ICTS String Seminar

Title   : The thin shell - line defect correspondence

Speaker   : Jeevan Chandra (Cornell University, USA)

Date   : Wednesday, 23 October 2024

Time   : 3:30 PM (IST)

Abstract   : Gravity, as a low-energy effective field theory, captures certain statistical information about the quantum theory in the UV. The most famous example is the black hole entropy: The area of the horizon tells us the density of states at high energies, coarse-grained over a large number of nearby microstates. More recently, it has been discovered that Euclidean wormhole contributions to the gravitational path integral, calculated in the low-energy effective field theory of gravity coupled to matter, capture higher statistics of the underlying quantum theory. In this talk, I shall illustrate these ideas using a simple example where I show that the statistics of 3D black holes formed by the collapse of thin shells of dust is governed by the universal dynamics of a class of line defects in 2D CFT. Specifically, I shall show that the CFT operator that creates the thin shell black hole is a line defect. So, I shall use the conformal bootstrap to derive a universal Cardy-like formula for the average high-energy matrix elements of the line defect in any compact, unitary 2D CFT with $c>1$. The asymptotics are controlled by a line defect in Liouville CFT at the same value of the central charge. At large c, three distinct quantities are related: The statistics of line defects in holographic CFTs, the individual matrix elements of a line defect in Liouville CFT, and the on-shell action of black holes and wormholes in 3D gravity. The three calculations match for black holes, and if the statistics of the line defects are assumed to be approximately Gaussian, then a class of wormholes is also reproduced by the dual CFT. At the end of the talk, I will provide a precision test for averaging over the microstate data of these thin-shell black holes by constructing wormholes using the Janus domain wall solution.

Venue   : Emmy Noether Seminar Room
Zoom Link: https://icts-res-in.zoom.us/j/88092766911?pwd=R3ZrVk9yeW96ZmQ4ZG9KRzVhenRKZz09
Meeting ID: 880 9276 6911
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