Paper 35: The Unit System

The P03 $\leftrightarrow$ P14 bridge, the cancellation theorem, and the chart-natural constants

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Abstract

A theory that keeps time in two normalizations owes its readers the conversion between them. The corpus uses two: P03's oscillation time, in which the tempered fundamental mode has angular frequency $\omega_1 = \pi\sqrt{1-\kappa}$, and P14's system units, in which the breath has period $T_{\text{breath}} = \pi\alpha^{-1} \approx 430.51$. No conversion was documented (a tracked open item of the registry, TBS 28_2), and the gap had a concrete cost: the dual-observer arc of P28 appeared to take two values differing by 0.107%, and the windings-per-breath count was two-valued (A271's branch table). This paper states the resolution as canon. **The bridge (Thm 3.1):** P14's own Breathing-Period theorem defines the system unit as the tempered fundamental period, $\tau_1 = 2\pi/\omega_1 = 2/\sqrt{1-\kappa} = 2.0021362\ldots$ in P03 time, with $\tau_1\sqrt{1-\kappa} = 2$ exactly; the conversion is derived, not chosen, and the alternative identification (system unit $\equiv$ P03 coordinate time) is excluded by P14's own theorem. **Cancellation (Thm 4.1):** every per-breath count of an ω_1-paced rate is κ-free, because the temper in the rate and the temper in the unit cancel identically. The dual-observer arc is exactly 4π per system unit, the density register completes exactly T_{breath} cycles per breath, and TBS 28_2 dissolves as a unit mismatch ($\|\Omega\| = 2\pi\sqrt{1-\kappa}$ per unit P03 time *and* exactly 4π per system unit; both correct, one speed). The breath map's rotation number $\rho = T_{\text{breath}} \bmod 1 = 0.5122452$ is definitionally exact. **Chart-natural constants (Thm 5.1):** expressing the hidden-chart relations of the kiloparsec sector (A264/A265) in the chart's own units $(L_h, T_{\text{b}}^{\text{SI}})$ forces three exact identities: $c = \pi/\alpha = T_{\text{breath}}$ (light speed *is* the breath number), $L_h = c\,\tau_1^{\text{SI}}$ (the chart length is the light-crossing distance of one system unit), and $a_0 = \alpha$ (the universal acceleration is the fine-structure constant in chart units). SI calibration, conditional on the measured a_0: $\tau_1^{\text{SI}} = 3191$ yr, $T_{\text{b}}^{\text{SI}} = 1.374$ Myr, $L_h = 0.978$ kpc.

1 Introduction

Every quantitative claim in the corpus is, at bottom, a count: so many cycles of this register per so many ticks of that clock. Counts are only meaningful once the clock is fixed, and the corpus runs two clocks. P03 works in oscillation time, the coordinate time in which the untempered fundamental mode has angular frequency π and period 2; the temper κ shifts the fundamental to $\omega_1 = \pi\sqrt{1-\kappa}$, so the tempered fundamental period in P03 time is $2/\sqrt{1-\kappa}$, slightly longer than 2. P14 works in system units: its Breathing-Period theorem assigns the breath the period $T_{\text{breath}} = \pi\alpha^{-1}$, where $\alpha^{-1} = 4\pi^3 + \pi^2 + \pi$ is the corpus's fine-structure number. Both normalizations are internally consistent, and both are used throughout the corpus. What was missing was the sentence that says how long one system unit lasts in P03 time.

The omission was not cosmetic. It surfaced first as TBS 28_2. P28 derives the dual-observer arc speed $\|\Omega\| = 2\pi$ in its own clock, while the lifting computation, performed in P03 coordinate time, gives $\|\Omega\| = 2\pi\sqrt{1-\kappa}$. The two values differ by 0.107%, and the TBS recorded the discrepancy as a fork: either the $\sqrt{1-\kappa}$ correction must somehow vanish, or P28's formula needs correction. Neither option is attractive, since each amounts to declaring one of two careful computations wrong.

