

Kadanoff-Baym Approach to Thermalization of Gluonic Matter

In this presentation, we propose the Kadanoff-Baym approach to the early nonequilibrium stage of ultrarelativistic heavy ion collisions and present recent results about equilibration of gluons. First we introduce the Kadanoff-Baym equation and present the proof of H-theorem for given off-shell dynamics of gluons. Next we show entropy production and equilibration with numerical analyses of this equation. Here we have adopted off-shell $g \leftrightarrow gg$ effects as scattering processes which are prohibited in normal quasiparticle approximation. Finally we estimate the equilibration time ($\sim 1\text{fm}/c$) of gluons for the coupling strength $g^2 = 1.0$ and show the significance of off-shell effects in heavy ion collisions at RHIC and LHC energies.

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