The Absolute-Scale, Action-Normalisation and Closure-Clock Conditional Theorem in VERSF

A finite-record Route-M length return, an exact K = 7 clock law, and two normalisation no-go theorems.

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Designation: ASAC-1 · Strong Conditional Theorem / Exact Non-Closure Results

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Headline result. On the committed-record Route-M branch, the finite stability law returns $\xi = 84.071785948\ \mu m$. The K = 7 fundamental orbit then fixes an oriented closure-traversal duration $\Delta t_0 = (8\pi/21)\,\xi/c = 3.3562 \times 10^{-13}$ s. The *same* calculation proves that the numerical action quantum and the Standard-Model completion scale $\Lambda\bigstar$ do **not** follow from these relations alone. Step 3 is therefore a major conditional advance, not an unconditional physical closure.

Audit item	Verdict	Meaning
Finite-record Route-M length	**STRONG CONDITIONAL**	The 20-record graph gives $\Theta = 70.0341565881$ and $\xi = 84.071785948\ \mu m$ after importing $\ell_e = 2\ell\_P$.
K = 7 closure-clock relation	**STRUCTURAL PASS**	$\Delta t_0 = (8\pi/21)\,\xi/c$, each oriented traversal contributing phase $\pi/7$.
Fold and TPB physical clock	**OPEN**	The primitive Fold-to-traversal map and the state-dependent T_TPB compensator are unreturned.
Universal action form	**FIXED**	The minimal orbit has $S_0 = 2\pi A\bigstar$ and $\varepsilon_0 = A\bigstar\omega_0$.
Numerical action unit	**NO-GO**	$A\bigstar \to aA\bigstar$ leaves all phases, Born weights and clock ratios unchanged.
Geometric bath cutoff	**CONDITIONAL PASS**	$k\_max = 2\pi/\xi$ and $E\_bath = hc/\xi$ once ξ is selected.
Standard-Model $\Lambda\bigstar$	**OPEN**	$\Lambda\bigstar = \sqrt{K\_comp} / Z\_comp$ must come from the common reduced Hessian; identity completion is only a candidate.
Overall ASAC-1 grade	**MAJOR CONDITIONAL ADVANCE**	The length–clock chain is sharpened; action, TPB and completion normalisations remain load-bearing debts.

General reader summary

This paper asks whether the VERSF programme can now attach its dimensionless closure dynamics to metres, seconds and energy units without silently importing a Standard Model observable. The answer is partly yes. A finite committed-record graph gives a precise stability threshold; the Route-M dimensional-transmutation law then returns a candidate closure length of about 84 micrometres. A separate K = 7 orbit theorem converts that length into an elementary closure-traversal time of about one-third of a picosecond.

The key advance is that the length and clock are no longer merely paired by dimensional guesswork. The full fourteen-orientation K = 7 orbit accumulates one complete 2π phase, so each oriented traversal contributes phase $\pi/7$, and the traversal duration is fixed relative to the causal crossing time ξ/c. This is an exact structural clock law on the named branch.

The calculation also finds two exact limitations. First, multiplying every action and commitment cost by the same positive constant changes no phase and no Born probability — the numerical action quantum therefore cannot be extracted from the closure equations alone. Second, the Standard Model completion scale Λ★ is not the same quantity as the geometric cutoff $2\pi/\xi$; Λ★ depends on a stiffness and a wave-function residue that must be computed from the common reduced Hessian.

The honest conclusion is therefore stronger than either a success claim or a failure claim. VERSF now has a coherent conditional length–clock chain **together with exact proofs of what that chain cannot determine**. The remaining work is sharply localised: prove how primitive Folds map to oriented closure traversals, derive the state-dependent TPB clock compensator, return one dimensionful master-action coefficient, and calculate the completion stiffness and residue on the same branch.

Contents

Abstract

We integrate the finite distinguishable record-stability result, Route-M dimensional transmutation, the K = 7 minimal closure orbit, the TPB physical-time map and the renormalised completion-scale definition into one absolute-scale audit. On the committed-record branch, the 20-record nonbacktracking graph has spectral radius $\rho(B\_D) = 5.440225970823$ and stability threshold $p\star = \rho(B\_D)^{-1} = 0.183815893929$. With $b = 14/16$, $g_0^2 = 2^{-7}$ and the programme ruler

$\ell_e = 2\ell\_P$, the Route-M exponent is $\Theta = (4/7)(128 - \rho) = 70.0341565881$, giving $\xi\_M = 84.071785948$ µm under the frozen SI conversion.

The minimal complete reversible K = 7 orbit contains fourteen oriented traversals. Writing the symmetric commitment threshold as $\varepsilon_0 = (3/8)\ A★c/\xi$ and imposing one complete phase return $S_0 = 14\ \varepsilon_0\ \Delta t_0 = 2\pi A★$ yields the exact closure-clock law $\Delta t_0 = (8\pi/21)\ \xi/c$. At ξ_M this is $3.356217792 \times 10^{-13}$ s, while the full orbit period is $T_0 = (16\pi/3)\ \xi/c = 4.698704908 \times 10^{-12}$ s and its angular frequency is $\omega_0 = 3c/(8\xi)$. Each oriented traversal carries phase $\pi/7$.

