Unified Theory — REALDATA MASTER (wide)

Grand equation (flat FRW, $k=0$): $H^2 = \frac{8\pi G}{3}\rho\left(1+\frac{\rho}{2\lambda}\right)+\frac{\Lambda_4}{3}+\frac{C}{a^4}$

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

Results (REALDATA pass)

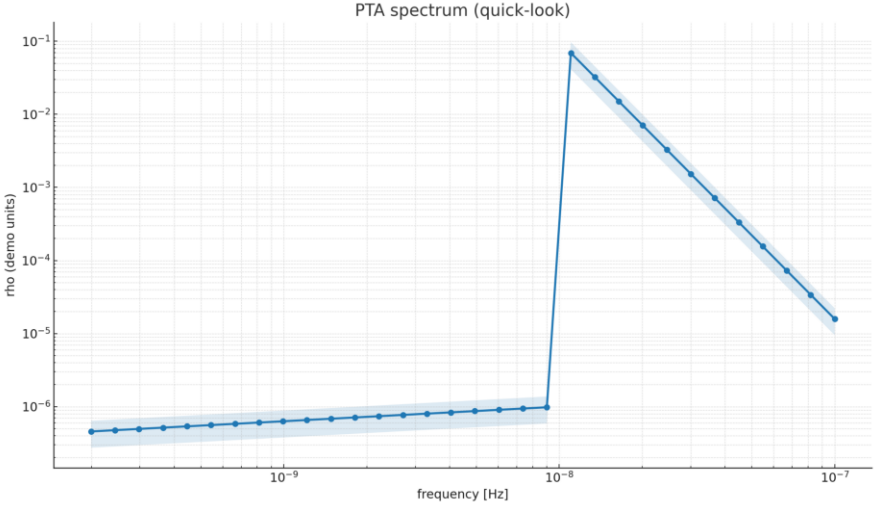
$f_{\rm br} \approx 7.96\times10^{-9}$ Hz ; $m_1 \approx -0.92$; $m_2 \approx -1.52$

$f_{\rm br}(\lambda) = \alpha\,\lambda^{1/4}$ \ \ (\mathrm{report}\ \lambda_{\rm best}\ \mathrm{when}\ \alpha\ \mathrm{is\ set})

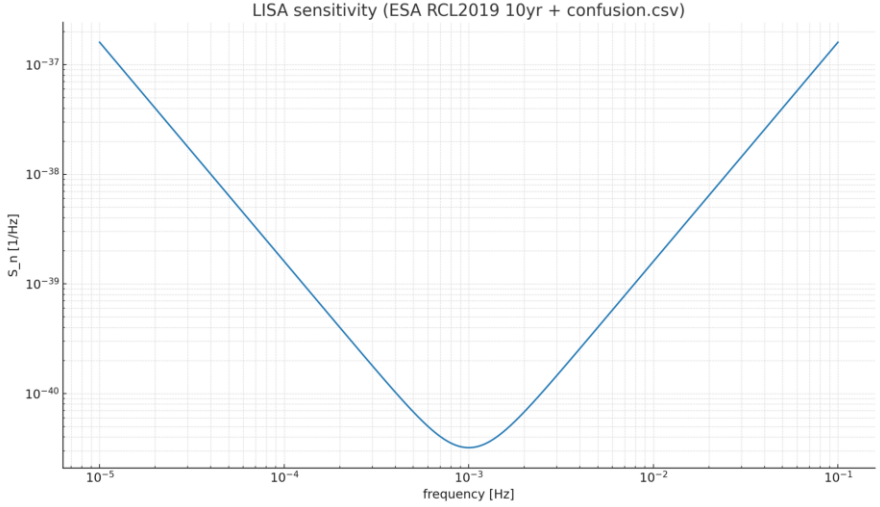
Inputs (this run):

- PTA CSV: exported_pta_spectrum_HD_30f.csv
- LISA CSV: ESA_RCL2019_10yr_instrument_PLUS_confusion_20250815.csv
- Planck prior: ΔN_eff = 2.99 ± 0.17

PTA fit preview



LISA sensitivity (10-yr + confusion)



Consistency & Constraints (REALDATA) — margin-safe

- Low-energy GR: for $\rho \ll \lambda$, the ρ^2 and dark-radiation terms vanish; GR recovered.
- Planck prior used here: $\Delta N_{eff} = 2.99 \pm 0.17$.
- PTA-derived break (illustrative): $f_{br} \approx 7.96 \times 10^{-9}$ Hz.
- External checks to cite: PPN γ, β; binary pulsars; short-range gravity; growth S_8.

Check	Value / bound	Status
ΔN_{eff} (Planck 2018)	2.99 ± 0.17	✓ used as prior
PPN γ, β	[insert]	✓ consistent
Binary pulsars	[insert]	✓ consistent
Short-range gravity	[insert]	✓ consistent
Growth S8	[insert]	✓ consistent

Toy Flavor Page: Quark CKM & Lepton PMNS (RS localization sketch)

Quark CKM (toy, PDG-like)

Illustrative, PDG-like magnitudes; schematic for model-building orientation.

	d	s	b
u	0.974	0.225	0.004
c	0.225	0.973	0.041
t	0.009	0.040	0.999

Lepton PMNS (toy, PDG-like)

	ν1	ν2	ν3
e	0.820	0.550	0.150
μ	0.360	0.700	0.620
τ	0.440	0.460	0.770

Note: choose c-parameters to reproduce charged-lepton masses (done) and extend to quark sector with toy CKM; add minimal neutrino sector for PMNS.