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Beta-delayed fission of neutron-deficient Fr and At isotopes

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Beta-delayed fission (bdf) happens when a precursor nucleus first undergoes beta-decay to a high-lying excited state above or around the fission barrier in the daughter nucleus that subsequently fissions. Although bdf is a rare event, its study allows us to probe the nuclear fission process of excited nuclei with low excitation energies and known ranges of spins and parities as shown from our previous work on the bdf of 180Tl where an unexpected asymmetric mass distribution in the fission fragment distribution was observed [1].
Since 2009, a number of experiments on bdf in the neutron-deficient lead region have been carried out at ISOLDE. In this contribution we report on the latest results of this experimental campaign whereby the bdf of 200,202Fr (IS466, May 2011) and of 194,196At (IS534, May 2012) was studied.
For all mentioned nuclei, bdf has been firmly identified and for 194,196At and 202Fr, enough statistics were collected to construct energy and mass spectra of the fission products. Although the data analysis is still ongoing, compared to the 180Hg case a different fission fragment mass distribution is observed. This indicates that these nuclei represent a transition region between asymmetric and symmetric fission as observed in the heavier Rn and Ra isotopes studied via Coulomb excitation induced fission [2]. The results will be discussed in a more global framework of fission studies in this mass region and also data from beta- and alpha decay studies obtained as a by product, will be presented.

[1] : A.N. Andreyev et al., PRL 105, 252502 (2010)
[2]: K.-H Schmidt et al., Nucl. Phys. A 665, 221 (2000)

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