

## Modelling early quark production and color dynamics for heavy-ion collisions

We perform real-time lattice simulations of out-of-equilibrium quark production in non-Abelian gauge theory in 3+1-dimensions. Our simulations include the backreaction of quarks onto the dynamical gluon sector, which is particularly relevant for strongly correlated quarks.

We observe fast isotropization and universal behavior of quarks and gluons at weak coupling and establish a quantitative connection to previous pure glue results. In order to understand the strongly correlated regime, we perform simulations for a large number of flavors and compare them to those obtained with two light quark flavors. By doing this we are able to provide estimates of the chemical equilibration time.

We also comment on efforts to simulate the complete space-time picture of a heavy-ion collision in labor frame using classical lattice gauge techniques and the Colored-Particle-In-Cell (CPIC) method. This description is capable of describing large deviations from boost invariance in initial states, which is of particular relevance for future experiments at FAIR, NICA and for the RHIC beam energy scan.

### Collaboration

**Primary author(s) :** Dr GELFAND, Daniil (Vienna University of Technology)

**Co-author(s) :** IPP, Andreas (TU Wien); Dr HEBENSTREIT, Florian (University of Bern); BERGES, Jürgen (Heidelberg University)

**Presenter(s) :** Dr GELFAND, Daniil (Vienna University of Technology)

**Session Classification :** Poster