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Strong-Coupling Effects in a Plasma of Confining Gluons

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For the first time we investigate non-equilibrium dynamic properties of a plasma consisting of confining gluons resulting from Gribov quantization [1]. For this purpose we employ the infrared-improved Gribov dispersion relation of gluons in the kinetic theory setup in the relaxation time approximation and determine the exact in- and out-of-equilibrium evolution of the system. In the static case the resulting equation of state of the studied system provides a good qualitative description of the pure-glue lattice QCD data down to the vicinity of the phase transition [2,3,4], thus permitting a study of the non-equilibrium phenomena in a plasma that exhibits crucial features of the QCD phase transition. In the case of local thermal equilibrium we observe Bjorken-like cooling of the boost-invariant expanding system. Out of equilibrium, by matching to the first order viscous hydrodynamics, we calculate bulk [3] and shear [5] viscosity of the system. We find significant enhancement of the bulk to shear viscosity ratio close to the transition temperature and its universal scaling behavior, in line with the one expected in a strongly-coupled theories [5]. We interpret the onset of strongly-coupled features in the system as the possible explanation of the close to perfect fluid behavior of the quark-gluon plasma.

References:

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3. W.Florkowski, R.Ryblewski, N.Su, K.Tywoniuk, arXiv:1504.03176, submitted to Phys.Rev.Lett.
4. S. Borsanyi, G. Endrodi, Z. Fodor, S. D. Katz and K. K. Szabo, JHEP 1207, 056 (2012)
5. W.Florkowski, R.Ryblewski, N.Su, K.Tywoniuk, forthcoming

On behalf of collaboration:

NONE

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