

# $\beta$ -delayed fission of neutron-rich actinides

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Beta-delayed fission ( $\beta$ DF) is a two-step process where a parent nucleus  $\beta$ -decays into a daughter that fissions [1].  $\beta$ DF plays a role in the termination of the r-process nucleosynthesis [2], and so it is of particular interest in the neutron-rich side of the nuclide chart, where only a few studies have been performed. Aiming at expanding the limited information in this region, an experimental campaign was performed at the ISOLDE facility (CERN, Switzerland) to study the  $\beta$ DF in  $^{230,232,234}\text{Ac}$  [3]. A new upper limit for the  $\beta$ DF probability ( $P\beta$ DF) of  $^{230}\text{Ac}$  was deduced to be two orders of magnitude lower than the previously measured  $P\beta$ DF value of  $1.19(40) \cdot 10^{-8}$  [4]. Upper limits for  $P\beta$ DF were also deduced for  $^{232,234}\text{Ac}$  and updated values were found for  $^{230,232}\text{Fr}$ .

Theoretical calculations of  $P\beta$ DF are ongoing, using the PyNEB code [5] to calculate the fission paths. The aim is to benchmark the models used with reliable experimental values found on the neutron-deficient side of the nuclide chart [1] and then to extend the calculations to the neutron-rich side. The results obtained from the ISOLDE campaign will be discussed in this contribution, along with future prospects of a combined experimental and theoretical campaign to study  $\beta$ DF.

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[1] A. N. Andreyev, et al., Rev. Mod. Phys., Vol.85, No. 4 (2013). [2] S. Goriely, et al., Phys. Rev. Lett. 111, 242502 (2013).

[3] A. N. Andreyev, et al., INT-I-216 (2020).

[4] Y. Shuanggui, et al., Eur. Phys. J. A 10, 1-3 (2001).

[5] E. Flynn, et al., Phys. Rev. C 105, 054302 (2022).

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