

A new technique for extracting isomeric yield ratios of fission fragments

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An observable that is strongly coupled to a fission fragment's angular momentum is its isomeric yield ratio (IYR), defined by the amount of fragment decays that passes through a metastable state. Though this observable is limited to fragments with such isomeric states, the IYR is known to be sensitive to small changes in the fragment's angular momentum distribution. Isomeric yield ratios have therefore been measured over the last four decades, where various techniques allow the IYR extraction of isomers with different half-lives, see eg. Refs.[1-3].

A new technique for extracting IYRs of fission fragments has been developed. With this technique, isomers with half-lives on the order of 10⁻⁷ seconds become accessible. We show values for the IYRs of ¹³⁴Te produced in the ²³⁸U(n,f), ²³²Th(n,f), and ²⁵²Cf(sf) reactions. Furthermore, this technique allows for the control of the number of neutrons emitted from the system as well as the minimum spin of the partner fragment, which adds new information to our understanding of angular momentum generation in nuclear fission.

References:

- [1] H. Naik, et al., Nuclear Physics A 587, 273 (1995).
- [2] T. Datta, et al., Phys. Rev. C 28 (1983).
- [3] A. Mattera, et al., Eur. Phys. J. A 54, 33 (2018).

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