

Proof of factorization for diffractive hard scattering

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A proof is given that hard-scattering factorization is valid for deep-inelastic processes which are diffractive or which have some other condition imposed on the final state in the target fragmentation region.

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V. CONCLUSIONS

We have proved the factorization theorem for the general class of diffractive deep-inelastic processes, and generalizations including those to which the fracture function formalism of Trentadue and Veneziano [14] applies. The proof includes a treatment of nonperturbative effects at the level of Refs. [2,3,21].

Given the results of Refs. [2,3] on the Drell-Yan process, we must not expect the theorem to be applicable to hadron-hadron collisions. Absorptive corrections should reduce diffractive hard-scattering cross sections below the expectations given by the factorization formula on the basis of deep-inelastic data. Furthermore, the “coherent Pomeron mechanism” of [4,11,22] may exist. It is only when one of the initiating particles is a lepton that the proof of factorization is valid.

The proof would appear to apply also to *direct* photoproduction of jets, etc., because the initiating particle of the hard scattering is a lepton. However, the proof does not apply to *resolved* photoproduction processes, since these are in effect hadron-hadron processes. The lack of an absolutely unambiguous separation between direct and resolved photoproduction will presumably limit the accuracy of the application of the factorization formula to direct diffractive photoproduction.

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