— 第968回九大原子核セミナー —

講師： Jinniu Hu 氏 (南開大学)

演題： Properties of neutron star from ab initio calculation to machine learning

日時： 7月17日 (金) 15:00〜

場所： (※ オンラインセミナー)

概 要

The golden age of neutron-star physics has come with rapid developments of astronomical techniques. The observation of gravitational wave as GW170817 event from binary neutron-star merger opens the multi-messenger astronomy. But, a 2.6 solar mass compact object in GW190814 observed recently also took a great challenge to present nuclear many-body theory. We investigated the properties of neutron star in the frame work of a relativistic ab initio method, i.e. relativistic Brueckner-Hartree-Fock (RBHF) theory with high-precision charge-dependent relativistic nucleon-nucleon (NN) potentials. All of the results obtained from present calculations only with two-body NN potentials completely satisfy various constraints from recent astronomical observations of massive neutron stars, gravitational wave detection (GW170817), and mass-radius simultaneous measurement (NICER).

Furthermore, we also try to produce a complete equations of state (EOS) of neutron star from crust to core with machine learning method and the mass-radius observations of available 14 neutron stars. A five layer artificial neural network (ANN) system was designed, where the observations of neutron star and EOS are regarded as the input and output of ANN system, respectively. 100 EOSs were obtained with millions of training data. These EOSs cannot only generate reasonable mass-radius relations of neutron star at intermediate mass region but also generate massive compact stars more than 2.6 solar mass.

連絡先: 九州大学 理学部 物理学教室 理論核物理研究室
TEL: 092-802-4101 (内線 8072)
金　龍熙 (kimu.ryonhi@phys.kyushu-u.ac.jp)

2020年7月6日