Abstract Submitted for the MAR16 Meeting of The American Physical Society

Multi-qubit measurements with a Josephson Photomultiplier¹ CALEB HOWINGTON, M HUTCHINGS, Syracuse University, GUILHEM RIBEILL, IVAN PECHENEZHSKIY, MAXIM G. VAVILOV, University of Wisconsin, FRANK K. WILHELM, Saarland University, R. MCDERMOTT, University of Wisconsin, BLT PLOURDE, Syracuse University — The ability to measure multiqubit parity is critical for the realization of a fault-tolerant quantum information processor. For a system of transmon qubits coupled to a superconducting cavity, a threshold photon detector can provide an efficient path towards the digital readout of qubit parity after the parity information is mapped onto the cavity photon occupation. We will describe progress towards the implementation of such a scheme for measuring the parity of two transmon qubits. On-chip flux bias lines allow us to tune the dispersive cavity shifts related to the state of the two qubits and an appropriately shaped pulse driven to the cavity results in a bright state for one parity but not the other. A Josephson Photomultiplier then serves as a phase-insensitive digital detector of the microwave photons that leak out of the cavity. Future improvements and various technical difficulties will be discussed.

¹We acknowledge support from ARO under Contract W911NF-14-1-0080.

Caleb Howington Syracuse University

Date submitted: 06 Nov 2015 Electronic form version 1.4