

## Evaluation of the $\pi^+n$ and $\pi^0p$ electroproduction cross section from the data measured with the CLAS detector

Tuesday, 13 October 2020 19:15 (20 minutes)

The measurements of exclusive  $\pi^+n$  and  $\pi^0p$  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  $Q^2 < 5.0$  GeV<sup>2</sup>. 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).

**Primary authors:** DAVYDOV, Maksim; BULGAKOV, Alexandr; NASRTDINOV, Almaz

**Co-authors:** MOKEEV, Victor (Thomas Jefferson National Accelerator Facility); GOLUBENKO, Anna (Lomonosov Moscow State University Skobeltsyn Institute of Nuclear Physics); Prof. ISHKHANOV, B (Moscow State University, Faculty of Physics, Moscow, Russia; Moscow State University, Skobeltsyn Institute of Nuclear Physics, Moscow, Russia); ISUPOV, Evgeny; CHESNOKOV, Vitaly

**Presenters:** DAVYDOV, Maksim; BULGAKOV, Alexandr; NASRTDINOV, Almaz

**Session Classification:** Poster session 4 (part 1)

**Track Classification:** Section 4. Relativistic nuclear physics, elementary particle physics and high-energy physics.