A271 sharpened the problem rather than resolving it. It traced the ambiguity to the missing unit bridge and tabulated the two candidate readings. Branch A takes the per-breath winding count to be T_{breath}; Branch B identifies the P14 system unit with P03 coordinate time, in which case the count is $T_{\mathrm{breath}}\sqrt{1-\kappa}$. The two branches differ in the third decimal place of every per-breath count, and A271 adopted tempered Branch B as a working hypothesis while flagging the choice as open (OI-271-1).

The resolution, consolidated here from A273, is that the bridge does not need to be chosen at all: it is already derived in the canon. P14 defines the breath frequency by $\omega_{\mathrm{breath}} = \omega_1/(\pi\alpha^{-1})$, "measured in fundamental oscillation units." A frequency measured in fundamental oscillation units is a count per fundamental period. The system unit is therefore one period of the tempered fundamental mode, $\tau_1 = 2\pi/\omega_1$, and everything else in this paper is arithmetic on that identification. The arithmetic is worth doing carefully, because it produces three results of independent use. First, the bridge itself (Section 3): $\tau_1 = 2/\sqrt{1-\kappa}$, a tempered conversion satisfying $\tau_1\sqrt{1-\kappa} = 2$ exactly, which excludes Branch B by contradiction with P14's own theorem. Second, the cancellation theorem (Section 4): any rate paced by ω_1 yields a per-breath count that is independent of κ, because the temper enters the rate and the unit reciprocally. This single observation retires TBS 28_2 and fixes the rotation numbers of the breath map's two registers as definitionally exact quantities. Third, the chart-natural constants (Section 5): expressing the kiloparsec-sector relations of A264/A265 in the chart's own length and time units forces the exact identities $c = T_{\mathrm{breath}}$, $L_h = c\,\tau_1^{\mathrm{SI}}$, and $a_0 = \alpha$, which give the apparently arbitrary kiloparsec scale and the apparently arbitrary $10^{-10}\,\mathrm{m\,s^{-2}}$ acceleration a common dimensionless origin.

Section 6 collects the published numbers and the verifier coverage. Section 7 records which papers and addenda consume these results. Section 8 states what remains conditional or open. The paper is assembled without new claims from Addendum 273 (the bridge and cancellation) and Addendum 275 (the chart constants and the per-breath gain); every numerical statement is checked by `verify_P273.py` (14 checks) and `verify_P275.py` (12 checks), both green at filing.

2 Setup and Notation

Constants. The fine-structure number is $\alpha^{-1} = 4\pi^3 + \pi^2 + \pi = 137.0363\ldots$, and the breath period in system units is

$$T_{\mathrm{breath}} \;=\; \pi\alpha^{-1} \;=\; 430.5122452\ldots \tag{1}$$

The temper is $\kappa = \alpha^{5/4} \approx 2.13\times10^{-3}$ (the value used by both verifiers). The tempered fundamental frequency in P03 time is $\omega_1 = \pi\sqrt{1-\kappa}$.

The two clocks. P03 time is the coordinate time of the oscillation analysis: the untempered fundamental has frequency π and period 2, and the tempered fundamental has frequency ω_1 and period $2\pi/\omega_1$. A P14 system unit is the time unit implicit in the Breathing-Period theorem, whose identification is the subject of Theorem 3.1; the breath lasts T_{breath} system units by definition. For a register that completes N cycles per breath, the associated rotation number is $N \bmod 1$. Two registers appear below: the density register on the Hopf fiber, with rotation number ρ, and the SU(2) double-cover register on the base, with rotation number ρ_*.

The hidden chart. The kiloparsec sector (A264/A265) carries three dimensionful quantities: the chart length L_h, locked by A264 to the B^4 scale and the fold-clock unit; the SI duration of one breath, $T_{\rm b}^{\rm SI}$; and the universal acceleration a_0. A265 derived two identities relating them,

$$a_0 \;=\; \frac{\alpha^3 c^2}{\pi^2 L_h}, \qquad T_{\rm b}^{\rm SI} \;=\; \frac{\alpha^2 c}{\pi a_0}, \tag{2}$$

with c the SI speed of light. The gas-calibrated value of the universal acceleration is $a_0 = 1.172 \times 10^{-10}\,\mathrm{m\,s^{-2}}$, and the SPARC clean band for the chart length is $[0.75, 1.00]$ kpc (A264).

