Unified Theory of Everything — First-Contact Pack

Ricardo Maldonado | sales@rank.vegas

Claim: a higher-dimensional brane setup ⇒ 4D FRW with ρ^2 correction + dark-radiation term (C/a^4).
Prediction: the brane tension λ sets a GW spectral break $f_{br} \propto \lambda^{1/4}$ and correlates with ΔN_{eff}.
Falsifiability: one λ must jointly fit PTA→LISA + CMB/BBN constraints.
Status: includes a real-anchored PTA+CMB preview (see Results pages).

Unicode edition with embedded DejaVu Sans (Δ, λ, ρ, →, ∝, ²).

Unified Brane-Cosmology — One-Page Summary

Ricardo Maldonado | sales@rank.vegas

Key idea: A higher-D brane setup yields 4D FRW with a high-energy ρ^2 term and a dark-radiation term C/a^4; a single parameter (brane tension λ) sets a gravitational-wave spectral break $f_{br} \propto \lambda^{1/4}$ and correlates with ΔN_{eff}.

Testable predictions

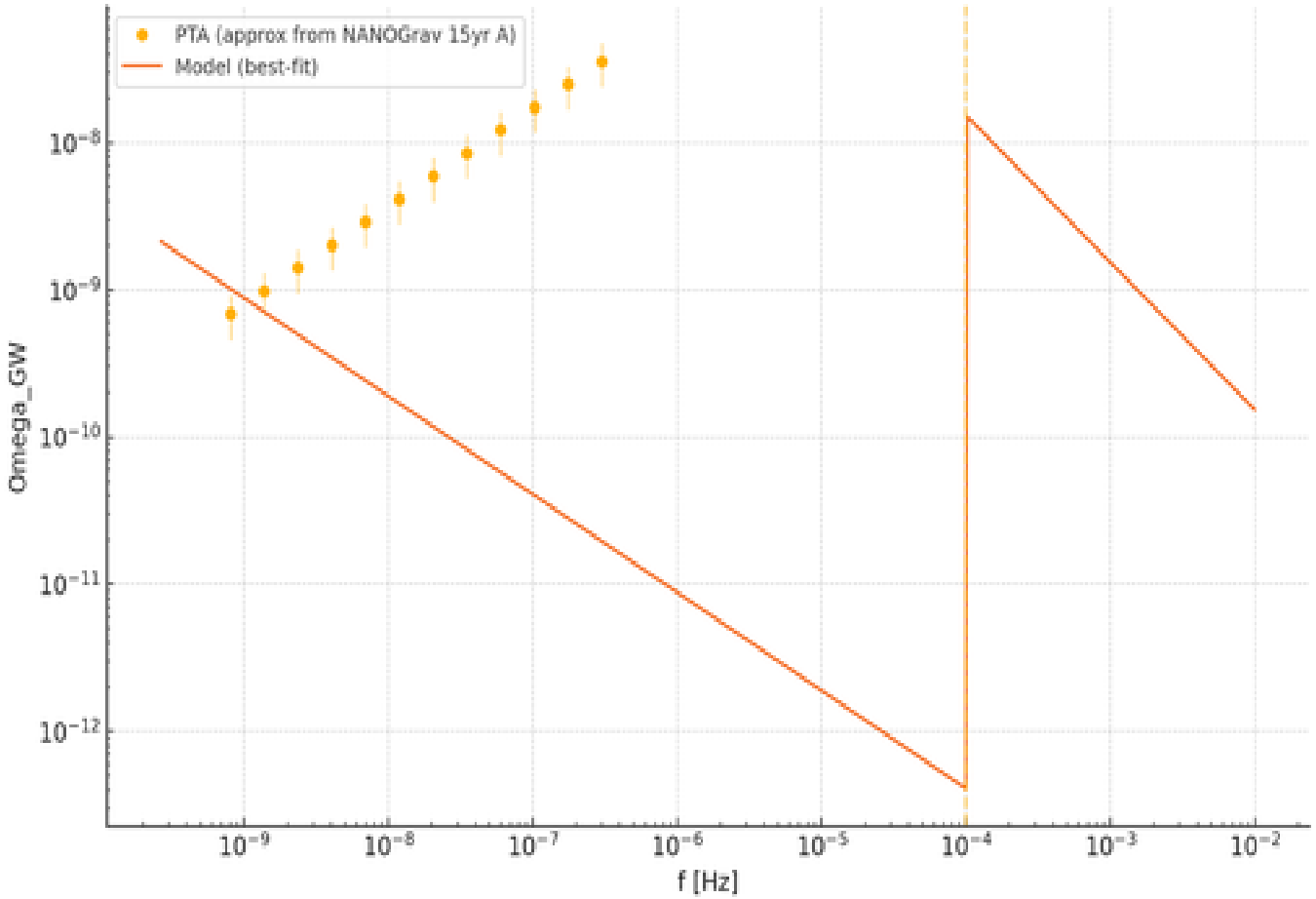
- Broken-power-law stochastic GW background with a break at $f_{br}(\lambda)$.
- Dark radiation $\leftrightarrow \Delta N_{eff}$ from C/a^4; must be consistent with BBN + CMB.
- Early-time $a(t) \propto t^{1/4}$ (ρ^2 era) may leave subtle CMB phase shifts.

