

# Improving Bayesian parameter estimation of QCD matter with the latest LHC heavy-ion collision data

Transport properties of quark-gluon plasma (QGP) created in ultra-relativistic heavy-ion collisions, contain important information on quantum chromodynamics (QCD). With a more precise estimate of the transport properties, such as specific shear and bulk viscosity, it is possible to deepen our understanding of QCD. In this talk, we present our latest study in inferring the transport properties of QGP by an improved Bayesian analysis using the CERN Large Hadron Collider Pb-Pb data at  $\sqrt{s_{NN}}=2.76$  and 5.02 TeV. We show that the uncertainty of the transport coefficients is significantly reduced by including the latest flow harmonic measurements, reflecting mostly nonlinear hydrodynamic responses. The analysis also reveals that higher-order harmonic flows and their correlations have a higher sensitivity to the transport properties than the other observables. This observation shows the necessity of accurate measurements of these observables in the future.

Based on:

[1] J.E. Parkkila, A. Onnerstad, D.J. Kim, Phys.Rev.C 104 (2021) 5, 054904, arXiv: 2106.05019 [hep-ph]

[2] J.E. Parkkila, A. Onnerstad, S. F. Taghavi, C. Mordasini, A. Bilandzic, D.J. Kim, arXiv: 2111.08145 [hep-ph]

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