Qubit Readout with the Josephson Photomultiplier IVAN PECH-
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sin, Madison — The realization of a large-scale fault-tolerant quantum processor
will require scalable high-fidelity readout of multiqubit parity operators. Here we
describe development of a scalable qubit measurement approach based on microwave
photon counting. The measurement protocol involves mapping the qubit state to
photon occupation of bright and dark cavity pointer states, followed by photodetec-
tion using the Josephson photomultiplier (JPM). We discuss use of the qubit as a
calibrated source of photons to measure JPM quantum efficiency, and we describe
global optimization of the measurement protocol. Finally, we discuss prospects for
interfacing the JPM output to single flux quantum circuits to allow low-latency
classical postprocessing of the qubit measurement result.

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