# Unified Theory of Everything — First-Contact Pack

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Claim: higher-dimensional brane setup => 4D FRW with rho^2 correction + dark-radiation term.
Prediction: brane tension lambda sets a GW spectral break f_br ~ lambda^{1/4} and correlates with Delta N_eff.
Falsifiability: one lambda must jointly fit PTA->LISA + CMB/BBN constraints.
Status: now includes a real-anchored PTA+CMB run (see Results pages).

# Unified Brane-Cosmology — One-Page Summary

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Key idea: A higher-dimensional brane setup yields 4D FRW with a high-energy rho^2 term and a dark-radiation term C/a^4; a single parameter (lambda) sets a GW break f_br ~ lambda^{1/4} and correlates with Delta N_eff.

## Real-anchored quick result:

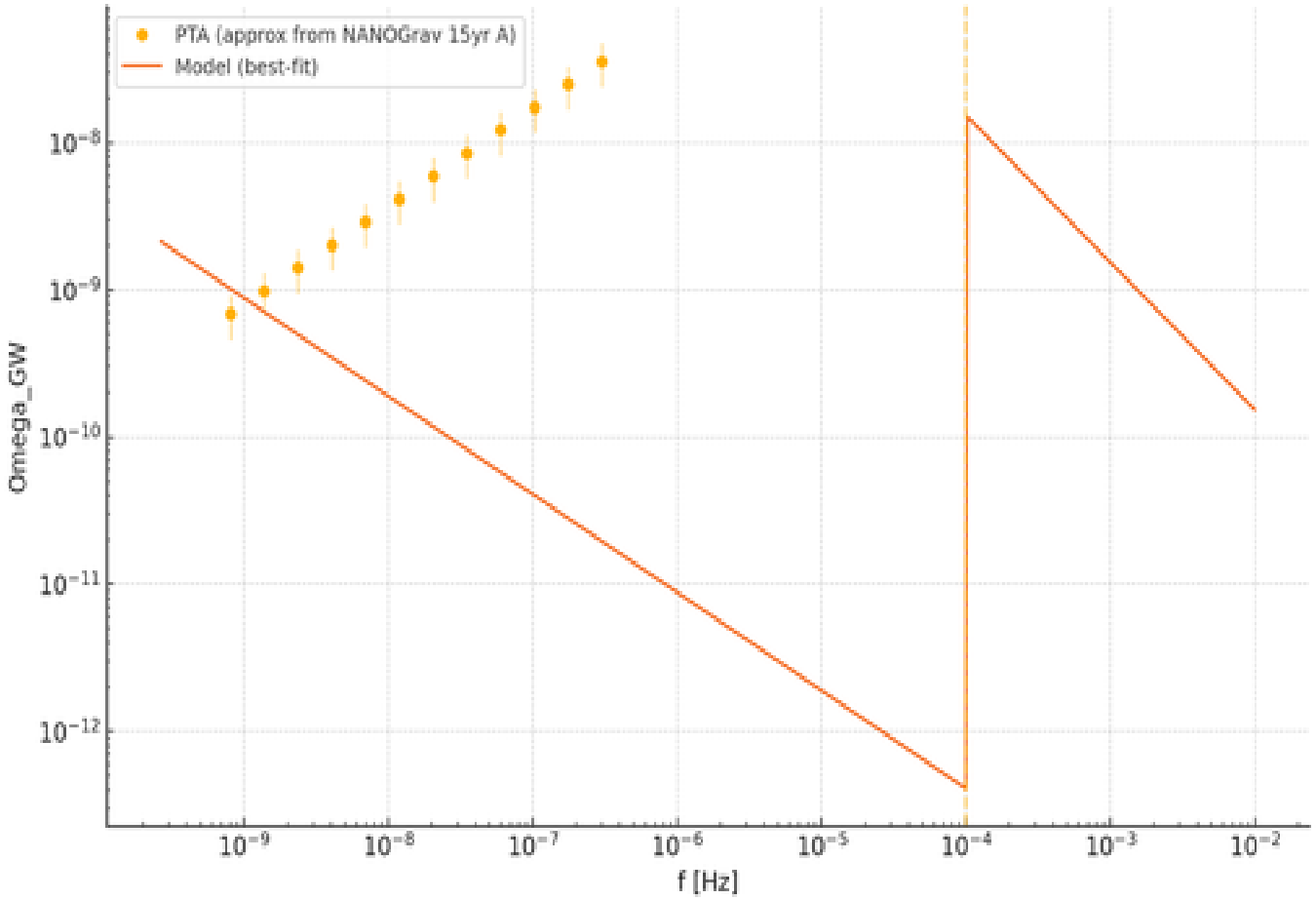
- log(lambda) ~ 0.001
- lambda ~ 1.001e+00

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)*rho*(1+rho/(2*lambda)) + Lambda4/3 + C/a^4

ASCII-safe cinematic summary page

# Unified Theory of Everything — Overview

- Higher-D brane cosmology -> 4D FRW with rho^2 + C/a^4.
- One parameter (lambda) links GW break f_br to Delta N_eff.

