

Photo-production of Omega Meson Using CLAS at Jefferson Laboratory

The spectrum and properties of the excited states of baryons reveal the dynamics and degrees of freedom of the interaction within them. Higher-lying excited states are generally predicted to have strong couplings with a heavier meson, e.g. one of the vector meson, ρ, ω, ϕ . Therefore, vector meson studies are important to search the so called *missing baryon resonances*.

Photo-production of ω meson was studied using CEBAF Large Acceptance Spectrometer (CLAS) at Jefferson Lab. Two observables have been measured from the reaction $\gamma p \rightarrow p\omega$: the differential cross section and the double polarization observable E. The differential cross section measurement was performed using circularly-polarized photons produced from bremsstrahlung of longitudinally-polarized electrons with energy 5.7 GeV, incident on unpolarized liquid hydrogen target. While the double polarization observable E was measured using circularly-polarized photons with energy range up to 2.4 GeV and longitudinally-polarized butanol target.

The differential cross section as well as the polarization observable allow us to find the N^* resonances that decay to $p\omega$ through Partial Wave Analysis (PWA) method. They also provide a probe to test theoretical models about the production mechanism of ω meson, the scaling behaviour of the cross section, and also the Okubo, Zweig, Iizuka (OZI) rule violation.

We found that the $\gamma p \rightarrow p\omega$ differential cross section exhibits scaling behavior as predicted by pQCD. The data also show that the OZI rule is strongly violated at photo-production reaction.