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Chiral dynamics and peripheral partons in the nucleon

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We introduce transverse densities in the study of parton dynamics in the proton's peripheral region. We calculate these densities using Chiral perturbation theory (ChPT) and parametrize the long distance structure of the nucleon in a model independent framework in which we identify chiral ($b \sim O(M_\pi^{-1})$) and molecular ($b \sim O(M_N^2/(M_\pi^3))$) parametrical regions. Through the light cone formulation of the nucleon's electromagnetic current in ChPT, one calculates transverse densities from local products of light cone wave functions of a pion-nucleon system. These products are understood as 2-dimensional parton distributions and as such are universal in processes that probe the nucleon's periphery. This universality and also that of the corresponding transverse density can be tested and used in phenomenological studies of reactions such as high energy proton-nucleon/nucleus collisions and in electron proton scattering as well as in low Q^2 extraction of baryonic form factors.

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