

Double-spin observables in charged pion photo-production from polarized neutrons in solid HD using the CLAS at Jefferson Lab

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Abstract

Recent Lattice QCD calculations have supported the long standing quark model expectation of many more excited states of the nucleon than have been experimentally observed. Detailed partial-wave analyses (PWA) fit to many polarization observables are required to search for such "missing states. Furthermore, the separation of isoscalar and isovector couplings to isospin 1/2 resonances requires information from both proton and neutron reactions. The present data base of neutron reactions is very sparse. To address this issue, the Jlab g14/E06-101 experiment was performed during 2011-2012 using the CLAS with circularly and linearly polarized photons incident on longitudinally polarized Deuterons in frozen-spin targets of solid Hydrogen-Deuteride (HD). Studies of experimental and theoretical methods that infer "free neutron" spin observables from deuteron data are ongoing. Preliminary results for the single-pion channel, $\gamma + n(p) \rightarrow \pi^- + p(p)$, will be discussed. Beam-target helicity asymmetries (E) have been extracted from data with circularly polarized photons. Data with linearly polarized photons have been used to extract the beam asymmetry Σ , along with the beam-target asymmetry G. The preliminary results for the E, Σ and G asymmetries will be compared to existing PWA predictions.