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Experimental studies of Generalized Parton Distributions

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Generalized Parton Distributions (GPDs) are nowadays the object of an intense effort of research, in the perspective of understanding nucleon structure. They describe the correlations between the longitudinal momentum and the transverse spatial position of the partons inside the nucleon and they can give access to the contribution of the orbital momentum of the quarks to the nucleon spin. Deeply Virtual Compton scattering (DVCS), the electroproduction on the nucleon, at the quark level, of a real photon, is the process more directly interpretable in terms of GPDs of the nucleon. Depending on the target nucleon (proton or neutron) and on the DVCS observable extracted (cross sections, target- or beam-spin asymmetries,...), different sensitivity to the various GPDs for each quark flavor can be exploited. This talk will be focused on recent promising results, obtained at Jefferson Lab, on cross sections and asymmetries for DVCS, and their link to the Generalized Parton Distributions. These data have opened the way to a “tomographic” representation of the structure of the nucleon, allowing the extraction of transverse-space densities of the quarks at fixed longitudinal momentum. The extensive experimental program to measure GPDs at Jefferson Lab with the 12-GeV-upgraded electron accelerator and the complementary detectors that will be housed in three experimental Halls (A, B, C), will also be presented.