

Kaon femtoscopy in Au+Au collisions at the energy from 7.7 to 200 GeV with the STAR experiment

Femtoscopy allows us to measure the space-time characteristics of the system at the moment of particle emission using two-particle correlations. In comparison to the most abundant pions, kaons provide a cleaner probe as they are less affected by resonance decays. Since kaons contain strange quarks and have smaller cross section with hadronic matter than pions, they may be sensitive to different effects and earlier collision stages. In particular, these measurements are of interest with the data from RHIC Beam Energy Scan (BES).

In this talk, we will present the STAR preliminary results on femtosopic correlations of like-sign and unlike-sign kaons from high-statistics dataset of Au+Au collisions at $\sqrt{s_{NN}}=200$ GeV and Au+Au collisions from BES. The kaon source radii for 200 GeV are compared to those for pions and the Blast-Wave model predictions.

The common m_T -scaling for pions and kaons would be an indication of the simultaneous thermal freeze-out. The m_T -scaling breaking is observed for both 1D and 3D femtosopic analyses. Such behavior can be interpreted as earlier decoupling of kaons compared with pions.

Moreover, the system of unlike-sign kaons contains $\phi(1020)$ resonance which exhibits high sensitivity. Systematic measurements in the region of resonance are able to provide complementary information about the source-size and can serve as a test of femtosopic formalism which was developed for measurement at low relative momenta. Experimental results indicate a breakdown of the formalism in the region of the resonance in peripheral collisions. The measured unlike-sign correlation functions are compared to the Lednicky final state interaction model which includes the treatment of the resonance decay.

Finally, the technique of decomposition of the experimental 3D correlation function into the spherical harmonics are used to study the possible difference between positive and negative kaon sources at the BES collision energies.

Preferred Track

Correlations and Fluctuations

Collaboration

STAR

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