Photoproduction of the Σ^{*-} resonance from the neutron at LEPS

K. Hicks (for the LEPS Collaboration)

Department of Physics, Ohio University

The $\Sigma(1385)$ resonance, or Σ^*, is well-known as part of the standard baryon decuplet with spin $J = 3/2$. Measurements of the reaction $\gamma p \to K^+\Sigma^{*0}$ are difficult to extract due to overlap with the nearby $\Lambda(1405)$ resonance. However, the reaction $\gamma n \to K^+\Sigma^{*-}$ has no overlap with the $\Lambda(1405)$ due to its charge. In this talk, the first measurement are reported of cross sections and beam asymmetries for photoproduction of the Σ^{*-} from a deuteron target, where the K^+ and π^- are detected in the LEPS spectrometer. The cross sections at forward angles range from 0.4 to 1.2 μb, with a broad maximum near $E_\gamma \simeq 1.85$ GeV, and show a nearly-flat angular distribution whereas theoretical calculations in the model of Oh, Ko and Nakayama rise at forward angles due to K^+ exchange in the t-channel. The beam asymmetries for $K^+\Sigma^{*-}$ photoproduction are negative, in contrast to postive values for the $\gamma n \to K^+\Sigma^-$ reaction. Comparison with calculations in the model of Oh *et al.* suggest that multiple s-channel resonances contribute to Σ^* photoproduction, and that K^* exchange in the t-channel is largely absent. These data may also be useful to constrain other theoretical calculations of Σ^* photoproduction, such as in the model of Lutz and Soyer.

In this talk, I will first explore the SU(3) relations for coupling constants used in the model of Oh *et al.* where $\rho\Delta$ photoproduction is used as input for caluclations of $K^+\Sigma^*$ photoproduction. Next I will discuss the t-channel diagrams for both ground-state Σ photoproduction and the Σ^* case. The data will be contrasted with preliminary data from CLAS on a proton target, with the focus on how the data constrain SU(3) symmetries within the baryon decuplet.