High energy exclusive reaction $(e, e'\pi^+)$ off nucleons and nuclei

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We propose an explanation of the large transverse cross section observed in the exclusive single pion electroproducion reaction $(e, e'\pi^+)$ off protons. It is shown that deep–inelastic scattering (DIS) dominate and explain the transverse response at moderate and high photon virtualities Q^2 whereas the longitudinal response is dominated by hadronic degrees of freedom. A model for the $p(e, e'\pi^+)n$ reaction which combines gauge invariant meson–exchange currents and hard DIS of virtual photons off nucleons is proposed. This leads to a coherent description of the longitudinal and transverse components of the cross section in a wide range of photon virtuality Q^2 and momentum transfer to the target t. The transverse cross sections are shown to be sensitive to the intrinsic transverse momentum distribution of partons.

A model is further applied to the analysis of the Color Transparency signal observed at JLab in the reaction $(e, e'\pi^+)$ off nuclei. Our results for the CT effect when using a transport approach for the propagation and attenuation of hadrons in nuclei will be presented.

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