies-quater	full report
§39.86 record-token localisation	open	**conditionally selected**: one interface token, γ_birth = 0	§39.91–94, Part XII-vicies-quinquies	full report
§39.48–51 endpoint measure and renewal existence	as issued	unchanged in substance, but **summary grade only**	Parts XII-quattuordecies-bis/-ter	**not audited here** — full reports absent (D-G456-REG)
§41.29–30 event-level preparation	open	still open; now typed (Gibbs–Haar family, eleven tilts) but not derived	Parts XII-vicies-bis/-ter	full reports
§43 “two forward returns plus two	current statement	**named error** (F79); two H_CMR sectors lack action-level returns	§43 as revised; §44	—

item as issued	original grade	current grade	superseded / amended by	reproducti on package
uniqueness proofs”				
Stage-A status code `BLOCKED_ON_D35 ‖ D36`	current status	**historical code**; mature form is `BLOCKED_ON_INCOMPLETE_H_CMR ‖ UNRECONCILED_XI`	§§43–44; Part X row	—
“D35 is the critical path” (Parts V and the intermediate construction sections)	current diagnosis	**stage-local**; superseded by the incomplete-H_CMR-plus-ξ formulation	§§43–44	—

Part XIV — Integrated Certificate and Next Theorem Target

Integrated Final Certificate

Certificate item	Verdict
All nine requirements attempted	PASS
Deterministic and hash-covered execution	PASS (manifest currency open)
Canonical history derivation	PASS, with exact no-screening result
Non-scalar source construction	CONDITIONAL PASS
Terminal covariant heat holonomy	PASS under H5
Two-level refinement stability (Stage-A factorised)	NOT TESTED
Two-level refinement stability (NFDMA-1 non-factorising)	PASS (internal, all tolerances met)
Regulator covariance of maintenance-record operator	PASS (internal, $\mathcal{O}(h^2)$, p = 1.99670)

Certificate item	Verdict
NFDMA-2 flavour/neutral regulator obstruction	REPAIRED
Strong phase $\bar{\theta}$	UNRESOLVED — stable near π at θ_top = 0 (RCMO branch); 0.0791 rad candidate (MHPE-1 branch)
One-bit history metric (D36)	**CONDITIONAL CANDIDATE RETURN / REPRODUCIBILITY FAIL / NOT SETTLED** — $\dot{\Sigma}$ = ln 2 with premises named, but an independent kernel rebuild returns 0.185; not yet a settled result by the D38/D40 standard
Nonzero $\mathbb{Z}_7$ occupancy (D32)	CONDITIONAL CANDIDATE RETURN — conjugate pair, residue open
No-fit gauge synthesis	SPLIT — weak/hypercharge close, colour −36% (isolates D41)
Independent CY3′ equality (free parents)	EXECUTED AND FAILED — residues 0.37–0.49, minimal action falsified
CY3′ under functorial lift (RRMK-1)	CONDITIONAL EXACT PASS — 5.84×10^{-16}, two lifts of one imposed tensor; superseded by RRHF-1
CY3′ under derived lift (RRHF-1)	DERIVED — two genuinely separate routes agree to 1.9×10^{-14}, blind, from the discrete ledger; imposed-tensor objection discharged
Charged/gauge side	CONDITIONALLY CLOSED at the action level (Result RH2); rests on the K=7 ledger (D-CY3-ledger)
Ledger forced by published transfer	NO — exact neutral-channel witness (Theorem 5, Result PS1)
Ledger uniqueness under named package	CONDITIONAL PASS (Theorem 6); debt localised to premises NT + score-map
NT as killed-kernel criterion	REDUCED (Theorem 9); radius < 1 ⟹ carrier typed and count = 3; protector theorem (PT1) open
Score map as conditional arithmetic	REDUCED (Result PT2); exact given primitive-innovation factorisation (PT2), which the counterexample shows is not yet forced
Charged-side debt	TWO COMPUTABLE KERNEL QUANTITIES (Theorem 10, Result PT3) — killed-kernel radius, and primitive-innovation factorisation
Killed-kernel absorption	PROVED (Theorem 11) — full rank ⟹ ρ(Q_ν) < 1, absorption = I_3, verified at two regulators
Marked-martingale factorisation	PROVED (Theorem 12) — quadratic score additive without independent counts; D44′ counterexample dissolved

Certificate item	Verdict
Charged-side debt, refined	ONE FULL-CARRIER OBJECT + THREE SUPPORT/GAP CHECKS (Result SG4) — numerical H_n, two positive-support facts, one continuum-gap bound
Full-carrier object	SUPPLIED (FCHI-1) — explicit 102-dim retained parent + complete Kraus instrument, positive, regenerated zero SHA mismatch
Three support facts	PASS (Result FC1) — rank-three active support, full-rank self-completion, no protector
Regulator-uniform terminal gap	EXACT (Theorem 13) — $1 - e^{-1}$, block-triangular, orientation-independent
Neutral terminal structural existence	CLOSED at retained quadratic order; residual = provenance theorem + absolute scale + physical mass block
Species/boundary interface re-execution	CONDITIONAL INTERFACE PASS (Part XII-undecies) — K=7 canonical residuals 0.0, record order 2.0018 with ¼ step ratios, CAR/Fock 144×334 $\varepsilon = 1.77\times10^{-15}$, obstruction localised to dΦ_n
Linear six-channel bridge	NOT ADMISSIBLE (Part XII-duodecies) — adjoint invariant nullity 0 for SU(3)/SU(2); rim steps $-\pi/3$ and cycle $-1/\sqrt{6}$ exact; graded source jet supplied; 48+18+6 = 72 Wilson triple consistency, Hessian min eigenvalue exactly 6
Graded-jet support descent	PASS (Part XII-tredecies) — min-norm quotient residual 9.9×10^{-16}; five witnesses $\leq 1.8\times10^{-11}$, four prescriptions $\leq 1.5\times10^{-7}$; exact Grams 13/7, $\{3-\sqrt{7}, 1, 1, 3+\sqrt{7}\}$, 45° angles; metric/attachments open (GSJB-3)
Completion attachment	CLOSED (Part XII-quattuordecies) — $\mathbb{Z}_2\times\mathbb{Z}_2$ character basis, Hessian exactly g·diag(3,3,1,1), off-diagonals $\leq 4.7\times10^{-14}$, drift 0.0 at n = 3–6; old HFB block equal-trace, spectrally different, no scalar bridge (residual 0.6417)
Native score metric	NON-IDENTIFIABLE (Part XII-quattuordecies) — rank-72 positive for all five witnesses, shape drift 1.5214 / 1.1397 trace-normalised; conjugate-branch covariance exact 0.0
Innovation-count H_CMR	TWO-BRANCH CONDITIONAL PASS (Part XII-quattuordecies) — (5,3,60) vs (5,4,80), endpoint-independent, drifts 0.0 at n = 3–6; √count record weights exact, branch planes 2.0226° (derived); promotion gated on GSJB-4
Endpoint measure	NO-GO PASS (Part XII-quattuordecies-bis, summary grade) — stationary simplex 2-dim, symmetric barycentre absorbing; species weights (3,3,6,2,9,9,18)/50 identical across witnesses, twirl I/50, Fisher shapes still differ 1.52; congruence bridge O(4)-nonunique

Certificate item	Verdict
Renewal existence	CONSTRUCTIVE PASS (Part XII-quattuordecies-ter, summary grade) — R(κ) law with exact masses r/(2r+p), p/(2r+p); rate $(1-e^{-1})/(3-e^{-1})$ at (1,1); rank 588 = 651−63; uniqueness NO-GO (lifts differ 1.7366)
Void reset and κ	ZERO-ENTROPY SELECTION PASS (Part XII-quindecies) — unique S_3 ray, void entropy 0, reset isometry 3.8×10^{-16}, uniform shadow κ = 1/3, ln 3 classical-label entropy typed; r removed as fact-time gauge
Renewal identities	EXACT (Part XII-quindecies) — mass partition = 1 with active = singlet; D = R = renewal = completed mass; Born residual ≤ 1.7×10^{-15}; mean neutral absorption exactly $2/(1-e^{-1})$; Fisher rank 774 = 837 − 63
Typed lift and hazard	NOT SELECTED (Part XII-quindecies) — two exact lifts differ 1.727; common hazard cancels from all winner probabilities; neutral occupancy conditional — GSJB-7 locked
Void-selection theorem	PASS (Part XII-sedecies) — common kernel dim 3 inside the rank-3 neutral-terminal projector; charged-minimal kernel dim 0; residuals exactly 0; post-freeze projector = N_R; neutral-extended SELECTED under void axioms
Graded void metric	FULL-RANK PASS (Part XII-sedecies) — rank 98 = 94 + 2 + 2 at both levels, drift 1.09×10^{-5}; direct key probabilities exactly 1/3; exact sum rule λ_min + λ_max = 8
Void-to-history embedding	NOT SELECTED (Part XII-sedecies) — two inequivalent exact congruence lifts (1.187/1.025); two physical/null directions undetermined; hazard free — GSJB-8 locked
Void block-diagonality	EXACT OBSTRUCTION PASS (Part XII-septendecies) — all first-order channels rank 0 (commutators exactly 0; 98×144 Jacobian rank 0; species derivatives 0) with mark/Kraus rank 155 support-preserving; linear ι_n NOT DEFINED
Minimal birth witness	EXISTENCE PASS (Part XII-septendecies) — 49 = 47 + 2 complex directions B_α =
Neutral two-plane	NOT SELECTED (Part XII-septendecies) — continuous S_3-invariant family, every plane exact FCHI pullback ≤ 2.9×10^{-10}; selection reserved to the birth law or a nullity proof — GSJB-9 locked
Birth symmetry no-go	IMPOSSIBILITY PASS (Part XII-duodevicies) — fixed tangent dimension 0 under gauge × S_3, residuals exactly 0; covariant 49-direction multiplet forced
Birth covariance cone	11-PARAMETER NONUNIQUENESS (Part XII-duodevicies) — twelve irreducible components, four blind laws differ up to 0.8819; $I_{98}/98$ conditional-unique only (entropy ln 98)

Certificate item	Verdict
Rank-96 admission	FAILS BY 2 (Part XII-duodevicies) — all 98 modes strictly positive, two smallest exactly neutral at $\sim 4\times10^{-7}$ of trace; minimum carrier 104 = 98 + 6 under the admission axiom — GSJB-10 locked
FS/W_D agreement	EXACT ON 94 DIRECTIONS (Part XII-undevicies) — residual 2.2×10^{-17} both levels; eleven ratios collapse to the neutral four-plane
Neutral four-plane	EXACT STRUCTURE (Part XII-undevicies) — spectrum pairwise-complementary to 8, trace exactly 16, best FS scalar exactly 51/49, residual 0.397
HCMR-104 family	STRUCTURAL PASS (Part XII-undevicies) — $H_{104} = G\_\theta \oplus 0_6$, rank 98, nullity 6, both levels; exact rational role weights at the endpoints; unique member NOT SELECTED — GSJB-11 locked
Timeless race	PASS (Part XII-vicies) — baseline-shape residual 5.3×10^{-16}; zero winner mismatches across 250,000 races × 5 monotone reparameterisations
Born/FS selection	TYPED-FORCED (Part XII-vicies) — phase covariance holds iff θ = 0 both levels; exhaustive branch norms sum to $2I_{98}$ exactly; readout Fisher REJECTED BY TYPE (contextual); $p\_A(z) = \lVert P\_Az\rVert^2/\lVert z\rVert^2$
Response completion	RETYPED (Part XII-vicies) — $H\_CMR104 = W\_D \oplus 0_6$, rank 98/nullity 6 both levels, drift 1.09×10^{-5}; not a pre-fact kinetic cost; θ removed as type conflation — GSJB-12 locked
First-differentiation no-go	PASS (Part XII-vicies-semel) — twirl kills any void-tangent coupling ($6.15 \to 1.4\times10^{-16}$); D7 relations and void-ray fixture exact to 0.0; B(η) loop-covariant at 2.3×10^{-16}
First-fact frame exclusion	PASS (Part XII-vicies-semel) — $(N-1)\log_2 q$ bits (2 exactly; $2\log_2 7 = 5.6147$) exceed one Bit; UR-comp selected conditionally
Law-level preparation and D44′	CONDITIONAL PASS (Part XII-vicies-semel) — Haar/FS on $\mathbb{C}P^{48}$ unique (covariance $I_{49}/49$); de Finetti under ER gives one ordinal opportunity probability with conditional covariance exactly 0; realised α/μ(dη
Record-conditioned measure	TYPED (Part XII-vicies-bis) — Gibbs–Haar family exp[−ΔI_ρ]μ_FS; Haar recovered at constant ΔI; component covariance rank exactly 11; witnesses differ 0.101; ΔI_ρ/β_j NOT returned
Occupancy separation	EXACT (Part XII-vicies-bis) — H^1 = 1 unfilled / 0 filled over $\mathbb{Z}_2$ and $\mathbb{Z}_7$; triangle law $[1-(1-2p)^3]/2$ at 1.1×10^{-16}; parity pair

Certificate item	Verdict
	gives 0 vs 1 at equal marginals (UR-comp NO-GO); symmetric $\nu \to 1/2$ exactly; $\mathbb{Z}_7$ diagnostic 6/7
Construction order	OPEN AND LOAD-BEARING (Part XII-vicies-bis) — D45″ one-record-vs-two on a pre-commitment shared face blocks the physical edge law — GSJB-14 locked
Commitment action form	STRUCTURAL PASS (Part XII-vicies-ter) — $M_i = -\ln a_i + \lambda\Delta S_i$ unique under the four stated conditions; iso-entropic Born recovery 6.9×10^{-18}
Preparation non-identifiability	EXACT NO-GO ×2 (Part XII-vicies-ter) — orthogonal states at identical ΔI, FS distance exactly $\pi/2$, T^{48} phase fibre; any positive target reproduced by non-negative ΔS at 5.6×10^{-17}
Provenance necessity	EXACT (Part XII-vicies-ter) — correlated duplication preserves entropy/KL/Fisher at 0.0 while independent duplication doubles them; G_γ ranks 16 + 4 = 20
D45″ reduction	ONE BINARY PRIMITIVE (Part XII-vicies-ter) — $m_{face} \in \{1,2\}$ → 16-token (ρ_{NB} 5.9529, ξ 62.72 μm) or 20-token (ρ_{NB} 5.4402, ξ 84.07 μm) graph; 25.39% coherence-scale split — GSJB-15 locked
Single-fact theorem	PASS CONDITIONALLY (Part XII-vicies-quater) — $g_{BA} = g_{AB}^{-1}$; 14 images for 14 D7 elements; $H(g,g^{-1}) = H(g)$, $H(g^{-1}$
D45″ correction	EVENT MULTIPLICITY CLOSED (Part XII-vicies-quater) — $m_{fact} = 1$; only $m_{record\_token} \in \{1,2\}$ remains open; post-commitment gluing still closes to two tokens under A2*
Dual-record consistency	EXACT (Part XII-vicies-quater) — $0 \to \mathbb{R}^4 \to \mathbb{R}^{20} \to \mathbb{R}^{16} \to 0$; **provenance-kernel dimension 4**, logical section isometric to 4.4×10^{-16}, quotient-annihilation residual 0; 2^{16} states, 16-bit joint entropy, exactly 4 bits redundancy; [2,1,2] codes (ε detect, ε^2 undetected)
Provenance stiffness typing	EXACT (Part XII-vicies-quater) — logical norms γ-invariant at 2.1×10^{-14}; γ acts only on the four syndrome modes; NOT derived — GSJB-16 locked
Bilateral access	NO DUPLICATION NEEDED UNDER DECLARED MODEL (Part XII-vicies-quinquies) — accessibility is premise P3; local reads rank 4 each and joint read also rank 4, so the second readout adds no independent information
Copy factorisation and encoding redundancy	EXACT, ALGEBRAIC (Part XII-vicies-quinquies) — dual write = one write ∘ deterministic copy, residual 0.0; $8 = 4 \oplus 4$; many-to-one encoding available on two 8-microstate basins. Temporal downstreamness needs P6 + economy; NOT a dynamical stability theorem

Certificate item	Verdict
Record localisation selection	CONDITIONAL PASS (Part XII-vicies-quinquies) — structure economy selects m_record_token,birth = 1, γ_birth = 0 exactly; 16-token carrier, ξ = 62.723178 μm blind; branch exponents share one frozen ruler to 15 digits; γ_copy and copy dynamics OPEN — GSJB-17 locked
Representation-resolved gauge (colour)	g_s = 1.000, gauge exact under blind differentiation; D41 addressed conditionally on RH1
Representation-resolved charged hierarchy	steep, reproduced to 7×10^{-14} blind; D42 addressed conditionally on RH1
Unique physical G_red	NOT ISSUED — NON-IDENTIFIABLE
Complete same-branch boundary	NOT ADMITTED — NON-CLOSURE PROVED
Common-scale gauge completion witness	WITHDRAWN — transport-consistency check only
Colour-scale repair	PASS in-family (Λ_3 = 0.225923 GeV)
Stability ceiling, cross-pipeline	CONFIRMED to seven figures (2.5×10^{-8} relative)
Sector-differentiated bath response	FIRST EXECUTED INSTANCE, DECLARED CONVENTION
Quark transport and scalar stability	CONDITIONAL PASS
CAR/Fock reflection positivity	NOT ESTABLISHED (determinant sign only)
Closure numerical certificate	NOT ADMITTED
Object set from one common action	RETURNED (internal)
Formal compatibility of object set + refinement	SOLVED BY CONSTRUCTION (Result N1)
Minimal constitutive action as physical boundary	FALSIFIED (Result N2)
Genuine conditional Standard Model derivation	NOT ESTABLISHED

┌──┐ │ FINAL VERDICT — COMPLETED NINE-REQUIREMENT ATTEMPT. │ │ NOT ADMITTED, and non-closure PROVED. Parameter closure not issued. │ │ │ │ Current obstruction (as revised by the later Parts): the physical │ │ H_CMR is INCOMPLETE, not merely un-unique — two of its sectors still │ │ lack action-level returns,

namely event-level preparation (D44′: │ │ ΔI_ρ, ν_ρ, realised η/z, entropy costs, phases) and post-commitment │ │ maintenance (copy dynamics, γ_{copy}, basin stability) — and the │ │ absolute length ξ is UNRECONCILED across four candidate values. │ │ D35 and D36 remain live inside that picture, D36 at conditional- │ │ candidate grade with a reproducibility failure. The obstruction is a │ │ new-information requirement, not a computational debt. │
└──┘

The terminal state is a completed structural theorem together with a proof of exactly what is missing. That is stronger than an unresolved attempt and weaker than a derivation. Both halves should be stated together whenever the result is quoted.

43. The six-into-two reduction

Corollary 4.1 establishes that new information is required; the parent RPC-1 theorem (§77) then establishes *how little*. What had been a list of six independent missing objects — the internal bath structure, the commitment dynamics, the generation-occupancy law, the absolute scale, the boundary operators, and the resolution ladder — is shown, under two named premises, to collapse into just **two primitive objects** the theory's action must produce.

> **Reduction (RPC-1 Theorem 77.1, candidate grade).** Under premise PF (a primitive Fact is a non-identity transition) and premise FP (a faithful $\mathbb{Z}_7$ phase forces $k_\Omega \neq 0$ with $|k_\Omega| = 1$ unit step), the closure problem reduces to the pair
>
> $\{ H_{CMR}, \xi \}$,
>
> where H_{CMR} is one representation-resolved commitment-maintenance action and ξ is one absolute length. The internal bath structure, commitment dynamics, boundary arrays and regulator maps are all compressions, spectral data or discretisation laws of H_{CMR}; the occupancy law dissolves because a genuine primitive Fact necessarily carries the winding that makes generations exist, so the zero-generation sector was never a competitor.

This reorganises SMC-1U's own debt ledger rather than adding to it. Under the reduction:

- **D35** (absolute normalisation) — its typed weights are reclassified as *spectral data of H_{CMR}*, not withdrawn but relocated. The absolute-scale tail becomes ξ.
- **D36** (one-bit metric), **D41** (colour-sensitive internal score), **D42** (steep-hierarchy mechanism) and **D-STRONG** — all fold into H_{CMR}'s return, since each names a property the commitment-maintenance action must have. Result MH1's requirement (that the mixed and Hessian routes agree) is the statement that H_{CMR}'s derivative equals the bosonic closure response.
- **D32** (occupancy) — dissolved to premise level (PF + FP), with Δf_{occ} retained only as a fallback.

The critical path is therefore no longer "one normalisation return." Nor is it accurately described as *two forward returns plus two uniqueness proofs* — that phrasing (a named error, F79) understates the debt, because two sectors inside H_CMR have not been returned by the action at all: the event-level preparation law (ΔI_ρ, ν_ρ, the realised amplitude, the entropy costs, the phases) and the post-commitment copying/maintenance dynamics. The accurate statement is: **complete and uniquely derive the physical H_CMR — including those two missing sectors — and separately reconcile and select the physical absolute scale ξ.** The forward returns exist at candidate grade: a representation-resolved H_CMR and an absolute length ξ, both built with no measured quantity entering. The absolute length has been reached by two independent routes — a bath-gap coherence construction ($\xi \approx 88$ μm, reproducing the electroweak scale to ten decimals) and a nonbacktracking percolation construction on the record graph ($\xi \approx 84$ μm) — agreeing to within 4.5%, the first two-route consistency on the absolute scale. **Superseded in scope by Part XII-vicies-quinquies:** after the conditional selection of the one-token primitive branch, the record-graph value belongs to the *non-primitive* dual-record/proliferated branch, so this two-route agreement can no longer be presented as support for the primitive length — at most it supports the duplicate branch. See the four-object scale ledger in that Part. What remains unproved are the two uniqueness statements: that H_CMR is the action the substrate forces (RPC-1 D44′) and that ξ's coherence branch is the one it selects (RPC-1 D45″). These map onto SMC-1U's D43 (uniqueness of the metric-graph record action) — see Appendix F.

44. The correct next theorem target

(Rewritten in the third review round; the earlier version of this section pre-dated the GSJB series and graded D36/D32 as discharged.)

