MODEL DEPENDENT PHASE TRANSITION FROM HADRONIC MATTER TO QUARK-GLUON PLASMA

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Ultrarelativistic Heavy-Ion Collisions are interesting tools to study the existence of quark gluon plasma (QGP). The location of the phase transition to QGP in hadronic matter can be found by an analysis of their equations of state (EOS). Present analysis of the QCD phase transition shows that the value of the bag constant B, which is used in the EOS, should be < 200 MeV/fm^3. Only then the theory may be useful to study both heavy ion collisions and cosmological problems [1]. In Ref. 2, it is reported that the critical energy density for deconfinement is nearly independent of the chemical potential μ_q and the baryon number density ρ_b (here $B > 200$ MeV/fm^3). For $B < 200$ MeV/fm^3, it is difficult to study [1] the dynamics of hadronization phase transition by using the model of Ref. 2. Following Ref. 3, we modify the above model by including the Hagedorn's correction only for the baryons and their resonances in the HRG phase: We exclude this correction for all mesons in the HRG phase. The resulting two phase coexistence region which separates the purely hadronic and QGP sectors in temperature - chemical potential plane is shown in Fig.1 for two cases. Using our modified model, the calculated values of critical energy densities for deconfinement depends strongly on μ_q and ρ_b and is shown in Figs. 2 & 3. The phase diagrams and the critical energy density for the complete deconfinement and onset of deconfinement for a softer EOS are investigated in detail using the modified model. The strong dependence of the critical energy density for deconfinement on μ_q and ρ_b may change the trend of the dynamics of the hadronization phase transition. Hence the modified model will be useful to study the phase transition for all values of the bag constant B.

References:

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