Photoproduction of Neutral Kaons on C in the Threshold Region

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Strangeness production process by the electromagnetic (EM) interaction is of interest by itself but also the information is required to understand hypernuclear production by EM interaction such as the (e,e'K$^+$) reaction, which has shown its effectiveness and great possibilities to hypernuclear spectroscopy [1]. There are wide variety of phenomenological models for EM strangeness production mostly based on the measured K^+ production data [2]. These calculations agree each others in the K^+ production channel, but disagrees in the K^0 channel. The K^0 channel provides key missing information. The project to measure K^0 photoprodution both on nuclear targets and on deuterium in the threshold region is in progress at Laboratory of Nuclear Science, Tohoku University.

Photon beams of 800 - 1100 MeV are generated by bremsstrahlung from the 1.2 GeV electrons circulating in the Stretcher Booster (STB) Ring and tagged with the internal tagging system (STB-Tagger) by detecting recoil electrons [3,4]. The K^0 is measured by detecting $K_s^0 \to \pi^+ + \pi^-$ decay with the Neutral Kaon Spectrometer (NKS), which consists of a dipole magnet, cylindrical drift chambers in the magnet gap for tracking and momentum reconstruction, inner and outer plastic scintillator hodoscopes for trigger and time of flight measurement, and other veto counters for e$^+$/e$^-$ rejection.

We took carbon target data for 3 days in January 2002 as detector performance studies. The K^0 peak was clearly observed in the invariant mass spectrum, number of identified K^0 being about 100. Detailed analysis is now in progress. We plan to obtain data with 10 times higher statistics in fall 2002. Measurement of the elementary production process on liquid deuterium target is also in preparation.

References

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