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In-beam gamma-ray spectroscopy of 136Te within the HiCARI project

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With the arrival of the HiCARI campaign [1] to the RIBF facility at RIKEN (Japan), a series of in-beam gamma ray spectroscopy experiments was performed in order to expand the previous spectroscopic information on exotic, neutron-rich nuclei of intermediate mass.

Previously, incompatible results regarding the reduced transition probability for the decay of the first excited 2+ state, B(E2), in 136Te were reported from Coulex experiments and direct lifetime measurements using the fast-timing technique [2-5]. Due to the better energy resolution of the Ge detectors forming the HiCARI array, as compared to the previously used DALI2 NaI(Tl) array [6], in experiment NP1912-RIBF193 it was possible to extract, from the same data set, B(E2) values from the cross sections measured for the inelastic excitation on Au and Be targets on the one hand and the analysis of Doppler-shifted lineshapes on the other. The new results shed light on the conflict between transition strengths derived from Coulex and lifetime measurements reported for several nuclei in the literature.

In addition, lifetimes of additional excited states of 136Te populated following one-neutron removal from 137Te were measured, some of them for the first time, and others with smaller uncertainty compared to previous works, highlighting the potential of high resolution detectors in in-beam gamma spectroscopy experiments.

References

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