

Abstract Submitted  
for the DNP17 Meeting of  
The American Physical Society

**Parity-Violating Neutron Spin Rotation in  $n$ - $^4\text{He}$** <sup>1</sup> MURAD SAR-SOUR, Georgia State University, NSR COLLABORATION<sup>2</sup> — The neutron spin rotation (NSR) collaboration used parity-violating spin rotation of transversely polarized neutrons transmitted through a 0.5 m liquid helium target to constrain weak coupling constants between nucleons. While consistent with theoretical expectation, the upper limit set by this measurement on the rotation angle,  $d\phi/dz = [+1.7 \pm 9.1(\text{stat.}) \pm 1.4(\text{sys.})] \times 10^{-7}$  rad/m, is limited by statistical uncertainties. The NSR collaboration is preparing a new measurement to improve this statistically-limited result by about an order of magnitude. In addition to using the new high-flux NG-C beam at the NIST Center for Neutron Research, the apparatus was upgraded to take advantage of the larger-area and more divergent NG-C beam. In addition, significant improvements are being made to the cryogenic design. The upgraded apparatus was used with a room temperature target for another project at LANSCE and performed very well. Details of these improvements and readiness of the upgraded apparatus will be discussed. We will also comment on how recent theoretical work combining effective field theory techniques with the  $1/N_c$  expansion of QCD along with previous NN weak measurements can be used to make a prediction for  $d\phi/dz$  in  $n+^4\text{He}$ .

<sup>1</sup>This work is supported by DE-SC0010443, NSF PHY-1614545

<sup>2</sup>Neutron Spin Rotation

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Date submitted: 29 Jun 2017

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