

β -decay spectroscopy activities at ALTO

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A little more than ten years ago, the very first electron beam was produced with the ALTO electron LINAC. 50 MeV and 10 μ A later, the induced photofission process allow the production of exotic neutron rich isotopes. Based on the ISOL technique, ALTO has shown its capability to produce radioactive ion beams in the ^{78}Ni mass region. Since then, the Orsay team working with the facility developed a set of instruments dedicated to the study of neutron rich nuclei β -decay such as BEDO or the neutron counter named TETRA [1]. The availability of these setups allowed the investigation of possible existence of low-lying structures in the β -strength function above the neutron separation energy (S_n). This endeavor was further encouraged by two remarkable serendipities. The first one concerns the unexpected observation of “ultra”-high-energy γ -rays (8-9 MeV) [2] in the β -delayed emission products of ^{83}Ga ($Z=31$; $N=52$; $T_{1/2}=312$ ms ; $Q_{\beta}=11.7$ MeV) sources collected at the BEDO station [3]. The second one concerns β -delayed neutron-emission probability (P_n) measurements of the $^{82,83,84}\text{Ga}$ ($N=51,52,53$) precursors [4] using the neutron counter TETRA: quite unexpectedly, after a steep increase of the P_n values from $N=51$ to 52 , the P_n falls down again at $N=53$ by a factor ~ 2 . More recently, manifestation of Pygmy Dipole Resonances (PDR) was observed in ^{80}Ge [5]. These results will be presented and discussed. It will be shown that they clearly point towards the existence of structures in the threshold region of the daughter-nucleus excitation spectrum, governing the decay properties in the ^{78}Ni region. Perspectives for further investigation of these questions at ALTO using the PARIS, TETRA and MONSTER (γ and neutron) spectrometers will be presented.

Others β -decay activities of the Orsay research group will also be presented.

- [1] D. Testov, D. Verney, B. Roussière et al., NIM A815, 96 (2016)
- [2] A. Gottardo, D. Verney, I. Deloncle et al. PLB 772, 359 (2017)
- [3] A. Etíl, D. Verney, N. N. Arsenyev et al. PRC 91, 064317 (2015)
- [4] D. Verney, D. Testov, F. Ibrahim et al., PRC 95, 054320 (2017)
- [5] R. Li, Ph. D. Thesis, Université Paris-Saclay (2022)

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