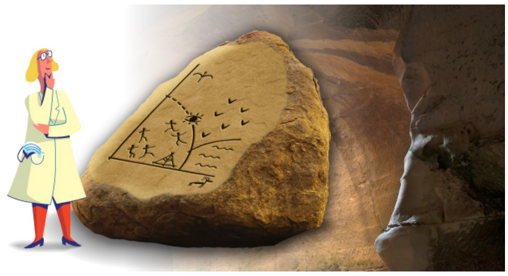
IS2021

The VI[th] International Conference on the
INITIAL STAGES
OF HIGH-ENERGY NUCLEAR
COLLISIONS



Contribution ID: **198** Type: **oral**

Constraining the initial state through many-body observables

Monday 11 January 2021 18:40 (20 minutes)

Initial state geometry is a key quantitative component of theoretical descriptions of relativistic heavy-ion collisions. Phenomenological models of the initial state are typically designed to reproduce one-body observables, e.g. charged hadron multiplicity and coefficients of the spatial Fourier decomposition, ⊠⊠. However, these models may not simultaneously describe many-body observables such as event plane correlators. In this talk, we present the results of state of the art simulations of heavy-ion collisions by combining Trento and IP-Glasma initial states with MUSIC, iS3D, and SMASH to demonstrate that Color Glass Condensate inspired models such as IP-Glasma with minimal tuning to one body observables better predict correlation observables than flexible geometric models. We will also present results demonstrating the source of these event plane correlators in the IP-Glasma framework. Together, these demonstrate the advantage of microscopic models of the initial stage of heavy-ion collisions which include the important correlations over simpler schematic models and motivates their use in Bayesian extractions of the properties of the initial state. We assert that by using an interpretable model of microscopic initial stage physics, we can gain insight into the properties of collective behavior in strongly interacting matter and reduce systematic uncertainties.

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Session Classification: IS

Track Classification: The initial stages of heavy-ion collisions