Contribution ID: **243** Type: **not specified**

Constraining the properties of the Quark-Gluon Plasma with anisotropic flow measurements in ALICE

Sunday, 3 September 2017 14:00 (25 minutes)

The primary goal of the ultra-relativistic heavy-ion collision program at the Large Hadron Collider (LHC) is to study the properties of the Quark-Gluon Plasma (QGP), a novel state of strongly interacting matter that is proposed to exist at high temperatures and energy densities. Studies of azimuthal correlations of produced particles have contributed significantly to the characterization of the matter created in heavy-ion collisions. Anisotropic flow, which quantifies the anisotropy of the momentum distribution of final state particles, is sensitive to the event-by-event fluctuating initial geometry of the overlap region, together with the transport properties and the equation of state of the system. The successful description of the measured anisotropic flow coefficients by hydrodynamic calculations suggests that the created medium behaves as a nearly perfect fluid with a shear viscosity to entropy density ratio close to a conjectured lower bound $1/4\pi$.

In this talk, we will present flow measurements in Pb–Pb collisions at $\sqrt{s_{NN}}$ = 2.76 and 5.02 TeV with ALICE at the LHC. The standard anisotropic flow coefficients, as well as the recently developed anisotropic flow observables, symmetric cumulants and non-linear modes of higher order anisotropic flow, will be discussed in detail [1, 2]. These measurements, together with the comparisons to hydrodynamic calculations, help constrain the initial conditions and temperature dependence of the shear and bulk viscosities of the QGP, which were not very well constrained by earlier flow measurements. These comparisons could also offer new insights into the geometry of the fluctuating initial state and further understanding of the dynamical evolution of the strongly interacting medium produced in relativistic heavy-ion collisions at the LHC.

Reference

[1] J.˜Adam et al. [ALICE Collaboration], "Anisotropic flow of charged particles in Pb-Pb collisions at $\sqrt{s_{NN}}$=5.02 TeV," Phys. Rev. Lett. 116, 132302 (2016);

[2] J.˜Adam et al. [ALICE Collaboration], "Correlated event-by-event fluctuations of flow harmonics in Pb-Pb collisions at $\sqrt{s_{NN}}$=2.76 TeV," Phys. Rev. Lett. 117, 182301 (2016)

Presenter: ZHOU, You (Niels Bohr Institute)

Session Classification: Hot and dense matter physics (QGP and heavy ion collision)

Track Classification: 1) Hot and dense matter physics (QGP and heavy ion collision)