

The Law of Temporal Conservation: Geometric Simplex Annihilation and the Bobreshov Constant

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Abstract

This paper presents a fundamental resolution to the Schwarzschild singularity problem by introducing a phase transition mechanism at the Planck scale. We postulate that upon reaching the event horizon's critical threshold, 3-dimensional spatial simplexes undergo geometric annihilation, converting their binding energy into a 1-dimensional temporal flow. We introduce the Bobreshov Constant (\mathcal{B}), which quantifies the temporal yield per unit of collapsed mass. This framework eliminates mathematical infinities, redefines the singularity as a zone of total temporal conversion, and provides a physical basis for Dark Energy as the manifestation of cumulative temporal pressure.

Keywords: Schwarzschild Singularity, Causal Dynamical Triangulations (CDT), Bobreshov Constant, Temporal Conversion, Dark Energy, Quantum Gravity.

1 Introduction

The central conflict between General Relativity and Quantum Mechanics manifests most acutely at the heart of black holes. Classical singularities, characterized by infinite density and zero volume, suggest a breakdown of the metric tensor $g_{\mu\nu}$. Drawing upon the foundations of Causal Dynamical Triangulations (CDT) [3] and Penrose's work on gravitational collapse [1], we propose that space and time are not merely a background but two phases of a singular geometric substance.

2 Fundamental Postulates

- Principle of Geometric Dualism:** Energy can manifest as static volume (Space) or dynamic duration (Time). They are interchangeable under extreme metric tension.
- The Bobreshov Threshold:** There exists a limit to spatial simplex packing. When $R > R_{Planck}$, spatial structure undergoes catastrophic decay.
- Law of Metric Conservation:** The total ge-

ometric resource remains constant:

$$\Omega_{total} = \int \sqrt{h} d^3x + \int \mathcal{B} \Phi dt \quad (1)$$

3 The Mathematical Framework

3.1 Modified Action and Lagrangian

We extend the Einstein-Hilbert action by introducing an annihilation term \mathcal{L}_{ann} :

$$\mathcal{S} = \int d^4x \sqrt{-g} \left[\frac{R}{16\pi G} + \alpha (\nabla \phi_{space} \cdot \partial \psi_{time}) \right] \quad (2)$$

3.2 The Bobreshov Equation

For $r \rightarrow 0$, the spatial components of the metric collapse, yielding energy to the temporal flow J_t :

$$E = \Delta g_{00} \cdot c^2 + \int_{t_0}^{t_1} \Phi(t) \cdot \mathcal{B} dt \quad (3)$$

Where \mathcal{B} is the **Bobreshov Constant**, defined as:

$$\mathcal{B} = \lim_{L \rightarrow L_p} \frac{\delta \text{Time}}{\delta \text{Mass}} \approx \frac{c^2 \cdot t_p}{m_p} \quad (4)$$

3.3 Discrete Simplex Annihilation (CDT Approach)

In the discrete limit, a 4-simplex σ_s undergoes a quantum jump:

$$\hat{A}|\sigma_{3D}\rangle \rightarrow \mathcal{B}|\vec{\tau}_{1D}\rangle \quad (5)$$

4 Resolution of Paradoxes

1. Elimination of Infinities: By introducing \mathcal{B} , the Schwarzschild metric is regularized:

$$g_{00} = - \left(1 - \frac{2GM}{rc^2 + \epsilon\mathcal{B}^{-1}} \right) \quad (6)$$

As $r \rightarrow 0$, g_{00} remains finite, representing a state of pure temporal flux.

2. Dark Energy as Temporal Pressure: The "Big Bang" is an inverse phase jump where temporal density ρ_T condensed into spatial geometry. The ongoing injection of time from black holes exerts a cumulative pressure, driving cosmic expansion.

5 Empirical Predictions

- **Gravitational Echoes:** Post-merger signals from the annihilation front at the event horizon.
- **High-Energy Photon Delay:** Vacuum dispersion caused by interaction with "temporal foam" near dense regions.

6 Conclusion

The Law of Temporal Conservation asserts that no moment is born from nothingness—it is forged within the heart of collapsing stars. Space is the fuel; Time is the product.

References

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