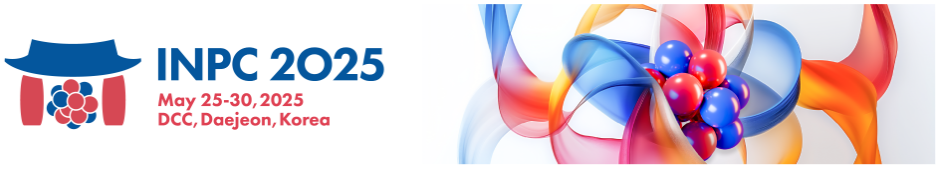

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Fission isomer studies at IGISOL and FRS

Friday, 30 May 2025 09:55 (15 minutes)

The 'island' of fission isomers identified in the actinide region (Z = 92 - 97, N = 141- 151) originates from multi-humped fission barriers, which can be understood as the result of superimposing microscopic shell corrections to the macroscopic liquid drop model description. In a recent experiment, fission isomers ^{240f,242f}Am have been produced with deuteron-induced reactions on a ^{242}Pu target at the IGISOL facility in Jyväskylä, Finland. Measurements of their fission fragments with a background-free method have been performed. For the first time, the in-flight fragmentation and electromagnetic dissociation methods were applied at GSI for populating fission isomers. With the fragment separator (FRS) at GSI, the fragmentation of 1 GeV/u ^{238}U projectiles gives access to isotopes that are hard or impossible to reach by light particle-induced reactions that are so far in use. In-flight separation with the FRS allows studying fission isomers with half-lives as short as 100 ns. Most importantly, it provides beams with high purity and enables event-by-event identification. Two detection methods were employed to study fission isomers with half-lives in the range of approximately 100 ns to 50 ms: beam implantation in a fast plastic scintillator, and beam thermalization in a cryogenic stopping cell at the FRS Ion Catcher followed by subsequent detection [1]. Results from these experiments will be presented in this contribution.

References

[1] J. Zhao *et al.*, Proceedings of Science **419** (2023) PoS (FAIRness2022) 063.

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