Abstract Submitted
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Compton scattering on the proton and deuteron in chiral effective field theory[1] DANIEL PHILLIPS, Ohio University — In this talk I will discuss recent efforts I have been involved in to describe Compton scattering in one- and two-nucleon systems using chiral perturbation theory (χPT). I will begin by summarizing the status of γp scattering in χPT. For this reaction we fit the two undetermined parameters in the $O(Q^4)$ γp amplitude of McGovern [1] to experimental data in the region $\omega, \sqrt{|t|} \leq 180$ MeV, obtaining a χ^2/d.o.f. of 133/113 [2]. This yields a model-independent extraction of proton polarizabilities based solely on low-energy data: $\alpha_p = (12.1 \pm 1.1\ (\text{stat.}))^{+0.5}_{-0.5}$ (theory) and $\beta_p = (3.4 \pm 1.1\ (\text{stat.}))^{+0.1}_{-0.1}$ (theory), both in units of 10^{-4} fm^3. I will then discuss how the χPT formalism can be extended to treat deuteron Compton scattering. In particular, χPT provides a systematic treatment of the large isoscalar exchange currents that occur in this process, and so it facilitates extractions of nucleon polarizabilities from γd data which have a well-motivated theoretical error bar [2].

References

[1] J.A. McGovern, Phys. Rev. C **63**, 064608 (2001).

[2] S.R. Beane, M. Malheiro, J.A. McGovern, D.R. Phillips, and U. van Kolck, Phys. Lett. B **567**, 200 (2003); Nucl. Phys. A **747**, 311 (2005).

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