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Design and Measurement of a Tunable Thin-Film LC Resonator for Coupling to Superconducting Circuits C. J. BALLARD, R. P. BUDOYO, K. D. VOIGT, S. K. DUTTA, C. J. LOBB, F. C. WELLSTOOD, University of Maryland-College Park — We have designed and measured a tunable lumped element LC resonator for coupling to transmon qubits. We use an rf SQUID loop as a variable inductive element that shunts the inductor of the resonator and produces a shift in the resonator frequency that depends on the flux applied to the loop. In order to achieve a balanced response, we shunt the inductor with two single junction SQUID loops. Each junction has a critical current of approximately 300pA, which is small enough to prevent multiple trapped flux states. We tune the effective inductance of the loops by using a split, gradiometric modulation coil that is well isolated from the cavity at the resonance frequency. Our resonator is made of thermally evaporated aluminum on a sapphire substrate and has a resonance frequency of 5.3 GHz. It is mounted inside a 3D microwave cavity that has a TE101 frequency of 6.3 GHz.

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