

: A Geant4 Based Simulation Software for Detectors in use at CTBTO Radionuclide Particulate Systems

Wednesday, 21 June 2023 11:51 (1 minute)

The CTBTO International Data Centre (IDC) developed a novel Geant4 based Monte Carlo simulation software for HPGe detectors in use at particulate systems of the International Monitoring System (IMS). The software, dubbed GRANDSim (an acronym for Geant4-based RADioNuclide Detector Simulation tool), allows to simulate both coaxial and planar detectors, and includes default definitions of standard measurement geometries and shielding configurations of the three technologies operated at IMS particulate systems. The software simulates efficiency calibration, isotopic response function and coincidence summing correction factors for any natural and anthropogenic radionuclides of interest. The physical model is automatically optimized by constraining simulation results against experimental calibration for non-summing energies.

Simulated entities are used as support parameters in the automatic processing of daily spectra from IMS for: (a) improving the quality of efficiency calibration (by including coincidence summing corrections), (b) enhancing the nuclide identification results (by including summation peaks) which reduces the workload on analysts in interactive mode, and (c) ensuring reliable activity concentration results by including required coincidence summing corrections when applicable. In addition, GRANDSim simulates gamma spectra for mixtures of radionuclides with any activity concentrations.

The contribution presents the key features of GRANDSim for HPGe detectors in use at particulate systems.

Promotional text

The CTBTO International Data Centre developed a novel open source Monte Carlo simulation software for particulate systems of the International Monitoring System. This poster outlines the key functionalities and main features of the software.

E-mail

abdelhakim.gheddou@ctbto.org

Oral preference format

Primary author: GHEDDOU, Abdelhakim (CTBTO Preparatory Commission)

Co-authors: Mr KALINOWSKI, Martin B. (CTBTO Preparatory Commission); Mr BARÉ, Jonathan (CTBTO Preparatory Commission); Mr HARMS, Arend (CTBTO Preparatory Commission); Ms MERESOVA, Jana (CTBTO Preparatory Commission); Mr NGUELEM MEKONGTSO, Eric Jilbert (CTBTO Preparatory Commission); Ms SALGUEIRO PIRES WINTER, Carla Maria (CTBTO Preparatory Commission); Mr WANG, Jun (CTBTO Preparatory Commission); Mr YOON, Seokryung (CTBTO Preparatory Commission)

Presenter: GHEDDOU, Abdelhakim (CTBTO Preparatory Commission)

Session Classification: Lightning talks: P2.2, P3.2, P3.6

Track Classification: Theme 3. Monitoring and On-Site Inspection Technologies and Techniques: T3.6
Analysis of Radionuclide Monitoring Data