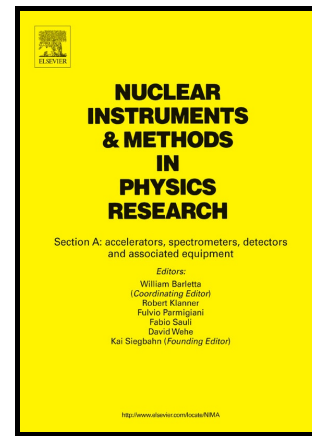


Author's Accepted Manuscript

Radionuclide identification algorithm for organic scintillator-based radiation portal monitor

Marc Gerrit Paff, Angela Di Fulvio, Shaun D. