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New implantation detectors for decay spectroscopy at fragmentation facilities

The study of
 decays far from stability is essential to understand the evolution of nuclear structure and nucleosynth esis processes. decay experiments with such exotic nuclei involve intense cocktail beams from fragmentation facilities. The role of an implantation detector in these experiments is to measure the energy and the positions of both heavy ion implantation a nd ray emission to correlate the identified ion with decay events.
Due to
the lack of time resolution of conventional Silicon strip detectors , we have developed a new implantation detector using a segmented YSO (Yttrium Orthosilicate) scintillator array f or time of flight spectroscopy of the delayed neutron emission. The new detector was implemented in delayed neutron measurement experiments at RIKEN RI Beam Factory, and it was confirmed that the YSO detector correlates and implant events better d ue to its higher effective atomic number Z~35.
The success of the YSO detector motivated us to develop a new detector using heavier scintillator material. We will report on the design of the new detector using (Gd,139La)2Si2O7:Ce (A=139 enriched La GPS) cr ystal which has a much higher effective atomic number (Z~51) and is expected to have better implant efficiency with a lower background.

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