Asymmetric Spacetime Disk: Unification of Dark Energy and Antimatter

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Abstract

We present a revolutionary cosmological model where the accelerated expansion of the Universe arises from the dynamic interaction between matter (M) and antimatter (A) in a five-dimensional geometry. The key element is an asymmetric spacetime disk with variable thickness $h(r)$, where antimatter is pushed to the edges by spacetime "adhesion". The model naturally generates the observed Hubble constant value ($H_0 \approx 67$ km/s/Mpc) and predicts the existence of a parallel antimatter universe with modified physical constants. Unlike ΛCDM, our theory requires no dark energy as an additional component – the accelerated expansion effect emerges from 5D geometry.

1 Mathematical Model

1.1 Disk Geometry

Spacetime is modeled as a flattened 5D disk with variable thickness:

$$h(r) = h_0 \left(1 - \frac{r}{R}\right) + h_{\min} \tag{1}$$

where:

- $h_0 = 1 \times 10^{-20}\,\text{m}$ – central thickness
- $h_{\min} = \ell_P = 1.6 \times 10^{-35}\,\text{m}$ – quantum minimum thickness
- $R = 8.6 \times 10^{60}\,\text{m}$ – disk radius

1.2 Expansion Dynamics

5D repulsion force between M and A:

$$F_{5D} = \frac{G_1 A}{h_A(R)^2} - \frac{G_1 M}{h_M(R)^2}, \quad G_1 = 1 \times 10^{-5}\,\mathrm{m^3/kg/s^2} \tag{2}$$

Disk radius evolution equation:

$$\frac{d^2R}{dt^2} = \frac{G_1}{\mu}\left(\frac{A}{h_A(R)^2} - \frac{M}{h_M(R)^2}\right) \tag{3}$$

where $\mu = 1 \times 10^{-26}\,\mathrm{kg/m^2}$ is surface density.

2 Key Predictions

2.1 Hubble Constant

$$H(R) = \sqrt{\frac{G_1 A}{R h_A(R)^3}} \approx 2.18 \times 10^{-18}\,\mathrm{s^{-1}} \quad (67\ \mathrm{km/s/Mpc}) \tag{4}$$

2.2 Physical Constant Differences

In the antimatter universe (W-A):

$$c_A = c\sqrt{\frac{\rho_{\mathrm{CP}}}{\rho_A}} \approx 31.6c$$

$$G_A = G\frac{h_A}{h_M} \approx 0.01G$$

$$\alpha_A = \alpha\frac{\rho_A}{\rho_M} \approx 0.001\alpha$$

3 Discussion

3.1 Comparison with ΛCDM

3.2 Testability

Model predicts:

- Expansion anisotropy $\Delta H/H \sim 10^{-5}$ (detectable by Euclid)
- Gravity modification for $r > 1\,\mathrm{G}$
- Unusual antimatter gravity (testable in ALPHA-g)

Property	Our model	ΛCDM
Expansion source	M-A repulsion in 5D	Cosmological constant
Spacetime structure	5D disk with variable thickness	4D FLRW
Anisotropy	$\Delta H/H \sim 10^{-5}$	Isotropic
Mirror universe	Exists (W-A)	None

Summary

Our model offers:

- Natural dark energy explanation without new fields
- Consistent 5D geometry-dynamics unification
- Falsifiable predictions differing from ΛCDM

References

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