Abstract Submitted
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Active resonator reset in the non-linear regime of circuit QED to improve multi-round quantum parity checks[1] CORNELIS CHRISTIAAN BULTINK, M.A. ROL, X. FU, B.C.S. DIKKEN, J.C. DE STERKE, R.F.L. VERMEULEN, R.N. SCHOUTEN, A. BRUNO, K.L.M. BERTELS, L. DICARLO, QuTech, Delft University of Technology — Reliable quantum parity measurements are essential for fault-tolerant quantum computing. In quantum processors based on circuit QED, the fidelity and speed of multi-round quantum parity checks using an ancillary qubit can be compromised by photons remaining in the readout resonator post measurement, leading to ancilla dephasing and gate errors. The challenge of quickly depleting photons is biggest when maximizing the single-shot readout fidelity involves strong pulses turning the resonators non-linear. We experimentally demonstrate the numerical optimization of counter pulses for fast photon depletion in this non-analytic regime. We compare two methods, one using digital feedback and another running open loop. We assess both methods by minimizing the average number of rounds to ancilla measurement error.

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