Isomeric ratios for nuclei with Z=62-67 and A=142-152 produced in the relativistic fragmentation of ^{208}Pb

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We have investigated isomeric states in a number of nuclei with Z=62-67 and A=142-152. They were produced by the fragmentation of the relativistic (1 GeV/u) ^{208}Pb beam from the SIS-18 synchrotron of the GSI facility on a ^{9}Be target, and selected by the FRagment Separator (FRS). The selected nuclei of interest were implanted into the stopper, a block of plastic 7mm thick. The gamma-rays from the decay of isomeric states in the implanted nuclei were measured by the high purity germanium array, RISING [1]. Details of the experiment are described in Ref. [2]. In total 22 nuclides were detected, isomeric states were observed in 9 of them: $I^{\pi}=19^{-}$ in ^{152}Ho (τ= 8.4μs), $I^{\pi}=31/2^{+}$in ^{153}Ho (τ= 229ns), $I^{\pi}=27^{+}$in ^{148}Tb (τ=1.3μs), $I^{\pi}=10^{+}$in ^{144}Gd (τ=145ns), $I^{\pi}=49/2^{+}$in ^{147}Gd (τ=510ns), $I^{\pi}=11/2^{-}$in ^{143}Eu (τ= 50μs), $I^{\pi}=8^{-}$in ^{144}Eu (τ=1μs), $I^{\pi}=11/2^{-}$ in ^{145}Eu (τ=490ns), $I^{\pi}=10^{+}$in ^{142}Sm (τ=480ns) and $I^{\pi}=7^{-}$ in ^{142}Sm (τ=170ns). Of special interest is the $I^{\pi}=27^{+}$ state in ^{148}Tb, as this is the highest spin that has been populated through the fragmentation reaction until present day. The aim of this work was the extraction of isomeric ratios (IR) for these isomeric states. The IR is the number of ions populated in a given isomeric state compared to the total number of ions populated for the selected nuclide. The IR can provide information about the production reaction and nuclear structure. It was evaluated based on time of flight, half-life decay, in-flight losses and by considering the finite measurement time . Results were compared with theoretical predictions, calculated using an abrasion-ablation approach [3]. Significant differences between experimental and theoretical results were observed, similarly as in Ref. [4,5]. Possible reasons for such behaviour will be discussed.

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