Abstract

We propose to study the reaction $^3He(\vec{\gamma},\pi^+)^3H$ with the momentum transfer Q^2 ranging up to 20 fm^{-2} using polarized photons from 300 MeV to 650 MeV. Both the differential cross section and the photon asymmetry Σ will be measured. The broad kinematic range spanned by the data will enable us to investigate a possible breakdown of DWIA (arising from two-body mechanisms and possible changes in elementary amplitudes), the influence of two-step processes in a dense nuclear system, and the magnitude of D-state components in the nuclear three-body wave function. Of these, the principal focus will be on the possible breakdown of the Impulse Approximation arising from modifications of the $E_{1+}(\Delta)$ amplitude in a dense nuclear system. The existence of a D-wave admixture in the trinucleon wave function gives rise to potentially large SD interference contribution to Σ. This contribution is approximately proportional to the $E_{1+}(\Delta)$ amplitude so the photon asymmetry Σ provides a sensitive measure of the $E_{1+}(\Delta)$ amplitude. The experiment will require the unique combination of properties provided by the CLAS detector and the proposed Compton $\vec{\gamma}$ source.