Neutral kaon photoproduction at LNS, Tohoku

Masashi Kaneta
for the NKS2 collaboration

Department of Physics, Tohoku University

The elementary photo-strangeness production process has been intensively studied based on the high-quality data of the charged kaon channel, $\gamma+p \rightarrow K^+ +\Lambda$ (Σ^0). However, there had been no reliable data for the neutral kaon channel $\gamma+n \rightarrow K^0_S +\Lambda$ (Σ^0) and the theoretical investigations suffer seriously from the lack of the data. In order to have reliable data for the neutral kaon photo-production data, we have been putting an effort to measure the $\gamma+n \rightarrow K^0 +\Lambda$ process in the $\pi i^+ \pi^-$ decay channel, using a liquid deuterium target and a tagged photon beam in the threshold region at Laboratory of Nuclear Science (LNS), Tohoku University. Prior to the NKS2 experiment, we have already taken exploratory data quite successfully with use of Neutral Kaon Spectrometer (NKS) at LNS-Tohoku in 2003 and 2004.

The second generation of the experiment, NKS2, is designed to extend the NKS experiment by considerably upgrading the original neutral kaon spectrometer, fully replacing the spectrometer magnet, tracking detectors and all the trigger counters. The new spectrometer NKS2 has significantly larger acceptance for neutral kaons compared with NKS, particularly covering forward angles and much better invariant mass resolution. The estimated acceptance of NKS2 is three (ten) times larger for K^0_S (Λ) than that of NKS.

The spectrometer is newly constructed and installed at Laboratory of Nuclear Science, Tohoku University in 2005. The advantage of NKS2 compared with NKS is that the NKS2 acceptance cover almost all kinematical region of K^{0}_{S} by covering forward angle region. We have taken the deuterium target data with tagged photon beam in E_γ = 0.8-1.1 GeV in 2006-2007.

We will present recent results of NKS2 in this talk. Additionally, we will show a status of the upgrade project that give us larger acceptance and capability of $K^0 +\Lambda$ coincidence measurement.