



東北大学 宇宙創成物理学国際共同大学院プログラム

GP-PU (Graduate Program on Physics for the Universe) Seminar

“Phase structure of hot and dense QCD and its experimental searches”

by Masakiyo Kitazawa (Osaka University)

Time and Date: 13:30-15:30, June 22nd, 2022

Place: Room 745, Science Complex B H03 (hybrid)

Registration: "<https://us02web.zoom.us/meeting/register/tZMrceGgrjltGtUz5f31XXkfdFzPtIGS8-dB>”

► Abstract

How are the properties of the matter modified when its temperature and/or density is extremely increased?

According to quantum chromodynamics (QCD), the fundamental theory of strong interaction, quarks and gluons that are usually confined into nucleons are liberated at 10^{12} Kelvin or 10^{15} g/cm³, and the new form of the matter called quark-gluon plasma is realized. Exploring these phase transitions is an important subject since it is indispensable for describing the early Universe and the internal structure of neutron stars.

Recently, there have been active attempts to search for these phase transitions experimentally by the relativistic heavy-ion collisions over the world. In particular, heavy-ion collisions to explore high-density regions of QCD phase diagram are actively ongoing, and future experimental plans are also underway.

In this talk, I will review the QCD phase structure and the latest topics on its experimental searches in heavy-ion collisions. I will discuss the basics concepts of the spontaneous breaking of chiral symmetry and quark confinement in the QCD vacuum, investigation of hot and dense media using lattice QCD numerical simulations and effective models, and the methodology of searching for the phase structure in relativistic heavy-ion collisions.