

VARIOUS CRYSTALLINE STRUCTURES OF PSEUDOSCALAR CONDENSATES IN ISOSPIN ASYMMETRIC QUARK MATTER

Kazuya Nishiyama¹, Toshitaka Tatsumi¹

¹ Department of Physics, Kyoto University, Kyoto 606-8502

We discuss the thermodynamic properties of the inhomogeneous chiral condensates by taking account of the charged pseudoscalar condensates. The inhomogeneous chiral phase characterized by spatially modulated chiral condensates in the intermediate density and low temperature region of the QCD phase diagram. Such inhomogeneous phases can appear in neutron stars. There have been few studies about the effects of external field, isospin asymmetry, and current quark mass on the inhomogeneous chiral phases, although these are important to the phenomenological investigation, especially neutron stars, where up quarks and down quarks have different number densities because of chemical equilibrium and charge neutrality. For the case of isospin asymmetry, it has been suggested an appearance of spatially modulated charged pseudoscalar condensates. We consider some crystalline structures of the inhomogeneous pseudoscalar condensates by taking into account the charged condensates, and discuss the thermodynamic properties of these phases.

Some implications on neutron star phenomena will be briefly discussed.