

Weak nuclear response studies and nuclear isotope detection using muon probes at the MuSIC facility at RCNP

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Abstract

MuSIC is a highly intense muon facilities at RCNP, Osaka University, where negative muons of about 10^8 muons/sec can be produced. The muon yield available at MuSIC is almost the same as the world highest [1]. By using nuclear muon capture reactions, nuclear weak/neutrino responses are studied by measuring emitted gamma-rays from residual nuclear states and nuclear radioactive isotopes [2,3]. They provide important information relevant to matrix elements for neutrinoless double beta decays and for supernova neutrino processes [4,5]. This gives unique opportunities to study them directly through the weak interaction. In addition, negative muons are useful to determine rare isotope concentration by measuring muonic X rays and gamma rays from nuclear radioactive isotopes [6]. Both of the measurements can be carried out by using high-resolution Ge detectors at RCNP. We are planning to carry out the experiment at MuSIC in June. Preliminary results will be presented.

[1] A.Sato, Y. Kuno, et al, Proceedings of IPAC2011, EPS-AG 820 (2011).

[2] H. Ejiri, Proceedings of MEDEX11, AIP Con.Proc.1417 (2011) 37

[3] H.Ejiri. J. Phys. Soc. Jap. 74 2101(2005).

[4].H. Ejiri, Progress in Particle and Nuclear Physics, 64 249 (2010).

[5] H. Ejiri, Phys. Rept. 338, 265 (2000).

[6] H. Ejiri and T. Shima, Phs.Rev.ST 15, 024701 (2012)