Nuclear

"Susuki" - Japanese pampas grass

Physics

The linearly polarized photon beam is produced by the backward-Compton scattering of laser photons from 8 GeV electrons at BL33LEP. The current LEPS facility studies photoproduction of hadrons in the forward angles, where the high linear polarization plays an essential role of decomposing 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 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 lights on their structure in terms of confined quark.

The first article reports the first exclusive measurement of the $\gamma p \rightarrow K^{*0}\Sigma^{+}$ reaction using linearly polarized photons at beam energies ranging from 1.85 to 2.96 GeV. The angular distributions in the rest frame of the $K^{+}\pi$ system were fitted to extract spin-density matrix elements of the K^{*0} decay. The measured parity spin asymmetry shows that natural-parity exchange is dominant in this reaction, which clearly indicates the need for the t-channel exchange of the $\kappa(800)$ scalar meson.

The second article reports the progress of the LEPS2 project, in which we aim to improve both the beam intensity and the detector acceptance. The construction was started in 2011. The expected performance of the beamline and the research plan with the upgraded LEP beam are presented.

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