Eta and two-pion electroproduction with CLAS

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In the mass region above 1.5 GeV many overlapping baryon states are present and some of them are not well known. There are also many baryon resonances predicted to be in this mass range which have never been observed. To fully understand the fundamental properties of baryon structure, the nucleon excitation spectrum must be measured in a variety of reaction channels. In this paper, we present results on the reactions $ep \to ep\pi^+\pi^-$ and $ep \to ep\eta$ obtained with the CLAS detector at the Thomas Jefferson National Laboratory. In the two-pion channel, the data show resonant structures not visible in previous experiments. Phenomenological predictions based on available information on known N^* and Δ states fail to match our results. In the η channel, results from CLAS have already been published[1]. Now we present results from the an order of magnitude more statistics, yielding a precise measurement of the proton-$S_{11}(1535)$ photocoupling over a wider range in Q^2 than any previous experiment. We also observe structure in the differential cross section that is not predicted by current phenomenological models. In both of these channels the observed discrepancies either indicate the presence of new baryon resonances[2] or a significant revision of the properties of known states in the models.

References

[1] R. Thompson, et al., (The CLAS Collaboration), Phys. Rev. Lett. **86** (2001) 1702.
[2] B. Saghai and Z.P. Li, Eur. Phys. J. **A11** (2001) 217, S. Capstick, et al., Phys. Rev. **C59** (1999) 3002.