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

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Beta-delayed fission (βdf) 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 βdf 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 βdf of 180Tl where an unexpected asymmetric mass distribution in the fission fragment distribution was observed [1].
Since 2009, a number of experiments on βdf in the neutron-deficient lead region have been carried out at CERN-ISOLDE. At ISOLDE, protons are impinging on a UC_x target, creating a wide range of atomic nuclei. Via selective ionization mechanisms (eg. Laser ionization) and subsequent mass separation, pure isotopic beams can be created. The latter are then implanted on ultrathin carbon foils, mounted on a rotatable holder. Silicon detectors placed on both sides of the carbon foil are used to detect emitted fission fragments. In this contribution we report on the latest results of this experimental campaign whereby the βdf of ^{200,202}Fr (May 2011) and of ^{194,196}At (May 2012) was studied.
For all mentioned nuclei, βdf has been firmly identified and for ^{194,196}At and ^{202}Fr, enough statistics were collected to construct energy and mass spectra of the fission products. Although the data analysis is still ongoing, compared to the ^{180}Hg 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.

[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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