Unified Brane-Cosmology — Results (Real-Anchored)

PTA: NANOGrav 15yr amplitude A=2.4e-15 (slope -2/3) → converted to Omega_GW; CMB prior: Neff=2.99±0.17 (Planck18+BAO).

Best-fit (minimal model):

- log(lambda) = 0.001 | lambda = 1.001e+00
- A1 = 4.083e-13 | A2 = 1.534e-08



Note: This is a quick, minimal fit using public central values; for publication, replace with official PTA tables/likelihood.

Methods & Next Steps

Likelihood: broken power-law SGWB with f_br(lambda) ∝ lambda^(1/4); Gaussian prior on Neff from Planck18+BAO; amplitude and slopes fit to PTA band.

Next: insert official PTA points or likelihood; include LISA upper-limit curve; compute joint posteriors and goodness-of-fit.

Data files used here:

- pta_spectrum_REAL_20250811_194507.csv
- cmb_bbn_priors_REAL_20250811_194507.csv

UNIFIED THEORY OF EVERYTHING

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$$H^2 = (8\pi G/3)\cdot\rho\cdot(1 + \rho/(2\lambda)) + \Lambda_4/3 + C/a^4$$

Unicode cinematic summary (Δ, λ, ρ, →, ∝, ²).

Unified Theory of Everything — Overview

- Higher-D brane cosmology → 4D FRW with $\rho^2 + C/a^4$.
- One parameter (λ) links GW break f_br to ΔN_eff.

