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Modelling Spatial Modes of Squeezed Vacuum – When it Comes to Squeezing, Plane Waves Are Just Too Plain R. NICHOLAS LANNING, ZHIHAO XIAO, Louisiana State University, MI ZHANG, IRINA NOVIKOVA, EUGENIY E. MIKHAILOV, College of William and Mary, JONATHAN P. DOWLING, Louisiana State University — Recent research relying on the *polarization self rotation* (PSR) effect in Rb^{87} has revealed a squeezed vacuum field consisting of several spatial modes with various squeezing parameters [Mi Zhang, Spatial Modes of a Squeezed Vacuum Field, 2015 APS March Meeting]. In order to explain these results, we re-derive the beam propagation model describing the creation of squeezed vacuum via PSR and incorporate more realistic multimode input-output relations in the paraxial approximation. We solve the propagation equation and use it to predict the spatial distribution of squeezed vacuum via the proper Laguerre-Gauss modal structure. This modal structure is instrumental in the development of a complete second quantized beam propagation formalism also being reported at this meeting [Zhihao Xiao, Second quantization of squeezed light through non-linear medium, 2015 APS March Meeting].

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