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Generation and spatial mode optimization of squeezed vacuum field in hot Rb vapor[1] MI ZHANG, MELISSA GUIDRY, College of William and Mary, R. NICHOLAS LANNING, ZHIHAO XIAO, JONATHAN P. DOWLING, Louisiana State University, IRINA NOVIKOVA, EUGENIY E. MIKHAILOV, College of William and Mary — We study a squeezed vacuum field generated in hot Rb vapor via the polarization self-rotation effect. By propagating the strong laser beam through a vapor cell once, we were able to achieve a noise suppression of 2 dB below shot noise. Our previous experiments showed that the amount of observed squeezing may be limited by the imperfect mode match between the squeezed field and the local oscillator (LO) due to the excitement of higher order modes during the atom-light interaction. Here, we use a liquid-crystal-based spatial light modulator (SLM) to change the spatial mode of the pump or the LO and optimize the squeezing result. We demonstrate that optimization of the spatial modes can lead to higher detected squeezing in some conditions, which would be very useful for precision metrology and quantum memory applications.

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Mi Zhang
College of William and Mary

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