



ID de Contribution: 33

Type: Poster

## Cold nuclear effects in Drell-Yan and quarkonium production

*lundi 22 juillet 2019 19:15 (15 minutes)*

Hard processes in proton–nucleus or electron-nucleus collisions are powerful tools to investigate cold nuclear matter effects. Among various QCD processes, the Drell-Yan (DY) mechanism in proton-nucleus collisions and the production of hadrons in semi-inclusive DIS (SIDIS) allow for probing parton distribution functions in nuclei as well as parton energy loss effects.

In this talk, we investigate the production of Drell-Yan and quarkonium production in proton-nucleus collisions, from SPS to LHC collision energies. The rapidity dependence of DY lepton pair production at low collision energies highlights the role of parton energy loss processes and would eventually allow for the precise extraction of the transport coefficient of nuclear matter. This, however, would only be possible once nuclear parton densities are better constrained from DY production at LHC energies and from measurements in an electron-ion collider. Constraints on the transport coefficient from the transverse momentum broadening of various probes, either DY or quarkonium production in hadron-nucleus collisions or from hadron production in SIDIS, will also be discussed.

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**Classification de Session:** Poster session