Within SMC-1U's own scope, the next step is still not to improve the RG calculation, not to choose a different η vector (Corollary 3.1 forecloses it), not to search for a new terminal-record law (the existing one carries the required phase), and not to recompute at higher precision (Corollary 4.1 proves no recomputation helps). After §43 the debts are not six independent tasks but the pair { H_CMR, ξ } — with the essential amendment that H_CMR is **incomplete**, not merely un-unique.

The three primitive-action fronts.

1. **Event-level preparation (D44′).** Derive from the local commitment action the extension-information functional $\Delta I\_\rho(\eta)$ and the comparison directing law $\nu\_\rho(dp)$, and return the realised directing state and amplitude rather than only their invariant ensemble. The form of the governing action is already forced — $M\_i = -\ln a\_i + \lambda \Delta S\_i$ — and is proved insufficient on its own: identical extension information is shared by orthogonal states at Fubini–Study distance $\pi/2$, and any strictly positive target law is reproducible by some non-negative ΔS. The costs must therefore be *computed* by the action, not chosen (F72).
2. **Post-commitment maintenance (D-GSJB17).** Derive whether and when the single interface record is copied into local or environmental fragments, and calculate γ_copy, the maintenance cost, and the basin-maintenance dynamics that any stability claim would require. This is a downstream continuation after D45″, not a substitute for front 1.

3. **Absolute scale (D35 ‖ D37, D-ξ-branch, D-ξ-uniq).** Reconcile and select among the four candidate lengths — 62.723 μm (primitive one-token branch, conditionally selected), 84.072 μm (dual-record), 84.137 μm (previously frozen corpus value), ≈ 88 μm (bath-gap) — and derive the absolute normalisation set { $\hat{g}_\kappa$, ω_0, c_A, b_A, r_A, cross-blocks, Λ⋆ } with the seven susceptibilities η_i as evaluated quantities rather than unit-incidence stipulations. D36 remains live here at **conditional-candidate grade with a reproducibility failure** ($\dot{\Sigma}$ = ln 2 under named premises; independent rebuild returns 0.185), and D32 at conditional-candidate grade.

Downstream certification requirements, which are not primitive-action fronts but must also close before physical predictions: the neutral physical mass block; the scheme bridge; cross-sector regulator covariance; the strong-phase certificate; the pole constructions; the boundary arrays P_Y^{phys}, the neutral addresses and M_R^{direct}; a data-independent branch selector or an exact-degeneracy theorem for the conjugate pair; and resolution of the CAR/Fock spectral discrepancy followed by a genuine chiral OS argument.

Already addressed since the earlier version of this section, and therefore removed from the target list: the non-factorising two-level regulator question (superseded by the regulator-covariance repair and the four-level audits of the GSJB series) and independent CY3′ agreement (executed and **failed** — Part XII-quater — which is a result, not an outstanding task).

The value of this attempt remains that it converts nine open tasks into a small, named set with explicit pass conditions. What it must not be read as claiming is that the set is now one object: it is three primitive fronts plus a downstream certification list.

Appendix A — The Fermion RG Matching and Self-Consistent Quark-Threshold Theorem

A conditional one-loop VBF descent from the low-current quark projection to the common electroweak boundary, with coupled threshold closure, analytic contraction certificate, and scalar–flavour stability. This is the transport component of Requirement 8, presented in full. Premises T1–T8 of Part I §4 govern throughout.

A1. The boundary-typing problem

The conditional up-sector grid contains the singular value 1.673560. Setting $D_u(\mu_0) = D_u^{grid}$ drives λ through zero near 383.611 GeV, rejecting $R_u = \mathbb{1}_3$ under the declared scalar boundary and RG truncation. It does not reject the grid at its own projection scale: the correct reading is that $\mathbb{1}_3$ is the wrong transport operator, not that the grid is the wrong object. The independent admission condition is

$\sigma_{max}(R_u D_u^{grid}) \le 0.666093443388 \cdot \sigma_{max}(D_u^{grid})$.

Whether QCD transport produces an operator on the admissible side is the calculation executed below, compared with the bound only afterward.

Binding firewalls. The grid is a projection/readout object, never silently promoted to a Yukawa matrix at μ_0. Anomalous dimensions transport masses; triality confinement governs coloured asymptotic states, and is not used to select a mass value. Threshold masses may not be copied from the unrun grid and then used as external inputs to run that same grid. The result is native one-loop VBF and is never quoted as an $\overline{\text{MS}}$ parameter. The stability ceiling is applied only after the matching operator is calculated.

A2. Frozen inputs

$v_{cl} = 243.722807638000$ GeV, $v_{cl}/\sqrt{2} = 172.338050010654$ GeV, $M_t = 288.418066976$ GeV, $M_b = 4.805818863$ GeV, $M_c = 1.099344421$ GeV.

These three projection-layer representatives, together with $\mu_R = 2$ GeV, μ_0 and $\mu_\star = 5.80$ TeV, are the complete continuous input. No observed threshold is inserted at any stage.

A3. Colour boundary and the six-flavour scale

At one loop,

$$\alpha_s^{(n)}(\mu) = 4\pi / [\beta_0^{(n)} L_n(\mu)],\quad L_n(\mu) \equiv \ln(\mu^2/\Lambda_n^2),\quad \beta_0^{(n)} = 11 - 2n/3.$$

Imposing $g_s(\mu_\star) = 1$, i.e. $\alpha_s(\mu_\star) = 1/(4\pi)$, gives $L_6(\mu_\star) = 16\pi^2/7$ and

$$\boxed{\Lambda_6 = \mu_\star \cdot e^{-8\pi^2/7} = 73.245777\ \text{MeV}}$$

This is the only place the colour boundary enters; everything downstream is transport.

A4. Transport within a flavour interval

$$U_n(\mu_2, \mu_1) \equiv m(\mu_2)/m(\mu_1) = [\alpha_s^{(n)}(\mu_2)/\alpha_s^{(n)}(\mu_1)]^{4/\beta_0^{(n)}} = [L_n(\mu_1)/L_n(\mu_2)]^{4/\beta_0^{(n)}},$$

with $4/\beta_0^{(4)} = 12/25$, $4/\beta_0^{(5)} = 12/23$, $4/\beta_0^{(6)} = 4/7$. U_n is multiplicative, and $U_n(\mu_2, \mu_1) < 1$ for $\mu_2 > \mu_1$, so upward transport is strictly contractive on masses.

A5. Cascade lemma

> **Lemma 5 (QCD scale cascade).** Under T3 and T4,
>
> $\Lambda_n^{33-2n} = \Lambda_6^{21} \cdot \prod_{h > n} m_h^2$, $n \in \{3, 4, 5, 6\}$,
>
> the product running over the heavy thresholds decoupled below the six-flavour region. Equivalently, $\mathcal{A}(\mu) \equiv 1/\alpha_s(\mu)$ is continuous on (Λ_3, ∞) and piecewise linear in $\ln \mu$ with slope $\beta_0^{(n)}/2\pi$ on each interval, fixed by $\mathcal{A}(\mu_\star) = 4\pi$.

Proof. Sharp continuity at $\mu = m_h$ reads $\beta_0^{(n)} L_n(m_h) = \beta_0^{(n-1)} L_{n-1}(m_h)$. Writing $3\beta_0^{(n)} = 33 - 2n$ and exponentiating gives $\Lambda_{n-1}^{33-2(n-1)} = m_h^2 \Lambda_n^{33-2n}$; iterating downward from $n = 6$ yields the product. The equivalent statement follows because $1/\alpha_s^{(n)}(\mu) = \beta_0^{(n)} L_n(\mu)/4\pi$ has ln μ derivative $\beta_0^{(n)}/2\pi$, and continuity of α_s at each threshold is continuity of $\mathcal{A}$. ■

Explicitly,

$\Lambda_5 = m_t^{(2/23)} \Lambda_6^{(21/23)}$, $\Lambda_4 = (m_t m_b)^{(2/25)} \Lambda_6^{(21/25)}$, $\Lambda_3 = (m_t m_b m_c)^{(2/27)} \Lambda_6^{(7/9)}$.

Lemma 5 makes the closure problem finite-dimensional: the entire scale ladder is a function of (m_t, m_b, m_c) and the frozen Λ_6.

A6. The threshold map and admissibility

With $\Lambda_4 = \Lambda_4(m_t, m_b)$ and $\Lambda_5 = \Lambda_5(m_t)$ from Lemma 5, define

$\mathcal{T}_b(x) = M_b \cdot U_4(m_b, \mu_R)$, $\mathcal{T}_t(x) = M_t \cdot U_4(m_b, \mu_R) \cdot U_5(m_t, m_b)$, $\mathcal{T}_c(x) = M_c \cdot U_4(m_c, \mu_R)$,

and impose $x = \mathcal{T}(x)$. This joins the quark projection ledger and the threshold ledger into one calculation: $\mathcal{T}$ is not a correction applied to known thresholds, it is the definition of what a threshold is on this branch.

A root is admissible only if consistent with the flavour assignment used to build $\mathcal{T}$:

$\Lambda_3 < m_c < \mu_R < m_b < m_t < \mu_0 < \mu\star$. (A)

The returned root satisfies (A) with $0.216517 < 1.228341 < 2 < 4.213224 < 171.783690 < 243.722808 < 5800$ GeV, resolving the top-threshold typing ambiguity: μ_0 lies above m_t, so the final leg is six-flavour.

A7. Contraction lemma

Work in $\xi = (\ln m_t, \ln m_b, \ln m_c)$ and write $\ell_R \equiv L_4(\mu_R)$, $\ell_c \equiv L_4(m_c)$, $\ell_b^4 \equiv L_4(m_b)$, $\ell_b^5 \equiv L_5(m_b)$, $\ell_t \equiv L_5(m_t)$, with $a \equiv 12/25$, $\bar{a} \equiv 12/23$, $\delta_4 \equiv 4/25$, $\delta_5 \equiv 4/23$. From Lemma 5, $\partial\ln\Lambda_4/\partial\ln m_t = \partial\ln\Lambda_4/\partial\ln m_b = 2/25$ and $\partial\ln\Lambda_5/\partial\ln m_t = 2/23$, while Λ_4 and Λ_5 are independent of m_c and Λ_5 of m_b.

> **Lemma 6 (analytic log-Jacobian).** $J = \partial\ln\mathcal{T}/\partial\ln x$ is given in closed form by
>
> $J_{bt} = -a[\delta_4/\ell_R - \delta_4/\ell_b^4]$, $J_{bb} = -a[\delta_4/\ell_R + (2 - \delta_4)/\ell_b^4]$, $J_{bc} = 0$, $J_{tb} = J_{bb} + \bar{a}[2/\ell_b^5]$, $J_{tt} = J_{bt} - \bar{a}[\delta_5/\ell_b^5 + (2 - \delta_5)/\ell_t]$, $J_{tc} = 0$, $J_{ct} = J_{cb} = -a[\delta_4/\ell_R - \delta_4/\ell_c]$, $J_{cc} = -2a/\ell_c = -(24/25)/\ell_c$.
>
> Since the third column vanishes off the diagonal, spec(J) is that of the upper-left 2×2 block together with J_{cc}, and the local contraction rate is $\rho(J) = (24/25)/L_4(m_c)$.

Proof. Direct differentiation of $\ln\mathcal{T}$ using $L_n(\mu) = 2 \ln \mu - 2 \ln \Lambda_n$ and the Λ-sensitivities. For $\mathcal{T}_b$, $\ln\mathcal{T}_b = \ln M_b + a[\ln \ell_R - \ln \ell_b^4]$; differentiating in $\ln m_b$ gives $\partial\ell_R/\partial\ln m_b = -\delta_4$ and $\partial\ell_b^4/\partial\ln m_b = 2 - \delta_4$, yielding J_{bb}. The rest follow identically; the block structure holds because neither Λ_4 nor Λ_5 nor $\mathcal{T}_t$ nor $\mathcal{T}_b$ depends on m_c. ■

At the root,

$$J = \begin{bmatrix} -0.084564350 & -0.003898265 & 0 \\ -0.003898265 & -0.158379371 & 0 \\ +0.004227479 & +0.004227479 & -0.256052906 \end{bmatrix}$$

with eigenvalues $(-0.084359048, -0.158584672, -0.256052906)$, $\rho(J) = 0.256052906$ and $\|J\|_\infty = 0.264507863$. The dominant eigenvalue is exactly J_{cc} with $L_4(m_c) = 3.749225$: convergence is controlled by a single logarithm — the charm threshold against the four-flavour scale — and by nothing in the top or bottom sectors.

A8. Uniform contraction and uniqueness

Define $\mathfrak{B} = \{m_t \in [50, 400]\} \times \{m_b \in [2, 8]\} \times \{m_c \in [0.5, 2]\}$ GeV.

Every entry of J is a sum of terms $\pm(\text{const})/\ell$ with fixed positive constants, so bounding $\|J\|_\infty$ reduces to bounding five logarithms from below. Each is monotone in the masses:

Logarithm	Monotonicity on $\mathfrak{B}$	Minimising corner	Lower bound
$\ell_R = 2\ln(\mu_R/\Lambda_4)$	decreasing in m_t, m_b through Λ_4	$m_t = 400$, $m_b = 8$	4.486360
$\ell_c = 2\ln(m_c/\Lambda_4)$	increasing in m_c; decreasing in m_t, m_b	$m_c = 0.5$, $m_t = 400$, $m_b = 8$	1.713771
$\ell_b^4 = 2\ln(m_b/\Lambda_4)$	$\partial/\partial\ln m_b = 2 - 4/25 > 0$; decreasing in m_t	$m_b = 2$, $m_t = 400$	4.708167
$\ell_b^5 = 2\ln(m_b/\Lambda_5)$	increasing in m_b; decreasing in m_t	$m_b = 2$, $m_t = 400$	5.117573
$\ell_t = 2\ln(m_t/\Lambda_5)$	$\partial/\partial\ln m_t = 2 - 4/23 > 0$	$m_t = 50$	11.916966

The monotonicity follows from Lemma 5: $\Lambda_4 \propto (m_t m_b)^{2/25}$, $\Lambda_5 \propto m_t^{2/23}$, with Λ_4 and Λ_5 independent of m_c and Λ_5 of m_b. The auxiliary ranges on $\mathfrak{B}$ are $\Lambda_4 \in [160.849, 212.241]$ MeV and $\Lambda_5 \in [129.191, 154.797]$ MeV.

Substituting into Lemma 6 and bounding each row by the triangle inequality gives the rigorous interval bounds

row t ≤ 0.539718, row b ≤ 0.238138, row c ≤ 0.649795, hence $\|J\|_\infty \le 0.649795 < 1$ on $\mathfrak{B}$.

This bound is uniform and does not rely on locating the extremum. The extremum can nevertheless be located, and the two agree in structure — the charm row dominates in both: $\sup_{\mathfrak{B}} \|J\|_\infty = 0.615558$, attained at (400, 8, 0.5) GeV, the corner simultaneously maximising Λ_4 and minimising m_c, which is exactly the corner minimising ℓ_c. Direct evaluation also confirms $\mathcal{T}(\mathfrak{B}) \subset \mathfrak{B}$.

> **Proposition A1.** Under T1–T5, $x = \mathcal{T}(x)$ has exactly one solution in $\mathfrak{B}$, and fixed-point iteration from any starting point in $\mathfrak{B}$ converges geometrically with ratio at

most 0.649795 — and at most 0.615558 by direct evaluation — and asymptotically with ratio 0.256052906.

Uniqueness is thus a consequence of the contraction property rather than an observation about starting points. An independent multistart audit (100 starts drawn from $m_t \in [140, 220]$, $m_b \in [3.5, 5.2]$, $m_c \in [1.0, 1.5]$ GeV) converges to the same root with maximum spread 1.194×10^{-11} GeV, and is reported as confirmation, not evidence.

A9. Threshold and matching theorems

Numerical certificate. From the superseded frozen ledger (291.827000, 4.862540, 1.112410) GeV, iteration gives 172.446896 / 4.230502 / 1.218751 at step 2, 171.789099 / 4.213672 / 1.227693 at step 4, and 171.783691 / 4.213224 / 1.228338 at step 8, with residual 8.527×10^{-14} GeV at the limit. The observed decade-per-1.7-iterations rate matches the predicted asymptotic ratio 0.256, itself a check on Lemma 6.

Theorem 7 (self-consistent threshold closure). Under T1–T5 the coupled equations have a unique solution in $\mathfrak{B}$,

$$\boxed{\begin{aligned}(m_t, m_b, m_c) &= (171.783689943, 4.213223810, 1.228341125)\ \mathrm{GeV}\\ (\Lambda_6, \Lambda_5, \Lambda_4, \Lambda_3) &= (73.245777, 143.827986, 188.445205, 216.516653)\ \mathrm{MeV}\end{aligned}}$$

satisfying the admissibility ordering (A).

Flavour blindness. At one loop $\gamma_m = 6C_F g_s^2/(16\pi^2)$ with $C_F = 4/3$ carries no generation index and no dependence on electric charge or weak isospin, so the transport operator on generation space is a positive multiple of the identity, identical for up and down sectors. This is a loop-order and colour-representation statement, not a phenomenological universality assumption.

Closed form. Since $m_c < \mu_R < m_b < m_t < \mu_0$,

$$r_q(\mu_0 \leftarrow \mu_R) = [L_4(\mu_R)/L_4(m_b)]^{(12/25)} \cdot [L_5(m_b)/L_5(m_t)]^{(12/23)} \cdot [L_6(m_t)/L_6(\mu_0)]^{(4/7)},$$

with legs $U_4 = 0.876695$, $U_5 = 0.679348$, $U_6 = 0.975118$, hence

$$\boxed{r_q = 0.580788332942}$$

and, on the same branch, $r_q(m_t \leftarrow 2\ \mathrm{GeV}) = 0.595606550395$ and $r_q(5.80\ \mathrm{TeV} \leftarrow 2\ \mathrm{GeV}) = 0.481003016501$.

Theorem 8 (common quark RG matching). Under Theorem 7 and T3,

$$R_u^{QCD}(\mu_0 \leftarrow \mu_R) = R_d^{QCD}(\mu_0 \leftarrow \mu_R) = 0.580788332942 \cdot \mathbb{1}_3,$$

so $Y\_u(\mu_0) = r\_q Y\_u$^grid and $Y\_d(\mu_0) = r\_q Y\_d$^grid. The matching preserves every within-sector singular-value ratio, both singular frames, matrix rank, determinant phase, and the matching-step CKM frame.

Proof. Piecewise integration across the four-, five- and six-flavour intervals gives the scalar. Multiplication by a positive scalar commutes with the SVD: if $Y = U \Sigma V^\dagger$, then $rY = U(r\Sigma)V^\dagger$, so frames are unchanged and Σ is uniformly rescaled, fixing all ratios. Rank is unchanged since $r > 0$; the determinant scales by $r^3 > 0$, leaving its phase unchanged; and since both quark left frames are individually unchanged, $V\_CKM = U\_uL^\dagger U\_dL$ is unchanged. ■

Non-insertion remark. The value is not selected because it resembles $1/\sqrt{3} = 0.577350$ (from which it differs by 0.596%), because it returns a familiar heavy-quark number, or because it passes the stability test. It is the output of the closed form given the frozen grid and colour boundary alone.

A10. Robustness

Readout-scale response. d ln r_q / d ln μ_R = 0.200487, against the frozen-threshold value a·(2/ℓ_R) = 0.203209: self-consistency *damps* the readout sensitivity by 1.34%, since raising μ_R raises the thresholds, partially offsetting the shortened transport interval.

Re-solving the entire fixed point across and beyond the preregistered band:

μ_R (GeV)	m_t	m_b	m_c	$r\_q(\mu_0)$	Stability
1.968	171.265401	4.201324	1.225106	0.578907188	PASS
2.000	171.783690	4.213224	1.228341	0.580788333	PASS
2.127	173.745901	4.258262	1.240584	0.587913564	PASS
2.184	174.581105	4.277426	1.245792	0.590947960	PASS
2.303	176.243151	4.315551	1.256151	0.596989163	PASS
3.000	184.273262	4.499542	1.306109	0.626228239	PASS
4.000	192.579907	4.689527	1.357633	0.656560530	PASS
4.390909	195.185762	4.749057	1.373765	**0.666093443**	**breach**
4.500	195.865022	4.764570	1.377968	0.668579702	FAIL
4.700	197.062037	4.791901	1.385372	0.672962406	FAIL
4.805819 = M_b	197.671709	4.805818863	1.389142	0.675195287	FAIL (terminus)

Every row satisfies ordering (A), so failures above the breach are genuine stability failures of an admissible branch, not artefacts of a broken flavour assignment.

Proposition A2 (readout-scale breach). Under T1–T7 the stability admission holds for every readout convention μ_R < μ_R^crit = 4.390909 GeV, and fails above it. Since the preregistered band lies entirely below μ_R^crit, the pass is independent of the readout convention throughout that band. It does not extend to the entire mathematically admissible four-flavour window.

The window boundary is exact: setting μ_R = m_b makes U_4(m_b, μ_R) = 1, so the closure equation collapses to m_b = M_b identically, and the four-flavour readout window terminates at μ_R^window = M_b = 4.805818863 GeV, where r_q = 0.675195 exceeds the ceiling. There is consequently a genuine failing sub-interval

4.390909 GeV < μ_R < 4.805818863 GeV

in which the closure still has a unique admissible root but the matching multiplier exceeds the ceiling. This is a sharpening rather than a blemish: the theorem locates the point at which its convention would begin to matter, and converts an unbounded readout freedom into the derived constraint μ_R < 4.390909 GeV.

Alternative branch. The alternative audit branch returns (m_t, m_b, m_c) = (173.648640, 4.255969, 1.240041) GeV and r_q = 0.580280141838, differing by −0.0875%. The verdict is unchanged.

Value of closure. The earlier one-way threshold calculation returned r_q^frozen = 0.576972794275 against the coupled 0.580788332942, a shift of +0.661%. The earlier result was already admissible; what the coupled theorem adds is the removal of the circularity itself and the resolution of the top-threshold ordering.

Perturbative control.

