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

“From hadrons to quarks in neutron stars”

by Toru Kojo (Tohoku Univeresity)

Time and Date: 15:00-17:00, February 24th, 2022

Registration: https://us02web.zoom.us/meeting/register/tZIkc-yvqjMjGNOFhHCl0DPlMR-w9EbTP8m6

▶ Abstract

I discuss dense matter in quantum chromodynamics (QCD), covering from dense nuclear matter to quark matter. After briefly reviewing the basic concepts of QCD, I sketch the overview of dense QCD matter and discuss how the recent neutron star observations help us to delineate the microphysics. In particular I focus on the recent constraints for the radii of 1.4- and 2.1-solar mass neutron stars and discuss how they constrain the nature of hadronic-to-quark matter transitions. Based on the neutron star constraints, we take the quark-hadron continuity picture as our baseline to construct neutron star equations of state. The equations of state generally accompany the peaks in sound velocity which originate from the quark substructure in hadrons, and hence such peaks may be taken as the signature of the onset of quark matter. This talk emphasizes the interplay among QCD (including nuclear physics), astrophysics, and condensed matter physics, all of which play important roles to understand dense matter in extreme conditions.

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