ICTS Condensed Matter Seminar

Title : Continuous weak measurements on quantum many-body systems and monitored Josephson Junction arrays (JJA)

Speaker : Sumilan Banerjee (Indian Institute of Science, Bengaluru)

Date : Wednesday, 26 February 2025

Time : 11:30 AM (IST)

Abstract : Control and manipulation of quantum states by measurements and bath engineering in open quantum systems have emerged as new paradigms in many-body physics. I will discuss the construction of Schwinger-Keldysh field theory, associated quantum-state diffusion and Lindblad dynamics for continuously and weakly measured quantum many-body systems with feedback, taking an example of a microscopic model of JJA coupled to detectors. I will discuss how such repetitive monitoring can transform an insulating state in these systems to a superconductor and vice versa. I will show that, even in the absence of any external thermal bath, the monitoring leads to a long-time steady state characterized by an effective `quantum' temperature in a suitably defined semiclassical limit. I will elucidate the fundamental difference in fluctuation-dissipation relation between quantum dissipation due to monitoring and equilibrium quantum and/or thermal dissipation in the well-studied case of JJAs in contact with an Ohmic bath. In particular, I will demonstrate that this difference can give rise to re-entrant steady-state phase transitions, resulting in unusual transition from an effective low-temperature insulating normal state to superconducting state at intermediate temperature.

Venue : Emmy Noether Seminar Room
Zoom Link: https://icts-res-in.zoom.us/j/93659725875?pwd=Pdag3mg6BGp1zbcvvdoT2hafgPQm4b.1
Meeting ID: 936 5972 5875
Passcode: 262627