

Balance Functions of Identified Hadron Pairs in Au+Au Collisions at STAR

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The correlations between positive and negative charged particles provide insight into their production mechanisms during high-energy heavy-ion collisions. The balance functions, B_2 , quantify these correlations and indicate the kinematic distribution of the particle species that are charge-balancing a given measured hadron in the acceptance. We have produced the balance functions of the matrix of $(\pi, K, p) \otimes (\pi, K, p)$ species pairs using linear combinations of fully-corrected normalized correlation functions, R_2 [1], weighted by efficiency-corrected single-particle cross-sections. These balance functions have been produced using this technique both for experimental data and several event generators in Au+Au collisions at $\sqrt{s_{NN}}=200$ GeV measured by the STAR Collaboration at RHIC. The integrals of the balance functions show how charge is being conserved across this matrix of particle species. They are obtained both by direct integration of the balance functions and from a simpler calculation using only the multiplicity distributions, assuming the system to be boost invariant. The results and their implications will be discussed.

1. J. Adam et al.(STAR Collaboration). Beam-energy dependence of identified two-particle angular correlations in $\sqrt{s_{NN}}=7.7-200$ GeV Au+Au collisions. Phys. Rev. C 101, 014916 (2020).