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Beta-decay studies of neutron-rich Mn isotopes

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The neutron-rich Mn-decay studies are of particular interest due to the recently observed rapid onset of deformation just below the 'semi-magic' 68Ni (Z=28,N=40), in the Co, Fe and Cr isotopes. Large-scale shell-model calculations are on the verge of explaining quantitatively the observed nuclear structure, but the experimental benchmarks in this region are still limited. The beta-decay study of neutron-rich manganese isotopes around N=40 presents a wealth of new and systematic nuclear-structure information in the iron, cobalt, and even the nickel isotopes for critical assessments of the state-of-the-art effective interactions.
In October 2009, Mn-decay data were successfully acquired for the masses A=58,60-68, which were produced in a proton-induced fission of 238U and selected using RILIS and mass separation in HRS. The Mn ions were implanted on a moveable tape system surrounded by three thin plastic Delta-E beta detectors and two MINIBALL clusters for gamma detection. The detector signals were processed by digital electronics.
Thanks to the selectivity of the laser ionization and the combination with previous work at the Leuven Isotope Separator On-Line setup on Fe and Co decay, beta-decay feeding patterns and spin assignments could be obtained. We will present results for the decay chains of 63,65,66,67,68Mn. New spin assignments are made changing the interpretation of previous data and, for the A=66 mass chain, comparisons with shell-model calculations will be presented.

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