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Tunable Thin-Film Resonator Coupled to Two Qubits in a 3D Cavity CODY BALLARD, S. K. DUTTA, R. P. BUDOYO, K. D. VOIGT, C. J. LOBB, F. C. WELLSTOOD, University of Maryland-College Park — We present preliminary results on using a tunable, thin-film lumped element LC resonator to couple two transmon qubits in a 3D microwave cavity. The cavity, which is used for readout, is made of aluminum and has a TE101 mode at 6.3 GHz. The LC resonator has a base frequency of about 5 GHz and the inductor contains two loops, each having a single Josephson junction. Applying magnetic flux to the loops modulates the overall inductance of the resonator allowing tuning over a 500 MHz range. Two Al/AlOx/Al transmon qubits are fabricated on the same sapphire substrate as the resonator, and are designed to have a charging energy of 200 MHz and a frequency that falls within the tuning range of the resonator. Observing the perturbations of the resonant frequencies of the qubits and the cavity as the LC resonator is tuned allows us to determine the coupling strengths between each qubit and the LC resonator and between the LC resonator and the cavity.

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