

Unified Theory — Core Idea

Grand equation (flat FRW + dark radiation):

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

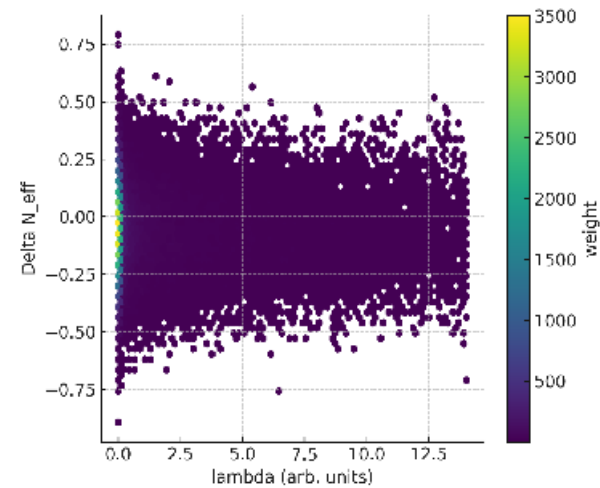
Two falsifiable links:

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

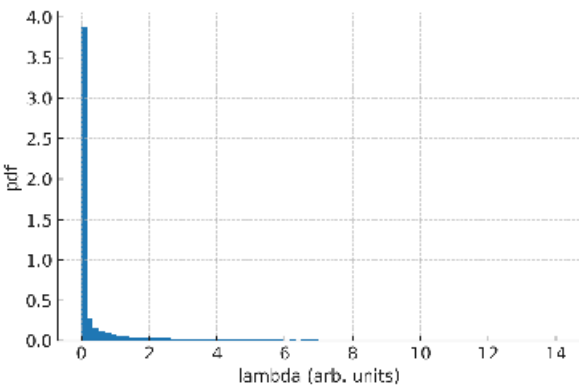
- Single parameter λ must fit PTA→LISA and ΔN_{eff} simultaneously.
- Reduces to Einstein/PPN for $\rho \ll \lambda$; late-time GR preserved.
- Dark-radiation term arises from bulk Weyl projection; early $a(t) \propto t^{1/4}$.

