

Ratios of helicity amplitudes for exclusive ρ^0 electroproduction on transversely polarized protons

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Results from the study of exclusive ρ^0 -meson electroproduction by the HERMES experiment, using the 27.6 GeV longitudinally polarized electron/positron beam of HERA and a transversely polarized hydrogen target, are presented. In analysis of the angular dependence of the distribution of the decay pions, 25 parameters are extracted, which determine the real and imaginary parts of the ratios of several helicity amplitudes describing ρ^0 -meson production by a virtual photon. The transverse target polarization allows for the first time the extraction of ratios of a number of nucleon-helicity-flip amplitudes. Results obtained in a handbag approach based on generalized parton distributions taking into account the contribution from pion exchange are found to be in good agreement with these ratios. Within the model, the data favor a positive sign for the $\pi - \rho$ transition form factor. By also exploiting the longitudinal beam polarization, a total of 71 ρ^0 spin-density matrix elements is determined from the extracted 25 parameters, in contrast to only 53 elements as directly determined in earlier analyses.

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