Photoproduction of eta mesons off protons at CB-ELSA

A. WOODARD, V. CREDE, A. MCVEIGH, Florida State University, CB-ELSA COLLABORATION — QCD-inspired models predict more states in the hadron mass spectrum than have been seen experimentally. Models show that some of these states should be observed in photoproduction experiments, thus providing a sensitive tool to study hadron properties. Baryon resonances have broad, overlapping widths. Photoproduction of η mesons serves as an isospin filter; the η meson has isospin \( I = 0 \) and for this reason, isospin conservation guarantees that the \( N\eta \) final state can only be reached via formation of \( N^* \) resonances. Contributions from \( Δ^* \) states with \( I = 3/2 \) are excluded. We used the Crystal-Barrel Detector (CsI(Tl) calorimeter) at ELSA to determine the cross-section of the reaction \( \gamma p \rightarrow η p \) studying the \( η \) in its two neutral decay modes (\( η \rightarrow 3π^0 \rightarrow 6γ \) and \( η \rightarrow 2γ \)) for photon incoming energies in the range of \( E_γ = 850 − 3000 \text{ MeV} \). In this experiment, the Two-Armed Photon Spectrometer (TAPS) was placed in the forward direction. This BaF\(_2\) calorimeter serves as a fast trigger and increases the overall angular coverage to essentially the full \( 4\pi \) solid angle. We present differential cross sections for η photoproduction off the proton for \( (−1 < \cos θ_η^{\text{cms}} < 1) \). Approximately 600,000 events have been identified. Preliminary results of a partial wave analysis are discussed.

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