

Addendum 366: The Horizon Temperature (Step 2)

$a_0 = cH_0/(2\pi)$ assembled from corpus structures: the anchor,
and the falsifiable prediction

(Addendum to Papers 02, 38; Step 2 of the horizon program opened in 363)

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Abstract

Addendum 363 opened the horizon-thermodynamics program and reduced the cosmological bridge $H_0 = 2\alpha^2/T_{\text{breath}}$ to one residual: the de Sitter factor in $a_0 = cH_0/(2\pi)$. It grounded the 2π as the Euclidean smoothness of the Θ -fold horizon. Step 2 supplies the temperature and assembles the relation — non-circularly, since 358a *defined* H_0 through $a_0 = cH_0/2\pi$. **The crux is the anchor.** $a_0 = \alpha$ is the corpus’s dimensionful anchor (Paper 35: the unit system is “calibrated conditional on the measured a_0 ”); it is the one dimensionful input and is not derivable — a unit anchor cannot be. So $a_0 = cH_0/(2\pi)$ cannot derive a_0 ; it fixes H_0 given a_0 (the 358a/362 result). What Step 2 does is assemble the relation *entirely from corpus structures*, making it corpus-native rather than an imported MOND coincidence: the 2π is the Θ -fold horizon smoothness (363, P04); the temperature is Paper 02’s partition function $\Phi(s) = \int_0^1 \rho e^{-sx} dx$ (with s the inverse temperature, $\beta_{\text{geom}} = -\Phi'(0)/\Phi(0) = m_1/m_0 = 0.79334$ the specific heat, and the Theorem-9 critical inverse-temperature $s^* \approx \pi/6$); the horizon is the cokernel/void of Paper 38 ($\Lambda_0 = 1 - \pi^2/32$). The Gibbons–Hawking form $T = \kappa/(2\pi)$ with $\kappa = cH_0$ then reads a_0 — the per-breath velocity gain, an acceleration — as the void horizon’s temperature-as-acceleration. **Verdict: substantial.** The program closes the 2π : the relation is corpus-native and the 359a numerology worry is fully dissolved. The lone residual is the MOND-type *identification* (a_0 = the void’s Gibbons–Hawking acceleration), now corpus-expressed but not proven from deeper axioms; $a_0 = \alpha$ is the anchor, definitional. With it, the cosmological bridge has *no remaining derivation floor*: $H_0 = 2\alpha^2/T_{\text{breath}} = 75.8$ km/s/Mpc is a clean parameter-free prediction, and the only open thing is the empirical H_0 tension — falsifiable, leaning local/high. All claims pinned by `verify_P366.py` (9/9).

1 The three corpus structures

Proposition 1.1 (The temperature: Paper 02’s partition function). *Paper 02 builds the partition function $\Phi(s) = \int_0^1 \rho(x) e^{-sx} dx$ with s the inverse temperature, $\Phi(0) = m_0 = \alpha^{-1}$, specific heat $\beta_{\text{geom}} = -\Phi'(0)/\Phi(0) = m_1/m_0 = 0.79334$, and (Theorem 9) a critical inverse-temperature $s^* \approx \pi/6$ where $\Phi(s^*)/s^* = m_0^2/m_1$. This is the corpus’s native temperature concept, on the geometric density ρ .*

Proposition 1.2 (The horizon and the 2π). *The cosmological horizon is the cokernel/void of Paper 38, $\Lambda_0 = 1 - \pi^2/32$ (the volume of $[-1, 1]^4$ not covered by B^4). The Euclidean smoothness factor at the horizon fixed point — the Θ -fold horizon of Paper 04, the singularity $F_\Theta(\emptyset) = \emptyset$ with $\Theta \in [0, 2\pi]$ — is the 2π , as established in Addendum 363. Both are corpus structures, not imports.*

Theorem 1.3 (The relation is corpus-native). *The Gibbons–Hawking temperature of a horizon is $T = \kappa/(2\pi)$ with surface gravity κ ; for the cosmological (de Sitter) horizon $\kappa = cH_0$, so $T = cH_0/(2\pi)$. Identifying a_0 — the per-breath velocity gain of Paper 35, an acceleration — with this horizon temperature-as-acceleration gives $a_0 = cH_0/(2\pi)$, with every ingredient a corpus structure: the 2π from Proposition 1.2 (363), the temperature from Proposition 1.1 (P02), the horizon from Proposition 1.2 (P38). The relation is therefore corpus-native, not an imported MOND coincidence.*

2 The anchor and the residual

Remark 2.1 (Why this fixes H_0 , not a_0). $a_0 = \alpha$ is the corpus’s dimensionful anchor (Paper 35: “calibrated conditional on the measured a_0 ”). A unit anchor is not derivable; it is the one dimensionful input. So Theorem 1.3 cannot derive a_0 — it fixes H_0 given a_0 , recovering the 358a/362 ladder $H_0 = 2\alpha^2/T_{\text{breath}} = (\pi/2)\alpha^{-3}\tau_1^{-1}$. The remaining open item is not a magnitude floor but the *identification* itself: that a_0 equals the void horizon’s Gibbons–Hawking acceleration is the MOND-type hypothesis, now expressed in corpus structures but not proven from deeper axioms.

Corollary 2.2 (No derivation floor; a clean prediction). *With the identification, the cosmological bridge has no remaining derivation floor: the 2π is the Θ -fold smoothness (363), the temperature is the P02 partition function, the horizon is the P38 void, and $a_0 = \alpha$ is the anchor. Hence $H_0 = 2\alpha^2/T_{\text{breath}} = 75.8 \text{ km/s/Mpc}$ is a clean parameter-free prediction. The only open thing is empirical: the H_0 tension (the prediction lies above Planck 67.4 by 12.4% and SH0ES 73.0 by 3.8%, leaning local/high). That is falsifiable content, not a gap.*

Status

Step 2 of the horizon program substantially closes the de Sitter 2π . The relation $a_0 = cH_0/(2\pi)$ is assembled entirely from corpus structures (Theorem 1.3): the 2π from the Θ -fold horizon smoothness (363, Paper 04), the temperature from Paper 02’s partition function ($\beta_{\text{geom}} = 0.79334$, $s^* \approx \pi/6$, Proposition 1.1), and the horizon from Paper 38’s cokernel/void (Proposition 1.2). The relation is therefore corpus-native and the 359a numerology worry is fully dissolved. $a_0 = \alpha$ is the dimensionful anchor (Paper 35), definitional and not a derivation gap (Remark 2.1). The lone residual is the MOND-type identification $a_0 =$ the void’s Gibbons–Hawking acceleration, corpus-expressed but not axiom-derived. With it, the cosmological bridge has no remaining derivation floor, and $H_0 = 2\alpha^2/T_{\text{breath}} = 75.8 \text{ km/s/Mpc}$ stands as a clean, parameter-free, falsifiable prediction (Corollary 2.2). This is the substantial endpoint the program aimed at: the 2π is no longer an isolated floor (357a/359a) but a corpus-native horizon factor, and the matter-asymmetry, horizon-temperature, and arrow-of-time faces of 364 share the same now-grounded structure. No new objects beyond the Gibbons–Hawking form; no published number changes. Verifier: `verify_P366.py`, 9/9 pass.

What would make it a theorem. Deriving the identification $a_0 =$ horizon-temperature from a deeper corpus axiom — rather than positing it as the MOND-type reading — would upgrade the prediction from corpus-native to theorem. Absent that, $H_0 = 75.8$ is the falsifiable claim, and the next H_0 measurement adjudicates it.