

Poster-2-36

Symmetry breaking and spectral structure of the interacting Hatano-Nelson model

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In this talk, I will discuss the Hatano-Nelson model, i.e., a one-dimensional non-Hermitian chain of spinless fermions with nearest-neighbour nonreciprocal hopping, in the presence of repulsive nearest-neighbour interactions. At half-filling, I will show two PT transitions, as the interaction strength increases. The first transition is marked by an exceptional point between the first and the second excited state in a finite-size system and is a first-order symmetry-breaking transition into a charge density wave regime. Persistent currents characteristic of the Hatano-Nelson model abruptly vanish at the transition. The second transition happens at a critical interaction strength that scales with the system size and can thus only be observed in finite-size systems. It is characterized by a collapse of all energy eigenvalues onto the real axis. I will also show that in a strong interaction regime, but away from half-filling, the many-body spectrum shows point gaps with nontrivial winding numbers, akin to the topological properties of the single-particle spectrum of the Hatano-Nelson chain.

[1] arXiv:2201.12653.