ICTS Ph.D. Thesis Defence

Title : Strings, Black Holes and Quantum Information

Speaker : Sudip Ghosh, ICTS-TIFR, Bangalore

Thesis Advisor : Suvrat Raju

Date : Thursday, May 30, 2019

Time : 2:00 PM

Venue : Emmy Noether Seminar Room, ICTS Campus, Bangalore

Abstract : Locality is generally recognised to be an approximate notion in quantum gravity and is expected to breakdown at length scales close to the Planck scale. In this talk I will discuss how for certain observables the failure of locality can instead become manifest over macroscopic length scales through a breakdown of gravitational perturbation theory. In particular I will consider scattering amplitudes in bosonic and supersymmetric string theories in a regime where the number of external particles is very large and show that string perturbation theory breaks down in this limit. The implications of this result for resolving certain formulations of the black hole information loss paradox will be discussed. The sensitivity of complicated observables to non-local effects also suggests a need to refine commonly used measures of quantum information for studying aspects of entanglement in the context of quantum theories of gravity. I will describe the construction of a novel class of quantum information measures that can be used to address this problem. I will also discuss aspects of entanglement in gauge theories.