Contribution ID: **17** Type: **Parallel Session**

Traces of the deconfined phase transition

Tuesday 8 August 2017 16:30 (30 minutes)

We address the issue of the deconfined phase transition from hadronic to partonic matter on microscopic basis.
We report about results from an extended dynamical quasiparticle model (DQPM*) in which the effective parton propagators have a complex selfenergy that depends on the temperature T of the medium as well as on the chemical potential μ_q and the parton three-momentum $\vec{p}$ with respect to the medium at rest. It is demonstrated that this approach allows for a good description of QCD thermodynamics with respect to the entropy density, pressure etc. above the critical temperature $T_c \approx 158$ MeV. Furthermore, the quark susceptibility χ_q and the quark number density n_q are found to be reproduced simultaneously at zero and finite quark chemical potential. The shear and bulk viscosities η, ζ, and the electric conductivity σ_e from the DQPM* also turn out in close agreement with lattice results for μ_q =0. The DQPM*, furthermore, allows to evaluate the momentum p, T and μ_q dependencies of the partonic degrees of freedom also for larger μ_q which are mandatory for transport studies of heavy-ion collisions in the regime 5 GeV $< \sqrt{s_{NN}} <$ 10 GeV.

Furthermore, based on the microscopic off-shell PHSD model for strongly interacting matter we analyse the possible traces of the deconfinement and chiral phase transitions in different observables of heavy-ion collisions - particle spectra and ratios, collective properties and fluctuations. In particular, we discuss the perspectives to identify a possible critical point in the (T, μ_B) phase diagram exploring the strangeness degrees of freedom.

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Session Classification: Parallel 3

Track Classification: Parallel Session