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Search for Pentaquarks at CLAS in Photoproduction from Protons

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The CLAS Collaboration at Jefferson Lab has a comprehensive program to search for evidence of a pentaquark in photoproduction from protons and deuterons. Preliminary results from the first of this new round of experiments from a proton target are presented here. The experiment was run in May-July 2004, with a photon energy range from 1.5 to 3.8 GeV. It collected an integrated luminosity of about 70 pb^{-1} , which yielded more than an order of magnitude greater statistical precision than previously obtained. We report on the search for the possible reaction $\gamma p \rightarrow \bar{K}^0 \Theta^+$, with $\Theta^+ \rightarrow K^+ n$. The \bar{K}^0 was reconstructed from the invariant mass of its detected π^+ and π^- decay products, the K^+ was detected directly, and the undetected neutron (n) was reconstructed from the missing 4-momenta of the detected particles. Preliminary results will be presented and compared with previously published data [1] in the same kinematic region. A second experiment on the proton focusing on higher energies (up to 6 GeV) is scheduled for next year. With ten times more statistics it will test our previously published [2] data on the proton for the possible existence of a pentaquark state in the reaction $\gamma p \rightarrow \pi^+ K^- \Theta^+$.

References

- [1] J. Barth *et al.*, Phys. Lett. B **572**, 127 (2003)
- [2] V. Kubarovsky *et al.*, Phys. Rev. Lett, **92**, 032001 (2004)