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A new region of fission isomers in medium-mass nuclei

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In a long series of experiments, in different settings, we have observed the Coulomb induced break-up of the fission fragments (FFs) in the solid foils [1, 2]. The break-up occurs with a delay after the initial binary fission event of the mother system. The fusion-fission channel is excluded as a cause of the break-up at the typical energies of the FFs undergoing the break-up which are approximately 1 MeV per nucleon. In our experiments, the time-of-flight between the FF's source and the foil where

the break-up takes place provided an estimate of the delay. This value can be regarded as a lower estimate of the lifetimes of the shape isomer states of the FFs undergoing the break-up. It is estimated to be up to 400ns. The discussed in this work results on the induced break-up of the medium-mass nucleus from the shape isomer state have not been observed experimentally before, and there are no theoretical predictions of the observed effect.

References

1. Yu.V. Pyatkov et al., Physics Procedia. 74, 67 (2015).
2. D.V. Kamanin et al., Proc. of the 28th Inter. Nuclear Physics Conference (INPC 2022), Cape Town, South Africa, 11–16 September 2022. Journal of Phys: Conf. Series 2586, 2023, art. 012043.

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