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Comparison of ARSA, SAUNA and ARIX Detector Responses Using FLUKA for Xenon Isotope Beta–Gamma Coincidence Spectrum

It has been recognized that ambient radio-xenon activity concentration monitoring could be used for the purpose of identifying the nuclear nature of an explosion. Therefor four detection systems have developed to monitor ambient radio-xenon which three of them have worked based on beta-gamma coincidence method. A Monte Carlo code FLUKA was used to model geometry of ARSA, SAUNA and ARIX beta-gamma coincidence systems and to simulate radio-xenon sources and their detector responses. Two -and three- dimensional beta–gamma coincidence spectra from these systems was acquired and compared with each other. Since FLUKA has the option of determining source as a radioisotope, 4 concerning isotopes of radio-xenon (131mXe, 133Xe, 133mXe and 135Xe) were defined as source of the beta-gamma counting coincidence systems. Moreover, the electrons, beta and gamma lines produced by simulated radioisotope sources were compared with literatures. The results indicate that using this option would ensure users applying source as a radioisotope. Since Compton coincidence spectrum of 137Cs is usually used for energy calibration of detection system, the 3-dimensional spectrum of 137Cs reconstructed using FLUKA.

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