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# Kaon photoproduction off proton

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## Collaboration

## Abstract content

An isobar model for photoproduction of kaons on the proton was recently constructed [1] utilizing new experimental data from CLAS, LEPS and GRAAL collaborations. Higher-spin nucleon (3/2 and 5/2) and hyperon (3/2) resonances were included using the consistent formalism by Pascalutsa and found to play an important role in data description.

The set of chosen nucleon resonances agrees well with the set of the most probable contributing states determined in the Bayesian analysis with the Regge-plus-resonace model [2]. Particularly, we confirm that the missing resonances $P_{13}(1900)$ and $D_{13}(1875)$ play an important role in the description of data. However, the spin-1/2 state $P_{11}(1880)$ included in the Bayesian analysis was in our analysis replaced by the near-mass spin-5/2 state $N^*(1860)$, recently considered by the Particle Data Group.

In our analysis, a close attention was paid to the model predictions of the cross sections at small kaon angles that are important for accurate calculations of the hypernucleus-production cross sections. It was shown that the small-angle cross sections dominated by the background part of the amplitude receive main contributions from the spin-1/2 and spin-3/2 hyperon exchanges in combination with the Born terms.

Furthermore, since the contribution of the background part of the amplitude is still not well understood, we have accomplished an analysis of the experimental data with the help of the hybrid Regge-plus-resonance model (with which we worked also earlier [3]). In this framework, only three free parameters are needed for the description of the background and it works well in the resonance region as well as in the high-energy region. In our results with the lowest value of $\chi^2$, which are still preliminary, 6 out of 10 nucleon resonances overlap with the resonances included in the set assigned in the Bayesian analysis.

Results of two versions of the isobar model will be compared with the new version of RPR model and experimental data in the third-resonance region and their properties will be discussed. We put an emphasis on the choice of resonances, the predictions in the forward- and backward-angle region as well as the choice of the hadron form factor and the value of its cutoff parameter.

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[3] P. Bydzovsky, D. Skoupil, Nucl. Phys. A 914 (2013) 14

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