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# Modelling Early Stages of Relativistic Heavy Ion Collisions: Coupling Relativistic Transport Theory to Decaying Color-electric Flux Tubes

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In this study we
model early times dynamics of relativistic heavy ion collisions by an initial color electric field
which then decays to a plasma by the Schwinger mechanism,
coupling the dynamical evolution of the initial color field
to the dynamics of the many particles system produced by the decay.
The latter
is described by relativistic kinetic theory in which we fix the ratio
$\eta/s$ rather than insisting on specific microscopic processes,
and the backreaction on the color field is taken into account by solving
self-consistently the kinetic and the field equations.
Within a single self-consistent calculation scheme
we address the problems of isotropization and thermalization of the quark-gluon plasma
produced by the field decay, as well as the quark-gluon plasma formation time
and its chemical equilibration,
both for $1+1$D and $3+1$D expanding geometry.
We find that regardless of the viscosity of the produced plasma,
longitudinal pressure becomes positive within 0.2 fm/c.
The initial color electric field decays within 1 fm/c;
however in the case $\eta/s$ is large, plasma oscillations appear
and affect the entire time evolution of the system.
In case of small $\eta/s$ ($\eta/s$<0.3)
we find $\tau_{isotropization} \approx 0.8$ fm/c
and $\tau_{thermalization} \approx 1$ fm/c.
Moreover quark-gluon plasma production occurs in $\tau_{qgp} < 1$ fm/c,
and almost perfect chemical equilibration takes place within 1 fm/c.
Hence our work supports the common assumptions of hydrodynamics about
thermalization, isotropization and equilibration of quark-gluon plasma.

## On behalf of collaboration:

NONE

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