Sharareh Sayyad (MPI for the Science of light, Erlangen, Germany)

Title: Exploring the underlying physics of Non-Hermitian Kitaev chain

Abstract: Employing non-Hermitian descriptions of open quantum systems to understand the underlying physics of these dissipative systems has encountered a surge of interest in recent years. In this talk, I will present two non-Hermitian effective models for open Kitaev chains. The first model describes a Kitaev chain in contact with a reservoir and can be exactly treated using the third quantization formalism [1]. Here, we calculate the rich phase diagram of the non-Hemritian Kitaev chain with gapless, real-line gapped, imaginary-line gapped, and topological phases. We also explore the signatures of the non-trivial topology in the time-evolution of the driven-dissipative Kitaev chain. We reveal that non-trivial topology is reflected in crossings in the entanglement spectrum for quenches from a trivial to the topological phase [2]. In the second model, I will present the exact phase diagram of the non-Hermitian dimerized interacting Kitaev chain[3]. Our results show how the topological superconducting phase fades away as non-Hermiticty enhances. If time permits, I will also show some numerical results addressing the phase diagram of this model for parameter regimes not accessible in the exact solution.

References:

1. T. Prosen, New J. Phys. 10, 043026 (2008).

2. Sh. Sayyad et al. Phys. Rev. Research 3, 033022 (2021).

3. Sh. Sayyad et al. arXiv:2302.13561 (2023).