

Addendum 361: The Geometric-Correction Swing

A pre-registered test for a TOE correction to the Goldbach comet —
a clean null, and the scale-bridge floor it lands on
(Addendum to Addendum 360; extends Paper 24)

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Abstract

Addendum 360 proved the layer weights $4\pi^3:\pi^2:\pi$ do not enter the *leading* Goldbach constant (the Hardy–Littlewood singular series is arithmetic). It named the harder question: is there a *geometric* correction the three-layer weights predict about the binary Goldbach comet — something the singular series does not — that survives a residue-matched null? This addendum takes that swing, *pre-registered* (not a scan, mindful of the PRVE history where a $p = 0.016$ prime signal failed to replicate). Three tests. **(T1)** The normalized comet $g(n) = r_2(n)(\ln n)^2/(n\mathfrak{S}(n))$, with $\mathfrak{S}$ the singular series, is *flat* (relative std 0.03): the arithmetic captures the n -trend, so any geometric correction must live in the residual. **(T2)** The falsifiable geometric prediction — that the layers ($\sim 90:7:2$) weight the Goldbach primes’ residues mod 3 — is *falsified*: the primes are Dirichlet-uniform ($\{1:0.498, 2:0.502\}$ on the coprime classes), no residue preference. **(T3)** The residual after removing $\mathfrak{S}$ is indistinguishable from Hardy–Littlewood noise (lag-1 autocorrelation $p = 0.27$ against a shuffle null). **Verdict: clean null.** The binary comet is fully arithmetic; the weights appear at *no* level (constant, residue, fluctuation), hardening 360’s limit. The one candidate this probe cannot test — a breath-frequency modulation of the comet — is under-specified for exactly the reason the Hubble 2π would not derive: its frequency on the integer line needs a calibrated map from the corpus’s intrinsic clock (the breath) to an external linear scale, the missing bridge of 357a (fold-rate) and 359a. *Observation, not theorem*: the Goldbach-weight null and the Hubble- 2π floor are the same kind of gap. All claims pinned by `verify_P361.py` (8/8).

1 The three pre-registered tests

The swing is fixed in advance to avoid the multiple-comparisons trap the PRVE programme documented (the twin-gap $p = 0.016$ that reversed sign on held-out data).

Proposition 1.1 (T1: the comet is flat). *With the Hardy–Littlewood singular series $\mathfrak{S}(n) = 2C_2 \prod_{p|n, p>2} (p-1)/(p-2)$ (C_2 the twin-prime constant), the normalized comet $g(n) = r_2(n)(\ln n)^2/(n\mathfrak{S}(n))$ has relative standard deviation ≈ 0.03 across $n \in [2 \times 10^4, 3 \times 10^5]$. The singular series removes the n -trend; the comet is flat. Any geometric correction must therefore appear in the residual $g(n) - \bar{g}$, not in the envelope.*

Proposition 1.2 (T2: no residue preference — the falsifiable prediction, falsified). *If the three layers $4\pi^3:\pi^2:\pi$ ($\sim 90:7:2$) weighted prime structure, the Goldbach primes p (for even n) would show a residue-class preference mod 3. They do not: the fractions on the coprime classes are $\{1:0.4976, 2:0.5022\}$ — Dirichlet uniform, $0:0.0002$ on the $p = 3$ class. The $90:7:2$ prediction*

is falsified by tens of standard deviations. The geometry induces no preferred residue class; this is forced by Dirichlet’s theorem and already inside the singular series.

Proposition 1.3 (T3: the residual is Hardy–Littlewood noise). *The residual $g(n) - \bar{g}$ has lag-1 autocorrelation 0.041; against a permutation (shuffle) null its two-sided p-value is 0.27. No structure survives a residue-matched null. The residual is consistent with the Hardy–Littlewood fluctuation, with no free geometric signal at $p < 0.05$.*

2 Where the swing lands

Theorem 2.1 (The binary comet is fully arithmetic). *Combining T1–T3, the layer weights $4\pi^3 : \pi^2 : \pi$ appear at no level of the binary Goldbach comet: not in the leading constant (360, the singular series), not in the residue distribution (T2, Dirichlet uniform), and not in the residual fluctuation (T3, HL noise). This hardens 360’s limit from “the weights do not set the leading constant” to “the weights do not appear anywhere.”*

Remark 2.2 (The one untested candidate, and the floor). A single candidate is not tested here, and deliberately so: a breath-frequency modulation of the comet. The breath is the corpus’s one log-periodic structure (the Hopf-fibre rotation), so a breath-driven oscillation is the only geometrically-motivated correction left. But its frequency on the integer line is unspecified: it would require a calibrated map from the breath (the corpus’s intrinsic clock) to the external linear scale of the integers. That map is exactly the missing bridge of 357a (the fold-rate $\nu = \frac{1}{4}H_0$) and 359a (the Hubble 2π) — the corpus is internally complete but lacks derived bridges to external scales. Scanning breath-periods would be the PRVE fishing trap; a pre-registered breath-period test needs the bridge first. So the swing does not find a signal; it lands on the same floor.

Remark 2.3 (Observation, not theorem). It is tempting to say the Goldbach-weight null and the Hubble- 2π floor are *the same* gap — the corpus’s intrinsic structures (breath, Hopf, layer weights) lacking a calibrated bridge to any external scale (the integers; cosmological time). This is offered as an observation that organises three named floors (357a, 359a, and the 360/361 Goldbach limit), not as a proven identity. What is proven is the null (Theorem 2.1); the unification is a conjecture about *why* the nulls recur.

Status

The pre-registered swing at a geometric correction to the binary Goldbach comet is a **clean null**. After removing the singular series the comet is flat (Proposition 1.1); the Goldbach primes carry no residue-class preference, the 90:7:2 prediction falsified by tens of sigma (Proposition 1.2); and the residual is Hardy–Littlewood noise under a residue-matched permutation null (Proposition 1.3). So the layer weights appear at no level of the comet (Theorem 2.1), hardening 360. The one untested candidate — a breath-frequency modulation — is under-specified by the missing breath-to-external-scale bridge, the same floor as 357a/359a (Remark 2.2); whether the Goldbach and Hubble floors are literally one gap is an organising observation, not a theorem (Remark 2.3). The probe is pre-registered with a residue-matched null and no scan, in keeping with the PRVE discipline. No new objects; no published number changes. Verifier: `verify_P361.py`, 8/8 pass.