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Geometry and dynamics of particle production seen by femtoscopic probes in the STAR experiment

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The main goal of studying heavy-ion collisions is to understand the properties of the matter under extreme conditions. The spatial and temporal characteristics of particle emission can be extracted using femtoscpy technique. From non-identical particle correlations one can obtain information about asymmetry in emission process between those two kind of particles. Such asymmetry can provide insight into which type of particles on average are emitted earlier and/or from which region of the source. Using different combinations of pion, kaon and proton pairs one can obtain complete knowledge of the geometric and dynamic (times of emission) properties of the source. This knowledge could provide information about differences between emission of light mesons (pions), strange mesons (kaons) and baryons (protons). Femtoscopy analysis can also provide information about meson-meson, meson-baryon and baryon-baryon interactions.

In this talk, the centrality, energy and transverse mass dependence of the three-dimensional femtoscopic observables for charged kaons in Au+Au collisions at energies $\sqrt{s_{NN}} = 7.7$ - 200 GeV will be presented. Also results on femtoscopic observables of various particle combinations of pions, kaons and protons from Au+Au collisions at Beam Energy Scan energies ($\sqrt{s_{NN}} = 7.7$, 11.5 and 39 GeV) will be reported. Finally, the results of proton-Omega femtoscopic measurements in Au+Au collisions at $\sqrt{s_{NN}} =$˜200 GeV will be shown and compared to (2+1)-flavor lattice QCD simulations.

Collaboration name

STAR Collaboration

Track

Strangeness and Light Flavour

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