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Measuring the beta-decay properties for exotic rare-earth isotopes

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The rapid neutron capture (so-called *r*-) process produces about half the heavy isotopes beyond the iron peak. The solar *r*-process abundance distribution has a local maximum around A $\approx$ 160 which originates from freeze-out during the late phases after neutron exhaustion. This rare-earth abundance peak (REP) provides a unique probe of the astrophysical conditions in the latter stages of the *r*-process [1-4].

According to the most recent sensitivity study the most influential nuclei to the REP formation can be found in the 55 $\leq$ Z $\leq$ 64 neutron rich region [3]. To constrain the peak formation models, in recent measurements at RIKEN Nishina Center using the BRIKEN array [5], the beta-decay parameters (delayed neutron emission probability and half-life) of 28 exotic neutron-rich Pm-Sm-Eu and Gd isotopes were measured. The half-life values and the neutron emission probabilities of the isotopes were obtained by fitting the time distribution of implantation-beta (i-β) and implantation-beta-neutron (i-β-n) correlation events using a sum of Bateman formulae. Furthermore, two CLOVER-type HPGe detectors are also mounted in the BRIKEN array, that are used to measure γ-spectra, thus the half-life results could be verified by exponential fitting the time distribution of implantation-beta-gamma (i-β-γ) correlation events [6]. The experimental results and astrophysical interpretation will be presented [7].

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