Abstract Submitted
for the 4CF17 Meeting of
The American Physical Society

Radial mode filtering of vortex and vector beams with capillary waveguides DAVID SCHMIDT, CHLOE KEEFER, CHARLES DURFEE, Colorado School of Mines — Vortex and vector beams have been receiving attention in numerous areas of research. Vortex modes are being investigated as channels for carrying information and for their orbital angular momentum properties. Vector beams, with radial or azimuthal polarization, can give pure longitudinal electric or magnetic fields on axis when focused. At the center of the mode, the field goes to zero owing to a singularity in either phase (vortex beams) or polarization (vector beams). These beams are natural modes in free space (Laguerre-Gauss) and circular cross-section waveguides. Optical elements have been developed to produce these beams by applying a spiral phase or polarization rotation to an initial Gaussian beam. The resulting beam has the desired phase or polarization property, but is a superposition of radial modes. In our research, we are interested in mode-specific nonlinear interactions with these beams. In this presentation, we show analytically and experimentally that hollow core waveguides can be used to filter unwanted high-order radial modes of the beam. We describe optimization of the coupling to waveguide and the lossy propagation to predict the ideal filtering properties. We also discuss applications of these beams to third-order mixing and high-order harmonic generation.

David Schmidt
Colorado Sch of Mines

Date submitted: 19 Sep 2017 Electronic form version 1.4