Sagnac Effect in superpositions of vortex states in Bose-Einstein Condensates

Abstract: Creation and manipulation of macroscopic - superposition as well as entangled - Bose-Einstein condensates (BEC) with all-optical means has become feasible over the years and corresponds to a mature technology with important applications to quantum information. In an entirely different area of optical manipulations, tremendous progress has been made in creating, manipulating and measuring orbital angular momentum (OAM) states of light [1]. These two areas of research were coupled to explore creation of superposition of vortex states of BECs through transfer of angular momentum of light from specially prepared OAM states [2]. I will discuss the Sagnac effect [3,4] produced using counter-rotating atom currents produced by these vortex states. The sensitivity and limitations of such a Sagnac interferometer is also discussed.

References

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[4] M.O. Scully and J. P. Dowling, "Quantum noise limits to matter-wave interferometry", Phys. Rev. A **48**, 3186 (1993)