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Lifetime investigations in the $A \sim 120$ region

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Abstract

The neutron–deficient region around $A \sim 120$ is a fertile ground for nuclear structure studies, as single–particle degrees of freedom compete with collective phenomena to form several of the observed spectroscopic properties. This work reports on the progress and the preliminary results of a recent experiment performed at IFIN–HH, in Magurele, Romania, focused around the measurement of lifetimes of excited states in neutron–deficient Te isotopes, by means of the Fast Electronic Scintillation Timing (FEST, or fast–timing) technique [1]. A ^{11}B beam of $E_{lab} = 35$ MeV impinging on a 5 mg/cm^2 ^{nat}Ag target was used to populate excited states in $^{115-120}$Te. The γ rays de–exciting these levels were detected by the ROSPHERE [2] array, in its mixed 15 HPGe + 10 $LaBr_3$(Ce) detector configuration, while charged particles were detected by the SORCERER [3] array. Activation measurements were carried out post irradiation, to measure the ground state lifetimes of the populated nuclei in the $\mathrm{Te} - \mathrm{Sb} - \mathrm{Sn}$ decay chains, through the study of their respective decay curves. The experimental results, in combination with theoretical predictions stemming from a variety of models, among which the recently developed proxy–SU(3) [4], are expected to provide insight on the dynamical shape evolution of the studied isotopes, in a region of the nuclear chart where shape coexistence is predicted to exist.

References

[1] N. Margineăn *et al.*, *Eur. Phys. J. A* **46**, 329 (2010)
[2] D. Bucurescu *et al.*, *NIM A* **837**, 1 (2016)
[3] T. Beck *et al.*, *NIM A* **951**, 163090 (2020)
[4] A. Martinou *et al.*, *Eur. Phys. J. A* **57**, 84 (2021)