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.

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

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