CONTROL ID: 2867520

TITLE: Approximate Counter-diabatic Driving Protocols for Non-integrable Quantum Systems

Abstract Body: Noise and decoherence caused by the environment are two major challenges in applying adiabatic protocols to quantum technologies. Counter-diabatic (CD) driving protocols, which are also known as "shortcuts-to-adiabaticity," provide powerful alternatives for controlling a quantum system. These protocols allow one to change Hamiltonian parameters rapidly while still mimicking adiabatic dynamics. They have been shown to work well for a wide variety of systems, but it is exponentially hard to find exact CD protocols for non-integrable quantum many-body systems. We study a method to develop approximate CD protocols which avoids exponential sensitivity to perturbations of the Hamiltonian. Our finite-size scaling of CD Hamiltonians reveals remarkable differences between integrable and non-integrable quantum systems. We identify numerically different scaling regimes and show how they arise from the eigenstate thermalization hypothesis.

PRESENTATION TYPE: Oral

UNIT: 11.0 STRONGLY CORRELATED SYSTEMS, INCLUDING QUANTUM FLUIDS AND SOLIDS (DCMP)

SORTING CATEGORY: 11.1.6 Non-Equilibrium Physics with Cold Atoms and Molecules, Rydberg Gases, and Trapped Ions (DAMOP, DCMP) [same as 06.1.4]

Category Type: Theoretical

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Teams: (none)