Recent HERMES results on meson production

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Over the past years HERMES has accumulated a significant amount of data on the production of various mesons in deep-inelastic scattering off the nucleon. Here, recent HERMES results for semi-inclusive and exclusive meson production will be given.

The use of the longitudinally polarized HERA lepton beam in combination with a longitudinally polarized target has allowed HERMES to measure spin asymmetries in exclusive meson production. Double-spin asymmetry results will be presented for exclusive ρ^0 and ϕ production on the proton and deuteron [1]. A single-spin azimuthal asymmetry was observed in exclusive π^+ production on a longitudinally polarized proton target [2].

The measurement of a certain component of the angular distribution of exclusive $\pi^+\pi^-$ pair production will be presented. This component is shown to receive contributions from both the isoscalar and isovector channel and can in principle provide further contraint s on the generalized parton distributions of the proton.

A signal for the production of the $f_0(980)$ scalar meson was found in semi-inclusive $\pi^+\pi^-$ data. The observed kinematical dependences and measured multiplicities of $f_0(980)$ production will be shown and may shed more light on the still not unambiguously determined nature of this scala r meson.

The HERMES results on the observation of a new narrow bound state at a mass of 1528 MeV in quasi-real photoproduction on deuterium will be presented [3]. Thi s state, which is found through its pK_s^0 decay channel, may be interpreted as the predicted exotic Θ^+ pentaquark baryon.

Finally, measurements on heavy targets have allowed to study the influence of nuclear medium on the semi-inclusive production of various identified hadrons (π^+, π^-, π^0, K^+, K^-, p and $\bar{p}$) [4]. The dependence of the production multiplicities on several kinematical quantities will be presented for krypton relative to the deuteron.

[1] HERMES Collaboration, A. Airapetian *et al.*, Eur. Phys. J. C **29** (2003) 171.

[2] HERMES Collaboration, A. Airapetian *et al.*, Phys. Lett. B **535** (2002) 85.

[3] HERMES Collaboration, A. Airapetian *et al.*, Phys. Lett. **B** (in press), hep-ex/0312044.

[4] HERMES Collaboration, A. Airapetian *et al.*, Phys. Lett. B **577** (2003) 37.

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