

3.2-P15. Monitoring of environmental radioactivity at the trace level using the new Gamma3 spectrometer

IMS support laboratories are in charge of the expertise of both particulates and noble gases samples collected by the CTBT radioactivity monitoring network. Due to radioactive decay and transportation delays, the highest detection sensitivities for CTBT relevant isotopes must be achieved by laboratories. FRL08 laboratory has designed and built a new low-level gamma/electron spectrometry setup. Most recent state-of-the-art techniques have been implemented to achieve high detection sensitivities and very low background. The Gamma3 setup is composed of a versatile array of three high efficiency HPGe gamma spectrometers surrounded by an optimized passive/active shielding. The integral background count rate is as low as 3.0 counts min⁻¹ (20-2500 keV range) which is among the lowest published values for a surface level instrument. Data acquisition is performed by a multichannel digital system, this configuration produces listmode files that are processed offline using home-developed ROOT-based routines. The feature allows to process signals produced by the detectors in various configurations: single/additive mode, coincidence/anti-coincidence mode. For noble gases measurement, a dedicated gas cell fitted with two silicon detectors is used in combination with two HPGe detectors to perform coincident b/g detection of radioxenon. Performances of the system will be illustrated for various CTBT relevant samples.

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