Contribution ID: **49** Type: **Oral**

Cold nuclear matter effects on charmonium production in RHIC and LHC energy domain

Friday 5 September 2025 15:00 (15 minutes)

Charmonia ($c\bar{c}$) states are believed to undergo considerable suppression, if quark-gluon plasma (QGP) is formed in relativistic heavy-ion collisions. However, a precise identification of the "anomalous" suppression pattern and its interpretation as a signature of color deconfinement demands a detailed understanding of charmonium production and suppression in proton-nucleus ($p + A$) collisions and its scaled-up contribution to nucleus-nucleus ($A + A$) collisions. In such collisions charmonium production is affected due to the presence of several different effects of different physical origin, inside the target nucleus for $p + A$ and inside the target as well as projectile nucleus for the $A + A$ system, collectively known as cold nuclear matter (CNM) effects. Interplay of various CNM effects ultimately result in an increase in resonance production cross section less than linearly with the number of binary collisions. The origin and degree of different physical processes causing charmonium suppression in normal nuclear matter would depend on the underlying collision energy and the kinematic window of the particular measurement.

In the foreseen contribution we plan to make a detailed evaluation of the different CNM effects, namely initial state parton energy loss, nuclear shadowing and final state energy loss of the nascent $c\bar{c}$ pairs in their pre-resonance stage by analyzing the available data on J/ψ production in $p + A$ and $A + A$ collisions as available from the experiments carried out at DESY, RHIC and LHC accelerator facilities. Extrapolating the observed pattern, we will give predictions for the expected level of J/ψ suppression due to confined nuclear matter, in the recently recorded $O + O$ and $Ne + Ne$ collisions at the LHC.

Author: GIRI, Sourav Kanti (Department of Atomic Energy (IN))

Co-author: Dr BHADURI, Partha Pratim (Variable Energy Cyclotron Centre)

Presenter: GIRI, Sourav Kanti (Department of Atomic Energy (IN))

Session Classification: Parallel Session