

Evaluation of $K\Lambda$ and $K\Sigma^0$ electroproduction cross sections from the CLAS data

Thursday, 14 July 2022 16:00 (20 minutes)

The method and computational tool will be presented for the evaluation of Λ and Σ^0 electroproduction cross sections from the experimental results on exclusive structure functions $\frac{d\sigma_T}{d\Omega}$, $\frac{d\sigma_L}{d\Omega}$, $\frac{d\sigma_{LT}}{d\Omega}$, and $\frac{d\sigma_{TT}}{d\Omega}$ available from the measurements with the CLAS detector [2,3] with numerical results stored in the CLAS physics database [1]. The tool is capable to predict differential Λ and Σ^0 cross sections within the kinematic area of the invariant mass of the final hadrons $W < 2.6$ GeV and at photon virtualities $0 \text{ GeV}^2 < Q^2 < 5.0 \text{ GeV}^2$ from interpolated/extrapolated exclusive structure functions $\frac{d\sigma_T}{d\Omega}$, $\frac{d\sigma_L}{d\Omega}$, $\frac{d\sigma_{LT}}{d\Omega}$, and $\frac{d\sigma_{TT}}{d\Omega}$. For reliable interpolation of structure function at low Q^2 , the photoproduction data on beam spin asymmetry Σ [4] were used. The developed approach provides evaluation of differential electroproduction cross section within mentioned above kinematics area entirely from the experimental data without any bias from reaction model assumptions. We implement several techniques for interpolation of the exclusive structure functions over kinematic variables W , Q^2 , and the final kaon emission angle in the CM frame $\cos(\theta)$. In addition, various extrapolation procedures were implemented in the kinematic area where the experimental data are still not available or insufficient. Comparison with available data confirmed credible evaluation of Λ and Σ^0 differential cross sections. The developed approach will be used for extraction of structure function from the first results on Λ and Σ^0 beam spin asymmetry data measured with the recently put in operation CLAS12 detector at Jefferson Lab. The studies of Λ and Σ^0 electroproduction channels will open the new avenue in exploration of the nucleon resonance structure in the experiments of 12 GeV era at Jefferson Lab in collaboration with Physics Department and Skobeltsyn Nuclear Physics Institute at Lomonosov Moscow State University.

1. <https://clas.sinp.msu.ru/cgi-bin/jlab/db.cgi>
2. P. Ambrozewicz et al. [CLAS Collaboration], Phys. Rev. C 75, 045203 (2007).
3. D.S. Carman et al. [CLAS Collaboration], Phys. Rev. C 87, №2, 025204 (2013).
4. M.E. McCracken et al. [CLAS Collaboration], Phys. Rev. C 81, 025201 (2010).

The speaker is a student or young scientist

Yes

Section

1. Intermediate and high energies, heavy ion collisions

Primary author: DAVYDOV, Maksim (Moscow State University)

Presenter: DAVYDOV, Maksim (Moscow State University)

Session Classification: Intermediate and high energies, heavy ion collisions