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Radial and elliptic flow in LHC Pb+Pb collisions from viscous hydrodynamics

Predictions and postdictions from viscous hydrodynamics for the transverse momentum spectra and differential elliptic flow for unidentified and identified charged hadrons from Pb+Pb collisions at LHC energies, including their centrality dependence, will be presented. These predictions are based on a global viscous hydrodynamic fit of soft hadron spectra and their anisotropies measured in Au+Au collisions at RHIC, using a state-of-the-art equation of state, which accurately reproduces the observed charged hadron, pion and proton spectra and their differential v_2(p_T) for all collision centralities in the range p_T<2 GeV. Assuming the same specific effective shear viscosity eta/s=0.20 for KLN initial conditions at RHIC and LHC, we obtain a good description of the soft charged hadron spectra in central Pb+Pb collisions at sqrt{s}=2.76 A TeV, but slightly overpredict the integrated charged hadron elliptic flow in measured by the ALICE Collaboration in non-central Pb+Pb collisions. We explore whether and how this can be remedied by allowing for a temperature dependent change of the specific shear viscosity eta/s of the quark-gluon plasma in the newly explored higher temperature region probed at the LHC. In doing so, we expose a need for a more quantitative understanding of the early pre-equilibrium stage. Future comparisons of spectra and elliptic flow for identified hadrons at both sqrt{s}=2.76 and 5.5 A TeV with predictions presented in this talk will allow to further test the validity of the viscous hydrodynamic model and will shed additional light on possible variations of the quark-gluon transport coefficients between RHIC and LHC energies.

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