東北大学 宇宙創成物理学国際共同大学院プログラム



GPPU Seminar

2) "Measurement of neutron inelastic scattering on 12C for triple alpha process in dense environment"

by Shumpei Yamazaki (Tohoku University) Time and Date: 13:00-15:00, March 26, 2025 Place: Room 745, Science Complex B (H-03) (hybrid)

Registration: "https://us02web.zoom.us/meeting/register/quZaCEG5RcCk6fil1a91Tw"

The triple alpha process is a set of reactions, which produces 12C from three alpha particles in stellar nucleosynthesis. The resonance of 12C, known as the Hoyle state, plays an important role in that process. The Hoyle state de-excites to the ground state of 12C with low probability by mainly radiative de-excitations under typical stellar conditions. In a hot and dense environment such as supernovae, the triple alpha reaction rate can be enhanced by neutron induced deexcitation. In the neutron induced deexcitation, the excited state decays into the bound states by giving its excitation energy to neutrons instead of radiative de-excitation. We plan to measure a cross section of the inverse reaction, expressed in 12C(n, n'), near the reaction threshold energy to determine the enhancement factor of the triple alpha reaction rate. For the measurement of neutron inelastic scattering on 12C, we have been developing a monoenergetic 10 MeV neutron source with 1H(13C, n)13N reaction. In this seminar, I will talk about the physics background and the current status of the development of the 10MeV monoenergetic neutron source, especially a new cryogenic hydrogen gas target.

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