Dense and Hot Matter With and Without Antiparticles in the Nonlinear Walecka Model

Alexandre Magno Silva Santos, Débora Peres Menezes
Departamento de Física-UFSC

In this work we study the effects of temperature on the equations of state obtained with the nonlinear Walecka model, where hadrons are coupled to scalar-isoscalar ϕ, vector-isoscalar V^μ and vector-isovector $\overrightarrow{b}^\mu$ meson fields. Temperature effects are considered in the treatment by the inclusion of a Thomas-Fermi distribuition function in the EOS. We make mean-field approximation to study matter with and without beta-equilibrium over a wide range of densities. We then compare the results of the equation of state, effective mass and strangeness fraction for the TM1, NL3 and GL sets of parameters. The Tolman-Oppenheimer-Volkoff equations are integrated in order to obtain compact star properties. We also study the EOS for particle matter (i.e., antiparticles are left out of the treatment), and we discuss our results.