Electroproduction Study of $\Lambda(1405)$ with CLAS12

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Content

$\Lambda(1405)$ has long been studied as a candidate for an exotic hadron that cannot be described within the conventional constituent quark model. Recent theoretical developments based on the chiral unitary approach suggest that $\Lambda(1405)$ has a two-pole structure, where two hadronic molecular states $\pi\Sigma$ and $\bar{K}N$ are dynamically coupled to form the resonance [1]. On the experimental side, various methods such as hadron scattering, kaonic hydrogen studies, and photoproduction reactions have been used to probe its properties [2,3,4]. While the results support the two-pole scenario, the production dynamics remain not fully understood. To gain deeper insight into its exotic nature, investigations from multiple perspectives are essential.

The CLAS Collaboration has conducted hadronic experiments and provided crucial data on $\Lambda(1405)$ through both photoproduction and electroproduction. In photoproduction, the invariant mass lineshape and cross section data have revealed their dependence on the total energy W and the K^+ production angle $\theta_K^{c.m.}$ [5,6]. As for electroproduction, the cross section has not yet been determined due to limited statistics in previous experiments, although a difference in the lineshape between photoproduction and electroproduction has been observed [7].

With the upgraded CLAS12 detector system, we have now collected approximately five times more data than before. This will enable us to investigate the Q^2 dependence of the cross section for the first time. In this presentation, I will report on our recent preliminary analysis of $\Lambda(1405)$ electroproduction using CLAS12 data and discuss its implications for understanding the resonance's internal structure.

Reference

[1] T. Hyodo, D Jido, Prog. Part. Nucl. Phys. 67 (2012) 55-98.
[2] J. Chiborowski *et al.*, J. Phys. G 8, 13 (1982).
[3] M. Bazzi *et al.*, Phys. Lett. B 704 (2011) 113-117.
[4] M. Niiyama *et al.*, Phys. Rev. C 78, 035202 (2008).
[5] K. Moriya *et al.*, Phys. Rev. C 87, 035206 (2013).
[6] K. Moriya *et al.*, Phys. Rev. C 88, 045201 (2013).
[7] H. Y. Lu *et al.*, Phys. Rev. C 88, 045202 (2013).

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