

of a 24-Channel Coincidence Radioxenon Detector with Silicon PIN Diodes

Existing radioxenon detectors for nuclear explosion monitoring typically use either scintillator based beta/gamma coincidence detectors or germanium based gamma only detectors. Silicon detectors have a number of potential advantages (high resolution, low background, sensitivity to both photons and electrons, and no memory effect) and have been shown previously to be a possible alternative to existing detectors. A radioxenon detector with 24 silicon PIN diodes has been designed, assembled, and tested. The PIN diodes are arranged as 2x2 arrays with 100 mm² active area on each of the six sides of a cubic Xe cell to achieve a high geometric efficiency. The probability for detecting higher energy gamma rays is low, but backgrounds are practically zero so that overall the minimum detectable concentration is estimated to be below 1 mBq/m³.

Primary author: HENNIG, Wolfgang (XIA LLC, Hayward, CA, USA)

Presenter: HENNIG, Wolfgang (XIA LLC, Hayward, CA, USA)

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