

Photoproduction and ultra-peripheral collisions with Pythia 8

Tuesday 20 March 2018 11:30 (30 minutes)

Photoproduction in electron-proton collisions were extensively studied at HERA for several observables. In these processes a quasi-real photon from the lepton interacts with the proton. Due to the small virtuality, the photons may also fluctuate into a hadronic state so that constituting partons act as initiators of the hard process. The partonic structure of these resolved photons can be described with DGLAP-evolved PDFs obtained through a global analysis and gives rise also to multipartonic interactions. Similar interactions can happen also in ultra-relativistic heavy-ion collisions if the colliding ions passes each other with a large impact parameter so that no strong interaction can happen. However, the ultra-relativistic ions produce photons which may still interact with the other nucleus. These interactions are referred to as ultra-peripheral collisions and provide an unique opportunity to study photon-nucleus interactions at the LHC. In this talk, I will present our recent Pythia 8 implementation for photoproduction and how the flux of photons from nuclei is obtained applying equivalent photon approximation. In particular, I will show results for dijet photoproduction at HERA and in ultra-peripheral Pb+Pb collisions at the LHC and discuss about theoretical uncertainties related to multiparton interactions and photon PDFs. As an application, the potential of the ultra-peripheral collisions to further constrain the nuclear PDFs is studied.

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