Title

$\gamma D \rightarrow K^*(892)^0 \Lambda p$, $\gamma D \rightarrow K^+ \Sigma^*(1385)^- p$, and $\gamma D \rightarrow pp\pi^-$ Cross Section Studies

Abstract

About a dozen N* states have been well-established according to the Particle Data Group, but some relativized quark models predict that many more N* resonances exist. Some models of baryon decays predict that most of the unobserved N* states couple somewhat weakly to the πN channel, and that some couple non-negligibly to the KY, K*Y, and KY* channels. Measurements of the cross sections and polarization observables of strangeness photoproduction reactions on the proton and the neutron can provide additional constraints on the extraction of the N* resonance parameters, which will provide valuable information on the relevant degrees of freedom within the nucleon.

Preliminary measurements of the differential cross sections of the $\gamma D \rightarrow K^*(892)^0 \Lambda p$, $\gamma D \rightarrow K^+ \Sigma^*(1385)^- p$, and $\gamma D \rightarrow pp\pi^-$ reactions are shown using data from the Jefferson Lab Hall B CLAS g13 experiment. No experimental cross section data have been published on the $\gamma D \rightarrow K^*(892)^0 \Lambda p$ reaction, and the only published cross section data on the $\gamma D \rightarrow K^+ \Sigma^*(1385)^- p$ reaction are at forward angles, where t-channel meson exchange is predicted to dominate. These cross sections are shown to be sizable to those of the ground state channels, indicating that it is important to include them in coupled-channels analyses used to extract the N* resonance parameters. In addition, the $\gamma D \rightarrow pp\pi^-$ data will be a significant increase to the world statistics for this channel, and will be used to study final-state interaction effects in photoproduction experiments on the deuteron.