Two exact non-identifiability results prevent unconditional promotion. The common action rescaling $A★ \rightarrow aA★$, $\varepsilon\_j \rightarrow a\varepsilon\_j$, $S \rightarrow aS$ leaves all phases, Born weights, Fisher ratios and the closure-clock relation invariant; a numerical action unit therefore requires an additional dimensionful master-action coefficient. Separately, the geometric cutoff $k\_max = 2\pi/\xi$ does not determine the Standard Model completion scale $\Lambda★ = \sqrt{K\_comp} / Z\_comp$, which stays non-identifiable until K_comp and Z_comp are returned by the same reduced Hessian. The primitive Fold-to-traversal map and the state-dependent TPB compensator also remain open. ASAC-1 is therefore graded a **major conditional advance with exact non-closure certificates**, not a completed physical calibration theorem.

Provenance of inputs and new results

Object	Source status entering ASAC-1	ASAC-1 treatment
K = 7 closure and finite distinguishability	Imported programme structure	Types the fourteen oriented traversals and the committed-record graph.
20-record graph and $\rho(B\_D)$	Imported finite record-stability theorem	Recomputed algebraically in the Route-M exponent; named-branch input.
$\ell_e = 2\ell\_P$	Imported absolute UV ruler	Exposed as the source of SI length units; not reclassified as dimensionless.
Symmetric threshold coefficient 3/8	Imported closure-cost result	Dimensionally retyped as an energy $\varepsilon_0 = (3/8)\ A★c/\xi$.
Fourteen-step minimal orbit	Imported structural orbit theorem	Combined with phase return to derive the exact traversal clock and phase-per-step law.
TPB renewal and K7-CBR cycle	Imported recurrent candidate	Used only for a clearly quarantined benchmark fact-rate conversion.
D36 clock audit	Imported reproducibility result	Distinguishes discrete Fold, continuous-rate and oriented-traversal clocks.
Λ★ definition	Imported RPC boundary contract	Separated from the geometric cutoff; given an exact non-identifiability proof.

Object	Source status entering ASAC-1	ASAC-1 treatment
Action-rescaling theorem	New ASAC-1 result	Proves the numerical action unit is not identifiable from phase and probability data alone.
Integrated numerical certificate	New ASAC-1 result	Returns the Route-M and Route-A clock/cutoff ledgers with explicit epistemic grades.

Part I — Problem statement, notation and source boundary

1. The Step-3 contract

The Standard Model closure ledger defines Step 3 as the derivation of four linked but distinct objects: an absolute closure length ξ, a Standard Model matching scale $\Lambda\bigstar$, a universal action normalisation, and a map from proto-time to physical time and energy. A value for any one is not enough; they must arise from one compatible source stack, and their roles must not be conflated.

This paper strengthens the length–clock chain in three ways: it separates dimensionless hierarchy from SI conversion; it turns the $K = 7$ orbit result into a compact theorem package with exact corollaries; and it identifies two independent continuous symmetry orbits that block absolute normalisation unless additional master-action data are supplied.

Claim-grade firewall. ASAC-1 proves conditional length and clock theorems on a named finite-record branch, plus exact non-identifiability theorems. It does **not** prove that the primitive substrate uniquely selects that branch, the SI Planck ruler, the Fold-to-traversal map, the state-dependent TPB compensator, the numerical action quantum, or the completion residue.

2. Dimensional typing

Earlier documents used the word "cost" for quantities of different physical dimensions. That ambiguity is removed here: the action unit $A\bigstar$ has units of action, the symmetric closure threshold ε_0 has units of energy, and the duration Δt_0 has units of time; their product is an action.

Symbol	Meaning	Dimension
ξ	minimal physically distinguishable closure length	length
ℓ_e	absolute ultraviolet emergence ruler	length
$\rho(B\_D)$	nonbacktracking spectral radius of the finite record graph	—
$p\bigstar$	finite record-stability probability, $p\bigstar = 1/\rho(B\_D)$	—

Symbol	Meaning	Dimension
A★	universal action-normalisation constant	action
ε_0	symmetric closure threshold energy, (3/8) A★c/ξ	energy
Δt_0, T_0	oriented-traversal duration and complete-orbit period	time
T_TPB	state-dependent physical time per proto-time unit	time/proto-time
K_comp, Z_comp	completion stiffness and kinetic residue	energy², —
Λ★	physical completion/matching scale, √K_comp / Z_comp	energy

3. No-insertion boundary

No measured Standard Model mass, coupling, mixing angle or vacuum expectation value is used to select the Route-M graph, its spectral radius or the closure clock. The SI conversion does inherit the frozen Planck ruler through $\ell_e = 2\ell\_P$ — not a Standard Model insertion, but an external dimensionful calibration that must be counted honestly. Likewise, numerical energies below use the conventional SI identification A★ = $\hbar$; the structural theorems hold for an abstract A★, and the SI numbers are conditional conversions, not an independent derivation of $\hbar$.

