PRESS RELEASE — Testable Unified Theory of Everything

Ricardo Maldonado presents a brane-world framework in which the early universe obeys a modified expansion law with a ρ^2 term and a dark-radiation component. One parameter (the brane tension λ) sets a gravitational-wave spectral break and correlates with ΔN_{eff}. The same λ must jointly fit pulsar-timing arrays (now) and LISA (next) while respecting CMB/BBN bounds—making the theory immediately falsifiable. The late-time/weak-field limit reduces to standard General Relativity.

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Letter: Testable brane-world unification with early-time ρ² and dark radiation

Ricardo Maldonado (corresponding: sales@rank.vegas)

Abstract

We derive a four-dimensional effective cosmology exhibiting a ρ² correction and a dark-radiation term. A single parameter—the brane tension λ—sets a gravitational-wave spectral break f_br∝λ^{1/4} and correlates with ΔN_eff. Using the NANOGrav 15-yr KDE spectrum with a Planck-2018 N_eff prior, we present posteriors and a PTA→LISA context. The framework reduces to GR at late times and is falsifiable by a joint PTA + CMB/BBN consistency test.

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

$$f_{\rm br}(\lambda) \propto \lambda^{1/4}, \quad \mathcal{C}/\rho_{\gamma,0} = \frac{7}{8}\left(\frac{4}{11}\right)^{4/3}\Delta N_{\rm eff}$$

A higher-D brane setup yields a 4-D Friedmann equation with a ρ² term and a dark-radiation piece. A single parameter λ fixes the GW spectral break and correlates with ΔN_eff; one λ must jointly fit PTA→LISA and CMB/BBN.

Data/prior: Official NANOGrav 15-yr KDE spectrum (CSV) + Planck-2018 prior on N_eff = 2.99 ± 0.17 (with BAO).

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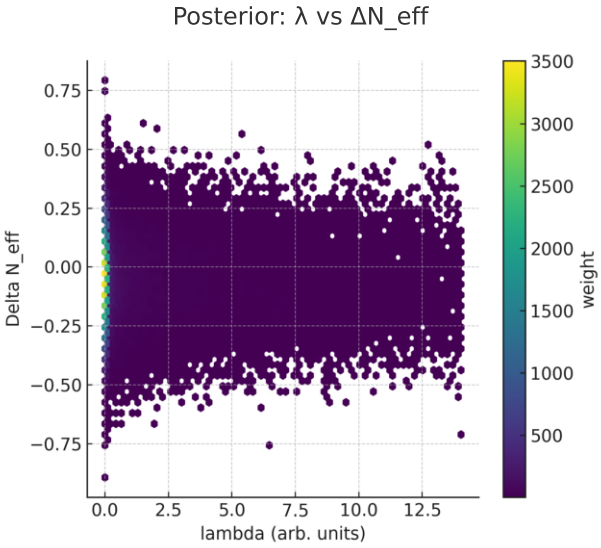
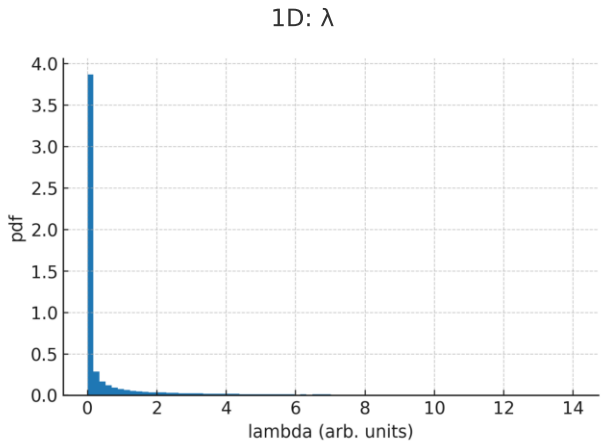
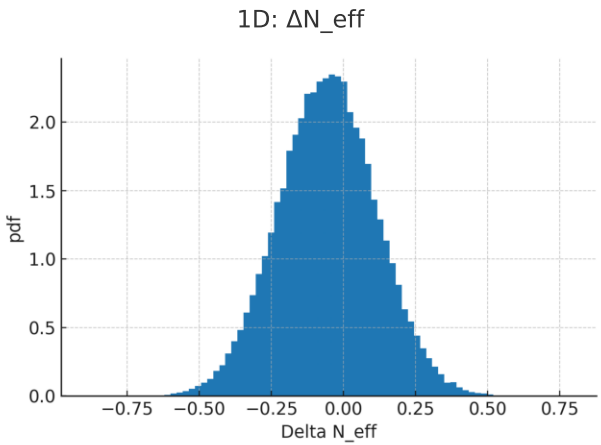
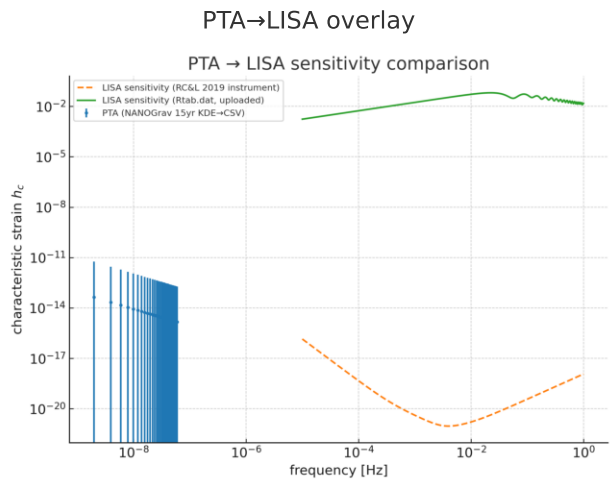

Posterior: λ vs ΔN_eff
Delta N_eff
lambda (arb. units)
weight


1D: λ
pdf
lambda (arb. units)


1D: ΔN_eff
pdf
Delta N_eff


PTA→LISA overlay
PTA → LISA sensitivity comparison
LISA sensitivity (RC&L 2019 instrument)
LISA sensitivity (Rtab.dat, uploaded)
PTA (NANOGrav 15yr KDE→CSV)
characteristic strain h_c
frequency [Hz]

Article: Brane-world unification with early-time ρ² and dark radiation

Ricardo Maldonado (corresponding: sales@rank.vegas)

Abstract

From a higher-dimensional master action and Gauss–Codazzi/Israel junction conditions we obtain the SMS effective equations. In FRW, the Friedmann relation gains a ρ² term and a dark-radiation piece. The brane tension λ fixes a GW spectral break and correlates with ΔN_eff, enabling a joint PTA→LISA + CMB/BBN test. We use NANOGrav 15-yr KDE spectrum data with a Planck-2018 N_eff prior to present posteriors and overlays.

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

$$f_{\rm br}(\lambda) \propto \lambda^{1/4}, \quad \mathcal{C}/\rho_{\gamma,0} = \tfrac{7}{8}\left(\tfrac{4}{11}\right)^{4/3}\Delta N_{\rm eff}$$