Contribution ID: **28** Type: **seminar l**

nPDFs at small x and exclusive photoproduction of J/psi in UPCs at the LHC

Friday 16 February 2018 18:30 (30 minutes)

Nuclear parton distribution functions (nPDFs) are fundamental quantities of QCD, which describe the structure and response of nuclei in such hard processes as deep inelastic lepton-nucleus scattering, hadron-nucleus lepton pair production (Drell-Yan process), inclusive production of gauge bosons in proton-nucleus collisions, and many more.
Nuclear PDFs are determined indirectly by fitting to these data employing the QCD factorization theorems and evolution equations. However, the resulting nPDFs are extracted with significant uncertainty, especially at small x, where nPDFs are expected to be suppressed compared to the sum of PDFs of the nucleon by nuclear shadowing (x is the light-cone momentum fraction of the nucleus momentum carried by the parton). As an alternative method, I will discuss a leading-twist dynamical model of nuclear shadowing, where nPDFs at small x result from multiple diffractive interactions with nucleons of the nuclear target. I will then explain that exclusive photoproduction of J/psi vector mesons on nuclei in Pb-Pb ultraperipheral collisions (UPCs) at the LHC gives an opportunity to probe and constrain the gluon distribution in nuclei at small x. Our analysis demonstrates that these data give evidence of the large gluon nuclear shadowing, which agrees with the leading-twist model and the EPS09 nPDFs.
Perspectives to further constrain nPDF using UPCs at the LHC will also be discussed.

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