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Equilibration of quark-gluon plasma in heavy-ion collisions

Non-equilibrium systems are omnipresent in nature. QCD plasma out of equilibrium and its equilibration are of particular interest given that the relativistic heavy-ion collisions (HICs) produce the non-equilibrium quark-gluon plasma (QGP) which eventually emerges to thermal hydrodynamic states. We investigate the kinetic and chemical equilibration of weakly coupled QCD plasma at finite density with a numerical implementation of QCD effective kinetic theory based on leading-order QCD, revealing the relevant equilibration pattern and turbulent nature of the QCD plasma far from equilibrium. We then show its equilibration in HICs as an attractor towards hydrodynamics. Based on that, some phenomenological applications such as pre-equilibrium dilepton production in HICs are discussed.

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