

Abstract

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Modelling System Response for Neutron Spectroscopic Correlations

Fission events are characterized by particle multiplicities, energies, and directions. Physics based fission event generators such as FREYA and CGMF predict event-by-event correlations between these observable properties. Experiments measuring these properties have also been carried out to validate these fission models. The response of the experimental system must be well known to compare experiment and prediction.

A description of analytical, Monte-Carlo, and experimental based techniques used to analyze the system response of a Cf-252 measurement using the ChiNu array at LANL is presented. A model of organic liquid scintillator fast neutron detection is compared to experimental data. MCNP_PoliMi simulations are then used to construct response matrices between emitted and measured energies.

This system response is used to unfold the experimental data. The results are shown to agree with evaluated nuclear data. Measured event-by-event energy-multiplicity and angle-energy correlations are compared to the fission event generator predictions.