

Black hole Information Loss Paradox

Overview

Gravitation is manifested as curvature of spacetime. In particular, gravity affects the causal structure of spacetime. This can lead to the existence of regions which are causally inaccessible to a class of observers. An example of such a region is the portion of spacetime inside the event horizon of a black hole. Classically black holes do not emit anything, but once we include quantum effects, black holes are allowed to emit thermal radiation and thereby lose their mass. The existence of Hawking radiation seems to suggest that quantum evolution in the presence of a black hole could be non unitary and this leads to the black hole information loss paradox. The resolution of this paradox is a major issue in theoretical physics and requires an understanding of the quantum dynamics of gravity.

The course will present an overview of the information loss paradox within semi classical gravity and attempts to resolve the problem. In the later part of the course, we will discuss the fuzzball proposal and show how this offers a resolution of the information loss paradox in string theory.

Modules	A: The Formulation of the Paradox : June 27th-July 1st B: Resolution of the Paradox : July 4th - July 6th C: The Firewall Problem : July 7th - July 9th Number of participants for the course will be limited to twenty.
You Should Attend If...	<ul style="list-style-type: none">▪ You are a P.hD student in Theoretical Physics.▪ You are a Postdoc in Theoretical Physics▪ You are a faculty working in Theoretical Physics
Fees	The participation fees for taking the course is as follows: Participants from abroad : US \$100 Academic Institutions: ` Rs. 500/- The above fee include all instructional materials, 24 hr free internet facility. The participants will be provided with accommodation and local hospitality on payment basis. For details visit, http://www.iitgn.ac.in/gian/courses_black_hole.php

The Faculty



Samir Mathur is a physicist who has spent over two decades working on the black hole information paradox. His background is in string theory, general relativity, and astrophysics. He has obtained his Ph.D. at the Tata Institute in Bombay, held postdoctoral appointments at the Tata Institute and Harvard, was a junior faculty at MIT, and is now a professor at Ohio State.

Prof. Mathur has contributed significantly towards the understanding of the quantum properties of black holes. His research on black hole information loss paradox based on the “Fuzzball” proposal is one of the most promising possible resolution of the paradox. Currently, Prof. Mathur is applying these insights to understanding the singularity at the origin of the Universe—the Big Bang.

Course Co-ordinator

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