Contribution ID: **426** Type: **Poster**

Extending the fluid dynamic description of heavy-ions collisions to times before the collision

Tuesday 5 September 2023 17:30 (2h 10m)

It is well established that the late states of a high energy nuclear collision can be described in terms of relativistic fluid dynamics. An open problem in this context is how the actual collision and the early time dynamics directly after it can be described. Phenomenological models are currently employed here and they have several parameters that need to be fitted to experimental data.
Using relativistic fluid dynamics of second order we develop a new approach which addresses the entire collision event, and which gets initialized in fact already before the collision. This is based on the droplet model for the incoming nuclei and a state-the-art equation of state including the first-order liquid-gas phase transition. The physics picture we propose assumes that the soft features of a high energy nuclear collision can be fully described through the dynamics of the energy-momentum tensor and other conserved currents.

This work is part of and supported by the DFG Collaborative Research Centre “SFB 1225 (ISOQUANT)”.

Category

Theory

Collaboration (if applicable)

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Session Classification: Poster Session

Track Classification: New theoretical developments