Photoproduction of $K^+\Lambda$ and $K^0\Lambda$ on the Deuteron

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Strangeness photoproduction on the nucleon provides important information about the hadron structure, meson-baryon couplings. The experimental and theoretical investigations have been carried out mainly using the proton as a target. However, due to the lack of the experimental data measured with the neutron as a target, uncertainties are large in the theoretical calculations for the channels with the neutron target. We investigated K^0 photoproduction on the neutron via inclusive measurements of K^0 or Λ using the deuteron as a target in the energy region $E_\gamma = 0.8 - 1.1$ GeV at Research Center for Electron Photon Science, Tohoku University (ELPH). Our data showed a similar excitation function with $\gamma p \to K^+\Lambda$ reaction and the backward enhancement of the angular distribution [1-3].

In order to confirm the investigation, we carry out the measurement of $K^0\Lambda$ and $K^+\Lambda$ with three particles in the final state. The merit is the reconstruction of center-of-mass kinematics for the $\gamma d \to K^+\Lambda n_s$. The similar systematics of the measurement of $\gamma d \to K^0\Lambda p_s$ to the measurement of $\gamma d \to K^+\Lambda n_s$ can be noted. In this analysis, three charged particles including proton were identified with the Neutral Kaon Spectrometer (NKS2). The strangeness produced reactions were selected by requiring the $p\pi^-$ invariant mass to be the mass of Λ. Separation of $K^0\Lambda$ and $K^+\Lambda$ was possible using a mass of the rest measured particle and a kinematic reconstruction. The current analysis derived $\sim 10^2$ $K^+\Lambda$ events in one third of the total collected statistics and further analysis is underway. We report the current status and the outlook of the analysis.

References

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