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Nonlinear optical SU(1,1) interferometer using four-wave mixing in Rb PRASOON GUPTA, BRIAN ANDERSON, TRAVIS HORROM, PAUL LETT, University of Maryland, NONLINEAR OPTICS GROUP, JOINT QUANTUM INSTITUTE TEAM — Quantum-enhanced precision measurements have emerged as one of the most useful applications of quantum optics. By replacing the beamsplitters in a traditional Mach-Zender interferometer with parametric amplifiers, one can create a nonlinear SU(1,1) interferometer. Nonclassical correlations in the interior state of the interferometer allow for Heisenberg-limited sensitivity of this device, an improvement over classical interferometers. The optical SU(1,1) interferometer can be experimentally realized using four-wave mixing in hot rubidium vapor to generate twin beams, and then recombining these beams in a second four-wave mixing process after a phase shift. We investigate the properties of this interferometer both theoretically and experimentally and examine how the sensitivity depends on detection method.

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