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Beta decay studies of the N=Z and waiting point nucleus 72Kr

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The N=Z nucleus 72Kr is situated in the mass region A≈70-80, where phenomena such as shape coexistence [1,2] and possibly also np pairing effects can show up. From the astrophysical point of view, 72Kr is involved in the rp-process of stellar nucleosynthesis being a waiting point nucleus as 73Rb, next step in the one proton capture, is unbound and there is a competition between the two proton capture, one proton capture, and beta decay of 72Kr. For this reason, a good knowledge on its beta decay properties such as B(GT) and level lifetimes are of vital importance for astrophysical calculations.
Total Absorption Spectroscopy (TAS) studies have previously shown successful results on information of the shapes of the ground state of nuclei as 76Sr and 74Kr [3,4].
Our method consists of the comparison between experimental B(GT) distributions, obtained by combining the TAS measurement with precise studies of the low spin structure, and calculations performed using the self-consistent HF plus RPA method with different types of Skyrme interactions [5] for the different deformations of the ground state of the parent nucleus in the beta decay.
The conversion coefficients of the de-excitation transitions were not available and the spin-parity of the low lying states in the daughter nucleus, 72Br, was not firmly established. All this information is crucial in order to face the analysis of the TAS data so we made an experimental campaign in two steps at ISOLDE: firstly, to study the low-spin structure of 72Br by means of the 72Kr beta decay and, secondly, the TAS measurement of this decay, with the "Lucrecia"spectrometer, to obtain the B(GT) distribution.
We here report on the results obtained through the TAS measurement including the information extracted on the deformation of the ground state of 72Kr by comparing the experimental B(GT) distribution with calculations, the measured conversion coefficients of the low-lying levels in 72Br and the information obtained on its level scheme (levels spin-parities, transition multipolarities, etc⋯).

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