Meson Spectroscopy in Coherent Production off ^{4}He with CLAS

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Abstract

One of the main goals of the CLAS experiment eg6 at Jefferson Lab is to study the mesonic states in the coherent quasi-real photo production on ^{4}He with the CEBAF 6 GeV electron beam. Studying the $\pi^0\eta$ and $\pi^0\eta'$ final states in the t-channel on hydrogen is challenging because the same final state particles can be produced by baryon resonances. However, the background from baryon resonances can be suppressed when the scattered nucleus is detected intact. In addition, production on a spin and isospin zero target simplifies PWA (Partial Wave Analysis). The final states $\pi^0\eta$ and $\pi^0\eta'$ have C=+1 and P=(-1)^L, where L is the angular momentum of the system. The L can be determined by analyzing the decay angular distribution of the final states. In case of L=1, the produced system will have exotic quantum numbers J^{PC}=1^{-+}, which are not possible for ordinary $q\bar{q}$-bar mesons. To study these final states, the CLAS detector, together with a new radial time projection chamber for detection of low energy recoil ^{4}He nuclei and the CLAS inner calorimeter, was used. The status of the calibration and the analysis of the data, taken in 2009, will be presented.