NONEQUILIBRIUM DYNAMICS AT THE QUANTUM CRITICAL POINT OF A SYSTEM WITH SCALE-FREE LOCALIZATION

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The skin effect is a significant feature of non-Hermitian systems and is caused by the global non-Hermitian nature of the system. Recent studies have discovered a scale-free localized eigenstate induced by a local non-Hermitian term. We constructed a uniform dimer model with an asymmetric transition embedded at the boundary. A change in the boundary parameter can cause a phase transition from the real energy level to the complex energy level, resulting in a scale-free state. Moreover, we introduce the inverse participation rate and the position of the center of mass to determine the local situation of the eigenstate. Interestingly, at the phase boundary, all the eigenstates of the system are observed to be scale-free localized. This phenomenon causes the evolution of the wave packet dynamics of the system to exhibit attractive power-law behavior and possesses EP-like characteristics. This interesting property provides a new possible realization of optical devices. Finally, we also present the circuit diagram of the system implementation for experimental observation.

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