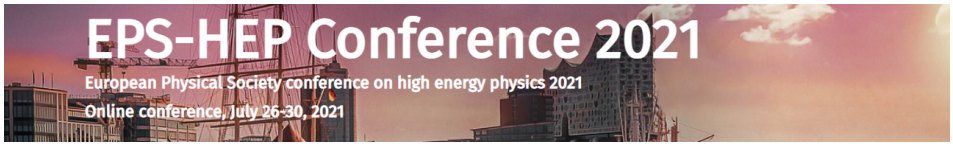

Contribution ID: **635** Type: **Parallel session talk**

Constraining transport properties of quark-gluon plasma using non-linear hydrodynamic response

Tuesday 27 July 2021 09:30 (15 minutes)

The primary goal of the ultrarelativistic heavy-ion collision program at the LHC is to study the properties of the quark-gluon plasma (QGP), a state of strongly interacting matter that exists at high temperatures and energy densities. Anisotropic flow, studied using the anisotropy of the momentum distribution of final state particles, is sensitive to the transport properties (i.e., specific viscosities) of the QGP. It v_n contains two components, the linear mode corresponds to the same order initial anisotropy coefficient while the non-linear flow mode is originated from lower-order initial anisotropy. It is commonly known that the lower order flow v_2 and v_3 have the linear response for non-peripheral collisions and therefore can be used directly to constrain the initial state models, while the study of linear and non-linear flow modes of higher-order flow has the potential to improve the accuracy of the extracted transport coefficients of QGP.

In this talk, the latest studies of the non-linear hydrodynamic response of anisotropic flow in Pb–Pb collisions at the LHC will be presented. The new studies using higher-order moments of v_2, as well as the newly proposed correlations between different moments of v_2 and v_3, show an unexpected non-linear response of v_2 and v_3 in the semi-central and semi-peripheral collisions. In addition, the non-linear hydrodynamic response has been explored via the correlations among multiple flow coefficients. These systematic studies using hybrid hydrodynamic iEBE-VISHNU with two different initial conditions, AMPT and TRENTo, and using AMPT and HIJING transport models, show that such non-linear hydrodynamic response has novel sensitivity to the specific viscosities of QGP. The comparisons of state-of-the-art hydrodynamic calculations and the recently available ALICE measurements offer new insights into the transport properties and the dynamical evolution of the QGP.

References:

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[2] M. Li, Y. Zhou, W. Zhao, B. Fu, Y. Mou and H. Song, arXiv: 2104.10422

First author

You Zhou

Email

you.zhou@cern.ch

Collaboration / Activity

QGP&Flow

Primary authors: Dr ZHOU, You (Niels Bohr Institute); MORAVCOVA, Zuzana (Niels Bohr Institute)

Presenter: MORAVCOVA, Zuzana (Niels Bohr Institute)

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