Analysis of high energy K^+K^- photoproduction on hydrogen

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We have analysed the process $\gamma p \to K^+K^-p$ at the incident photon energy of 4 and 5.65 GeV. A special emphasis has been put on the study of the interference effects between the S- and P-waves. We have investigated an asymmetry in the angular distribution of the outgoing kaons.

A model of the S- and P-wave amplitudes has been constructed. In the S-wave the final state interactions in two isospin states, related to the $f_0(980)$ and $a_0(980)$ resonances, have been taken into account. Our model includes 16 independent helicity amplitudes in contrast to previous experimental analyses in which only one P-wave amplitude interfered with one S-wave amplitude. We have used moments $\langle Y_M^L \rangle$ as a tool for analysis of the kaon angular distributions. The model succesfully reproduced the experimental data on the K^+K^- mass distributions and moments. We were able to remove the existing uncertainty concerning the S-wave contributio n to the K^+K^- photoproduction process in the effective mass region corresponding to the $\phi(1020)$ resonance. According to our calculations the integrated S-wave cross section varies between 4 and 7 nb for the two photon energies. Moreover, we have attempted to make predictions about the mass distribution and the moments of angular distribution at the photon energy of 8 GeV. This energy of the photon beam is planned in the future experiments in Hall D at Jefferson Laboratory.

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