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Optical Angular Momentum manipulations in a Four Wave Mixing process[1] NIKUNJKUMAR PRAJAPATI, NATHAN SUPER, William and Mary, NICHOLAS LANNING, JON DOWLING, Louisiana State University, IRINA NOVIKOVA, Williams and Mary, WILLIAM AND MARY QUANTUM OPTICS COLLABORATION, LOUISIANA STATE UNIVERSITY COLLABORATION — We investigate the spatial and quantum intensity correlations between the probe and Stokes optical fields produced via four-wave mixing in a double-λ configuration. When both fields carry non-zero optical orbital angular momentum (OAM), we observed that the topological charge of the generated Stokes field obeyed the angular momentum conservation law and that the intensity squeezing between the two fields were mostly independent on their OAM value. We also investigated the case of a composite-vortex pump field, containing two closely-positioned optical vortices, and showed that the generated Stokes field carried the OAM corresponding to the total topological charge of the pump field. Our current work focuses on showing squeezing and polarization entanglement using a dual-rail experimental arrangement, for which we are developing a simplified version of a truncated SU (1,1) interferometer.

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