

New Results of Pion and Kaon Femtoscopy at High Baryon Density from RHIC-STAR

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1 Femtoscopic measurements provide valuable information on the spatial and temporal
2 characteristics of the source of particle emission in heavy-ion collisions, enabling us to
3 study the dynamic evolution of the created matter and the final state interactions be-
4 tween the particles. A first-order phase transition is expected to lead to longer duration
5 of particle emission, which can be probed by extracted source radii in the femtosopic
6 measurements. Therefore, it will help us understand the properties of QGP and the na-
7 ture of the QCD phase transition. Further, femtosopic measurements of $K_s^0 - K_s^0$ and
8 $K^+ - K^+$ in high baryon density Au+Au collisions provide insights into the propoerties
9 of $f_0(980)$ and $a_0(980)$ resonances.

10 In this talk, we report on the results of systematic femtosopic measurements of
11 charged pions (π^\pm) and kaons (K^+ , K_s^0), obtained from Au+Au fixed-target collisions
12 at RHIC with collision energies of $\sqrt{s_{NN}} = 3.0, 3.2, 3.5,$ and 3.9 GeV, measured by
13 the STAR experiment at RHIC. We extract the correlation strength (λ) and source radii
14 ($R_{out}, R_{side}, R_{long}$ for pions and R_{inv} for kaons) from the identical two-particle correlation
15 function and study their dependence on the collision energy, centrality, rapidity, and pair
16 transverse mass. We also compare our measurements with results from transport model
17 calculations. Finally, the implications on the properties of QCD matter at high baryon
18 density will be discussed.