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Extracting isomeric yield ratios in fission fragments

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In nuclear fission, a heavy nucleus typically divides into two fission fragments. The fragments are observed to have an angular momentum of 6-7 $\hbar$ on average, the mechanism behind this generation of angular momentum is still not fully understood. One approach to investigate the angular momentum of the fragments is to measure the isomeric yield ratio (IYR) i.e. the population fraction of an isomeric state. The IYR is known to be sensitive to the angular momentum distribution in the fragments. Consequently, measuring the IYR can provide insights into the initial state of the fission fragments.

This study employs a technique to access short-lived isomeric states for which the IYR have not been previously measured. Using this method, we have extracted the IYR of ^{94}Rb, ^{130}Sn, ^{135}Te and ^{137}Xe, from data taken in the ν-ball campaign at the ALTO facility at IJC Laboratory, Orsay. We use the nuclear decay code TALYS in combination with the fission code FREYA and GEF to calculate the primary angular momentum of the fragment derived from the measured IYR values. These results can be used to constrain the fission models.

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