Contribution ID: **567** Type: **Poster**

Accuracy vs. precision: the importance of theoretical uncertainties in Bayesian constraints of the quark-gluon plasma's properties

Wednesday, 6 April 2022 18:42 (4 minutes)

Determining QCD properties via experimental observations is an essential part of the heavy-ion program, and a crucial aspect of any such study is an accurate assessment of uncertainty. This uncertainty comes not only from experiments but also from theoretical modeling. Bayesian inference methods provide an ideal framework for a systematic treatment of these sources of uncertainty and an accurate determination of QGP properties. We present a Bayesian Model Averaging framework to account for different sources of theoretical uncertainty [1] and show results obtained from comparison to RHIC and LHC measurements. We further show how including additional deuteron observables affect the posterior constraints. Finally, we discuss the choice of observables to use in an analysis, especially the benefits and risks of including observables with strong constraining power but also significant sensitivity to theoretical uncertainty.

[1] D. Everett et al. [JETSCAPE], Phenomenological constraints on the transport properties of QCD matter with data-driven model averaging, Phys. Rev. Lett. 126, 242301 (2021)

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Session Classification: Poster Session 2 T14_1

Track Classification: Hadron production and collective dynamics