Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

A phenomenological model for tunneling rate of nonequilibrium quasiparticles in superconducting qubits MOHAMMAD ANSARI, Kavli Institute for Nanoscience, Delft University of Technology — In superconducting qubits the lifetime of quantum states cannot be prolonged arbitrarily by decreasing temperature. At low temperature quasiparticles tunneling between electromagnetic environment and superconducting islands takes the condensate state out of equilibrium due to charge imbalance. We obtain tunneling rate from a phenomenological model for non-equilibrium, where a fixed non-equilibrium quasiparticle density leads to a temperature-dependent chemical potential shift. This deduces a non-monotonic behavior of the relaxation rate as function of temperature. As a result electromagnetic environment can dramatically influence qubit transitions. This leads to crucial fabrication hints for improvement in quantum control of superconducting qubits.

Mohammad Ansari
Kavli Institute for Nanoscience, Delft University of Technology

Date submitted: 14 Nov 2014 Electronic form version 1.4