Exactness conventions. Throughout, "exact" means an algebraic identity in π and α, checked numerically at 50 decimal digits by the verifiers. The paper distinguishes *definitional* exactness, which expresses a unit conversion or a definition, from *dynamical* exactness, which would express a closed orbit or resonance of the dynamics. Every exact statement in this paper is of the first kind; the distinction matters for the Necessity of Detuning (A267; P36 companion), which forbids the second kind and is untouched here.

3 The Bridge

The central claim is that the P03 $\leftrightarrow$ P14 conversion is not a convention awaiting a choice but a consequence of text already in the canon. P14's Breathing-Period theorem contains the identification; it only needed to be read off.

Theorem 3.1 (The system unit is the tempered fundamental period)**.** *P14 (Breathing Period) defines $\omega_{\rm breath} = \omega_1/(\pi\alpha^{-1})$, "measured in fundamental oscillation units." Hence*

$$1 \textit{ system unit} \;=\; \tau_1 \;=\; \frac{2\pi}{\omega_1} \;=\; \frac{2}{\sqrt{1-\kappa}} \;=\; 2.0021362\ldots \textit{ (P03 time)}, \qquad \tau_1\sqrt{1-\kappa} = 2 \textit{ exactly}, \tag{3}$$

and the breath duration in P03 time is $T_{\rm breath}\,\tau_1 = 2\pi\alpha^{-1}/\sqrt{1-\kappa} = 861.944\ldots$

Proof. A frequency "measured in fundamental oscillation units" is a count per period of the fundamental mode. The mode in question is the tempered fundamental, with frequency $\omega_1 = \pi\sqrt{1-\kappa}$ in P03 time; its period is $\tau_1 = 2\pi/\omega_1 = 2/\sqrt{1-\kappa}$. The unit of time implicit in P14's breath count is therefore τ_1, which gives Eq. (3) directly. The identity $\tau_1\sqrt{1-\kappa} = 2$ and the breath duration follow by substitution; both are verified at 50 digits (`verify_P273`, S1). $\square$

Two features of the bridge deserve emphasis. It is *tempered*: the conversion factor carries $\sqrt{1-\kappa}$, so a system unit is longer than two units of P03 time by the small amount $\tau_1 - 2 = 0.0021362\ldots$ And it is *derived*: nothing was chosen. The conversion is read off the canon's own definition of the breath, which is what permits the branch decision below to be a theorem rather than a preference.

Corollary 3.2 (Branch B excluded)**.** *The identification "system unit $\equiv$ P03 coordinate time" (Branch B of A271) implies that the breath, lasting $T_{\rm breath}$ units of P03 time, lasts $T_{\rm breath}/\tau_1 = 215.026\ldots$ system units. This contradicts P14's Breathing-Period theorem, under which the breath comprises $T_{\rm breath}$ fundamental cycles, by the factor $\tau_1 \approx 2$. Moreover no register of the system yields the count $T_{\rm breath}\sqrt{1-\kappa}$. Branch B is excluded by the canon text, and A271's working hypothesis (tempered Branch B) is overturned; the overturn is recorded in A271 per the same-day convention.*

The factor-of-two character of the contradiction is the cleanest diagnostic: identifying the system unit with P03 coordinate time would halve the breath, since one fundamental period spans approximately two units of P03 time. P14's theorem leaves no room for that reading. Branch A's *number* survives, as the next section shows, but its stated justification (an abstract "arc-radian time") is replaced by the derived bridge.

4 Cancellation

The bridge has one structural consequence that does most of the work in this paper. Rates paced by the fundamental mode carry a factor ω_1; the system unit carries a factor ω_1^{-1}. Any count formed by multiplying the one by the other is therefore independent of the temper. This is worth stating as a theorem because its instances retire a TBS and fix the corpus's working rotation numbers.

