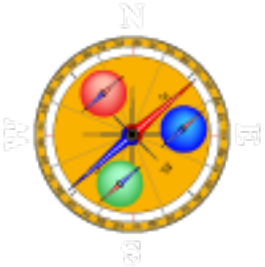

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Studies of GPDs (and Time-like Compton Scattering) at Jefferson Lab

Tuesday, 12 December 2017 15:00 (25 minutes)

Key properties of the nucleon are encoded in the correlation between their longitudinal momentum and their transverse position, such as the orbital angular momentum. This correlation is expressed through Generalized Parton Distributions (GPDs), which can be understood as spatial densities at different values of the longitudinal momentum of the quark. Validation of our understanding of hard exclusive reactions (pions, kaons, photons) is an essential aspect towards such 3D hadron imaging and potential future flavor decomposition. The key to extracting GPDs from experiment is QCD factorization theorems. Deeply Virtual Compton Scattering (DVCS) is generally thought of as the cleanest tool for accessing the valence quark GPDs. A new and promising opportunity for constraining GPDs is presented by Timelike Compton scattering (TCS) the inverse process to space-like DVCS. TCS offers straightforward access to the real part of the Compton amplitude. Combining space-like and time-like data thus makes it possible to test the universality of GPDs. To potentially extract flavor separated GPDs from experiment, one has to validate the meson factorization theorems, which requires measuring the separated longitudinal and transverse cross sections and their -t and Q2 dependencies. Recent data and prospects for deep exclusive pion, both charged and neutral, and kaon electroproduction are presented, which conceptually would allow for flavor separations. The addition of a neutral particle detection facility and compact photon source would significantly augment these scientific capabilities. We will give an overview of the scientific program enabled by such a facility, and discuss its requirements and plans.

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