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Triangular flow of negative pions emitted in PbAu collisions at $\sqrt{s_{\mathrm{NN}}} = 17.3$ GeV ☆

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Abstract

Differential triangular flow, $v_3(p_T)$, of negative pions is measured at $\sqrt{s_{\rm NN}} = 17.3$ GeV around midrapidity by the CERES/NA45 experiment at CERN in central PbAu collisions in the range 0–30% with a mean centrality of 5.5%. This is the first measurement as a function of transverse momentum of the triangular flow at SPS energies. The p_T range extends from about 0.05 GeV/c to more than 2 GeV/c. The triangular flow magnitude, corrected for the HBT effects, is smaller by a factor of about 2 than the one measured by the PHENIX experiment at RHIC and the ALICE experiment at the LHC. Within the analyzed range of central collisions no significant centrality dependence is observed. The data are found to be well described by a viscous hydrodynamic calculation combined with an UrQMD cascade model for the late stages.

Keywords: Triangular flow; SPS; Heavy-ion

1. Introduction

The azimuthal anisotropy of particles emitted in heavy-ion collisions is used to study properties of hot and dense systems created in such collisions. The almond shape of the overlapping region in a non-central collision manifests itself in the appearance of the elliptic flow anisotropy [1] driven by strong interactions among constituents of the expanding medium. By these interactions the geometrical anisotropy of the overlap zone evolves, following the pressure gradients, into the momentum space anisotropy that is measured by the second harmonic coefficient v_2. But due to fluctuating positions of the colliding nucleons, the event plane derived from the elliptic anisotropy is not a strict plane of symmetry, and higher-order anisotropies may appear [2]. In fact, among the prominent results from collider experiments are observations of significant triangular flow, at the Relativistic Heavy Ion Collider (RHIC) at nucleon–nucleon center-of-mass energy up

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