

Transverse target spin asymmetries of exclusive ρ^0 mesons at HERMES

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Hard exclusive meson production in deep inelastic lepton scattering provides access to the unknown Generalized Parton Distributions (GPDs) of the nucleon. GPDs parameterize the nucleon structure and provide a unified description of exclusive and inclusive reactions.

Predictions based on a GPD model have shown that the transverse target spin asymmetry of exclusive ρ^0 mesons is sensitive to the GPD E , and thus, to the total angular momentum of quarks. Hence, this transverse target spin asymmetry is a key observable to study the contribution of the orbital angular momentum of quarks to the spin of the proton.

This talk will report on the preliminary measurement of the transverse target spin asymmetry of exclusive ρ^0 mesons on a polarized hydrogen target at HERMES using the 27.6 GeV HERA positron beam. Since the factorization theorem is proved for longitudinally polarized photons only, a matter of theoretical interest is the asymmetry of ρ^0 mesons induced from longitudinal photons. The ρ^0 electroproduction data supports the fact that the s -channel helicity conservation holds to a good accuracy. This implies that a longitudinally polarized vector meson originates from a longitudinal polarized photon. Assuming the s -channel helicity conservation, the longitudinal polarization component of the ρ^0 production is obtained experimentally through its decay angular distribution.

For the first time the longitudinal component of the transverse target spin asymmetry of exclusive ρ^0 mesons will be presented and compared to theoretical calculations.

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