



ICTS Statistical Physics & Condensed Matter Seminar

Title : Long-Range Interactions and the Origin of Black Hole Entropy

Speaker : Nicolo Defenu (ETH Zurich, Switzerland)

Date : Friday, 19 June 2026

Time : 3:00 PM (IST)

Abstract : In our quest to understand the emergence of structure in complex quantum systems, we investigate the thermodynamic properties of a paradigmatic disordered model. The Sachdev–Ye–Kitaev (SYK) model has established itself as a cornerstone framework for probing the quantum nature of black holes, most notably through its finite residual entropy at zero temperature. In this talk, I will present a systematic study of a chain of SYK dots coupled via power-law decaying interactions, and demonstrate how the range of these couplings governs the fate of this residual entropy.

Tuning from the strongly non-local to the local limit, the black-hole phase of the isolated SYK model gives way to a long-range Fermi-liquid regime, which in turn crosses over into a conventional non-Fermi-liquid phase as interactions become short-ranged. These findings establish the interaction range as a natural tuning parameter in black hole thermodynamics and quantum information, and point toward a broader organising principle for non-Fermi-liquid physics in systems with long-range interactions.

Venue : Emmy Noether Seminar Room

Zoom Link: <https://icts-res-in.zoom.us/j/92705003096?pwd=bhJNR4mm60HeS7gyMOpkyY6b5sqGTH.1>

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