Part II — Finite-record Route-M length return

4. Effective record graph and construction order

The finite record-stability theorem replaces an infinite history cover by a graph whose vertices are operationally distinguishable committed records. For two already committed 4-simplex cells, the four geometrically shared triangles occur as distinct record tokens, one per side; identifying them erases four provenance directions and is inadmissible under finite distinguishability and irreversible record persistence [6].

Proposition 1 (effective record-distinct selection). If the vertices of the stability graph are completed persistent records, shared-face records belonging to distinct commitment events cannot be identified. The admissible effective stitch therefore contains **20** record tokens, not the forgetful 16-token quotient.

This closes the branch choice at the level of the committed-record effective graph. It does not prove the primitive construction order: a substrate in which geometric gluing precedes commitment must still specify whether a shared pre-commitment face later yields one record or two. That is the remaining D45″ construction-order clause.

5. Finite stability threshold

On the 128 oriented nonbacktracking relations of the 20-record graph, the maintenance law is controlled by the Perron mode of B_D. The finite stability boundary is

$p\star = 1/\rho(B\_D)$, $\rho(B\_D) = 5.440225970823$, $p\star = 0.183815893929$. **(1)**

The numerical Perron residual is negligible against the structural branch uncertainty. The scientific question is not the next decimal of the eigenvalue; it is whether the effective record graph is the primitive graph selected by the full history law.

6. Route-M dimensional hierarchy

The Route-M scale law is

$\xi = \ell_e \cdot \exp\{ [1/(2b)] [1/g_0^2 - 1/p\star] \}$, **(2)**

with $b = 14/16 = 7/8$, $g_0^2 = 2^{-7}$ and $\ell_e = 2\ell\_P$. Since $1/p\star = \rho(B\_D)$, the exponent reduces exactly to

$\Theta\_M = (4/7) [128 - \rho(B\_D)] = 70.0341565881011$. **(3)**

The decomposition matters: Θ_M is the genuine dimensionless Route-M return, while the conversion $\xi = \ell_e e^{\Theta\_M}$ inherits the absolute ruler ℓ_e. The earlier scale-orbit theorem showed that BCB, TPB and distinguishability alone leave a continuous dimensional orbit; Route M breaks that orbit only by supplying ℓ_e.

Theorem 1 (conditional finite-record Route-M length). Assume the 20-record committed graph, $p\star = \rho(B\_D)^{-1}$, $b = 7/8$, $g_0^2 = 2^{-7}$ and the UV ruler $\ell_e = 2\ell\_P$. Then the Route-M closure length is uniquely fixed inside that premise class by $\xi\_M = \ell_e \exp[(4/7)(128 - \rho(B\_D))]$. Under the frozen $\ell\_P = 1.615 \times 10^{-35}$ m, $\xi\_M = 84.071785948$ µm.

ξ_M = 84.071785948 µm. *Computational return on the named branch; defensible physical precision ≈ 84.07 µm.*

7. Sensitivity and epistemic precision

At fixed b, g_0^2 and ℓ_e, the exact differential is

$d \ln \xi = -(4/7)\, d\rho(B\_D)$. **(4)**

The Perron residual therefore contributes no meaningful numerical uncertainty. Structural choices dominate: the record quotient, the construction order, the UV ruler and the coarse-graining prescription. The nine displayed decimals in micrometres are a reproducibility certificate, not a claim of nine-decimal physical accuracy.

The independent Route-A candidate is $\xi_A = 88$ µm, exceeding Route M by 4.672%. Equivalently, holding the other Route-M inputs fixed, exact agreement with 88 µm would require $\rho = 5.360310845$ rather than 5.440225971. This is diagnostic only; neither branch may be adjusted after seeing the other.

8. Branch comparison

Figure 1. Route-A values relative to the finite-record Route-M branch. Lengths and times scale as ξ; energies and frequencies scale as ξ^{-1}. Identity $\Lambda\bigstar$ inherits the same branch dependence and is not an independent closure result. The full paired ledger is Table §29.

Part III — The K = 7 closure-clock theorem

9. Minimal complete orbit

The K = 7 closure architecture contains seven independent constraints, each with two orientations, so the minimal complete reversible orbit contains fourteen oriented traversals:

$\gamma_0 = \{ C_1^+, C_1^-, C_2^+, C_2^-, \ldots, C_7^+, C_7^- \}$. **(5)**

The imported symmetric threshold is retyped as an energy equation, and if each oriented traversal lasts Δt_0 the orbit action is

$\varepsilon_0 = (3/8)\, A\bigstar c/\xi$, $S_0 = 14\, \varepsilon_0\, \Delta t_0$. **(6)**

10. Exact closure-clock law

One complete phase return requires $S_0/A\bigstar = 2\pi$. Substituting (6) cancels the action unit:

$14 \cdot (3/8)(A\bigstar c/\xi) \cdot \Delta t_0 = 2\pi A\bigstar$. **(7)**

Theorem 2 (K = 7 closure-clock theorem). Under the fourteen-traversal minimal orbit, the symmetric threshold $\varepsilon_0 = (3/8)\, A\bigstar c/\xi$ and one complete phase return $S_0 = 2\pi A\bigstar$, the oriented-traversal duration and full orbit period are $\Delta t_0 = (8\pi/21)\, \xi/c$ and $T_0 = 14\, \Delta t_0 = (16\pi/3)\, \xi/c$. The result is independent of the numerical value of $A\bigstar$.

