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#07-241 The Mini Labyrinth –A Simple Benchmark For Radiation Protection And Shielding Analysis

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Since World War II there has been a significant development of methods and approaches used in the calculation of radiation shielding. This development was directly supported by the needs of industry (military technology, nuclear power plants, food processing, medical applications, accelerators, etc.). Over time, modelling and simulation of relevant effects shifted from an analytical modelling to methods based on the so-called primary principles and their stochastic nature. Even nowadays it is necessary to know the accuracy of available computation codes, used nuclear data and it is desirable to evaluate the influence of the user on the final calculated parameter. One of the most effective ways of gaining user experience and minimizing user effects on the results of calculation is international collaboration comprising the designing and constructing of relevant benchmark experiments, following simulation with tools available at the workplace (engineering tools vs. high-fidelity methods), comparison of work group results and subsequent identification of the source of observed deviations from the experiment. The proposed paper comprises a definition of the simple neutron and gamma shielding benchmark, inspired by the ALARM-CF-AIR-LAB-001 ICSBEP experiment. The experimental setup consists of the PuBe neutron source, several NEUTRONSTOP C5 shielding blocks (polyethylene with 5 % boron), H2O filled PLA tank, plastic source holder and the active and passive detectors. The measured quantities are compared to values calculated by MONACO (as a part of SCALE 6.2.4 system) and MCNP 6 stochastic codes. The influence of different cross section libraries and propagation of cross section uncertainties is studied through the shielding analysis. The achieved results are included and finally, some discussions on further needed development are also included.

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