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Charmonium suppression in QGP at LHC energy using temperature dependent formation time

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The charmonium wavefunction is expected to expand with the temperature of the quark-gluon plasma (QGP) formed in the heavy-ion collision experiments. We model the effect of this expansion on the formation time of the charmonium bound states and eventually, the effect of this temperature dependent formation time on the J/ψ suppression in the QGP medium. The effect of charm quark and anti-charm quark via recombination to form secondary charmonium states is also incorporated in the present work. A set of coupled rate equations is established which incorporates color screening, gluonic dissociation, collisional damping and recombination of uncorrelated c and $\bar{c}$ pair in the QGP medium. The effect of light quarks is also evaluated. Shadowing as a cold nuclear matter (CNM) effect is also incorporated in the current work. The final J/ψ suppression, thus determined as a function of centrality, is compared with the ALICE (low p_T) experimental data at both, mid rapidity and forward rapidity and CMS (high p_T) experimental data at mid rapidity obtained from the Large Hadron Collider (LHC) at center-of-mass energy, $\sqrt{s_{NN}} = 2.76$ TeV. We find that our predicted result on suppression depicts reasonably good agreement with the data. We also find that contribution of color screening in determining the total suppression of J/ψ in QGP medium becomes insignificant due to employing temperature dependent formation time.

On behalf of collaboration:

NONE

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