Cerutti, CERN, Salvatore Danzeca, CERN, Ruben Garcia Alia, CERN, Angelo Infantino, CERN.

Presenter: Matteo Marzo, CERN, matteo.marzo@cern.ch

RadFETs integrated in the RadMON system at the CERN High energy AcceleRator Mixed-field (CHARM) test facility are used to perform micro-dosimetry and to characterize the mixed-field of the the facility, e.g. in terms of Total Ionizing Dose. Different radiation fields representative of accelerators, atmospheric and space radiation environments can be reproduced at CHARM, by means of the interaction of a 24 GeV/c beam extracted from the Proton Synchrotron (PS), with a copper target: the developing particles shower can be then further modified using a movable shielding and finally reaches a set of tests positions, where electronic components to be tested are placed. Simulations and measurements of the dose response of RadFETs in the facility's mixed-field have already been performed in copper target and no shielding configuration, providing a good agreement between simulated and experimental values (5÷25% difference, within statistical uncertainty). On the other hand, when the concrete/iron movable shielding is in place, the massive presence of neutrons (mostly thermal) populating the mixed-field produces a significant discrepancy between simulated and experimental values (~50% difference), possibly caused by a strong dependence of the RadFET response on neutrons energy. This paper focuses on both FLUKA Monte Carlo simulations and experimental results of a test campaign we are conducting to investigate the RadFET response, when irradiated by thermal neutrons. A first set of irradiations have been performed in Grenoble in early 2017, using monoenergetic beams of 0.025eV neutrons (ILL, Institut Laue-Langevin) and 14MeV neutrons (LPSC, Laboratoire de Physique Subatomique & Cosmologue). Further tests will be conducted at ILL and CHARM in March-April 2017. In parallel, FLUKA is used to improve the RadFET model and the physics settings of the simulations to investigate the causes of the present mismatch.

Dose estimate for cone beam CT equipment protocols using Monte Carlo simulation in computational adult anthropomorphic phantoms

1 - M. Rosangela Soares, Instituto de Pesquisas Energéticas e Nucleares, Comissão Nacional de Energia Nuclear, IPEN/CNEN, SP, Brazil, 2 - William S. Santos, Instituto de Física, Universidade Federal de Uberlândia (UFU), MG, Brazil, 3 - Walmir Belinato, Instituto Federal de Educação, Ciência e Tecnologia da Bahia (IFBA), BA, Brazil, 4 - Ana F. Maia, Universidade Federal de Sergipe (UFS), SE, Brazil, 5 - Linda V.E. Caldas, Instituto de Pesquisas Energéticas e Nucleares, Comissão Nacional de Energia Nuclear, IPEN/CNEN, SP, Brazil

Presenter: Maria Rosangela Soares / Instituto de Pesquisas Energéticas e Nucleares, Comissão Nacional de Energia Nuclear, IPEN/CNEN and Universidade Federal de Rondônia, UNIR, mrs2206@gmail.com

Cone beam computed tomography (CBCT) has become essential for dental diagnosis in the last decade. The objective of this study was to estimate the effective dose and the absorbed dose in tissue and organ for CBCT protocols intended for dental use. Monte Carlo (MC) simulations were used to estimate the effective dose and absorbed dose in tissue / organ suggested by the International Commission of Radiological Protection (ICPR) in its report ICRP-103. Seven different fields of view (FOV) were simulated. Two CBCT equipment were used in this work: i-Cat Classic CBCT and ProMax 3D CBCT. The code used was MCNPX. Anthropomorphic phantoms FASH (Female Adult MeSH) and MASH (Male Adult MeSH) were used. The results were compared with measurements previously obtained, and they were satisfactory. The tissue and organ doses vary for different FOV. The effective dose was in the range 66-111 μSv for the i-Cat Classic CBCT equipment and 68 - 236 μSv for the ProMax 3D equipment. The ProMax 3D equipment presented absorbed doses of at least 34% higher than the i-Cat Classic equipment in all protocols with the same clinical objective image. For both devices, the largest single contribution to the effective dose was from the salivary glands (31%, between 27 – 36 %) and other tissues (36%, between 31 – 39 %). The highest dose range, using the protocols, was shown in the salivary glands and thyroid. For the i-Cat equipment, the conversion factor dose–area product (DAP) was more efficient. For the ProMax 3D equipment the conversion factor kerma was more effective. The effective dose and the dose absorbed in tissues / organs vary according to the FOV exposure parameters and the positioning of the beam relative to the radiosensitive organs. The conversion factors for the equipment used were satisfactory.

COINCIDENCE SUMMING CORRECTION FACTORS FOR 238U AND 232Th DECAY SERIES USING THE MONTE CARLO METHOD.

José Ordóñez Ródenas, Grupo de Medioambiente y Seguridad Industrial. Universitat Politècnica de València
Sergio Gallardo Bermell, Instituto Universitario de Seguridad Industrial, Radiofísica y Medioambiental. Universitat Politècnica de València
Josefina Ortiz Moragón, Laboratorio de Radiactividad Ambiental. Universitat Politècnica de València.
Sebastián Martorell Alsina, Grupo de Medioambiente y Seguridad Industrial. Laboratorio de Radiactividad Ambiental. Departamento de Ingeniería Química y Nuclear. Universitat Politècnica de València

Presenter: José Ordóñez Ródenas, Grupo de Medioambiente y Seguridad Industrial. Universitat Politècnica de València., joorro1@etsii.upv.es

A common application of the gamma ray spectrometry in laboratories is the quantification of the activity in environmental samples containing natural radionuclides such as 238U and 232Th. Those radionuclides are not gamma emitters and, therefore, it is not possible to obtain their activity directly by gamma spectrometry techniques.