757th ASRC Seminar

Date：令和元年6月11日(火)
13：30～
Location：第2センター会議室
Speaker：住吉光介氏
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Title：Core-collapse supernovae in light of neutrino and nuclear physics

Abstract:

Massive stars lead to dramatic phenomena, supernova explosions, in the sky at the end of stellar evolution. Core-collapse supernovae from the gravitational collapse of massive stars exhibit bright displays with the production of heavy elements and are the birth place of neutron stars or black holes. Despite the importance of supernovae in the astrophysics and nuclear physics, the mechanism of supernova explosion has been elusive even after extensive studies for decades. Difficulty of the problem resides in the extreme condition of hot and dense matter in nuclear physics and in the treatment of neutrino transport through reactions and propagation. The so-called neutrino heating mechanism is the key for the explosion together with hydrodynamical instabilities. I will explain the issues in the mechanism of supernova explosion and demonstrate recent progress by the numerical simulations of neutrino-radiation hydrodynamics, which directly solve the Boltzmann equation in 6+1 dimensions. I would like to stress the importance of nuclear data at extreme conditions in supernovae through examples of the influence of nuclear physics (dense matter and neutrino reactions) on explosions and observational signals such as supernova neutrinos.

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