Contribution ID: **179** Type: **Contributed Oral Presentation**

Indoor exposure prediction through Monte Carlo Simulation Geant4 : Case of primary schools of the Doukkala-Abda Region

Wednesday, 27 September 2023 17:00 (13 minutes)

A higher level of radiation may result from the use of building materials with a higher degree of radioactivity in addition to the ongoing exposure of humans to background ionizing radiation. As a result, it is important to assess the radionuclide content of construction materials as well as the potential exposure to occupants from these materials. is study employed Monte Carlo simulations to determine the absorbed dose rate and annual effective dosage brought on by the presence of naturally occurring radioisotopes Ra226, 232, and K40 , in a common primary schools[1] . Additionally, values determined from frequently used straightforward equations pertaining to the dose rate emitted by granite plates covering the inside of a typical room were compared with the results of the dose rate simulation. In the simulation, a room/class was built with typical proportions (4 m by 5 m by 2.8 m) with a 3 cm thick granite floor and walls. The room's focal point was a MIRD Human phantom. It was simulated that the sample matrix would emit the strongest gamma rays from the progeny of Ra226, 232, and K40. Each simulation's quantity of produced photons—typically of the order of 106—exactly matched the amounts of Ra226, 232, and K40 activity seen in material samples. e spectra of deposited energy inside of the water cylinder were obtained ater GEANT4 simulation software took into account all processes involved in the interactions of gamma photons with the granite matrix itself, the outer concrete shell, the air inside the room, and the water cylinder. For the different examined samples, each with a different amount of Ra226, 232, and K40 , the deposited energy was used to determine the distribution of the absorbed dose rate and yearly effective dosage. e numbers obtained by applying a standard formula were found to be 30%–40% lower than the values obtained by simulating the absorbed dose rates and, subsequently, the annual effective dosage.

Key words: Geant4,indoor exposure, Dose,Annual effective dose

References :
[1] Ouakkas S, Boukhair A, Abdo MAS, Benjelloun M. Development of a corrective model of short-term radon concentrations to
estimate annual efective doses in the primary schools of the Doukkala-Abda region, Morocco. Indoor and Built Environment.
2022;31(6):1482-1492

Abstract Category

Nuclear Physics

Primary author: Ms ETTOUFI, Asmae (Hassan II University of Casablanca)

Presenter: Ms ETTOUFI, Asmae (Hassan II University of Casablanca)

Session Classification: Parallel Session 1

Track Classification: Physics Education and Outreach