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Experimental TDA Program at FAIR, JLab and J-PARC

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Hard exclusive processes are a well established tool to study the 3D nucleon structure. The QCD factorisation mechanism in the “nearly forward region” (t/Q^2 small) can be divided into a hard part, described by perturbative QCD (pQCD) and in two general structure functions, the Generalized Parton Distributions (GPDs) for the nucleon and the pion Distribution Amplitudes (DAs), describing the complex non perturbative structure of these particles. In the “nearly backward” kinematic region (u/Q^2 small) the potentially applicable collinear factorized description in terms of a convolution of the non-perturbative nucleon to pion Transition Distribution Amplitudes (TDAs), the nucleon DAs and the hard interaction amplitude from pQCD is assumed to be valid. The scattering under backward angles provides complementary information for studies of the hadron structure, but has been so far less extensively studied than the forward angle case. Therefore, it provides new experimental and theoretical opportunities to gain insights into the 3D structure of the nucleon. The talk will give an overview on recent u -channel measurements at JLab which provide first hints for the factorisation of the TDA mechanism and discuss them in the context of the TDA model. As an outlook, plans and perspectives for upcoming measurements at JLAB, PANDA at FAIR and J-PARC will be discussed in the context of advancing our understanding of u -channel physics and gaining new insights into the nucleon structure.

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