the general science journal

The Black Hole Form of Matter: Curvature-Triggered K-Form Model for the Regularization of Black Hole Interiors

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March 5, 2026

Abstract

This work presents a model referred to as "The Black Hole Form of Matter," aimed at resolving the singularity problem at the center of black holes. We propose that under extreme spacetime curvature, matter undergoes a phase transition into a third state termed "K-Form." This state represents a dimensional saturation where matter occupies not only three spatial dimensions but also the temporal dimension, preventing classical gravitational collapse.

Keywords: Black hole, Singularity, K-Form, Phase transition, Dimensional saturation, Spacetime curvature.

1 Introduction: The Evolutionary Chain of Energy

In our current understanding of physics, the relationship between energy and matter is defined by $E = mc^2$. However, we propose that this is not the final stage of condensation. Just as energy condenses into matter, we suggest that under extreme gravitational pressure, matter itself condenses into a third phase: the Black Hole Form (K-Form). This transition completes the evolutionary chain: Energy $\rightarrow$ Matter $\rightarrow$ K-Form.

2 Dimensional Saturation

The K-Form model suggests that at the heart of a black hole, matter achieves a state of "dimensional saturation." In this state, the K-Form does not merely exist within time; it occupies the temporal dimension as part of its physical structure. By occupying the time dimension, the K-Form prevents the density from diverging to infinity.

3 Governing Equations

The proposed relation for the K-Form is $m = kc^3$. The stabilization of the core results in a density profile $\rho(r)$ that is finite at the center:

$$\rho(r) = \frac{3M}{4\pi(r^6 + r_{min}^6)} \tag{1}$$

4 Conclusion

By defining the K-Form as a state of matter that occupies the time dimension, we eliminate the paradox of infinity. Black holes are the most condensed and dimensionally complete form of reality.