Polarization observables in the $\phi(1020)$ meson photoprodiction with linearly polarized photons

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At high energies, photoproduction of the $\phi(1020)$ meson is described as diffractive scattering of a vector meson via exchange of a Pomeron. Because of the OZI rule, contributions from meson exchange are suppressed in photoproduction of ϕ compared to those in ρ and ω photoproduction. The photoproduction of ϕ mesons near the threshold is predicted to be sensitive to non-diffractive production mechanisms [1,2] which are difficult to be studied via ρ and ω photoproduction because of the backgrounds from the meson exchange.
Polarization obserbables provide a useful means to clarify production mechanisms in terms of the parity of exchanged particles. It is possible to extract the unnatural-exchange part of the photoproduction amplitude associated with exotic non-diffractive channels.
There is no published data for the polarization observables of ϕ photoproducion near the threshold. At LEPS/SPring-8, the ϕ photoproduction off the proton was measured with linearly polarized photons from the threshold to $E_\gamma = 2.4$ GeV. High polarization of the photon beam was obtained by laser-induced backward Compton scattering off the circulating electrons in the storage ring. Photon energies are determined by tagging scattered electrons from the Compton scattering process. Charged particles produced in the reaction were detected by the LEPS spectrometer. The events of ϕ mesons were identified by making the invariant mass and missing mass spectra in K^+K^- or $K^{+(-)}p$ pair. In the contribution, the preliminary results for the polarization observables and their dependencies on the beam energy and the transferred momentum are presented.

References
[1] T. Nakano and H. Toki, in Proceedings of the International Workshop on Exciting Physics with New Accelerator Facilities, SPring-8, Hyogo, 1997 (World Scientific Singapore, 1998), p.48.
[2] A.I. Titov et al, Phys. Rev. **C60** (1999) 035205.