

## $\beta$ -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  $\mu$ 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  $^{78}\text{Ni}$  mass region. Since then, the Orsay team working with the facility developed a set of instruments dedicated to the study of neutron rich nuclei  $\beta$ -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  $\beta$ -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  $\gamma$ -rays (8-9 MeV) [2] in the  $\beta$ -delayed emission products of  $^{83}\text{Ga}$  ( $Z=31$  ;  $N=52$  ;  $T_{1/2}=312$  ms ;  $Q_{\beta}=11.7$  MeV) sources collected at the BEDO station [3]. The second one concerns  $\beta$ -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  $\sim 2$ . More recently, manifestation of Pygmy Dipole Resonances (PDR) was observed in  $^{80}\text{Ge}$  [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  $^{78}\text{Ni}$  region. Perspectives for further investigation of these questions at ALTO using the PARIS, TETRA and MONSTER ( $\gamma$  and neutron) spectrometers will be presented.

Others  $\beta$ -decay activities of the Orsay research group will also be presented.

- [1] D. Testov, D. Verney, B. Roussi re et al., NIM A815, 96 (2016)
- [2] A. Gottardo, D. Verney, I. Deloncle et al. PLB 772, 359 (2017)
- [3] A. Etil , 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, Universit  Paris-Saclay (2022)

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