A Multi-Phase Transport study of J/ψ suppression at RHIC

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Abstract

J/ψ suppression is one of the most promising signals of Quark-Gluon-Plasma formation. In an infinite Quark-Gluon-Plasma, due to color screening, J/ψ's are dissociated into free $c\bar{c}$ pairs. As Quark-Gluon-Plasma produced in relativistic nucleus-nucleus collisions have finite size and finite life time, a study of J/ψ suppression in realistic space-time picture is necessary. We performed such a study using A Multi-Phase Transport model that includes both parton and hadron space-time evolution. Besides plasma dissociation, we included dissociation of J/ψ by collisions with gluons and hadrons. Both plasma screening and gluon scatterings are found to be important for J/ψ suppression in Au+Au collisions, and the effect due to absorption by hadrons is minor. The final J/ψ survival probability is only a few percent. For S+S collisions, in spite of the initial high parton density, due to short plasma life time, the plasma screening dissociation is absent. This provides an opportunity for the study of gluon-J/ψ interactions.

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