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Prescaling and far-from-equilibrium hydrodynamics in the quark-gluon plasma

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We use the leading-order QCD kinetic equations with quarks and gluons to study the QGP in the far-from-equilibrium state. At weak coupling, we demonstrate the emergence of early hydrodynamic behavior–prescaling–around a nonthermal fixed point, which is qualitatively different from the more conventional hydrodynamics around equilibrium. Prescaling is a far-from-equilibrium phenomenon which describes the rapid establishment of a universal scaling form of distributions much before the universal values of their scaling exponents are realized. The dynamics in the prescaling regime is encoded in a few time-dependent scaling exponents, whose slow evolution gives rise to far-from-equilibrium hydrodynamic description.

Reference: A. Mazeliauskas and J. Berges, Phys. Rev. Lett. 122, 122301 (2019), arXiv:1810.10554

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