Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Spatial Modes of a Squeezed Vacuum Field[1] MI ZHANG, College of William & Mary, R. NICHOLAS LANNING, ZHIHAO XIAO, JONATHAN P. DOWLING, Louisiana State University, IRINA NOVIKOVA, EUGENIY E. MIKHAILOV, College of William & Mary — We prepared a quantum noise suppressed squeezed vacuum field by propagating a beam with a wavelength of 795nm through a hot Rb cell. Observation of the quadrature noise showed that we achieved a noise suppression of -2.0 dB below the quantum noise limit. When a spatial mask was applied to the beam after its interaction with atoms, we observed that the detected quantum noise suppression strongly depended on the shape of the mask. An exploration of the spatial distribution of noise in the squeezed field illustrated that the squeezed field was in a different spatial mode from the pump field used as a local oscillator. Our research showed that the squeezed field consisted of several spatial modes with various squeezing parameters. If a pure squeezed mode could be extracted, it would enhance the signal to noise ratio, which would impact precision metrology and quantum memory applications.

[1]This project is supported by AFOSR grant FA9550-13-1-0098.

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Date submitted: 14 Nov 2014 Electronic form version 1.4