

ICTS Thesis Synopsis Seminar

- Title** : Out of time ordered effective dynamics of a Brownian particle
- Speaker** : Soumyadeep chaudhuri, ICTS-TIFR, Bangalore
- Thesis Supervisor** : R. Loganayagam
- Date** : Monday, June 24, 2019
- Time** : 4:00 PM
- Venue** : Emmy Noether Seminar Room, ICTS Campus, Bangalore
- Abstract** : In this talk I will present the out of time ordered dynamics of a Brownian particle interacting with a thermal bath. To illustrate the features of this effective dynamics, I will describe a simple toy model where the bath comprises of two sets of harmonic oscillators coupled nonlinearly to the Brownian particle. Beginning with a Schwinger-Keldysh effective action of the particle, I will demonstrate its duality with a stochastic theory governed by a non-linear Langevin equation. This Langevin dynamics or the equivalent Schwinger-Keldysh effective theory is, however, inadequate for determining the Out-of-Time-Order Correlators (OTOCs) of the particle. This limitation can be overcome by extending the particle's effective theory to a path integral formalism defined on a contour with multiple time-folds. This extension introduces some new effective couplings which are determined by the bath's OTOCs. The couplings in this OTO effective theory satisfy some constraints due to microscopic reversibility and thermality of the bath. I will show that, from the point of view of the Langevin dynamics, these constraints lead to a generalised fluctuation-dissipation relation between a non-Gaussianity in the noise distribution and a thermal jitter in the particle's damping coefficient.