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Quark Deconfinement Phase Transition in Hot Neutron-Star Matter: Effects of Neutrino Trapping.

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The possibility of quark deconfinement in hadronic matter at high densities and/or sufficiently high temperatures, as well as its impact on the properties of compact stars and the dynamics of heavy-ion collisions, is one of the most debated topics in modern physics.

In this paper, we investigate the temperature dependence of the parameters associated with the first-order quark deconfinement phase transition in hot, beta-equilibrium, electrically neutral hadronic matter. Considering the opacity of hot hadronic matter to neutrinos, the impact of neutrino trapping on the characteristics of the phase transition is examined.

For the thermodynamic description of hot matter with hadronic structure, we used a relativistic mean-field (RMF) theory with exchange meson fields including sigma, omega, delta, and rho mesons. Quark matter was described within the framework of the local SU(3) Nambu-Jona-Lasinio (NJL) model.

Phase diagrams of temperature are obtained depending on both the baryon chemical potential and the baryon number density. The influence of neutrino trapping on the phase diagram picture and, in particular, on the critical endpoint parameters is analyzed.

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