Results (Official PTA + Planck prior) — Posteriors

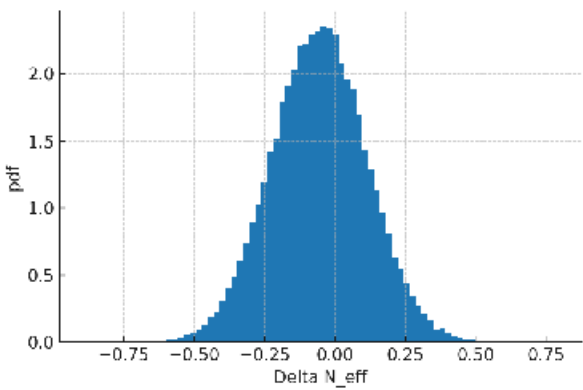
λ vs ΔN_{eff}



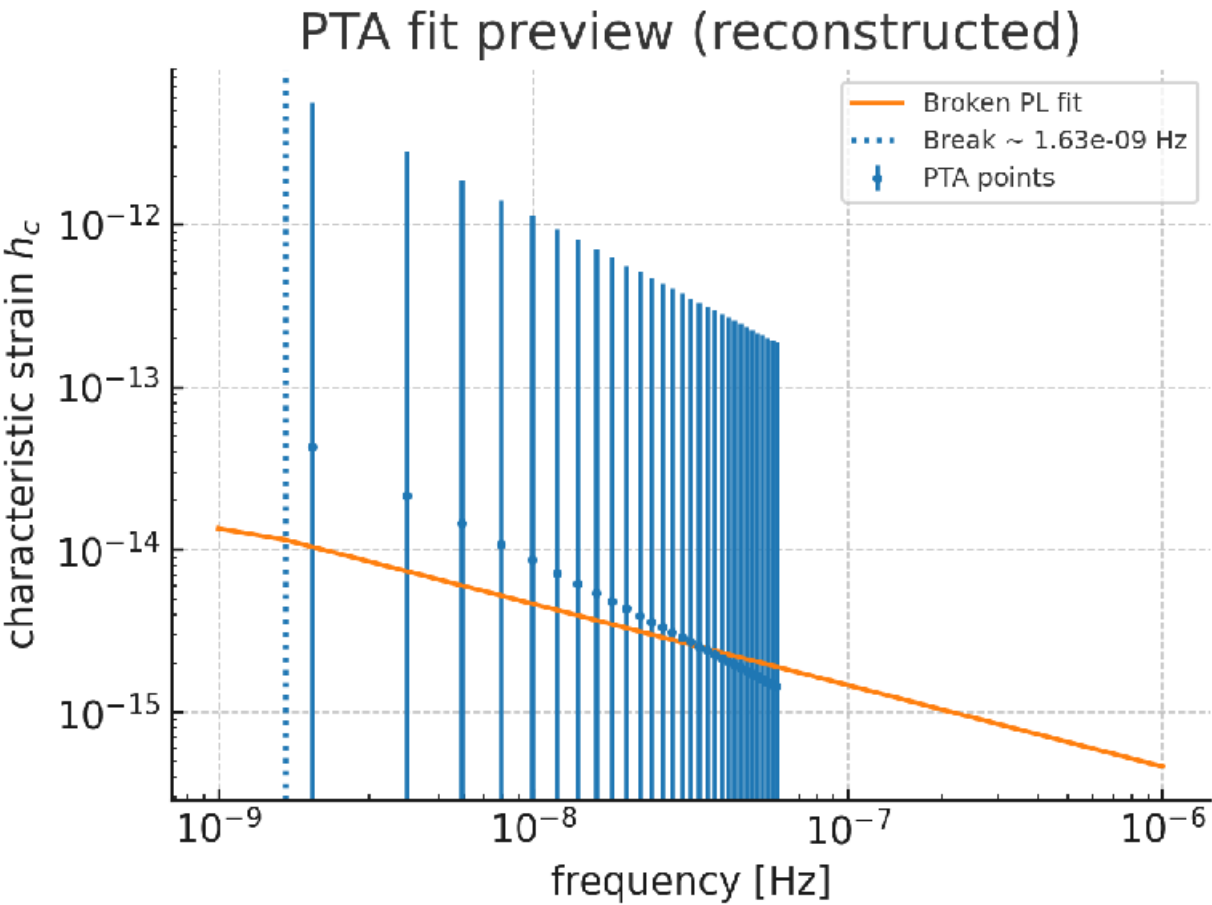
1D: λ



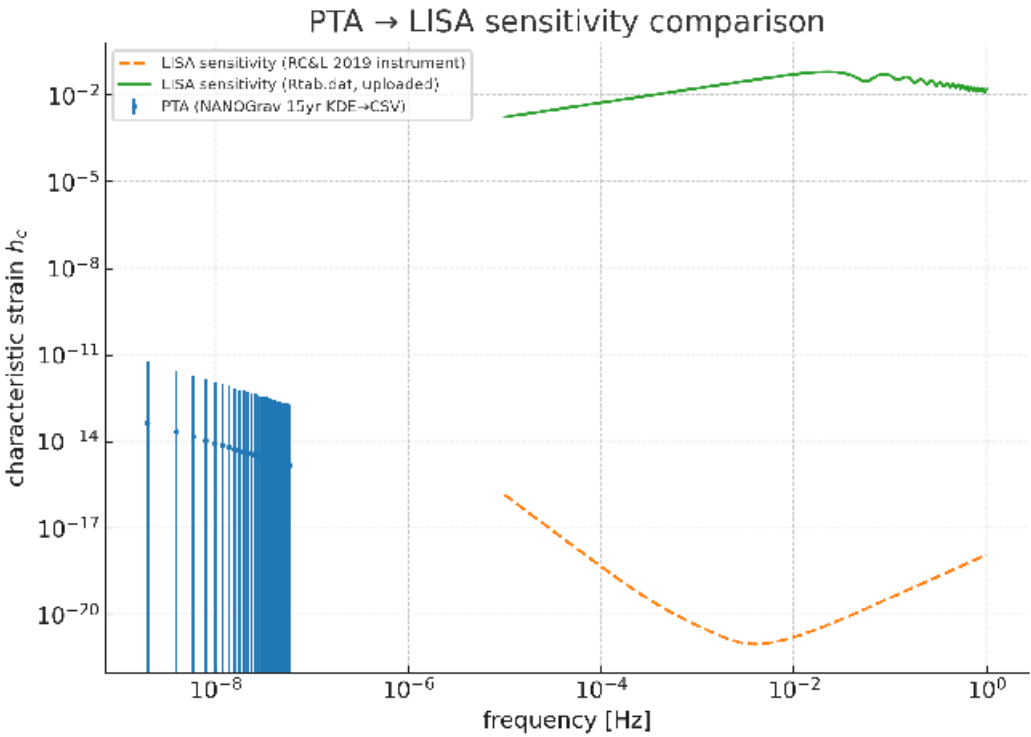