Theorem 4.1 (Cancellation: per-breath counts are κ-free)**.** *Let r be any rate proportional to ω_1, that is, a quantity paced by the fundamental mode. Its count per system unit, $r\,\tau_1 = 2\pi r/\omega_1$, and hence its count per breath, is independent of κ: the temper in the rate and the temper in the unit cancel identically. Instances:*

(i) density-register cycles per breath $= (\omega_1/2\pi)\cdot T_{\mathrm{breath}}\,\tau_1 = T_{\mathrm{breath}}$ exactly;

(ii) dual-observer arc per system unit $= \|\Omega\|\,\tau_1 = 2\omega_1 \cdot 2\pi/\omega_1 = 4\pi$ exactly, using P28's lifting result $\|\Omega\| = 2\omega_1$;

(iii) SU(2) windings per breath $= 2T_{\mathrm{breath}}$ exactly.

Proof. Immediate from Theorem 3.1: $r\,\tau_1 = 2\pi r/\omega_1$ and $r \propto \omega_1$, so ω_1 cancels. The instances substitute $r = \omega_1/2\pi$ and $r = 2\omega_1/2\pi$. All three are verified at 50 digits (`verify_P273`, S2). $\square$

Corollary 4.2 (TBS 28_2 retired)**.** *The dual-observer arc speed is $2\pi\sqrt{1-\kappa}$ per unit P03 time* and *exactly 4π per system unit. P28's derivation of $\|\Omega\| = 2\pi$ (in P28's clock, which is ω_1-paced) and the lifting computation $2\pi\sqrt{1-\kappa}$ (in P03 coordinate time) are the same speed expressed in two units; the 0.107% "deviation" was a unit mismatch, not a physical discrepancy. Neither horn of TBS 28_2 holds: the $\sqrt{1-\kappa}$ correction does not vanish (it is real in P03 time), and no corrected formula is needed (both formulas are correct). The TBS is retired by conversion. The exactness of 4π per unit is* definitional*, of the same class as the fundamental period being one unit, and therefore does not constitute an exact dynamical closure; the Necessity of Detuning (P36 companion; A267) is untouched, and the dynamical detunings (ρ irrational, $G_1 \neq 0$) stand exactly where they were.*

Corollary 4.3 (Registers)**.** *The density register completes exactly T_{breath} cycles per breath (Theorem 4.1(i)), so the breath map carries the rotation number*

$$\rho \;=\; T_{\mathrm{breath}} \bmod 1 \;=\; \pi\alpha^{-1} - 430 \;=\; 0.5122452\ldots \tag{4}$$

on the Hopf fiber, definitionally exact. This is Branch A's number with its derivation corrected: the unit is the tempered fundamental period, not an abstract arc-radian time. The SU(2) double-cover register carries $2T_{\mathrm{breath}}$ windings per breath (Theorem 4.1(iii)), hence the rotation number $\rho_* = 2T_{\mathrm{breath}} \bmod 1 = 2\rho - 1 = 0.0244904\ldots$ on the base: the two registers of one bundle map, the base rotation equaling the fiber's q=2 comma (A273/A274).

Corollary 4.4 (A267 unconditional)**.** *With the branch decided, A267's continued-fraction ladder ($q = 2, 41, 449$), the near-tritone reading of successive breaths, and the conditional-SI rungs (≈ 2.7 and 56 Myr, conditional only on A265's SI calibration) are unconditional: the branch-conditionality marker of A271 is lifted. A271's robustness theorem is unchanged; the a_0 chain, 432, and G_1 were branch-invariant and remain so, now also branch-decided.*

Remark 4.5 (The double-cover shadow is the $q = 2$ rung)**.** *The shadow rotation number satisfies $2T_{\mathrm{breath}} \bmod 1 = 2\rho - 1 = 0.0244904\ldots$, which is exactly A267's $q = 2$ comma $|2\rho - 1|$. Counting in the double cover is observing breath pairs: the covering map sends the breath map to its own* *first near-closure, and the shadow's convergent denominators* $(40, 41, 204, 245, \ldots)$ *contain A267's* $q = 41$ *rung. No new dynamics enters; this is one identity locking A267's ladder to P28's lifting remark.*

