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Femtoscopic pair correlations of mesons and baryons at RHIC and LHC from hydrokinetic model

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The femtoscopic scales for identical pions and kaons are presented at different centralities for the top energy RHIC and LHC A+A collisions in comparison with ones for p+p collisions. The later results are obtained in hydrokinetic model (HKM) in view of the quantum uncertainty principle. The three-dimensional pion and kaon emission source functions are extracted from the HKM model simulations for A+A collisions. The model describes well the experimental data, previously obtained by the PHENIX and STAR collaborations using the imaging technique. In particular, the HKM reproduces the non-Gaussian heavy tails of the source function in the pair transverse momentum (out) and beam (long) directions, observed in the pion case and practically absent for kaons. The role of the rescatterings and long-lived resonances decays in forming of the long range tails is investigated. The prediction is made for the source functions in the LHC Pb+Pb collisions at $\sqrt{s}$= 2.76 TeV.
As for the baryon-baryon correlations, the source functions of pp, pΛ and $\bar{p}\Lambda$ pairs are found in Au+Au collisions and used by means of FSI correlation technique for an extraction of the scattering lengths in two-baryon systems. The role of residual correlations in formation of the total baryon-baryon correlation function is analyzed.

The talk is based on the results of the following works:

1. Iu.A. Karpenko, Yu.M. Sinyukov. Uniform description of bulk observables in the hydrokinetic model of A+A collisions at RHIC and LHC, Phys. Rev. C 87, 024914 (2013).
2. V.M. Shapoval, P. Braun-Munzinger, Iu.A. Karpenko, Yu.M. Sinyukov. Femtoscopic scales in p+p and p+Pb collisions in view of the uncertainty principle. Phys. Lett. B 725, 139 (2013).
3. V.M. Shapoval, Yu.M. Sinyukov, Iu.A. Karpenko. Emission source functions in heavy ion collisions, Phys. Rev C 88 064904 (2013).
4. V. M. Shapoval, B. Erazmus, R. Lednicky, and Yu. M. Sinyukov. Extracting pΛ and $\bar{p}\Lambda$ scattering lengths from heavy ion collisions. Proceedings of the International School-Seminar "New Physics and Quantum Chromodynamics at External Conditions", pp. 115-119 , 2013, Dnipropetrovsk, Ukraine. (Publication in preparation).
5. V.M. Shapoval, P. Braun-Munzinger, Iu.A. Karpenko, Yu.M. Sinyukov. Femtoscopic correlations of kaons in Pb+Pb and p+p collisions at LHC within hydrokinetic model. (Publication in preparation).

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