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Precision phase measurements with an SU(1,1) interferometer using 4-wave mixing in hot Rb85 vapors[1] PRASOON GUPTA, BRIAN ANDERSON, TRAVIS HORROM, PAUL LETT, Univ of Maryland-College Park — Interferometry allows for the precision measurement of length and optical phase. Quantum entanglement of the optical state internal to the interferometer can help in achieving higher precision in phase measurement than is possible with classical light sources.[2][3] In this context we are constructing an SU(1,1) interferometer[3] in order to perform precision measurement of optical phase. An SU(1,1) interferometer can be understood as a Mach-Zehnder interferometer with the beam splitters replaced by a non-linear gain medium which can generate entangled photons. The output depends on the relative phase shift provided to the photons inside the interferometer.[3][4][5] We use either vacuum or coherent beam seeds for the optical paths. Here we measure the error in our optical phase depending on the measurement of the number of photons at the outputs of the interferometer and compare it with the classical and Heisenberg limits. In future we also want to apply more sophisticated techniques of Bayesian analysis to our measurements to compute the error in optical phase estimation which could improve the sensitivity of phase estimation.[6]

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