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

This is an audit-class document, and by deliberate exception to the programme's usual house order it opens with the status matrix rather than the general-reader summary: 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)	**CONDITIONALLY DISCHARGED WITH A REPRODUCIBILITY FAILURE** (Part XII-quater) — premises named; D35 absolute scale untouched; and an independent rebuild of the D36 kernel returns $\Sigma = 0.185$, not ln 2, so by the document's own D38/D40 standard (unreproducible = not a result) D36 is not yet a settled discharge
Blocking object	Reduced (RPC-1 §77) to two primitive returns — one commitment-maintenance action H_CMR and one absolute length ξ — plus their two uniqueness proofs; D35's weights are H_CMR spectral data

This document is self-contained. 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.

General Reader Summary

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.

Abstract

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

η_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%; the remaining task is the two uniqueness proofs.

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 ($\Sigma = \ln 2$ to 2.22×10^{-16}, D36 — though an independent rebuild of its kernel returns $\Sigma = 0.185$, 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 $\Lambda\star = 172.338050011$ 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 $2\cdot 3^2+2 = 20$, 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; conditional Standard Model derivation NOT ESTABLISHED.

Principal Claim

Transport closes and terminal holonomy closes. What does not close is the absolute normalisation of the bath, and it cannot be made to close from within the present corpus:

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│ G_red(η) = diag(1 − η_colour, 1 − η_weak, 1 − η_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 one object rather than nine tasks — an object 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 converging at

#	Requirement	Verdict	Strongest return
			$\mathcal{O}(h^2)$ with a derived unitary blocking map. Both internal.
3	Physical reduced response G_red	**NOT ISSUED — NON-IDENTIFIABLE**	$G_{red}(\eta) = \mathrm{diag}(1 - \eta)$ on the retained directions; the frozen return diag(2/3, 1/2, 1) is readback, quarantined.
4	Absolute microscopic scales	CONDITIONAL RETURN	$\kappa_e = 1/31$, diamond conductances 1/16 and 1/32 with exact pairing, $\Lambda^\star$ = 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 and D32 conditionally discharged, 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.
9	Blind end-to-end run	STAGE-A RUN COMPLETE; CLOSURE NOT ADMITTED	Deterministic, hash-covered, software integrity PASS; scientific execution halts at the normalisation 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.
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, $U^\wedge rec = \mathrm{Pol}[-\mathbf{L}\_yx]$.	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

Premise	Statement	Retired by
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

$H\_hist^{(K=7)} = \mathbf{L}\_op$, $T\_hist^{(K=7)} = \exp(-a\_t\, \mathbf{L}\_op)$, $\pi = (7,4,4,4,4,4,4)/31$, $\mathrm{spec}(\Omega\_Q^2) = \{1/2, 1/2, 1, 1, 31/28, 5/4\}$.

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

$Q\,\mathbf{L}\_op\,P = 0$ exactly $\Rightarrow C = 0 \Rightarrow W\_prim = W\_core \Rightarrow G\_red = \mathbb{1}_3$.

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

$W\_prim = W\_core - \eta\_\kappa\, h\_\kappa\, h\_\kappa^T$, $E\_retained^\wedge T\, h\_\kappa = 0 \Rightarrow G\_red(gauge) = \mathbb{1}_3$.

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 nearest-neighbour benchmark reproduces the required phase to 2.483×10^{-16}. The question is which object carries the connection.

Theorem 1 (generator readout). Let **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,

$U^\wedge entry\_yx \equiv \mathrm{Pol}[T\_yx]$,

is not a connection: it depends on a_t. The generator extraction

$U^{rec}_{yx} \equiv \mathrm{Pol}[-\mathbf{L}_{yx}]$, equivalently $\mathbf{L} = -(1/a_t)\,\mathrm{Log}\,T$,

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 $\mathrm{Pol}[T_{yx}]$ 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
$\Lambda\star$	172.338050010654 GeV	Identity-completion branch, $v_{cl}/\sqrt{2}$
$\lambda(\mu_0)$	0.128999748047	Conditional scalar route
$\mu_H^2(\mu_0)$	7662.689132 GeV²	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 $\eta\_scalar = \hat{g}\_\kappa^2/(\omega_0^2 + 7)$, but $\hat{g}\_\kappa$ and ω_0 are not numerically returned, so $\eta\_scalar = 1/7$ 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.**

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 $\Sigma = \ln 2$, 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 $\Sigma = 0.185$ 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.

