

Dynamical Quantum Phase Transitions in Hybrid Quantum Dot Systems: the Competition between Superconducting and Magnetic Correlations

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Theoretical investigations of quantum dot systems coupled to ferromagnetic and superconducting electrodes reveal complex dynamics. The time-dependent numerical renormalization group (td-NRG) approach is employed to calculate the time-evolution of these systems, enabling the examination of responses to abrupt changes in parameter values. This method allows for the calculation of transient properties, revealing non-trivial interplay between superconducting and magnetic correlations.

The study of the system's Loschmidt echo and return function offers means to identify signatures of dynamical quantum phase transitions. The resulting dependencies provide a nuanced understanding of the competition between superconducting and ferromagnetic correlations, ultimately deepening our knowledge of the dynamical behavior of quantum dot systems.