

Abstract Submitted  
for the MAR07 Meeting of  
The American Physical Society

**Heisenberg limited Sagnac interferometry** AZIZ KOLKIRAN, G.S. AGARWAL, Oklahoma State University — When two electromagnetic waves counter-propagate along a circular path in rotation they experience different travel times to complete the path. This induces a phase shift between the two counter-propagating waves proportional to the angular velocity of the rotation. It was studied and used in optics only with lasers until recently when single photons were used. However, it turns out that the results of interference are no different than with classical sources. Thus a natural question would be –what is the nature of interference if we replace the single photon source by entangled photon pair source. This is what we examine in detail. We find that the sensitivity of Sagnac interferometer could be considerably improved by using entangled photons produced by a down-converter. We present analytic results for the sensitivity of the interferometer. In particular, two-photon and four-photon entanglements increase the sensitivity by a factor of 2 and 4 respectively.

Aziz Kolkiran  
Oklahoma State University

Date submitted: 02 Dec 2006

Electronic form version 1.4