Abstract Submitted
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Decoherence of a driven quantum system interacting with environment through many degrees of freedom[1] ZHONGYUAN ZHOU, SHIH-I. CHU, Department of Chemistry, University of Kansas, Lawrence, KS 66045, SIYUAN HAN, Department of Physics and Astronomy, University of Kansas, Lawrence, KS 66045 — We present a comprehensive approach for the study of decoherence of an ac-field-driven multilevel quantum system interacting with environment through many degrees of freedom. In this approach, the system is described by a reduced density operator and the environment is characterized by a number of spectral densities. The reduced density operator is governed by a master equation in which the effect of ac fields and leakage to non-computational states are included. The approach is applied to investigate decoherence of a SQUID flux qubit with a two-dimensional (2D) potential coupled to environment through its control and readout circuits. The calculated relaxation time agrees well with experimental result when the potential is quasi one-dimensional (1D). Effects of the second degree of freedom, which is frozen in a quasi-1D system, on relaxation and decoherence times are examined systematically by varying circuit parameters.

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