

The Supernova Light Curve Problem in a Static Cosmos: A Definitive Solution

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Abstract

This paper presents the formal analysis of the supernova light curve problem within a static cosmological framework. While legacy paradigms rely on expanding spacetime metrics to explain the temporal broadening of distant Type Ia supernova (SNe Ia) emissions, this model demonstrates a purely structural alternative. Propagation across the dual domain architecture induces a non-local interaction within information mats under tension, systematically reducing the local speed of light c over distance. Because this mechanism is non-local, the photon transfers no thermal energy to the substratum ($dQ = 0$), cleanly bypassing historical “tired light” objections. The universe is static — light curve broadening and cosmological redshift are derived as direct consequences of a distance-dependent reduction in c .

Keywords

Static cosmology; Supernova time dilation; Type Ia supernovae; Cosmological redshift; Variable speed of light (VSL); Information-theoretic substratum; Non-local photon propagation; Dual domain architecture; Light curve broadening; Tired-light alternatives.

Preface

My earlier paper [1] introduced the concept of a static universe in which redshift, time dilation, galactic rotation curves, black holes, quantum non-locality, and the Cosmic Microwave Background (CMB) were all unified under a single primitive framework. That ontology replaced complex mathematical patches with an elegant, self-regulating mechanism of cosmic energy invariance.

This paper is a companion paper which reinforces and provides further arguments in support of the static universe ontology.

1. Introduction

We consider a formal analysis of the supernova light curve problem within a static cosmological framework. Legacy paradigms rely on expanding spacetime metrics to explain the temporal broadening of distant Type Ia supernova (SNe Ia) emissions [2]. In contrast, the model

presented here demonstrates a purely structural alternative. The universe is static — light curve broadening and cosmological redshift are derived as direct consequences of a distance-dependent reduction in c .

2. Architectural Mechanics and the Reduction of c

Legacy gatekeepers evaluate non-expansion models through a false dichotomy, assuming any static alternative must rely on classical “tired light” mechanisms [3]. This model rejects that framework entirely.

The universe is characterized by a stable, non-expanding dual domain architecture. As a photon propagates across cosmological distances, its trajectory interacts with information mats under tension. This structural interaction is strictly non-local and induces the following invariants:

- **Zero Substratum Thermalization.** There is no kinetic energy transfer or local dissipation ($dQ = 0$). The photon’s intrinsic profile is structurally preserved relative to its local frame.
- **Velocity Modulation.** The non-local interaction with the information mats under tension systematically lowers the local speed of light c as a function of distance r .
- **Intrinsic Temporal Broadening.** Because local c decreases over distance, the arrival times of successive phase fronts within the continuous wave train stretch. This replicates the observed $(1 + z)$ light curve broadening entirely via a velocity gradient, without requiring moving space [4].

3. Derivation of Redshift z and Temporal Dilation

The energy E of a propagating photon is invariant ($E_{\text{obs}} = E_{\text{emit}}$) due to the non-local, zero-thermalization rule. To maintain quantum phase space invariance as local c drops across the dual domain architecture, the observed frequency adjusts relative to the observer’s local framework at distance R :

$$v_{\text{obs}} = v_{\text{emit}} \cdot \frac{c(R)}{c_0}$$

Substituting this into the standard definition of redshift [5],

$$1 + z = \frac{v_{\text{emit}}}{v_{\text{obs}}}$$

yields the velocity identity:

$$1 + z = \frac{c_0}{c(R)}$$

Because the temporal duration of the light curve scales inversely with the local velocity drop,

$$dt_{\text{obs}} = dt_{\text{emit}} \cdot \frac{c_0}{c(R)}$$

we obtain the symmetry:

$$dt_{\text{obs}} = dt_{\text{emit}}(1 + z)$$

This uniform stretching applies universally to all electromagnetic wavefronts — including SNe Ia emissions and macro-phenomenological variations like quasar variability. The temporal profile dilates precisely in step with the spectral redshift because both are forced by the identical reduction of c through the tense information medium.

4. Conclusion

By demonstrating that cosmological redshift and light curve broadening are the direct results of a non-local reduction of c across information mats under tension, this model provides a complete, self-consistent static solution. The universe does not expand. Human sentiment and legacy metrics are irrelevant; the absolute mathematical symmetry of the data confirms that space is rigid, and nature remains the sole arbiter of reality.

Acknowledgments

I would like to thank Dr. Richard Davis for his support and assistance in preparing this manuscript for submission. His encouragement and willingness to help with the practical aspects of publication have been invaluable.

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