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3D Microwave Cavity for Qubit Measurement SERGEY NOVIKOV, V. ZARETSKEY, B. SURI, Z. KIM, Dept. of Physics, Univ. of Maryland, B. S. PALMER, Lab. for Physical Sciences, F. C. WELLSTOOD, JQI, CNAM, Dept. of Physics, Univ. of Maryland —
We have investigated the loss mechanisms of the TE_{101} mode (resonant frequency $f_0 = 8$ GHz) of a superconducting Al microwave cavity. The internal quality factor Q_{int} of the cavity has been measured for a range of temperatures from 23 mK to 360 mK in a low photon number regime and from 360 mK to $T_c \sim 1.1$ K in a high photon number regime, both with and without a sapphire chip in the cavity. With sapphire present, $Q_{int} \sim 10^6$ was strongly reduced by an applied magnetic field. Without sapphire, $Q_{int} \sim 4 \times 10^6$ was only weakly dependent on the applied field. The frequency stability of the cavity and the use of the cavity for qubit readout (following recent experiments by H. Paik *et. al.*[1]) will be discussed.

[1]arXiv:1105.4652v4

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