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Optimized reconstruction methods for imaging squeezed microwave states[1] ADITYA VENKATRAMANI, DAVID TOYLI, QNL, University of California, Berkeley, SAMUEL BOUTIN, Département de Physique, Université de Sherbrooke, ANDREW EDDINS, QNL, University of California, Berkeley, ALEXANDRE BLAIS, Département de Physique, Université de Sherbrooke, IRFAN SIDDIQI, QNL, University of California, Berkeley — Superconducting parametric amplifiers (paramps) are essential tools for quantum-limited measurement of superconducting qubits. A central feature of these devices is that they can ideally amplify information in one quadrature without adding noise while simultaneously squeezing fluctuations in the orthogonal quadrature. At microwave frequencies, moment-based reconstruction techniques are commonly utilized to image such squeezed states. Motivated by a desire to characterize and improve paramp squeezing performance, we have developed simulations to understand the application of these reconstruction techniques, with a focus on determining their performance at large signal gains where the amplifier output field becomes non-Gaussian. We make comparisons of this analysis to experimental data. We have also developed a complementary imaging method based on deconvolution techniques that is effective for high signal-to-noise ratios. This method benefits from a simple implementation and provides a best estimate for the output field Q function. We discuss experimental implementations of these techniques facilitated by the use of a broadband parametric amplifier.

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