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Preliminary results of a Monte Carlo study to determine neutron fleunce using activation

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Abstract content
   (Max 300 words)

In nuclear physics applications, such as fast neutron radiotherapy where neutron beams are used for cancer treatment and research, detailed knowledge of neutron fluence spectra are required since neutron interaction cross sections is energy dependent. There are a variety of methods that can be used to measure neutron energy spectra which includes time-of-flight, recoil spectrometry, threshold (activation or fission) spectrometry and methods based on neutron moderation. Although the time of flight measurement is most accurate for in air measurement in neutron radiotherapy facilities were flight path is small due space limitation in the treatment room threshold (activation or fission) spectrometry can be used as an alternative.
In this work a Monte Carlo study, using MCNPX was carried out to investigate the feasibility of using neutron activation to measure fast neutron beam fluence spectra for a water phantom at iThemba Labs neutron beam line. MCNPX simulations were used to model the experiments. In these simulations the activation reactions for 1 cm× 2.54 cm diameter activation foils Aluminium, copper, iridium, Holmium, Tantalum, indium, Titanium, Terbium, Gold and Bismuth were calculated as well as the response for each of the activation reactions. These simulated activation reactions were unfolded into neutron fluence spectra, using the Bayesian unfolding code MAXED. This study reports on preliminary results obtained.

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Msc

Main supervisor (name and email)
and his / her institution

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