Scale	α_s	α_s/π
m_c = 1.228341 GeV	0.402207	0.128024
μ_R = 2 GeV	0.319201	0.101599
m_b = 4.213224 GeV	0.242658	0.077239
m_t = 171.783690 GeV	0.115666	0.036817
μ_0 = 243.722808 GeV	0.110678	0.035229
μ⋆ = 5.80 TeV	0.079577	0.025330

Comfortable above the bottom threshold, marginal at the charm threshold — the honest source of the scheme debt, and the reason the charm channel, which also sets the contraction rate, is the least controlled part of the calculation.

Two-loop stress branch. A self-consistent two-loop diagnostic without finite VBF subtraction or finite threshold matching returns (145.804105, 3.956526, 1.317813) GeV and r_q = 0.484458755000, also below the ceiling. This is *not* promoted to a production result. The permitted conclusion is exactly: the stability pass is not an artefact of the one-loop coefficient, and the precision value of r_q remains a scheme debt.

A11. Cross-sector stability

0.580788332942 < 0.666093443388,

a relative margin of 12.806778%, equivalently a logarithmic margin of 0.137058, sending the largest up singular value to 0.971984122478 < 1.114747343116.

The full complex matrices are evolved with the one-loop reference system,

$16\pi^2\, dY_u/dt = (3/2)(Y_u Y_u^\dagger - Y_d Y_d^\dagger) Y_u + Y_u[T_Y - (17/12)g'^2 - (9/4)g^2 - 8g_s^2]$, $16\pi^2\, dY_d/dt = (3/2)(Y_d Y_d^\dagger - Y_u Y_u^\dagger) Y_d + Y_d[T_Y - (5/12)g'^2 - (9/4)g^2 - 8g_s^2]$,

with $T_Y = \mathrm{Tr}(3Y_u Y_u^\dagger + 3Y_d Y_d^\dagger + Y_e Y_e^\dagger)$ and the full quartic trace retained in β_λ. The result is $\lambda(\mu) > 0$ on $[\mu_0, \mu\star]$ with

$\lambda(5.80\ \mathrm{TeV}) = 0.068065835223$,

the minimum at the upper endpoint, so the certificate is an endpoint certificate with no concealed interior approach.

At $\mu\star$ the spectra are $\sigma(Y_u) = (6.145327624235\times10^{-6}, 3.153746193953\times10^{-3}, 0.848101152080)$ and $\sigma(Y_d) = (1.334385233698\times10^{-5}, 2.668568752986\times10^{-4}, 0.013482868555)$, with J_q moving from $-2.996770873555\times10^{-5}$ to $-3.148471821472\times10^{-5}$ by transport alone.

A12. Transport-layer debts

1. Scheme-invariant derivation of the substrate readout scale, bounded by $\mu_R < 4.390909$ GeV.
2. Finite VBF → standard-scheme quark-mass bridge.
3. **The coupled charm weakness.** The charm channel is simultaneously the rate-setting sector — the contraction rate is exactly $\rho(J) = J_{cc} = (24/25)/L_4(m_c)$, controlled by the charm threshold alone (§A7) — and the least perturbatively controlled sector, with $\alpha_s/\pi \approx 0.13$ there against ≈ 0.077 at the bottom threshold. So higher-loop running, finite decoupling coefficients, and a controlled two-loop production branch all bite hardest exactly where the convergence rate is set. This single linkage, not two separate loop-order debts, is the real weakness of the transport layer.
4. Derivation of B_{col} from the microscopic operators, which the RG operator does not supply and must not be relabelled as.
5. The blind quark frame from the projected Hessian.
6. P_Y^{micro}, chiral species embeddings and the dressed left–right bilinear.
7. A machine-checked interval proof of global uniqueness beyond $\mathfrak{B}$.

Appendix B — Numerical Certificates

B1. Stage-A certificates

Certificate	Value
rank J_D	183
analytic null residual	$8.573514{\times}10^{-16}$
source orthogonality residual	$3.845925{\times}10^{-16}$
source Fisher orthogonality residual	$2.763438{\times}10^{-13}$
source reconstruction residual	$2.862544{\times}10^{-13}$
W_prim minimum eigenvalue	$-4.285483{\times}10^{-14}$
W_prim rank	183
G_red conditional target residual	$2.127111{\times}10^{-15}$
G_red core identity residual	$2.896404{\times}10^{-15}$
G_red saturated zero residual	$4.198567{\times}10^{-16}$
spatial lift isometry residual	$6.633966{\times}10^{-16}$
spatial generator intertwining residual	$7.187033{\times}10^{-16}$
spatial heat intertwining residual	$6.422882{\times}10^{-16}$
conductance pairing residual	0
branch operator central commutator, both levels	0
branch root refinement residual	$1.887379{\times}10^{-15}$
terminal T_0 lumpability residual	0
terminal heat lumpability residual	$1.922963{\times}10^{-16}$
terminal T_0 Wilson residual	$2.482534{\times}10^{-16}$
terminal entry-readout Wilson residual at a_t = 1	0.370538046592
terminal Wilson residual, a_t → 0 (generator readout)	$4.35{\times}10^{-9}$ at a_t = 10^{-8}, $\mathcal{O}$(a_t)
score-bath Schur identity residual	$6.9{\times}10^{-18}$
score-bath m2 darkness	$\leq 9{\times}10^{-17}$
CAR residual	0
Fock trace/determinant residual	$9.947598{\times}10^{-14}$
Fock transfer minimum eigenvalue	1

The three G_red residuals changed meaning rather than value in this reading: together they constitute the proof of Lemma 3 rather than three independent consistency checks.

B2. Transport-layer ledger

Grid singular spectra (pre-matching).

$\sigma(Y\_u\hat{}grid) = (1.243000000000\times10^{-5}, 6.379000000000\times10^{-3}, 1.673560000000)$, $\sigma(Y\_d\hat{}grid) = (2.692600000000\times10^{-5}, 5.385000000000\times10^{-4}, 0.027886000000)$, $\sigma(Y\_e) = (2.991800000000\times10^{-6}, 6.197000000000\times10^{-4}, 0.010696000000)$.

Boundary couplings at μ_0.

$g' = 0.341991048898$, $g = 0.650476840991$, $g\_s = 1.179332652482$, $\lambda = 0.128999748047$, $\mu\_H^2 = 7662.689132\ \text{GeV}^2$.

Logarithm ledger ($L\_n(\mu) = \ln(\mu^2/\Lambda\_n^2)$).

Quantity	Value
$L_4(\mu\_R)$	4.724190373182
$L_4(m\_c)$	3.749225173118
$L_4(m\_b)$	6.214352222721
$L_5(m\_b)$	6.754730676871
$L_5(m\_t)$	14.170746603693
$L_6(m\_t)$	15.520341518331
$L_6(\mu_0)$	16.219932471343
$L_6(\mu\star)$	$16\pi^2/7 = 22.559097571051$

Transport legs. $U_4(m\_b \leftarrow \mu\_R) = 0.876694676$, $U_5(m\_t \leftarrow m\_b) = 0.679348243$, $U_6(\mu_0 \leftarrow m\_t) = 0.975118217$.

Contraction data. $J\_tt = -0.084564350$, $J\_tb = -0.003898265$, $J\_bt = -0.003898265$, $J\_bb = -0.158379371$, $J\_ct = J\_cb = +0.004227479$, $J\_cc = -0.256052906$; $\mathrm{eig}(J) = (-0.084359048, -0.158584672, -0.256052906)$; $\rho(J) = 0.256052906$; $\|J\|\infty = 0.264507863$; $\sup\_\mathfrak{B} \|J\|\infty = 0.615558$; rigorous interval bound on $\mathfrak{B} = 0.649795$.

Sensitivity and window. $d \ln r\_q/d \ln \mu\_R = 0.200487$; $\mu\_R\hat{}crit = 4.390909$ GeV; $\mu\_R\hat{}window = M\_b = 4.805818863$ GeV with $r\_q = 0.675195287$.

B3. Diagnostic-layer cross-sector ledger

Identity	Result	Grade
Vacuum $v^2 = \mu\_H^2/\lambda$ at μ_0	1.428×10^{-10} GeV	Conditional pass by construction
QCD threshold fixed point	8.527×10^{-14} GeV	Pass at declared order
QCD matching arrays	exact reconstruction	Pass
Scalar stability	$\lambda\_min = 0.068065835223$	Conditional pass
Ceiling reproduction in-package	residual 0	Pass — implementation check only
Ceiling cross-pipeline agreement	7 figures, 2.5×10^{-8} relative	Pass — independent

Identity	Result	Grade
Colour round trip $g_s(\mu\star) = 1$	exact	Tautology; integrator check only
CKM unitarity	$\approx 10^{-15}$	Pass
CKM matrix/commutator CP route	$<3\times10^{-16}$	Pass
Frame randomisation	$<3\times10^{-13}$	Pass
Top-entry transport identity	$167.509848/U_6 = 171.784$ GeV	Pass — identity, not agreement
Score-bath Schur identity	6.9×10^{-18}	Pass on the declared-convention branch
Determinant phase	≈ 0	Partial only
CY3′	no mixed vertex	Not executable
Neutral Schur	no absolute neutral block	Not executable
Ward / Slavnov–Taylor	no production effective action	Not executable
Scheme identity	no second scheme or finite bridge	Not executable
Regulator identity	no physical two-level return	Not executable
Pole identities	no self-energy calculation	Not executable

Appendix C — Reproduction and Re-Audit Algorithm

The audit order is fixed in advance; the stability comparison may not be moved earlier.

Transport layer.

1. Load the frozen conditional Y_u, Y_d, Y_e arrays and convert heavy grid singular values to projection-layer representatives using $v_{cl}/\sqrt{2}$.
2. Set $g_s(5.80\text{ TeV}) = 1$ and calculate $\Lambda_6 = \mu\star\, e^{(-8\pi^2/7)}$.
3. Define $\Lambda_5(m_t)$, $\Lambda_4(m_t, m_b)$, $\Lambda_3(m_t, m_b, m_c)$ via Lemma 5, and the threshold map of §A6.
4. Verify $\mathcal{T}(\mathfrak{B}) \subset \mathfrak{B}$ and $\sup_{\mathfrak{B}} \|D\mathcal{T}\|_\infty < 1$ using the closed-form entries of Lemma 6.
5. Solve $x = \mathcal{T}(x)$; confirm ordering (A) and the residual.
6. Calculate r_q through the $n_f = 4, 5, 6$ intervals; set $R_u = R_d = r_q \cdot \mathbb{1}_3$.
7. Evolve the full matrix and scalar system to 5.80 TeV.
8. Publish root residuals, analytic and numerical Jacobians, multistart audit, singular spectra, CKM invariants and the scalar minimum.
9. **Only then** compare with the preregistered stability gate.

10. Re-solve across the readout band and locate μ_R^{crit} by bisection.

Stage-A layer.

11. Rerun the all-nine solver with seed 20260719 and the frozen tolerance block.
12. Recompute the terminal connection by both readouts, $U^{entry} = \mathrm{Pol}[T_{yx}]$ and $U^{rec} = \mathrm{Pol}[-\mathbf{L}_{yx}]$.
13. Verify U^{rec} is a_t-independent by evaluating the Wilson phase at $a_t \in \{10^{-4}, 10^{-2}, 1, 5\}$ and confirming a constant $2\pi/7$.
14. Reproduce the entry-readout continuation and fit the small-time slope; confirm 0.434765.
15. Evaluate G_{red} at $\eta = 0$, at the frozen branch, and at the saturated audit point; confirm $\mathbb{1}_3$, diag(2/3, 1/2, 1) and 0, thereby confirming Lemma 3 at three points.
16. Confirm the factorisation dimensions $748 = 4\times187$ and $1309 = 7\times187$ and the equality of the minimum auxiliary eigenvalues.
17. Re-audit the CAR/Fock branch by reporting the full one-particle spectrum alongside the 6-mode Fock spectrum in the same units.
18. Reproduce all six witness families of Theorem 4 and confirm each leaves every certified corpus quantity invariant; in particular verify that the neutral (a, a^2) scaling preserves the light operator to machine precision while the heavy spectrum moves four orders.
19. Re-derive the score kernel from its published description and report $\dot{\Sigma}$; the current discrepancy against ln 2 is an open debt.

Diagnostic layer.

20. Confirm the colour round trip by evaluating $1/\alpha_s(\mu_0) + (\beta_0/2\pi) \ln(\mu\star/\mu_0)$ against 4π, and confirm independence from the Yukawa sector at one loop.
21. Recompute the 5.80 TeV gauge triple from the μ_0 inputs alone and confirm it reproduces §35, establishing that it carries no independent information.
22. Recompute $r_{u,crit}$ on the colour-completed branch and confirm agreement to seven figures, retaining the eighth-digit difference as the evidence of pipeline independence.
23. Verify 167.509848 / 0.975118217 against the threshold m_t.
24. Confirm that no table heading in the transported ledger uses the word “mass”.
25. Replace any bundled superseded source with current text and regenerate the SHA-256 manifest.
26. Re-publish the gate ledger with the corrected gradings.

Maintenance-record layer (RCMO-1).

27. Build the maintenance-record operator $M_\Omega^{(n)}$ from the six address slots and $s = (0, +1, -1, 0, -1, +1)$ on the fixed metric multigraph; subdivide dyadically and recompute the physical carrier at each level.
28. Derive the blocking map $B_{n+1\to n} = (OO^\dagger)^{-1/2}O$ from the carrier overlap and confirm its unitarity residual $\approx 2.2\times10^{-15}$ independently of the operator.

29. Tabulate the blocked mismatch across levels and confirm the successive ratios approach 4 and the fitted order approaches 2; confirm the level-3/level-4 subspace overlap ≥0.99998.
30. Richardson-extrapolate the spectrum and report the remaining spectral error; confirm the invariant eigenvalue 1.
31. Substitute the converged family into the frozen NFDMA-2 action and confirm each previously-failing subsystem falls to a few percent.
32. Confirm the determinant phase is regulator-stable and report its value at $\theta\_top = 0$; do not record it as a resolved strong phase.

Reduced-evaluation layer (MHPE-1).

33. Confirm the frozen core manifest is written before the comparison script opens any conditional boundary, and that its keys contain no target or boundary array.
34. Solve the one-bit irreversible-score equation forward and confirm $\dot{\Sigma} = \ln 2$ to $\sim 10^{-16}$ and the positive W_prim spectrum; record D36 as a **conditional candidate with premises named**; then attempt an independent rebuild of the kernel from the published narrative alone — the reference rebuild returns $\dot{\Sigma} = 0.185$, not ln 2, so D36 must be recorded as **not settled** until that discrepancy is resolved (F81).
35. Build the mixed route from the oriented-completion derivative and the Hessian route from the bosonic closure Hessian *independently*, and confirm neither array is a copy of the other before comparing.
36. Report the per-sector CY3′ residues and confirm max $\varepsilon\_CY3' \approx 0.49 \gg 10^{-8}$; confirm via the two-level table that the residues are regulator-stable, so the failure is a property of the candidate.
37. Assemble the no-fit gauge synthesis from the current trace and score fractions with no measured input, and report the split (colour ≈ −36%, weak/hypercharge within ~10%).
38. Execute the neutral a-scaling (a = 1, 10, 100) and confirm the light seesaw operator is invariant to $\sim 10^{-16}$ while heavy masses move four orders — the executed instance of Theorem 4 witness family 5.

Representation-resolved-kernel layer (RRMK-1).

39. Verify the package SHA-256 against its manifest, and confirm the conditional comparison is opened only after the construction manifest is frozen.
40. Assemble the gauge Schur census from Z = (1, 5/2, 298) and confirm (g_s, g, g′) = (1.000, 0.6325, 0.3476) with a positive 24×24 gauge Hessian (min eig 0.475).
41. **Load the two CY3′ route arrays (fermion_vertex_derivative, bosonic_cross_derivative) and check whether they are independent.** They are bit-for-bit identical at both levels — so the 5.84×10^{-16} residue is the functorial-lift identity, not two free parents agreeing. Record it as CONDITIONAL, never as a discharge (F34).
42. Confirm the charged singular values within 0.03% of the boundary, the steep spectrum, CKM unitarity to $\sim 10^{-16}$, and the low Jarlskog (-1.86×10^{-5}); grade the quark frame partial.

43. Confirm the RCMO continuation: CY3′ residue, bosonic Hessian min eigenvalue, spectra and CKM/PMNS drift all stable across levels 3→4.

History-functional layer (RRHF-1).

44. Verify the package SHA-256, and confirm the core seal: `target_directory_empty = true` and `comparison_opened_after_core_seal = true` — the parent action is frozen before any comparison.
45. **Re-run the array-identity check that discriminated RRMK-1 from RRHF-1:** load the two CY3′ route arrays and confirm `array_equal → False` at both levels (genuinely separate), agreeing to $\sim 2.6\times10^{-16}$ — versus RRMK-1's bit-for-bit identity. This is the discriminator; record RH1 only if it passes.
46. Confirm the blind reproduction: gauge Schur max relative 0.0, charged operator to 7×10^{-14}, CY3′ max 1.9×10^{-14}, with no RRMK array or target value in the core manifest hashes.
47. Confirm the improvement over the unextended parent law: CY3′ 0.493 → 1.9×10^{-14}, colour 0.546 → 0.
48. Confirm that the residual debt is recorded as the ledger-provenance question (D-CY3-ledger), not as an unconditional charged/gauge closure (F35).

Ledger-uniqueness layer (PRLU-1).

49. Enumerate the K=7 rim automorphism group and confirm order 12, hence 6!/12 = 60 inequivalent role assignments; confirm the 15 perfect matchings reduce to 4 strongly lumpable and 1 layer-equivalent (the antipodal pairing).
50. **Run the neutral-channel witness:** with per-channel Abelian score $2|\Delta q|^2+2 = 20$, confirm the charged-minimal (3-channel) branch gives relaxation (5,3,60) → reduced Z (1,7/2,318) and the neutral-extended (4-channel) branch gives (5,4,80) → (1,5/2,298), while both share direct traces (6,13/2,378). This is the exact counterexample; record D-CY3-ledger as localised, not discharged (F36–F38).
51. Solve the charged anomaly system in q = 6Y, $q_H = 3$ and confirm the unique solution $(q_Q,q_u,q_d,q_L,q_e) = (1,4,-2,-3,-6)$, including $3q_Q + q_L = 0$; confirm $q_N = 0$ returns $q_Q = 1$ and the RRHF ledger only under premise PS2.
52. Confirm no RRMK/RRHF tensor or Standard Model target value enters the exact enumeration (PRLU-1 uses none by construction).

Terminal-and-score-descent layer (PTSD-1).

53. Form the neutral killed kernel (remove candidate terminal exits) from the Doob-normalised transfer and compute its spectral radius at both regulators; confirm the descent's typing (Theorem 9) is invoked only if the radius is < 1.
54. Reproduce the score descent arithmetically: colour 6−1 = 5, one weak unit per channel, per-channel Abelian $2\cdot3^2+2 = 20$; confirm three channels give (5,3,60)→Z(1,7/2,318) and four give (5,4,80)→Z(1,5/2,298).
55. **Run the rate-rescaling counterexample:** apply positive type-dependent constants to the transition rates and confirm the move graph, positivity, terminal classes, record orthogonality, ledger and stationary measure are preserved while the score

weights change — establishing that PT2 is not forced by positivity or one-bit additivity (F40).

56. Confirm the residual debt is recorded as the two computable kernel quantities (killed-kernel radius; primitive-innovation factorisation), not as a discharged NT or score map (F39).

Six-gate path-law layer (SGPL-1).

57. Form the killed semigroup $Q\_\nu(t) = \exp[-t \operatorname{diag}(s\_i^2)]$ from the reduced Dirac completion singular values and confirm $\rho(Q\_\nu(1)) = e^{(-\min s\_i^2)} < 1$ for both full-rank routes; verify the absorption identity $\int_0^\infty Q\_\nu(t) \operatorname{diag}(s^2)\, dt = I_3$ per mode. Reproduce the two-regulator $1 - \rho$ values (2.82×10^{-11} mixed, 1.07×10^{-11} Hessian).
58. Build the exact-grade constraint system on the neutral Nambu carrier and confirm Dirac-only nullity 1 (the lepton-number grade (1,1,1,−1,−1,−1)) collapsing to 0 with M_R support, stable across thresholds 10^{-14}–10^{-5}.
59. Reproduce the score descent: $r_3 = \operatorname{rank}(I_6 - u\_C\, u\_C^T) = 5$, $r_2 = 4$, per-channel Abelian $3^2+3^2+1^2+1^2 = 20 \rightarrow r\_q = 80$, giving $Z = (1, 5/2, 298)$.
60. Confirm the reduced-compression firewall (SG1): no full-carrier claim is made from the compressions, and no experimental target enters (F41); and that Theorem 12 is stated as the quadratic-metric result, not an all-orders independence law (F42).

Full-carrier-instrument layer (FCHI-1).

61. Verify the package SHA-256 manifest (101 files, 52 core arrays regenerated fresh-directory with zero mismatch) and confirm no experimental target enters the construction or gap proof.
62. Confirm the 102-dim block ledger and per-block positive minimum eigenvalues; confirm the nonterminal block is strictly positive ($\lambda\_\min = 0.0363308239$) and the six terminal directions are exact zero modes.
63. **Verify the exact-gap theorem (Theorem 13):** construct $Q\_n = [[e^{-1}I_3,0],[(1-e^{-1})P\_D, e^{-1}I_3]]$ for arbitrary doubly-stochastic P_D and confirm $\rho(Q\_n) = e^{-1}$ independent of P_D, hence $1-\rho = 1-e^{-1}$ exactly and regulator-uniform. Keep this separate from the RCMO-conditional strain bound $\delta\_\text{strain} \geq 2.61\times10^{-11}$ (F43).
64. Confirm the support passes: $p = 1-e^{-1}$ for every active and singlet key at levels 3–6, coherent support rank 3, M_R kernel dimension 0, grade nullity 1→0 with Majorana support.
65. Confirm the instrument completeness residuals (31 K=7 Kraus at 2.22×10^{-16}; seven-outcome neutral at 1.11×10^{-15}; 217-Kraus product at $\leq3.3\times10^{-15}$) and that FCHI-1 is recorded as a supplied candidate, not a substrate theorem (F43).
66. Re-run the two-level species/boundary interface and confirm the terminal-record successive relative differences fall by ≈ ¼ per level (0.004225 → 0.001051 → 0.000262) with fitted order within 0.01 of 2; any drift strikes the Part XII-undecies refinement certificate.
67. Recompute the three HM4 endpoint calculations (pass, 45°, fail) and confirm all three preserve the selector Gram to $\leq 3 \times 10^{-15}$ with absolute residuals scaling as

$\varepsilon\sqrt{6}$; if the Gram distinguishes endpoints, the dΦ_n localisation is void and Part XII-undecies must be re-graded.

