Abstract Submitted
for the DAMOP11 Meeting of
The American Physical Society

Spatially Resolved Object Detection Using Entangled Twin Beams JEREMY CLARK, ZHIFAN ZHOU, QUENTIN GLORIEUX, ULRICH VOGL, PAUL LETT, JQI/NIST — It has been demonstrated that squeezed twin beams of light generated using four-wave mixing in hot rubidium vapor can produce multiple simultaneously entangled spatial modes allowing for the production of "entangled images." We propose, model, and experimentally investigate schemes that would exploit these quantum correlations in order to resolve the shape of a mask partially obstructing one of the twin beams. In one scheme we generate twin beams of squeezed vacuum using four-wave mixing on the D1 line of 85Rb and place an arbitrarily shaped mask in the path of one of the quantum correlated squeezed vacuum fields. We simultaneously perform balanced homodyne detection on both the obstructed beam as well as its unobstructed twin with matched local oscillators that are dynamically shaped using a spatial light modulator. The spatial light modulator can then be programmed to search for the local oscillator shape that matches that of the squeezed vacuum leaking through the mask. By using information obtained by the detection of both beams we can resolve the shape of the partially obstructing mask with an enhanced sensitivity unobtainable using classical states of light.

Jeremy Clark
NIST

Date submitted: 04 Feb 2011 Electronic form version 1.4