

Study of multi-neutron system with (p,2p) reaction

Tetraneutron has been drawing the attention of nuclear physicists around the globe for decades. But no firm conclusion on its properties has been drawn despite many experimental and theoretical efforts. The multi-neutron systems, whether existing as bound or low-lying resonances, are of fundamental importance in nuclear physics. They provide the possibility to investigate “purely” the nuclear forces which is free from Coulomb interaction, and serve as the most stringent test of our knowledge of the nuclear force. The properties of the tetraneutron are also essentially important for our understanding of neutron-rich nuclear matter, neutron star, and the evolution of the universe.

We have carried out new measurements on the four-neutron system populated in the decay of ${}^7\text{H}$ in 2017/July at RIBF, aiming to pin down the low-lying states of tetraneutron and to study the multi-neutron correlation. ${}^7\text{H}$ was produced in the (p,2p) reaction on ${}^8\text{He}$ with the vertex-tracking liquid hydrogen target MINOS. The recoil protons were tracked by the TPC of MINOS and then recorded by NaI scintillator array. The charged fragments were analyzed by the SAMURAI spectrometer, and the decay neutrons are detected by a combined setup of NEBULA and NeuLAND. A presentation of the preliminary data analysis, which is in progress, will be given.

Summary

Primary author: Dr YANG, Zaihong (RIKEN)

Presenter: Dr YANG, Zaihong (RIKEN)