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, $\lambda_{min} = 0.475$, 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 $\mu^\star$ (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
$\sigma(Y_u)$ at μ_0	7.21919×10^{-6}, 3.70485×10^{-3}, 0.971984	QCD-matched conditional matrix
$\sigma(Y_d)$ 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
$\mathscr{B}_\nu$	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 $0 < Z \leq w$
2	Scalar susceptibility $\eta_\kappa = \hat{g}_\kappa^2/(\omega_0^2 + 7)$	ω_0	$\omega_0 \in \{0, 1, 7\}$
3	Completion scale $\Lambda\star$	$\Lambda\star$	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 $\mathrm{diag}(1 - \eta)$ 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

k_Ω	k_vac	Free energy	Selected within nonzero set
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, $R\_u\text{^}QCD(\mu_0 \leftarrow \mu\_R) = R\_d\text{^}QCD(\mu_0 \leftarrow \mu\_R) = 0.580788332942 \cdot \mathbb{1}_3$.

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	BLOCKED_ON_D35 ‖ D36

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 = $\prod(1 + t_i)$ 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 $\sigma(\mathfrak{h}, \mathscr{M})$ 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	$\mathscr{B}_\nu$ is absent; θ̄ 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 $\mu_0 = 243.722807638000$ 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 GeV²

Quantity	Conditional value
$v\_run = \sqrt{\mu\_H^2/\lambda}$	243.722807637857 GeV

The identity $v\_run = \mu_0$ 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

$(\theta_{12}, \theta_{13}, \theta_{23}) = (33.40°, 8.59°, 48.37°)$, $J\_\ell = -0.024466298$.

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
λ	0.068065835223	Transported conditional
μ_H^2	8311.749265 GeV²	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,

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

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
4	Coupled RG	NOT STARTED	CHARGED/GAUGE/SCALAR PASS TO 5.80 TeV

Stage	Action	Strict	Diagnostic
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

$G\_red = diag(1 - \eta\_C, 1 - \eta\_W, 1 - \eta\_Y)$

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. 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,

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

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 $\theta_{top} = 0$* that any physical strong-phase derivation must reproduce or dissolve.
- **D35** is unchanged as the critical path. 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) are conditionally discharged, 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 discharges

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 $\Sigma = 0.693147180560 = \ln 2$ to residual 2.22×10^{-16}, so λ_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 derivation**. It still fixes only a dimensionless curvature in one-bit step units, so it does not supply the absolute GeV scale: D36 is discharged *conditionally on the named premises*, and 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 discharges are recorded in the debt ledger as *conditionally discharged with premises named*, not closed. 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† O_H E_fR R_fR, Y_f^Hess = R_fL E_fL† 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 ε_CY3′ = 0.493124 ≫ 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 = -1.35×10^{-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 $M_R = \Lambda_\star R_{NR}^\dagger O_H^{sym} R_{NR}$, 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** are conditionally discharged, sharpening the ledger without closing it. 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

$Z = (1, 5/2, 298)$, $(g_s, g, g') = (1/\sqrt{Z_C}, 1/\sqrt{Z_W}, 6/\sqrt{Z_q}) = (1.000000, 0.632456, 0.347571)$, 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 **5.838×10^{-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 2.2×10^{-16}; exactly equal to floating-point). The 5.84×10^{-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 1.9×10^{-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 $\sim10^{-16}$, the bosonic Hessian minimum eigenvalue holds at 1.0275, the charged spectra drift $\leq4.1\times10^{-4}$, the CKM modulus drifts 1.25×10^{-3}, and the determinant phase shifts 6.4×10^{-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	F36

Premise	Statement	Retired by
	unrequired species is admitted; each support-return layer is terminal and complete.	
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 $2|\Delta q|^2 + 2 = 2\cdot 3^2 + 2 = 20$, 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, $(5, 3, 60) \neq (5, 4, 80)$. 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 $3\times[Q_L + u_R + d_R + L_L + e_R + N_R]$ 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	$r_3 = 6 - 1 = 5$

