K^{*0} and ϕ production in Au+Au collisions at RHIC

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Heavy-ion collisions provide a unique opportunity to study the properties of the QCD matter at varying temperatures and densities. For the K^{*0} resonance which has a short lifetime (4.16 fm/c), its yield may deviate from thermal model expectations due to hadronic processes (re-scattering and re-generation) that occur after the chemical freeze-out. On the other hand, the ϕ resonance, which has a longer lifetime (46 fm/c), has relatively small hadronic interaction cross section. Therefore, it is less susceptible to final-state effects and can be used to study the early evolution of the system. In addition, coalescence model calculations indicate that the Ω/ϕ yield ratio is sensitive to strange quark thermodynamic properties since both the Ω hyperons and ϕ mesons have relatively small hadronic interaction cross sections and their yields suffer minimal distortion from decay feed-down. Therefore, measuring the Ω/ϕ yield ratio as a function of collision energy can potentially probe the onset of deconfinement.

In this talk, we will present measurements of K^{*0} at $\sqrt{s_{NN}}$ = 19.6, 14.6 and 7.7 GeV and ϕ at $\sqrt{s_{NN}}$ = 27, 19.6, 14.6 and 7.7 GeV using high statistics STAR BES-II data. Transverse momentum spectra of K^{*0} and ϕ will be presented in intervals of rapidity and centrality, and resonance to non-resonance particle ratios (ϕ/K and K^{*0}/K) will be shown as a function of centrality for various collision energies. In addition, rapidity dependence of K^{*0} and ϕ production and the elliptic flow of K^{*0} will be shown. Physics implications of these measurements will also be discussed.