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Equilibration of anisotropic quark-gluon plasma produced by decays of color flux tubes

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A set of kinetic equations is used to study equilibration of the anisotropic quark-gluon plasma produced by decays of color flux tubes possibly created at the very early stages of ultra-relativistic heavy-ion collisions. The decay rates of the initial color fields are given by the Schwinger formula, and the collision terms are treated in the relaxation-time approximation. By connecting the relaxation time with viscosity we are able to study production and thermalization processes in the plasma characterized by different values of the ratio of the shear viscosity to entropy density, $\bar{\eta}$. For the lowest (KSS) value of this ratio, $4\pi\bar{\eta} = 1$, and realistic initial conditions for the fields, the system approaches the viscous-hydrodynamics regime within 1–2 fm/c. On the other hand, for larger values of the viscosity, $4\pi\bar{\eta} \geq 3$, the collisions in the plasma become inefficient to destroy collective phenomena which manifest themselves as oscillations of different plasma parameters. The presence of such oscillations brings in differences between the kinetic and hydrodynamic descriptions, which suggest that the viscous-hydrodynamics approach after 1–2 fm/c is not complete if $4\pi\bar{\eta} \geq 3$ and should be extended to include dissipative phenomena connected with color conductivity.

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Primary author: FLORKOWSKI, Wojciech (Institute of nuclear Physics, Krakow)

Co-author: RYBLEWSKI, Radoslaw (Institute of Nuclear Physics PAS)

Presenter: FLORKOWSKI, Wojciech (Institute of nuclear Physics, Krakow)

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