Sector	Rule	Return
Weak	one canonical unit per completion channel	r_2 = (number of channels)
Abelian	each channel has $\|\Delta q\| = 3$: two oriented current innovations $2\cdot 3^2$ 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 $2\cdot 3^2 + 2 = 20$; 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
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

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

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 $N_L = H_{\nu L} + H_{N_R}^c$, 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 $M_R \neq 0$ 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 $r_3 = \mathrm{rank}(I_6 - u_C u_C^T) = 5$ (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

Block	Real dimension	Level-3 min eig	Level-4 min eig
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 $5.31\times10^{-6} \rightarrow 5.30\times10^{-6}$, 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 XIII — What the Attempt Establishes

39. Established

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 Λ_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. The one-bit history metric is conditionally discharged (Σ = 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 Σ = 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, $(5,3,60) \neq (5,4,80)$.
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.

40. Established as construction consequences, carrying no evidential weight

13. $g_s(5.80\text{ TeV}) = 1$ — a round trip of the colour boundary through Λ_6.

14. The 5.80 TeV gauge triple — the transported conditional boundary, not a completion witness.
15. The in-package ceiling reproduction — an implementation check, distinct from the cross-pipeline agreement of §28.
16. v_run = μ_0 at the matching point — definitional.
17. Level-independence of G_red and equal auxiliary gaps — theorems of the factorisation (Lemma 2).
18. 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. Not established

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 Σ = 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.

Part XIV — Integrated Certificate and Next Theorem Target

42. 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)	CONDITIONALLY DISCHARGED, NOT REPRODUCED — $\bar{\Sigma}$ = 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)	CONDITIONALLY DISCHARGED — 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 ⟹ $\rho(Q_\nu) < 1$, absorption = I_3, verified at two regulators
Marked-martingale factorisation	PROVED (Theorem 12) — quadratic score additive without independent counts; D44′ counterexample dissolved
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

Certificate item	Verdict
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
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. The obstruction is localised │ │ to the absolute normalisation return D35, in parallel with the │ │ commitment entropy-production operator D36, and is shown to be a │ │ new-information requirement rather than a computational debt. │ │ Parameter closure not issued. │

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" but **two forward returns plus two uniqueness proofs.** 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. 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

Within SMC-1U's own scope, the next step is not to improve the RG calculation, not to choose a different η vector — Corollary 3.1 forecloses that — not to search for a new terminal-record law, since the existing one carries the required phase, not to recompute anything at higher precision, since Corollary 4.1 proves no such recomputation can help, and — after §43 — not to attack the six debts separately, since they are one object H_CMR and one length ξ. It is to supply H_CMR and ξ, and then to prove them unique. The two returns must import information the corpus does not contain; the two proofs are pure mathematics on the substrate path measure and the record graph.

Target (D35). Derive, from one master history operator and its action, the absolute normalisation set

$\{ \hat{g}\_\kappa, \omega_0, c\_A, b\_A, r\_A, \text{cross-blocks}, \Lambda\star \}$,

and with it the seven susceptibilities η_i as evaluated quantities rather than unit-incidence stipulations.

Ranked companion targets, in the order their absence bites — now read as facets of { H_CMR, ξ } rather than independent tasks:

1. **H_CMR** — the representation-resolved commitment-maintenance action, whose spectral data are D35's weights, whose derivative must equal the bosonic closure response (Result MH1), and which must carry the colour score (D41) and steep hierarchy (D42). Sole critical path for Requirement 3, and therefore for Requirements 4 and 6. NFDMA-1 sharpens its type: by Result N2 the missing object must carry a steep light-to-heavy hierarchy mechanism that does not inflate the mixing, which the minimal-address embedding provably lacks. Result MH1 sharpens it further: the same object must make the mixed and Hessian routes agree to CY3′ tolerance, which the minimal MASD/HMGBC action provably does not. D36 and D32 are now conditionally discharged, but neither supplies the absolute scale that remains D35's core.
2. **D36 ‖ D37** — the commitment entropy-production operator and the substrate length calibration, on which absolute scale and the meaning of "running" both depend. The score branch of §20 is the first executed instance; its convention debt must be closed first.
3. **Boundary arrays** — P_Y^phys, the neutral addresses and M_R^direct.
4. **A non-factorising two-level regulator** with a complete auxiliary census, so Requirement 2 is tested rather than restated. K_{N,N} is the surviving candidate, subject to its admissibility debt.
5. **A data-independent branch selector**, or an exact-degeneracy theorem for the conjugate pair.

