

Nuclear astrophysics and structure experiments using RI beams

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Nuclear astrophysics experiments using radioactive ion (RI) beams have been very successful to understand some of the important thermonuclear reactions related to hydrogen burning processes.

For example, the ${}^7\text{Be}(p,g){}^8\text{B}$ and ${}^{14}\text{O}(a,p){}^{17}\text{F}$ reactions are important for understanding the solar neutrino production and studying the breakout mechanism from the HCNO cycle to the rp process, respectively. The above reactions were investigated using RI beams at various RIB facilities such as RIKEN and ORNL.

Several interesting structure studies on exotic nuclei such as ${}^{11}\text{Be}$, ${}^{52}\text{Ar}$, ${}^{54}\text{Ca}$ and other neutron-rich nuclei related to halo structure and new magic numbers were carried out using RI beams. We also studied the structures of both proton-rich and neutron-rich nuclei that are important to understand the rp-process and the r-process. The KoBRA experimental facility at RAON is being designed and is expected to carry out nuclear structure and astrophysics experiments in Korea. Current activities and prospects of nuclear astrophysics and nuclear structure experiments in Korea as well as other countries will be discussed.