

— 第 907 回九大原子核セミナー —

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演題：Thermodynamical description of hadron-quark phase transition and its implications on compact-star phenomena

日時：2月19日(火) 16:30 ~

† 今回は通常と曜日が異なりますのでご注意ください

場所：理学部 物理大学院講義室 (理学部 2 号館 2 階 2263 室)

概要

One of the most promising possibilities may be the appearance of quark matter in astrophysical phenomena in the light of recent progress in observations. The properties of deconfinement is not well understood, but the thermodynamical aspects of hadron-quark (HQ) phase transition have been extensively studied in recent years. Then the mixed phase of hadron and quark matter becomes important; the proper treatment is needed to describe the HQ phase transition and derive the equation of state (EOS) for hadron-quark matter, based on the Gibbs conditions for phase equilibrium. We here use a realistic EOS for hadron matter in the hadron phase. For quark matter we further try to improve the previous EOS by considering other effective models of QCD. One of the interesting consequences may be the appearance of the inhomogeneous structures called “pasta”, which are brought about by the surface and the Coulomb interaction effects. We present here a comprehensive review of our recent works about the HQ phase transition in various astrophysical situations: cold catalyzed matter, hot matter and neutrino-trapped matter. We show how the pasta structure becomes unstable by the charge screening of the Coulomb interaction, thermal effect or the neutrino trapping effect. Such inhomogeneous structure may affect astrophysical phenomena through its elasticity or thermal properties. Here we also discuss some implications on supernova explosion, gravitational wave and cooling of compact stars.

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