

Measurement of Compton scattering at MAMI and extraction of nucleon polarizabilities

Polarizabilities are fundamental properties related to the internal dynamics of the nucleon. They play a crucial role not only in our understanding of the nucleon, but also in other areas such as precision atomic physics. The experimental program performed by the A2 Collaboration at the MAMI accelerator facility in Mainz aims for an accurate extraction of the nucleon polarizabilities using Compton scattering on nucleons. Recently, the A2 Collaboration at MAMI measured the unpolarized cross-section and the beam asymmetry Σ_3 for Compton scattering below pion photoproduction threshold with unprecedented precision. This measurement allowed accurate extraction of the proton scalar polarizabilities based only on this new data set. Moreover, for the extraction of the spin polarizabilities, the beam asymmetry Σ_3 and the beam-target asymmetries Σ_{2x} and Σ_{2z} were measured at energies above pion production threshold, where the sensitivity to the spin polarizabilities increases. Presently, the A2 Collaboration plans a high-precision measurement of the neutron polarizabilities using Compton scattering on light nuclei with novel experimental technique, exploiting an active target in combination with the Crystal Ball/TAPS setup. In this talk, the current results and the plans for the upcoming measurements with the A2 setup at MAMI will be presented.

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