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Title:

Approximate symmetries out of equilibrium: from pump-probe experiments to quantum simulation and computation

Abstract:

Symmetries are a theoretical concept that often helps us predict, describe, and understand many fascinating phenomena. Essential consequences of symmetries are conservation laws; however, these are frequently just approximately realized in nature. In my research, I have considered several manifestations of approximate symmetries and conservation laws, from Hubbard exciton formation and charge recombination in photo-excited Mott insulators to heat and spin pumping in approximately integrable spin chains.

In this talk, I will highlight some of the intriguing phenomena that can arise when we drive strongly correlated systems with approximate symmetries, with a focus on the potential overlap and collaboration with CUI members. I will discuss exotic superconducting-like holon-doublon pairing in photo-excited Mott insulators, the notion of (generalized Gibbs) ensemble concepts from statistical physics, and the use of modern tensor network and neural network techniques to describe mixed states in driven dissipative systems, as relevant for quantum simulators, computers, and solid-state experiment.

References:

Pumping approximately integrable systems, Nat. Comm. 8, 15767 (2017)

A Hubbard exciton fluid in a photo-doped antiferromagnetic Mott insulator, Nat. Phys. 19, 1876 (2023)

Generalized Gibbs ensemble in weakly interacting dissipative systems and digital quantum computers, arXiv:2406.17033