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In situ squeezing-enhanced qubit readout with intrinsic Purcell protection LUKE C. G. GOVIA, AASHISH A. CLERK, McGill University — We introduce a dispersive readout scheme for weakly coupled qubits that uses in situ two-mode squeezing to significantly enhance the signal-to-noise ratio (SNR). By generating the squeezing directly in the measurement cavity, our setup avoids the difficult task of injecting an externally prepared squeezed state with high fidelity. The scheme allows one to exponentially enhance the measurement at long times, allowing a weakly coupled system to achieve the same measurement rate as a strongly-coupled qubit in a standard dispersive measurement setup. In addition, Purcell decay of the qubit is highly suppressed in our system due to interference, implying that the system acts as its own Purcell filter.

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