Abstract Submitted
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Pion-Mass Dependence of the Nucleon Polarisabilities: A Reappraisal[1] DANIEL R. PHILLIPS, Department of Physics and Astronomy and Institute of Nuclear and Particle Physics, Ohio University, Athens OH, USA, HARALD W. GRIESSHAMMER, Institute for Nuclear Studies, Department of Physics, George Washington University, Washington DC, JUDITH A. MCGOVERN, School of Physics and Astronomy, The University of Manchester, Manchester, UK — The static electric and magnetic scalar dipole polarisabilities and the four spin polarisabilities parametrise the nucleon's two-photon response. At next-to-next-to-leading order in Chiral Effective Field Theory (χEFT) with dynamical $\Delta(1232)$s, they have recently been extracted from Compton scattering data; ongoing experiments at HIγS, MAMI and MAXlab test proton-neutron differences and chiral symmetry breaking. Comparing lattice QCD simulations at pion masses $m_\pi > 220$MeV to data and χEFT predictions requires a reliable extrapolation to the physical point. Since χEFT provides a systematically improvable, model-independent parametrisation of the polarisabilities, it is well-suited for that task. The relative theoretical uncertainties increase with increasing m_π: the magnitudes of the polarisabilities decrease; the χEFT expansion parameter itself increases; and the $\Delta(1232)$ becomes more important, leading to a re-ordering of contributions. After a review of χEFT, this presentation offers a method to quantitatively assess error-bands for chiral lattice extrapolations which can also be applied to other cases. Published errors appear to be underestimated.

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