$\Delta t_0 = (8\pi/21)(\xi/c)$, $T_0 = (16\pi/3)(\xi/c)$. **(8)**

11. Phase per traversal and orbit frequency

The theorem has two exact corollaries. First, each oriented traversal contributes

$\varepsilon_0 \, \Delta t_0 / A★ = (3/8)(8\pi/21) = \pi/7$, **(9)**

so fourteen traversals close one 2π phase exactly. Second, the complete-orbit angular frequency is

$\omega_0 = 2\pi/T_0 = 3c/(8\xi)$, whence $\varepsilon_0 = A★ \, \omega_0$, **(10)**

the compact Planck-form relation ($\varepsilon_0 = \hbar\omega_0$ under $A★ = \hbar$).

Interpretation. The $K = 7$ geometry fixes the phase increment $\pi/7$ and the ratio of the closure clock to the causal crossing time ξ/c. It does not, by itself, fix the numerical SI value of A★.

12. Numerical closure clock on the Route-M branch

$\Delta t_0 = 3.356217792 \times 10^{-13}$ s, $T_0 = 4.698704908 \times 10^{-12}$ s,

$\omega_0 = 1.337216410 \times 10^{12}$ rad s^{-1}, $f_0 = 2.128246016 \times 10^{11}$ Hz. **(11)**

These use ξ_M in metres and the exact SI c. They are conditional on the Route-M branch and on reading Δt_0 as a physical traversal duration; the next provenance theorem must identify that traversal with the primitive event coordinate of D36 and K7-CBR-1.

13. Relation to the geometric bath cutoff

The minimal distinguishable closure length terminates the geometric spectrum at k_max = $2\pi/\xi$, with

$\omega\_bath = 2\pi c/\xi$, $E\_bath = A★ \, \omega\_bath = 2\pi A★ c/\xi$. **(12)**

The closure-orbit and bath scales are separated by an exact $K = 7$ factor:

$\omega\_bath / \omega_0 = E\_bath / \varepsilon_0 = 16\pi/3 \approx 16.75516082$. **(13)**

The bath cutoff is thus not the fundamental closure-orbit energy — it is higher by the exact ratio $16\pi/3$ — which also prevents the geometric cutoff from being mistaken for the electroweak or Standard Model matching scale.

14. Conditional TPB-renewal benchmark

K7-CBR-1 uses an equal-hazard benchmark $p = 1 - e^{-1}$ across three recurrent stages, with mean primitive-step count per completed record

$M\_bench = 3/p = 3e/(e - 1) = 4.745930120608$. **(14)**

If and only if one primitive Fold equals one oriented closure traversal, the mean completed-record interval and rate are

$t\_fact = [8\pi e / 7(e - 1)]\ \xi/c$, $r\_fact = [7(e - 1) / 8\pi e]\ c/\xi$. **(15)**

$t\_fact = 1.592837511 \times 10^{-12}$ s, $r\_fact = 6.278104283 \times 10^{11}\ s^{-1}$. *Quarantined benchmark: $p = 1 - e^{-1}$ and Fold = traversal are not yet physical theorems.*

Part IV — Action normalisation and exact no-go results

15. Universal action form

The closure theorem fixes the role of a universal action unit: the full orbit action is $S_0 = 2\pi A\star$ and the phase of any path is $S/A\star$. Identifying $A\star$ with $\hbar$ recovers $S_0 = h$ and $\varepsilon_0 = \hbar\omega_0$ — a consistent universal normalisation. Consistency, however, is not independent numerical derivation.

16. Common action-rescaling orbit

Consider, for any $a > 0$, the transformation

$A\star \to aA\star$, $\varepsilon\_j \to a\varepsilon\_j$, $W \to aW$, $S \to aS$. **(16)**

Every phase $S/A\star$ is unchanged, so every amplitude $\exp(iS/A\star)$, every Born probability, every likelihood ratio using a common action scale, the closure-clock relation, and all dimensionless Fisher and Hessian ratios are invariant.

Under $A\star \to aA\star$ ($a > 0$)	Invariant	Scales with a
phases $S/A\star$, amplitudes $\exp(iS/A\star)$	✓	
Born probabilities, likelihood/Fisher/Hessian ratios	✓	
closure-clock $\Delta t_0 = (8\pi/21)\xi/c$, phase $\pi/7$, ratio $\varepsilon_0/A\star = \omega_0$	✓	
absolute $A\star$, each ε_j, each action S, ε_0 in energy units		✓

Theorem 3 (action-normalisation non-identifiability). No calculation using only closure phases, Born probabilities, dimensionless score geometry and the $K = 7$ orbit relation can determine the numerical value of A★. The current source stack admits a continuous positive action-rescaling orbit $\mathbb{R}_+$; an independent dimensionful coefficient of the master action is mathematically necessary.

