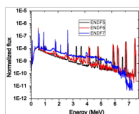
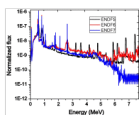
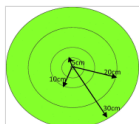


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## Nuclear Instruments and Methods in Physics Research Section B: Beam Interactions with Materials and Atoms



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### Reproducibility of (n, $\gamma$ ) gamma ray spectrum in Pb under different ENDF/B releases

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#### Abstract

Radiative capture reactions are of interest in shielding design and other fundamental research. In this study the reproducibility of (n, $\gamma$ ) reactions in Pb when cross-section data from different ENDF/B releases are used in the Monte-Carlo code, MCNP, was investigated. Pb was selected for this study because it is widely used in shielding applications where capture reactions are likely to occur. Four different neutron spectra were declared as source in the MCNP model which consisted of a simple spherical geometry. The gamma ray spectra due to the capture reactions were recorded at 10 cm from the center of the sphere. The results reveal that the gamma ray spectrum produced by ENDF/B-V is in reasonable agreement with that produced when ENDF/B-VI.6 is used. However the spectrum produced by ENDF/B-VII does not reveal any primary gamma rays in the higher energy region ( $E > 3$  MeV). It is further observed that the intensities of the capture gamma rays produced when various releases are used differ by a some margin showing that the results are not reproducible. The generated spectra also vary with the spectrum of the source neutrons. The discrepancies observed among various ENDF/B releases could raise concerns to end users and need to be addressed properly during benchmarking calculations before the next release. The evaluation from ENDF to ACE format that is supplied with MCNP should also be examined because errors might have arisen during the evaluation.

#### Keywords

Radiative capture; ENDF/B cross-section data releases; Reproducibility; Pb

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