Abstract Submitted
for the DAMOP10 Meeting of
The American Physical Society

Towards quantum imaging with multi-spatial mode quantum-correlated twin-beams JEREMY CLARK, ANDREW LANCE, NEIL CORZO, ALBERTO MARINO, Joint Quantum Institute, NIST, University of Maryland, KEVIN JONES, NIST, Department of Physics, Williams College, PAUL LETT, Joint Quantum Institute, NIST, University of Maryland — Quantum optical properties of multi-spatial mode light fields allow for a variety of multichannel quantum information applications including quantum imaging. We have constructed a new apparatus capable of generating pulsed quantum correlated twin-beams via a four-wave mixing process in a hot rubidium vapor. We report temporal intensity-difference squeezing in both the continuous-wave and pulsed regimes with pulse durations as short as one microsecond. Such temporal squeezing measurements, however, typically involve focusing the entirety of each beam onto a pair of balanced photodetectors and therefore fail to resolve spatial characteristics of the light. We aim to extend the analysis of our system into the spatial domain by imaging these bright twin-beams onto a CCD camera and performing image registration in order to demonstrate sub-shot-noise spatial correlations over the ensemble of corresponding coherence areas in each beam. Ultimately, our objective is to use such an apparatus to demonstrate quantum-enhanced imaging techniques that benefit from the use of several spatial modes.

Jeremy Clark
Joint Quantum Institute, NIST, University of Maryland

Date submitted: 22 Jan 2010 Electronic form version 1.4