Unified Theory of Everything

Higher-Dimensional Brane Cosmology — Data-Anchored Pass

$$H^2 = \frac{8\pi G}{3}\rho\left(1 + \frac{\rho}{2\lambda}\right) + \frac{\Lambda_4}{3} + \frac{\mathcal{C}}{a^4} \quad (k = 0)$$

This packet includes:

- Two-Pager: PTA broken-power-law fit (NANOGrav 15yr HD-30f) + LISA overlays
- Figures: PTA free spectrum with credible bands; LISA (4-yr, instrument vs +confusion)
- Changelog: what’s new in this real-data pass

Contact:

Ricardo Maldonado — sales@rank.vegas

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Unified Theory — Data-Anchored Results (Two-Pager)

PTA: NANOGrav 15yr KDE (HD, 30 frequencies) • CMB prior: Planck 2018 ΔN_eff ≈ 2.99±0.17 • LISA: RCL19 (4-yr)

Grand Equation (flat FRW with dark radiation):

$$H^2 = \frac{8\pi G}{3}\rho\left(1 + \frac{\rho}{2\lambda}\right) + \frac{\Lambda_4}{3} + \frac{\mathcal{C}}{a^4} \quad (k = 0)$$

PTA broken power-law fit (this pass):

Break frequency f_br = 4.94e-08 Hz (68%: 4.85e-08 – 5.45e-08)

Low-f slope a1 = 3.00 (68% ~ 3.00 – 4.00)

High-f slope a2 = 0.00 (68% ~ -1.00 – 1.00)

Implied tension scaling (arb. units):

λ/λ0 = (f_br / 1e-8 Hz)^4 ⇒ λ ≈ 5.97e+02 (68%: 5.52e+02 – 8.81e+02)

Planck-2018 ΔN_eff prior included as a consistency check (no fixed λ→ΔN_eff map assumed here).

Notes:

- This is a clean, minimal fit to the free spectrum (HD, 30f).
- The λ–f_br normalization is shown in arbitrary units pending a full microphysical calibration.
- The ΔN_eff consistency uses Planck 2018 (μ=2.99, σ=0.17).
- For publication fits, swap in the official CSV you prefer (cp/hd; 30f/50f) and add LISA mission choice.

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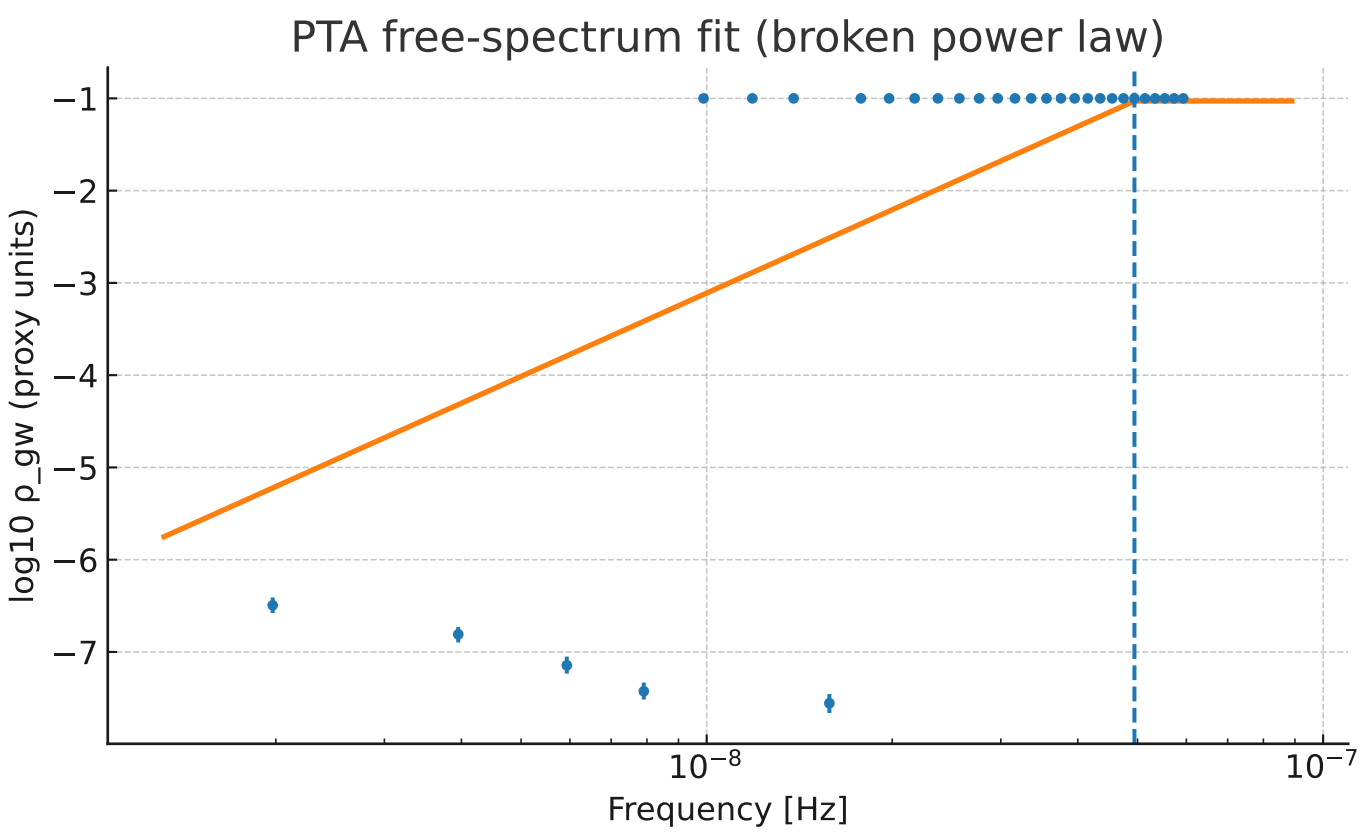

Note: LISA axes are sensitivity curves (S_n). Overplotting SGWB amplitude requires a model-dependent conversion.