

NUCLEAR



"Fuji" - Wisteria



"Rindou" - Marsh gentian

PHYSICS



A linearly polarized photon beam is produced by the backward Compton scattering of laser photons from 8 GeV electrons at BL33LEP. At the current LEPS facility, the photoproduction of hadrons in forward angles is studied, 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 the photon energy region from 1.5 GeV to 2.9 GeV, which is suitable for studying creation of strange quark and anti-quark pairs near the production thresholds, in such process like as photoproduction of the ϕ meson and hyperons. Since we cannot extract a free quark from a hadron, detailed studies of its production and decay are essential for revealing the structure of hadrons in terms of quarks and their interactions governed by QCD.

The first topic we report is ϕ photoproduction near the production threshold. The aim of the experiment is to shed light on the interaction between a ϕ meson and a nucleon. Since a ϕ meson is composed of a strange quark and an anti-strange quark, meson exchange contributions in the interaction are highly suppressed. Multi-gluon exchanges such as Pomeron exchange and glueball exchange processes have become very important to understand the mechanism of the production process. By studying the correlation between the spin polarization of a ϕ meson and linear polarization, we can get information about the spin and parity of the exchanged particles.

The second topic reported is meson photoproduction, which is a powerful tool for obtaining deeper insight into baryon resonances. We observed anomalous behavior in both the cross-section and the spin observable in backward π^0 production. This may indicate a hint for the existence of a missing resonance, which has been predicted by a quark model but not yet observed. A theoretical investigation to understand the new data obtained from LEPS is now in progress.

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