Contribution ID: **364** Type: **Poster**

【723】Spin-Rotation Coupling Observed in Neutron Interferometry

Wednesday 28 August 2019 19:02 (1 minute)

Spin-rotation coupling is an extension of the Sagnac effect, based upon the inertia of intrinsic spin. To confirm its existence, a neutron interferometer experiment was proposed [1,2] coupling the spin to the rotation of a magnetic field. The results of a neutron polarimeter experiment comply with the prediction but can also be explained semi-classically.
A spin manipulator for a respective interferometer experiment is developed [3] which produces a rotating field while ensuring a non-adiabatic transition, necessary to induce Larmor precession. The observed phase shift of interferograms [4] is linearly dependent on the frequency of the rotating field. This result is purely quantum mechanical.

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[2] B. Mashhoon and H. Kaiser, Inertia of intrinsic spin, Physica B 385–386, 1381 (2006)
[3] A. Danner et al., Development and perfomance of a miniaturised spin rotator suitable for neutron interferometer experiments, J. Phys. Commun. 3, 035001 (2019)
[4] A. Danner et al., Spin-Rotation Coupling Observed in Neutron Interferometry, arXiv 1904.07085

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Session Classification: Poster Session

Track Classification: Quantum Beam Science: bio, materials and fundamental physics with neutrons and X-rays