68. Verify the adjoint invariant nullity: 0 for the SU(3) and SU(2) factors, 1 for U(1), at both levels; any nonzero simple-factor nullity revives the linear bridge and strikes the Part XII-duodecies no-go.
69. Recompute the action-selected rim cycle: all six rim phase steps $-\pi/3$, cycle vector $-1/\sqrt{6}$ on rim links, incidence residual 0; and the Wilson triple 48 + 18 + 6 = 72 with Wilson Hessian minimum eigenvalue exactly 6.
70. Re-run the minimum-norm quotient of the 836 post-gauge flat directions and confirm residual $\le 10^{-14}$ and support-frame agreement across the declared five-witness family ($\le 10^{-10}$ post-polar) and four prescriptions ($\le 10^{-6}$); enlargement of the witness family must not move the rank-72 support.
71. Verify the exact structural Grams of the descent: record-sector condition exactly 13/7; completion metric exactly the integer matrix [[5,−1,−1,−1],[−1,1,0,0],[−1,0,1,0],[−1,0,0,1]] with spectrum $\{3-\sqrt{7}, 1, 1, 3+\sqrt{7}\}$; all record principal angles exactly 45°; primitive completion pair ratio exactly 3.
72. Recompute the conjugate-branch current residual (reference 6.49×10^{-9}) and confirm the primitive/HFB completion-metric non-proportionality (best scalar residual ≈ 0.8745); a proportional fit at machine precision would contradict the Part XII-tredecies typing and must trigger re-audit before any GSJB-3 claim.
73. Verify the √count record-weight law: for each branch compute $a_i = \sqrt{c_i}/\sqrt{\Sigma c}$ from the integer rosters (5,3,60)/68 and (5,4,80)/89 and confirm agreement with the reported amplitudes to ≥ 10 significant figures; then reproduce the branch principal angle $\arccos[(5 + 2\sqrt{3} + \sqrt{4800})/\sqrt{6052}] = 2.0226022°$.
74. Verify the character diagonalisation: build the route metric $g\cdot[[2,1],[1,2]] \oplus g\cdot[[2,1],[1,2]]$ with g = 73.25141 and confirm the $\mathbb{Z}_2\times\mathbb{Z}_2$ character vectors are its exact eigenbasis with spectrum g·{3,3,1,1}; involution commutator and attachment orthogonality must be 0 to machine precision.
75. Verify the no-scalar-bridge fact: the primitive character spectrum {3,3,1,1} and the old HFB completion spectrum $\{3-\sqrt{7}, 1, 1, 3+\sqrt{7}\}$ have equal trace 8; confirm the best scalar proportionality residual ≈ 0.6417 and that any claimed scalar bridge is thereby excluded.
76. Reproduce the endpoint non-identifiability: recompute the history-weighted Fisher metric on the declared five-witness family and confirm rank 72 with positive spectrum for each, relative drift ≥ 1.5 for the heptadic witness and ≥ 1.1 after trace normalisation, with conjugate-branch residual 0 — a materially smaller drift indicates witness-family contamination and voids the no-go.
77. Verify the primitive bookkeeping: stationary distribution sums to 1 with hub weight equal to the self-mark probability; self-mark plus the twelve edge exposures equals 1 exactly; direct counts (6, 13/2, 378) match the frozen PRLU traces at residual 0; D36 flow residual $\le 10^{-16}$.
78. Verify the void-reset theorem: the S_3-invariant subspace of the three-key carrier has dimension 1 with ray $(1,1,1)/\sqrt{3}$; the void density matrix is rank 1 with von Neumann entropy $\le 10^{-15}$; the reset dilation is isometric to $\le 10^{-15}$, preserves a

random record state exactly, and its dephased shadow is the uniform kernel with old/new-key mutual information 0 and branch entropy exactly ln 3.

79. Verify the fact-time gauge removal: recompute first-passage winner probabilities under a common hazard rescaling and under $r \in (0, 1]$ with fact-indexed counting, and confirm both leave every winner probability unchanged; any r-dependence or hazard-dependence voids the Part XII-quindecies selection.
80. Verify the exact renewal identities: completed + active + singlet = 1 with active = singlet to $\leq 10^{-14}$; D-rate = R-rate = renewal rate = completed mass; first-passage/Born residual $\leq 5 \times 10^{-15}$ at both regulators; stationary residual $\leq 10^{-16}$.
81. Verify the two-stage absorption law: the neutral-extended mean absorption equals $2/(1 - e^{-1})$ to ≥ 12 significant figures with terminal gap exactly $1 - e^{-1}$; departure indicates the killed kernel has lost its block-triangular Theorem 13 structure and the Part must be re-graded.
82. Verify the Fisher accounting: full marked rank = product mark count − carrier dimension (837 − 63 = 774); neutral block rank 6 with eigenvalue ratio ≤ 1.0001; and reproduce the typed-lift ambiguity — two exact lifts of the supplied 102-dimensional Hessian with residuals $\leq 10^{-15}$ differing by ≈ 1.727 in relative norm (a unique lift would contradict the no-go and demands source re-examination before any GSJB-7 claim).
83. Verify the central-insufficiency theorem inputs: all declared endpoint witnesses return species weights exactly (3, 3, 6, 2, 9, 9, 18)/50 with invariant twirl I/50 at every history vertex and vanishing twirled representation current, while their Fisher shapes differ by ≥ 1.5; identical central data with differing metrics is the certificate — a witness with deviating central weights is outside the declared family and voids the comparison.
84. Verify the closed-form renewal law: for sampled (r, κ) confirm stationary masses $r/(2r+p)$, $r/(2r+p)$, $p/(2r+p)$ with $p = 1 - e^{-1}$ and equal D/R/renewal rates $pr/(2r+p)$; at (1, 1) confirm $(1 - e^{-1})/(3 - e^{-1})$ to ≥ 12 figures and the marks-minus-carrier rank formula (651 − 63 = 588; 837 − 63 = 774 after fact-indexed canonicalisation).
85. Verify the congruence-bridge status: the symmetric-positive bridge reproduces the old HFB completion curvature to $\leq 10^{-14}$, and explicit O(4) conjugations generate further exact congruences; exhibiting the family is the check — a claim that the symmetric-positive member is unique among congruences (rather than unique within its convention) is false and triggers F56.
86. Verify the void-selection theorem: the stacked twelve-generator kernel on the 50-dimensional faithful carrier has dimension exactly 3 with the kernel contained in the grade-1 rank-3 central projector to residual 0; deleting that projector must drop the common-kernel dimension to 0 on the 47-dimensional charged-minimal carrier; the S_3-neutral ray is unique with entropy 0 and projector occupancies (0, 1, 0, 0, 0, 0, 0).
87. Audit the post-freeze protocol: the core-freeze SHA-256 must match the recorded value and the representation mapping (anonymous projector → N_R) must be demonstrably opened only after the sealed core; any pre-freeze access to the species labels voids the selection and triggers F58.

88. Verify the graded-metric accounting: rank 98 = 94 (species Hessian) + 2 (direct keys, probabilities exactly 1/3) + 2 (Dirac-completion phase pair, unitarity $\leq 10^{-14}$); and the exact sum rule λ_min + λ_max = 8 at both levels to $\leq 10^{-14}$ — departure from either indicates the frozen construction has drifted and the Part must be re-graded before use.
89. Reproduce the embedding ambiguity: two exact congruence lifts of the rank-98 void metric into the rank-96 nonterminal FCHI parent with residuals $\leq 10^{-11}$, differing by ≥ 1.0 in relative norm; a unique-lift claim, or any lift chosen by proximity to downstream HFB data, contradicts the no-go and triggers F59 re-audit before any GSJB-8 assertion.
90. Re-audit the block-diagonality theorem: at the void ray, generator/projector and generator/density commutators must be exactly 0; the 98 × 144 gauge-link state-tangent Jacobian, the representation-current commutator orbit, and the 7 × 98 species-population first-derivative matrix must all have rank 0; any nonzero first-order leak voids the obstruction and the GSJB-9 framing and must be traced before any birth-law claim.
91. Verify the tangent accounting of the minimal witness: 49 = (50 − 3) + (3 − 1) complex directions with real Jacobian rank 98 and void-orthogonality $\leq 10^{-16}$, each direction typed by exactly one of the seven central projectors; a witness leaking across projectors is mistyped.
92. Audit the plane family: sample the S_3-invariant rank-2 planes across the mixing parameter, confirming plane commutator residual 0 and exact FCHI pullback $\leq 10^{-9}$ for every sample; a plane failing pullback, or any claim of a unique distinguished plane at this stage, triggers F61 re-audit.
93. Confirm the mark/endpoint split: the EX2A instrument derivative has rank 155 on the 45-dimensional charged carrier with unchanged support graph and zero N_R-to-role amplitude marks — strong field dependence without support change is the certificate that the missing object is a birth operator, not a stronger coupling.
94. Re-audit the birth symmetry no-go: the joint gauge × S_3 fixed-tangent dimension on $\mathbb{C}P^{49}$ must be exactly 0 with void residuals 0; any nonzero invariant direction would permit deterministic birth and void the multiplet-forcing theorem.
95. Verify the covariance-cone accounting: twelve orthogonal inequivalent projectors summing to the identity at $\leq 10^{-15}$ with gauge and S_3 commutators $\leq 10^{-15}$; confirm the four blind laws are each positive, full-support and invariant yet differ pairwise (max ≈ 0.88), and that $I_{98}/98$ has entropy exactly ln 98 — agreement of the blind laws would contradict the nonuniqueness theorem and demand source re-examination.
96. Verify the rank-correction data: all 98 eigenvalues strictly positive at both levels with the two smallest exactly neutral-supported (residual $\leq 10^{-15}$), minima matching the sedecies values to ≥ 9 digits, trace fraction of the smallest pair ≈ 4×10^{-7}, and best rank-96 trace retention ≈ 0.9999996 — the near-perfect retention alongside strict positivity is the certificate that the parent's fit quality cannot argue for its completeness.

97. Confirm the carrier bound bookkeeping: 104 = 98 + 6 persistent-record nulls under the declared no-hidden-distinction admission; any claimed smaller carrier must exhibit an exact protector for each omitted positive mode (the GSJB-10 pass condition), and any use of the 104 bound without stating the admission axiom triggers F63.
98. Verify the FS/W_D agreement: on the 94 nonneutral directions the two tensors must coincide to $\leq 10^{-15}$ at both levels with cross terms $\leq 10^{-14}$; any genuine nonneutral discrepancy revives the eleven-ratio problem and voids the collapse.
99. Verify the neutral four-plane structure: both eigenvalue pairs sum to 8 to $\leq 10^{-13}$, trace exactly 16, and the best scalar fit of W_D from 2 I_{98} equals 51/49 exactly (the trace ratio 204/196) with residual ≈ 0.397 — a drift in the pairwise-8 rule or the rational scalar indicates the frozen construction has moved and re-grades the Part.
100. Verify the endpoint role rationals: θ = 0 weights N_R = 2/49 and Q_L = 18/49 with direct = inverse; θ = 1 direct weights N_R = 4/51 and Q_L = 6/17 (trace shares 16/204, 72/204) with the inverse concentrating ≥ 0.9996 on the neutral role; and confirm G_θ positivity of rank 98 across sampled θ ∈ [0, 1].
101. Verify the carrier family: H_{104} = G_θ ⊕ 0_6 has dimension 104, positive rank 98 and exactly six nulls at both regulators for sampled θ, with the nulls persistent-record typed; any seventh null or rank drop breaks the duodevicies admission accounting and must be traced before any GSJB-11 claim.
102. Re-audit the timeless race: across the declared baseline shapes and monotone reparameterisation set at large trial count, winner mismatches must be exactly 0 and proportional first-passage residuals $\leq 10^{-15}$; any winner change under a monotone relabelling breaks the timeless formulation and re-grades the Part.
103. Verify the selection theorem: J^TG_θJ = G_θ within the frozen family must hold iff θ = 0 at both levels; the sum of exhaustive branch norms must equal 2 I_{98} with completeness residuals $\leq 10^{-15}$; and the selection Hessian must equal the Fubini–Study form to $\leq 10^{-15}$ — a second passing θ, or a branch-norm sum differing from $2I_{98}$, voids the Born selection.
104. Enforce the type ledger: H_CMR104 = W_D ⊕ 0_6 with rank 98 and nullity 6 at both levels (drift $\sim 10^{-5}$); any identification of H_CMR104 with a pre-fact kinetic cost, any physical θ ∈ (0, 1), or any use of a readout-count-dependent tensor as a primitive selection metric triggers F66 before further use.
105. Check the prior boundary: the isotropic-prior role weights must equal projector dimension over 98 exactly (2/49, 6/49, 2/49, 18/49, 9/49, 3/49, 9/49; sum 1); any quotation of these as physical preparation predictions, or of fact order as metric duration, triggers F67.
106. Re-audit the twirl no-go: an arbitrary Hermitian operator with O(1) void-tangent coupling must, after the complete no-private-label/refinement twirl, have birth norm $\leq 10^{-14}$ and block-scalar-form residual $\leq 10^{-12}$; a surviving twirled coupling voids the no-go and every downstream event-level framing.
107. Re-audit the D7/$\mathbb{Z}_7$ separation: the group relations $r^2 = s^7 = I$ and $rsr^{-1} = s^{-1}$, the single-face canonicalisation, and the uniform-ray fixture under all seven loop powers must hold at residual exactly 0; holonomy rank on the nonuniform subspace

must be 6; and the loop covariance of $B(\eta)$ must hold at $\le 10^{-15}$ — any void-ray motion under holonomy alone contradicts the transport-not-creation theorem.

108. Verify the frame-capacity arithmetic: $(N - 1) \log_2 q$ bits, with the binary three-site case exactly 2 and the $\mathbb{Z}_7$ three-site case exactly $2 \log_2 7 = 5.6147098441$; and confirm the void supplies no canonical frame, so a one-Bit first commitment cannot install UR-frame.
109. Verify the factorisation package: the exactly-one-of-two exchangeable law has covariance exactly $-1/4$ (the nonextendibility witness) and the correlated family a strictly positive unconditional covariance; the conditional covariance given the directing variable must be exactly 0, the beta-mixture normalisation $\le 10^{-15}$, the projective deletion residual $\le 10^{-16}$; Haar covariance must converge to $I_{49}/49$ at the $1/\sqrt{N}$ Monte-Carlo scale; and any quotation of the ordinal opportunity probability as a physical rate, or of the D44′ discharge without its ER condition, triggers F69.
110. Verify the measure typing: constant ΔI must recover Haar exactly; the twelve-component weight covariance must have rank exactly 11 with its single zero mode the common normalisation shift; valid witness covariances must differ at the ~ 0.10 scale with effective sample size $\ge 5 \times 10^4$ — a second zero mode, or witness agreement at machine precision, contradicts the record-conditioning sensitivity and re-grades the Part.
111. Verify the topology separation: $\dim H^1 = 1$ for the unfilled three-edge cycle and 0 for the filled triangle, over both $\mathbb{Z}_2$ and $\mathbb{Z}_7$ ($b_1 = E - V + 1$).
112. Verify the occupancy laws: the binary triangle formula against cyclic convolution and DFT at $\le 10^{-15}$; the parity pair reproducing occupancy exactly 0 and exactly 1 at identical $p = 1/2$ marginals; the complement-symmetric evaluation returning 1/2 to $\le 10^{-15}$; and the uniform $\mathbb{Z}_7$ value exactly 6/7.
113. Guard the event level: any quoted physical edge law must state its D45″ order resolution (one record or two on a pre-commitment shared face); any tilt coefficients must be action-derived rather than inserted (F70); and any occupancy claim must name its directing law and topology (F71).
114. Verify the action-form recovery: with all ΔS_i equal, the Gibbs–Born unfolding must reproduce the timeless Born weights to $\le 10^{-16}$; and ΔI_i must equal $-\ln|c\_i|^2$ identically (a re-expression, not a new input).
115. Reproduce the phase no-go: exhibit two states in $\mathbb{C}P^{48}$ with identical $|\eta\_i|^2$ whose inner product is $\le 10^{-15}$ and Fubini–Study separation is exactly $\pi/2$, and confirm the generic relative-phase fibre has dimension 48; a unique state at fixed ΔI would contradict the no-go and re-grade the Part.
116. Reproduce the cost no-go: for sampled strictly positive targets and λ values, invert $\Delta S\_i = -(1/\lambda)\ln(q\_i/a\_i) + \text{const}$ and confirm probability residuals $\le 10^{-15}$ with all $\Delta S\_i \ge 0$ — the inversion must succeed, since its success is the certificate that the action must compute costs rather than assume them.
117. Verify the shared-face family and provenance ranks: $P\_J(x, y) = \exp(Jxy)/(4 \cosh J)$ normalised ($\Sigma = 4 \cosh J$), exchange and complement residuals 0, uniform marginals $\le 10^{-15}$, effective joint information running from 2 bits at $J = 0$ to 1 bit as $|J| \to \infty$; and rank $P\_\text{common} = 16$, rank $P\_\text{prov} = 4$, with the quotient annihilating the four

provenance vectors at $\le 10^{-16}$. Confirm the duplication no-go: correlated duplication leaves entropy, KL and Fisher unchanged at 0.0 while independent duplication doubles each.

118. Verify both stability graphs: 20 nodes/64 edges/mean degree 6.4/128 oriented relations/ρ_NB = 5.440225970823 and 16 nodes/54 edges/6.75/108/ρ_NB = 5.952870951488, with p⋆ exactly 1/ρ_NB in each case and source residuals $\le 10^{-12}$; under the frozen Route-M normalisation confirm ξ = 84.071786 μm and 62.723178 μm (the latter reproducing the published ≈ 62.72 μm). Record — do not resolve — the 0.078% offset from the separately frozen corpus scale 84.137118546 μm; asserting identity without reconciliation triggers F73.
119. Verify the single-fact theorem: enumerate D7 (14 elements), confirm $g \mapsto (g, g^{-1})$ yields exactly 14 distinct images, and on several nonuniform laws confirm $H(g, g^{-1}) = H(g)$ and $H(g^{-1}|g) = 0$ to $\le 10^{-15}$ with orientation-parity and double-inverse errors 0; confirm four shared faces give joint-event incidence rank 4, not 8. A nonzero conditional entropy would restore the two-fact reading and re-open the corrected fork.
120. Verify the record exact sequence and code: rank P_common = 16, rank P_prov = 4, provenance-kernel dimension exactly 4 with quotient-annihilation residual $\le 10^{-15}$ (dimension 4, not 0 — a zero-dimensional kernel would void the construction), logical section isometric to $\le 10^{-15}$; the binary code has exactly 2^{16} configurations with uniform-logical joint entropy 16 bits, summed token marginals 20 bits, and per-face joint entropy 1 bit with conditional entropy 0 — the 4-bit redundancy must equal the number of shared faces.
121. Verify the code parameters and γ typing: each duplicated pair is [2, 1, 2] (distance 2 — detect one, correct none), single-error scaling ε and undetected ε^2; and every encoded logical norm must be γ-invariant to $\le 10^{-13}$ across sampled γ, with γ acting only on the four syndrome directions. A γ-dependence of any logical norm contradicts the typing and voids the maintenance-stiffness reading.
122. Re-verify both stability graphs under the corrected accounting: degree distributions $6^{12}7^{8}$ (Σ = 128 = 2E) and $6^{12}9^{4}$ (Σ = 108 = 2E), PF residuals $\le 10^{-13}$, p⋆ = 1/ρ_NB exactly; and confirm that each branch is now quoted with one-Bit logical accounting plus maintenance redundancy — any two-Bit shared-face accounting is the corrected error and triggers F74.
123. Verify bilateral access: on the four-dimensional interface, both single-side readout ranks and the joint readout rank must all equal 4 — a joint rank exceeding the single-side rank would restore the locality argument for duplication and void the Part XII-vicies-quinquies selection.
124. Verify the copy factorisation and stability witness: the dual write must equal one interface write composed with a deterministic copy to residual $\le 10^{-15}$ on the $8 = 4 \oplus 4$ carrier; and a single binary macrorecord must be realisable on disjoint microstate basins (reference two basins of eight) without macroscopic duplication.
125. Verify the selection bookkeeping: γ_birth must be exactly 0 on the primitive carrier, with the four provenance directions absent from the primitive write and appearing only after an explicit copy operation; and the selection must be quoted with its named structure-economy premise attached (F76).

126. Verify the blind scale return: the selected 16-token carrier must give ρ_NB = 5.952870951488, p⋆ = 1/ρ_NB and ξ = 62.723178 μm, with the two branch Route-M exponents differing by exactly $\ln(\xi_{20}/\xi_{16})$ to ≥ 14 digits (the single-ruler certificate); confirm the localisation rule was applied before either scale was evaluated, and record the 25.45% offset from the separately frozen corpus scale as an open reconciliation, never as a correction to another paper (F77).

Appendix D — Falsifiers

History layer.

- **F1** — The K = 7 operational heat generator is shown not to be the master-history carrier.
- **F2** — The seven typed directions are shown not to span the physical bath response, or Fisher orthogonality is shown to be an artefact of the derived basis.
- **F3** — The bath-relaxed metric is shown not to have the form W_core − H diag(η) H^T, in which case Lemma 3 is void and Requirement 3 reopens on different terms.
- **F4** — The antipodal quotient or equal-edge basic cochain is shown to be the wrong terminal law.
- **F5** — The generator extraction is shown not to be the physical connection, or an a_t-independent entry-based extraction is exhibited. Either restores the earlier terminal rejection.
- **F6** — The conditional scalar route is retired.
- **F7** — The one-loop full-matrix reference system is shown inadequate at the declared order.
- **F8** — Any measured Standard Model value is shown to have entered a Stage-A construction.

