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Quasiparticle anisotropic hydrodynamics for ultrarelativistic heavy-ion collisions

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We present the first comparisons of experimental data with phenomenological results from 3+1d quasiparticle anisotropic hydrodynamics (aHydroQP). We compare charged-hadron multiplicity, identified-particle spectra, identified-particle average transverse momentum, charged-particle elliptic flow, and identified-particle elliptic flow produced in LHC 2.76 TeV Pb+Pb collisions. The dynamical equations used for the hydrodynamic stage utilize non-conformal aHydroQP. The resulting aHydroQP framework naturally includes both shear and bulk viscous effects in addition to higher-order non-linear transport coefficients. The 3+1d aHydroQP evolution obtained is self-consistently converted to hadrons using anisotropic Cooper-Frye freezeout performed on a fixed-energy-density hypersurface. The final production and decays of the primordial hadrons are modeled using a customized version of THERMINATOR 2. In this first study, we utilized smooth Glauber-type initial conditions and a single effective freeze-out temperature $T_{\rm FO} = 130$ MeV with all hadronic species in full chemical equilibrium. With this rather simple setup, we find a very good description of many heavy-ion observables.

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