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Kaon femtoscopy in Au+Au collisions from the Beam Energy Scan at the STAR experiment

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Quantum Chromodynamics calculations predict that under sufficiently high temperature or energy density nuclear matter undergoes a phase transition from hadrons to a state of deconfined quarks and gluons, the Quark-Gluon Plasma. The properties of this novel state of matter have been extensively studied in high-energy nuclear collisions at RHIC.

Two-particle correlations at small relative momenta reveal the space-time characteristics of the system at the moment of particle emission. The femtoscopic analyses of kaons can serve as a cleaner probe of the studied system than measurements with pions as they are less affected by resonance decays. Since kaons contain strange quarks and have smaller cross-section with hadronic matter, measurements with kaons can be sensitive to different effect and/or earlier collision stages.

In this talk, I will present the STAR preliminary results on femtoscopic correlations of like-sign kaons from Au+Au collisions at Beam Energy Scan energies. The measured kaon source radii are studied as a function of collision energy as well as centrality and transverse pair mass m_{T}. In addition, high-statistics dataset of Au+Au collisions at $\sqrt{s_{\mathrm{NN}}}$=200 GeV allows more detailed and precise study including extraction of freeze-out parameters using Blast-Wave parameters.

Moreover, I will present results from measurements of the system of unlike-sign kaons which contains $\phi(1020)$ resonance. In the region of the resonance, the correlations due to the strong final-state interaction exhibit high sensitivity to the space-time extents as it was theoretically predicted. The measured unlike-sign kaon correlation function from 200 GeV Au+Au collisions are compared with Lednický's model including the final-state interaction as well as the resonance within the femtoscopic framework.

List of tracks

QCD phase diagram (BES)

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