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New approach to QCD Factorization

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Factorization is the fundamental concept in order to apply QCD calculations to description of hadronic reactions. According to Factorization, theoretical study of any hadronic process includes both parton scattering and parton distributions. The partonic sub-processes are calculated with the use of regular methods of perturbative QCD. In contrast, the parton distributions are introduced purely phenomenologically, without any theoretical grounds. There are two popular kinds of Factorization in the literature: Collinear and kT - factorizations. They were introduced independently of each other. We show that both the kT - and collinear factorization can be obtained by consecutive reductions of some more general (Basic) factorization. Each of these reductions is an approximation valid under certain assumptions.

First, the transitions from Basic to kT - factorization assumes that the momenta of the partons connecting the perturbative and non-perturbative blobs are mostly transverse. This assumption fairly agrees both with the DGLAP and BFKL.

Second, if the unintegrated parton distributions in kT -factorization have a maximum(s) in kT , then kT - factorization can be reduced to collinear factorization. The sharper the maximum is, the better is accuracy of the transition. This assumption can be checked with analysis of available experimental data. Integration over momenta of the connecting partons in the Basic factorization for amplitudes of the forward Compton scattering o hadrons must yield a nite result. This obvious requirement allowed us to deduce theoretical constraints on the parton distributions both in kT - and Collinear factorizations.

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