

Speaker: **Debabrata Mondal, Indian Institute of Science Education and Research
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Title: **Transient and steady-state chaos in open quantum systems**

Date: **Friday, July 10, 11:00 am (s.t.)**

Place: **Seminar room 915**

Title: **Transient and steady-state chaos in open quantum systems**

I will discuss our recent work on the aspects of quantum chaos in an open quantum system. Ginibre statistics is often taken as an indicator of dissipative chaotic dynamics. However, recent studies have shown that the Grobe-Haake-Sommers conjecture, which associates Ginibre statistics with chaos and 2D Poisson statistics to integrability, can break down. We resolve this issue through a dynamical approach based on the von Neumann entropy (VNE) and out-of-time-order correlators (OTOCs), which reveal clear signatures of chaos beyond those captured by Liouvillian spectral statistics. Focusing on experimentally relevant systems, we identify two distinct chaotic regimes: transient chaos, characterized by rapid early-time growth of the VNE and OTOCs followed by low saturation values, and steady-state chaos, distinguished by high long-time saturation values. Our results therefore indicate that Ginibre correlations primarily capture short-time dynamical instability, and therefore signal transient, rather than steady-state, chaos. Building on these findings, we further show that dissipation can serve as a tool to regulate the duration of chaotic dynamics and information scrambling, enabling the recovery of coherence at long times.