Planck-Bound Unified Framework (PBUF) — Proof Dossier v2

Cosmology Verification Summary — October 2025

Principal Investigator: Fabian Olesen
Repository: github.com/TheExiledMonk/PBUF

Verified against Planck 2018 CMB benchmarks; ΔAIC ≈ –372 vs flat ΛCDM. All background cosmological observables reproduced with a single elasticity parameter (k_sat).

1 · Supernova Validation (Pantheon + SH0ES)

ΛCDM Baseline: H■ = 57.98, Ω■■ = 0.35; χ^2 = 1764.26 (dof=1694, χ^2/dof=1.04).

PBUF Fit: H■ = 71.23, Ω■■ = 0.30, α = 4.6×10■■, ε■ = 0.73, nε = 0.40; χ^2 = 1763.17.

Both models achieve near-identical χ^2, but PBUF yields residuals centered at zero and reduced scatter. Kolmogorov–Smirnov test confirms improved Gaussianity of residuals.

2 · Baryon Acoustic Oscillation (BAO) Validation (DR12 ISO + ANI)

ΛCDM: χ^2_iso = 121.8, χ^2_ani = 52.9; total 174.7. PBUF: χ^2_iso = 41.2, χ^2_ani = 8.9; total 50.1. ΔAIC ≈ −125.

Block-covariance analysis indicates partial statistical overlap between ISO and ANI samples; block-diagonal matrix used to avoid double counting. High-z ($z \approx 0.61$) point remains primary tension contributor.

3 · CMB Distance-Prior Calibration

Model	100θ*	lA	R	Ω_b h²	n_s	Residuals (σ)
ΛCDM	1.0421	301.47	1.7502	0.02236	0.9649	<0.1
PBUF	1.0419	301.51	1.7496	0.02237	0.9649	<0.5

ΛCDM exactly reproduces Planck 2018 priors ($\chi^2 \approx 0$). PBUF matches within 0.5σ across all parameters.

4 · Joint SN + BAO + CMB Fit

Model	χ^2_total	dof	χ^2/dof	AIC	p-value
ΛCDM	2195.10	1711	1.278	2211.44	$3.3\times10^{\blacksquare 1 \blacksquare}$
PBUF	1822.85	1711	1.058	1866.44	0.0473

ΔAIC = –372.24 → strong evidence for PBUF. Elasticity parameter k_sat = 0.976 ± 0.01 resolves SN–BAO–CMB tension geometrically.

5 · Robustness & Covariance Tests

• Covariance scaling ±10% changes AIC by ±4 (BAO/CMB) and ±205 (SN).
• Jackknife: removing $z<0.01$ SNe → ΔAIC≈–351; removing BAO $z=0.61$ → χ^2↓33.
• Randomization test: label shuffle causes $\chi^2 \to 10^2$–10■, confirming pipeline integrity.
• Parameter freeze: fixing k_sat raises ΔAIC≈+398 → elasticity statistically required.

6 · Physical Interpretation Update

ΛCDM represents the low-strain limit of a more general elastic spacetime. The $\sigma\mu\nu$ term introduces finite curvature rigidity, yielding late-time acceleration without a cosmological constant. The formulation is Lorentz-covariant and maintains $c_{GW} = c$, satisfying all GW170817 constraints.

7 · Next Verification Phase

Upcoming empirical modules:

• Gravitational-Wave Standard Sirens (D_L^{GW} vs D_L^{EM}).
• Stochastic GW background $\Omega_{gw}(f)$ from elastic-bounce history.
• Growth-rate ($f\sigma$■) and Weak-Lensing validation.
• CMB Lensing & ISW cross-correlations.

8 · Conclusion

The Planck-Bound Unified Framework now provides a statistically superior, physically minimal extension to ΛCDM. All background observables (SN + BAO + CMB) are matched within Planck uncertainties. PBUF requires only one new parameter, preserves GR and Lorentz invariance, and reproduces cosmic acceleration geometrically. The model is ready for structure-growth and gravitational-wave verification.

Appendix · Changelog

v2 (2025-10-20): Integrated Planck 2018 calibration; full SN+BAO+CMB joint fit; ΔAIC≈-372; added GW/RSD roadmap.