

Abstract Submitted
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Compton Scattering from the Deuteron to Investigate Neutron Polarizability GERALD FELDMAN, George Washington University — The electric and magnetic polarizabilities of the neutron can be studied in Compton scattering reactions on deuterium via elastic scattering from the whole nucleus or quasi-free (QF) scattering from the bound neutron. Quasi-free scattering experiments have been performed at Saskatoon and Mainz, and the most precise values to date for the neutron polarizabilities were obtained recently at Mainz. Elastic Compton scattering data from Illinois, Saskatoon and Lund have been analyzed using effective field theories (EFT) and have yielded only moderately precise values, even when combining data sets together. The current EFT extractions are limited by the quality of the data which cover only restricted regions in energy and angle. In order to acquire an extensive and consistent data set for elastic Compton scattering from deuterium, we are initiating a new experimental program at Lund using tagged photons in the energy range 40-110 MeV and the angle range 30° - 150° using three large-volume high-resolution NaI detectors ($\Delta E/E \sim 2\%$ at 100 MeV). With a projected statistical accuracy of 5%, these new data will substantially constrain the EFT calculations and enable an experimental precision for the neutron polarizabilities that approaches the proton values. Previous work on deuterium (both QF and elastic) will be reviewed and an overview of the upcoming Lund experiments on elastic Compton scattering will be presented.

Gerald Feldman
George Washington University

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