Remark 4.6 (The conversion residue retyped; schisma flag demoted)**.** *The quantity* $1 - \sqrt{1-\kappa} = \kappa/2 + O(\kappa^2) = 0.0010670\ldots$ *now has a type: it is the per-unit* conversion residue *between the two clocks, equal to* $\tau_1/2 - 1$*, and it measures the difference of two tick lengths, not a failure of any closure map to close. A266 had flagged its near-miss against the schisma* ($3^8 \cdot 5/2^{15} - 1 = 0.0011292$*, ratio* 0.945*); with the residue typed as a tick-length difference rather than a comma, that flag loses its candidate referent and is demoted from flagged near-miss to numerical coincidence, unless future work gives the conversion residue a closure-map reading. A266's quarter-comma/*G_1 *flag is unaffected.*

5 Chart-Natural Constants

The bridge converts between the corpus's two internal clocks. The remaining conversion is external: between system units and SI, through the hidden chart of the kiloparsec sector. A265 supplied the two identities of Eq. (2) relating the chart length L_h, the SI breath duration $T_{\mathrm{b}}^{\mathrm{SI}}$, and the universal acceleration a_0. Those identities involve c and SI magnitudes and look like calibration statements. Expressed in the chart's own units, they collapse into pure numbers.

Theorem 5.1 (Exact chart identities)**.** *With the hidden-sector relations* $a_0 = \alpha^3 c^2/(\pi^2 L_h)$ *and* $T_{\mathrm{b}}^{\mathrm{SI}} = \alpha^2 c/(\pi a_0)$ *(A264/A265), in chart units* $(L_h, T_{\mathrm{b}}^{\mathrm{SI}})$*:*

$$\frac{c\,T_{\mathrm{b}}^{\mathrm{SI}}}{L_h} = \frac{\pi}{\alpha} = T_{\mathrm{breath}}, \qquad L_h = c\,\tau_1^{\mathrm{SI}}, \qquad \frac{a_0\,(T_{\mathrm{b}}^{\mathrm{SI}})^2}{L_h} = \alpha, \tag{5}$$

all exact, where $\tau_1^{\mathrm{SI}} = T_{\mathrm{b}}^{\mathrm{SI}}/T_{\mathrm{breath}}$ *is the SI duration of one system unit. The apparently arbitrary kiloparsec and the apparently arbitrary* $10^{-10}\,\mathrm{m\,s^{-2}}$ *are two faces of one dimensionless statement,* $a_0 = \alpha$ *in natural chart units; the chart length is the causal horizon of one system unit.*

Proof. Substitution. For the first identity,

$$\frac{c\,T_{\mathrm{b}}^{\mathrm{SI}}}{L_h} = \frac{\alpha^2 c^2}{\pi a_0 L_h} = \frac{\alpha^2 c^2 \cdot \pi^2}{\pi\,\alpha^3 c^2} = \frac{\pi}{\alpha}, \tag{6}$$

using $T_{\mathrm{b}}^{\mathrm{SI}} = \alpha^2 c/(\pi a_0)$ and then eliminating $a_0 L_h$ with $a_0 = \alpha^3 c^2/(\pi^2 L_h)$. For the third, $a_0 (T_{\mathrm{b}}^{\mathrm{SI}})^2/L_h = \alpha^4 c^2/(\pi^2 a_0 L_h) = \alpha$ by the same elimination. The second is the first divided by T_{breath}: since $c\,T_{\mathrm{b}}^{\mathrm{SI}}/L_h = T_{\mathrm{breath}}$ and $\tau_1^{\mathrm{SI}} = T_{\mathrm{b}}^{\mathrm{SI}}/T_{\mathrm{breath}}$, we have $L_h = c\,T_{\mathrm{b}}^{\mathrm{SI}}/T_{\mathrm{breath}} = c\,\tau_1^{\mathrm{SI}}$. Both core identities are verified symbolically at 50 digits (`verify_P275`, S1). □

Each identity is worth reading in words. The first says that light crosses $T_{\mathrm{breath}} \approx 430.51$ chart lengths per breath, equivalently one chart length per system unit: in chart units the speed of light *is* the breath number, and the fine-structure constant and the speed of light are reciprocal faces of the same number, $c = \pi/\alpha$. The second locates the kiloparsec: the chart length is the distance light travels in one fundamental oscillation, the causal horizon of one system unit. The third strips a_0 of its SI costume: the universal acceleration is α chart-lengths per breath squared.

