



Canadian Association
of Physicists

Association canadienne
des physiciens et physiciennes

Contribution ID: 3637 Type: **Oral Competition (Graduate Student) / Compétition orale (Étudiant(e) du 2e ou 3e cycle)**

(G*) From Spin to Structure: Beam Single-Spin Asymmetry and the Strong Force

Monday 19 June 2023 15:00 (15 minutes)

The KaonLT/PionLT Collaboration probes hadron structure by measuring deep exclusive meson production reactions at Jefferson Lab. A set of high momentum, high resolution spectrometers in Hall C allow for precision measurements from which form factors and other observables can be extracted. One possible measurement is the beam spin asymmetry, which describes the fractional difference in cross-section between events caused by an electron of positive or negative helicity. This asymmetry is caused by interference between longitudinally and transversely polarized virtual photons, which makes it possible to extract a polarized interference cross-section $\sigma_{LT'}/\sigma_0$. In this work, the asymmetry is calculated in the transition regime where the strong force is still poorly understood (Q^2 between 2 and 5.5 GeV^2), for the $p + e \rightarrow e' + \pi + n$ reaction data from the recent KaonLT experiment. The dependence of $\sigma_{LT'}/\sigma_0$ on the four-momentum transfer to the target $-t$ is then determined, and the results are compared to two different classes of theoretical models. By comparing with predictions made using both Regge trajectories and Generalized Parton Distributions, the asymmetry helps determine how to best describe hadronic reactions in the transition regime, thus providing insight into the strong force.

Keyword-1

QCD

Keyword-2

Hadrons

Keyword-3

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Session Classification: (DNP) M2-4 Hadronic physics, nucleon structure, QCD | Physique hadronique, structure des nucléons, QCD (DPN)

Track Classification: Technical Sessions / Sessions techniques: Nuclear Physics / Physique nucléaire (DNP-DPN)