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Obtaining generalized parton distributions from hadronic observables and lattice QCD

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We propose a physically motivated parametrization for the unpolarized Generalized Parton Distributions (GPDs), H and E, valid at both zero and non-zero values of the skewness variable, zeta. We start from a detailed study of the zeta = 0 case where H and E are determined using constraints from simultaneous fits of experimental data on both the nucleon elastic form factors and the deep inelastic structure functions [1]. Lattice calculations of the higher moments of GPDs [2,3] allow us in principle to constrain the parametrization at zeta > 0. Since lattice calculations are at present limited to large quark masses, we extrapolate to the chiral limit by using the technique devised in [4] to obtain the nucleon form factor dipole masses. We then perform a reconstruction of the GPDs using Bernstein polynomials. The inclusion in our fit, of recent precise Jefferson Lab data on Deeply Virtual Compton Scattering [5] is also discussed. Our method provides an alternative to the mathematical ansatz of double distributions in that GPDs are generated from direct constraints from experimental data combined with lattice calculations.

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