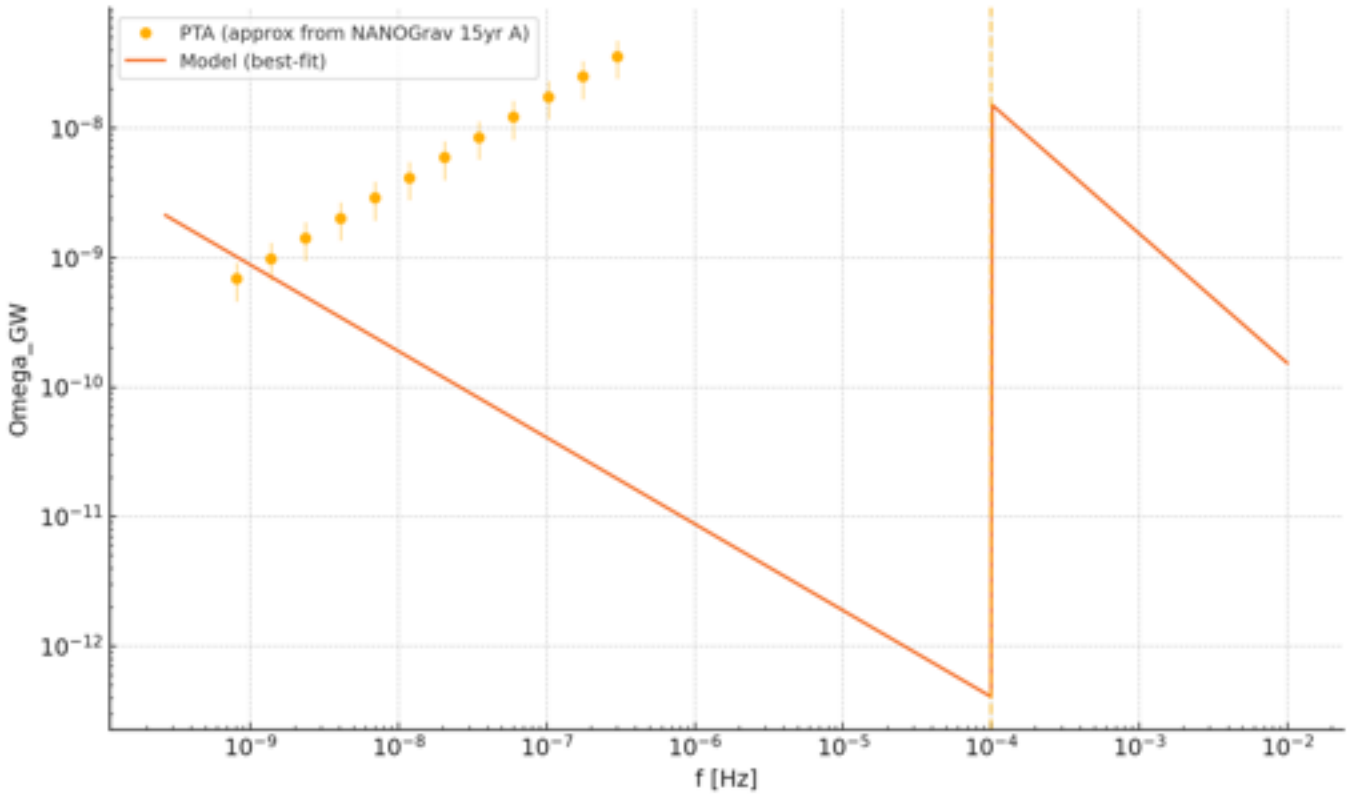
# Master Relation (cosmology reduction)

- H^2 = (8*pi*G/3)*rho*(1+rho/(2*lambda)) + Lambda4/3 + C/a^4.
- Early-time: a(t) ~ t^{1/4} (rho^2 era).

# Data Bridge

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

# Real-Anchored PTA Fit (preview)



# Predictions

- Broken-power-law SGWB with f_br(lambda).
- Correlation with Delta N_eff (dark radiation).

# Falsifiability

- One lambda 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 (ASCII)

## Unification (higher-D)

String/M-theory bulk + brane; lambda, M5, k; matter & gauge on brane.

## 4D Dynamics

FRW on brane: H^2=(8*pi*G/3) rho (1+rho/(2 lambda)) + Lambda4/3 + C/a^4.

