PHYSICS AND ASTRONOMY
SEMINAR

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"Black Hole Information Loss: Is there light at the end of the tunnel?"

Abstract

The recent gravity wave observations by LIGO have provided startling, direct confirmation of the existence of black holes. Hawking's famous calculation of the mid 1970's proved that black holes evaporate by emitting radiation that cannot contain information about the state of the matter that formed the black hole. This result led to one of the deepest unsolved puzzles of modern theoretical physics: what happens to this information? Is it lost forever or does it somehow emerge during the final stages of evaporation?

I will first briefly review the key properties of black holes, followed by a more detailed description of the information loss paradox and the famous "firewall" resolution of Almheiri, Marolf, Polchinski and Susskind. I will then go on to describe my own research into a different, considerably more mundane solution to the problem based. It is based on the observation that the singularity thought to exist at the center of all black holes lies at the heart of the information loss conundrum. Specifically, I will present calculations of black hole formation and evaporation based on a simplified effective action that is constructed to prevent the singularity from forming. As I will show, in this scenario the usual event horizon of the black hole is replaced by a compact trapping horizon that allows the information to emerge gradually as the black hole evaporates.

Friday, March 18, 2016
1:30 p.m.
Elliott Building
Room 062