Investigation of Δ medium effects using the ^{4}He$(\gamma, \pi^+$n$)$ reaction

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Abstract

A measurement of the ^{4}He$(\gamma, \pi^+$n$)$ reaction in quasifree π–production kinematic regimes has been performed using linearly polarised and unpolarised tagged photons in conjunction with large solid angle π and n detectors. The aim of the experiment was to investigate predicted modifications to the Δ excitation of nucleons and their subsequent propagation and decay, brought about by the nuclear medium. Differential cross sections and polarisation asymmetries were determined for photon energies spanning the $\Delta(1232)$ excitation region. It was observed that the cross section results fall significantly below DWIA calculations including corrections for final state interactions as expected from investigations on Δ medium effects using PWIA calculations. However, mainly because of uncertainties in the magnitudes of the final state interactions, it has to be concluded that improved calculations are required to obtain a quantitative estimate of Δ medium effects.