

ICTS String Seminar

Title : Replica Wormholes, Entanglement Wedges and the Black Hole Information Paradox

Speaker : Geoff Penington (Stanford University)

Date : Wednesday, June 24, 2020

Time : 09:00 am

Abstract : Hawking famously argued, based on semiclassical calculations, that the radiation from evaporating black holes is always perfectly thermal and contains no information about the matter that fell in. Such a result is inconsistent with the unitarity of quantum mechanics. In this talk, I will argue that a more careful replica trick calculation shows that the gravitational path integral becomes dominated at late times by saddles containing spacetime wormholes. These wormholes cause the entropy to decrease after the Page time, consistent with unitarity, and allow information to escape from the interior of the black hole. In very simple toy models, we can evaluate the path integral exactly, and see the information emerge. In more realistic black holes, the full wormhole solutions cannot be found explicitly. However, their existence, and their most important consequences, can be derived by studying the location and properties of a non-trivial ‘quantum extremal surface’ in the original Hawking solution.

ICTS virtual seminar : Zoom link:
<https://zoom.us/j/96113616930?pwd=UVIxbjY4SzF2aTBLMnpGeGNQNFBrUT09>

Meeting ID: 961 1361 6930

Password: 1y0fG8

Recordings of past talks can be found here:

<https://www.youtube.com/channel/UCw9LdPQ5t7Q7muD0qzn70TA>