# Critical quantum dynamics of observables at eigenstate transitions

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Based on the dynamics of survival probability in a quantum quench protocol, the intriguing critical phenomena of scale invariance was recently pointed out for eigenstates transitions, providing a promising tool to detect the boundaries of thermalizing behavior in closed quantum systems. In this work we generalize single-particle survival probability to transition probabilities between singleparticle states in the eigenbasis of the Hamiltonian before a quantum quench. Studying two paradigmatic quadratic Hamiltonians, i.e. the three-dimensional Anderson model and the onedimensional Aubry-André model, we demonstrate that the transition probabilities exhibit scaleinvariant mid- and late-time dynamics in a similar fashion as the survival probability. Futher, we show that under the dynamics governed by quadratic Hamiltonians, one-body observables in a many-body sector are given as linear combinations of single-particle transition probabilities. As the main result of this work, we then demonstrate that scale invariance occurs also for generic observables like the particle imbalance in a quench from an initial Hamiltonian that shares the observables eigenbasis.

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