Single-spin azimuthal asymmetry in hard exclusive electro-production of ϕ vector mesons on transversely polarized protons

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The hard exclusive electro-production of ϕ vector mesons was studied with the HERMES spectrometer at the DESY laboratory by scattering 27.6 GeV positron and electron beams off a transversely polarized hydrogen target. The single-spin azimuthal asymmetry with respect to the transverse proton polarization was measured. The azimuthal angles are defined as the angle ϕ (ϕ_S) between the lepton scattering plane and the hadron production plane (proton polarization vector) about the virtual photon direction. From the asymmetry

$$A_{UT}^{l}(\phi,\phi_{S}) = (d\sigma(\phi,\phi_{S}) - d\sigma(\phi,\phi_{S}+\pi))/[P_{T}(d\sigma(\phi,\phi_{S}) + d\sigma(\phi,\phi_{S}+\pi))],$$

the amplitudes of the $\sin(m\phi \pm n\phi_S)$ harmonics were determined. The interpretation of all amplitudes was given in ref [1]. Two important observables, $A_{UT}^{\sin(\phi+\phi_S)}$ and $A_{UT}^{\sin(\phi-\phi_S)}$, will be presented as a function of the negative squared four momentum $\langle Q^2 \rangle$ of the exchanged virtual photon, and the scaling variables $\langle t \rangle$ and $\langle x_B \rangle$. The experimental conditions and cuts as well as the influence of other processes on the results will be discussed and the data will be compared with theoretical model predictions based on Generalized Parton Distributions.

[1] M. Diehl and S. Sapeta, Eur.Phys. J.C41, 515(2005), hep-ph/0503023.

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