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Factorization of double Drell–Yan

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In a double Drell–Yan process two hard interactions take place instead of a single one, leading to a more complex momentum, spin, and color structure of the diagrams involved. Higher-precision predictions for the LHC and the prospect of future high-energy colliders motivate the efforts for a rigorous field-theoretical description of these kinds of processes, as well as for the broader class of multi-parton interactions (MPI). A factorization theorem is therefore the first step, needed to legitimize the phenomenological applications of the standard factorized cross-section formulae. We present an overview of the all-order factorization proof at leading twist, with a stronger focus on the extraction of the soft factor. Our proof extends the well-known work of Collins, Soper and Sterman for single Drell–Yan, dropping one of the approximations on which their argument was based. The proof involves a recursive application of Ward identities, and some more carefulness in dealing with the more complicated color structure of our processes.

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