

Addendum 262: The Breath as Fold Metronome

OI-260-1: fold pacing from the corpus's unique rhythm,
and the one identification that remains

TOE Corpus

2026-06-09

Skill: gap-closure v1.1 — **Outcome:** Case A' (selection upgraded from conditional-on-derivability to conditional-on-one-named-identification) — **Verifier:** `verify_P262.py` — all PASS

Abstract

A260 selected the conformal fold clock $C\text{-}\eta$ *conditionally on the fold clock being corpus-derivable*, leaving OI-260-1: derive the pacing. This addendum supplies the derivation chain and isolates its single remaining assumption. *Step 1 (uniqueness of rhythm):* the corpus admits exactly one rhythm — the breath, $T_{\text{breath}} = \pi\alpha^{-1}$ — closed as a cosmological observable (P14, A239) and constitutionally unique (Pin: no subsystem generates its own rhythm). If fold completions have a corpus pacemaker at all, it is breath counting; A256 already excluded the only alternative (the Θ -fraction ledger). *Step 2 (breath $\rightarrow$ arc):* P28's intrinsic arc-speed is constant ($\|\Omega\| = 2\pi$), so equal breath counts traverse equal arc; one breath winds the phase exactly $\pi\alpha^{-1}$ times (the winding count *is* T_{breath} , an identity verified to machine precision). *Step 3 (arc $\rightarrow$ conformal time):* on an FRW background with spatial slice S^3 , equal arc equals equal conformal time *provided* phase propagation defines the causal structure — i.e. phase fronts are null. This is the load-bearing identification: P28 derives the Lorentz lapse from phase projection, which makes phase geometry the *origin* of causal structure, but the corpus nowhere states the null identification as a theorem. With it, fold completions paced by breath count are uniform in η : **C- η is selected**, and A260's conditional theorem upgrades to conditional on exactly one named statement (the Null Phase Identification, NPI), graded NEW THEORY-adjacent: strongly motivated by P28, not yet proven. The observational programme is unchanged ($z_1 \approx 17\text{--}26$ seeds $\leftrightarrow w(z)$ step at $z_4 \approx 4\text{--}6$); what changes is that a failed C- η test would now falsify NPI or the uniqueness-of-rhythm reading, not merely a map choice. All arithmetic certified by `verify_P262.py`.

1 Uniqueness of Rhythm

Proposition 1.1 (The breath is the only candidate pacemaker). *The corpus contains exactly one periodic structure: the breath, $T_{\text{breath}} = \pi\alpha^{-1} \approx 430.51$ system units, identified as the fundamental cosmological cycle by P14 and closed as an observable by A239. The constitutional architecture mirrors this (every subsystem synchronises to T_{breath} ; none generates its own rhythm), and the mirror is not decorative: the OS pins are transcriptions of TOE structure. The only other candidate ever proposed for fold pacing — the Θ -cycle phase fraction — was excluded empirically by A256 (Cor. 3.4: ledger, not pacemaker) in every clock variable. Therefore: if fold completions are paced by corpus structure at all, they are paced by breath count, i.e. uniformly in the breath's clock.*

Remark 1.2. *The hypothesis “paced by corpus structure at all” is not vacuous — a fold sequence paced by nothing (random completion epochs) is logically possible but would abandon the A256*

result that equal-fold spacing fits the data window; equal spacing in some clock is what the staircase phenomenology already requires.

2 Breath to Arc

Proposition 2.1 (Equal breaths, equal arc). *P28’s numerical experiments fix the intrinsic arc-speed on S^3 at $\|\Omega\| = 2\pi$ per system unit, independent of α . Hence one breath traverses $2\pi \cdot T_{\text{breath}}$ radians of phase — exactly $\pi\alpha^{-1}$ full windings; the winding count per breath equals T_{breath} numerically, an identity rather than a coincidence (arc-speed 2π makes “windings per unit time” $= 1$). Equal breath counts therefore traverse equal arc, with no α -dependent drift.*

3 Arc to Conformal Time: the One Identification

Theorem 3.1 (Conditional metronome theorem). *Assume the **Null Phase Identification (NPI)**: phase fronts of the dual-observer construction propagate on the null cones of the emergent causal structure. Then on an FRW background with spatial slice S^3 of radius R_{curv} , an arc interval $\Delta\chi$ corresponds to a conformal interval $\Delta\eta = R_{\text{curv}} \Delta\chi$, and Propositions 1.1–2.1 give: fold completions are uniform in conformal time. **C- η is selected.***

Remark 3.2 (Status of NPI). *NPI is the single load-bearing assumption. Its support: P28 derives the Lorentz lapse $d\tau/dt = \sqrt{1-v^2}$ from phase projection — causal structure in the corpus is an output of phase geometry, not an input — and the lapse vanishes exactly where phase advance saturates, which is the defining behaviour of a null structure. Its gap: the corpus nowhere proves that the phase fronts coincide with the null cones of the metric that P20 embeds; P28’s open remark P28_3_c (the Hopf-observable-to-physical-velocity postulate, flagged in the 2026-06-09 corpus deep-read as the canon’s deepest unproven joint) is exactly the statement NPI would formalize. NPI is therefore graded: strongly motivated, unproven, and now load-bearing for cosmology — which promotes resolving P28_3_c from a foundational nicety to the highest-leverage open derivation in the canon.*

Corollary 3.3 (Upgrade of A260; sharpened falsification). *A260 Thm. 1.3 (“if the fold clock is corpus-derivable, C- η ”) upgrades to: C- η holds modulo NPI alone. The observational programme is unchanged — heavy seeds at $z_1 \approx 17$ –26 coupled to a $w(z)$ step at $z_4 \approx 4$ –6 — but its epistemic weight increases: a clean failure of the C- η coupling would now falsify NPI or Proposition 1.1’s reading, i.e. it would reach back into P28/P14 rather than merely eliminating a map. Conversely a confirmed coupling would be indirect evidence for NPI, hence for the phase-geometric origin of causal structure — the corpus’s central interpretive claim.*

4 Status

OI-260-1: closed to a point. The pacing is derived modulo one named statement (NPI $\equiv$ formalized P28_3_c). Full unconditional closure is now exactly the closure of P28_3_c, filed as **OI-262-1** — and that item predates this thread: it is the velocity-identification gap the corpus has carried since P28. The fold thread has, fittingly, terminated on the canon’s oldest open joint.

Upgraded (2026-06-09, same day; A263). OI-262-1 is closed: A263 proves NPI from the bundle Pythagoras under the canon’s two prior commitments (winding = time; base = space). Theorem 3.1 here is now unconditional within the canon: **C- η is the fold clock.**

Verifier. `Lumen/corpus/addenda/verify/verify_P262.py` — all checks pass, exit 0.