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Normal Metal Quasiparticle Traps in 3D-Transmon Qubits[1] LUKE D. BURKHART, YVONNE Y. GAO, CHEN WANG, KYLE SERNIAK, GIJS DE LANGE, YIWEN CHU, URI VOOL, LUIGI FRUNZIO, MICHEL H. DEVORET, Department of Applied Physics and Physics, Yale University, GIANLUIGI CATELANI, Peter Grunberg Institut (PGI-2), Forschungszentrum Julich, LEONID I. GLAZMAN, ROBERT J. SCHOELKOPF, Department of Applied Physics and Physics, Yale University — Quasiparticles are a known source of decoherence in Josephson-junction based superconducting qubits. While equilibrium quasiparticles should not be present in devices operated at dilution refrigeration temperatures well below the superconducting energy gap, non-thermal quasiparticles have been observed in many different superconducting qubits, including 3D-transmons and fluxonium qubits. Vortices induced by applied magnetic fields have been shown to improve non-equilibrium quasiparticle decay rates and improve coherence times by creating regions of the superconductor with vanishing energy gap, which act as quasiparticle traps. We aim to further mitigate quasiparticle-induced limits on coherence by engineering strong trapping via the introduction of normal metal to the superconducting qubit. In this talk, we present recent results regarding normal metal quasiparticle traps in 3D-transmon qubits.

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