Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

A Multi-Channel Josephson Parametric Amplifier MICHAEL SELVANAYAGAM, ALEXANDER PAPAGEORGE, DAMON RUSSELL, NICK RUBIN, MEHRNOOSH VAHDIPOUR, SPIKE CURTIS, ANTHONY POLLORENO, MATTHEW REAGOR, CHAD RIGETTI, Rigetti Quantum Computing — One of the challenges of constructing a multi-qubit system is putting in place a readout and amplification system capable of single-shot high-fidelity qubit state measurements. This readout system has been envisioned in a variety of ways including such ideas as multiplexing and broadband JPA's. We investigate a specific quantum circuit, where each qubit in an multi-qubit system has a dedicated lumped Josephson Parametric Amplifier. We discuss a scalable implementation of this system, including JPA design, circuit layout, packaging, calibration, and single-shot operation across multiple qubits.

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Date submitted: 10 Nov 2016 Electronic form version 1.4