Abstract Submitted
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Stabilizer quantum error correction toolbox for superconducting qubits[1] SIMON NIGG, STEVEN GIRVIN, Yale University — Rudimentary quantum error correction (QEC) has been achieved in a superconducting qubit circuit [1]. Realization of topological protection and QEC based on stabilizer codes will require protocols for QND measurement of multi-qubit Pauli operators on arbitrary selected subsets of qubits. Initial progress towards this goal has been achieved with four-qubit stabilizer pumping in a trapped ion system [2]. We present a general protocol for stabilizer measurement and pumping in a system of N superconducting qubits. We assume always-on, fixed dispersive couplings χ to a single mode of a high-Q microwave resonator in the strong-dispersive limit defined by $\chi \gg 1/T_2, \kappa$, where T_2 is the qubit coherence time and κ is the cavity line width. In this limit, we show how to measure an arbitrary weight $M \leq N$ Pauli operator, by entangling the multi-qubit state with two distinguishable coherent states of the cavity. Together with a fast cavity readout ($T_{\rm meas} \ll 1/\kappa$), which can be achieved by tunable coupling to a low-Q cavity mode, this enables the efficient measurement of mulit-qubit Pauli operators.

[1] M. D. Reed et al. Nature 2012, **482**, 382-385
[2] J. T. Barreiro et al. Nature 2011, **470**, 486

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