Warm stellar matter with neutrino trapping
D.P.Menezes Depto de Física - CFM - Universidade Federal de Santa Catarina Florianópolis - SC - CP. 476 - CEP 88.040 - 900 - Brazil
C. Providência Centro de Física Teórica - Dep. de Física - Universidade de Coimbra - P-3004 - 516 Coimbra - Portugal

abstract

The properties of hybrid stars formed by hadronic and quark matter in β-equilibrium at fixed entropies are described by appropriate equations of state (EOS) in the framework of relativistic mean-field theory. In this work we include the possibility of neutrino trapped EOS and compare the star properties with the ones obtained after deleptonization, when neutrinos have already diffused out. We use the nonlinear Walecka model for the hadron matter with two different sets for the hyperon couplings and the MIT Bag and the Nambu-Jona-Lasinio models for the quark matter. The phase transition to a deconfined quark phase is investigated. Depending on the model and the parameter set used, the mixed phase may or may not exist in the EOS at high densities.

The star properties are calculated for each equation of state. The maximum mass stellar configurations obtained within the NJL have larger masses than the ones obtained within the Bag model. The Bag model predicts a mixed phase in the interior of the most massive stable stars while, depending on the hyperon couplings, the NJL model predicts a mixed phase or pure quark matter. Comparing with neutrino free stars, the maximum allowed baryonic masses for protoneutron stars are ∼ 0.4M⊙ larger for the Bag model and ∼ 0.1M⊙ larger for the NJL model when neutrino trapping is imposed.