Transport layer.

- **F9** — The projection is shown to be an interface-scale rather than a low-current boundary without a compensating convention change; or a derived readout scale returns μ_R ≥ 4.390909 GeV.
- **F10** — The physical VBF boundary is not g_s(5.80 TeV) = 1.
- **F11** — The declared-order QCD anomalous dimension is shown to carry generation or up/down texture, voiding Theorem 8.
- **F12** — Valid production matching with finite decoupling coefficients moves r_q above the ceiling.
- **F13** — The coupled threshold map has no positive fixed point satisfying ordering (A), or a physically inequivalent stable root is exhibited outside $\mathfrak{B}$ without a pre-observation selector, or $\mathcal{T}$ is shown not to map $\mathfrak{B}$ into itself.
- **F14** — The calculated operator exceeds the preregistered ceiling, or still drives λ negative on [μ_0, μ⋆].

- **F15** — No finite map connects the native VBF mass coordinate to a standard renormalised definition.
- **F16** — Any measured α_s, heavy-quark mass or stability number is shown to have entered the fixed point or the matching factor.

Quarantine layer.

- **F17** — A diagnostic input is shown to have been treated as a blind microscopic output at any stage.
- **F18** — The constructed diagnostic scale μ_0 is shown inconsistent with any history-derived matching scale.
- **F19** — Any diagnostic return is cited in support of a strict-layer claim.
- **F20** — Any of the construction consequences of §40 is cited as evidence.
- **F21** — Any measured value is shown to have entered the execution, including as a validation target.
- **F22** — A quarantined return is quoted without its provenance warning.
- **F23** — Hash coverage is quoted as establishing currency rather than integrity.
- **F24** — A rounded displayed array is used for downstream arithmetic.

Master-action layer (NFDMA-1).

- **F25** — A returned object is shown to require per-object tuning rather than the common action, voiding Result N1.
- **F26** — Hierarchy-generating structure is shown to have been inserted by hand into the minimal-address embedding, so that Result N2's falsification does not isolate the minimal choice.
- **F27** — The Level-2 regulator is shown to be factorising (tensor-product) after all, so that its two-level agreement is a theorem rather than evidence and Result N1's refinement claim collapses.

Maintenance-record layer (RCMO-1).

- **F28** — The blocking map B_{n+1→n} is shown not to be derived from the physical-carrier overlap (or its unitarity residual is shown to be construction-tuned), so the measured $\mathcal{O}(h^2)$ convergence of Result R1 is an artefact of the map rather than a property of the operator.
- **F29** — The regulator-stable near-π determinant phase at θ_top = 0 is cited as a resolved strong phase, rather than as an unresolved stable target — i.e. regulator covariance is read as physical correctness.

Reduced-evaluation layer (MHPE-1).

- **F30** — Inequivalent Standard Model addresses are shown to require mixing by an untyped common bath, voiding the ledger-adjacency premise MH1.
- **F31** — The mixed and Hessian Yukawa routes are shown to share a parent after all, so that the CY3′ residue is an internal identity and Result MH1's falsification does not apply.

- **F32** — The conditional CY3′ failure or the no-fit colour split is cited as evidence against the *framework* rather than against the *minimal constitutive choice*; or a conditional discharge of D36 or D32 is quoted as an unconditional closure.

Representation-resolved-kernel layer (RRMK-1).

- **F33** — The gauge Schur census Z = (1, 5/2, 298) is shown to require a factor-blind multiplicity rather than the representation-resolved relaxation count, voiding premise RK1 and the $g_s = 1$ colour return.
- **F34** — RRMK-1's 5.84×10^{-16} CY3′ residue is cited as an independent-route agreement or as discharging the CY3′ debt, rather than as the verification that two lifts of one imposed tensor agree (premise RK2). *(This falsifier guards the RRMK-1 construction specifically; RRHF-1's routes are genuinely separate, so it does not apply there — see F35.)*

History-functional layer (RRHF-1).

- **F35** — The discrete K=7 representation ledger (premise RH1) is treated as *derived from the primitive MASD-HMGBC substrate* rather than registered from prior-paper returns; equivalently, Result RH2's conditional closure is quoted as an unconditional closure of the charged/gauge side, or the blind-differentiation agreement is cited as proof that the ledger is the unique one the substrate allows.

Ledger-uniqueness layer (PRLU-1).

- **F36** — Theorem 6's conditional ledger uniqueness is cited as an unconditional primitive-transfer result, i.e. without the premise package PS1–PS3; equivalently, the conditional PASS is quoted as discharging D-CY3-ledger.
- **F37** — The neutral extension (N_R, the fourth channel, relaxation (5,4,80)) is treated as forced by the primitive transfer or by anomaly freedom alone, when PRLU-1's witness shows it requires premise PS2 (NT) — the transfer and the direct traces cannot distinguish it from the charged-minimal (5,3,60) branch.
- **F38** — The score-normalisation map (premise PS3) or the relaxation ledger is treated as a transfer output rather than a canonical convention still to be derived from the full MASD/CAR/Fock move kernel.

Terminal-and-score-descent layer (PTSD-1).

- **F39** — Theorem 9's forced terminal typing or Theorem 10's descent is cited as an unconditional NT/score derivation, i.e. without establishing the killed-kernel radius < 1 (PT1) — equivalently, the No-Unprotected-Recurrent-Neutral-Class theorem is treated as proved when it is not in the corpus.
- **F40** — Primitive-innovation factorisation (PT2) is treated as forced by one-bit additivity or positivity, when the exact rate-rescaling counterexample shows a positive type-dependent reweighting preserves the move graph, terminal classes, ledger and stationary measure while changing the score weights.

Six-gate path-law layer (SGPL-1).

- **F41** — A Gate result is cited as a full-carrier derivation when the reduced MASD-HMGBC compressions were used: the killed-kernel pass (SG1), exact-grade audit (SG3) or score descent is quoted as discharging D-NT or D-SCORE without the complete numerical H_n and instrument.
- **F42** — Theorem 12's marked-martingale orthogonality is overstated as an all-orders product/independence law for complete histories, rather than the quadratic-metric statement it is; or the terminal-gap positivity is quoted as a regulator-uniform lower bound when only two positive converging levels exist.

Full-carrier-instrument layer (FCHI-1).

- **F43** — The FCHI-1 instrument is cited as a substrate theorem rather than a supplied retained-order candidate (premise FC1): the exact $1-e^{-1}$ gap or the support passes are quoted as proving the unextended primitive law *forces* this instrument, when FCHI-1 proves only that the supplied instrument is complete, positive, regulator-stable and sufficient; or Theorem 13's route-support gap is conflated with the RCMO-conditional strain bound, or with a neutrino mass/lifetime/GeV quantity.

- **F44** — Precursor promotion Citing the numerical G_red, E_i, V_H, X_H or Yukawa candidates of this paper as derived physical boundary objects — rather than conditional branch outputs of the declared interface — is a named error.

- **F45** — Convergence overreach (strikes the two-level evidence-typing premise) Citing the two-level diagnostic pass as a continuum convergence theorem, or the second-order record refinement as a full-carrier statement, is a named error.

- **F46** — Endpoint selection (branch forgery) Selecting the pass endpoint of the HM4 interval — or any point of [0, 1] — without a derived dΦ_n is a branch choice masquerading as a derivation; any downstream number produced this way is quarantined (the same Gram at all endpoints is the proof that the data cannot decide).

- **F47** — Provenance mixing: any citation that attributes to Parts XII-undecies–tredecies a result established in an earlier Part (or the converse), or quotes a USBA/GSJB conditional branch output as carrying the provenance of the earlier theorems; the Part designations and the Appendix F rows are the only admissible map.

- **F48** — Linear-bridge revival Any future claim that a single linear map $d\Phi: \mathbb{C}^6 \to \mathbb{C}^{334}$ exists as a derived object contradicts the exact §VI.2 no-go (adjoint invariant nullity 0 for SU(3) and SU(2)) and is falsified in advance; four channels are mistyped at the level of representation theory.

- **F49** — Phase or frame selection (extends F46) Selecting the record global phase (S^1), the completion direction (O(6)), or the internal endpoint frame without a primitive derivation — in particular by using downstream couplings in the GSJB-2 gate — is branch forgery; any downstream number so produced is quarantined.

- **F50** — Support/metric conflation (strikes Part VII typing) Citing the frame-independent rank-72 support, or the exact sector visibility Grams, as a derived absolute score metric or numerical HFB boundary is a named error: the quotient removes metric weights by construction, and the raw Grams demonstrably vary by O(1) across endpoint witnesses.

- **F51** — Downstream inversion (extends F49) Selecting the absolute score metric, the record factor weights, or the completion attachment to (φ_H, X_{H0}, X_{H1}, X_{H2}) from the HFB response itself reverses the derivation and violates non-insertion; the non-proportionality of the primitive diag(1, 1, 3, 3) and HFB $\{3 - \sqrt{7}, 1, 1, 3 + \sqrt{7}\}$ metrics (residual 0.874) makes any such choice detectable.

- **F52** — Branch-selection forgery: promoting the neutral-extended (5, 4, 80) innovation metric, its √count record weights, or any downstream number built on them, without the GSJB-4 provenance theorem (or promoting charged-minimal without refuting neutral-extended), is a named error; the Part XII-septies neutral-channel witness proves the current substrate cannot distinguish the branches, so any selection is insertion.

- **F53** — Old-completion conflation: using the old conditional HFB completion block as if it were the primitive character-basis curvature, fitting a scalar bridge between them (excluded exactly: equal trace 8, different spectra), or choosing the attachment, weights or metric from the HFB response after the non-reproduction result, is quarantined; the old block enters again only through a same-action finite bridge or an explicit supersession.

- **F54** — Renewal-gauge misuse: quoting the reset probability r or the key-retention $\kappa = 1/3$ as physical tunables, citing the fact-indexed selections as an SI rate or absolute-hazard determination, or attributing the ln 3 dephased branch entropy to the substrate canvas rather than the classical label distribution, is a named error; the selections are dimensionless theorems under the declared void/fact axioms.

- **F55** — Conditional-occupancy promotion: citing the conditional neutral forcing (finite fact formation given a nonzero pre-fact distinction) as an unconditional occupancy or existence theorem for the neutral carrier, or quoting N_R as unconditional before the GSJB-7 occupancy theorem, is a named error distinct from F52: F52 guards the roster choice, F55 guards the carrier's existence.

- **F56** — Congruence-bridge promotion: citing the symmetric-positive diagnostic bridge between the primitive completion curvature and the old HFB block as a derived object — when the exact solution set is an O(4) family and the symmetric-positive member is a matrix convention — is a named error extending F53; the bridge acquires derivational status only through same-action selection.

- **F57** — Central-sufficiency claim: asserting that central or invariant endpoint data (species weights, twirls, invariant currents) can select the physical endpoint frame or the rank-72 metric contradicts the executed GSJB-4 result — identical central data, twirl I/50, vanishing twirled current, yet Fisher shapes differing by 1.52 — and is falsified in advance; only noncentral coherence data can carry the selection.

- **F58** — Void-axiom conflation: citing the N_R selection as an unconditional substrate theorem, as literal neutrino occupation of the void, or as an unconditional discharge of the F52 branch guard — when it is a representation-capacity theorem conditional on the frozen faithful algebra, the declared zero-entropy/gauge/S_3 axioms and the supplied Dirac support maps — is a named error; equally, any pre-freeze access to the species labels in the selection pipeline voids the post-freeze protocol and the claim.

- **F59** — Congruence-fit promotion at the void boundary: presenting any exact congruence lift of the rank-98 void metric into the rank-96 FCHI parent as the derived tangent-to-history embedding — when inequivalent exact lifts coexist and the carriers are differently typed with two undetermined physical/null directions — extends F51/F56 to the void boundary; only the action-derived intertwiner ι_n of the GSJB-8 pass condition carries derivational weight, and no post-hoc congruence fit does.

- **F60** — Witness promotion: citing the minimal 49-direction birth alphabet B_α = |v_α⟩⟨Ω| (or any completion of it) as an action-derived object — when its status is an explicit existence witness with provenance open — is a named error; equally, denying the exact block-diagonality obstruction (nonzero first-order void leak) without tracing it through step 90 is quarantined.

- **F61** — Plane selection by pullback: choosing the neutral two-plane of the 98/96 boundary by fit to the FCHI parent — when every S_3-invariant plane admits exact pullback and the parent provably cannot discriminate — extends F59; the plane is selected only by the derived birth law or retired only by a nullity proof.

- **F62** — Ignorance-axiom conflation: citing the maximum-entropy covariance $I_{98}/98$ as a derived VERSF law — when it is unique only under the additional "maximum pre-fact ignorance" axiom and the zero-entropy canvas does not imply it — or promoting any of the four blind stiffness laws (microstate-, role-, isotypic-blind, equal-flux) as selected, is a named error; the eleven stiffness ratios are underived until the GSJB-10 action metric returns.

- **F63** — Admission bookkeeping: using the rank-96 parent as exactly complete while asserting no-hidden-distinction (it fails admission by two genuine neutral modes), or quoting the 104-dimensional carrier bound without declaring the admission axiom it is conditional on, or arguing from the parent's 0.9999996 trace retention to its completeness, is a named error; fit quality and admission are different predicates.

- **F64** — Declaration conflation at the action metric: citing the Fubini–Study branch ($\theta = 0$, inverse covariance $I_{98}/98$) or the distinguishability branch ($\theta = 1$) as derived VERSF results — when both are explicitly conditional declarations of the frozen source set — or quoting the $\theta = 1$ neutral-dominated inverse covariance (0.9996 on

N_R) as a physical occupation rather than a curvature diagnostic, is a named error; the axiom unification (isotropy ⇒ max-entropy) reduces two conditions to one but does not derive that one.

- **F65** — Family-completeness overreach: treating the convex cone G_θ = (1 − θ)2I_{98} + θW_D as the exhaustive set of source-compatible pre-fact tensors — it is a declared lower-bound nonuniqueness witness — or the H_{104} = G_θ ⊕ 0_6 family as the unique carrier realisation, or selecting θ by any FCHI/HFB/Standard-Model comparison rather than the GSJB-11 action-to-rate derivation, is a named error extending F61/F62.
- **F66** — Selection/response type conflation: identifying or physically interpolating the pre-fact selection geometry G_pre = 2I_{98} with the post-fact response geometry H_response = W_D (any physical θ), citing H_CMR104 = W_D ⊕ 0_6 as a pre-fact kinetic cost, or using any readout-count-dependent (contextual) tensor — including phase-twirled Fisher — as a primitive next-fact weight, contradicts the executed Part XII-vicies typing theorem; the F64 conditionality is superseded on the selection side only: θ = 0 is typed-forced for selection, and the guarded error is now role conflation, with W_D retaining full standing as the response metric.
- **F67** — Prior and duration promotion: quoting the isotropic no-information prior role weights (dimension/98) as derived physical preparation predictions, citing the conditional Born law as an unconditional derivation of the substrate's amplitudes, or converting ordered-fact counts into metric duration without the separate derived clock calibration, is a named error; the preparation law and the duration conversion are the GSJB-12 objects and nothing upstream supplies them.
- **F68** — Creation-from-symmetry claims: asserting that loop holonomy, single-face closure labels, or any deterministic operator surviving the complete refinement twirl generates a first innovation from the invariant void — all excluded exactly (holonomy fixes the uniform ray to the digit; the twirl kills every void-tangent coupling) — or quoting the first-differentiation no-go beyond its stated conditionality (the full irreducible refinement/isosymmetry bridge), is a named error.
- **F69** — Law/event and condition conflation: citing the D44′ factorisation as unconditionally discharged (it is conditional on the named ER condition plus the complete directing variable), citing Haar/FS as the derived physical preparation (it is the unique *unresolved* law-level measure), quoting the common dimensionless opportunity probability as a rate in physical time (it is ordinal), or citing the UR-comp selection as a proof of holonomy occupancy, is a named error; the realised α, μ(dη|ρ) and z(ρ, α) are the GSJB-13 objects and nothing at law level supplies them.
- **F70** — Tilt insertion and Haar overreach: inserting the eleven relative tilt coefficients β_j(ρ) (or a ΔI_ρ) chosen to reproduce any downstream target, rather than deriving them from the local commitment action, is the forgery pattern at event level; equally, citing Haar/FS as remaining the unique preparation *after* a nontrivial

record exists contradicts the executed rank-11 result — uniformity is the no-information special case, not the conditioned law.

- **F71** — Occupancy conflation: citing UR-comp, nontrivial topology, or one-bit marginals — singly or together — as forcing holonomy occupancy (the parity pair realises 0 and 1 at identical marginals), quoting the complement-symmetric 1/2 or the uniform $\mathbb{Z}_7$ 6/7 as physical occupancies rather than conditional/diagnostic values, or stating any edge comparison law without its D45″ construction-order resolution, is a named error; occupancy claims must name their directing law, their topology and their ordering.

- **F72** — Action-form sufficiency: citing the additive form $M_i = -\ln a_i + \lambda\Delta S_i$, or the identity $\Delta I_i = -\ln|c_i|^2$, as a derivation of the prepared amplitude, of its relative phases, or of the record-conditioned distribution, contradicts both executed no-gos (identical ΔI at Fubini–Study distance $\pi/2$ with a T^{48} fibre; any positive target reproducible by non-negative ΔS); inserting entropy costs or an affinity chosen to reproduce a target law is the forgery pattern at the action layer — the costs must be computed from the commitment action.

- **F73** — Construction-order and scale conflation: quoting either D45″ branch as selected (m_face is underived), citing outcome extension information as capable of distinguishing one record from two redundant provenance tokens (exactly excluded — correlated duplication is informationally invisible), omitting the provenance term γ while claiming record-distinctness, or identifying the branch-conditional ξ values with the separately frozen corpus coherence scale (the record-distinct value sits 0.078% below it, and the branches differ by 25.39%) without an explicit reconciliation, is a named error; every downstream use of ξ must state which m_face branch it assumes.

- **F74** — Two-fact and two-Bit accounting: treating the two side readings of a shared face as two primitive facts, quoting two-Bit shared-face entropy, using joint-event incidence rank 8 for four shared faces, or citing the twenty-token carrier as twenty logical Tick-Race channels, contradicts the executed single-fact theorem (deterministic inverse, zero conditional entropy, exactly 4 bits of redundancy) — this supersedes the m_face framing of F73, which is retained only for the record-token half.

- **F75** — Redundancy-as-derivation and stiffness misuse: citing the [2, 1, 2] error-detection advantage of duplicate records as a derivation that two tokens exist (detection at ε and undetected failure at ε^2 motivate but do not force duplication, and two copies cannot localise the error), fixing γ from any logical-sector, Tick-Race or Route-M datum (γ is invisible to all of them by the exact typing, and the scale must not be used as a target), or quoting either coherence-scale branch without stating its record-localisation assumption, is a named error.

- **F76** — Unconditional-selection claim: citing the single-interface-token selection (m_record_token,birth = 1, γ_birth = 0) as a theorem of bare finite distinguishability, rather than as a strong conditional result invoking the named minimum-distinction / structure-economy premise together with P1–P6, is a named error; equally, citing it as excluding duplicate records altogether — it displaces them downstream of primitive commitment and leaves the twenty-token carrier correct for commit-before-glue under A2* and for later proliferation.

- **F77** — Scale-branch conflation across the corpus: quoting ξ without stating its construction order and record localisation, treating the selected primitive ξ = 62.723178 μm and the separately frozen corpus coherence scale 84.137118546 μm as the same quantity (they differ by 25.45%; the dual-copy branch value differs by 0.078%), or using either as a target when deriving γ_copy or the localisation rule, is a named error; the discrepancy is an open cross-corpus reconciliation (D-ξ-branch), not a correction to any other paper, and the SI length inherits the frozen Route-M ultraviolet ruler in every branch.

- **F78** — Ledger-reading and scope errors (review-round guards): reading Part XIII as a list of current results rather than a chronological audit ledger; citing the GSJB-16 localisation selection as closing D44′ (it closes the D45″ construction-order/localisation clause only — the event-level preparation debt is untouched and parallel); quoting the basin construction as a dynamical stability theorem, or the algebraic copy factorisation as by itself establishing temporal order; writing "provenance kernel 0" for the four-dimensional provenance kernel whose annihilation *residual* is 0; presenting the ≈ 88 μm / ≈ 84 μm 4.5% agreement as support for the conditionally selected primitive 62.723 μm branch; or citing the one-bit normalisation $\dot{\Sigma}$ = ln 2 as established when an independent rebuild returns 0.185 — each is a named error, and each was corrected in the review round that introduced this falsifier.

- **F79** — Grade and mapping errors (second review round): quoting the first-differentiation no-go, the one-Bit global-frame exclusion, the Born-weight selection or the shared-face single-fact theorem as *unconditional* results — each is exact only within its declared model or axiom package and belongs to the conditional grade; collapsing the three residual lines into one another (D44′ event-level preparation, the D45″ construction-order clause, and the D-GSJB17 maintenance continuation, which has no exact RPC-1 counterpart), or describing D-GSJB17 as the remaining D44′ calculation; describing D36 as "discharged" when its independent rebuild returns 0.185 rather than ln 2 (correct grade: conditional candidate return / reproducibility fail / not settled); stating the closure residual as "two uniqueness proofs" when two sectors inside H_CMR still lack action-level returns; and quoting the reconstructed CKM matrix as an experimental match, or mixing its half-split and full-curvature conventions.

- **F80** — Obsolete-ledger citation: quoting the final verdict box, §43 or §44 in any form predating the third review round (obstruction "localised to D35 in parallel with D36"; residual as "two forward returns plus two uniqueness proofs"; D36/D32 as "conditionally discharged"; the non-factorising regulator or independent CY3′ agreement listed as outstanding targets when the latter was executed and failed);

citing any §39 entry without checking the §42 re-grading table; treating "three live fronts" as the complete list of work remaining before physical predictions (the downstream certification requirements — neutral mass block, scheme bridge, cross-sector covariance, pole constructions, strong-phase certificate — sit on top of them); or using a summary-grade Part (XII-quattuordecies-bis/-ter) to support a headline claim or downstream derivation while its full report is absent.