6. **Resolution of the CAR/Fock spectral discrepancy**, followed by a genuine chiral OS argument.
7. **Independent CY3′ agreement** between the Hessian and dressed mixed-vertex routes.

Only after D35 returns should the working transport and closure machinery be rerun. The value of this attempt is that it converts nine open tasks into one blocking object with a named type.

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

$$\sigma_{max}(R_u D_u^{grid}) \leq 0.666093443388 \cdot \sigma_{max}(D_u^{grid}).$$

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 $\overline{MS}$ 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 μ_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,

$$\Lambda_n^{(33-2n)} = \Lambda_6^{21} \cdot \prod_{(h > n)} m_h^2, \quad n \in \{3, 4, 5, 6\},$$

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 $\ln \mu$ 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 $\mathfrak{B}$,

$$\boxed{\begin{aligned}(m_t, m_b, m_c) &= (171.783689943,\ 4.213223810,\ 1.228341125)\ \text{GeV}\\ (\Lambda_6, \Lambda_5, \Lambda_4, \Lambda_3) &= (73.245777,\ 143.827986,\ 188.445205,\ 216.516653)\ \text{MeV}\end{aligned}}$$

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, $r_q(m_t \leftarrow 2\ \text{GeV}) = 0.595606550395$ and $r_q(5.80\ \text{TeV} \leftarrow 2\ \text{GeV}) = 0.481003016501$.

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. $d \ln r_q / d \ln \mu_R = 0.200487$, against the frozen-threshold value $a\cdot(2/\ell_R) = 0.203209$: 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(μ₀)**	**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 $\mu_R < \mu_R^{crit} = 4.390909$ 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 $\mu_R = m_b$ makes $U_4(m_b, \mu_R) = 1$, so the closure equation collapses to $m_b = M_b$ identically, and the four-flavour readout window terminates at $\mu_R^{window} = M_b = 4.805818863$ GeV, where $r_q = 0.675195$ exceeds the ceiling. There is consequently a genuine failing sub-interval

$$4.390909 \text{ GeV} < \mu_R < 4.805818863 \text{ GeV}$$

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 $\mu_R < 4.390909$ 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
$\mu_R = 2$ GeV	0.319201	0.101599
$m_b = 4.213224$ GeV	0.242658	0.077239
$m_t = 171.783690$ GeV	0.115666	0.036817
$\mu_0 = 243.722808$ GeV	0.110678	0.035229
$\mu_\star = 5.80$ 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	8.573514×10^{-16}
source orthogonality residual	3.845925×10^{-16}
source Fisher orthogonality residual	2.763438×10^{-13}
source reconstruction residual	2.862544×10^{-13}
W_prim minimum eigenvalue	-4.285483×10^{-14}
W_prim rank	183
G_red conditional target residual	2.127111×10^{-15}
G_red core identity residual	2.896404×10^{-15}
G_red saturated zero residual	4.198567×10^{-16}
spatial lift isometry residual	6.633966×10^{-16}
spatial generator intertwining residual	7.187033×10^{-16}
spatial heat intertwining residual	6.422882×10^{-16}
conductance pairing residual	0
branch operator central commutator, both levels	0
branch root refinement residual	1.887379×10^{-15}
terminal T_0 lumpability residual	0
terminal heat lumpability residual	1.922963×10^{-16}
terminal T_0 Wilson residual	2.482534×10^{-16}
terminal entry-readout Wilson residual at a_t = 1	0.370538046592
terminal Wilson residual, a_t → 0 (generator readout)	4.35×10^{-9} at a_t = 10^{-8}, $\mathcal{O}$(a_t)
score-bath Schur identity residual	6.9×10^{-18}
score-bath m2 darkness	$\leq 9\times10^{-17}$
CAR residual	0
Fock trace/determinant residual	9.947598×10^{-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).

$\sigma(Y\_u\text{^}grid) = (1.243000000000\times10^{-5}, 6.379000000000\times10^{-3}, 1.673560000000)$, $\sigma(Y\_d\text{^}grid) = (2.692600000000\times10^{-5}, 5.385000000000\times10^{-4}, 0.027886000000)$, $\sigma(Y\_e) = (2.991800000000\times10^{-6}, 6.197000000000\times10^{-4}, 0.010696000000)$.

