XXIV QUARK MATTER DARMSTADT 2014

Contribution ID: **358** Type: **Poster**

Quark production, Bose-Einstein condensates and thermalization of the quark-gluon plasma

Tuesday, 20 May 2014 16:30 (2 hours)

In this talk, I would like to report the results of our recent work on the thermalization of gluons and N_f flavors of massless quarks and antiquarks in a spatially homogeneous
system. First, we give two coupled transport equations for gluons and quarks (and antiquarks), which are derived within the diffusion approximation of
the Boltzmann equation with only $2 \leftrightarrow 2$ processes included in the collision term. These transport equations are solved
numerically in order to study the thermalization of the quark-gluon plasma. Next, we discuss three different patterns of the thermalization of the quark-gluon system. At initial time, we assume that no quarks or antiquarks are present
and we choose the gluon distribution in the form $f = f_0\,\theta\left(1 - \frac{p}{Q_s}\right)$ with Q_s the saturation momentum and f_0 a constant. The subsequent evolution of systems
may, or may not, lead to the formation of a (transient) Bose condensate, depending on the value of f_0. The three patterns of thermalization are as follows: (a) thermalization
without gluon Bose-Einstein condensates (BEC) for $f_0 \leq f_{0t}$,
(b) thermalization with transient BEC for $f_{0t} < f_0 \leq f_{0c}$ and (c) thermalization with BEC for $f_{0c} < f_0$. Here, the values of f_{0t} and f_{0c} depend on N_f. When $f_0 \geq 1 > f_{0c}$, the formation of BEC starts at a finite time $t_c \sim \frac{1}{(\alpha_s f_0)^2}\frac{1}{Q_s}$. We also find that the equilibration time
for $N_f = 3$ is typically about 5 to 6 times longer than that for $N_f = 0$ at the same Q_s.

On behalf of collaboration:

None

Primary authors: Dr WU, Bin (IPhT Saclay); Dr YAN, Li (IPhT Saclay)

Co-author: Prof. BLAIZOT, Jean-Paul (IPhT Saclay)

Presenter: Dr YAN, Li (IPhT Saclay)

Session Classification: Poster session

Track Classification: Approach to Equilibrium