

Abstract Submitted  
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**The non-linear Sagnac effect and potential limitations to matter wave inertial navigation** JOHN BURKE, Air Force Research Laboratory, JAMES STICKNEY, Space Dynamics Laboratory — The classical Sagnac effect relates the phase shift in a separated paths, area-enclosing interferometer to the rotation rate of the platform to which the interferometer is attached [1]. In the case of a Sagnac interferometer that employs matter waves (e.g. laser cooled atoms)[2], the separated path waves are not only shifted in phase relative to each other, but also spatially deflected relative to each other and relative to the platform. The displacement of the matter-waves leads to corrections to the Sagnac effect resulting in nonlinearity in rotation rate. This effect has significant repercussions to the design of inertial navigation devices that use matter waves and may limit the sensitivity of inertial measurement in some circumstances.

[1] Sagnac, Georges. Comptes Rendus 157, 708-710 (1913).

[2] Cronin, A.D. et al. Rev. Mod. Phys. 81, 1051-1129 (2009)

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