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Imaging Spatial Quantum Noise Suppression[1] SAVANNAH CUOZZO, NIKUNJKUMAR PRAJAPATI, William Mary, LIOR COHEN, ELISHA SIDDIQUI, JON DOWLING, Louisiana State University, IRINA NOVIKOVA, EUGENIY MIKHAILOV, William Mary — We will present our study on spatial quantum noise decomposition which allows us to image different quantum noise structures and manipulate the beam to optimize overall squeezing. Precision measurements are limited by intrinsic noise because of quantum uncertainty. This noise appears in two different quadratures - phase and amplitude quadratures. The noise quadratures obey the Heisenberg uncertainty principle, which sets the standard quantum limit (SQL), so we can reduce noise in one of these quadratures (at the expense of increasing noise in the other). Light with noise suppression in one of the quadratures below the SQL is called squeezed light. Squeezed light yields significant improvement of signal-to-noise ratios in many applications including precision metrology and optical communication. Squeezing, however, is not generated uniformly throughout the beam. To use these squeezed beams to our maximal advantage, we are developing methods that allow for spatial mode decomposition of the quantum beam. Advances in spatial detection and control of squeezed beams is of particular interest to optical communication technologies since it would allow quantum information transfer on individual spatial modes.

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