

Abstract Submitted  
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**Cavity-induced decoherence in a long-lived superconducting flux qubit**<sup>1</sup> FEI YAN, ARCHANA KAMAL, Research Laboratory for Electronics, Massachusetts Institute of Technology, THEODORE GUDMUNDSEN, JONILYN YODER, MIT Lincoln Laboratory, SIMON GUSTAVSSON, MIT Lincoln Laboratory; Research Laboratory for Electronics, Massachusetts Institute of Technology, WILLIAM OLIVER, Research Laboratory for Electronics, Massachusetts Institute of Technology — We implement a circuit QED system with a capacitively shunted (C-shunt) flux qubit coupled to a transmission line resonator. The improved design substantially enhances qubit coherences, achieving  $T_1$  of 55us at degeneracy. Dephasing is also improved, giving a spin-echo decay of 40us. We found that the dephasing is limited by photon shot noise at a residual thermal photon population of 0.006. The driven-evolution  $T_1$ -spectroscopy and free-evolution CPMG results both validate the finding.

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