Contribution ID: **271** Type: **Poster Presentation**

Preliminary results of a Monte Carlo study of neutron beam production at iThemba LABS

Wednesday, 10 July 2013 17:40 (1 hour)

Abstract content
   (Max 300 words)

Abstract
Many applications in nuclear and applied nuclear physics require well-characterized fast neutron beams in terms of their fluence spectra, since neutron interactions cross sections are energy dependent. Fast neutron beams are widely used in radiation therapy for cancer treatment, radiation protection for detector calibration and basic research in nuclear physics for neutron cross section measurement. Monitoring these neutron beam fields and determining their fluence spectra pose a challenge. In principle, these fluence spectra can either be calculated by Monte Carlo Methods or measured experimentally.
At research facility namely iThemba LABS fast neutron beams characterization in terms of their fluence spectra are important for detector calibration and neutron cross section measurement. Monte Carlo methods are widely used to optimise neutron beam delivery system of such facilities and to predict their source spectra. In this work it was decided to use the Monte Carlo Code MNCPX to investigate neutron production at IThemba LABS because it had be widely used and validated in the energy range of interest.
This paper present preliminary results in which the Monte Carlo code MCNPX was used to simulate neutron production by different targets either Li (1.0 mm), Be (10.0 mm) or C (10.0 mm), for fast neutron beams facility at iThemba LABS. Neutron production was investigated in terms of proton neutron ratio and fluence spectra as a function of target thickness, incident proton energy and angular distribution.

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yes

Level for award
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MSc

Main supervisor (name and email)
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Session Classification: Poster2

Track Classification: Track B - Nuclear, Particle and Radiation Physics