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 in the 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 the photon energy region from 1.5 GeV to 2.9 GeV, which is suitable to study 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.

In 2010, we reported two unexpected results. The first article shows the unexpected reduction of the ϕ photoproduction cross section from a deuteron, which is a loosely bound system of two nucleons. Since the nuclear density effect is expected to be small, the reduction must be due to the nuclear structure such as correlation of two nucleons. The second article shows an unexpected bump structure found in the backward η photoproduction cross section just above 2 GeV. One possible interpretation of the structure is that the enhancement is due to the presence of missing resonances (N*), which contain large $s\bar{s}$ components, which preferably decay into ηN. Both results are new and not theoretically well understood yet. Further studies, both experimental and theoretical, will be needed.

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