Two-particle correlation distributions on transverse momentum in relativistic heavy-ion collisions

R. L. Ray, for the STAR Collaboration

Two-particle, pair-number correlation projections onto two-dimensional transverse momentum coordinates (p_{t1}, p_{t2}) allow access to relativistic heavy-ion collision dynamics beyond that accessible in previous, complementary studies of two-particle angular correlations. We report charged-particle correlations from minimum-bias Au + Au collisions at $\sqrt{s_{NN}} = 200$ GeV taken by the STAR experiment at the Relativistic Heavy-Ion Collider (RHIC). These new correlations are constructed using all charged particles with $p_t > 0.15$ GeV/c, $|\eta| < 1$, and full 2π acceptance in azimuth. Correlations are presented for like-sign and unlike-sign charge-pair combinations and for specific azimuthal angle projections. The major correlation features include a saddle shape and a peak extending from $p_t = 0.5$ to 4.0 GeV/c. The measurements are compared to predictions of models based on color-string (LUND) plus hard-scattered parton fragmentation (HIJING), and (3+1)-dimensional, event-by-event hydrodynamics, including hard-scattering (EPOS). The features of the correlations are also described by phenomenology [1], i.e. a blast-wave model and a two-component fragmentation model, representing two distinct frameworks for understanding relativistic heavy-ion collisions. Implications of these new measurements and analysis with respect to equilibration, the origin of transverse-momentum fluctuations, longitudinal and transverse parton fragmentation, and interactions within the dense, partonic medium are discussed.
[1] R.L. Ray, A. Jentsch, Phys. Rev. C **99**, 024911 (2019).

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