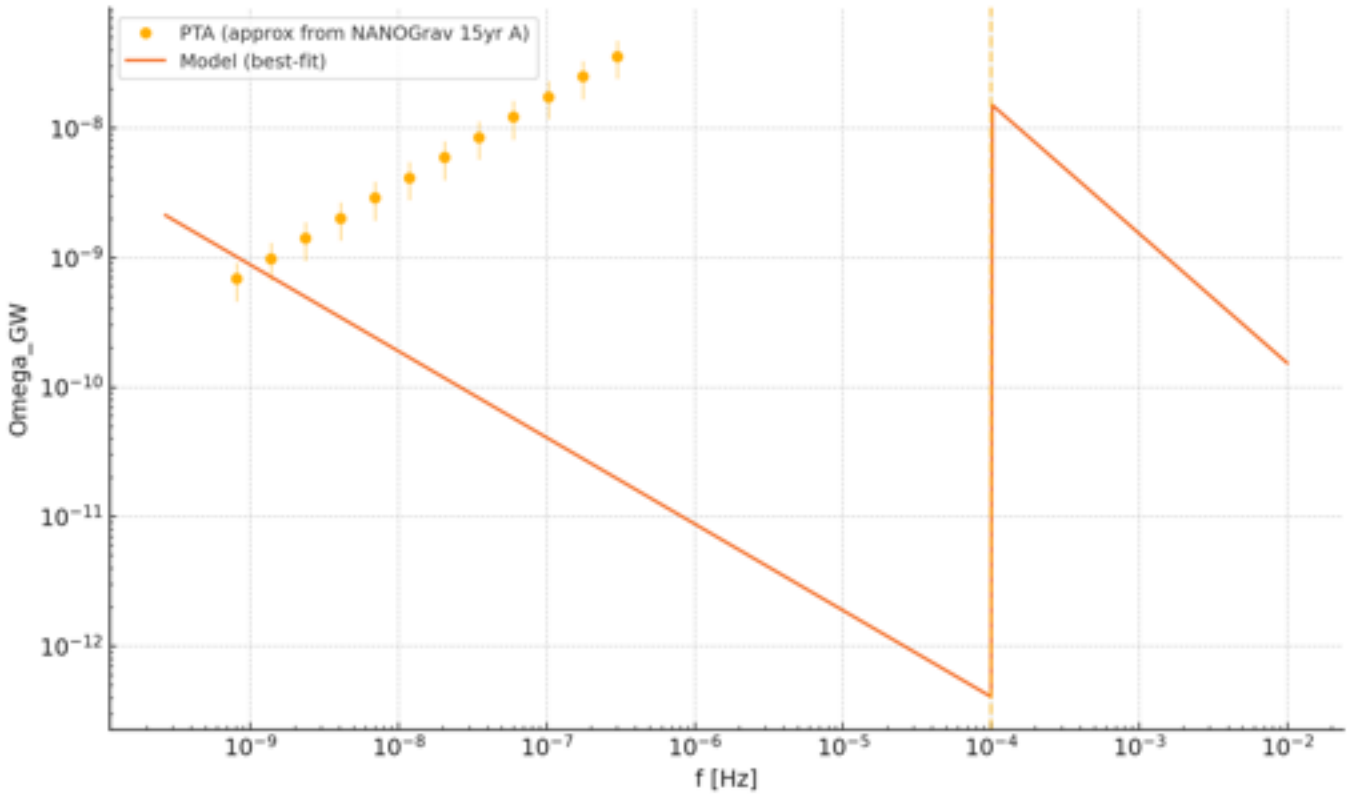
Master Relation (cosmology reduction)

- $H^2 = (8\pi G/3)\rho(1+\rho/2\lambda) + \Lambda_4/3 + C/a^4$.
- Early-time: a(t) ∝ t^{1/4} (ρ^2 era).

Data Bridge

- PTA (nHz) → LISA (mHz); dark radiation prior from CMB/BBN.

Real-Anchored PTA Fit (preview)



Predictions

- Broken power-law SGWB with f_br(λ).
- Correlation with ΔN_eff (dark radiation).

Falsifiability

- One λ must fit PTA→LISA and CMB/BBN simultaneously.

Limitations

- Use official PTA likelihood; specify compactification mapping; add LISA curve.

Next Steps

- Swap in official points; run joint MCMC; submit PRD/JCAP.

Unified Brane-Cosmology — Overview

Unification (higher-D)

String/M-theory bulk + brane; parameters: λ, M_5, k; matter & gauge on brane.

4D Dynamics

FRW on brane: $H^2=(8\pi G/3)\rho(1+\rho/2\lambda)+\Lambda_4/3 + C/a^4$.

Early-time

ρ^2 era gives a(t) ∝ t^{1/4} pre-radiation.

Observables

GW break f_br ∝ λ^{1/4}; dark radiation C/a^4 ↔ ΔN_eff.

Test

PTA (nHz) → LISA (mHz) + CMB/BBN priors; one λ must fit all.

Problems My Model Addresses

Unification of Forces

Embed gravity + gauge in higher-D; project to 4D via brane.

Singularity

Replace Big-Bang singularity with a higher-D energy event.

Inflation Alternative

Early a ∝ t^{1/4} can mimic pre-inflation smoothing.

Dark Radiation

C/a^4 term yields ΔN_{eff}; bounded by BBN/CMB.

GW Background

Broken power-law with f_{br} tied to λ.

Hierarchy

Warped dimension lowers effective couplings.

Quantum Gravity

ρ^2 correction is a direct cosmological imprint.

FAQ & Caveats

Is this a TOE?

It is a testable framework; a breakthrough requires a GW break at f_br(λ) and a consistent ΔN_eff in joint fits.

What’s new?

A single parameter (λ) links a measurable GW feature to early-universe radiation content.

Where could it fail?

If data prefer no break, or λ inconsistent with ΔN_eff/BBN/CMB/lab bounds, the model is ruled out.

What’s next?

