Modelling Spatial Modes of Squeezed Vacuum R. NICHOLAS LANNING, ZHIHAO XIAO, Louisiana State University, MI ZHANG, IRINA NOVIKOVA, EUGENIY MIKHAILOV, College of William and Mary, JONATHAN P. DOWLING, Louisiana State University — We develop a fully quantum model to describe the spatial mode properties of squeezed light generated as a laser beam propagates through a Rb vapor cell. Our results show that a Gaussian pump beam can generate a collection of higher order Laguerre-Gaussian squeezed vacuum modes, each carrying a particular squeeze parameter and squeeze angle. We show that a proper sorting of modes could lead to improved noise suppression and thus make this method of squeezed light generation very useful for precision metrology and quantum memory applications. Additionally, we model a multi-pass beam configuration and show that this can lead to a further improvement of vacuum squeezing.

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