

Seminar

Quantum many-body physics in the open

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Recent progress in programmable many-body quantum information processors motivate us to study fine-grained probes of “phases of matter” in the regime of open quantum circuits with noise and measurements. Adding quantum noise mixes classical and quantum information, leading to novel notions of “mixed state phases of matter”, with universal features that are distinct from both regimes. One of the key ideas that distinguishes truly quantum from classical non-equilibrium phenomena is the notion of separability from quantum information theory: namely whether a mixed state can be expressed as an ensemble of short-range entangled states. By suitably generalising the notion of symmetries for mixed states, I will show that strongly symmetric dynamics and thermalisation generically leads to highly entangled mixed states. Interestingly, the lessons from the interplay of randomness and symmetry also lead to fresh insights into disordered quantum systems at low temperatures. Finally, I will touch on how the generalised notion of mixed state phases of matter motivates future studies in classical non-equilibrium phenomena and machine learning.

Thursday, Sep 17th 2026

16:00 Hrs (Tea / Coffee 15:45 Hrs)

Auditorium, TIFRH