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Strongly interacting parton-hadron matter in- and out-off equilibrium

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We study the equilibrium properties of strongly-interacting infinite parton-hadron matter and the non-equilibrium dynamics of heavy-ion collisions from SIS to LHC energies within the Parton-Hadron-String Dynamics (PHSD) transport approach, which incorporates explicit partonic degrees of freedom in terms of strongly interacting quasiparticles (quarks and gluons) in line with an equation of state from lattice QCD as well as the dynamical hadronization and hadronic collision dynamics in the final reaction phase.

The equilibration of different observables on light and strange sector and their fluctuations in the QGP and also transport coefficients, such as shear and bulk viscosity, electric and heat conductivity are presented.

We investigate as well as out-off equilibrium phenomena seen in azimuthal angular distribution in higher harmonics (v_1, v_2, v_3, v_4), particle spectra etc. in heavy-ion collisions. We focus on the sensitivity of different observables (in particular, involving strange particles) to the “traces” of the QGP from low to ultrarelativistic energies.

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