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High-fidelity dispersive readout using squeezed light. Part II
ARCHANA KAMAL, Massachusetts Institute of Technology, NICOLAS DIDIER, McGill University/Universite de Sherbrooke, SAMUEL BOUTIN, Universite de Sherbrooke, SIMON GUSTAVSSON, Massachusetts Institute of Technology, ANDREW J. KERMAN, WILLIAM D. OLIVER, MIT Lincoln Laboratory, TERRY P. ORLANDO, Massachusetts Institute of Technology, ALEXANDRE BLAIS, Universite de Sherbrooke, AASHISH A. CLERK, McGill University — Protocols employing squeezed radiation for quantum measurement have been realized in a gamut of systems. The central idea is to squeeze noise associated with the measured observable to enhance the signal-to-noise ratio (SNR) beyond the standard shot noise limit of detection. A similar strategy may be exploited to achieve fast, high-fidelity dispersive readout of superconducting qubits. Nonetheless, most of the reported schemes would require small dispersive shifts and/or encode information in vacuum fluctuations of the output quadrature, limiting their applicability in circuit-QED (cQED). In this talk, I will present further details on a new scheme using two-mode squeezing to dramatically enhance SNR in cQED measurement, in a setup where the qubit couples to two readout modes. I will discuss how the scheme is not limited to small dispersive couplings, and how it is robust even against various imperfections. Details on implementation of this protocol in practical cQED setups will also be discussed.

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