

Cross section measurement of virtual photoproduction of iso-triplet three-body hypernucleus, Lambda- Λ n.

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The existence of the bound state of iso-triplet three-body hypernucleus Λ nn attracts attention since possible events were reported by HypHI collaboration at GSI. Missing-mass spectroscopy with the $(e, e' K^+)$ reaction has been performed at Jefferson Lab (JLab) to investigate the Λ nn hypernucleus (JLab E12-17-003 Experiment). A tritium gas of 0.1 g enclosed by a target cell made by Al alloy was used as an experimental target. Data analyses were divided into three as follows: (i) a peak search with a count-base spectrum, (ii) study of the Λ -n final state interaction from an energy spectrum of quasi-free Lambda production, and (iii) cross section analysis for the virtual photoproduction of Λ nn.

In the analysis (iii), event-selection criteria were optimized to derive the cross section. Therefore, the number of events was smaller by 10–15% compared to the count-base spectrum. In addition, systematic errors were imposed due to uncertainties that originated from the cross-section analysis such as an acceptance correction. As a result, no significant structures were observed at the Λ nn threshold region in the cross-section spectrum. We obtained the upper limits of the differential cross section at the 90% confidence level to be 21 and 31 nb/sr for assumptions of $(-B_\Lambda, \Gamma) = (0.25, 0.8)$ and $(0.55, 4.7)$ MeV, respectively, which are theoretically predicted energies and decay widths. I will present the experimental overview and the result of the cross-section analysis (K.N. Suzuki et al., Prog. Theor. Exp. Phys. 2022, 013D01 (2022), DOI: 10.1093/ptep/ptab158).

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