Determination of half-life of the ^{155}Sm β-decay

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The half-lives of some nuclides are of high importance, especially for calculations regarding the nuclear fallout in nuclear accidents. Rare-earth elements, like Eu and Ce, in the form of oxides dissolved in irradiated nuclear fuel are non-volatile and released with difficulty during an accident, making their isotopes important in the investigation of radioecologycal studies. There are many codes to calculate these radioisotopes activities in nuclear reactors, but to make these inventories, all the feeding chain must be known. Particularly, ^{155}Eu is formed by direct fission process, neutron capture of ^{154}Eu and beta decay of ^{155}Sm. The last process have a short half life and the correct value is an important information for the activity calculation.
In this work, the half-life of the ^{155}Sm β decay was determined using enriched ^{154}Sm samples submitted to irradiation in the IEA-R1 reactor of IPEN; the activity of the samples were followed for 4-5 consecutive half lives using a 198cm^3 HPGe detector. The data was corrected using a non paralizable dead time correction and fitted to an exponential decay function using a non linear fitting procedure developed on the MatLab platform. The resulting value was compatible to the one found in the literature, with a lower uncertainty.