

Abstract Submitted
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A Search for Exotic Spin-Gravity Couplings Through Polarized Neutron Interferometry¹ KYLE STEFFEN, IU Bloomington, ROBERT DALGLIESH, ISIS-RAL, NIELS GEERITS, TU Wien, STEVEN PARNELL, JEROEN PLOMP, TU Delft, ROGER PYNN, W. MICHAEL SNOW, IU Bloomington, NINA-JULIANE STEINKE, ISIS-RAL, AD VAN WELL, TU Delft, VICTOR DE HAAN, BonPhysics — In 1975 Colella, Overhauser, and Werner demonstrated the accessibility of gravitationally- induced phase shifts in quantum systems using perfect silicon crystal neutron interferometry. [1] Recently, further measurement of this effect has been made using the OffSpec instrument (ISIS-RAL) in spin-echo mode to act as a polarized neutron interferometer. [2] The ability to interfere neutrons of various polarization orientations to measure gravitationally-induced phase shifts provides an opportunity to search for spin-dependent gravitational effects. [3] I will describe a direct search for Lorentz violating spin-gravity couplings in the fermion sector of the Standard Model Extension. [4] An overview of the experimental system will be presented, as well as the status of data collection and analysis.

[1] R. Colella, A.W. Overhauser, S.A. Werner, Phys. Rev. Lett. 34 (1975)

[2] V.O. de Haan, *et al.*, Phys. Rev. A 89 (2014)

[3] Y. Bonder, Phys. Rev. D 88 (2013)

[4] Z. Li and A. Kostelecky, private communication (2019)

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Kyle Steffen
IU Bloomington

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