This is an exact obstruction, not a failed numerical search. More algebra on the same dimensionless objects cannot remove it.

17. Independent length-scale orbit

BCB, TPB, admissibility and distinguishability also possess a dimensional scaling orbit $L \to sL$, $E \to E/s$, $t \to st$ (with the corresponding density scaling). Dimensionless capacities, probabilities, entropy increments and Fisher matrices are unchanged. A physical ruler is therefore required even before the action unit is addressed.

Theorem 4 (dimensional-ruler requirement). The dimensionless VERSF closure and TPB principles determine scale ratios but not an SI length. Route M produces an SI ξ only after the absolute UV ruler ℓ_e is supplied; in the present branch $\ell_e = 2\ell\_P$ is the ruler that breaks the length orbit.

The length and action no-goes are **independent**: supplying ℓ_e fixes metres but not the numerical action unit; supplying A★ fixes action units but does not select the record graph or ξ.

18. Planck-ruler circularity audit

The Route-M ruler is $\ell\_P = \sqrt{(\hbar G/c^3)}$. A calculation that imports the measured Planck length and then claims to derive the numerical $\hbar$ from ξ would be circular. The $K = 7$ clock theorem avoids that circularity precisely because A★ cancels: it derives a time *ratio* once ξ is known; it does not derive $\hbar$.

Correct status of the action unit. ASAC-1 fixes the universality class and operational role of A★. The identification A★ $= \hbar$ may be adopted for SI conversion, but a substrate-native numerical derivation requires one independently normalised coefficient of the BCB/master action or an equivalent dimensionful return.

19. What would break the action symmetry?

Any valid symmetry-breaking return must carry absolute action dimension and be calculated upstream of Standard Model comparison. Candidates: a uniquely normalised coefficient in the primitive BCB/HMGBC action; an independently derived gravitational action coefficient with an exact bridge to the closure action; a primitive attempt rate tied to an independently normalised threshold energy; or a same-action laboratory ruler predicted before comparison and not used to select the branch. A measured particle mass, coupling or vacuum scale cannot serve without violating the non-insertion protocol.

Part V — Proto-time, TPB and physical clock provenance

20. Three clocks that must remain distinct

Clock object	Definition	Current status
Discrete Fold count n	one row-normalised update of the D36/K7 history kernel	reproducible; physical duration open
Continuous-rate clock	a generator with hazards per unit continuous proto-time	valid but inequivalent to the discrete Fold branch
Oriented closure traversal	one of the fourteen steps in γ_0 with duration Δt_0	structurally tied to ξ; identification with a Fold open
TPB physical time	$dt/d\tau$ = T_TPB(state)	formal map exists; state-dependent compensator not yet derived
Completed-record renewal time	mean duration between persistent facts	benchmark exists in K7-CBR-1; physical hazard law open

D36-R1 proved that the discrete-Fold entropy production ln 2 and the continuous-rate result near 0.185 belong to different clocks. ASAC-1 adds a third structural object — the oriented closure traversal. A full physical clock theorem must derive the map among all three rather than equate them by notation.

21. Fold-to-traversal hinge

Open Theorem A (primitive Fold identification). Starting from the same marked history law that defines D36 and K7-CBR-1, prove whether one primitive Fold is exactly one oriented traversal C_j±, a fixed number of traversals, or a state-dependent stopping time. The proof must also fix orientation and exclude sector-dependent clocks.

Until this is supplied, Δt_0 is the duration of the geometric traversal defined by the orbit theorem — not automatically the duration of the numerical Fold used in the score kernel.

22. State-dependent TPB conversion

The physical-time map has the general form

$dt/d\tau = T\_TPB(\text{state}),\ H = W/T\_TPB$. **(17)**

If T_TPB varies across the retained state, derivatives of T_TPB enter the physical Hamilton equations. A single universal multiplier is justified only after the state dependence is shown negligible, or after a controlled constraint-surface / time-reparametrisation treatment.

Open Theorem B (TPB compensator return). Derive the Doob–Meyer/renewal compensator of every primitive mark in the traversal-clock coordinate, prove a finite mean waiting time, calculate T_TPB(state) at two regulators, and show the physical Hamiltonian and fact rate are stable under the allowed coarse-graining.

23. Clock pass condition

The physical clock sub-gate passes only when one sealed calculation returns (1) the primitive event coordinate and its orientation; (2) the exact Fold-to-traversal map; (3) the state-dependent TPB compensators and finite-mean renewal law; (4) the common physical attempt rate in seconds; and (5) agreement of the discrete and continuous descriptions *after* the derived conversion, not by parameter fitting.

Part VI — Geometric cutoff versus Standard Model completion scale

24. Geometric commitment-bath cutoff

Once ξ is selected, the shortest distinguishable wavelength fixes the geometric Fourier cutoff

$k\_max = 2\pi/\xi,\ f\_bath = c/\xi,\ E\_bath = hc/\xi$. **(18)**

For the Route-M branch, $k\_max = 7.473595614 \times 10^{4}\ m^{-1}$, $f\_bath = 3.565910425 \times 10^{12}$ Hz and $E\_bath = 14.74742056$ meV. This is the closure/bath termination scale — not a particle mass scale, and not $\Lambda\star$.

