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Probing Hadron Structure through $e + p \rightarrow e^{'} + \pi^{+} + \Delta^{0}$ reaction at Jefferson Lab

Tuesday 10 June 2025 11:45 (15 minutes)

The internal structure of hadrons is incompletely understood, as the intrinsic properties of hadrons (e.g. mass, spin) cannot yet be fully understood within a QCD framework. Generalized Parton Distributions (GPDs) provide information about the three dimensional structure of hadrons. The pion is a good candidate for hadron structure studies, due to its relatively simple structure and its experimental accessibility. Experimental Hall C at Jefferson Lab is a unique facility that can host high precision studies of exclusive pion electroproduction reactions. The cross-section of this reaction is dictated by the longitudinal and transverse polarizations of the virtual photon. Considering the recoil system in such a reaction, the ground state nucleon in the $p(e, e^{'}\pi^{+})n$ reaction has been studied in detail but little is known about the nucleon-to-resonance ($N \rightarrow \Delta$) transition reaction $p(e, e^{'}\pi^{+})\Delta^{0}$. This reaction provides access to the transition GPDs. The 12 GeV upgrade at Jefferson Lab provides a unique opportunity to study the higher resonance of pion electroproduction reaction $p(e, e^{'}\pi^{+})\Delta^{0}$ at wide range of kinematics (Q^2, W and $-t$). This talk will present the first measurement of the beam spin asymmetry and cross-section ratio ($\sigma_{LT'}/\sigma_{0}$) from the Kaon-LT Experiment. These are compared with the ground state reaction. The comparison of two reactions will be invaluable for our understanding of hadron GPDs.

Keyword-1

Hadron Structure

Keyword-2

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Keyword-3

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