

Plenarvortrag

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Modern Real Photon Experiments: Illuminating the Structure and Excitations of the Nucleon — ●SVEN SCHUMANN for the A2-Collaboration — Institut für Kernphysik, Johannes Gutenberg-Universität Mainz

One of the challenges of modern physics is the understanding of QCD in the non-perturbative regime, when hadrons emerge from their constituents. Determinations of fundamental properties like electromagnetic polarisabilities and studies of the excitation spectrum of hadrons provide insight into hadronic structures at low energies. The most prominent example of a hadronic system in non-perturbative QCD, the nucleon, can be investigated with real photons in Compton scattering and meson photoproduction experiments. In real Compton scattering,

measurements of polarisation observables provide access to nucleon polarisabilities. For pseudoscalar meson production (e.g. $\gamma p \rightarrow p\pi^0$) polarisation observables can be used to study the excitation spectrum of the nucleon, where a sufficiently large set of observables will pave the way towards a model independent partial wave analysis to disentangle overlapping N^* and Δ resonances. In recent years, high-intensity real photon experiments with both polarised beams and targets, combined with 4π detector systems have become available at various facilities like MAMI, ELSA, or JLab. This talk will present an overview of the ongoing programme of real photon experiments with a tagged photon beam and the Crystal Ball / TAPS detectors at MAMI. Latest results from Compton scattering and π^0 photoproduction and the current status of single-energy partial wave analyses for $\gamma p \rightarrow p\pi^0$ will be discussed.