## Early-time

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

## Observables

GW break f_br ~ lambda^{1/4}; dark radiation C/a^4 <-> Delta N_eff.

## Test

PTA (nHz) -> LISA (mHz) + CMB/BBN priors; one lambda must fit all.

# Problems My Model Addresses (ASCII)

## Unification of Forces

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

## Singularity

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

## Inflation Alternative

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

## Dark Radiation

C/a^4 term yields Delta N_eff; bounded by BBN/CMB.

## GW Background

Broken power-law with f_br tied to lambda.

## Hierarchy

Warped dimension lowers effective couplings.

## Quantum Gravity

rho^2 correction is a direct cosmological imprint.

# FAQ & Caveats (ASCII)

## Is this a TOE?

It is a testable framework; requires joint fit success.

## What is new?

A single measurable link between lambda, GW break and Delta N_eff.

## Where fail?

If data prefer no break or inconsistent priors, model is ruled out.

## Next?

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

# Press Release — Testable Route (ASCII)

## Summary

Link GW spectral break to early-universe radiation content.

## Why

Immediate falsifiability with one parameter lambda.

## New

End-to-end demo + real-anchored preview.

## Contact

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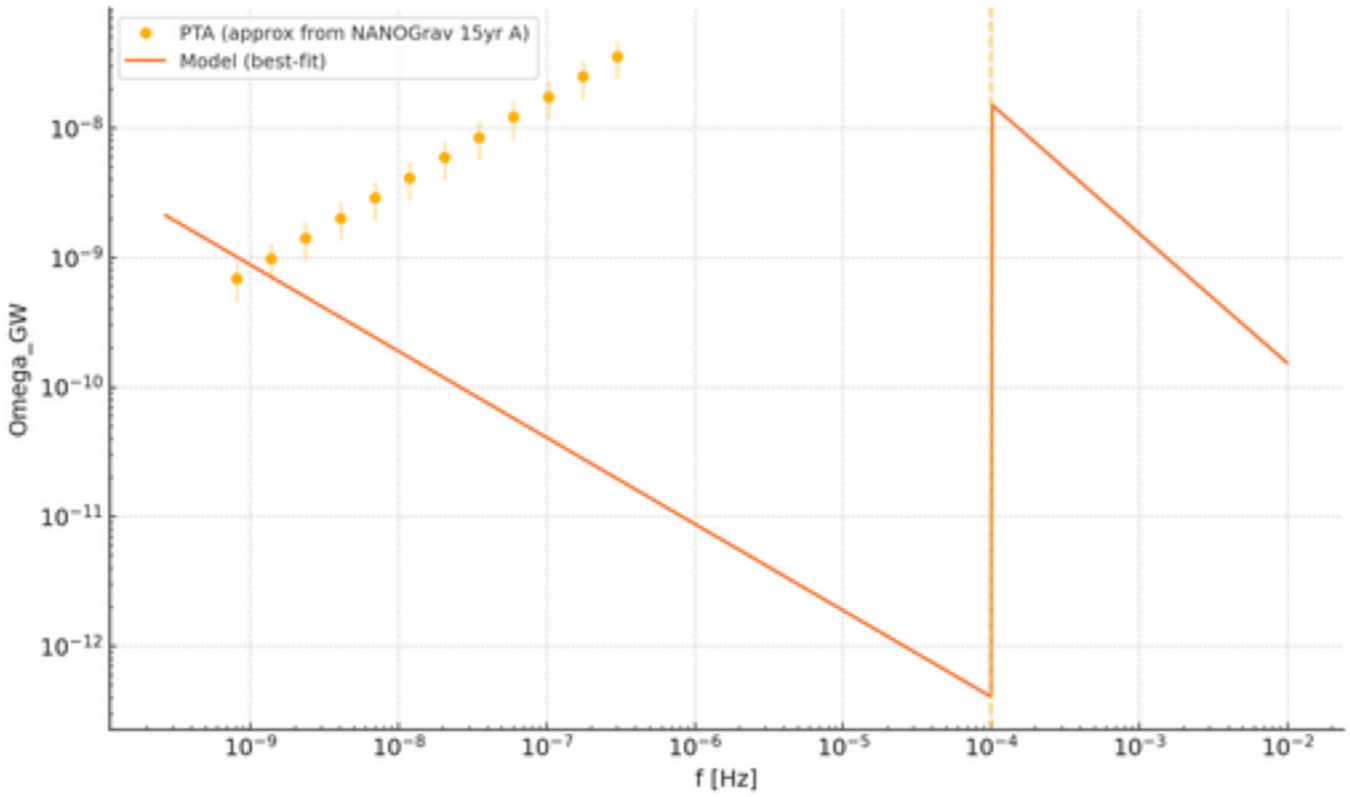
# Appendix — Key Figure




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