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TATA INSTITUTE OF FUNDAMENTAL RESEARCH

ICTS Synopsis Seminar

Title : Spectral and Dynamical Observables in Disordered Open Quantum Systems

Speaker : Sparsh Gupta (ICTS-TIFR, Bengaluru)

Date : Tuesday, 20 May 2025

Time : 2:00 PM (IST)

Abstract : Understanding the mechanisms underlying thermalization and localization in quantum systems has been a central challenge, particularly in the context of disorder and environmental interactions. This work investigates the robustness of localization phenomena in disordered open quantum systems, focusing on how environmental effects such as driving and dissipation influence both spectral and dynamical properties. Employing a combination of several quantum master equations and exact diagonalization, the study systematically probes the fate of localization-delocalization transitions in both non-interacting and interacting systems. Key spectral diagnostics, including the dissipative spectral form factor and complex spacing ratios, are complemented by dynamical observables such as imbalance, occupation number, and entanglement entropy. The talk is structured in two parts: (i) investigation of the spectral and dynamical signatures of localization in open systems with disorder and interactions, revealing that certain hallmarks of localization persist even under dissipation and (ii) quantum evolution of a coupled system-reservoir setup, exploring particle injection and spreading in clean and quasi-periodic non-interacting lattices.

Venue : Emmy Noether Seminar Room

Zoom Link: <https://icts-res-in.zoom.us/j/95512415738?pwd=hxRi4mQ93b3kRYKHjYWiS9ejZpBPDJ.1>

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