Polarization Observable E in $\gamma n \to K^0 Y$

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The photoproduction of strange final states off the nucleon has proven important in defining the N^* resonance landscape above 1.6 GeV. KY photoproduction is described in terms of 15 well-defined spin observables in addition to the differential cross section. With CLAS at Jefferson Lab, almost all polarization-observable measurements have been experiments using a proton target, aiming to provide a "complete" set of observables that define uniquely the amplitudes participating in the strangeness-creation process. The self-analyzing aspect of hyperon weak decays gives easy access to some of them, while measurements with polarized photon beams and/or targets give access to others. Even the incomplete set of observables obtained so far has led to better definition of the N^* spectrum. A comprehensive picture of strangeness production, however, requires measurements on a neutron target as well to allow for isospin separation of the reaction mechanism. That is, paired measurements of observables in γp and γn reactions are necessary to separate the photoproduction mechanism on the basis of $I = 0$ and $I = 1$ transition amplitudes.

This talk highlights one result of a unique experimental arrangement at CLAS using a spin-polarized deuteron target and a polarized photon beam to extract the "E" beam-target spin observable for strangeness photoproduction. A solid molecular "HD-Ice" target was used to create longitudinally-polarized deuterons with low background contamination from other nuclear species. The CEBAF accelerator provided beams of circularly and linearly polarized photon beams in the energy range $1.5 < W < 2.3$ GeV. The observable E is the longitudinal beam-target spin asymmetry, measured as a function of kaon production angle and W. The reactions of interest, photoproduction of $K^0\Lambda$ and $K^0\Sigma^0$ on the neutron, were reconstructed in CLAS using the $\pi^+\pi^-p\pi^-$ 4-body final state. For comparison, the measurements are compared to effective Lagrangian calculations from the MAID and SAID models.