

Measurement of the double polarization observable E in the reaction $\vec{\gamma}\vec{p} \rightarrow p\eta'$

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The main goal of the CBELSA/TAPS experiment is the investigation of the nucleon excitation spectrum, which consists of many overlapping resonances. In order to disentangle the different resonance contributions, a partial wave analysis is necessary. In the field of photoproduction of single pseudoscalar mesons, the measurement of a well chosen set of at least eight single and double polarization observables enables the determination of an unambiguous solution. Of particular interest is the η' meson since it couples only to resonances with isospin $I = \frac{1}{2}$, thus reducing the number of overlapping resonances. Additionally, its comparatively high mass gives access to the poorly understood regime of high-lying resonances.

With the CBELSA/TAPS experiment at the electron stretcher accelerator ELSA double polarization observables can be obtained by studying photoproduction reactions using a linearly or circularly polarized photon beam in combination with a longitudinally or transversely polarized butanol target. The calorimeter setup is well suited for the detection of neutral mesons in the final state due to its almost 4π angular coverage and its high detection efficiency for photons. One of those mesons is the η' meson, whose two decay modes $\eta' \rightarrow \gamma\gamma$ and $\eta' \rightarrow \pi^0\pi^0\eta \rightarrow 6\gamma$ were analyzed for a beam photon energy range of 1400-2400 MeV. The preliminary results for the double polarization observable E will be shown.

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