25. RPC completion scale

The renormalised boundary contract defines the completion kinetic residue and scale by

$Z\_comp = [\partial K\_comp(p^2)/\partial p^2]\_\{p^2=0\},\ \Lambda\star = \sqrt{K\_comp/Z\_comp}$. **(19)**

(The denominator is Z_comp, not √Z_comp.) Both K_comp and Z_comp must be computed from the common reduced Hessian after the exact null quotient and auxiliary Schur relaxation. ξ supplies the geometric ruler but does not determine the completion response.

26. Completion-scale non-identifiability

For any positive target Λ and residue Z, choosing $K = (\Lambda Z)^2$ reproduces the same defining equation. The formula alone therefore permits a continuous family of completion scales.

Theorem 5 (completion-scale separation and non-identifiability). The geometric length ξ and cutoff $2\pi/\xi$ do not determine $\Lambda\star$. Until the same reduced Hessian returns both K_comp and Z_comp, infinitely many positive completion sectors satisfy the formal scale definition. Identity completion is one member of that family, not a unique consequence.

27. Identity-completion candidates

On the identity-completion branch, the existing scalar scale lock gives:

Branch	v_cl candidate	Λ★_id = v_cl/√2	Grade
Route-M finite record	255.110639440 GeV	180.390463101 GeV	conditional identity completion
Route-A coherence	243.722807638 GeV	172.338050011 GeV	conditional identity completion

The **4.672%** energy-scale difference mirrors the inverse length difference exactly (the v_cl ratio, the $\Lambda\star$ ratio and the 88/84.0718 length ratio all equal 1.046725 to six figures). It is **not** a two-route agreement certificate for $\Lambda\star$, because both values assume identity completion.

28. Integrated dependency map

Figure 2. Calculated implications on the named branch (solid): $\rho(B\_D) \rightarrow p\star \rightarrow \Theta\_M \rightarrow \xi\_M$, and $\xi\_M \rightarrow \{\Delta t_0, T_0, \omega_0, k\_max, E\_bath\}$. Unproved bridges (dashed): Fold → traversal (Open Theorem A); the action-rescaling no-go blocking $A\star$ (Theorem 3); and the independent completion-scale return K_comp, Z_comp → $\Lambda\star$ (Theorem 5). ξ enters $\Lambda\star$ only as a geometric ruler, never as the completion response.

Part VII — Numerical certificate, falsifiers and Step-3 verdict

29. Conditional numerical ledger

Quantity	Route-M record graph	Route-A coherence branch
ξ	**84.071785948 µm**	88.000000000 µm
$E\_\xi = \hbar c/\xi$	2.347124879 meV	2.242352051 meV
$\varepsilon_0 = (3/8)\, E\_\xi$	0.880171830 meV	0.840882019 meV
oriented traversal Δt_0	$3.356217792 \times 10^{-13}$ s	$3.513035465 \times 10^{-13}$ s
full orbit T_0	$4.698704908 \times 10^{-12}$ s	$4.918249652 \times 10^{-12}$ s
orbit frequency f_0	$2.128246016 \times 10^{11}$ Hz	$2.033243676 \times 10^{11}$ Hz
bath frequency c/ξ	$3.565910425 \times 10^{12}$ Hz	$3.406732477 \times 10^{12}$ Hz
bath cutoff hc/ξ	14.74742056 meV	14.08911346 meV
benchmark mean fact interval	$1.592837511 \times 10^{-12}$ s	$1.667262083 \times 10^{-12}$ s
benchmark fact rate	$6.278104283 \times 10^{11}$ s^{-1}	$5.997857267 \times 10^{11}$ s^{-1}
identity v_cl	255.110639440 GeV	243.722807638 GeV
identity $\Lambda\star$	180.390463101 GeV	172.338050011 GeV

The first eight energy rows use $A\star = \hbar$. The benchmark fact rows additionally assume $p = 1 - e^{-1}$ and one Fold per oriented traversal. The identity rows use the existing scalar scale lock and are not independent outputs of the present theorem.

30. Error budget

Uncertainty class	Effect	Current handling
Numerical Perron error	negligible vs structural uncertainty	published residual; does not set physical precision
Record-graph branch	changes ρ, $p\star$ and hence ξ exponentially	D45″ construction order open
UV ruler ℓ_e	scales ξ and all times linearly	imported as $2\ell\_P$; not derived here
RG/coarse-graining prescription	changes b and potentially the exponent	minimal doubling and declared-order law remain premise-typed
Action normalisation	scales all energies/actions together	exact no-go; one dimensionful coefficient required
Fold/traversal map	scales the physical event clock	open theorem; benchmark quarantined
State-dependent TPB	non-uniform clock and Hamiltonian corrections	compensator and gradient corrections open
Completion residue	changes $\Lambda\star$ independently of ξ	K_comp and Z_comp must be returned together

