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Engineering stabilizer measurements in circuit QED: II[1] JACOB BLUMOFF, KEVIN CHOU, M REAGOR, C AXLINE, R BRIERLY, Yale University, S NIGG, University of Basel, P REINHOLD, R HEERES, C WANG, K SLIWA, A NARLA, Yale University, M HATRIDGE, University of Pittsburgh, L JIANG, M H DEVORET, S M GIRVIN, R J SCHOELKOPF, Yale University — Quantum error correction based on stabilizer codes has emerged as an attractive approach towards building a practical quantum information processor. One requirement for such a device is the ability to perform hardware efficient measurements on registers of qubits. We demonstrate a new protocol to realize such multi-qubit measurements. A key feature of our approach is that it enables arbitrary stabilizer measurements to be selected in software, and requires a relatively small number of buses, ancillae, and control lines. This allows for a minimally complex sample realizing a simple dispersive hamiltonian while maintaining a high degree of decoupling between our fixed-tuned qubits. We experimentally implement these measurements in 3D circuit QED using transmon qubits coupled to a common bus resonator. In the second of two talks, we present a full characterization of the algorithm describing the outcome dependent projections via quantum process tomography.

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