

Evaluation of the π^+n and π^0p electroproduction cross section from the data measured with the CLAS detector

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The measurements of exclusive π^+n and π^0p electroproduction with the CLAS detector in Hall B at Jlab provided the dominant part of the world data on observables of these channels [1] stored in the CLAS Physics Data Base [2]. The data on exclusive $N\pi$ and $\pi^+\pi^-p$ electroproduction are the major source of the information on nucleon resonance (N^*) electroexcitation amplitudes. They offer insight into the N^* structure and strong QCD dynamics which underlie the nucleon resonance generation from quarks and gluons [1,3,4]. The approach for evaluation of the four-fold $N\pi$ differential cross sections and unpolarized, transverse-transverse, longitudinal-transverse exclusive structure functions will be presented in the talk. The estimates of $N\pi$ electroproduction observables have become available from the measured with the CLAS detector differential cross sections for the first time. They cover a broad kinematics area of the invariant masses of the final hadron system of $W < 1.7$ GeV and the photon virtuality range $Q^2 < 5.0$ GeV². The estimated $N\pi$ cross sections and exclusive structure functions are of particular importance both in the studies of the N^* structure in 1-dimension and in exploration of the ground nucleon structure in 3-dimensions from the results on the chiral-odd generalized parton distributions constrained by the data of deeply virtual $N\pi$ electroproduction.

[1] I.G. Aznauryan and V.D. Burkert, Electroexcitation of Nucleon Resonances, Prog. Part. Nucl. Phys. 67, 1 (2012).

[2] CLAS Physics Database, <http://clasweb.jlab.org/physicsdb>

[3] V.D. Burkert et al., The Nucleon Resonance Structure from the $\pi^+\pi^-p$ Electroproduction Reaction off Protons, Moscow Univ. Phys. Bull. 74, 243 (2019).

[4] V.D. Burkert and C.D. Roberts, Roper Resonance: Toward a Solution to the Fifty Year Puzzle, Rev. Mod. Phys. 91, 011003 (2019).

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