Contribution ID: **4** Type: **not specified**

Nuclide identification algorithm for polyvinyl toluene scintillation detector based on artificial neural network

Thursday, 19 August 2021 15:30 (15 minutes)

Radiation Portal Monitors (RPMs) are highly sensitive fixed installation systems designed to detect illicit radioactive material trafficking. RPMs are typically installed with detectors that have a high detection efficiency, such as plastic detectors. However, due to these detectors' limited energy resolution, radioisotope identification from their spectra is often not of interest. This research describes a radioisotope identification technique based on an artificial neural network that was applied to the gamma spectrum received from the large-size EJ-200 plastic detector. The simulated gamma spectra using MCNP-5 are used to generate the training data set. With an Exact Match Ratio of 98.8 percent, this method can precisely detect a single or mixture of radioisotopes in the gamma spectrum. In addition, the model can analyses gamma spectrum with up to 10% gain shift, up to 40° incident angle, and sealed source with good precision. This study also presents the model's sensitivity to each isotope in order to attain a True Positive rate of 95%. For radioisotopes detection, this model is usable on RPMs employing a large-size EJ-200 plastic scintillation detector.

Experimental nuclear physics

1

Theoretical nuclear physics

Primary authors: Mr HIEP, Cao Van (Vietnam Military Institute of Chemical and Environmetal Engineering); Dr HUNG, Dinh Tien (Vietnam Military Instutute of Chemical and Environmental Engineering)

Presenter: Mr HIEP, Cao Van (Vietnam Military Institute of Chemical and Environmetal Engineering)

Session Classification: Young Scientist Session 4