Timelike Compton Scattering with CLAS12 at Jefferson Lab

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Generalized Parton Distributions (GPDs) are nowadays the subject 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.

Timelike Compton Scattering (TCS) ($\gamma p \to \gamma^* p' \to e^+ e^- p'$) is the photoproduction of a virtual timelike photon on the proton, with the virtual photon then decaying into an electron-positron pair. TCS is the time-reversal inverse process of Deeply Virtual Compton Scattering (DVCS, $ep \to e'p'\gamma$), which has been and is still the focus of several experiments worldwide because of its direct link to GPDs. Experimental studies of DVCS and TCS are complementary. Beam and target spin asymmetries for DVCS give direct access to the imaginary part of combinations of Compton Form Factors (CFFs, which are related to GPDs), whereas the angular asymmetries of the decay lepton pairs in TCS allow to access primarily the real parts of CFFs. TCS is also an important tool to verify the universality of GPDs.

The upgraded CEBAF 12-GeV accelerator and the recently constructed CLAS12 detector of Jefferson Lab provide the ideal setting to perform a TCS experiment. CLAS12 has started its data taking, with an 10.6-GeV electron beam impinging on a liquid-hydrogen target, in the spring of 2018. This talk will outline the procedures to extract TCS angular asymmetries from these new data and will assess the current status of the TCS analysis. We will also provide an overview of the physics reach of the new CLAS12 data to contribute to our knowledge of nucleon structure in terms of GPDs.