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Surface Detector System for the Contamination Evaluation of Air Filters

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The system is an alpha/beta detector able to determine the independently alpha and beta contaminations based on PSD (pulse shape discrimination) capabilities of the scintillator and the real time digital pulse processing of fast electronic readout. The detector is designed for measuring alpha and beta emitter contamination on large air sampling filters and to complement the high-resolution spectrometry of gamma radiation.

The detector is based on a ZnS scintillator with a sensitive surface of 576 cm² and an active area of more than 97%, that can be customizable. It is embedded in a shielding structure to reduce the external background and radiological content coming from other filters located nearby.

The system was laboratory tested with the procedure used for contamination monitors based on large area radioactive sources to verify its functionality and the uniformity for both alpha and beta sources. Results demonstrate a good response to the different source energies and over the full area.

The signal discrimination analysis used, electronics, software, test procedure and measurements performed will be described.

Promotional text

The system exploits digital pulse processing to identify beta and alpha radiation with large surface detectors and rejects cosmic radiation background. This detection system could be integrated in the CTBTO gamma monitoring stations, for an additional assay of the air filters.

Primary authors: Dr FANCHINI, Erica (CAEN S.p.A., Viareggio, Italy); Dr MORICHI, Massimo (CAEN S.p.A., Viareggio, Italy)

Co-author: Dr CORBO, Matteo (CAEN S.p.A., Viareggio, Italy)

Presenter: Dr FANCHINI, Erica (CAEN S.p.A., Viareggio, Italy)

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