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Fission Yield Analysis of Neutron-Induced Fission on Th-232

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Thorium-based molten salt reactors have recently attracted increasing interest as one of the promising Generation-IV reactor concepts and as a potentially safer alternative to Uranium-fuelled systems. However, the fission properties of Thorium are still insufficiently understood, particularly due to the limited availability of experimental fission yield data. In this work, we analyze γ-ray spectroscopy data from neutron-induced fission of Th-232 performed with the nu-Ball1
spectrometer at the ALTO facility to obtain its fission fragment yields. The yields were first extracted using a conventional spectroscopy method, and then further improved by introducing a Cf-252-based normalization approach. Using the well-characterized Cf-252 spontaneous fission dataset, we established the fraction of specific γ transitions relative to the total transitions intensity for major isotopes, and applied these ratios to the Th-232 data. This method enables more reliable yield extraction, particularly for odd-Z and odd-A nuclei with complex decay schemes where conventional spectroscopy often fails. The results demonstrate that the Cf-252-based normalization provides a valuable complementary strategy for yield reconstruction, enhancing accuracy for isotopes with complicated level structures.

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