

Hadronic parity violation in few-nucleon systems

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The weak interaction between quarks induces a parity-violating component in the interactions between nucleons (see, e.g., Refs. [1,2,3]). Compared to the dominant parity-conserving part, this parity-violating component is typically suppressed by a factor of $\approx 10^{-6}$ or more. Due to the short range of the weak interactions, however, it provides a unique probe of the strong dynamics that bind quarks into nucleons. An experimental program to map out this weak component of the nuclear force is underway at a number of facilities, including the Spallation Neutron Source at Oak Ridge National Laboratory. I will discuss recent theoretical progress to analyze and interpret hadronic parity violation in few-nucleon systems. In particular, most experimentally accessible observables are related to processes at very low energies, at which pionless effective field theory provides a reliable and model-independent theoretical approach to hadronic parity violation. I will describe results in two- and three-nucleon systems [4,5,6], the role of parity-violating three-nucleon forces [7], and discuss the extension to systems with more constituents.

- [1] E. G. Adelberger and W. C. Haxton, *Ann. Rev. Nucl. Part. Sci.* **35**, 501 (1985).
- [2] M. J. Ramsey-Musolf and S. A. Page, *Ann. Rev. Nucl. Part. Sci.* **56**, 1 (2006) [hep-ph/0601127].
- [3] M. R. Schindler and R. P. Springer, *Prog. Part. Nucl. Phys.*, *in press* [arXiv:1305.4190 [nucl-th]].
- [4] D. R. Phillips, M. R. Schindler and R. P. Springer, *Nucl. Phys. A* **822**, 1 (2009) [arXiv:0812.2073 [nucl-th]].
- [5] M. R. Schindler and R. P. Springer, *Nucl. Phys. A* **846**, 51 (2010) [arXiv:0907.5358 [nucl-th]].
- [6] H. W. Griesshammer, M. R. Schindler and R. P. Springer, *Eur. Phys. J. A* **48**, 7 (2012) [arXiv:1109.5667 [nucl-th]].
- [7] H. W. Griesshammer and M. R. Schindler, *Eur. Phys. J. A* **46**, 73 (2010) [arXiv:1007.0734 [nucl-th]].

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