

Colored particle-in-cell simulations for heavy-ion collisions

Wednesday, 25 May 2016 17:10 (20 minutes)

We present our work on the simulation of the quark-gluon-plasma using the colored particle-in-cell (CPIC) method. CPIC is a generalization of particle-in-cell simulations - commonly used in plasma physics - to real-time non-abelian lattice gauge theories. Using this method we are able to model the early time dynamics of heavy-ion collisions in the laboratory frame in 3+1 dimensions. In particular we study the effects of finite pancake thickness in the McLerran-Venugopalan model. Our approach requires a consistent treatment of gauge fields and color currents, which is achieved using charge-conserving CPIC methods. We show that the description in the laboratory frame agrees with boost-invariant approaches as a limiting case and investigate collisions beyond boost-invariance.

Collaboration

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Session Classification: Parallel