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Complete characterization of bright entangled twin beams with analysis cavity method[1] GAURAV NIRALA, University of Oklahoma, MARCELO MARTINELLI, PAULO NUSSENZVEIG, Universidade de So Paulo, ALBERTO M. MARINO, University of Oklahoma — The ability to perform a complete and accurate characterization of a quantum state is a fundamental problem in quantum information science. However, for continuous-variable (CV) Gaussian states, the standard measurement technique, homodyne detection, does not provide a complete characterization. This technique cannot access certain correlations present in a field, which are implicitly assumed to be zero in most quantum state reconstruction experiments. Given the unique role that CV quantum states play in precision measurements and quantum information science and the fact that they can be readily generated in a deterministic way in the laboratory, it is important to develop techniques that can accurately characterize them. Here we report on measurements performed with an analysis cavity that can provide a complete reconstruction of the covariance matrix for entangled twin beams generated with a four-wave mixing process in rubidium vapor. In particular, we show that there are off-diagonal elements in the covariance matrix that prove the presence of the correlations that are not accessible with homodyne detection.

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