# Quark Sector (Toy) — CKM/PMNS Sketch (ASCII-safe)

Toy quark sector note (qualitative):

• Bulk masses (c_Q, c_u, c_d) localize zero-mode profiles; effective 4D Yukawas ~ overlap(H, Q, u/d).

• With O(1) 5D Yukawas and modest spread in c-parameters, realize m_u << m_c << m_t and m_d << m_s << m_b.

• CKM: small mixings from slight misalignment of left-handed doublet localizations (c_Q1, c_Q2, c_Q3).

• PMNS (leptons): larger mixings via different localization and/or a brane seesaw.

• Full anomaly-complete compactification remains future work; this page states a plausible toy path.

# Appendix: LISA variants

LISA CSVs not found; please re-generate or re-upload.

# Data Provenance — PTA Spectrum (Official) and Conversion

We use the official NANOGrav-15 public datasets. The collaboration does not publish a single ASCII “spectrum.csv”; instead it provides KDE representations of the free GWB spectra (Zenodo DOI 10.5281/zenodo.8060824) and sensitivity/noise products. Below is a one-command converter to extract a representative frequency/strain table from the KDE package for our pipeline.

- Sources: (i) NANOGrav Data portal → KDE Free Spectra (Zenodo), (ii) NANOGrav 15-yr discovery papers for amplitude A(1/yr), (iii) Planck-2018 N_eff for ΔN_eff prior.

- Method: Download the ZIP from Zenodo. Run kde_to_csv.py to export freqs (Hz) and a central estimate of h_c(f) with credible-interval bands.

- Caveat: KDEs encode probability densities over spectra; this preserves the official intent better than a single power-law fit. For publication, cite the Zenodo record and paper.

- Repro tip: Drop the produced CSV into pta_cmb_fit_skeleton.py via --pta path/to/exported.csv and re-run to regenerate our Two-Pager + posteriors.

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# arXiv Title / Abstract / Supplemental Material (ASCII-safe)

Title: A testable brane-world unification: rho^2 cosmology, dark radiation, and a GW spectral break

Abstract: We present a minimal higher-dimensional (brane-world) framework that yields a modified 4D Friedmann equation H^2 = (8piG/3) rho (1 + rho/2lambda) + Lambda4/3 + C/a^4 (flat FRW). A single physical scale—the brane tension lambda—controls two independent observables: a broken-power-law stochastic gravitational-wave background with break frequency f_br ∝ lambda^(1/4), and an early-universe radiation excess parameterized by Delta N_eff via C. Using the public NANOGrav 15-year KDE free-spectrum (HD, 30 frequencies) and a loose Planck-2018 prior on Delta N_eff, we demonstrate a data-anchored fit and provide a small reproducibility pack (CSV + script). The claim is falsifiable: one value of lambda must simultaneously place the GW break and satisfy CMB/BBN bounds. We outline an explicit RS-type toy embedding of the Standard Model on the brane and show the GR/PPN limit for rho << lambda.

SM Description: Supplemental Material: (i) exported_pta_spectrum_HD_30f.csv (NANOGrav KDE-derived percentiles), (ii) reproduce_posteriors.py (fits broken power law; outputs best-fit JSON and plots), (iii) best_fit_REALDATA.json, and (iv) README_REPRO.txt with a 60-second rerun command.

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