Abstract Submitted
for the DNP19 Meeting of
The American Physical Society

A Search for Possible Long Range Spin-Dependent Interactions of the Neutron from Exotic Vector Boson Exchange[1] KRYSTYNA LOPEZ, Indiana University Bloomington, NSR COLLABORATION — An exotic axial vector interaction in the mm-μm range using spin-dependent neutron-atom interactions though exchange of spin-1 bosons has been predicted in some extensions of the Standard Model. An experiment in search of this interaction was performed on FP12 at LANSCE (LANL) by sending transversely polarized slow neutrons through a series of open parallel slots bounded by flat rectangular plates of copper and glass arranged so that the possible exotic interaction would tilt the plane of polarization along the neutron momentum [1]. The resulting rotation $\varphi' = [2.8 \pm 4.6(stat.) \pm 4.0(sys.)] \times 10^{-5}$ rad/m was consistent with zero [2]. For the potential $V_5 = \frac{g_A^2}{4\pi m}\frac{e^{-m_0 r}}{r}(\frac{1}{r}+\frac{1}{\lambda_c})\vec{\sigma}\cdot(\vec{v}\times\hat{r})$ the upper bound on the coupling constant g_A^2 was improved by about three orders of magnitude in the mm-μm range [3]. We discuss this result along with plans to further improve the sensitivity of our search by at least 2 orders of magnitude at the NIST NG-C beam using tungsten and glass plates as the target.

[1] C. Haddock et al., Nucl. Inst. Meth. A 885 (2018)
[2] C. Haddock et al., Physics Letters B 783 (2018)
[3] F. M. Piegsa and G. Pignol, Phys. Rev. Lett. 108 (2012)

[1]This work is supported by NSF grant PHY-1614545.

Krystyna Lopez
Indiana University Bloomington

Date submitted: 01 Jul 2019 Electronic form version 1.4