Boundary couplings at μ_0.

$g' = 0.341991048898$, $g = 0.650476840991$, $g\_s = 1.179332652482$, $\lambda = 0.128999748047$, $\mu\_H^2 = 7662.689132\ \mathrm{GeV}^2$.

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. $d \ln r\_q/d \ln \mu\_R = 0.200487$; $\mu\_R\text{^}crit = 4.390909$ GeV; $\mu\_R\text{^}window = M\_b = 4.805818863$ 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

Identity	Result	Grade
Ceiling cross-pipeline agreement	7 figures, 2.5×10^{-8} relative	Pass — independent
Colour round trip $g\_s(\mu\star) = 1$	exact	Tautology; integrator check only
CKM unitarity	$\approx10^{-15}$	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 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 Σ; 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 θ_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 $\Sigma = \ln 2$ to $\sim 10^{-16}$ and the positive W_prim spectrum; record D36 as conditionally discharged with premises named.
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 ε_CY3′ ≈ 0.49 ≫ 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 ~2.6×10^{-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 $Q_\nu(t) = \exp[-t\, \mathrm{diag}(s_i^2)]$ 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 $\int_0^\infty Q_\nu(t)\, \mathrm{diag}(s^2)\, dt = I_3$ 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: $r_3 = \mathrm{rank}(I_6 - u_C u_C^T) = 5$, $r_2 = 4$, per-channel Abelian $3^2+3^2+1^2+1^2 = 20 \to r_q = 80$, 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 $\delta_{strain} \geq 2.61\times10^{-11}$ (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 $1\to0$ 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 $\leq 3.3\times10^{-15}$) and that FCHI-1 is recorded as a supplied candidate, not a substrate theorem (F43).

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 $W_{core} - H\, \mathrm{diag}(\eta)\, H^T$, 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 $\mu_R \geq 4.390909$ GeV.
- **F10** — The physical VBF boundary is not $g_s(5.80\ \text{TeV}) = 1$.
- **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 $[\mu_0, \mu\star]$.
- **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 $B_{n+1\to n}$ 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 $\theta_{top} = 0$ 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.

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 — candidate at 88 μm (bath-gap) and 84 μm (record-graph percolation), agreeing to 4.5%	[ξ] the absolute GeV scale; **the second critical forward return**
D35	Absolute normalisation weights { ĝ_κ, ω₀, c_A, b_A, r_A, cross-blocks, Λ⋆ } and the seven η_i — **reclassified by §43 as spectral data of H_CMR**, not withdrawn but relocated	[H_CMR] Requirements 3, 4, 6; new-information 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

Debt	Object	Blocks
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. Residual = **the same provenance theorem** (FC1) that the full-carrier instrument is substrate-forced, not supplied	[proof] Requirement 6
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 Σ = 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 θ̄, with a regulator-stable near-π feature at θ_top = 0 (RCMO branch) and a 0.0791 rad	Requirement 6; Stage 9; Closure Rule 1

Debt	Object	Blocks
	candidate (MHPE-1 branch), both to reproduce or dissolve	
D36	One-bit history metric — CONDITIONALLY DISCHARGED ($\Sigma = \ln 2$ conditional on $\eta = 1$ conversion + K = 7 wheel-family); remaining: derive the conversion and wheel-family unconditionally, and supply the physical attempt rate	[H_CMR] absolute scale (with D35)
D32	Nonzero $\mathbb{Z}_7$ occupancy — CONDITIONALLY DISCHARGED (conjugate pair {+1,−1} conditional on the primitive-Fact theorem); dissolved to premise level (PF + FP) under §43, $\Delta f\_occ = 0.007414782101$ 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-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–F42 (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.

SMC-1U	RPC-1	Result
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.
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·$\mathbb{1}_3$.
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.
Theorem 13 + Results FC1–FC2 (exact	D44′ (provenance half)	The full-carrier object is supplied and its support/gap facts pass, closing structural

SMC-1U	RPC-1	Result
terminal gap; existence closed)		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; candidates 88 μm and 84 μm.
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-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.

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) and F43 (the FCHI-1 supplied-vs-forced guard) are unrelated to RPC-1 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.