- **F81** — Stale-grade and stale-diagnosis citation: describing D36 as "discharged" anywhere in current use (its correct grade is a conditional candidate under named premises that **fails independent reproduction and is therefore not settled**), or D32 as discharged rather than a conditional candidate conjugate pair with residue and orientation open; quoting the Stage-A code `BLOCKED_ON_D35 ‖ D36` as the current scientific status rather than as the historical code superseded by `BLOCKED_ON_INCOMPLETE_H_CMR ‖ UNRECONCILED_XI`; or quoting any stage-local "D35 is the critical path" statement as the current diagnosis. The separate phrase "the D44′ factorisation is conditionally discharged under ER" is **not** covered by this falsifier: it names its condition explicitly and makes no claim about the event-level preparation sector.

Appendix E — Open-Debt Ledger

Under the §43 reduction, these debts are facets of two primitive objects rather than independent tasks. The rightmost grouping records which primitive object each folds into: **[H_CMR]** for the commitment-maintenance action, **[ξ]** for the absolute length, **[proof]** for a uniqueness statement, and **[transport]** for the self-contained quark-transport layer that is already closed at its declared order.

Debt	Object	Blocks
H_CMR	The representation-resolved commitment-maintenance action — the primitive object §43 reduces the internal bath, commitment dynamics, boundary arrays and regulator law onto	[H_CMR] Requirements 3, 4, 5, 6; **the critical forward return**
ξ	The absolute length — now a four-object ledger (Part XII-vicies-quinquies §6): 62.723 μm primitive one-token branch (conditionally selected), 84.072 μm dual-record graph, 84.137 μm previously frozen corpus scale (unreconciled), ≈ 88 μm bath-gap route. The earlier 88/84 agreement to 4.5% refers to the non-primitive branch	[ξ] the absolute GeV scale; **the second critical forward return**
D35	Absolute normalisation weights { $\hat{g}$_κ, ω_0, c_A, b_A, r_A, cross-blocks, Λ⋆ } and the seven η_i —	[H_CMR] Requirements 3, 4, 6; new-information

Debt	Object	Blocks
	reclassified by §43 as spectral data of H_CMR, not withdrawn but relocated	requirement (Corollary 4.1); Result N2 adds the steep-hierarchy-without-mixing requirement
D42	Hierarchy-generating structure beyond minimal-address embedding — ADDRESSED CONDITIONALLY by the steep charged spectrum, now blind from the parent action (RRHF-1 §RH4) on premise RH1; the minimal action (Result MH1) provably lacks it	[H_CMR] Requirement 5
D41	Colour-sensitive internal score the factor-blind lift erases — ADDRESSED CONDITIONALLY by the representation ledger returning $g_s = 1$ exactly under blind differentiation (RRHF-1 §RH4) on premise RH1; provenance of the ledger open (D-CY3-ledger)	[H_CMR] Requirement 6
D-CY3-ledger	Discrete-ledger provenance. The functorial lift is DERIVED (RRHF-1 RH1); PRLU-1 then proves the published transfer does NOT force the ledger (Theorem 5, neutral-channel witness) but that it is unique under premises PS1–PS3 (Theorem 6). **Localised**: the debt is now the two premises the wheel does not supply — PS2 (neutral terminal-carrier completeness) and PS3 (score-normalisation map) — not the whole ledger. Everything else (charged roles, charges (1,4,−2,−3,−6,0;3), three generations) is conditionally forced. **Maps onto RPC-1 D44′**	[proof] Requirement 5, 6
D-NT	Neutral terminal-carrier completeness — killed-kernel criterion PROVED (Theorem 11); full-carrier object SUPPLIED and its support facts PASS (FCHI-1): rank-three active support, exact regulator-uniform gap $1-e^{-1}$ (Theorem 13). Structural existence CLOSED. Residual = **the provenance theorem** — that the unextended primitive substrate uniquely forces this support instrument (premise FC1) — plus the physical neutral mass block and absolute scale	[proof] Requirement 5, 6
D-SCORE	Canonical score-normalisation map — quadratic content DISCHARGED (Theorem 12); the M_R positive-support the arithmetic needed is now SUPPLIED (FCHI-1, full-rank self-completion, Result FC1), so (5,4,80)→Z(1,5/2,298) follows.	[proof] Requirement 6

Debt	Object	Blocks
	Residual = **the same provenance theorem** (FC1) that the full-carrier instrument is substrate-forced, not supplied	
D37	Substrate length calibration ξ	[ξ] — absolute scale; Closure Rules 3, 4; the meaning of “running” throughout
D38	Score-kernel convention: published description insufficient to reproduce $\dot{\Sigma} = \ln 2$	[H_CMR] §20; the RPC-1 D40 rebuild standard
D34	Admissibility of complete overlap in the K_{N,N} antichain family	[H_CMR] Requirement 2
D-R2	A non-factorising two-level operator with full auxiliary census and a convergence, monotonicity or Cauchy estimate	Requirement 2
D-BR	Data-independent branch selector, or exact-degeneracy theorem for k_Ω = ±1	Requirement 7
D-OS	Resolution of the 45D / 6-mode Fock spectral discrepancy, then a chiral OS argument	Requirement 1; §31
D-NEU	Neutral addresses, Y_ν, M_D and direct M_R	Requirements 5, 6; Closure Rule 1
D-COV	Joint cross-sector covariance	Closure Rule 5
D-PMNS	Sealed-manifest repair of the benchmark-reproducing neutral frame	Closure Rule 8; §34
D-MAN	Revision-registry check distinguishing integrity from currency	Closure Rule 9
D-CY3	Independent CY3′ agreement between Hessian and dressed mixed-vertex routes	Requirement 6; Stage 11
D-STRONG	Physical strong phase $\bar{\theta}$, with a regulator-stable near-π feature at θ_top = 0 (RCMO branch) and a 0.0791 rad candidate (MHPE-1 branch), both to reproduce or dissolve	Requirement 6; Stage 9; Closure Rule 1
D36	One-bit history metric — **CONDITIONAL CANDIDATE RETURN / REPRODUCIBILITY FAIL / NOT SETTLED** ($\dot{\Sigma} = \ln 2$ conditional on η = 1 conversion + K = 7 wheel-family; an independent rebuild of the kernel returns 0.185, so by the D38/D40 standard this is not a settled result); remaining: derive the conversion and wheel-family unconditionally, and supply the physical attempt rate	[H_CMR] absolute scale (with D35)

Debt	Object	Blocks
D32	Nonzero $\mathbb{Z}_7$ occupancy — CONDITIONAL CANDIDATE RETURN (conjugate pair {+1,−1} conditional on the primitive-Fact theorem); dissolved to premise level (PF + FP) under §43, Δf_occ = 0.007414782101 retained as fallback; remaining: exact residue and orientation, not selectable from CP data	[H_CMR] Requirement 7
D43	Unique derivation of the metric-graph maintenance-record action from the master substrate — RCMO-1 certifies its covariance, not its uniqueness; **maps onto RPC-1 D44′** (see Appendix F)	[proof] Requirement 5
D-ξ-uniq	Unconditional selection of the ξ coherence branch **— maps onto RPC-1 D45″** (see Appendix F)	[proof] the absolute scale
D-dΦ → GSJB-3	EXECUTED (Part XII-quattuordecies) with a split verdict: completion attachment CLOSED (character basis), branch covariance and n = 3–6 convergence PASS, but the endpoint-flat action cannot fix the metric — the residual advances to D-GSJB4	[proof] Requirement 5
D-GSJB4	ADVANCED (Part XII-quindecies): κ = 1/3 selected, the reset gauge retired, and the neutral question reduced from roster provenance to pre-fact-carrier occupancy; the endpoint-measure half remains open inside D-GSJB7 (the absolute hazard cancels from winner probabilities, so the measure question is now typed, not numerical)	[proof] Requirement 5
D-GSJB7	EXECUTED (Part XII-sedecies) as a major conditional pass: the occupancy half is closed under the void axioms (neutral-singlet canvas forced, neutral-extended selected, charged-minimal excluded) and the internal graded metric closes at full rank 98; the residual advances to D-GSJB8	[proof] Requirement 5
D-GSJB8	EXECUTED (Part XII-septendecies) as a graded no-go: the current action is exactly block-diagonal at the void, so no linear ι_n exists; the object is retyped as a support-changing graded birth functor with the minimal 49-direction witness explicit; the residual advances to D-GSJB9	[proof] Requirement 5

Debt	Object	Blocks
D-GSJB9	EXECUTED (Part XII-duodevicies): the support half is forced (deterministic birth impossible, covariant 49-multiplet required, twelve-type decomposition exact) and the two-plane is settled as genuine under admission; the stiffness half is not forced (eleven-parameter cone) — the residual advances to D-GSJB10	[proof] Requirement 5
D-GSJB10	EXECUTED (Part XII-undevicies): FS and W_D agree exactly on all 94 nonneutral directions, collapsing the eleven ratios to the neutral four-plane parameter θ; the 104-carrier is constructed as the family H_{104} = G_θ $\oplus$ 0_6 at both levels; the unique member is not selected — the residual advances to D-GSJB11	[proof] Requirement 5
D-GSJB11	EXECUTED (Part XII-vicies) and resolved by typing: the timeless race is invariance-certified, phase covariance and exhaustive additivity force the Born/FS selection geometry, readout Fisher is rejected by type, and θ is removed as a selection/response conflation — the residual advances to D-GSJB12	[proof] Requirement 5
D-GSJB12	EXECUTED (Part XII-vicies-semel) as a major conditional pass: deterministic equivariant preparation excluded, the law-level measure fixed as Haar/FS, and the D44′ factorisation conditionally discharged under ER — the residual advances to the event level, D-GSJB13	[proof] Requirement 5
D-GSJB13	EXECUTED (Part XII-vicies-bis) as a major typing pass: the Gibbs–Haar family is the unique source-supported form with exactly eleven relative tilts, the exact occupancy functional is derived, and UR-comp alone is a no-go — the residual advances to D-GSJB14	[proof] Requirement 5
D-GSJB14	EXECUTED (Part XII-vicies-ter): the additive action form is derived with two exact non-identifiabilities (phases, costs), the shared-face law reduced to one free coupling, provenance proved independently necessary, and D45″ reduced to the binary primitive m_face with both stability graphs explicit — the residual advances to D-GSJB15	[proof] Requirement 5
D-GSJB15	EXECUTED (Part XII-vicies-quater) and *corrective*: the event-multiplicity half closes at	[proof] Requirement 5

Debt	Object	Blocks
	m_fact = 1 under the strong transport model, dual records are proved exactly consistent as a four-bit redundancy code, and γ is retyped as syndrome-only maintenance stiffness — the residual advances to D-GSJB16	
D-GSJB16	EXECUTED (Part XII-vicies-quinquies): the localisation is selected conditionally — one interface token at birth with $\gamma_{birth} = 0$ exactly, duplication disproved as a locality requirement and displaced downstream, and the 16-token carrier returned blind at $\xi = 62.723178$ μm — the residual advances to D-GSJB17	[proof] Requirement 5
D-GSJB17	Primitive record copy dynamics and post-commitment redundancy cost (Part XII-vicies-quinquies §7) — derive whether and when the single interface record is copied into downstream local or environmental fragments, and calculate γ_{copy} and the maintenance cost without altering the primitive sixteen-channel fact law. **Mapping:** this is a *downstream maintenance continuation after D45″*, not the remaining D44′ calculation — it has no exact RPC-1 counterpart, and the D44′ event-level line (D-GSJB13/14 content) runs in parallel with it (see Appendix F)	[proof] Requirement 5
D-editorial	Per-item grade columns (claim as issued / original grade / current grade / superseding result / reproduction package) for all 94 entries of §39 and all 32 of §41; the §42 re-grading table currently covers only the entries known to have changed	[audit] editorial
D-ξ-branch	After the Part XII-vicies-quinquies selection the primitive scale is $\xi = 62.723178$ μm (one interface token), with 84.071786 μm retained for commit-before-glue under A2* or later proliferation; the selected value sits 25.45% below the separately frozen corpus coherence scale 84.137118546 μm, which therefore corresponds to the non-primitive branch under these premises. Reconcile the two normalisations and state the construction order and localisation wherever ξ is used	[audit] Requirement 5

Debt	Object	Blocks
	downstream; both branch exponents are certified to share one frozen ultraviolet ruler	
D-G456-REG	PARTIALLY DISCHARGED: the GSJB-4/5 summaries are merged as Parts XII-quattuordecies-bis/-ter (summary grade); the residual is report-grade only — the full calculation reports, if supplied, upgrade those Parts and override any summary-grade figure	[registration] Parts XII-quattuordecies-bis/-ter
D-USBA3	Stationary completion/address morphism — a derived bridge from the declared 33-dimensional common address carrier to the faithful tangent, currently declared not derived	[proof] Requirement 5
D-FR1…D-FR8	Transport-layer debts (Appendix A §A12)	[transport] Requirement 8

Appendix F — Cross-Walk to the Parent RPC-1 Theorem

SMC-1U and the parent theorem *The Renormalised Standard Model Parameter-Closure Theorem in VERSF* (RPC-1) evolved in parallel and carry **disjoint internal numbering**. RPC-1 runs falsifiers F1–F39 and debts through D45″; SMC-1U runs F1–F81 (contiguous) and its own D-series. The two F-series and D-series are *not* a shared namespace: SMC-1U F30 is the MHPE-1 ledger-adjacency falsifier, whereas RPC-1 F30 is a different condition entirely, and the two series overlap by number across F36–F39 without sharing meaning. This appendix records the identities that do hold, so neither document is read through the other's numbering by mistake.

F.1 Shared theorems (same result, two documents)

SMC-1U	RPC-1	Result
Theorem 1 (generator readout)	Theorem 69.1 (log-before-polar)	The terminal connection is extracted from the generator, not the transfer; the entry readout's a_t-dependence is the artefact.
Lemma 2 (factorisation)	Lemma 74.2	A tensor-product two-level operator makes level-independence a theorem, so it tests nothing.
Lemma 3 (η-readback)	§71.2 whitening tautology / §66.2 non-identifiability	G_red = diag(1 − η) is a bijection of the inserted susceptibilities; no η carries derived gauge content.

SMC-1U	RPC-1	Result
Theorem 4 (non-closure)	**Theorem 72.1**	The corpus admits a continuum of inequivalent boundaries; refusal to certify is a theorem; missing objects non-invertible.
Part XI audit basis	**Theorem 7.3** (non-insertion/measurability)	Every output is measurable w.r.t. the frozen boundary and manifest alone; the audit reduces to "what could the process read?"
§43 reduction	**Theorem 77.1**	The six missing objects reduce to { H_CMR, ξ } under premises PF and FP.
Theorem 7 / 8 (quark transport)	§74.7 FRGM-1C returns	Self-consistent thresholds and the matching operator R_u = R_d = $0.580788332942 \cdot \mathbb{1}_3$.
Result RK1 (conditional CY3′) + RK2 premise	D44′ territory (§79.4 counterexamples)	Whether the substrate's completion law is the functorial lift is the D44′-class uniqueness obligation.
Result RH1/RH2 (derived lift, ledger provenance)	D44′ (deeper form)	The functorial lift is derived; the residual is whether the substrate forces the K=7 representation ledger.
Theorem 5 / 6 + Result PS1 (transfer non-injectivity; conditional uniqueness)	D44′ (localised)	The published transfer provably does not force the ledger (neutral-channel witness); the ledger is unique under PS1–PS3, localising D44′ to PS2 (NT) and PS3 (score map).
Theorem 9 / 10 + Results PT1–PT3 (NT criterion; conditional score arithmetic; descent)	D44′ (two computable quantities)	NT and the score map become the killed-kernel radius and primitive-innovation factorisation — the two path-law computations that close D44′. PT2's factorisation is the Primitive Innovation Factorisation statement named in the RPC D44′ analysis.
Theorem 11 / 12 + Results SG1–SG4 (killed-kernel absorption; marked-martingale orthogonality)	D44′ (quadratic half proved)	The killed-kernel criterion is proved and the factorisation is an exact quadratic theorem — the quadratic half of D44′ becomes a theorem, dissolving the RPC D44′ counterexamples for that content; residual = the full-carrier numerical law and M_R support.

SMC-1U	RPC-1	Result
Theorem 13 + Results FC1–FC2 (exact terminal gap; existence closed)	D44′ (provenance half)	The full-carrier object is supplied and its support/gap facts pass, closing structural existence; the residual is precisely the provenance half of D44′ — that the unextended substrate uniquely forces the supplied instrument.

F.2 Shared debts (same object, two labels)

SMC-1U	RPC-1	Object
H_CMR (Appendix E)	H_CMR (§77–78)	The representation-resolved commitment-maintenance action.
ξ (Appendix E)	ξ / D37 (§78)	The absolute length; four-object ledger — 62.723 µm (primitive, conditionally selected), 84.072 µm (dual-record), 84.137 µm (frozen corpus, unreconciled), ≈ 88 µm (bath-gap).
D35 weights	D35 (relocated to H_CMR spectral data, §77.5)	Typed bath normalisation weights.
D43	**D44′** (Primitive Innovation Factorisation)	Uniqueness of the maintenance-record action / current-score factorisation.
D-ξ-uniq	**D45″** (Construction-Order Clause)	Unconditional selection of the ξ coherence branch, reduced to whether the substrate commits before it glues.
D41	D41 (sector-internal score generators)	The colour-sensitive internal score the factor-blind lift erases; RRMK-1 supplies it conditionally ($g_s = 1$).
D-CY3-ledger	**D44′** (Primitive Innovation Factorisation)	The functorial lift is now derived (RRHF-1); the residual maps onto D44′ one level deeper — prove the primitive substrate forces the K=7 representation ledger.
$d\Phi_n$ localisation	**D44′** (provenance line, localised)	USBA-1 (Part XII-undecies) proves the obstruction is not the K=7 carrier or CAR/Fock visibility but the non-identification of the representation-resolved source derivative $d\Phi_n$; the D44′ question becomes: does the primitive action select the source-to-tangent embedding?
Graded jet retype	**D44′** (typing correction)	GSJB-1 (Part XII-duodecies) proves the linear $d\Phi$ is not admissible — adjoint invariant nullity 0 for the simple factors — so the D44′ object is

SMC-1U	RPC-1	Object
		the graded source jet ($Q_3^{(2)}$, $Q_2^{(2)}$, $E\_Y^{(1)}$, $E\_record^{(1\mathbb{C})}$, $Q\_completion^{(2\,mx)}$, $T\_CARFock^{(3\,mx)}$), not a linear column map.
D-dΦ → GSJB-3	**D44′** (residual, sharpest form)	GSJB-2 (Part XII-tredecies) clears the support half — rank-72 score support frame-independent, exact structural Grams — leaving the native score metric and record/completion attachments as the entire D44′ provenance residual, with pass criteria fixed in advance.
GSJB-3 split	**D44′** (attachment half closed)	GSJB-3 (Part XII-quattuordecies) closes the completion attachment structurally ($\mathbb{Z}_2 \times \mathbb{Z}_2$ characters) and proves the endpoint-flat action cannot fix the metric; the D44′ residual unifies with the D-NT provenance theorem — one endpoint measure plus one neutral-branch provenance proof (D-GSJB4) now carries the entire line.
GSJB-4/5 pair	**D44′** (no-go/constructive pair)	GSJB-4 (summary grade) proves invariant data cannot select the endpoint frame and the neutral branch fails uniqueness, while GSJB-5 (summary grade) constructs the renewal family in closed form and removes the rank obstruction without uniqueness — jointly forcing the quindecies axiomatic turn.
GSJB-6 renewal	**D44′** (gauge stripped, question typed)	GSJB-6 (Part XII-quindecies) removes the reset gauge, selects $\kappa = 1/3$, and proves the common hazard cancels from all winner probabilities, so the D44′ residual is no longer any numerical normalisation: it is the typed distinguishability functional D_A(X) plus the neutral pre-fact occupancy theorem (D-GSJB7) — the provenance line in its sharpest form yet.
GSJB-7 occupancy	**D44′** (occupancy half closed under axioms)	GSJB-7 (Part XII-sedecies) proves the pure gauge-invariant canvas exists only in the neutral-singlet sector and closes the internal metric at full rank 98; the D44′ provenance line reduces to the innovation intertwiner ι_n plus the primitive derivation of the faithful algebra itself (D-GSJB8) — the first time the residual is a single covariant map.
GSJB-8 obstruction	**D44′** (map retyped as birth)	GSJB-8 (Part XII-septendecies) proves the current action cannot supply that map at any linear order — exact block-diagonality at the

SMC-1U	RPC-1	Object
		void — and retypes the D44′ residual as a support-changing graded birth functor, with the minimal 49-direction alphabet explicit and the neutral two-plane reserved to the birth law (D-GSJB9): the provenance line is now a creation problem, not an embedding problem.
GSJB-9 cone	**D44′** (creation problem halved)	GSJB-9 (Part XII-duodevicies) forces the birth support outright — deterministic birth impossible, twelve-type multiplet required — and proves the rank-96 parent incomplete by two, so the D44′ residual is a pure cost-geometry selection: one primitive quadratic action choosing eleven stiffness ratios on a fully determined alphabet (D-GSJB10) — the narrowest the provenance line has ever been.
GSJB-10 collapse	**D44′** (eleven to one)	GSJB-10 (Part XII-undevicies) proves the two source-supported cost geometries coincide exactly off the neutral sector, so the D44′ residual is one interpolation parameter θ on a four-plane with exact pairwise-8 structure, plus one action-to-rate identification and one absolute unit (D-GSJB11): the provenance line is now a single bridge law.
GSJB-11 typing	**D44′** (bridge answered, dial dissolved)	GSJB-11 (Part XII-vicies) resolves the bridge by typing: the Born norm is forced as the primitive selection law and W_D is the separately typed response, so no θ exists to choose — the D44′ residual becomes the preparation problem (which amplitude the substrate supplies) plus the order-to-duration conversion (D-GSJB12): the provenance line no longer contains any undetermined geometry, only an undetermined input and an undetermined clock.
GSJB-12 factorisation	**D44′ — CONDITIONAL PASS**	GSJB-12 (Part XII-vicies-semel) discharges the D44′ primitive-innovation factorisation conditionally: under the named ER condition, opportunities are conditionally iid Bernoulli with one common ordinal probability, branch identity is carried by the derived Born weights, and the consumer Fisher geometry was closed upstream — the first conditional discharge of the parent debt in the corpus, with the residual

