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β -delayed Neutron Emission Studies for Heavy Isotopes

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β-decay is the most common way for neutron-rich nuclei to reach the stability valley. However, when the neutron separation energy is lower than the Qβ-value, β-delayed neutron emission [1] takes over a dominant role in these β-decays, decreasing the mass of the nucleus by one unit (β1n) or more in the case of multiple neutron emission (β2n, β3n, ...). The study of the neutron branching ratios, Pn, is crucial for a better understanding of the astrophysical rapid neutron capture (r-) process where neutron emission can become dominant during freeze-out when the material decays back to stability. So far only a third of the around 600 accessible isotopes that are neutron emitters have been measured, the heaviest ones with masses up to A~150 [2], plus a single measurement for 210Tl [3]. Concerning multiple neutron emission, only 24 of the ~300 accessible isotopes have been measured up to mass A=100.

In this contribution the results of two recent measurements with the neutron detector BELEN [4] will be presented. A first experiment performed at the GSI Darmstadt (Germany) with the Fragment Separator allowed for the first time the determination of the P1n values of several isotopes of Hg and Tl for masses beyond A>200 and N>126 [5]. A second experiment that took place at the IGISOL facility in Jyvaskyla (Finland) allowed to measure the heaviest β2n emitter identified so far, 136Sb. The resulting P2n value is much smaller than previously assumed. In addition, the P1n values of many important fission products in this mass region were remeasured with higher precision [6].

An outlook will be given about the BRIKEN campaign at RIKEN (Japan) which was commissioned in November 2016 and will start data taking in May 2017. BRIKEN aims to perform in the next years measurements for more than a hundred β1n-, dozens of β2n- and several β3n-emitters, lots of them for the first time and in the most exotic regions reached so far.

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