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Beam energy dependence of bulk properties via K^{*0} and ϕ resonances in Au+Au collisions at RHIC

Resonances are excellent probes to understand the properties and evolution of the QCD medium created in relativistic heavy-ion collisions. Because of their short lifetime, resonances decay inside the fireball and their decay daughters interact with particles present in the medium. If the decay daughters are re-scattered by other hadrons present in the medium, the resonance signal cannot be reconstructed. On the other hand, pseudo-elastic interactions among the hadrons can regenerate resonances. The properties of resonances such as mass, width and yield are decided by the interplay of these processes. The centrality-dependent resonance to non-resonance ratio measured at top RHIC and LHC energies already hints at the dominance of re-scattering in the hadronic phase of the medium at these energies. The elliptic flow parameter, v_2, has been widely used as a tool for understanding the dynamics of the system created in the early stages of a collision. Comparison between K^{*0} and ϕ is very promising, because the lifetime of these examples differ by a factor of ten, and K^{*0} is expected to be affected more by the hadronic phase. Moreover, both offer the advantage of being vector mesons with masses close to that of the proton.

We report the production of K^{*0} and ϕ resonances in Au+Au collisions at $\sqrt{s_{NN}}$ = 7.7, 11.5, 14.5, 19.6, 27, 39 and 200 GeV using the STAR detector. We present invariant mass peak position, width, yield and elliptic flow of K^{*0} and ϕ at these beam energies, including tests of NCQ scaling. Comparing the relative yield of resonances to non-resonances between RHIC and LHC energies will help us to understand the relative contributions from the hadronic phase at these energies.

Preferred Track

Baryon-Rich QCD Matter and Astrophysics

Collaboration

STAR

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