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Effect of field fluctuations on heavy mesons nuclear modification factor at LHC energies

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The aim of the ongoing relativistic heavy-ion collision experiments is to explore the possible hot and dense deconfined state of QCD matter produced in such high energy collisions, the so called Quark-Gluon-Plasma (QGP). High energy partons (gluons, light quarks as well as heavy quarks) are produced in initial partonic sub-processes in the collisions between two heavy nuclei. Heavy quarks are mostly produced at the early stage of the collisions from the initial fusion of the partons which makes them a good probe to characterize the QGP. Immediately after their production, these heavy quarks will travel through the dense QGP medium and will start losing energy during their path of travel. They lose energy in two different manners, one is by elastic collisions and another is by bremsstrahlung gluon radiations. These energy loss calculations are usually obtained by considering the QGP medium in an average manner and statistical field fluctuations of the QGP medium are ignored. The QGP being a statistical system of mobile color charge particles, one could characterize it by stochastic electromagnetic field fluctuations. The effect of this field fluctuations in the QGP leads to an energy gain of the travelling heavy quarks of all momenta and significant at the lower ones.

We have calculated the nuclear modification factor (R_{AA}) of heavy mesons by considering the collisional and radiative energy loss of heavy quarks along with the energy gain due to field fluctuations. Our results are in good agreement with the experimentally measured R_{AA} of D and B mesons by ALICE and CMS experiments at $\sqrt{s_{NN}} = 2.76$ TeV and $\sqrt{s_{NN}} = 5.02$ TeV.

Content type

Theory

Collaboration

Centralised submission by Collaboration

Presenter name will be specified later

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