# Absolute Theory Passes High-Precision Tests in Triple System and Binary Pulsars: The End of Dark Matter and Dark Energy?

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**Abstract**

General relativity and the ΛCDM model face problems such as dark matter, dark energy, and Hubble tension when explaining cosmological observations. Within the framework of Absolute Theory (Xin, 2026, *Physics Essays*, manuscript ID PHES-26120, under review), this paper reinterprets gravity as the discrete cumulative effect of light wavelength stretching in absolute space, with the core recurrence formula:

$$\lambda_{n+1} = \lambda_n \left(1 + \frac{g_n \lambda_n \cos\theta_n}{c^2}\right).$$

We apply this discrete dynamical model for the first time to three high-precision astrophysical systems: the triple pulsar system PSR J0337+1715 (2007–2020 timing data), and the binary pulsar systems PSR B1913+16 (1975–2006) and PSR J0737-3039 (2003–2006). Numerical simulations show that the arrival-time residuals of the Absolute Theory model are significantly better than those of general relativity (improvement 5%–7.8%, $\Delta\text{BIC} = 4.1$), and do not rely on dark matter, dark energy, or space-expansion assumptions. This result provides strong quantitative verification for Absolute Theory and indicates a possible paradigm shift in physics that may end the concepts of dark matter and dark energy.

**Keywords**: Absolute Theory; triple system; binary pulsar; discrete wavelength stretching; dark matter; dark energy; test of general relativity

## 1 Introduction

Since the birth of general relativity (GR), it has successfully explained classical phenomena such as Mercury precession, light deflection, and gravitational redshift. However, GR and the ΛCDM standard cosmological model have to introduce dark matter and dark energy—two components never directly detected—to explain galaxy rotation curves, cosmic microwave background (CMB), and supernova redshift–distance relations. In addition, a significant $5\sigma$ discrepancy exists between the early- and late-universe Hubble constant (Hubble tension), implying that the current theory may be incomplete.

Absolute Theory starts from a different postulate: light propagates at a constant speed continuously in absolute space, and redshift arises from wavelength stretching during propagation rather than space expansion. In a previous work, the author derived the differential equation for wavelength stretching from radiation-pressure experiments and obtained the redshift formula $1+z = \exp(\bar{g}D/c^2)$, which agrees with GR in the weak-field limit but requires no dark energy.

However, the original paper uses continuous calculus, which easily confuses "instantaneous acceleration" and "path-averaged acceleration". This paper discretely reconstructs Absolute Theory, treating light propagation as a recursive process of wavelength steps $\lambda_n$. The core equation becomes Eq. (1), where $g_n$ is the local instantaneous gravitational acceleration, $\theta_n$ is the angle between light propagation and gravity, and $c$ is the speed of light. This discrete form strictly separates instantaneous and average quantities and avoids conceptual ambiguity in the continuous model.

We apply this discrete dynamical model to three high-precision relativistic test systems:

- Triple system PSR J0337+1715 (millisecond pulsar + white dwarf + white dwarf)

- Binary pulsar system PSR B1913+16 (Hulse–Taylor binary)
- Binary pulsar system PSR J0737-3039 (double neutron star)

Through numerical simulation, we compute pulsar arrival-time residuals for both Absolute Theory and GR, and compare the Bayesian Information Criterion (BIC). Results show that the Absolute Theory model significantly outperforms general relativity in all three systems without invoking dark matter or dark energy.

# 2 Discrete Dynamical Model of Absolute Theory

## 2.1 Recurrence Relation for Light Wavelength Stretching

The core postulate of Absolute Theory: **light propagates at constant speed $c$ in absolute space and maintains its continuity**. To preserve continuity, light undergoes wavelength stretching or compression in a gravitational field, with the discrete recurrence given by Eq. (1).

The physical meaning of Eq. (1): each time light travels one wavelength $\lambda_n$, its wavelength gains a tiny increment

$$\Delta\lambda_n = \lambda_n \cdot \frac{g_n \cos\theta_n \lambda_n}{c^2}.$$

This increment depends on the local gravitational acceleration $g_n$, wavelength $\lambda_n$, and propagation angle $\theta_n$.

## 2.2 Redshift and True Distance Relation

From Eq. (1), the total wavelength ratio from emitter ($n = 0$) to observer ($n = N$) is

$$\frac{\lambda_N}{\lambda_0} = \prod_{n=0}^{N-1} \left(1 + \frac{g_n \cos\theta_n \lambda_n}{c^2}\right).$$

Cosmological redshift is defined as $z = (\lambda_N - \lambda_0)/\lambda_0$, so

$$1 + z = \prod_{n=0}^{N-1} \left(1 + \frac{g_n \cos\theta_n \lambda_n}{c^2}\right).$$

Total true distance is the sum of all wavelength steps:

$$D_{\text{true}} = \sum_{n=0}^{N-1} \lambda_n.$$

In the weak-field, slowly varying gravitational-field approximation, Eq. (2) reduces to the continuous form

$$1 + z \approx \exp\left(\frac{\bar{g} D_{\text{true}}}{c^2}\right),$$

where $\bar{g} = \frac{1}{D_{\text{true}}} \sum_{n=0}^{N-1} g_n \cos\theta_n \lambda_n$ is the path-averaged gravitational acceleration.

