Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Normal-metal quasiparticle traps for superconducting qubits ROMAN-PASCAL RIWAR, Forschungszentrum Jülich & Yale University, AMIN HOSSEINKHANI, Forschungszentrum Jülich, LUKE D. BURKHART, YVONNE Y. GAO, ROBERT J. SCHOELKOPF, LEONID I. GLAZMAN, Yale University, GIANLUIGI CATELANI, Forschungszentrum Jülich — The coherence time of superconducting qubits is intrinsically limited by the presence of quasiparticles. While it is difficult to prevent the generation of quasiparticles, keeping them away from active elements of the qubit provides a viable way of improving the device performance. We develop theoretically and validate experimentally a model for the effect of a single small trap on the dynamics of the excess quasiparticles injected in a transmon-type qubit. By means of this model, we show that for small traps,increasing thesize shortensthe evacuation time of quasiparticles from the transmon. We further identify a characteristic trap size above whichthe evacuation time saturates to the diffusion time of thequasiparticles. In thediffusion limit, the geometry of the qubit and the trap become relevant. We compute the optimal trap number andplacement for several realistic geometries. Finally, our estimates show that the dissipation introduced by the presence of normal metal traps is well below the losses observed in the transmon.

Roman-Pascal Riwar
Forschungszentrum Jülich & Yale University

Date submitted: 10 Nov 2016 Electronic form version 1.4