Unveiling nucleon structure through measurements of Generalized Parton Distributions

Silvia Niccolai[1]
[1]IJCLab Orsay, France

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. 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. GPDs can also be accessed in other reactions, such as Timelike Compton Scattering, Double DVCS, or the exclusive electroproduction of mesons.

This talk will provide an overview on recent and new, promising, GPD-related experimental results, mainly obtained at Jefferson Lab with a 12-GeV electron beam, for various target types and final states. 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 providing an insight on the distribution of forces inside the nucleon.

The perspectives for future JLab experiments using a polarized positrons beam will also be outlined.