Deeply Virtual Compton Scattering using COMPASS at CERN

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Deeply virtual Compton scattering is a very suitable tool to learn about Generalized parton distributions. These functions seem very promising as they provide a unifying picture for an entire set of fundamental quantities of hadronic structure, such as: the traditional form factors, the polarized and unpolarized parton distributions and the spin components of the nucleon due to orbital excitations.
Our group has undertaken the study of the feasibility of such an experiment using CERN's high energy muon beam and the COMPASS apparatus. The high energy of the lepton beam and the fact that both μ^+ and μ^- are available and the present luminosity allows to measure absolute cross section or beam charge asymmetry in a large kinematical domain ($1 < Q^2 < 7$ GeV^2 and $0.03 < x_{Bj} < 0.27$). The beam charge asymmetry shows an interesting sensitivity to the different models of GPDs.
Experimentally, the muon beam will scatter off a 2.5 m long hydrogen target. The detection of the scattered muon will use the existing COMPASS chambers. The photon will be detected in a large calorimeter taking advantage of the already existing pieces. Finally, a dedicated recoil proton detector has to be built. Tests of this detector using plastic scintillators were conducted at CERN. They demonstrated the validity of the detection principle and that the background level was acceptable.