

Unified Theory — Technical Appendices

SMS equation • FRW reduction • PPN consistency • Toy mass table

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Effective 4D field equation on the brane (SMS form)

$$G_{\mu\nu} + \Lambda_4 g_{\mu\nu} = \frac{8\pi G}{c^4} T_{\mu\nu} + \frac{\kappa_5^4}{c^4} \Pi_{\mu\nu} - E_{\mu\nu}$$

$\Pi_{\mu\nu}$ encodes high-energy (ρ^2) corrections; $E_{\mu\nu}$ is the projected bulk Weyl tensor (dark radiation).

Einstein gravity limit (late-time consistency)

- In the low-energy regime $\rho \ll \lambda$, the ρ^2 and $E_{\mu\nu}$ terms are negligible.
- Post-Newtonian parameters reduce to GR values (PPN $\gamma = \beta = 1$ within existing bounds).
- Binary pulsars: deviations are below current timing sensitivities for λ above cosmological scale.
- Hence late-time gravity and Solar-System tests are automatically preserved.

Toy RS c-parameter table (order-of-magnitude lepton masses)

Lepton	c_L	c_R	m_target (MeV)
e	0.62	0.68	0.51
mu	0.60	0.54	105.66
tau	0.58	0.50	1776.86

These are illustrative c-values showing how exponential profiles can span observed mass scales.

A proper fit would include the full Higgs vev normalization and bulk mass sign conventions.