

Slovak University of Technology in Bratislava, Exercise STU-04

Main topic: Dosimetry

Keywords: Radiation dose, measurement, simulation, shielding analysis, gamma radiation, radiation transport, Monte Carlo, MCNP5, Monaco

Purpose: The purpose of the experiment is to acquire knowledge of determining radiation doses. The experiment comprises two different methods, i.e. numerical simulation and experimental measurement. For numerical simulations, the Monaco and MCNP5 Monte Carlo transport codes are used. The main goal of the exercise is to perform the experimental measurement, run the calculations and evaluate the achieved result, so as the results lies in the range of uncertainties.

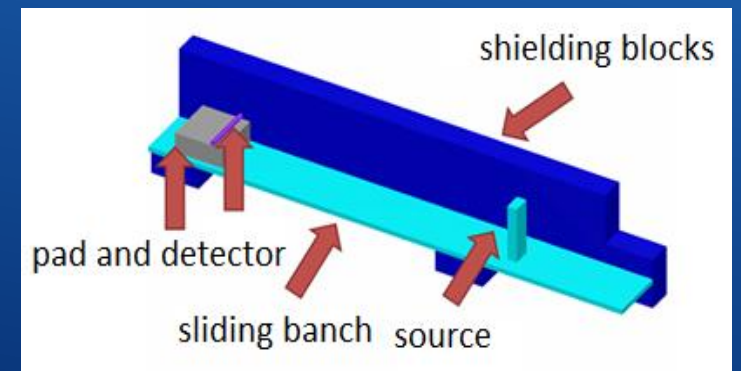
Level of exercise: Basic Advanced Complex
Level of education: BSc MSc PhD

What you will learn:

The students will get familiar with basic principles of radiation sources and their detection and with the Monte Carlo method. Upon finishing this exercise, they will be able to create experimental set-ups, perform measurements, run simulations and evaluate the results.

Important information:

- Minimal size of student group: 2
- Maximal size of student group: 4
- Overall duration of the experiment (in wall clock hours): 8



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Possibility to perform experiment on demand: Yes No

Frequency of occurrence: 2-3 times per year

Examination modalities: report

Teaching languages: English, Slovak

Pre-knowledge required: Knowledge of types, sources, interaction detection and shielding of radiation, nuclear data, radiation transport, statistics, numerical simulations, data processing

Instruments required for exercise:

- MCNP5 Monte Carlo code / Monaco Monte Carlo code
- AmBe/PuBe neutron source and calibration gamma sources
- Detector stand with adjustable bench
- Dose rate measuring unit and 128 CPU cluster system

Execution:

- The exercise starts with the creation of the experimental setup and the measurement of the RA background
- Sources of neutron and gamma radiation are placed in specific positions and the measurements are carried out as well as uncertainties related to the measurement, used methods are evaluated
- The calculation models are created, with focus on nuclear data and flux-to-dose functions
- The simulations are carried out, the results are compared with the experimental values

Limitations:

Pregnant and breastfeeding women are not allowed to enter the controlled radiation area. Legal age (18) is required. For more information please visit <http://www.ujfi.fe.i.stuba.sk/kontakt.php>

