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## Total absorption gamma-ray spectroscopy at ISOLDE for isospin mirror asymmetry studies

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The isospin mirror asymmetry parameter in mirror systems is evaluated based on the  $\beta$ -decay data of the mirror partners. In particular,  $\beta$  decay intensities are traditionally obtained from  $\gamma$ -ray spectroscopy experiments with HPGe detectors. However, due to the limited efficiency of such detectors, this approach is known to be potentially affected by the Pandemonium effect [1], specially when high excitation-energy levels are fed and de-excitation cascades are very fragmented. A well consolidated tool to avoid this bias and determine the complete  $\beta$ -intensity distributions is the total absorption  $\gamma$ -ray spectroscopy technique [2].

In this contribution we will focus on a recent experiment with the Lucrecia total absorption spectrometer at ISOLDE [3] aimed at investigating the  $\beta$  decay of  $^{27}\text{Na}$ , studied in the past with germanium detectors [4]. Our preliminary results point to previously unseen  $\beta$  intensity populating excited states in  $^{27}\text{Mg}$ , including the observation of competition between neutron emission and  $\gamma$  de-excitation above the neutron separation energy. This would be the first confirmation of Pandemonium effect for such a light system and it would reduce the isospin mirror asymmetry of the  $^{27}\text{Na} - ^{27}\text{S}$  pair, suggested to be an evidence of a proton halo structure in  $^{27}\text{S}$  [5]. The  $\gamma$  emission from neutron-unbound states, observed so far in heavier nuclei, can be interpreted as a nuclear structure effect by means of Hauser-Feshbach statistical model calculations [6].

- [1] J. Hardy et al., Phys. Lett. B 71, 307 (1977)
- [2] B. Rubio et al., J. Phys. G: Nucl. Part. Phys. 31, S1477 (2005)
- [3] B. Rubio et al., J. Phys. G: Nucl. Part. Phys. 44, 084004 (2017)
- [4] D. Guillemaud-Mueller et al., Nucl. Phys. A 426, 37 (1984)
- [5] L. J. Sun et al., Phys. Rev. C 99, 064312 (2019)
- [6] J.L. Tain et al., Phys. Rev. Lett. 115, 062502 (2015)

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