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DVCS studies with CLAS12

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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 and gluons to the nucleon spin.

Deeply Virtual Compton scattering (DVCS), the electroproduction on the nucleon, at the partonic 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. Gluon GPDs can also be accessed by probing specific kinematic regimes. And, besides DVCS, other exclusive reactions, such as Timelike Compton Scattering, Double DVCS, or the exclusive electroproduction of mesons, can provide information on GPDs.

This talk will provide an overview on recent and new, promising, DVCS-related experimental results, obtained at in Hall B at Jefferson Lab on fixed target experiments with a 12-GeV electron beam, for various target types and final states, using the CLAS12 spectrometer. These data open 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, as well as paving the way to the quarks’ angular momentum contribution to the spin of the proton.

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