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Nonequilibrium quark production in the expanding QCD plasma

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In the high-energy limit of heavy-ion collisions, the system right after a collision is described as an over-occupied gluon plasma expanding in the beam direction. Its space-time evolution can be studied by means of real-time lattice gauge theory simulation techniques with dynamical quarks. To find observable consequences of such nonequilibrium evolution, the understanding of quark dynamics is crucial since they couple to electromagnetic probes. We present results for nonequilibrium quark production in the longitudinally expanding QCD plasma. We find that the quark number density per unit transverse area and rapidity shows almost linear growth in time, and its growth rate is consistent with a simple kinetic theory estimate involving only two-to-two scattering processes in small-angle approximation. We also show that the quark transverse momentum spectra for a wide range of quark masses exhibit an exponential shape that resembles a thermal Boltzmann distribution.

Reference: N. Tanji and J. Berges, arXiv:1711.03445

Content type

Theory

Collaboration

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Presenter name already specified

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