Physics Seminar: Tarun Grover

Wednesday, May 15 · 2:00 – 3:00pm in room 313

Title: Separability as a window into many-body mixed-state phases

Abstract: Ground states as well as Gibbs states of many-body quantum Hamiltonians have been studied extensively for some time. In contrast, the landscape of mixed states that do not correspond to a system in thermal equilibrium is relatively less explored. In this talk I will explore a rather coarse classification of mixed quantum many-body states. The key idea I will employ is that of "separability", i.e., whether a mixed state can be expressed as an ensemble of short-range entangled pure states. I will discuss several examples of decoherence-driven phase transitions from a separability viewpoint, and argue that such a framework also provides a new view on Gibbs states.

Based on work with Yu-Hsueh Chen. References: 2309.11879, 2310.07286, 2403.06553.

Physics Seminar: Tarun Grover

Thursday, May 16 · 1:00 – 2:00pm in room 313

Title: Fixed-point annihilation and a critical phase in a dissipative quantum spin chain

Abstract: Motivated from experiments on spin-chains embedded in a metallic bath, as well as closed quantum systems described by long-range interacting Hamiltonians, in this talk I will discuss a critical quantum spin-chain perturbed by dissipation, or equivalently, after space-time rotation, long-range spatial interactions. The interplay of dissipation and the Wess-Zumino (Berry phase) term results in a rich phase diagram with multiple renormalization group fixed points. For a range of the exponent that characterizes the dissipative bath, one finds a stable, gapless, non-relativistic phase of matter whose existence necessarily requires coupling to the dissipative bath. Upon tuning the exponent, one finds that the fixed-point corresponding to this gapless, stable phase annihilates a fixed point that describes the transition out of this phase to a dissipation-induced ordered phase. I will also discuss potential implications of these results for Kondo lattice systems.

Based on work with Simon Martin. Reference: 2307.13889.