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Hybrid Equation of State for Heavy-Ion Collisions and Astrophysics

The aim of our work is to develop a unified equation of state (EoS) for nuclear and quark matter for a wide range in temperature, density and isospin so that it becomes applicable for heavy-ion collisions as well as for the astrophysics of neutron stars, their mergers and supernova explosions. As a first step, we use improved EoS for the hadronic and quark matter phases and join them via Maxwell construction. For this we work with a generalized density functional approach for the self energies in a quasi particle picture, which gives us the possibility to start with a reasonable physical basis and apply improvements to fit constraints from lattice QCD and neutron star measurements.

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