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Phenomenology with the PARTONS framework of GPD models built from Light Front Wave Functions

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Generalized Parton Distributions (GPDs) encode the correlations between longitudinal momentum and transverse position of partons inside hadrons and can give access to a picture of the nucleon structure in 2+1 dimensions. They have been studied theoretically and experimentally for almost two decades and a new experimental era is starting (at JLab and COMPASS currently, and in the future at an EIC) to extract them.

The difficulty is that only an indirect experimental access is so far possible, through different exclusive channels and various observables. Therefore, one has to take into account the many theoretical constraints to be able to produce accurate models and rely on their phenomenology. Two important constraints are called the polynomiality and positivity properties. We will show how to make use of both of them by first modeling low Fock states light-front wave-functions, which gives a GPD in the DGLAP region by a parton number conserved overlap, and then covariantly extending this GPD to the ERBL region.

This work will be illustrated on a constituent quark-like model for valence GPDs. We will show that this allows to produce a phenomenological output (on DVCS data for instance) from this kind of models, which was impossible before. We will demonstrate the unique versatility of the PARTONS framework to achieve this under various perturbative QCD assumptions.

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