Decay spectroscopy experiments at the RIBF

S. Nishimura

RNC, RIKEN, Wako, Saitama 351-0198, Japan
E-Mail: nishimu@riken.jp

The astrophysical r-process is one of the major nucleosynthesis processes in the universe, producing roughly half of all elements heavier than iron. Understanding the features of the r-process requires knowledge of mass, life-times ($T_{1/2}$), isomeric states, level scheme, and neutron emission probabilities ($P_n$) of neutron-rich nuclei. Because of extremely low production yield of such r-process nuclei far from the stability, high precision decay spectroscopy experiment is essential by introducing high efficiency beta-counting system under extremely low production yield of r-process nuclei.

A second-generation of radioactive beam facility (RIBF)\footnote{Y. Yano, Nucl. Instr. and Meth. B 261 (2007) 1009.} has started providing unstable nuclei using high intensity $^{235}$U beam in 2007. First attempt for new isotope search has been performed and successfully demonstrates its identification capability of heavy isotope ($^{125}$Pd, etc) beyond mass $A > 100$ by measuring $B_\rho$, Time-of-Flight (TOF), energy loss (dE), and total energy (E) of each particle with large acceptance beam separator (Big-RIPS)\footnote{T. Kubo, Nucl. Instr. and Meth. B 204 (2003) 97.}. While, the persistent efforts for preparation of decay spectroscopy experiments have been made to deduce the decay properties of neutron-rich nuclei efficiently.

Here, the scope of decay experiments will be discussed related to the astrophysical nucleosynthesis by introducing two different beta-counting systems, one for multi-layers of double-sided-silicon-strip-detectors (DSSSD), and another for a super-segmented scintillation detector (CAITEN) with a novel technique \footnote{S. Nishimura, et al., Nucl. Phys. A 718 (2003) 214c.} \footnote{S. Nishimura, et al., OMEG (2003) 304.}. 

References