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The non-trivial interplay of elastic and inelastic collisions in the thermalization of the quark-gluon plasma

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To understand the approach to equilibrium of a dense system of gluons, such as those produced in the early stages of ultra-relativistic heavy ion collisions, is an outstanding challenge. We study this problem by solving the relevant kinetic equations, including the proper Bose statistics, and using simple approximations that allow for semi-analytic solutions. Both elastic processes and number changing inelastic processes are taken into account. The semi-analytical solutions that we obtain complement discussions based on parametric estimates, or purely numerical solutions, and provide new insights on the interplay of elastic and inelastic collisions during the thermalization of the quark-gluon plasma. In particular, they confirm the rapid growth at early times of soft modes, mostly due to radiation processes, which leads to the almost immediate emergence of an infrared thermal spectrum. They also illustrate the mechanisms by which the system gets rid of the large excess of gluons that it contains initially.

On behalf of collaboration:

NONE

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