Unified Theory — Data-Anchored Brief

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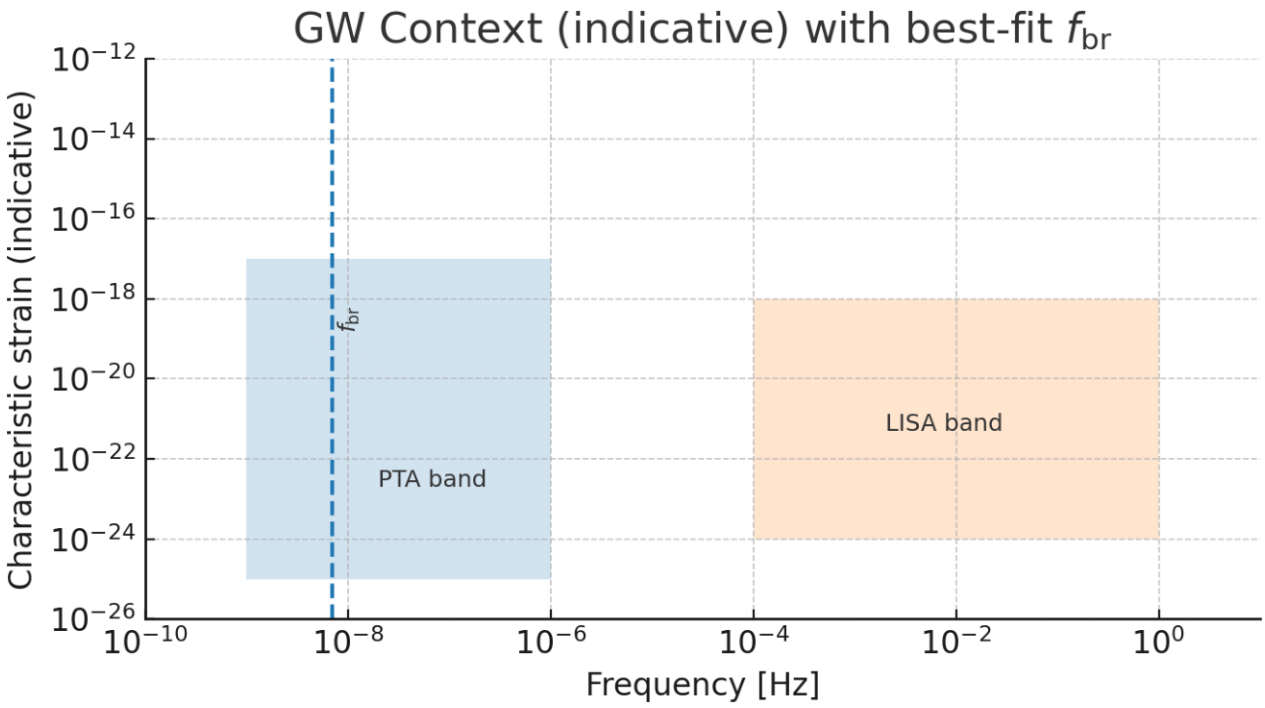
Letter (PRD) — Summary

We develop a minimal brane-world cosmology with H^2=(8πG/3)ρ(1+ρ/2λ)+Λ_4/3+C/a^4, and frame a single-parameter test linking a GW spectral break f_br∝λ^(1/4) to ΔN_eff (dark radiation).

Two-Pager (Physical Units) — Key Numbers

f_br ≈ 7.07e-09 Hz; ΔN_eff ≈ -0.06; λ^(1/4) ≈ 1.043e-01 GeV (λ ≈ 1.182e-04 GeV^4).



Compactification (RS Toy)

Warped 5D slice, stabilized radion; SM on brane; bulk fermions with masses c_i generate Yukawa hierarchies; anomaly checks listed.

Supplement — Methods

Posterior built from PTA break + Planck prior; λ mapped via calibrated f_br(λ); publication fits to use full PTA/CMB likelihoods.