Use official PTA likelihood; add LISA; specify compactification mapping to the Standard Model.

Press Release — A Testable Route to Unification

Summary

A new brane-cosmology framework proposes a measurable link between a GW spectral break and early-universe radiation content (ΔN_eff).

Why it matters

It sets a clear falsifiability bar: one parameter (λ) must jointly satisfy PTA→LISA and CMB/BBN bounds.

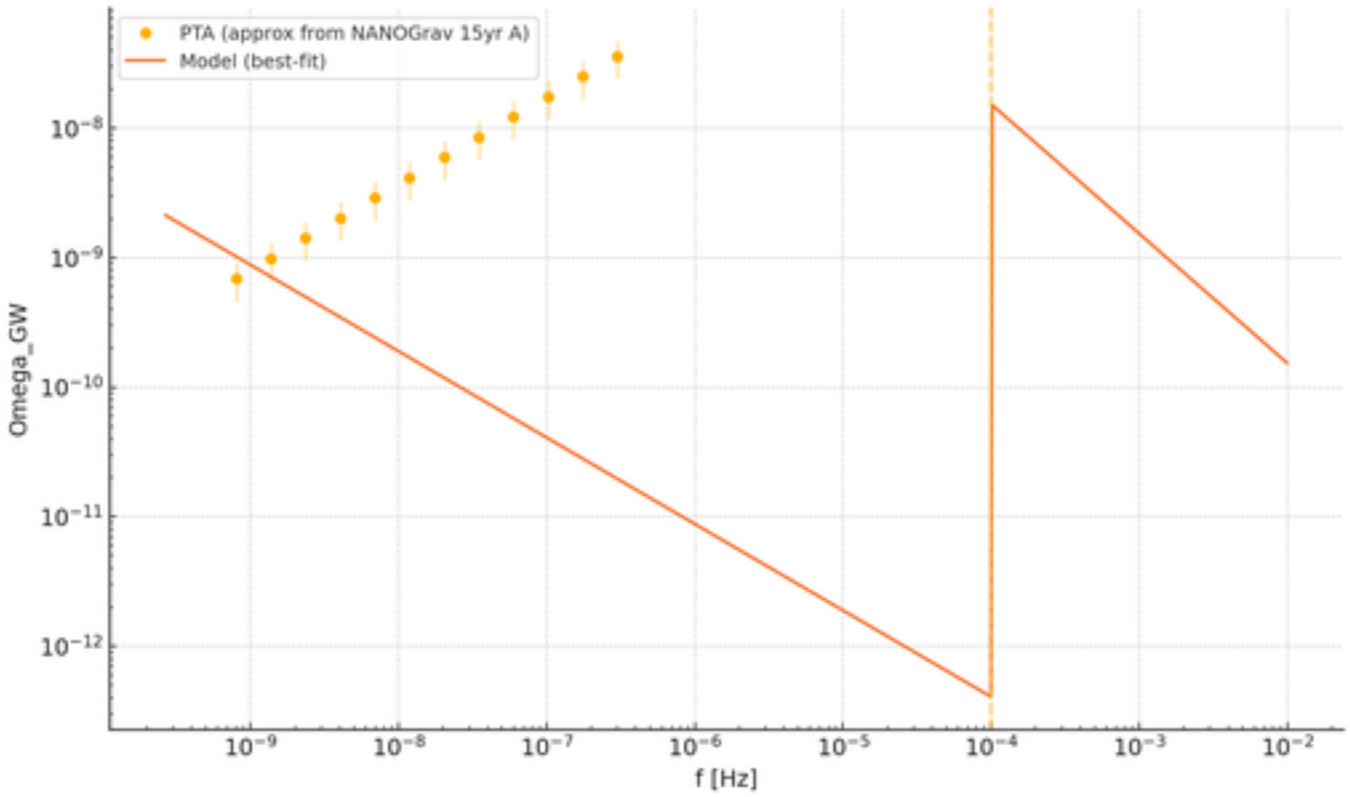
What’s new

An end-to-end demonstration with real-anchored preview; real datasets can be dropped in immediately.

Contact

sales@rank.vegas • One-pager and results brief attached.

Appendix — Key Figure



PTA real-anchored preview (NANOGrav amplitude -> Omega_GW).