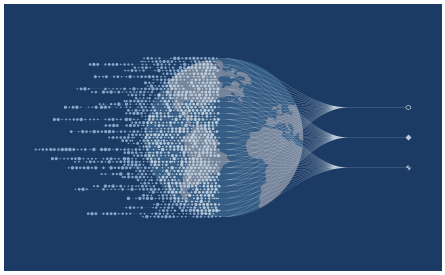

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# of a background model for coincidence gamma-ray spectrometry measurements in radionuclide monitoring

In the Comprehensive Nuclear-Test-Ban Treaty (CTBT), radionuclide monitoring is a key to provide evidence of an explosion being nuclear in nature. In this respect, the gamma-ray coincidence spectrometry has emerged as a powerful technique to suppress background from naturally occurring radioactivity while maintaining good efficiency for coincident gamma-ray emitters of interest. Although this technique can be employed with the state-of-the-art high-resolution High Purity Germanium (HPGe) detectors to improve the sensitivity to radionuclides relevant for CTBT verification, the proper estimation of the background is essential for optimizing and designing a coincidence instrument.

For this purpose it has been found essential to make use of Monte Carlo simulation software. Currently, a background model is being developed using Geant4. The background consists of three components to be used for comparison with experimental data obtained with a single-crystal HPGe detector from 1) an unexposed particulate filter for the collection of airborne radionuclides, from 2) an exposed filter, and in addition 3) the background measured from the detector setup and lab environment without any filter. The obtained background model is presented and its aimed use for evaluation of candidate coincidence detector designs is discussed.

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