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Nuclei formation in pp and heavy-ion collisions at the LHC: Insight into the production mechanisms using novel tools

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A hot topic at the Large Hadron Collider (LHC) is the production of anti-nuclei. In ultra high-energy collisions, nuclei with very low binding energies are not expected to survive the dense and hot final state environment. The traditional view of nuclei production has been that antinuclei form via coalescence after the hot environment has dissipated. However, statistical thermal models, where hadrons are produced from a fireball at thermal equilibrium, can also describe the relative abundances of light nuclei in pp and heavy-ion collisions at the LHC. In this talk, latest measurements on nuclei in pp and heavy-ion collisions at the LHC will be discussed. The deuteron and anti-deuteron production will be investigated to test the microscopic mechanism of their production, which is still under debate. In particular, using a realistic coalescence model for deuteron production, the deuteron-antiproton (antideuteron-proton) balance functions as a function of multiplicity and transverse momentum selection for pp collisions will be presented. This will be compared with balance functions obtained using the statistical-thermal FIST package. Finally, the possibility to differentiate between the two production mechanism will be discussed.

Author: TRIPATHY, Sushanta (CERN)

Presenter: TRIPATHY, Sushanta (CERN)

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