Recent J/ψ results in p+p and Au+Au collisions from STAR

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Abstract

Heavy quarkonia are ideal probes of the Quark-Gluon Plasma (QGP). The J/ψ suppression due to the color screening effect in heavy-ion collisions is a key experimental observable to study the QGP. At RHIC energies, charm quark recombination could also affect the J/ψ yield in the QGP. Measurements of J/ψ production in Au+Au collisions at different collision energies will help to understand the interplay of these mechanisms for J/ψ production in heavy-ion collisions. Additionally, measurements of J/ψ cross section, polarization and its production in jets in p+p collisions are important in understanding the J/ψ production mechanism in vacuum.

Suppression of the J/ψ production at mid-rapidity in the Au+Au collisions at $\sqrt{s_{\rm NN}}$ = 39, 62.4 and 200 GeV from the STAR experiment showed no significant collision energy dependence within large uncertainties. In 2017, STAR collected a high statistics sample of 54.4 GeV Au+Au collisions which is more than ten times larger than the 39 and 62.4 GeV data. In this talk, we will present new measurements of inclusive J/ψ production in Au+Au collisions at $\sqrt{s_{\rm NN}}$ = 54.4 GeV by the STAR experiment. The collision energy and transverse momentum dependences of the nuclear modification factor will be presented. We will also present the measurements of J/ψ cross section and polarization in p+p collisions, as well as the first measurement of the fraction of charged jet transverse momentum carried by the J/ψ meson at $\sqrt{s_{\rm NN}}$ = 500 GeV. Physics implications of these results will also be discussed.