

HERMES measurement of DVCS from p and d targets, and status and prospects of the recoil detector

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Hard exclusive processes provide access to the unknown generalized parton distributions (GPDs), which extend our description of the nucleon structure beyond the standard parton distributions. The Deeply Virtual Compton Scattering (DVCS) process, i.e. the hard exclusive leptonproduction of real photons, provides the theoretically cleanest access to the GPDs. DVCS amplitudes can be measured most readily through the interference between the Bethe-Heitler process and the DVCS process.

Azimuthal cross-section asymmetries are generated by both the real and imaginary parts of the DVCS amplitude with respect to the charge and helicity of the incoming lepton, and with respect to the spin polarization of the target, either longitudinal or transverse with respect to the lepton beam. The accumulated HERMES data offers access to all of these spin and charge degrees of freedom, and the combined set of asymmetry measurements allows independent access to the four GPDs in different combinations. An overview of these results will be presented. In particular, a recent highlight has been the measurement of the DVCS azimuthal asymmetry using a transversely-polarized hydrogen target. This particular asymmetry is sensitive to the GPD E , related via the Ji sum rule to the total angular momentum of quarks within the proton. By comparing the HERMES result and the theoretical predictions based on the GPD model, a model-dependent constraint on J_u and J_d has been obtained.

In late 2005, a Recoil Detector was installed at HERMES with the purpose of greatly improving the experiment's ability to measure hard-exclusive processes during its final running period. The status of this detector's operation and commissioning will be presented, along with rojections for the expected results.

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