Remark 5.2 (The unit lock's kinematic face)**.** *A264 locked three lengths into one (*B^4 *scale* $\equiv$ *fold-clock unit* $\equiv L_h$*). Theorem 5.1 states* why *the locked length sits at a kiloparsec: it is the causal horizon of one breath tick. In chart units the kinematics reads: light crosses one chart length per system unit; the breath is* T_{breath} *system units (Theorem 3.1); hence* $c = T_{\mathrm{breath}}$ *chart-velocities.*

5.1 The response channels and the per-breath gain

The identity $a_0 = \alpha$ acquires dynamical content through the breath map's deformation theory, worked out in A275 and summarized here because it is the principal consumer of the chart units. The breath map acts on $\mathbb{CP}^1$ as $B(u) = \lambda u$ with fixed points $\{0, \infty\}$ and unimodular multiplier $\lambda = e^{2\pi i \rho_*}$.

Proposition 5.3 (Deformation space; channel split)**.** *A first-order holomorphic deformation of $B(u) = \lambda u$ preserving the fixed points is generated by a holomorphic vector field on $\mathbb{CP}^1$ vanishing at both poles, i.e. $c\,u\,\partial_u$ with $c \in \mathbb{C}$: $B_s(u) = e^{cs}\lambda u + O(s^2)$. The perturbed multiplier is $\lambda' = e^{cs}\lambda$, so $|\lambda'| = 1 + s\,\mathrm{Re}\,c + O(s^2)$ and $\arg\lambda' = 2\pi\rho_* + s\,\mathrm{Im}\,c$. There are therefore exactly two response channels: $\mathrm{Im}\,c$ perturbs the rotation number at unimodular multiplier (A268's phase channel, gain exactly 1), and $\mathrm{Re}\,c$ is radial drift toward the rest pole, the unique channel that moves $|\lambda|$ off the unit circle. Both channels commute with the rotation symmetry and the lens $\mathbb{Z}_3$ (A274); no other first-order channel exists.*

Radial infall, attraction toward the rest pole, is thus not one coupling among many; it is the only symmetry-allowed modulus response.

Proposition 5.4 (α is the per-breath gain)**.** *Normalize the source so that $s = 1$ is the universal field a_0 acting at chart scale for one breath. The per-breath velocity gain in chart units is*

$$\frac{a_0\,T_{\mathrm{b}}^{\mathrm{SI}}}{L_h/T_{\mathrm{b}}^{\mathrm{SI}}} = \frac{a_0\,(T_{\mathrm{b}}^{\mathrm{SI}})^2}{L_h} = \alpha \quad \textit{exactly,} \tag{7}$$

hence $\partial|\lambda'|/\partial s\,\big|_{s=0} = \alpha$: the modulus channel of Proposition 5.3, at unit source, contracts the chart by exactly α per breath.

One reading is flagged rather than derived: that physical baryonic sources couple through the drift channel. The form is symmetry-forced (Proposition 5.3: there is no other modulus channel) and the normalization is the chart's own (Theorem 5.1); what is typed rather than derived is the statement that GM_b enters the breath map at all. That statement is the v4 kernel's closure hypothesis, confronted with data in A264 (SPARC: $a_0 = 0.976\times$ empirical). It is recorded as the single condition on A265's upgrade A$-$ $\to$ A.

Read together, the two gains characterize the chart's dynamics. The phase response has gain 1 and cannot be detuned at first order: pacing is rigid (A268; Pin 3, A269). The modulus response has gain α: matter attracts at the kernel coupling, once per breath. Rigid clock, weak infall, ratio α: the hidden chart is a system whose timekeeping is stiffer than its geometry by exactly the fine-structure constant. This is the dynamical restatement of the theme of P03, α as the price of observation, now read off a multiplier.

6 Numerical Results

Table 1 collects the published numbers. The first block is dimensionless and exact in the stated sense; the second block is SI and conditional on the gas-calibrated $a_0 = 1.172 \times 10^{-10}\,\mathrm{m\,s^{-2}}$ only.

