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Polarisabilities of the proton and neutron from Compton scattering

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We have recently completed a high-precision extraction of the proton spin-independent polarisabilities from the world database of low-energy Compton scattering experiments, within the framework of chiral effective field theory (χEFT) with pions, nucleons, and the Delta(1232) as explicit degrees of freedom [1]. Our Baldin-sum-rule-constrained results are [2]
α_p = 10.65 ± 0.35(stat) ± 0.2(Baldin) ± 0.3(theory),
β_p = 3.15 ± 0.35(stat) ± 0.2(Baldin) ± 0.3(theory).
These were obtained in the heavy-baryon formulation, but almost identical results have been obtained in a covariant calculation [3]. With the publication this year by Myers et al. of the results of the deuteron Compton scattering experiment using the Tagged-Photon Facility at the MAX IV Laboratory in Lund, Sweden, the world γ-d database has doubled in size, allowing the extraction of the isoscalar polarisabilities with unprecedented accuracy, and combined with the proton results we obtain [4]
α_n = 11.65 ± 1.25(stat) ± 0.2(Baldin) ± 0.8(theory),
β_n = 3.55 ± 1.25(stat) ± 0.2(Baldin) ± 0.8(theory).
A new generation of experiments with polarised beams have been performed at the Mainz Microtron, with the first results published this year by Martel et al. [5]. These experiments are sensitive to the spin polarisabilities, and we will discuss the predictions of χEFT for the relevant cross sections cross sections and asymmetries.

References
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