Neutral Kaon Spectrometer at Laboratory of Nuclear Science, Sendai

T. Watanabe[a] for Tohoku K0 experiment collaboration

[a] *Dept. of Physics , Tohoku University, Sendai, Japan*

A Neutral Kaon Spectrometer (NKS) has been installed at Laboratory of Nuclear Science (LNS), Tohoku University, Sendai, Japan with an intension to investigate strangeness production by electromagnetic interaction through measurement of K^0 photoproduction. [1]
The NKS, which is based on the old TAGX spectrometer of INS-ES[2], consists of a Dipole Magnet (1.07 m diameter), Inner Hodoscope (IH) and Outer Hodoscope (OH) for particle ID, Straw Drift Chamber (SDC) and Cylindrical Drift Chamber (CDC) for momentum reconstruction, Electron Veto counter (EV) and Aerogel Cherenkov counter (AC) for rejection of e^-e^+ background (Fig. **??**). The spectrometer has a large acceptance of π sr, and thus it can efficiently measure two pions in coincidence which are associated with neutral kaon decay. Expected mass resolution of the NKS is 1% in rms.
The booster synchrotron of LNS can provides a tagged photon beam with an intensity of 5×10^6 Hz and high duty factor (90%). The photon energy ranges from 800 to 1100 MeV and the energy resolution is 6 MeV in the present study.
In a feasibility study in Jan. 2002, the spectrometer system was thoroughly tested with the tagged photon beam. It was shown that time of flight resolution between IH and OH is 500 ps and position resolution of the tracking detector is 500 μm, which are good enough for measurement of the K^0 mass spectrum. By suppressing electromagnetic background, a trigger rate of 200 Hz was achieved under a beam intensity of 3×10^6 Hz. Furthermore we have successfully observed a clear K^0 peak in a $\pi^+\pi^-$ invariant mass spectrum with a carbon target (Fig. **??**) and obtained about 100 K^0's. The NKS proved its ability to measure K^0's as designed. It is scheduled to fully study quasi-free photoproduction of neutral kaons in the threshold region in the fall of 2002.

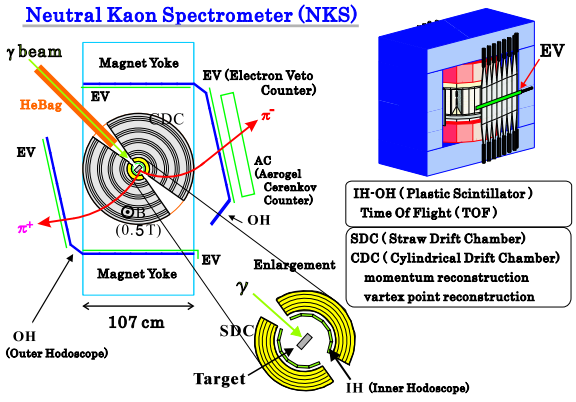

Figure 1: Overview of Neutral Kaon Spectrometer

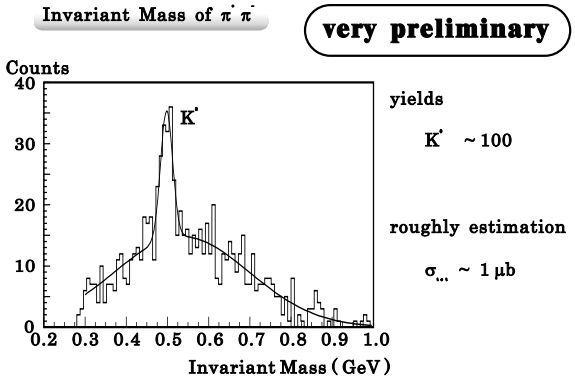

Figure 2: Observed invariant mass spectrum

References

[1] T. Takahasi *et. al.*, Nucl. Phys. **A691** (2001), 387c-390c
[2] K. Maruyama *et. al.*, Nucl. Instr. Meth.**A376** (1996), 335-355.