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Generation of Squeezed Light via Phase-Sensitive Amplification[1]
NEIL CORZO-TREJO, ALBERTO MARINO, QUENTIN GLORIEUX, Joint Quantum Institute / NIST-UMD, KEVIN JONES, Williams College, PAUL LETT, Joint Quantum Institute / NIST-UMD — A phase-sensitive amplifier (PSA) is based on a parametric process that can amplify or deamplify a signal depending on the phase of the input. It does so without degrading the signal-to-noise ratio of the input, making it possible to obtain noiseless amplification of signals. Furthermore the PSA can generate bright quadrature squeezed states of light and, when working unseeded, vacuum squeezed light. We present experimental results on the generation of quadrature squeezed light via phase-sensitive optical amplification based on four-wave mixing in hot ^{85}Rb vapor. The squeezing is observed for a wide range of pump powers and probe detunings on the D1 line. The squeezing is present in different transverse modes of the single output beam, making our system one of the first sources of multi-spatial-mode quadrature squeezed light. The maximum squeezing observed is -2.8 $\pm$ 0.2 dB, which is consistent with the best results reported using atomic vapors. We have also observed that this system can amplify signals without a significant degradation of the signal-to-noise ratio.

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Neil Corzo-Trejo
Joint Quantum Institute / NIST-UMD

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