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Stroboscopic qubit measurement with injected squeezed light, Part II: Enhancing SNR[1] ANDREW EDDINS, SYDNEY SCHREPPLER, DAVID TOYLI, LEIGH MARTIN, SHAY HACOHEN-GOURGY, Quantum Nanoelectronics Laboratory, Department of Physics, University of California, Berkeley CA 94720, USA, LUKE GOVIA, HUGO RIBEIRO, AASHISH CLERK, McGill University, Montreal, Quebec, Canada, IRFAN SIDDIQI, Quantum Nanoelectronics Laboratory, Department of Physics, University of California, Berkeley CA 94720, USA — Advances in measurement and amplification technology have dramatically decreased the time needed to perform quantum nondemolition (QND) measurements of superconducting qubits. As the efficiency with which a signal can be transferred from the qubit to room-temperature approaches unity, further reductions in measurement time will require new techniques, as the measurement power is limited by the dispersive readout mechanism. Here we demonstrate how injection of electromagnetic squeezed vacuum can enhance measurement fidelity. Our platform combines a stroboscopic measurement technique with an interferometric configuration of parametric amplifiers to optimally align squeezing with our phase-sensitive readout. In this second of two talks, we present data showing SNR improvements relative to measurements performed without squeezing. We further note that under some conditions, squeezing allows us to trade off measurement speed for an increase in overall measurement efficiency.

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