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Peak Search and Fitting Techniques for Analysis of the Radioxenon Beta-Gamma Coincidence Spectra

Beta-gamma coincidence monitoring systems are one of the technologies of the noble gas component of the International Monitoring System (IMS). The coincidence spectra are analysed at the International Data Centre (IDC) using the so called net count calculation method (NCC) based on a number of Regions of Interest (ROI) in the coincidence spectrum. In order to enhance the reliability of analysis results, an alternative method - briefly called 2D-fitting method - has been developed to be used in parallel with the NCC method. This applies peak search and peak fitting techniques on the beta and gamma projections of the coincidence spectrum. The idea is to reduce the rate of false positives in reported results, using the distinct peak structures of the radioxenon isotopes, especially the coincidence beta peaks of the metastable Xe-131m and Xe-133m. As a first step, the fitted peak areas instead of the net counts in each ROI are determined but the same energy and efficiency calibration data of the NCC method is used. This contribution presents the analysis method and results for spike samples as well as for high level noble gas samples from the IMS beta-gamma coincidence based Noble Gas systems.

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