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Preliminary results on Se64 beta decay experiment at RIKEN Nishina Center and Mirror Symmetry

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Spin-isospin excitations can be studied by beta decay and charge exchange reactions in mirror nuclei, shedding light on mirror symmetry, hence we can compare our results on the beta decay of proton-rich nuclei with the results of charge exchange experiments when appropriate targets for the mirror nuclei are available. Accordingly we have performed experiments at GSI and GANIL to study T_z =-1 and T_z =-2 nuclei respectively where it became clear that the study of heavier, more exotic systems, demands beam intensities available only at the RIKEN Nishina Center. In this work we present the first experimental observation of the beta-delayed protons in the decay of the T_z =-2 ^{64}Se.
We have performed an experiment using the fragmentation of a 345 MeV·A ^{78}Kr beam with typical intensity of 200 particle nA on a Be target. The fragments were separated in flight using the BigRIPS separator and implanted in three double-sided Silicon strip detectors (DSSSD) named WASSSABi (60 mm × 40 mm × 1.2 mm, 60 horizontal and 40 vertical strips). The implantation setup was surrounded by the EUROBALL-RIKEN Cluster Array (EURICA). We perform time correlation between the ^{64}Se implantations and beta signals within a single pixel defined as the crossing of one X and one Y strip. In addition, only the strips where the highest energy has been deposited are correlated. The DSSSD detectors were calibrated using an external electron conversion ^{207}Bi source. Due to the fact that the proton emitted is in prompt coincidence with the beta particle, also partially absorbed in the DSSSD detector, shifts in the measured energies are expected. These energy shifts were estimated using the ^{57}Zn and ^{61}Ge beta-delayed proton spectra observed in the same experiment. The ^{57}Zn and ^{61}Ge proton energies were taken from literature. Three proton peaks were observed for ^{64}Se, (1612(10), 2003(13), and 3249(22) keV) and the proton energy errors were estimated from the fit for each proton peak as well as the systematic shift with the proton energies reported in the literature.

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