Contribution ID: **16** Type: **not specified**

Development of Reaction Models for KY Photo- and Electroproduction

Tuesday, 18 October 2022 15:20 (20 minutes)

New models for photo- and electroproduction of kaons on the proton were constructed [1,2,3] utilizing new experimental data from LEPS, GRAAL, and particularly CLAS collaborations. The higher spin nucleon (spin-3/2 and spin-5/2) and hyperon (spin-3/2) resonances were included using a consistent formalism and they were found to play an important role in the data description. In these analyses, we paid close attention to model predictions of the cross section at small kaon angles which are vital for accurate calculations of the hypernucleus-production cross section.

In order to account for the unitarity corrections at the tree level, we have introduced energy-dependent widths of nucleon resonances, which affect the choice of hadron form factors and the values of their cutoff parameters extracted in the fitting procedure.

We have implemented a new shape of electromagnetic form factors so that we are now able to describe also the process of electroproduction [4]. Moreover, for a reliable description of $K^+\Lambda$ electroproduction at small Q^2 within our models it is necessary to take into account also a longitudinal coupling of virtual photons to nucleon resonances.

For the investigation of kaon photoproduction off the proton target, we have exploited also the hybrid Regge-plus-resonance (RPR) model [3] which provides an acceptable description of data in and above the resonance region. A novel feature of our version of the RPR model consists in applying a different scheme for the gauge-invariance restoration [5], which results in a need for a contact current. We reveal that the choice of the gauge-invariance restoration method may play a significant role for cross-section predictions at forward angles where data are scarce.

After focusing on the $K^+\Lambda$ channel, we utilized our isobar model to investigate the $K^+\Sigma^-$ photoproduction off a neutron target. A novel feature of the fitting procedure is the use of a regularization method and information criteria for choosing the best fit.

The sets of chosen nucleon resonances in our recent models are mutually quite well consistent and they also greatly overlap with the set selected in the Ghent analysis [6]. The results of our new isobar and RPR models will be compared with photo- and electroproduction experimental data and the properties of the models will be discussed.

[1] D. Skoupil, P. Bydžovský, Phys. Rev. C 93, 025204 (2016).

[2] D. Skoupil, P. Bydžovský, Phys. Rev. C 97, 025202 (2018).

[3] P. Bydžovský, D. Skoupil, Phys. Rev. C 100, 035202 (2019).

[4] E. L. Lomon, Phys. Rev. C 66, 045501 (2002).

[5] H. Haberzettl et al., Phys. Rev. C 92, 055503 (2015).

[6] L. De Cruz et al., Phys. Rev. Lett. 108, 192002 (2012).

Primary author: SKOUPIL, Dalibor (Nuclear Physics Institute, Rez, Czech Republic)

Presenter: SKOUPIL, Dalibor (Nuclear Physics Institute, Rez, Czech Republic)

Session Classification: Parallel 1

Track Classification: Hyperon production with electromagnetic probes