New Results on ρ^0 Production 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.

This talk will report on the measurement of the transverse target spin asymmetry (TTSA) of exclusive ρ^0 mesons on a polarized hydrogen target at HERMES using the 27.5 GeV HERA positron beam. The predictions based on a GPD model have shown that the asymmetry is sensitive to the GPD *E*, and thus, to the total angular momentum of quarks. Hence, TTSA is a key observable to study the contribution of the orbital angular momentum of quarks to the spin of the proton.

We will also report new measurements of the beam polarization dependent and independent Spin Density Matrix Elements (SDMEs) for exclusive ρ^0 production on hydrogen and deuterium targets. The dependence of the SDMEs on the Mandelstam variable *t* is compared to model calculations. The longitudinal-to-transverse ρ^0 electroproduction cross section ratio is determined as a function of Q^2 assuming either S-channel helicity conservation or natural parity exchange dominance.