A few entries deserve comment. The rotation number $\rho = \pi\alpha^{-1} - 430 = 0.5122452\ldots$ is definitionally exact, and its continued-fraction convergent denominators are $1, 2, 39, 41, 449, \ldots$, recovering A267's ladder rungs $q = 2, 41, 449$. The shadow $\rho_* = 0.0244904\ldots$ has continued fraction beginning $[0; 40, 1, \ldots]$ with convergent denominators $40, 41, 204, 245, \ldots$, containing the

quantity	expression	value	status
breath period	$T_{\rm breath} = \pi\alpha^{-1}$	$430.5122452\ldots$	exact
system unit (P03 time)	$\tau_1 = 2/\sqrt{1-\kappa}$	$2.0021362\ldots$	exact
bridge identity	$\tau_1\sqrt{1-\kappa}$	2	exact
breath in P03 time	$T_{\rm breath}\,\tau_1$	$861.944\ldots$	exact
Branch-B breath (excluded)	$T_{\rm breath}/\tau_1$	$215.026\ldots$	contradiction
fiber rotation number	$\rho = T_{\rm breath} \bmod 1$	$0.5122452\ldots$	definitionally exact
base rotation number	$\rho_* = 2\rho - 1$	$0.0244904\ldots$	definitionally exact
conversion residue	$1-\sqrt{1-\kappa} = \kappa/2 + O(\kappa^2)$	$0.0010670\ldots$	typed: tick-length
residue/schisma ratio	$(1-\sqrt{1-\kappa})/(3^8\cdot 5/2^{15}-1)$	0.945	coincidence
universal acceleration	a_0 (gas-calibrated)	$1.172\times 10^{-10}\,\mathrm{m\,s^{-2}}$	input
SI breath duration	$T_{\rm b}^{\rm SI} = \alpha^2 c/(\pi a_0)$	1.374 Myr	conditional
SI system unit	$\tau_1^{\rm SI} = T_{\rm b}^{\rm SI}/T_{\rm breath}$	3191 yr	conditional
chart length	$L_h = c\,\tau_1^{\rm SI}$	0.978 kpc	conditional
SPARC clean band	A264	0.75–1.00 kpc	measured

Table 1: Published numbers of the unit system. The dimensionless block is verified at 50 decimal digits; the SI block is conditional on the measured a_0 only.

$q = 41$ rung. The conversion residue satisfies $|\text{residue} - \kappa/2| < \kappa^2$, confirming the expansion $\kappa/2 + O(\kappa^2)$.

In the SI block, the chart length comes out as $L_h = 0.978$ kpc, inside the SPARC clean band $[0.75, 1.00]$ kpc, and the second identity of Eq. (5) gives it a direct reading: since $L_h = c\,\tau_1^{\rm SI}$ and $\tau_1^{\rm SI} = 3191$ yr, the chart length is 3191 light-years. The SI breath duration $T_{\rm b}^{\rm SI} = 1.374$ Myr sits in A265's band 1.37 ± 0.14 Myr. With these durations, all breath-counted statements of the corpus acquire SI timescales, conditional on the calibration only.

Verifier coverage. `verify_P273.py` (14 checks, 50 decimal digits): the bridge identity $\tau_1\sqrt{1-\kappa} = 2$; the breath duration in P03 time; all three cancellation instances; the TBS-dissolution identity $2\pi\sqrt{1-\kappa}\,\tau_1 = 4\pi$; the Branch-B contradiction factor; ρ and the recomputed ladder; the shadow identity $2T_{\rm breath} \bmod 1 = 2\rho - 1$ and its convergents; the $\kappa/2$ expansion bound; the demotion ratio. `verify_P275.py` (12 checks): both chart identities symbolically; the SI numerics ($T_{\rm b}^{\rm SI}$, $\tau_1^{\rm SI}$, $c\,\tau_1^{\rm SI} = L_h$ within the A264 band); the channel split ($|\lambda'|$ responds to $\operatorname{Re} c$ only and ρ_* to $\operatorname{Im} c$ only, at first order); the gain identity; and the consistency pair (phase gain 1, modulus gain α). All 26 checks pass.

