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Characterization of Multipole Microwave Cavity Filters PHILIP REINHOLD, DAVID SCHUSTER, University of Chicago, LEV S. BISHOP, University of Maryland — An essential requirement for a quantum information processor is the ability to controllably couple and decouple individual qubits with each other. With superconducting circuit QED, this can be implemented by coupling multiple qubits to a transmission line cavity bus, and can be controlled by moving the qubit frequencies in and out of resonance with the bus. As coherence times increase, and the number of qubits attached to a bus grows larger, the problem of spurious coupling while detuned will become more important. We propose using principles from microwave filter design to create new couplers with higher contrast ratios in the effective qubit-qubit coupling. We present progress towards circuit implementations of multipole qubit coupling architectures.

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