

Abstract Submitted
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Searches for possible T-odd and P-odd interactions of mesoscopic range using polarized nuclei and nonmagnetic masses RAKSHYA KHATI-WADA, Indiana University, PINGHAN CHU, Duke University, ALEC DENNIS, Indiana University, CHANGBO FU, Shanghai Jiaotong University, HAIYAN GAO, GEORGIOS LASKARIS, Duke University, KE LI, ERICK SMITH, MIKE SNOW, HAIYANG YAN, Indiana University, WANGZHI ZHENG, Duke University — Various theories predict the possible existence of T-odd and P-odd interactions of mesoscopic ranges (millimeters to microns) between two spin 1/2 fermions proportional to $\mathbf{S}\cdot\mathbf{r}$, where \mathbf{S} is the spin of one of the fermions and \mathbf{r} is the unit vector between the particles. We use ensembles of polarized nuclei and an unpolarized mass along with NMR technique to search for such an interaction over sub-mm ranges. We established an improved upper bound on $g_s g_p^n$, the product of the scalar coupling to particles in the unpolarized mass and the pseudoscalar coupling of polarized neutrons for force ranges from 10^{-4} to 10^{-2} m, corresponding to a mass range of $2\cdot 10^{-3}$ to $2\cdot 10^{-5}$ eV for the exchange boson [1]. We will describe this experiment and possible improvements.

[1] P. H. Chu, A. Dennis, C. B. Fu, H. Gao, R. Khatiwada, G. Laskaris, K. Li, E. Smith, W. M. Snow, H. Yan, and W. Zheng, Phys. Rev. D **87**, 011105(R) (2013)

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