

Title: Investigation of the factorization scheme dependence of finite order perturbative QCD calculations

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Abstract: The main aim of this thesis is the investigation of phenomenological implications of the freedom in the choice of the factorization scheme for the description of hard collisions with the potential application for an improvement of current NLO Monte Carlo event generators. We analyze the freedom associated with the definition of parton distribution functions and we derive general formulae governing the dependence of parton distribution functions and hard scattering cross-sections on unphysical quantities specifying the renormalization and factorization procedure. The issue of the specification of factorization schemes via the corresponding higher order splitting functions is discussed in detail. The main attention is paid to the so called ZERO factorization scheme, which allows the construction of consistent NLO Monte Carlo event generators in which initial state parton showers can be taken formally at the LO. Unfortunately, it has turned out that the practical applicability of the ZERO factorization scheme is restricted. Hence, the potential exploitation of other factorization schemes is also investigated.

Keywords: QCD, parton distribution functions, factorization schemes, NLO Monte Carlo event generators