Compactification Options — RS (AdS_5) and Calabi–Yau (string)

Option A — Randall–Sundrum (warped AdS_5):

Pros: Natural hierarchies via localization; simple $\lambda \leftrightarrow f_{br}$ mapping; clear late-time GR limit; radion can be stabilized (Goldberger–Wise). Cons: Requires care with flavor constraints and radion/Kaluza–Klein spectra; need explicit gauge embedding and brane terms.

Option B — String/M-theory (Calabi–Yau or G_2 compactifications):

Pros: UV-complete candidate; gauge groups and chiral spectra arise from geometry/fluxes; moduli stabilization frameworks exist. Cons: Model space is vast; concrete cosmology and λ mapping are compactification-dependent; computationally heavy.

Working choice for paper:

Adopt Option A (RS) for explicit equations/phenomenology; include Option B as outlook. Provide toy c-parameter tables (leptons, quarks) and stabilization note; keep cosmology tests (PTA/CMB/BBN) compactification-agnostic at leading order.

Prepared: Aug 12, 2025 (UTC)