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# beta-decay half lives of nuclei approaching the r-process path near the 126-neutron shell closure

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The decay properties of neutron-rich nuclei around N=126 are very important not only because they will provide valuable information about nuclear models far from stability, but also because these nuclei approach the astrophysical rapid-neutron capture [1] path near the waiting-point A˜195. Particularly, the beta-decay half lives provide a noteworthy understanding of the r-process time-scales, and hence of the atomic abundances in the Universe. The use of projectile fragmentation at relativistic energies has opened up the possibility to produce these nuclei via the "cold-fragmentation"reaction channels [2]. Isomer spectroscopy using passive stoppers with a germanium array [3] and time correlations for beta-decays with an active stopper [4,5] have provide the first structural information on some of them.
In a previous experiment the half-lives of 198-199-200Ir, 199-200Os and 194-195Re were measured from time-position correlations between implanted ions and subsequent beta-decays using double side silicon strip detectors (DSSSD) [4]. In this work we benefit from the last developments using beta-delayed gamma-ray spectroscopy to measure the beta-decay half lives of other nuclei at the current limits of experimental synthesis. The present experiment was performed at GSI where the Fragment Separator (FRS) was used to identify and select heavy neutron-rich nuclei produced in the reaction 208Pb+Be at 1 AGeV. The nuclei were then slowed down and implanted in three DSSSD detectors acting as active stopper [6], recording the position and time of implantations and decays. Additionally, the RISING gamma-ray array [7] enclosed the active stopper in order to register the characteristic transitions from daughter nuclei. The event-by-event position and time correlations between implantations and gamma-labelled radioactive electrons allowed for the measurement of the beta-decay half lives of 204Au, 204-203Pt and 200-202Ir with improved background conditions.
The new measurements allow to validate the numerical technique previously proposed for the analysis of beta-decay half lives under complex background conditions [4], and confirm the conclusions on the beta-decay of nuclei in this region of the Segrè chart. Indeed, the comparison of all our measurements with theoretical predictions [8,9] indicates the importance of FF transitions in the beta-process picture of this region. Moreover, the fact that beta-decay models used in standard r-process calculations do not consider FF transitions suggests that the r-process matter flow across N=126 is faster than expected.

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