A balanced, superconducting multiplier circuit for fast-switching and multiplexed qubit readout: Design and modeling Abstract Submitted

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A balanced, superconducting multiplier circuit for fast-switching and multiplexed qubit readout: Performance and demonstration[1] BRAD A. MOORES, BENJAMIN J. CHAPMAN, ERIC I. ROSENTHAL, JILA, University of Colorado, Boulder, JOSEPH KERCKHOFF, HRL Laboratories, JILA, University of Colorado, Boulder, K. W. LEHNERT, JILA, University of Colorado, Boulder — A major challenge of scaling the promising transmon qubits into a quantum information processing machine is the classical hardware burden required to readout many qubits. Within the cavity QED architecture, qubit states are measured by detecting the transmission through microwave cavities. A multiplexing scheme could allow the classical hardware burden of generating and measuring a readout tone to be shared among several cavity-qubit systems. In this talk, we will present measurements of a recently designed superconducting multiplier circuit intended to accomplish time and code domain multiplexed readout. In particular, we characterize three modes of microwave operation: transmission, reflection and inversion. The device can be switched between these modes approximately 100 times faster than typical qubit coherence times. Exploiting this performance, we demonstrate a code domain multiplexing scheme with classical signals created to simulate typical qubit signals. The scheme operates with near unity fidelity at microwave powers comparable to typical qubit tones.

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