$K^+\Lambda$ and $K^+\Sigma^o$ Photoproduction Results from CLAS

Reinhard Schumacher[a] (for the CLAS Collaboration)

[a] *Carnegie Mellon University, Pittsburgh, PA 15213, USA*

The CEBAF Large Acceptance Spectrometer (CLAS) at Jefferson Lab has accumulated data for the elementary strangeness production reactions

$$\begin{aligned} \gamma + p &\rightarrow K^+ + \Lambda \\ \gamma + p &\rightarrow K^+ + \Sigma^o \end{aligned}$$

The data permit a more sensitive determination of which non-strange intermediate resonances contribute to photoproduction of these strangeness-containing final states. We seek evidence for previously unseen resonances which may be revealed by coupling strongly to these two channels. Analysis is complete for the Λ and Σ^o total and differential cross sections, and for the induced (or recoil) polarizations of the hyperons. Results for photon energies from $E_\gamma = 0.911$ GeV (the Λ threshold) to 2.4 GeV will be reported. The angular coverage is complete from about 18^o upwards. A combined total of about 800,000 events were obtained in these channels.

There are several hadrodynamic models which can be confronted with these results. A recent model for Λ photoproduction [1] compared to recent data [2] suggests [3] that there may be evidence in the total cross section for a non-strange resonance near $W = 1.9$ GeV which couples with significant strength to both the photon and the $K^+\Lambda$, but relatively weakly to πN. Positive evidence for such s-channel states tends to support a recent quark-model analysis which predicted "missing" baryon resonances in this mass range [4]. The CLAS data confirm the structure near 1.9 GeV, without uniquely identifying it as the postulated $D_{13}(1900)$ resonance, however. Also, there is evidence for additional high-mass s-channel structure; a moment analysis of the angular distributions reveals interference structures at several W values below 2.2 GeV. The polarization induced in the recoiling hyperons will be presented; comparison between Λ and Σ^o final states shows "opposite" behavior when averaging over wide ranges of W, as well as resonance-like interferences over smaller ranges of W. The data from CLAS will be compared to several Effective Lagrangian and Regge-based theoretical models for the Λ and Σ^o channels. None of the available models capture the detailed information in the CLAS results.

References

1. H. Haberzettl, C. Bennhold, T. Mart, and T. Feuster, Phys. Rev. **C58** (1998) R40.
2. M. Q. Tran *et al*, Phys. Lett. B **445** (1999) 20.
3. C. Bennhold, H. Haberzettl, T. Mart, *nucl-th/9909022*, (Trieste '99).
4. S. Capstick and W. Roberts, Phys. Rev. **D58** (1998) 1.