Measurements of charmonium production in heavy-ion collisions at STAR

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In relativistic heavy-ion collisions, the dissociation of charmonium is considered an important evidence for the formation of the quark-gluon plasma (QGP). However, charmonia also experience the regeneration effect in the QGP, which acts against the dissociation process. With decreasing collision energy, the regeneration effect decreases quickly, providing leverage to disentangle the two competing effects. Additionally, it is expected that different charmonium states dissociate at different temperatures, with a suppression pattern ordered sequentially with the binding energy. Therefore, sequential suppression of different charmonium states will further help to study the thermodynamic properties of the QGP.

In this talk, we present the nuclear modification factor (R_{AA}) of J/ψ as a function of centrality and transverse momentum in Au+Au collisions at $\sqrt{s_{NN}}$ = 14.6, 17.3, 19.6, and 27 GeV using the Beam Energy Scan Phase II data. Additionally, we investigate the energy dependence of J/ψ R_{AA} from RHIC to LHC energies in central heavy-ion collisions, including a comparison to model calculations. Furthermore, the first measurement of ψ(2S) production in isobaric collisions ($^{96}_{44}Ru$ + $^{96}_{44}Ru$ and $^{96}_{40}Zr$ + $^{96}_{40}Zr$) at top RHIC energy, including the centrality and transverse momentum dependence of the ratio of ψ(2S) yield over that of J/ψ, will also be presented.