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Cold nuclear matter effects on charmonium production in fixed target proton-nucleus collisions

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Charmonia ($c\bar{c}$) states are believed to undergo considerable suppression, if quark-gluon plasma (QGP) is formed 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. In these collisions charmonium production is affected due to the presence of several different effects inside the target nucleus, collectively known as cold nuclear matter (CNM) effects resulting an increase in production cross section less than linearly with the number of target nucleons. In the foreseen contribution we plan to make detailed evaluation of the different CNM effects, namely initial state parton energy loss, nuclear shadowing and final state absorption of the nascent $c\bar{c}$ pairs in their pre-resonance or resonance stage by analyzing the available data on charmonium production in fixed target $p + A$ collision experiments from SPS, Fermilab and HERA-B. Extrapolating the observed pattern we give a prediction of the level of "normal" absorption in the upcoming experiments NA60+ at CERN SPS and CBM at FAIR.

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

Co-authors: Dr PAUL, Biswarup (Department of Atomic Energy (IN)); Dr BHADURI, Partha Pratim (Department of Atomic Energy (IN)); DAS, Santosh Kumar (School of Physical Science, Indian Institute of Technology Goa, India)

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

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