SMC-1U	RPC-1	Object
		reduced to the realised event-level directing state (D-GSJB13) and the ER condition itself.
GSJB-13 typing	**D44′** (event level typed)	GSJB-13 (Part XII-vicies-bis) types the event-level residual completely: the conditioned measure is a Gibbs–Haar family with exactly eleven tilts, the occupancy functional is exact, and what remains of the entire provenance line is two named functions — $\rho \to \Delta I_\rho(\eta)$ and $\rho \to \nu_\rho(dp)$ — plus one construction-order theorem (D45″), carried by D-GSJB14.
GSJB-14 reduction	**D44′ / D45″** (order made binary)	GSJB-14 (Part XII-vicies-ter) derives the action's form, proves it cannot supply either the phases or the costs, and reduces the D45″ construction-order clause from a conceptual question to one primitive binary return, $m_{face} \in \{1,2\}$, each branch giving a fully explicit stability graph and its own coherence scale — the D44′ line and the parent D45″ clause now share a single physical unknown (D-GSJB15).
GSJB-15 correction	**D45″ — HALF CLOSED**	GSJB-15 (Part XII-vicies-quater) corrects and halves the clause: the event-multiplicity question is closed ($m_{fact} = 1$ — the two side readings are one relation and its deterministic inverse, so the earlier fork was double-counting), leaving only record-token localisation and the maintenance stiffness γ (D-GSJB16). This removes the probabilistic content from the *D45″ construction-order clause* — what remains of **that clause** is where a fact is written and what maintaining a duplicate costs. It leaves the separate **D44′ event-level line untouched and open**.
GSJB-16 selection	**D45″ — CLOSED CONDITIONALLY; D44′ EVENT LEVEL STILL OPEN**	GSJB-16 (Part XII-vicies-quinquies) conditionally closes the shared-face construction-order and primitive record-localisation clause under the named structure-economy premise: $m_{fact} = 1$, $m_{record\_token,birth} = 1$, $\gamma_{birth} = 0$. **It does not close D44′.** The event-level preparation debt left by GSJB-13/14 stands: the microscopic extension-information functional $\Delta I_\rho(\eta)$, the comparison directing law $\nu_\rho(dp)$, the realised η and z, the physical entropy costs ΔS and the

SMC-1U	RPC-1	Object
		relative phases are all still not action-derived. D-GSJB17 is therefore a *post-commitment copy-dynamics* calculation, not the sole remaining primitive-innovation calculation — the D44′ event-level line (D-GSJB13/14 content) runs in parallel with it.
D-STRONG	§66.7 vs RCMO strong-phase cross-tension	$\bar{\theta} = 0$ on the positive-real Hermitian charged branch vs the regulator-stable near-π determinant phase; both branch-conditional, neither promoted.

Current three-way debt mapping (after the second review round)

The three residual lines are distinct and must not be collapsed into one another:

line	content	status
D44′ (event level)	the extension-information functional $\Delta I_\rho(\eta)$, the comparison directing law $\nu_\rho(dp)$, the realised η and z, the physical entropy costs ΔS, the relative phases, and the ER provenance condition	**OPEN —** untouched by the localisation rounds
D45″ (construction order)	shared-face event multiplicity and primitive record localisation	**CLOSED CONDITIONALLY** ($m_{fact} = 1$; $m_{record\_token,birth} = 1$; $\gamma_{birth} = 0$) under the named structure-economy premise
D-GSJB17 (maintenance)	post-commitment copy dynamics, γ_{copy}, maintenance cost, and the basin-maintenance dynamics a stability claim would require	**OPEN** — a downstream continuation after D45″, with **no exact RPC-1 counterpart**; it is not the remaining D44′ calculation

A fourth line, the absolute scale (D-ξ-branch and D-ξ-uniq), is separate again and is neither a D44′ nor a D45″ question.

F.3 Falsifiers with no counterpart

SMC-1U F25–F32 (the NFDMA-1, RCMO-1 and MHPE-1 layers) and RPC-1 F34–F39 (the multi-wheel exclusion, factorised-corroboration, clock-fitting and manifest-currency conditions) each exist only in their own document. In particular:

- SMC-1U **F27** (Level-2 shown factorising) is the constructive companion of RPC-1 **F39** (factorised-refinement corroboration) — related in spirit, distinct in statement.

- SMC-1U **F31** (CY3′ routes shown to share a parent) has no RPC-1 counterpart: the independent CY3′ test is executed in MHPE-1 (SMC-1U Part XII-quater), not in the parent.
- RPC-1 **F38** (sector-dependent clocks used to fit the force ratios) has no SMC-1U counterpart: SMC-1U does not attempt the TPB clock calibration that falsifier guards.
- SMC-1U **F33** (factor-blind gauge census), **F34** (RRMK-1 CY3′ cited as independent-route agreement), **F35** (RRHF-1 ledger treated as substrate-derived), and **F36–F38** (PRLU-1: conditional uniqueness cited as unconditional; neutral extension treated as transfer-forced; score map treated as a transfer output) are RRMK/RRHF/PRLU-specific and have no RPC-1 counterpart, since the representation-resolved kernel, history functional and ledger-uniqueness attempt are executed in SMC-1U Parts XII-quinquies through XII-septies, not the parent. **Namespace caution:** the parent RPC-1 independently uses F36–F39 for unrelated conditions (e.g. F37 the entry-readout error, F38 clock-fitting, F39 factorised-refinement corroboration); SMC-1U F36–F40 are a *disjoint* series and must be mapped through this appendix, never equated by number. In particular SMC-1U F39/F40 (the PTSD-1 killed-kernel and factorisation guards), F41/F42 (the SGPL-1 full-carrier and overstatement guards), F43 (the FCHI-1 supplied-vs-forced guard) and F44–F55 (the USBA/GSJB precursor-promotion, endpoint-branch, provenance-mixing, linear-revival, frame-selection, support/metric-conflation, downstream-inversion, branch-selection, old-completion, renewal-gauge, conditional-occupancy, congruence-bridge, central-sufficiency, void-axiom, void-boundary-congruence, witness-promotion, plane-selection, ignorance-axiom, admission-bookkeeping, declaration-conflation, family-completeness, type-conflation, prior/duration, creation-from-symmetry, law/event-conflation, tilt-insertion, occupancy-conflation, action-form-sufficiency, construction-order/scale, two-fact-accounting, redundancy-as-derivation, unconditional-selection, scale-branch, ledger-reading, grade/mapping, obsolete-ledger and stale-grade guards) are unrelated to RPC-1's F36–F39, which stop at F39.

F.4 Division of labour

The two documents are complementary, not redundant. **RPC-1 is the assembly-layer transport theorem —** the frozen structural theorem, the admission protocol, and the audit era that reduced the blockade to { H_CMR, ξ } and attempted the uniqueness proofs. **SMC-1U is the conditional-derivation and audit corpus —** it carries the nine-requirement Stage-A execution, the quark-transport theorem in full (Appendix A), and the forward-construction attempts (NFDMA-1, RCMO-1, MHPE-1) that test what a candidate action must do. Where they touch the same object they agree; the identities above are the map. When one is revised, the shared rows of §F.1–F.2 are the lines to check for drift.

Appendix G — Post-audit delta ledger (general-reader narrative)

This appendix preserves, unedited, the accreted general-reader narrative that previously stood as the summary. It is a chronological reading of how the audit and the subsequent construction rounds unfolded, retained because it records the order in which positions were taken and revised. For the current standing, read the General Reader Summary and Part XIII; where this narrative and the current summary differ in emphasis, the current summary governs.

This document attempts, in one audited chain, everything the programme has said is still required to derive the Standard Model from VERSF microscopic rules: a physical history law, two genuine refinement levels, a reduced response matrix, absolute scales, species embedding arrays, one common boundary, a branch selection, production-grade transport, and a blind end-to-end run. It then attempts the parameter-closure step that would turn such a boundary into predictions.

The chain does not reach a Standard Model boundary. The reason is now sharper than "more work is needed," and it is worth stating carefully, because two very different-looking failures have been confused in the past.

What closes. The quark transport problem closes. Quark masses change strongly between the low-energy scale at which the theory reads them off and the electroweak scale at which they must be used, and the amount of that change depends on the heavy-quark thresholds — which are themselves values of the transported masses. Solving both together is not merely possible but well-posed: the problem is a contraction with a unique solution, and the contraction rate turns out to be set by a single logarithm. The result removes a previously fatal instability in the Higgs sector and keeps the Higgs self-coupling positive all the way to the 5.8 TeV record-layer boundary.

The terminal holonomy closes too. A discrete sevenfold phase that the history law must carry around a closed cycle is reproduced exactly. An earlier run appeared to reject the candidate on this point; that rejection does not survive scrutiny, because the phase had been read off the wrong object, and the number it returned depended on an arbitrary regulator time — which a genuine phase of this kind cannot do.

What does not close, and why it cannot. The reduced gauge response comes out as a tidy diagonal matrix. It is not a result. It is exactly one minus the three bath susceptibilities that were supplied by hand, so the calculation returns what was inserted, sector by sector. No choice of those susceptibilities changes this, because the map from inputs to response is one-to-one.

That turns out to be one instance of something more general. Six explicit families of alternative boundaries can be written down, each fully consistent with everything the corpus certifies, each giving different physics. One of them leaves the light neutral operator exactly unchanged while moving the heavy spectrum by four orders of magnitude. So the missing information is not merely absent — it is unrecoverable from anything downstream. No amount of further computation on the present material can supply it.

Refusing to issue a certificate has therefore been upgraded from a cautious policy to a proved statement.

What the second layer shows. Because a refusal alone is uninformative about whether the machinery works, a second, strictly quarantined layer proceeds anyway with every input labelled as a conditional candidate, and asks the narrower question: if such a boundary existed with roughly these values, would the transport work? Largely yes. The thresholds close, the quartic stays positive, the gauge, scalar and flavour sectors transport together, and the flavour frame passes two internal tests that do not depend on the values used.

Three cautions govern how that layer may be read, and they are stated here because they are easy to lose. Several of its apparent successes are consequences of how the inputs were built: the strong coupling returns to exactly one at the top of the range because it was defined to; the gauge triple there is the transported conditional boundary, not independent evidence that a consistent completion exists; and a stability ceiling recomputed inside the package reproduces its own input rather than confirming it. Second, quantities reported at 5.8 TeV are not masses — they are formal products evaluated far above the scale where the broken-phase description applies. Third, the neutral sector is not merely incomplete but absent, and the mixing angles that exist reproduce a previously identified candidate benchmark, so they carry a provenance warning wherever they appear.

One new positive. A recently executed branch returns, for the first time, a bath response that differs between sectors rather than treating them alike. That is the shape of object the missing normalisation requires. It is a first executed instance under a declared convention, not the normalisation itself — and a rebuild from its own published description does not currently reproduce it, which is itself an open debt.

A further construction, executed last, sharpens the target. A single compact action was built that returns everything the boundary calls for — the mixing frames, the mass structures, the neutral sector, the strong phase — from one common source, and holds together when the underlying lattice is genuinely refined rather than merely copied. That is the first time any candidate has done both at once, and it settles a question that had been open: the object set does not over-constrain the framework. But when that action was frozen and then measured against the strongest conditional boundary, it failed badly — most starkly, it cannot manufacture the enormous spread between the lightest and heaviest fermions, and in trying it mixes them too much. The failure is the useful part: it says the physical content lives entirely in a mechanism for generating that spread cheaply, which this minimal action lacks. So the missing piece is now not just “an absolute scale” but “a scale that also steepens the hierarchy without over-mixing” — a sharper target than before.

A companion construction, done last, fixes a different and narrower problem. A successor action had a regulator flaw: its predicted mixing and neutral masses drifted wildly — by half to nine-tenths — when the underlying lattice was refined, which means those predictions were artefacts of the mesh rather than the physics. A maintenance-record operator was derived from the graph geometry that cures this: it converges cleanly as the mesh is refined (halving the error each time the mesh halves, the hallmark of a well-posed operator), and it derives the up/down/neutral contrast that earlier work had to put in by hand. Dropped into the flawed action, it brings every drifting prediction back to a few percent. This is a real repair, but a bounded one: it makes the machine's answers stable under refinement, which is necessary but not sufficient for them to be right. In particular it leaves a stubborn feature in the strong-interaction phase — a stable value sitting in the wrong place — which now becomes a specific thing to explain rather than a wobble to iterate away.

The most recent construction runs the single most important test in the whole effort, and it is worth being plain about why it matters. Throughout the work there is a consistency requirement — two entirely different ways of computing the fermion structure must give the same answer. Every earlier version quietly built both ways from the same starting object, so of course they agreed to fifteen decimal places; that agreement proved the arithmetic, not the physics. This construction builds the two ways genuinely separately for the first time — and they disagree, badly, by a third to a half, worst for the electron/neutrino family. So the honest headline is that the first time this test was run fairly, the simplest candidate failed it. That is not a step backwards. It is the most informative result so far, because it rules out the minimal version and says exactly what the real one must fix. Two smaller ingredients were also upgraded from arbitrary choices to conditional derivations along the way — including the "one bit per commitment" law, which now comes out to exactly the natural value. And a blind attempt at the force strengths came out lopsided in a telling way: the weak and hypercharge forces landed close without any tuning, while the strong force came out about a third too weak — which fingers one specific missing ingredient rather than a general failure.

The very latest construction is the strongest yet on the parts it reaches, and it clarifies the failed test rather than papering over it. It builds the fermion machinery "representation-resolved" — keeping track of which force each piece feels — and with that, the strong force comes out exactly right, the full spread of particle masses appears without the over-mixing that sank the earlier minimal version, and a common physical size (about the same 0.17 TeV scale seen before) is attached. On the consistency test that the previous construction failed, this one instead *passes* — but with an important asterisk that the paper states plainly and that a direct check of its data files confirms: it passes because it feeds both sides of the test from one shared object by assumption, rather than building the two sides independently. So it hasn't overturned the earlier failure; it has converted it into a single sharp question — is that shared object the one the deep theory actually produces? That is now the one thing left to check on the charged/force side, and it is a specific, testable calculation rather than an open-ended search. Everything on the neutral-particle side, the overall scale's first-principles value, and the final admission of the whole package still remain open.

And that specific calculation has now been done. The newest construction builds the missing ingredient *into the deep theory's own machinery* — computed blind from a discrete tally of the theory's building blocks, with none of the earlier construction's answers or any measured value allowed in — and then lets the theory produce the consistency check by itself. This time the two sides of the test are built genuinely separately (a direct check of the data files confirms they are no longer the same object copied twice), and they agree to fourteen decimal places, with the force strengths coming out exactly right. So the ingredient that was previously slipped in by hand is now generated by the theory. The catch is one level deeper and much smaller: that blind tally of building blocks is taken from earlier results rather than proven, from the very bottom, to be the only tally the theory allows. So the charged/force side of the derivation is now internally consistent and self-generating, resting on a single short, checkable list — and the last question there is whether that list is forced by the deepest layer of the theory or is one extra assumption. The neutral particles, the absolute size scale, and final sign-off on the whole package remain open.

That last question — is the short list forced or assumed — has now been examined head-on, and the answer is precise and useful: as the theory is currently written, the list is *not* forced. The clean demonstration is that the deepest layer, taken alone, genuinely cannot tell apart two versions of the particle roster — one with a right-handed neutral partner and one without — because they look identical in every way the deepest layer can measure, yet they give different downstream numbers. So the deepest layer does not, by itself, pick the version the working construction used. But the same analysis shows the list is not arbitrary either: it is the one and only roster consistent with a short, explicit set of stated rules. The upshot is that the remaining gap has shrunk from "derive the whole roster" to "derive just two of those rules from the bottom layer" — a sharper and smaller target. Everything else on the charged side is pinned down; the neutral particles, the absolute scale, and final sign-off remain open.

Those two rules have now been taken on directly, and the result is uneven but genuinely clarifying. Each rule has been turned from a broad assumption into a precise, single, computable test. The neutral-partner rule becomes a concrete question about whether the theory's dynamics always "settle" a neutral line rather than letting it drift forever — and if they do, the paper proves the settled endpoint can only be the right-handed neutral partner, and that there must be exactly three of them. The scoring rule becomes exact arithmetic — the force-strength tallies fall out mechanically — provided one clean statistical property of the theory's basic events holds. Neither is proven yet: a specific "settling" theorem is missing for the first, and a worked counterexample shows the published law doesn't yet force the statistical property for the second. But both have gone from "assumption we hope the theory supplies" to "one specific number and one specific property to compute from the theory's engine" — which is the smallest and most concrete the remaining charged-side gap has ever been. The neutral masses, the absolute scale, and final sign-off remain open.

Those two computations have now been tackled, and the structural core of each is done. For the neutral-partner rule, the paper proves that *if* the theory's dynamics settle the neutral line at all, they settle it completely and exactly onto three right-handed partners — the "settling implies exactly three" step is now a theorem, checked at two levels of detail. For the scoring rule, the earlier worry — that a hidden freedom could rescale the tallies — turns out to dissolve: the theory's events happen one at a time, and that single fact is enough to make the tallies additive and rigid, without needing the stronger statistical assumption that the earlier counterexample had broken. A separate check confirms that once the neutral partners are switched on, the theory has no leftover hidden conservation law that would spoil neutrino masses. What is left is no longer conceptual: it is to write down the theory's full engine (not the compressed stand-in used for these checks) and confirm three positivity facts and one stability bound. In plain terms, the remaining charged-side gap is now a concrete numerical to-do list on one object, with the hard conceptual questions answered. The neutral masses, the absolute scale, and final sign-off remain open.

That numerical to-do list has now been carried out. The theory's full engine — the complete parent object, not the compressed stand-in used before — has been written down explicitly and checked, and it passes the three tests that were asked of it: each neutral line genuinely finds its right-handed partner, the partners complete themselves with no leftover hidden conservation law, and — the cleanest result — the "settling" that sends a neutral line to its partner happens at a rate that is provably the same at every level of detail, because of the rigid mathematical shape of the process rather than any numerical coincidence. So the *existence* of the neutral partner structure, long assumed, is now built and verified. What is left is one deep question of pedigree — whether the theory's most basic layer is forced to produce exactly this engine, or merely permits it — together with the absolute size scale and the actual neutral particle masses. The gap has narrowed from "does this structure exist and behave" to "is this structure the only one the foundations allow," which is the last and hardest kind of question, but a single sharp one.

The honest terminal position is a completed structural theorem together with a proof of exactly what is missing. That is stronger than an unresolved attempt and weaker than a derivation, and both halves should be quoted together.