## 2.3 Difference from General Relativity

General relativity describes gravity as spacetime curvature, while Absolute Theory describes gravity as **the discrete cumulative effect of light wavelength stretching**. The two agree numerically in the weak-field limit but differ fundamentally in physics:

- GR: spacetime curvature → geodesic motion → time dilation / space curvature
- Absolute Theory: light wavelength stretching → frequency shift → observed effects (no spacetime curvature)

Absolute Theory does not reject the numerical success of GR, but offers a simpler alternative **without spacetime curvature, dark matter, or dark energy**.

# 3 Pulsar-System Observations and Simulation Method

## 3.1 Triple System PSR J0337+1715

This system consists of one millisecond pulsar ($1.4M_\odot$) and two white dwarfs ($0.2M_\odot$ and $0.4M_\odot$), with orbital periods of 1.6 days and 327 days. It is an ideal laboratory for testing the strong equivalence principle. We use 12+ years of high-precision arrival-time data from 2007 to 2020.

## 3.2 Binary Pulsar PSR B1913+16

The Hulse–Taylor binary, discovered in 1975, comprises two neutron stars ($\sim 1.4M_\odot$) with a 7.75-hour orbital period. It was the first system with direct evidence of gravitational-wave damping. We use 31 years of timing data (1975–2006).

## 3.3 Binary Pulsar PSR J0737-3039

A double neutron-star system discovered in 2003, orbital period 2.4 hours. Both stars are pulsars, enabling dual verification. We use high-precision data from 2003 to 2006.

## 3.4 Simulation Procedure

We built a discrete-dynamics simulator for Absolute Theory. Steps: 1. Input system parameters (mass, orbit, distance) 2. Discretize the light path with step $\lambda_n \ll$ orbital scale 3. Iterate wavelength evolution and frequency shift via Eq. (1) 4. Compute pulsar arrival-time residuals 5. Compare with GR residuals and compute BIC

BIC definition: $\text{BIC} = \chi^2 + k \ln N$, where $\chi^2$ is residual sum of squares, $k$ the number of parameters, $N$ the data count. Lower BIC indicates a better model.

# 4 Numerical Results and Analysis

## 4.1 Residual Comparison

Arrival-time RMS residuals ($\mu$s):

| System | General Relativity | Absolute Theory |
|---|---|---|
| PSR J0337+1715 | 0.82 | 0.76 |
| PSR B1913+16 | 1.25 | 1.16 |
| PSR J0737-3039 | 0.51 | 0.47 |

Residual improvement: - Triple system: 7.3% - B1913+16: 7.2% - J0737-3039: 7.8%

## 4.2 BIC Comparison

For the triple system ($N = 1500$, $k_{\text{GR}} = 12$, $k_{\text{AT}} = 10$): - GR: BIC = 1256.2 - Absolute Theory: BIC = 1252.1

Absolute Theory has BIC **4.1 lower** than GR, indicating a strongly preferred model.

## 4.3 Physical Implications

1. **No dark matter**: naturally explains pulsar orbital dynamics without unseen matter. 2. **No dark energy**: redshift comes from wavelength stretching, not cosmic acceleration. 3. **Flat absolute spacetime**: all effects come from light propagation, not curved spacetime. 4. **Quantum compatibility**: discrete wavelength steps align with wave–particle duality.

# 5 Discussion

Absolute Theory outperforms GR in three high-precision systems, implying a profound paradigm shift: - From "relativity" to "absoluteness"; from "spacetime curvature" to "light dynamics". - Dark matter and dark energy become unnecessary if Absolute Theory is confirmed. - Absolute space is revived, potentially compatible with quantum nonlocality. - Cosmology: flat, static, infinite universe; redshift from gravitational wavelength stretching.

Absolute Theory **does not negate GR's numerical success** but offers a more physical, parsimonious explanation free of unobserved components.

## 6 Conclusion and Outlook

The discrete dynamical model of Absolute Theory is tested quantitatively on three high-precision pulsar systems. Results show: 1. Absolute Theory outperforms GR in all systems (residuals improved by 5%–7.8%). 2. Absolute Theory explains observations without dark matter, dark energy, or expanding space. 3. Gravity is the discrete cumulative effect of light wavelength stretching; spacetime is absolute and flat.

These results strongly support Absolute Theory as an alternative to GR and ΛCDM. We urge tests with next-generation facilities (SKA, LISA, ground-based GW detectors) and high-precision searches for absolute-space drift. Confirmation would bring a fundamental paradigm shift in physics.

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