Evolving Dark Energy Signatures as a Conformal Modeling Artifact of Torus-Knot Lattice Eversion

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Audited Status (§0bn1077, §0bn1078): In CPT, the vacuum has strictly zero dark energy: $\Lambda = 0$. Apparent acceleration and DESI evolving dark energy signatures (w_0, w_a) are non-FLRW geometric and template-fitting artifacts. Free acceleration from Weber is closed (`SFH-W`, `PASS_HB_CENSUS_FIRE_FREE_ACCEL_STILL`). Galactic constitutive gravity is completely decoupled (`PASS_FT_DE_NO_MATCH_RAR_DECOUPLED`). Live status: cpt-physics.com/status.

Abstract

Recent observations from the Dark Energy Spectroscopic Instrument (DESI) favor a time-varying dark energy equation of state ($w_0 > -1$, $w_a < 0$) over a constant cosmological constant ($\Lambda = -1$). We demonstrate that dynamic dark energy is an artifact of forcing non-FLRW propagation into the standard General Relativity (GR) Friedmann template. In our framework, the cosmological constant is zero ($\Lambda = 0$). We examine the mathematical inversion through the Friedmann equation and show how apparent dark energy dynamics arise as an artifact of cosmological template fitting.

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1. The Dynamic Dark Energy Puzzle (DESI 2024)

Standard cosmology (ΛCDM) models dark energy as a constant energy density of the vacuum (the cosmological constant Λ), corresponding to a flat equation of state $w(z) = -1$. The DESI 2024 first-year baryon acoustic oscillation (BAO) data, combined with Type Ia supernovae (SNIa) datasets, favor a dynamic model parameterized by: $$w(z) = w_0 + w_a \frac{z}{1+z}$$ where $w_0 \approx -0.9$ and $w_a \approx -0.3$. This suggests that dark energy is thinning out or evolving over cosmic time, presenting a severe theoretical challenge for standard quantum field theories.

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2. Inviolable Zero Vacuum Fluid ($\Lambda = 0$)

In the CPT framework, the physical vacuum contains no dark energy fluid: $\Lambda = 0$. Galactic constitutive gravity (AQUAL / SPARC / RAR) does not ingest Ω_Λ or q_0.

An early hypothesis considered whether velocity-dependent Weber potential corrections could dynamically alter expansion acceleration. A formal audit in `SFH-W` and §0bn1078 proved that the causal Green–Weber ball yields $q_{\text{sc}} = +0.081$ (still decelerating), and even under isotropic pressure yields coasting ($q=0$), not cosmic acceleration ($q_0 < 0$). Exit code `PASS_HB_CENSUS_FIRE_FREE_ACCEL_STILL` stands: Weber gravity is an established electrodynamic effect, not a driver of cosmic acceleration.

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3. Mathematical Inversion of the Friedmann Template

When cosmologists analyze distance datasets, they fit the observed luminosity distance $d_L(z)$ using the standard GR Friedmann template: $$H^2(z) = H_0^2 \left[\Omega_m (1+z)^3 + \Omega_{DE} \exp\left(3 \int_0^z \frac{1+w(z')}{1+z'} dz'\right) \right]$$

If an observer fits a linear or conformal propagation profile $H(z) = H_0(1+z)$ into this template: $$(1+z)^2 = \Omega_m (1+z)^3 + (1-\Omega_m) \exp\left(3 \int_0^z \frac{1+w(z')}{1+z'} dz'\right)$$

Differentiating both sides with respect to z directly solves for the effective equation of state: $$w(z) = \frac{-1}{3 \left[1 - \Omega_m (1+z)\right]}$$

Taylor-expanding around $z=0$ in the Chevallier–Polarski–Linder (CPL) parameterization: $$w_0 = \frac{-1}{3(1-\Omega_m)}, \quad w_a = \frac{-\Omega_m}{3(1-\Omega_m)^2}$$

As audited in §0bn1078: * At baryonic density $\Omega_m = 0.049$: $w_0 \approx -0.3505, w_a \approx -0.0181$. * At apparent matter density $\Omega_m = 0.30$: $w_0 \approx -0.4762, w_a \approx -0.2041$. * To reach $w_0 = -0.912$ requires $\Omega_m = 0.635$, which forces $w_a = -1.583$.

The apparent “dark energy dynamics” detected by DESI are the mathematical signature of forcing non-accelerating propagation into an FLRW Friedmann curve. CPT rejects the dark energy fluid entirely, treating the residual observational discrepancies as open frontiers rather than invoking unobserved vacuum energy.

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4. Falsifiable Predictions

1. **Lower Fit χ^2:** Fitting the eversion expansion profile $H(z) = H_0 (1+z)$ directly to the combined Pantheon+ SNIa and DESI BAO datasets will yield a lower overall χ^2 value than either the standard flat ΛCDM model or the 8-parameter $w_0 w_a$ parameterization, with zero free parameters for the dark energy sector.

2. **No Late-Time Acceleration Boundary:** At very high redshifts ($z > 10$), the effective deceleration parameter $q(z) = -\ddot{a} a / \dot{a}^2$ asymptotically approaches a constant flat expansion rate ($q \approx 0$), preventing the standard cosmic “rip” or perpetual acceleration collapse predicted by standard dark energy models.