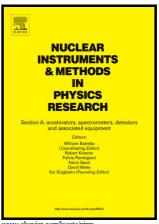
Author's Accepted Manuscript

Measurement and Simulation of the TRR BNCT beam parameters

Elham Bavarnegin, Alireza Sadremomtaz, Hossein Khalafi, Yaser Kasesaz, Mohadeseh Golshanian, Hossein Ghods, Arsalan Ezzati, Mehdi Keyvani, Mohammad Haddadi



www.elsevier.com/locate/nima

PII: S0168-9002(16)30451-X

DOI: http://dx.doi.org/10.1016/j.nima.2016.05.061

Reference: NIMA58964

To appear in: Nuclear Inst. and Methods in Physics Research, A

Received date: 27 October 2015 Revised date: 9 May 2016 Accepted date: 15 May 2016

Cite this article as: Elham Bavarnegin, Alireza Sadremomtaz, Hossein Khalafi Yaser Kasesaz, Mohadeseh Golshanian, Hossein Ghods, Arsalan Ezzati, Mehd Keyvani and Mohammad Haddadi, Measurement and Simulation of the TRI BNCT beam parameters, *Nuclear Inst. and Methods in Physics Research*, *A* http://dx.doi.org/10.1016/j.nima.2016.05.061

This is a PDF file of an unedited manuscript that has been accepted fo publication. As a service to our customers we are providing this early version o the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain

ACCEPTED MANUSCRIPT

Measurement and Simulation of the TRR BNCT beam parameters

Elham Bavarnegin^{1,2}, Alireza Sadremomtaz², Hossein Khalafi¹, Yaser Kasesaz^{1*}, Mohadeseh Golshanian¹, Hossein Ghods¹, Arsalan Ezzati¹, Mehdi Keyvani¹ and Mohammad Haddadi¹

¹Nuclear Science and Technology Research Institute (NSTRI), Tehran, Iran

Abstract

Recently, the configuration of the Tehran Research Reactor (TRR) thermal column has been modified and a proper thermal neutron beam for preclinical Boron Neutron Capture Therapy (BNCT) has been obtained. In this study, simulations and experimental measurements have been carried out to identify the BNCT beam parameters including the beam uniformity, the distribution of the thermal neutron dose, boron dose, gamma dose in a phantom and also the Therapeutic Gain (TG). To do this, the entire TRR structure including the reactor core, pool, the thermal column and beam tubes have been modeled using MCNPX Monte Carlo code. To measure in-phantom dose distribution a special head phantom has been constructed and foil activation techniques and TLD700 dosimeter have been used. The results show that there is enough uniformity in TRR thermal BNCT beam. TG parameter has the maximum value of 5.7 at the depth of 1 cm from the surface of the phantom, confirming that TRR thermal neutron beam has potential for being used in treatment of superficial brain tumors. For the purpose of a clinical trial, more modifications need to be done at the reactor, as, for example design, and construction of a treatment room at the beam exit which is our plan for future. To date, this beam is usable for biological studies and animal trials. There is a relatively good agreement between simulation and measurement especially within a diameter of 10 cm which is the dimension of usual BNCT beam ports. This relatively good agreement enables a more precise prediction of the irradiation conditions needed for future experiments.

²Department of Physics, University of Guilan, Rasht, Iran

^{*}Corresponding author. Nuclear Science and Technology Research Institute (NSTRI) ,Tehran ,Iran. ykasesaz@aeoi.org.ir

Download English Version:

https://daneshyari.com/en/article/8168824

Download Persian Version:

https://daneshyari.com/article/8168824

<u>Daneshyari.com</u>