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Mass measurement of the low-lying isomeric states in 100Y and 102Y

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Beta-decaying, high-spin, spin-trap isomers have been observed in 96Y, 98Y and 100Y with half-lives ranging from 9 to 0.9 seconds [Ab08,Ch20,Si21]. However, in 102Y there are two beta-decaying states which have similar half lives ($t_{1/2} = 360(40)$ ms [Sh83] and $300(10)$ ms [Hi91]) and a small energy difference, making it difficult to measure their relative energy and to ascertain if the high-spin state is the ground state or the isomeric state. This presentation will report on the use of the Phase Imaging – Ion cyclotron Resonance (PI-ICR) method [El13] at the JYFLTRAP double Penning trap at the IGISOL facility at the University of Jyväskylä, Finland to measure the relative energies of the beta-decaying states in 102Y and re-measure 100Y.

The nuclei of interest were produced via nuclear fission of ^{238}U using a 30 MeV proton beam. In 100Y a value of 147.8(42) keV has been measured for the excitation energy of the isomeric state, which overlaps with the previously measured value of 145(15) keV [Ha07] and reduces the experimental error by a factor of 4. In 102Y the closeness in energy of the 2 states makes the analysis quite complicated and although the two states were not fully separated, the observed mass distribution can be fitted with a bi-modal distribution which indicates an excitation energy of 12.3 (16) keV for the isomeric state. Details of the experiment and of the analysis procedures will be discussed.

References

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Attendance Type

In-person

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