

Investigations of the longitudinal broadening of two-particle transverse momentum correlations from STAR

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Two-particle transverse momentum correlator is a powerful technique for understanding the dynamics of relativistic heavy-ion collisions. Among these, the transverse momentum correlator $G_2(\Delta\eta, \Delta\varphi)$ is of particular interest for its potential sensitivity to the shear viscosity per entropy density η/s of the quark-gluon plasma formed in heavy-ion collisions [1,2]. We used Au–Au at $\sqrt{s_{NN}} = 200$ GeV data to investigate: (i) the self-correlations associated with the definition of the collision centrality[3], (ii) the longitudinal broadening of the $G_2(\Delta\eta, \Delta\varphi)$ correlator, (iii) the long range azimuthal dependence of the $G_2(\Delta\eta, \Delta\varphi)$. We will present the centrality and event shape dependence of the longitudinal width $\sigma(\Delta\eta)$ and the azimuthal harmonics a_n^{pT} of the $G_2(\Delta\eta, \Delta\varphi)$ correlator. Our measurements are compared to similar LHC measurements as well as with calculations using the UrQMD, AMPT, and EPOS models [4]. These comparisons are expected to reflect the efficacy of the $G_2(\Delta\eta, \Delta\varphi)$ correlator to differentiate among theoretical models as well as to constrain the η/s .

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[3] N. Magdy, et al., arXiv:2101.01555

[4] N. Magdy, et al., arXiv:2105.07912