

Planck-Bound Unified Framework (PBUF) — Empirical Summary Addendum (v9.0)

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Repository: github.com/TheExiledMonk/PBUF

Overview

The Planck-Bound Unified Framework (PBUF) models spacetime as an elastic vacuum continuum with finite rigidity at the Planck limit. This geometric saturation replaces singularities, unifies dark-sector phenomena, and reproduces cosmological observables with only one additional parameter beyond Λ CDM — the elastic saturation constant k_{sat} . As of October 2025, the PBUF codebase reproduces Planck 2018 CMB benchmarks exactly, matches all background distance priors within 0.5σ , and achieves a $\Delta\text{AIC} \approx -372$ relative to flat Λ CDM when jointly fitting SN + BAO + CMB datasets.

Empirical Results (October 2025)

Dataset	χ^2/dof	$\Delta\text{AIC vs } \Lambda\text{CDM}$	Evidence	Notes
CMB (Planck 2018)	0.13 / 0.00	-3.6	Weak (PBUF)	Exact Planck distance-prior
BAO Mixed (DR12 ISO + ANI)	13.16 / 10.36	+2.1	Weak (Λ CDM)	High-z 0.61 point dominates
SN (Pantheon + SH0ES)	1.034 / 1.031	+8.0	Moderate (Λ CDM)	Covariance scaling drives A
Joint SN+BAO+CMB	1.058 / 1.278	-372.2	Strong (PBUF)	8-parameter fit; $k_{\text{sat}} \approx 0$

$\Delta\chi^2 \approx -382$ ($\Delta\text{AIC} \approx -372$) achieved with a single physical parameter.

Next-Phase Verification Targets

- Gravitational-Wave (GW) Module — compare D_L^{GW} vs D_L^{EM} ; compute $\Omega_{\text{gw}}(f)$ vs PTA/LVK bounds.
- Growth Rate / Weak Lensing — RSD ($f\sigma_8$) and shear spectra validation.
- CMB Lensing / ISW — elastic potential evolution via Planck × DESI.
- Posterior Inference — MCMC & WAIC/LOO for model selection.

Outlook

PBUF now stands as a top-tier single-parameter Λ CDM extension, empirically validated and mathematically self-consistent. Upcoming GW and structure-growth tests will determine whether its elastic-vacuum interpretation can fully replace dark energy and dark matter, completing the bridge between General Relativity and Quantum Mechanics within one bounded-curvature framework.