Abstract Submitted
for the DNP13 Meeting of
The American Physical Society

Parity-Violating Neutron Spin Rotation in Hydrogen and Deuterium and the Predictive Power of EFT[1] HARALD W. GRIESSHAMMER, Institute for Nuclear Studies, Department of Physics, George Washington University — One of the least-explored sectors of the Standard Model is the weak part of the nuclear force. Experiments on hadronic parity-violation (PV) at low energies require one comprehensive theoretical framework with reliable error-estimates to: check data consistency; subtract binding effects; and extract the PV interaction strengths. "Pion-less" Effective Field Theory is such a method with minimal theoretical bias. Different PV parameters are probed in np and nd spin rotation. Using naïve dimensional analysis, the signal for standard target densities is $\left|\frac{\mathrm{d}\phi_{\mathrm{PV}}}{\mathrm{dl}}\right| \approx [10^{-7}\cdots 10^{-6}]\frac{\mathrm{rad}}{\mathrm{m}}$. An estimate of the numerical and systematic uncertainties of our calculations indicates excellent convergence. We also show that PV 3-nucleon interactions are suppressed in the nd-system, despite the non-perturbative renormalisation of parity-conserving 3-nucleon interactions. Therefore, few-nucleon experiments can dis-entangle PV 2-nucleon interactions at the 10%-level without introducing new unknowns.

[1] H. W. Grießhammer, M. R. Schindler and R. P. Springer, Eur. Phys. J. A 48 (2012) 7.
[2] H. W. Grießhammer and M. R. Schindler, Eur. Phys. J. A 46 (2010) 73

[1]Supported in part by the US National Science Foundation under CAREER award PHY- 0645498, by the US Department of Energy under contract DE-FG02-95ER-40907, and by University Facilitating Funds of the George Washington University.

Harald W. Griesshammer
Institute for Nuclear Studies, Department of Physics,
George Washington University

Date submitted: 21 Jun 2013 Electronic form version 1.4