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Resonance fluorescence from an artificial atom in squeezed vacuum, Part 2: Squeezing characterization through fluorescence[1] D.M. TOYLI, A. EDDINS, Quantum Nanoelectronics Laboratory, UC Berkeley, S. PURI, S. BOUTIN, Departement de Physique, Universite de Sherbrooke, D. HOVER, V. BOLKHOVSKY, MIT Lincoln Laboratory, W.D. OLIVER, MIT Lincoln Laboratory and Research Laboratory of Electronics, Massachusetts Institute of Technology, A. BLAIS, Departement de Physique, Universite de Sherbrooke, I. SIDDIQI, Quantum Nanoelectronics Laboratory, UC Berkeley — The accurate prediction of the fluorescence spectrum of a single atom under coherent excitation, comprising canonical phenomena such as the Mollow triplet, is a fundamental success of quantum optics. Despite considerable efforts, experiments demonstrating a strong modification to the resonance fluorescence spectrum resulting from driving an atomic system with non-classical squeezed light have remained elusive, in part due to challenges in efficient coupling. In this second of two talks, we discuss observations of the dramatic dependence of the Mollow triplet spectrum on the phase of the squeezed vacuum environment and measurements of subnatural fluorescence linewidths that demonstrate up to 3.5 dB of squeezing below the standard vacuum limit. In addition to realizing two seminal predictions for resonance fluorescence in squeezed vacuum, our work provides simple and robust metrological tools for characterizing squeezed light at microwave frequencies.

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