[12pt]article amsmath, amssymb graphicx hyperref

# Black Hole Singularities as Spacetime Rips: A Hypothetical Mechanism for Information Transfer Between Universes

Your Name

August 13, 2025

**Abstract**

Black hole singularities in classical general relativity lead to infinite curvature, while Hawking radiation raises the information paradox. We propose a speculative hypothesis: instead of forming a true singularity, the curvature reaches a critical density at which the spacetime fabric tears, forming a connection to another universe. Information is preserved and transferred through this connection. This framework conceptually resolves both the singularity problem and the information paradox.

## 1 Introduction

- Classical General Relativity predicts singularities at black hole centers.
- Hawking radiation and the information paradox highlight potential loss of information.
- Existing approaches: Loop Quantum Gravity bounces, ER=EPR wormholes, baby universe cosmology.
- Problem statement: How can we preserve information and avoid infinite curvature?

## 2 Hypothesis Statement

1. Black hole interior reaches a critical curvature $R_{\text{crit}}$.
2. At $R_{\text{crit}}$, spacetime fabric tears, forming a connection to another universe.
3. Information falling into the black hole is transferred to the other universe.

## 3 Conceptual Framework

- Comparison with classical singularity (GR) and LQG bounce models.
- Diagram placeholder: Black hole interior $\rightarrow$ spacetime rip $\rightarrow$ new universe.
- Analogy: Drain pipe transferring water to another tank.

## 4 Conflicts and Similarities with Existing Theories

- Conflicts:
  - Classical GR: violates exact singularity solutions.
  - Hawking evaporation: information destruction.
  - Point-like singularity assumption.
- Similarities:
  - LQG bounces.
  - ER=EPR wormhole interpretations.
  - Baby universe theories.

## 5 Implications

- Preserves information (resolves paradox).
- Avoids infinite curvature.
- Suggests multiverse connections.

## 6 Possible Predictions / Observables

- Subtle deviations in Hawking radiation spectrum.
- Gravitational wave signatures from black hole mergers or bounces.
- Statistical features indicating information transfer.

## 7 Discussion

- Strengths: Conceptually resolves paradoxes, intuitive, visualizable.
- Weaknesses: No current formalism, requires modification of GR or quantum gravity.
- Opportunities: Toy models using simplified metrics, potential connection with string theory or LQG.

## 8 Conclusion

- Singularities may be replaced by spacetime rips.
- Information is preserved and transferred.
- The idea is speculative but provides a new perspective on black hole interiors and information paradox.

## Figures

Figure 1: Schematic diagram: black hole interior leading to spacetime rip connecting to a new universe.

## References


- Misner, C. W., Thorne, K. S., Wheeler, J. A., *Gravitation*, W. H. Freeman, 1973.
- Hawking, S. W., "Black hole explosions?", *Nature*, 248, 30–31, 1974.
- Rovelli, C., Vidotto, F., *Covariant Loop Quantum Gravity: An Elementary Introduction to Quantum Gravity and Spinfoam Theory*, Cambridge University Press, 2014.
- Einstein, A., Rosen, N., "The Particle Problem in the General Theory of Relativity," *Phys. Rev.* 48, 73, 1935.
- Maldacena, J., Susskind, L., "Cool horizons for entangled black holes," *Fortsch. Phys.* 61, 781–811, 2013.