

Measurement of the proton scalar polarizabilities at MAMI

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The electric (α_{E1}) and magnetic (β_{M1}) scalar polarizabilities are fundamental properties related to the internal structure of the nucleon. They play a crucial role not only in our understanding of the nucleon, but also in other areas such as atomic physics. In the past, the values of α_{E1} and β_{M1} were determined from the unpolarized differential cross-section of the Compton scattering $\gamma p \rightarrow \gamma p$. The measurement of the beam asymmetry Σ_3 , provides an alternative approach to the extraction of the scalar polarizabilities, with different sensitivity and systematics compared to the unpolarized cross-section. This asymmetry was measured for the first time below the pion photoproduction threshold by the A2 Collaboration with the Crystal Ball/TAPS experiment at MAMI (Mainz, Germany). A linearly polarized photon beam impinged on a liquid hydrogen target and the scattered photons were detected with the Crystal Ball/TAPS setup, providing almost 4π coverage. A new high precision measurement of both unpolarized cross-section and beam asymmetry Σ_3 will be performed in the near future and polarizabilities α_{E1} and β_{M1} will be extracted with unprecedented precision. The impact of the recently obtained and expected results on the extraction of the scalar polarizabilities will be discussed in this talk.

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