Abstract Submitted
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Decay of Rabi Oscillations in Josephson Charge Qubits.[1] ROMAN LUTCHYN, LEONID GLAZMAN, ANATOLY LARKIN, University of Minnesota — We analyze the decay of Rabi oscillations in a charge qubit consisting from a Cooper pair box connected by a Josephson junction to a finite-size superconductor.[2] The dominant mechanisms of the decay are still debated, and we concentrate on the contribution of quasiparticles to the decay rate. Passing of a quasiparticle through the Josephson junction tunes the qubit away from the charge degeneracy, thus spoiling the Rabi oscillations. We find the temperature dependence of the quasiparticle contribution to the decay rate. This dependence has three distinct regimes defined by two temperature scales, $T^*_{1,2} = \Delta/\ln(\Delta/\delta_{1,2})$, where Δ is the superconducting gap, and $\delta_{1,2}$ are the one-electron level spacings in the electrodes forming the qubit. Temperatures $T^*_{1,2}$ characterize the appearance of thermally excited quasiparticles in the parts of qubit; typically $T^*_{1,2} \ll E_c, E_j$, where E_c and E_j are the charging and Josephson energies, respectively.

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[2]A. Blais *et. al.*, cond-mat 0402216.; A. Wallraff *et. al.*, Nature (London) 431,162 (2004)

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