$K^0\Lambda$ photoproduction studied with an electromagnetic calorimeter FOREST

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The $\gamma n \to K^0\Lambda$ reaction is one of the good probes to study highly-excited nucleon resonances. It does not have a contribution from the exchange of charged particles since all of the participants are neutral. It is also expected to be sensitive to the prominent peak structure which has been observed at $W \sim 1.67$ GeV in the $\gamma n \to \eta n$ cross section. While many theoretical interpretations have been advocated to understand this prominent structure, the situation is not settled down yet. The ηn system has an isospin 1/2 and includes $s\bar{s}$ which can also decay into $K^0\Lambda$. Hence, the study of $\gamma n \to K^0\Lambda$ would help to reveal its properties.

Meson photoproduction experiments were carried out at Research Center for ELectron PHoton Science (ELPH), Tohoku University, Sendai, Japan. The incident photon energy ranged from the $\gamma n \to K^0\Lambda$ threshold to 1.2 GeV. Photoinduced reactions were detected with an electromagnetic calorimeter complex FOREST. The $\gamma n \to K^0\Lambda$ events were identified via $K^0_S \to \pi^0\pi^0 \to \gamma\gamma\gamma\gamma$ and $\Lambda \to p\pi^-$ decay chains. Neutral kaons were clearly observed as a peak in the four photon invariant mass distribution. The cross sections for the $\gamma n \to K^0\Lambda$ reaction were extracted. We will present the current status of the $\gamma n \to K^0\Lambda$ analysis.