



Contribution ID: 235

Type: **not specified**

Simulations of photo-nuclear dijets with PYTHIA 8 and their sensitivity to nuclear PDFs

Tuesday 17 April 2018 11:30 (25 minutes)

In ultra-peripheral heavy-ion collisions the ions encounter with such a large impact parameter that no strong interaction can take place. However, the photons produced by the colliding ion can interact either with the other nucleus or with a photon from the another nucleus. The former corresponds to photoproduction studied earlier in electron-proton collisions at HERA but with a nuclear target. This provides an unique opportunity to study the nuclear modifications of the PDFs with the photo-nuclear processes measured in lead-lead collisions at the LHC. First preliminary results for photo-nuclear dijets were recently published by ATLAS and plenty of more data are expected in near future. In this talk, I will first present our recent implementation of photoproduction processes in PYTHIA 8 general-purpose Monte-Carlo event generator. The resulting simulations are compared to charged-hadron and dijet production data from different HERA experiments and the theoretical uncertainties of the framework are quantified. Then I will discuss how the relevant part of the photon flux from heavy-ions is obtained using equivalent photon approximation and present predictions for photo-nuclear dijet cross section at the LHC. To estimate the potential of this data to further constrain the nuclear PDFs, the expected statistical uncertainty based on LHC luminosity is compared to uncertainties in current nuclear PDF analyses.

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Session Classification: WG4: Hadronic and Electroweak Observables

Track Classification: WG4: Hadronic and Electroweak Observables