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Type: Poster

an anti-coincidence system plastic-HPGe to lower the MDA of radioxenon measurement

The systems developed to detect the emissions of xenon isotopes, for the verification of the CTBT treaty are required to have a very sensitive detection limit, having to reach specific values of minimum detectable activity (MDA). To improve the sensitivity of the measurements and to decrease the minimum detectable activity (MDA) values it is important to reduce, among other factors, the background detected by the system. At ENEA Noble Gas laboratory an anticoincidence system has been developed to support the measurement of radio xenon isotopes in atmospheric samples. The system consists of a HPGe coaxial detector p-type installed inside a low-background shield of old lead (150 mm) with a layer of electrolytic copper (35 mm). Two NUVIA plastic scintillators were placed above the shielding to detect coincident cosmic-ray interactions. The electronics associated with the detector amplifies the signal and passes it through an analogue-to-digital converter. Tests conducted with the anticoincidence system have shown a reduction of the Compton continuum that contributes to the spectrum background. In addition, the measured MDA values, compared to those obtained using the standard system, decreased for all the radioxenon isotopes.

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Track Classification: Theme 3. Verification Technologies and Technique Application