

Preliminary results on β -decay of the $T_z = -1$ nucleus ^{66}Se at RIBF

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In this paper, the preliminary results of the analysis of the NP1112-RIBF82 experimental campaign are presented. The main goal of this study is the $T_z = -1$ ^{66}Se β -decay.

^{66}Se was produced using a primary beam of ^{78}Kr with 345 MeV/nucleon and a target of Be. The nuclei of interest were separated and identified at the BigRIPs mass separator by the ΔE -ToF- $B\rho$ method (see Fig. 1 inset). The nuclei of interest were implanted in three Double-Sided Silicon Strip Detectors (DSSSDs) named WAS3ABi, surrounded by the EUROBALL-RIKEN Cluster Array¹⁾ (EURICA).

The β and γ spectra were obtained by the correlations between implants and decays within a ± 400 ms time

window. Backward correlation times were used to subtract random correlations. In Fig. 1, the β spectrum with background subtraction is shown. A similar procedure was applied to obtain the γ -spectrum, considering that EURICA was triggered by WAS3ABi. In Fig. 2 the γ -spectrum is shown.

We present here the first experimental results on the β -delayed gamma decay of ^{66}Se . Two gamma lines were previously observed in the isomeric decay²⁾ and in-beam study³⁾ of ^{66}As . They correspond to the gamma-deexcitation of two levels with $J^\pi = 1^+$ and 2^+ at 836 keV and 964 keV energy respectively. Through our analysis, we could identify three additional levels by implant- γ and implant- γ - γ correlation analysis (see Fig. 3).

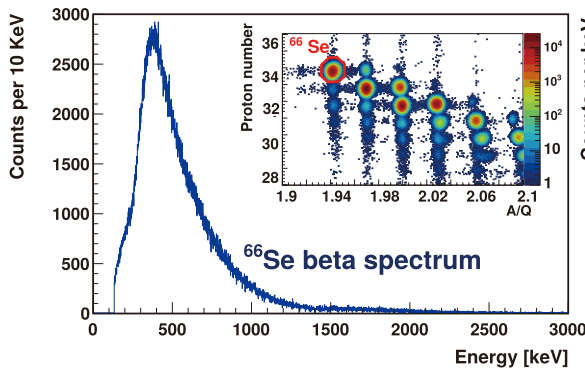


Fig. 1. Beta spectrum from ^{66}Se decay with background subtracted and PID selection of ^{66}Se implants identified by the BigRIPs mass separator.

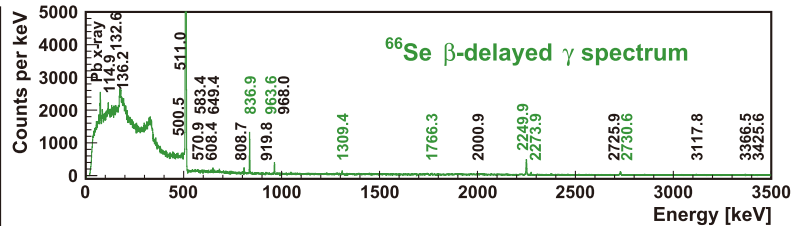


Fig. 2. Gamma spectrum following ^{66}Se decay, background subtracted. In green, γ lines identified in ^{66}Se β -decay.

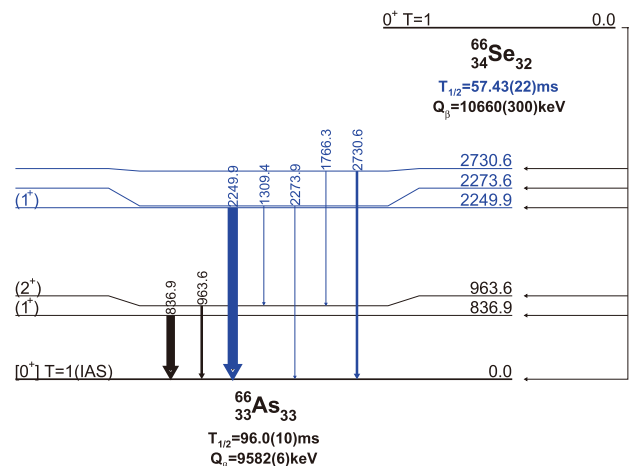


Fig. 3. (Color online) Preliminary level scheme for ^{66}Se decay. Levels previously known in the literature are shown in black, blue lines correspond to this work.

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References

- 1) B. Rubio *et al.*, RIKEN Accel. Prog. Rep. **49**, 27 (2015).
- 2) R. Grzywacz *et al.*, Phys. Lett. B **429**, 247 (1998).
- 3) R. Grzywacz *et al.*, Nucl. Phys. A **682**, 41c (2001).