# Deeply Virtual Compton Scattering and Generalized Parton Distributions

Marie BOËR

Hard exclusive processes such as photoproduction or electroproduction of photon or meson off the nucleon provide access to the Generalized Parton Distributions (GPDs). These functions are defined in the regime where the scattering amplitude is factorized into a hard and a soft part and parameterize the complex structure of the nucleon. GPDs contain the correlation between the longitudinal momentum fraction and the transverse spatial densities of quarks and gluons in the nucleon.

Such exclusive processes are for instance Deeply Virtual Compton Scattering (DVCS), Timelike Compton Scattering (TCS) and Double Deeply Virtual Compton Scattering (DDVCS). These processes share the fact that a high-energy photon is scattered off a quark in the nucleon and probe its quark and gluon content. DVCS is measured in the reaction $\ell N \to \ell N \gamma$ ($N$ = proton or neutron, $\ell$ = lepton), TCS is measured in the reaction $\gamma N \to \ell^+ \ell^- N$ ($\ell^+ \ell^-$ is a lepton pair which can be electrons, muons...) and DDVCS is measured in the reaction $\ell N \to \ell N \gamma\, \ell^+ \ell^-$. All these processes are measured through their interferences with the corresponding associated Bethe-Heitler processes, which have the same final states and which don't depend on GPDs.

I will first present the physical motivations for measuring these reactions to access the GPDs. Then, I will present some experimental results for DVCS obtained with the COMPASS spectrometer at CERN. I will then switch to theoretical calculations concerning TCS with predictions for single and double beam and/or target spin asymmetries off the proton and off the neutron. I will conclude by presenting some experimental perspectives for JLab at 12 GeV. In particular, several letters of intent were submitted this year at JLab in order to measure TCS and DDVCS in the coming years.