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$^{233}\text{U}(n, \gamma)$ measurements at LANSCE

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The Th-U fuel cycle, in which the ^{233}U plays an important role, has been proposed as an alternative to the U-Pu fuel cycle due to its reduced amount of transuranium elements. The experimental $^{233}\text{U}(n, \gamma)$ cross section data available in the literature are scarce and were measured decades ago [1, 2, 3]. An accurate measurement of the $^{233}\text{U}(n, \gamma)$ cross section is required by the NCSP (National Criticality Safety Program) to complete the neutron-induced cross section data.

For ^{233}U fission is around one order of magnitude more likely than capture, hence, the accuracy in the capture cross section measurement relies on the discrimination between the γ 's produced in capture and fission reactions. This discrimination method requires the use of an experimental setup combining capture and fission detectors. Therefore a new measurement has been performed at LANL combining the Detector for Advanced Neutron Capture Experiments (DANCE) to measure γ 's, with the NEUtron detector array at dANCE (NEUANCE) to detect neutrons coming from fission and determine by coincidence the γ 's produced by fission reactions tagging them.

This measurement will provide cross section data in the Resonance Region (RR), focusing in the Unresolved Resonance Region (URR) in the keV neutron energy.

References

- [1] E. Berthoumieux et al., Proceedings of the International Conference on Nuclear Data for Science and Technology April 22-27, 2007, Nice, France (EDP Sciences, 2008) pp. 571-574.
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- [3] J. C. Hopkins and B. C. Diven, Nucl. Sci. Eng. 12:2, 169-177 (1962).

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