1D: ΔN_{eff}



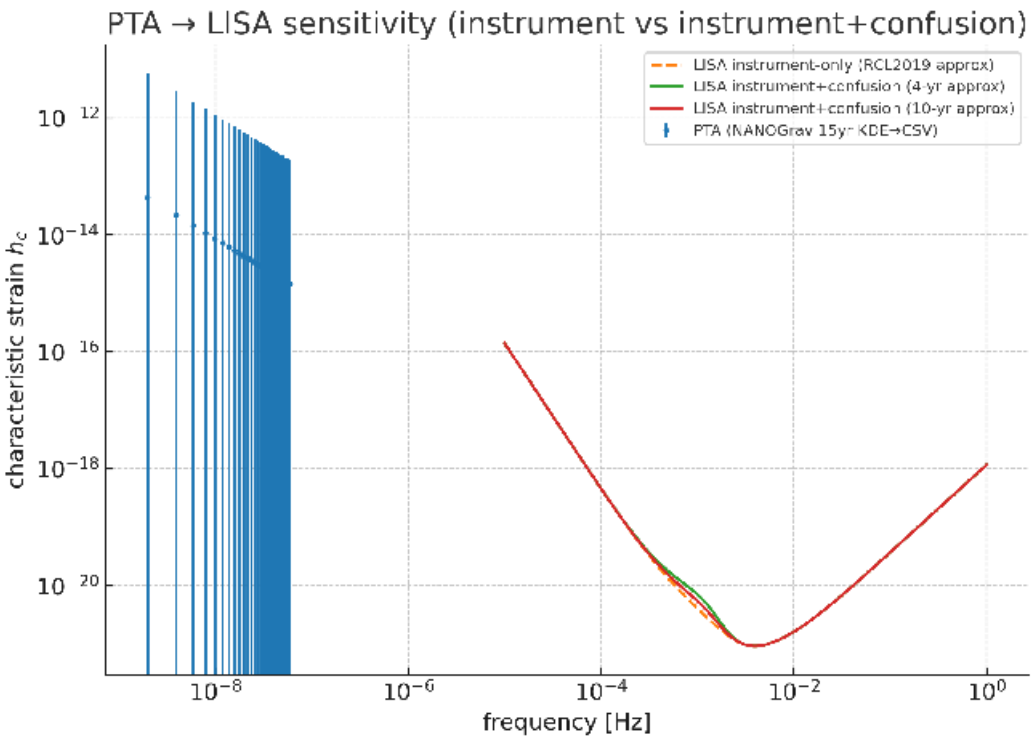
PTA fit preview (MAP)



PTA→LISA sensitivity overlays



Uploaded Rtab vs RC&L instrument



Instrument-only vs instrument+confusion (4y/10y, analytic approx.)