अंतर्राष्ट्रीय सैद्धांतिक विज्ञान केंद्र
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भारत सरकार के परमाणु ऊर्जा विभाग की एकस्वायत्त संस्थान एवं समविश्वविद्यालय
An Autonomous Institution of the Department of Atomic Energy of Government of India and a Deemed to be University

ICTS Thesis Defence Seminar

Title : Chaos, dynamics and transport in isolated and open systems

Speaker : Tamoghna Ray (ICTS-TIFR, Bengaluru)

Date : Friday, 13 November 2026

Time : 11:30 AM – 1:00 PM (IST)

Abstract : Recent advances in experimental quantum platforms, including cold atoms, trapped ions, superconducting qubits, and cavity QED systems, have enabled unprecedented experimental control over interacting quantum systems, making it possible to directly probe fundamental questions about chaos, entanglement, and transport at the quantum level. This talk addresses two themes: the emergence of chaos in dissipative quantum systems and the nature of quantum dynamics and transport in many-body settings. The first part investigates quantum chaos in open systems. Using the dissipative Dicke model, we demonstrate that quantum bath fluctuations, in addition to dissipation, can generate a strange attractor with fractal dimension and a positive Lyapunov exponent in an otherwise classically regular phase space, with deep connections to shear-induced chaos. The second part addresses quantum dynamics and transport. We study entanglement dynamics in the XXZ spin$-1/2$ chain, finding Page curve like behaviour with power-law growth rates sensitive to initial conditions and the presence of integrability-breaking interactions, and draw connections between entanglement and Boltzmann entropy. We also show that in such setups, magnon bound states govern the power-law decay of return probability.

Venue : Madhava Lecture Hall
Zoom Link: https://zoom.us/j/98620728735?pwd=MfMEd7LDDeLf3pL3H9YjmttfUGtlkg.1
Meeting ID: 986 2072 8735
Passcode: 202030