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Probing Quark-Gluon-Plasma properties with a Bayesian model-to-data comparison[1] TIANJI CAI, JONAH BERNHARD, WEIYAO KE, STEFFEN BASS, Duke Univ, DUKE QCD GROUP TEAM — Experiments at RHIC and LHC study a special state of matter called the Quark Gluon Plasma (QGP), where quarks and gluons roam freely, by colliding relativistic heavy-ions. Given the transitory nature of the QGP, its properties can only be explored by comparing computational models of its formation and evolution to experimental data. The models fall, roughly speaking, under two categories–those solely using relativistic viscous hydrodynamics (pure hydro model) and those that in addition couple to a microscopic Boltzmann transport for the later evolution of the hadronic decay products (hybrid model). Each of these models has multiple parameters that encode the physical properties we want to probe and that need to be calibrated to experimental data, a task which is computationally expensive, but necessary for the knowledge extraction and determination of the models' quality. Our group has developed an analysis technique based on Bayesian Statistics to perform the model calibration and to extract probability distributions for each model parameter. Following the previous work that applies the technique to the hybrid model [1], we now perform a similar analysis on a pure-hydro model and display the posterior distributions for the same set of model parameters. We also develop a set of criteria to assess the quality of the two models with respect to their ability to describe current experimental data.
[1]J.E.Bernhard *et.al.*, arXiv:1605.03954v1

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Tianji Cai
Duke Univ

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