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Photoproduction of diffractive dijets in Pythia 8

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In the Ingelman-Schlein approach for hard diffraction the cross sections can be factorized into diffractive PDFs and perturbatively calculable partonic coefficient functions. The diffractive PDFs can be determined in a global QCD analysis using data for diffractive processes in DIS in a similar manner as for inclusive PDFs. However, it has been observed that this factorization breaks down in proton-proton collisions as the predicted cross sections overshoot the data by an order of magnitude. Similarly, factorization-based calculations for diffractive dijets in photoproduction at HERA tend to lie a factor of two above the H1 and ZEUS measurements.

Such a breaking of factorization can be naturally explained with multiparton interactions (MPIs) where the additional partonic interactions produce particles that fill the rapidity gap used to select the diffractive events. Following this idea, we have introduced a dynamical rapidity gap survival model for hard diffraction in Pythia 8 Monte Carlo event generator. The model relies on the existing MPI model in Pythia 8 and the generated cross sections are in a good agremeent with the most recent CMS data for diffractive dijet production in proton-proton collisions at the LHC. Here we focus on the recent extension of the model for photoproduction and show that the generated cross sections are well in line also with the measurements at low photon-virtuality in the electron-proton collisions at HERA. Furthermore, predictions for diffractive dijet production in ultra-peripheral collisions at the LHC are provided for different beam configurations and an outlook for photo-nuclear processes is given.

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