

## **ICTS Skype Seminar**

Title : Memory of initial state in disordered system and open quantum system

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Date : Monday, January 7, 2019

Time : 10:45 AM

Venue : Amal Raychaudhuri Meeting Room, ICTS Campus, Bangalore

Abstract : Schwinger Keldysh (SK) field theory is a widely used paradigm to study non-equilibrium dynamics of quantum many-body systems. A key requirement of the current formalism of Keldysh field theory is that the initial state of the system is described by a thermal density matrix. We show how to include arbitrary initial manybody density matrices and describe their dynamics within a Keldysh field theoretic formalism. This opens up the possibility of using field theory techniques for a wide range of non-equilibrium problems, where the dynamics depends on the initial condition. As a specific example, we study the dynamics of a one-dimensional chain of non-interacting and interacting particles in presence of a disordered potential or a quasi-periodic potential where an initial imbalance of atom number between two sub-system is imprinted in the system. Using SK field theory, we study how the imbalance decays with time and analytically relate it to the localization length of the correlation function of the system. Hence, our analysis gives a new way of extracting localization length from an experimentally measurable non-equilibrium quantity. We also explore important applications of this newly developed formalism in studying the dynamics of the Wigner function and Renyi entropy of a Bosonic many body open quantum system, in presence of both Markovian and non-Markovian environments.