SES15-2015-000111

Abstract for an Invited Paper
for the SES15 Meeting of
the American Physical Society

Application of Virtuality Distribution Formalism to Pion Transition and Electromagnetic Form Factors[1]

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We discuss two applications of the Virtuality Distribution Amplitudes (VDA) formalism developed in our recent papers. We outline first the basic concepts of the VDA approach and introduce the pion transverse momentum distribution amplitude (TMDA) which plays, in a covariant Lagrangian formulation, a role similar to that of the pion wave function in the 3-dimensional Hamiltonian light-front approach. Then we propose simple factorized models for soft TMDAs, and use them to describe existing data on the pion transition form factor, thus fixing the scale determining the size of the transverse-momentum effects. Finally, we apply the VDA approach to the one-gluon exchange contribution for the pion electromagnetic form factor. In our model, we observe a very late $Q^2 > 20$ GeV^2 onset of transition to the asymptotic pQCD predictions and show that in the $Q^2 < 10$ GeV^2 region there is essentially no sensitivity to the shape of the pion distribution amplitude. Furthermore, the magnitude of the one-gluon exchange contribution in this region is estimated to be an order of magnitude below the Jefferson Lab data, thus leaving the Feynman mechanism as the only one relevant to the pion electromagnetic form factor behavior for accessible Q^2.

[1]This work is supported by Jefferson Science Associates, LLC under U.S. DOE Contract No. DE-AC05-06OR23177 and by U.S. DOE Grant #DE-FG02-97ER41028.