Polarization Observables in Vector Meson Production Decaying to Multipion-Final States using a Transversely Polarized Target and Polarized Photons at CLAS

P. Roy (for the CLAS Collaboration)

A primary approach in hadronic physics to understand quark-gluon interactions in baryons is to interpret the baryon spectrum in terms of the effective degrees of freedom. Lately, a significant amount of information about light baryon spectrum comes from the photoproduction experiments. The current database of polarization observables in photoproduction, however, is inadequate to understand the spectrum, particularly above 1.7 GeV c.m. energies. At these energies, the photoabsorption cross section is dominated by the production of multipion states and vector mesons. Therefore, it is essential to study vector meson decay modes of excited baryons in order to establish a resonance. The FROST (FROzen Spin Target) experiment at Jefferson Lab using the CLAS detector has been performed with all possible combinations of beam-target polarizations and covers the c.m. energy regime up to 2.2 GeV. It provides a good platform to study the decay of excited baryon states to a large variety of final states, in particular to vector mesons such as ω and ρ. Here we report on polarization observables from FROST in $\vec{\gamma}\vec{p} \to p\omega \to p\pi^+\pi^-\pi^0$ using a transversely polarized butanol target and observables $I^{s,c}$, $P_{x,y}$ and $P^{s,c}_{x,y}$ in $\vec{\gamma}\vec{p} \to p\pi^+\pi^-$ using linearly polarized tagged photons and the transversely polarized target. The $\pi^+\pi^-$ photoproduction reaction will allow for the study of $N^* \to p\rho$ decay modes. Many observables presented here are first-time measurements and will significantly augment the world database in an effort to approach a complete experiment in these final states that is necessary to determine contributing N* resonances with minimal ambiguities.