

PHYSICS AND ASTRONOMY COLLOQUIUM

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The Black Hole Information Paradox, Alive and Kicking

Thought experiments have played an important role in figuring out the laws of physics. For the unification of quantum mechanics and gravity, where the phenomena take place in extreme regimes, they are even more crucial. Hawking's 1976 paper "Breakdown of Predictability in Gravitational Collapse" presented one of the great thought experiments in the history of physics, arguing that black holes destroy information in a way that requires a modification of the laws of quantum mechanics. Skeptics for years failed to poke holes in Hawking's argument, but concluded that if quantum mechanics is to be saved then our understanding of spacetime must break down in a radical way. For a time it seemed that Maldacena's discovery of gauge/gravity duality had resolved the issue, but recent developments have opened many new questions.



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