Nuclear

PHYSICS

The linearly polarized photon beam is produced by backward Compton scattering of laser photons from 8 GeV electrons at BL33LEP. The current LEPS facility studies photoproduction of hadrons at forward angles, where the high linear polarization plays an essential role to decompose various reaction processes.

The beam polarization is high and can be changed easily by changing the laser polarization. The LEPS covers a photon energy region from 1.5 GeV to 2.9 GeV, which is suitable for studying the creation of excited baryons containing a strange quark or an anti-strange quark near the production thresholds. The production and decay properties of the excited hadrons shed light on their structure in terms of confined quarks.

The first topic we chose is the penta-quark Θ^+ photoproduction from a deuteron target. The aim of the study is to confirm the first evidence of Θ^+, which was reported in 2003 by the LEPS collaboration. The Fermi-motion corrected invariant mass of a neutron and K^+ clearly shows an evidence of Θ^+ with improved statistics.

The second topic we chose is the $\Lambda(1520)$ photoproduction from protons and deuterons. $\Lambda(1520)$ is an excited hyperon with a mass similar to that of Θ^+. A theoretical model on photoproductions of $\Lambda(1520)$ predicted that the main contribution for the production is a contact-term contribution associated with the t-channel K exchange process. The validity of the model was tested by measuring the cross sections and photon beam asymmetry simultaneously.

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