Title: Rethinking Dark Energy: A Dynamic Radial Recoil Model for Cosmic Expansion

Abstract: The concept of dark energy was introduced to explain the unexpected accelerated expansion of the universe observed in distant supernovae. However, this interpretation relies on a cosmological constant (Λ) that lacks a concrete physical mechanism and introduces profound theoretical issues. In this paper, we review the historical and observational background of dark energy, present foundational criticisms of the standard model, and propose a physically motivated alternative: a radial recoil model based on sequential energy releases from a central neutron core. We demonstrate that this model explains key cosmological observations without invoking a mysterious force, and further show that it aligns with the structure of our solar system.

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1. Introduction: The Rise of Dark Energy In 1998, observations of Type Ia supernovae revealed that the universe's expansion is accelerating. To account for this, physicists reintroduced a term originally proposed and later rejected by Einstein: the cosmological constant (Λ). This term functions as a repulsive force in the Friedmann equations:

$$\ddot{a}(t) = -\frac{4\pi G}{3}(\rho + \frac{3p}{c^2})a(t) + \frac{\Lambda}{3}a(t)$$

Here, Λ serves as a placeholder for dark energy, which is estimated to constitute nearly 70% of the energy content of the universe.

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2. The Problems with Dark Energy

- **No Physical Basis**: Λ is not derived from known physics. It is inserted to fit the data.
- **Fine-Tuning Problem**: The observed value of Λ is over 120 orders of magnitude smaller than what quantum field theory predicts.
- **Coincidence Problem**: Why does dark energy dominate precisely now, and not earlier or later in the universe's history?
- **Einstein's Regret**: Einstein referred to his introduction of Λ as his "greatest blunder," as it was originally intended to counteract gravity to achieve a static universe.
- **Philosophical Discomfort**: Many physicists view dark energy as an ad hoc fix rather than a robust explanation.

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3. An Alternative: The Radial Recoil Model

We propose a different mechanism based on a physically intuitive process:

> The universe began as a highly dense neutron core. Instead of a singular explosive bang, this core underwent a staged disintegration, releasing successive concentric shells of matter. Each release generated a powerful radial recoil (explosive pressure), which imparted real acceleration to the previously released layers.

This model introduces a dynamic, time-dependent acceleration function $D(t)$ to the Friedmann equation:

$$\ddot{a}(t) = -\frac{4\pi G}{3}(\rho + \frac{3p}{c^2})a(t) + D(t) \cdot a(t)$$

Where $D(t)$ is not a constant but a cumulative effect of discrete energy releases over cosmic time.

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4. Application to the Solar System

When applying this model to the solar system, we observe a striking match:

- Outer planets (e.g., Saturn, Jupiter) formed early and received fewer recoil impulses.
- Inner planets (e.g., Earth, Venus, Mercury) formed later and were successively accelerated outward by each subsequent energy release.
- The current distances of the planets from the Sun match a decay pattern proportional to $1/N$, where N is the number of explosive events after their formation.

This provides a natural explanation for the spacing of planets without requiring arbitrary initial velocities or post-formation migrations.

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5. Conclusion

Dark energy may not be a fundamental force or field, but rather a misinterpretation of a real dynamical process: the cumulative outward pressure from a sequence of nuclear-scale releases originating in a dense primordial core. This perspective removes the need for Λ , aligns with observations, and invites a deeper reconsideration of cosmological dynamics grounded in known physics.

Future work will explore quantitative modeling of $D(t)$, implications for galaxy-scale structures, and potential observables to distinguish this model from the standard cosmological constant paradigm.