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# Improving Bayesian parameter estimation with the latest RHIC and LHC data including a new initial conditions model

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The evolution of the strongly interacting medium is modelled with hydrodynamic models, which are driven by a large number of parameters quantifying the properties of the medium. The need to find model parameters which give the best description of the experimental data imposes a multidimensional optimization problem. The Bayesian analysis has shown to be very effective in constraining the parameter values[1], and the combined inclusion of LHC Pb-Pb 5.02 and 2.76 TeV data with additional flow observables has greatly narrowed down the uncertainties[2].

In this talk, we present our latest study in inferring the transport properties of QGP by an improved Bayesian analysis using the RHIC Au-Au collision data in addition to the previous studies[1,2] where only the LHC data were used. Additionally, the initial conditions are in our study now described with a dynamical initial conditions model called EKRT. With the addition of RHIC data and the change of initial conditions model we aim to get a better understanding of the initial conditions' and transport properties' dependence on the system' s size and energy scale. Furthermore, we will quantify the sensitivities of newly developed flow observables, Asymmetric Cumulants and Symmetry Plane Correlations[3] as well as the $\rho(v_n^2,\,[p_T])$ correlation to model parameters.

[1] J. E. Parkkila, A. Onnerstad, and D. J. Kim. Phys. Rev. C, 104(5):054904, 2021

[2] J. E. Parkkila, A. Onnerstad, S. F. Taghavi, C. Mordasini, A. Bilandzic, M. Virta, and D.J. Kim. Physics Letters B, 835:137485, 2022.

[3] A. Bilandzic, M. Lesch, and S. F. Taghavi. Phys. Rev. C, 102:024910, 2020.

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