Contribution ID: **187** Type: **Oral report**

New experimental methods and observables for anisotropic flow analyses in high-energy physics

Monday 12 October 2020 15:30 (25 minutes)

The properties of an extreme state of nuclear matter, the Quark-Gluon Plasma (QGP), are studied in experiments at RHIC and LHC with heavy-ion datasets collected at ultrarelativistic energies. The QGP consists of asymptotically free quarks and gluons which move freely over distances large in comparison to the typical size of a hadron. If the nuclear matter produced in heavy-ion collisions reaches thermalization, its behavior will be dominantly governed by non-trivial collective effects, like anisotropic flow. In non-central heavy-ion collisions, the initial ellipsoidal volume containing the interacting nuclear matter is anisotropic in the coordinate space, due to the geometry of non-central collisions. Multiple interactions within this anisotropic volume cause the anisotropy to be transferred from coordinate space into momentum space. This transfer is the anisotropic flow phenomenon. Flow measurements have provided the key constraints on transport properties of QGP (e.g. on its shear viscosity), and these results helped a great deal in establishing the perfect fluid paradigm about QGP.

In this contribution, we introduce new experimental methods and observables for anisotropic flow analyses in high-energy physics, which can provide further and independent constraints on QGP properties. The cornerstone of this approach are multiparticle azimuthal correlations, from which the new observables, dubbed higher-order Symmetric Cumulants, have been recently derived in [1], as well as new estimators for symmetry-plane correlations in [2]. Both theoretical predictions and first experimental results from ALICE Collaboration are presented and discussed.

[1] C. Mordasini, A. Bilandzic, D. Karakoc, and S. F. Taghavi, "Higher-order Symmetric Cumulants,", accepted by Physical Review C, arXiv:1901.06968 [nucl-ex].

[2] A. Bilandzic, M. Lesch, S. F. Taghavi, "New estimator for symmetry plane correlations in anisotropic flow analyses", accepted by Physical Review C, arXiv:2004.01066 [nucl-ex].

Author: BILANDZIC, Ante (Technische Universitaet Muenchen (DE))

Presenter: BILANDZIC, Ante (Technische Universitaet Muenchen (DE))

Session Classification: Section 4. Relativistic nuclear physics, elementary particle physics and high-energy physics

Track Classification: Section 4. Relativistic nuclear physics, elementary particle physics and high-energy physics.