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Second quantization of squeezed light through non-linear medium ZHIHAO XIAO, R. NICHOLAS LANNING, Department of Physics and Astronomy, Louisiana State University, MI ZHANG, IRINA NOVIKOVA, EUGENIY E. MIKHAILOV, Department of Physics, College of William & Mary, JONATHAN P. DOWLING, Department of Physics and Astronomy, Louisiana State University — We investigate the interaction of Rb atoms and squeezed light which is treated quantum mechanically. We establish the model of Gaussian beam propagating through the non-linear medium. The spatial modes of the output beam include high order Laguerre-Gaussian (LG) modes. We find the differential equation describing the second-quantized input-output relations. Since the spatial LG modes of the output beam are entangled with the squeezed states, we apply various schemes of spatial modes selection in order to produce the squeezed states which can lead to various applications. We also explain the result of the experiment where a Gaussian pump field is put through a Rb cell and a sub-shot noise is found.

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