The newest chapters re-run the machine that assembles particle species onto the boundary and find it works perfectly as an interface — every structural test passes — while proving the one thing it cannot do: pick out, by itself, how the six microscopic channels plug into the large faithful space. That plug turns out not to be a simple linear map at all; for four of the six channels the correct object is quadratic, a fact of pure representation theory. With the corrected graded object, the descent to the boundary now lands on exactly the right supports with striking exact numbers appearing on the way; The follow-up settled half of that: the final attachment rule is now derived outright — the four completion routes carry two built-in yes/no labels whose combinations pick out the coordinates uniquely, and the natural curvature comes out exactly diagonal there — while the weighting question split cleanly in two: the raw probability-based stiffness provably depends on an arbitrary background choice and cannot be the answer, whereas the theory's own event-counting stiffness is background-independent and exact, but comes in two versions depending on whether the neutral partner is counted. Which version is real is the same single provenance question the neutral sector has owed since its existence was closed; Two intermediate rounds first proved the hard way that no symmetric equilibrium choice can do the job — the symmetric option exists but is informationally dead, and averaged data provably cannot recover what is needed — and that adding a renewal step restores everything measurable, in exact closed form, without being uniquely demanded. A further round then settled the machinery of return: after each completed fact the substrate demonstrably comes back to one unique, perfectly featureless resting state — a genuine zero-entropy theorem — and once time is counted by facts rather than idle steps, one of the supposed free dials turns out to be no dial at all, while another is fixed at exactly one third. The bookkeeping closes beautifully: probabilities, masses and rates all agree to machine precision, and the neutral sector's waiting time comes out as exactly two of the theory's own characteristic beats. The occupancy question has since been answered within the theory's own alternatives: a featureless, fully symmetric canvas can live only in the neutral-singlet sector — the charged-only option provably has no room for one — so the extended ledger is selected by the void axioms themselves, and every internal direction of distinguishability is now measurable, the whole internal geometry closing at full rank with a striking exact identity binding its softest and stiffest directions to the number eight. What remains is a single dictionary — the derived map carrying this internal geometry into the historical variables, where fitted bridges exist but a fitted bridge is not a derivation — together with the absolute rate of the clock; The dictionary hunt then hit an exact wall, with a map attached: at the featureless canvas the current machinery is provably inert at first order in every channel — nothing linear can be born from it, and everything charged appears only at second order — so the dictionary is not a table but a birth process. A minimal alphabet of forty-nine creation directions is written out explicitly and shown to span everything needed, but the theory's action does not yet produce it; and the two leftover directions sit in a small symmetric plane that the old parent demonstrably cannot choose. The birth round then pinned what must exist: the symmetries forbid any single definite creation direction, so birth must offer the whole forty-nine-letter alphabet at once, sorted into twelve distinct types — but how strongly each type is weighted is left an eleven-way freedom, with the elegant equal-ignorance choice available only as an extra assumption. And the little plane resolved the other way: its two faint directions, under a millionth of the total, are genuine after all, so the inherited parent is two directions short and the true carrier must be at least one hundred and four dimensional. That derivation then collapsed almost completely on its own: the two natural cost geometries the theory supports turn out to agree exactly on all ninety-four charged-side directions, so the eleven-way freedom shrinks to a single dial on the four faint neutral directions — where the spectra pair off to the number eight again and the mismatch is an exact simple fraction — and the one-hundred-and-four dimensional carrier is built outright, as a one-dial family. The bridge question then answered itself in an unexpected way: the dial was an illusion born of mixing two different kinds of object. Once background time is removed — the race runs on opportunity, not seconds, and no re-labelling of the racetrack can change a single winner — internal consistency alone forces the familiar quantum rule for which fact happens next: chances are squared lengths, exactly. The rival geometry was never a rival; it describes the response after a fact, not the choice before one, and all its beautiful exact structure stays true in that role. So the dial is gone without ever being tuned. The preparation question then split one more time, at law versus event. At the level of law everything now closes: nothing deterministic and fully symmetric can make the first mark — that is a theorem — the ledger's loop structure can steer innovations but never create one, information counting forbids the first fact from setting up a universe-wide reference frame, the unique unbiased offering of possibilities is the perfectly uniform quantum measure, and under one clean new consistency assumption the deep bookkeeping debt this document has chased throughout is discharged: chances factor into one common opportunity dial times the quantum weights already derived. The event level is now typed even though not yet computed. Once the first records exist, perfect uniformity is provably no longer forced: the records tilt the odds through a single Boltzmann-like formula, in exactly eleven independent ways, with uniformity surviving only as the no-information special case. And whether the ledger's loop-labels actually get occupied turns out to hinge on three things the law alone cannot fix: the shape of the network must supply an unfilled loop, the tilting function must be derived from the commitment action, and one deceptively simple bookkeeping question must be settled — when two cells are glued together before anything is committed, does the shared face hold one record or two? The tilting function then turned out to have a forced shape — cost plus readiness, in the familiar thermodynamic form, reproducing the quantum weights exactly when no irreversible cost differs — while proving, twice over, that shape alone decides nothing: the same information is shared by states pointing in completely different directions, and any desired outcome distribution can be manufactured by some choice of costs. So the costs themselves must be computed, not chosen. Meanwhile the deceptively simple gluing question has been sharpened into a single yes-or-no primitive: does a shared face fire once or twice? Each answer builds a different, fully explicit network — one with sixteen labels, one with twenty — and they disagree about the theory's fundamental length scale by a quarter. That yes-or-no question has since been answered — and it was partly the wrong question. Looking at a shared boundary from either side gives the same single relationship, just read backwards, and reading it backwards adds no new information whatsoever: so a shared face registers exactly one event, not two, and the earlier fork was double-counting. What genuinely remains is a bookkeeping choice of a different kind: is that one shared fact written once, on the boundary itself, or copied twice, once in each neighbour? Both are mathematically consistent, and the twin-copy version is exactly a simple error-detecting code — it can spot a corrupted copy but not say which one is wrong — so redundancy makes duplication attractive without making it necessary. That choice has now been made, conditionally but on a clear principle. One shared record turns out to be readable from both sides without duplication — checking it from the second side adds nothing at all — and a single record can be made durable by having many microscopic arrangements stand for the same recorded value, rather than by keeping a spare copy. Since the theory's standing discipline is to install no structure that nothing requires, the primitive act of committing writes exactly one record, and any duplicate copies belong to a later, optional stage of proliferation. That answer picks the smaller of the two networks and with it the shorter fundamental length — about sixty-three thousandths of a millimetre rather than eighty-four — which is a quarter away from the value other parts of the programme have been using, and that discrepancy is now recorded openly as something to reconcile. What remains is when and how copies actually get made, and what maintaining them costs.

Appendix H — Executive Ledger (retained)

This section preserves, unedited, the long-form executive account that formerly served as the abstract. It is a chronological reading of the audit and its construction rounds, retained for provenance. Where it and the compressed abstract differ in emphasis, the abstract and the verdict box govern.

Nine outstanding requirements for a conditional VERSF derivation of the Standard Model are executed in one deterministic, hash-covered Stage-A run, together with the self-consistent quark transport theorem and the strict parameter-closure admission protocol.

Transport (Requirement 8, Appendix A). The low-current quark grid and the QCD threshold cascade are solved as one coupled fixed point. A cascade lemma collapses the scale hierarchy to $\Lambda_n^{(33-2n)} = \Lambda_6^{21} \prod_{(h>n)} m_h^2$*, equivalently the continuity and piecewise linearity of* $1/\alpha_s$ *in* $\ln \mu$*. A contraction lemma gives the log-Jacobian in closed form, identifies the local rate as* $\rho = (24/25)/L_4(m_c) = 0.256052906$ *exactly, and supplies a rigorous interval bound* $\|D\mathcal{T}\|_\infty \leq 0.649795$ on a wide physical box, so existence and uniqueness follow from the Banach theorem. The root is $(m_t, m_b, m_c) = (171.783689943, 4.213223810, 1.228341125)$ GeV with cascade $(\Lambda_6, \Lambda_5, \Lambda_4, \Lambda_3) = (73.245777, 143.827986, 188.445205, 216.516653)$ MeV, and the matching operator is $R_u^{QCD} = R_d^{QCD} = 0.580788332942 \cdot \mathbb{1}_3$, below the independent ceiling 0.666093443388 and keeping $\lambda(\mu) > 0$ to 5.80 TeV with $\lambda(\mu\star) = 0.068065835223$.

Stage-A re-gradings. Three verdicts change on evidence internal to the frozen run. The terminal-holonomy failure (Wilson residual 0.370538) is an artefact of extracting the connection from the transfer operator rather than its generator; the archived heat-time continuation returns 0.8975978967 at $a_t = 10^{-8}$ against $2\pi/7 = 0.8975979010256552$, with slope 0.434765 linear in a_t, and the monotone decay to 0.025582 at $a_t = 5$ measures winding contamination rather than rejecting the candidate. The reduced response satisfies $G_{red}(\eta) = \mathrm{diag}(1 - \eta_{colour}, 1 - \eta_{weak}, 1 - \eta_{abelian})$ exactly, certified at both endpoints by the run itself, so it is a bijective readback carrying no derived content. The two-level operator is a pure tensor factorisation, so level-independence and equal auxiliary gaps are theorems of the construction, and Requirement 2 is not tested by it.

Non-closure and reduction. Six witness families exhibit mutually inequivalent positive boundaries consistent with every certified corpus quantity (this is the parent RPC-1 Theorem 72.1). Certificate refusal is therefore a theorem and the missing objects are non-invertible: the required returns are new information, not computation. The parent theorem's §77 then reduces the six missing objects to two primitive ones — a representation-resolved commitment-maintenance action H_{CMR} and an absolute length ξ — under two named premises, with both existing at candidate grade and ξ reached by two independent routes agreeing to 4.5% — an agreement now referred to the non-primitive duplicate branch only (Part XII-vicies-quinquies). The remaining task is not two uniqueness proofs alone: the event-level preparation sector (ΔI_ρ, ν_ρ, realised η/z, ΔS, phases) and the post-commitment maintenance sector are still missing action-level returns inside H_{CMR}, and ξ additionally requires reconciliation and selection among four candidate values.

Closure audit. The strict parameter-closure algorithm halts at Stage 0 with seven of ten admission rules failing outright, one proved permanently unsatisfiable. A separately typed quarantined continuation returns a conditional partial pass across quark thresholds, coupled transport, scalar stability, running electroweak reconstruction and charged-flavour identities, with four of its returns reclassified as construction consequences carrying no evidential weight.

Master action (Part XII-bis). A normalised fermion-dressed master-action candidate returns the full requested object set — a positive G_red, a rank-9 Yukawa projector, eight normalised chiral embeddings, all four Yukawa matrices, a complete 6×6 neutral block, a native-Λ scalar boundary, an internally exact CY3′ and $\bar{\theta} \approx 0$ — from one common action, and remains within all predeclared tolerances under a genuine non-factorising refinement (subdivided graphs, midpoint interactions, Schur-eliminated). This solves formal compatibility by explicit construction. Frozen and then compared with the strongest conditional boundary, it fails decisively — g′ too large by ≈16.6×, the light and middle fermion singular values orders of magnitude too large, the Jarlskog invariant ≈11.3× target — with a single structural diagnosis: the closure spectrum is too shallow and the minimal-address construction over-mixes. The minimal constitutive choice is thereby falsified as the physical action, and the missing physical content is isolated in one property — a steep-hierarchy mechanism that does not inflate the mixing.

Regulator covariance (Part XII-ter). A regulator-covariant maintenance-record operator family is calculated from the six physical address slots and the signed record s = (0, +1, −1, 0, −1, +1) on one metric multigraph, subdivided dyadically. The blocked operator converges at measured order p = 1.99670 under a derived unitary blocking map (unitarity residual 2.20×10^{-15}), with fixed-point spectrum (−0.943683, 0.024996, 1.000000). Substituted into the frozen successor action NFDMA-2 — a distinct action whose flavour and neutral subsystems drifted 53–93% between regulator levels — it repairs every failing subsystem to a few percent. This derives the signed up/down/neutral maintenance contrast from closure geometry rather than inserting it. It does not admit the boundary: the determinant phase is regulator-stable but sits near π at θ_top = 0, so the strong phase is unresolved with a new stable target rather than closed.

Independent CY3′ (Part XII-quater). A reduced physical evaluation conditionally discharges two upstream ledger entries — the one-bit history metric ($\dot{\Sigma}$ = ln 2 to 2.22×10^{-16}, D36 — though an independent rebuild of its kernel returns $\dot{\Sigma}$ = 0.185, so the discharge is not yet reproducible) and nonzero $\mathbb{Z}_7$ occupancy (conjugate pair {+1, −1}, D32) — and returns a no-fit gauge synthesis whose split is the content: (g_s, g, g′) = (0.750, 0.583, 0.330), colour low by 36% while weak and hypercharge close to within 10%, isolating a colour-sensitive score the factor-blind lift erases. Decisively, it runs the first genuinely independent CY3′ comparison: the mixed and Hessian Yukawa routes, built from different parents rather than copied from one closure object as in every prior return, disagree at normalised residues 0.37–0.49, worst in the charged-lepton and neutrino sectors, far above the 10^{-8} equality tolerance. The residues are regulator-stable to sub-percent, so the minimal MASD/HMGBC reduced action is falsified as the physical fermion completion as a property of the candidate, not discretisation noise. The absolute scale (D35) is untouched.

Representation-resolved kernel (Part XII-quinquies). A forward return of the representation-resolved kernel — the H_CMR-class object §43 reduces the corpus to — closes the charged hierarchy (nine singular values within 0.03%, steep without over-mixing), brings colour to g_s = 1.000 via the representation-resolved relaxation count (repairing the −36% deficit MHPE-1 isolated), and attaches Λ⋆ = 172.338050011 GeV. Its CY3′ residue is 5.84×10^{-16}, but the two route arrays are bit-for-bit identical: the agreement is two lifts of one imposed completion tensor, not two free parents. It therefore converts Result MH1's falsification into a conditional (Result RK1) — the routes agree *if* the functorial-lift premise holds — moving the physical content into whether the finite-regulator MASD-HMGBC law is that lift. Under two named synthesis premises this is the strongest charged/gauge boundary in the corpus; it is not a physical HFB-1 derivation, and HFB remains NOT ADMITTED.

History functional (Part XII-sexies). RRHF-1 executes the calculation RRMK-1 named as decisive: it adds representation-score and functorial-CAR terms to the parent history functional, fixed blind from the frozen K=7 representation ledger, and differentiates. The two CY3′ routes are now genuinely separate arrays (not the bit-for-bit copies of RRMK-1) produced by two functors on one ordered history, and they agree to 1.9×10^{-14}; the gauge Schur response reproduces exactly and the full charged tensor to 7×10^{-14}, with no RRMK array, no RK premise and no target value loaded (core seal: target directory empty, comparison opened after seal). This *derives* the functorial lift rather than imposing it, discharging the imposed-tensor objection and closing the charged/gauge side at the conditional action level. The frontier moves one level down: to whether the primitive MASD-HMGBC substrate forces the discrete K=7 ledger, or whether that ledger is an additional postulate. HFB remains NOT ADMITTED — the neutral block, absolute scale and global measure still block it.

Ledger provenance (Part XII-septies). PRLU-1 attempts to prove the published primitive MASD-HMGBC transfer *forces* the K=7 ledger RRHF-1 registered. It proves the opposite for the published transfer, with an exact neutral-channel witness: the charged-minimal and neutral-extended ledgers share every wheel transition and the direct traces (6, 13/2, 378), because N_R is a singlet with $q_N = 0$, yet differ in relaxation, $(5, 3, 60) \neq (5, 4, 80)$ — and RRHF used the latter, so the transfer does not select it. All enumerations (wheel automorphism order 12, the 15→1 lumpable matchings, the charge solution (1,4,−2,−3,−6), both relaxation branches) reproduce exactly. It simultaneously proves the ledger *is* the unique solution of a named premise package (SC-1 census, neutral terminal-carrier completeness NT, canonical score map), so the debt D-CY3-ledger does not close but localises to the two premises NT and the score map that the wheel provably does not supply. The terminal charged/gauge verdict is unchanged.

Terminal-and-score descent (Part XII-octies). PTSD-1 attempts to derive PRLU-1's two localised premises directly from the finite-regulator MASD/CAR/Fock history law. The result is asymmetric and sharp. Neutral completeness becomes a non-circular killed-kernel spectral criterion: if the neutral killed-kernel radius is < 1 the terminal image is uniquely typed as the right-chiral neutral singlet and generation-key preservation forces exactly three (Theorem 9), but the No-Unprotected-Recurrent-Neutral-Class theorem that would establish the radius is < 1 is not in the corpus. The score map becomes exact arithmetic conditional on primitive-innovation factorisation — colour $6-1 = 5$, one weak unit per channel, per-channel Abelian $2\cdot3^2+2 = 20$, giving both PRLU branches (5,3,60) and (5,4,80) — but an exact rate-rescaling counterexample shows the published law does not yet force that factorisation. The consolidated Primitive Terminal-and-Score Descent Theorem (Theorem 10) shows four explicit path-law properties suffice; the debt shrinks to two computable kernel quantities. The terminal charged/gauge verdict is unchanged.

Six-gate path law (Part XII-nonies). SGPL-1 delivers the structural halves of PTSD-1's two quantities across six gates. The killed-kernel criterion is proved: full rank of the Dirac completion gives $\rho(Q\_\nu) < 1$ with absorption integral exactly I_3 (Theorem 11), verified at two regulators ($1 - \rho = 2.82\times10^{-11}$ mixed, 1.07×10^{-11} Hessian). The factorisation counterexample is dissolved: a marked-point-process argument shows the quadratic Fisher metric needs only orthogonal compensated-martingale innovations — guaranteed by one mark per Fold — not the independent counts the counterexample broke (Theorem 12), which removes the force of the D44′ counterexamples for the quadratic score problem. An exact-grade audit removes the B−L protector once M_R is active (Dirac-only nullity 1, the lepton-number grade, → 0 with Majorana support, verified). Neither debt closes — the neutral matrices are inherited compressions — but the residual is now one full-carrier numerical object plus three positive-support/continuum-gap checks, with both structural theorems in hand. The terminal charged/gauge verdict is unchanged.

Full-carrier Hamiltonian (Part XII-decies). FCHI-1 supplies the object SGPL-1 named as the entire residual: an explicit 102-dimensional retained quadratic parent (history 12 + gauge 6 + completion 18 + charged 36 + neutral 24 + terminal 6) with positivity certificates, a complete 31-operator K=7 Kraus history instrument and a seven-outcome neutral terminal instrument, regenerated with zero SHA-256 mismatches. The three SGPL-1 support facts pass: every active-neutral key has positive rank-three support to the singlet ($p = 1 - e^{-1}$), the singlet self-completion is full-rank with grade nullity collapsing 1 → 0 (no protector), and — the strongest result — the terminal-route gap is exact and regulator-uniform, $1 - \rho(Q\_n) = 1 - e^{-1}$, because the killed kernel is block-triangular with spectrum $\{e^{-1}\}$ independent of the regulator (Theorem 13). The structural existence of the neutral terminal sector is thereby closed at retained quadratic order; the residual is the single provenance theorem — that the unextended primitive substrate uniquely forces this supplied instrument — plus the absolute scale and the physical neutral boundary.

The terminal classification is: nine-requirement attempt COMPLETED; HFB boundary NOT ADMITTED with non-closure proved; RPC numerical certificate NOT ADMITTED; formal object-set compatibility SOLVED BY CONSTRUCTION with the minimal constitutive action FALSIFIED; regulator covariance ACHIEVED with one regulator obstruction REPAIRED; the first independent CY3′ test EXECUTED AND FAILED, then CONDITIONALLY RESOLVED, then the functorial lift DERIVED by blind differentiation with the charged/gauge side CONDITIONALLY CLOSED at the action level; the neutral terminal sector's structural existence now CLOSED at retained quadratic order with an exact regulator-uniform gap (Theorem 13), the residual a single provenance theorem; the species/boundary interface RE-EXECUTED with the obstruction localised to the representation-resolved source derivative dΦ_n, the linear bridge EXCLUDED by representation typing with a graded replacement derived, and the graded-jet descent PASSED at support level; the GSJB-3 selection then EXECUTED with a split verdict — completion attachment CLOSED by the route-character basis, native Fisher metric proved endpoint non-identifiable, innovation-count H_CMR endpoint-independent but two-branch conditional — leaving one unique endpoint measure and the neutral-branch provenance theorem as the locked residual (GSJB-4); the endpoint-measure and renewal rounds EXECUTED as a no-go/constructive pair — unique ensemble and unique branch FAIL with central data provably insufficient, while constructive renewal restores neutral information and full Fisher rank in closed form; the void-relative renewal round then EXECUTED under declared zero-entropy/fact-time axioms — $\kappa = 1/3$ selected, the reset probability removed as gauge, first-passage Born compatibility exact, the neutral question reduced to pre-fact occupancy — with the absolute hazard and the typed distinguishability lift the locked residual (GSJB-7); the occupancy round then EXECUTED as a major conditional pass — the neutral-singlet canvas FORCED within the frozen faithful alternatives (charged-minimal admits none) with the neutral-extended ledger selected under the void axioms, and the internal graded metric CLOSED at full rank 98 — leaving the primitive innovation intertwiner from void tangent to history carrier as the locked residual (GSJB-8); the intertwiner round then EXECUTED as a graded no-go — the current action proved exactly inert at first order at the void, the intertwiner retyped as a support-changing graded birth functor with an explicit minimal 49-direction witness, and the neutral two-plane shown unselectable by the parent — leaving the source-clean birth law as the locked residual (GSJB-9); the birth round then EXECUTED — deterministic birth forbidden by symmetry, the covariant multiplet support forced, the stiffness left an eleven-parameter cone, and the rank-96 parent proved incomplete by two with minimum carrier 104 under the admission axiom — leaving the pre-fact innovation action metric as the locked residual (GSJB-10); the action-metric round then EXECUTED — Fubini–Study and the distinguishability Hessian proved exactly equal on all 94 nonneutral directions, collapsing the eleven ratios to a single neutral interpolation θ with the 104-dimensional carrier family constructed — leaving the action-to-hazard bridge as the locked residual (GSJB-11); the bridge round then EXECUTED and resolved by typing — the timeless race formulated and proved reparameterisation-invariant, the Born norm selected by phase covariance and exhaustive additivity as the primitive next-fact law, readout Fisher rejected by type, and the θ dial removed as a conflation of selection with response — leaving the pre-fact amplitude preparation and the fact-order-to-duration conversion as the locked residual (GSJB-12); the preparation round then EXECUTED as a major conditional pass — deterministic equivariant first differentiation excluded outright, the first-fact global frame excluded by information capacity, Haar/FS selected as the unique unresolved preparation law, and the D44′ factorisation conditionally discharged under the named ER condition — leaving the realised record-conditioned directing state as the locked event-level residual (GSJB-13); the directing-measure round then EXECUTED as a major typing pass — the Gibbs–Haar family selected as the unique source-supported form with exactly eleven relative tilts, occupancy separated into topology, directing law and the D45″ construction order, and UR-comp proved insufficient alone — leaving the extension-information functional, the comparison directing law and the construction-order theorem as the locked residual (GSJB-14); the commitment-action round then EXECUTED — the additive action form derived and its two non-identifiabilities proved exactly (phases and entropy costs), the shared-face law reduced to one free logical coupling, provenance shown independently necessary by an exact duplication no-go, and the construction-order debt reduced to the single binary primitive $m\_face \in \{1,2\}$ with its two explicit stability graphs — leaving the shared-face event multiplicity and the provenance-sensitive generator as the locked residual (GSJB-15); the shared-face round then EXECUTED and *corrected* that fork — under the strong transport model the two side readings are one relational fact and its deterministic inverse, so $m\_fact = 1$ closes and only the record-token localisation $m\_record\_token \in \{1,2\}$ remains, with dual copies shown exactly consistent as a four-bit redundancy code and γ retyped as maintenance stiffness — leaving record localisation and the maintenance stiffness as the locked residual (GSJB-16); the localisation round then EXECUTED and selected, conditionally on the named structure-economy discipline: one interface token at birth with $\gamma_{birth} = 0$, duplication disproved as a locality requirement and displaced downstream of commitment, and the 16-token carrier returned blind with $\xi = 62.723178$ μm — leaving the copy dynamics and post-commitment redundancy cost as the locked residual (GSJB-17) — which closes the construction-order/localisation clause only, the D44′ event-level preparation debt (extension-information functional, directing law, realised amplitude, entropy costs, phases) remaining open in parallel; conditional Standard Model derivation NOT ESTABLISHED. **Current headline:** the corpus does not determine a unique Standard Model boundary and cannot support a physical closure certificate; it does close the self-consistent quark-transport problem, establish several exact structural no-go and existence results, and reduce much of the remaining architecture to explicit primitive action and scale questions — with the event-level preparation law, the physical entropy costs, the post-commitment copying dynamics and an unconditional absolute scale all still owed.
