Abstract Submitted
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Design of a Tunable 3D Microwave Cavity for Use in Coupling to Quantum Superconducting Circuits[1] C.J. BALLARD, R.P. BUDOYO, K.D. VOIGT, J.B. HERTZBERG, J.R. ANDERSON, C.J. LOBB, F.C. WELLSTOOD, JQI and CNAM, Dept. of Physics, University of Maryland — We have designed a tunable 3D cavity system for use with transmon qubits. We use an rf SQUID loop as a variable inductive element that perturbs the cavity modes and produces a shift in the cavity frequency that depends on the flux applied to the loop. Our 3D cavity is made of aluminum and has a lowest mode TE101 frequency of 6.2 GHz. Following a method developed by E. U. Condon, we estimate our cavity to have an effective inductance of 100 nH [1]. Our inductive SQUID loop is made of thermally deposited aluminum on a sapphire substrate, with dimensions 250μm x 250μm, which yields an expected geometric inductance of 0.9 nH. We use a single junction in our inductive loop with a critical current of approximately 1μA. We tune the effective inductance of the loop by using a modulation coil that is well isolated from the cavity at the resonance frequency.

[1] Condon, E. U. Reviews of Modern Physics. Volume 14, Number 4 (1942)

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