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Thin-film Lumped-Element LC Resonator Coupled to 3D Microwave Cavity[1] C.J. BALLARD, R.P. BUDOYO, JQI and CNAM, Univ of Maryland-College Park, J.B. HERTZBERG, K.D. VOIGT, JQI, Univ of Maryland-College Park, J.R. ANDERSON, C.J. LOBB, F.C. WELLSTOOD, JQI and CNAM, Univ of Maryland-College Park — Dramatic improvements have recently been obtained in the coherence times of superconducting transmon qubits by placing the devices into a 3D cavity and probing them via the cavity mode [1]. To better characterize the causes of these improvements, we have replaced the transmon in the 3D cavity with isolated lumped-element LC resonators made from thin-film aluminum on silicon or sapphire substrates. We have tested several resonator designs with a range of coupling strengths and detunings from the 6.1 GHz TE101 cavity mode. We can determine the resonator's internal and external quality factors, shifts in both the cavity and the resonator frequencies, the coupling strengths between the resonator and the cavity, and the power dependence of internal loss in the resonator. We compare these data to a circuit model of an LC resonator capacitively coupled to a cavity resonance.

[1] H. Paik et al., PRL 107, 240501 (2011)

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Cody Ballard
Univ of Maryland-College Park

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