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Isotropization of the Glasma

Thursday 12 September 2013 10:00 (30 minutes)

In recent years, the problem of thermalization in Heavy Ion Collision has received much attention, but has yet to be solved. The issue is that on the one hand, viscous hydrodynamics simulations suggest that the matter produced in such collisions (called the Quark Gluon Plasma, or QGP) behaves like a nearly perfect fluid, and does so very shortly after the collision (around 1 fm/c). Since hydrodynamics requires local thermal equilibrium, this tends to show that the QGP has thermalized during the very early stages of the collision. On the other hand, theoretical models (based on microscopic theories like the Color Glass Condensate, or CGC) predict that the QGP is very far from local thermal equilibrium at the initial time (its energy-momentum is very anisotropic). One of the approaches developed to study this non-perturbative problem in QCD is a resummation scheme that amounts to averaging over classical fields, with random initial conditions. Its numerical implementation is presented here for the case of a scalar field theory with quartic coupling, that shares some important features with QCD. In particular, we will show the relevance of this resummation in capturing the physics relevant for thermalization. Analytical and numerical results concerning the case of QCD will also be presented.

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