7 Relation to the Corpus

Upstream. P03 supplies the oscillation time and the tempered fundamental $\omega_1 = \pi\sqrt{1-\kappa}$, and its theme of α as the price of observation is restated dynamically by the gain pair of Section 5.1. P14 supplies the Breathing-Period theorem from which the bridge is read off; nothing in P14 changes, but its phrase "measured in fundamental oscillation units" is now load-bearing. P28 supplies the dual-observer arc and the lifting result $\|\Omega\| = 2\omega_1$. A264 and A265 supply the kiloparsec sector: the unit lock, the SPARC calibration, and the two identities of Eq. (2).

Resolved or retired by this paper. TBS 28_2 is retired by conversion (Corollary 4.2). The temporal reading of TBS P034_3_c is superseded. A271's branch table is resolved: Branch B excluded, Branch A's number confirmed with corrected derivation, the working hypothesis overturned and noted in A271. OI-271-1 is closed (via A273) and OI-265-1 is closed (via A275), the latter upgrading A265 from Case A− to Case A under the flagged reading of Section 5.1. A266's schisma near-miss flag is demoted to numerical coincidence (Remark 4.6); its quarter-comma/G_1 flag is unaffected.

Made unconditional. A267's continued-fraction ladder ($q = 2, 41, 449$), its near-tritone reading of successive breaths, and its conditional-SI rungs (≈ 2.7 and 56 Myr, conditional only on A265's calibration) lose their branch-conditionality marker (Corollary 4.4). The Necessity of Detuning itself (A267; P36 companion) is untouched: the exactness established here is definitional, not dynamical.

8 Limitations and Open Items

The SI block is conditional. The identities of Theorem 5.1 are exact, but the durations $\tau_1^{\mathrm{SI}} = 3191$ yr, $T_{\mathrm{b}}^{\mathrm{SI}} = 1.374$ Myr, and $L_h = 0.978$ kpc enter through the gas-calibrated $a_0 = 1.172 \times 10^{-10}\,\mathrm{m\,s^{-2}}$ and inherit its uncertainty. A different calibration of a_0 rescales the SI block while leaving the dimensionless block untouched.

The flagged reading. That physical baryons enter through the drift channel is the symmetry-forced form with the chart's own normalization, but it is a typing of the source, not a dynamical derivation from the kernel. It is the single condition on A265's upgrade A− $\to$ A, and it rests on the v4 kernel's closure hypothesis, whose contact with data is the SPARC comparison of A264 ($a_0 = 0.976\times$ empirical).

The schisma demotion is reversible in principle. The near-miss of the conversion residue against the schisma (ratio 0.945) is recorded as a coincidence because the residue is typed as a tick-length difference, not a comma. If future work gives the conversion residue a closure-map reading, the flag would have to be reinstated.

Definitional exactness only. Nothing in this paper claims an exact dynamical closure. The exact statements are unit conversions and definitions; the dynamical detunings (ρ irrational, $G_1 \neq 0$) stand exactly where they were, as the Necessity of Detuning requires.

Canonical status. This paper is proposed canon, assembled 2026-06-10 from A273 and A275 and subject to review and rollback per the header block.

9 Conclusion

The unit system of the corpus closes on a single identification: one P14 system unit is one period of the tempered fundamental mode, $\tau_1 = 2/\sqrt{1-\kappa}$, read off P14's own Breathing-Period theorem rather than chosen. From it, three layers of structure follow by arithmetic. Per-breath counts of ω_1-paced rates are κ-free, which retires TBS 28_2 as a unit mismatch and fixes the breath map's two rotation numbers, $\rho = 0.5122452$ on the fiber and $\rho_* = 0.0244904$ on the base, as definitionally exact. Branch B of A271 is excluded by contradiction with the canon text, so A267's ladder and its readings hold unconditionally. And in the chart's own units the kiloparsec sector reduces to three exact identities, $c = T_{\mathrm{breath}}$, $L_h = c\,\tau_1^{\mathrm{SI}}$, and $a_0 = \alpha$, under which the kiloparsec is the causal horizon of one system unit and the universal acceleration is the fine-structure constant. The corpus keeps two clocks, but it now keeps one time.

Provenance and verification. Assembled without new claims from Addendum 273 (the bridge; `verify_P273.py`, 14 checks) and Addendum 275 (chart constants; `verify_P275.py`, 12 checks), both green at filing. Supersedes the temporal reading of TBS P034_3_c; retires TBS P028_2; resolves A271's branch table.