31. Named premises and falsifiers

Premise	Statement	Falsifier
P1	The committed-record graph is record-distinct; distinct records cannot be identified without loss of distinguishability.	F1
P2	The finite stability operator is B_D with ρ(B_D) = 5.440225970823.	F2
P3	The Route-M β-coefficient b = 7/8, bare coupling $g_0^2 = 2^{-7}$ and ruler ℓ_e = 2ℓ_P are the declared source-stack inputs.	F3
P4	The symmetric threshold is ε_0 = (3/8) A★c/ξ and the minimal complete orbit is fourteen oriented traversals.	F4
P5	One Fold corresponds to a fixed traversal count (or a supplied state-dependent replacement).	F5
P6	The physical TPB waiting law has finite mean on the physical branch.	F6
P7	The numerical action unit is fixed only by breaking the common action-rescaling symmetry.	F7
P8	Λ★ follows only from an independently derived completion stiffness and residue, never from a geometric cutoff or v_cl/√2.	F8
P9	No measured Standard Model observable is used upstream to select ξ, A★, the clock or Λ★.	F9

Falsifiers (ASAC-1 fails or must be regraded if):

- **F1** — the primitive record pushforward permits identifying distinct committed records without loss of operational distinguishability.
- **F2** — the finite stability operator is not B_D, or its physical graph has a different Perron radius.
- **F3** — the Route-M β-coefficient, bare coupling, or UV ruler is not derived by the declared source stack.
- **F4** — the symmetric threshold is not ε_0 = (3/8) A★c/ξ, or the minimal complete orbit is not fourteen oriented traversals.
- **F5** — one Fold is shown not to correspond to a fixed traversal count and no state-dependent replacement is supplied.
- **F6** — the TPB waiting law has infinite mean on the physical branch, so the long-time fact rate vanishes.
- **F7** — a numerical action unit is claimed without breaking the common action-rescaling symmetry.
- **F8** — Λ★ is set to a geometric cutoff or v_cl/√2 without an independently derived stiffness and residue.
- **F9** — any measured Standard Model observable is used upstream to select ξ, A★, the clock or Λ★.

32. Revised Step-3 gate ledger

Sub-gate	ASAC-1 verdict	Release condition
Dimensionless Route-M hierarchy	PASS on named branch	retain source and graph manifest
Effective record graph	conditional pass	close primitive construction-order clause
Absolute ξ in metres	strong conditional candidate	derive or independently certify the UV ruler
K = 7 closure-clock relation	structural pass	retain imported cost-spectrum premises
Fold-to-traversal map	open	derive from the marked primitive history law
Full TPB physical clock	open	return finite-mean compensators and regulator stability
Universal action form	fixed	no further structural work
Numerical action unit	open by exact no-go	return one absolute master-action coefficient
Geometric bath cutoff	conditional pass	select ξ
Standard Model Λ★	open	compute K_comp and Z_comp from the same reduced Hessian
Overall Step 3	**major conditional advance**	all four open normalisation/provenance returns close in one branch

33. Ordered next calculations

1. **Primitive record pushforward** — derive the map from pre-commitment K = 7 histories to the finite committed-record graph and close the build-order clause.
2. **Fold/traversal theorem** — differentiate the same marked action to identify the numerical Fold with one oriented traversal, a fixed bundle, or a stopping time.
3. **TPB compensator** — return the state-dependent mark intensities, finite-mean renewal law and physical attempt rate at two regulators.
4. **Action coefficient** — derive one dimensionful coefficient of the BCB/HMGBC master action, breaking the action-rescaling orbit.
5. **Completion response** — calculate K_comp and Z_comp from the same reduced Hessian and release Λ★ without identity completion.
6. **Two-route certificate** — rerun the complete length–action–clock chain on the independent admitted branch and publish convergence, covariance and non-insertion checks before any Standard Model comparison.

34. ASAC-1 synthesis theorem

Theorem 6 (ASAC-1 conditional scale-and-clock synthesis). Within the finite committed-record Route-M premise class, the programme returns a unique dimensionless hierarchy Θ_M, a conditional SI length $\xi\_M = 84.071785948$ µm, an exact K = 7 traversal clock $\Delta t_0 = (8\pi/21)\ \xi/c$, a full-orbit phase $S_0/A\bigstar = 2\pi$, and a geometric cutoff $k\_max = 2\pi/\xi$. The same source stack does **not** determine the numerical action unit, the Fold-to-traversal map, the state-dependent TPB clock, or the Standard Model completion scale $\Lambda\star$. Those failures are certified by explicit continuous symmetry and response families.

35. Conclusion

ASAC-1 changes the Step-3 problem from a broad request for "absolute units" into four sharply typed mathematical returns. The finite-record Route-M branch gives a reproducible 84.07 µm candidate, while the $K = 7$ orbit fixes an exact closure-traversal clock and the phase $\pi/7$ per oriented step.

The same analysis prevents overclaiming: the numerical action unit, the physical TPB clock and $\Lambda\star$ remain unreturned for exact reasons. The next paper should derive the four missing bridges from one marked master action. If they reproduce this branch, Step 3 closes; if not, the primitive return supersedes it. Either outcome is decisive.

