

Study of the beta decay of ^{70}Br

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In this report we present some preliminary results of the analysis of the experiment NP1112-RIBF93. The main goal of the proposal is to study p-n pairing and isospin-related features in the structure of $^{70,71}\text{Kr}$ through the beta decay of these isotopes and through the decay of the $9/2^+$ isomer in ^{71}Kr if it is excited. In this experiment in addition to the $^{70,71}\text{Kr}$ nuclei, other nuclear species of interest, such as ^{70}Br and $^{68,69}\text{Se}$ were also produced. We have started the analysis of the experiment with the study of the beta decay of the odd-odd ^{70}Br nucleus, which is produced in two beta decaying states, namely the $T = 0$, $J^\pi = 9^+$ excited isomeric state and the $T = 1$, $J^\pi = 0^+$ ground state. The decay of the latter state is of particular relevance in the framework of superallowed transitions (see Ref. 1) for a recent review). For this kind of study inputs needed are the half-life, the Q value of the beta decay and the branching ratio of the superallowed $0^+ \rightarrow 0^+$ transition. Hence, the determination of weak Gamow-Teller transitions that compete with the superallowed one becomes essential.

To produce the nuclides of interest a high intensity ^{78}Kr beam with 345 MeV/nucleon provided by the RIBF accelerator complex was used. Neutron-deficient $A \sim 70$ nuclei were produced in in-flight fragmentation of the beam on a 7-mm thick Be target. In the study, the EURICA gamma-ray array was employed, which surrounded the implantation detector WAS3ABI. The fragments were identified using the BigRIPS separator applying the ΔE -ToF- $B\rho$ method. Figure 1 shows the identification plot of the fragments using this technique

for the ^{71}Kr setting, where ^{70}Br is also seen. Figure 2 presents examples of coincidence gamma spectra associated with this setting.

Several gamma transitions deexciting states populated in the beta decay of the 9^+ isomer in ^{70}Br have been observed for the first time. A better determination of the beta-decay half-lives of the ^{70}Br 0^+ and 9^+ isomers, and in particular of the half-life of the 0^+ ground state is relevant for using this decay as an additional input to $\mathcal{F}t$ calculations of superallowed transitions.

The analysis of the experimental data on the $^{70,71}\text{Kr}$ beta decays and on the ^{71}Kr isomer decay is in progress.

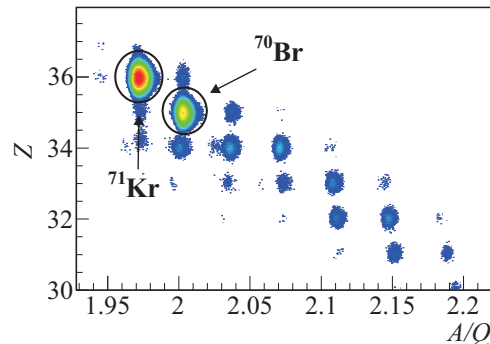


Fig. 1. Identification plot for the isotopes produced in ^{78}Kr fragmentation for the ^{71}Kr setting.

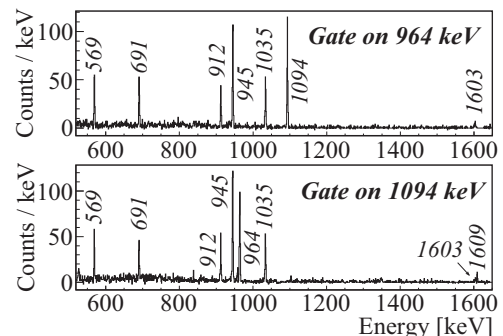


Fig. 2. Coincidence gamma spectra following the decay of the $J^\pi = 9^+$ isomer in ^{70}Br .

Reference

1) J. C. Hardy and I. S. Towner; Phys. Rev. C 91, 025501 (2015).

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