

Abstract Submitted
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Observation of 0.2 ms Lifetime in a Cooper-pair Box Z. KIM, B. SURI, V. ZARETSKEY, Dept. of Physics, Univ. of Maryland, S. NOVIKOV, K. OSBORN, A. MIZEL, Lab. for Physical Sciences, F. WELLSTOOD, JQI, CNAM, Dept. of Physics, University of Maryland, B. PALMER, Lab. for Physical Sciences — We have coupled a quasi-lumped element superconducting microwave resonator with a resonant frequency of 5.44 GHz to an Al/AlO_x/Al Cooper-pair box (CPB) charge qubit. The resonator is in turn weakly coupled to a transmission line and shows no higher resonant modes up to 20 GHz. By monitoring perturbations of the resonant frequency, we have measured the spectrum and lifetime (T_1) of the CPB at the charge degeneracy point while the CPB was detuned from the resonator by up to 3.5 GHz. The maximum T_1 of the CPB was 200 μ s for $f = 4$ to 4.5 GHz, while T_1 decreased to 4 μ s around 8 GHz. Our measured T_1 's imply that the loss tangent in the AlO_x junction barrier must be less than about 4×10^{-8} at 4.5 GHz, about 4 orders of magnitude less than reported in larger area Al/AlO_x/Al tunnel junctions.

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