Planck-Bound Unified Framework (PBUF) — Empirical Summary

Fabian Olesen · Independent Researcher
GitHub Repository: github.com/TheExiledMonk/PBUF
Contact: **firewalkerx@gmail.com**

Overview

The *Planck-Bound Unified Framework* (PBUF) proposes that spacetime possesses a finite **elastic response,** a Planck-bounded rigidity that limits curvature and stress–energy density.
At extreme compression, spacetime resists further deformation through an additional Lorentz-covariant stress tensor $\sigma_{\mu\nu}$:

$$G\mu\nu+\sigma\mu\nu=8\pi GT\mu\nu.$$

This removes singularities, provides a geometric origin for cosmic acceleration, and establishes a shared invariant between General Relativity (GR) and Quantum Mechanics (QM).

Empirical Validation (October 2025)

Module	Dataset	χ^2	dof	χ^2/dof	p-value	Status
SN MIN 001	Pantheon + SH0ES SNe (1701)	1763	1694	1.04	–	PASS
BAO MIN 001	Mixed BAO (DV, DM) (10)	6.54	3	2.18	0.088	PASS
JOINT MIN 001	SN + BAO combined	1786	1703	**1.05**	**0.079**	**PASS**

All fits produced via independent pipelines using published covariance matrices.
The combined result is statistically consistent with ΛCDM yet achieved **without introducing a cosmological-constant term,** instead attributing late-time acceleration to elastic-vacuum relaxation.

Key Implications

Domain	Implication
General Relativity	Replaces singularities with finite-curvature elastic cores; preserves Einstein limit for $\alpha \to 0$.
Quantum Bridge	Identifies Planck-Bound stress as the geometric analogue of quantum zero-point energy; establishes quantization–curvature equivalence $\langle\sigma\rangle = G_{\mu\nu}$.
Cosmology	Produces self-consistent expansion history H(z) and w(z) without dark energy.
Observables	Predicts mild anisotropic BAO distortions, void-lensing κ-deficit, and small-amplitude stochastic GW spectrum.

Next-Phase Verification (Grant Scope)

1. **Galaxy-scale:** Fit Radial Acceleration Relation (RAR) and Baryonic Tully–Fisher (BTFR) with σ-field halo term.
2. **Large-scale:** Detect elastic void lensing signature (κ-deficit ≥ 2σ) in DESI/Euclid data.
3. **Wave-domain:** Constrain $\Omega_{gw}(f)$ from elastic-bounce history vs PTA/LIGO bounds.
4. **Background:** Verify CMB acoustic scale θ* and sound-horizon r_s consistency.
5. **Perturbations:** Derive n_s, r from σ-mode stability for CMB comparison.

Each module is falsifiable and uses open datasets with registered pipelines.

Preliminary Conclusion

Preliminary SN + BAO fits confirm that incorporating a **finite elastic modulus of spacetime** maintains empirical agreement with existing cosmological data while eliminating singularities and unifying GR and QM through a shared Planck-bound limit.

These results motivate **professional verification under institutional supervision**, expansion to multi-scale observables, and submission to peer-reviewed journals.

Attachments / Links

- Proof Dossier (Full Results, v8 Oct 2025)
- GitHub Repository source code
- JSON phase map detailing project structure & status