

## Measurement of Cross Sections in $\pi^+\pi^-$ and $\omega$ Photoproduction as well as Beam-Helicity Asymmetries using CLAS at Jefferson Lab.

Cross sections for the reactions  $\gamma p \rightarrow p\pi^+\pi^-$  and  $\gamma p \rightarrow p\omega$  have been measured, covering the photon energy range from 1.15 GeV to 5 GeV. The g12 experiment was performed at Jefferson Lab with the CEBAF Large Acceptance Spectrometer (CLAS) using an unpolarized hydrogen target and circularly-polarized photons produced from bremsstrahlung of longitudinally-polarized electron with energy 5.7 GeV. The cross sections allows the study of excited baryon decays to  $p\rho$  and  $p\omega$ . However, performing partial wave analysis using differential cross sections alone to extract resonance is difficult because of the overlapping nature among resonances. Polarization observables are sensitive to the interference of resonances in the scattering amplitude. Hence the beam helicity asymmetry measurement for  $\gamma p \rightarrow p\pi^+\pi^-$  is also presented. The results are compared with previous measurements from CLAS and also some model calculations. Our data are in good agreement with previous CLAS measurements but show discrepancies with model predictions.