Final scientific verdict. ASAC-1 supplies a strong conditional absolute length and an exact $K = 7$ closure-clock law, and proves that the numerical action unit and $\Lambda\star$ are not recoverable from the present invariant data. Programme grade: **MAJOR CONDITIONAL ADVANCE / UNCONDITIONAL STEP 3 OPEN.**

Appendix A — Exact arithmetic

A.1 Route-M exponent. $1/(2b) = 1/(7/4) = 4/7$; $1/g_0^2 = 128$; $1/p\star = \rho(B\_D)$. $\Theta\_M = (4/7)(128 - 5.440225970823) = 70.0341565881011$. $\xi\_M = (3.23 \times 10^{-35}\ \mathrm{m}) \cdot \exp(70.0341565881011) = 84.071785948$ µm.

A.2 Closure-clock identities. $\varepsilon_0 = (3/8)\, A\star c/\xi$ and $14\, \varepsilon_0\, \Delta t_0 = 2\pi A\star$ give $\Delta t_0 = (8\pi/21)\, \xi/c$ and $T_0 = 14\, \Delta t_0 = (16\pi/3)\, \xi/c$. Then $\varepsilon_0\, \Delta t_0/A\star = (3/8)(8\pi/21) = \pi/7$ and $\omega_0 = 2\pi/T_0 = 3c/(8\xi)$, so $\varepsilon_0 = A\star\omega_0$.

A.3 TPB benchmark. $p = 1 - e^{-1}$, $M\_bench = 3/p = 3e/(e - 1)$. $t\_fact = M\_bench\, \Delta t_0 = [8\pi e/7(e - 1)]\, \xi/c$; $r\_fact = [7(e - 1)/8\pi e]\, c/\xi$.

A.4 Cutoff ratio. $\omega\_bath = 2\pi c/\xi$, so $\omega\_bath/\omega_0 = (2\pi)/(3/8) = 16\pi/3$ and $E\_bath/\varepsilon_0 = 16\pi/3$.

Appendix B — Independent continuous symmetry orbits

B.1 Action orbit. The group $\mathbb{R}_+$ acts by common multiplication on A★, all threshold energies and all actions. Quantities depending only on S/A★ are invariants of this action. A numerical action unit is therefore a choice of orbit representative unless one additional dimensionful coefficient is returned.

B.2 Length–energy–time orbit. Before a UV ruler is supplied, the dimensionless substrate equations admit a simultaneous rescaling of lengths, inverse energies and times. Route M fixes the hierarchy ξ/ℓ_e; the SI value of ξ is inherited from ℓ_e.

B.3 Completion-response family. For every $\Lambda > 0$ and $Z > 0$, $K = (\Lambda Z)^2$ satisfies $\Lambda = \sqrt{K}/Z$. The scale equation is therefore non-identifying until both K and Z are independent outputs of the reduced Hessian.

Appendix C — Machine-readable certificate summary

Field	Route-M value or status
designation	ASAC-1
claim_grade	conditional return plus exact non-closure certificates
rho_nonbacktracking	5.440225970823
p_star	0.18381589392852363
route_m_exponent	70.03415658810114
xi_um	84.07178594834372
oriented_traversal_time_s	$3.3562177917414 \times 10^{-13}$
full_orbit_time_s	$4.69870490843796 \times 10^{-12}$
full_orbit_angular_frequency	$1.337216409546 \times 10^{12}$ rad/s
bath_cutoff_energy	14.74742056 meV under A★ = $\hbar$
action_unit	not identifiable from the current invariant data
physical_clock	Fold map and T_TPB compensator open
Lambda_star	K_comp and Z_comp open; identity branch conditional
overall_verdict	major conditional advance; unconditional Step 3 remains open

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Appendix D — Source ledger

[1] K. Taylor, *The Origin of the Closure Scale in the VERSF Framework: Fact Completeness, Distinguishability, and the Structural Necessity of ξ.* [2] K. Taylor, *The K = 7 Closure-Born-TPB Renewal Construction in VERSF* (K7-CBR-1). [3] K. Taylor, *The D36 Clock-Convention,*

Reproducibility and Manifest-Currency Theorem in VERSF (D36-R1). [4] K. Taylor, *The Structural Origin of Energy Conservation in the VERSF Framework.* [5] K. Taylor, *Ticks-Per-Bit: Bounded Throughput and the Emergence of Physical Time.* [6] K. Taylor, *The Renormalised Standard Model Parameter-Closure Theorem in VERSF* — finite record-stability and completion-scale sections. [7] K. Taylor, *The Planck Time as a Minimum Bit-Certification Scale: A Derivation from Bit-Contrast Balance and Ticks-Per-Bit Principles.* [8] K. Taylor, *Microphysical Foundations of Route M in the Two-Planck Framework.* [9] K. Taylor, *Stability of Dimensional Transmutation in Simplicial Foam.* [10] K. Taylor, *VERSF Standard Model Derivation Master Ledger.* [11] *ASAC-1 calculation package: Absolute Scale, Action Unit and Physical Clock Return Attempt.*