

XIV Polish Workshop on Relativistic Heavy-Ion Collisions: Interplay between soft and hard probes of heavy-ion collisions



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A unified quark-nuclear matter equation of state from the cluster virial expansion within the generalized Beth-Uhlenbeck approach

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We consider a cluster expansion for strongly correlated quark matter where the clusters are baryons with spectral properties that are described within the generalized Beth-Uhlenbeck approach by a medium dependent phase shift. We employ a simple ansatz for the phase shift which fulfils the Levinson theorem by describing an on-shell bound state with an effective mass and models the continuum by an anti-bound state located at the mass of the three quark threshold. The quark and baryon interactions are accounted for by the coupling to scalar and vector meson mean fields modelled by density functionals. At increasing density and temperature, due to the different medium dependence of quark and baryon masses, the Mott dissociation of baryons occurs and the nuclear clusters contributions to the thermodynamics vanish. It is demonstrated on this simple example that this unified approach to quark-nuclear matter is capable of describing crossover as well as first order phase transition behaviour in the phase diagram with a critical endpoint.

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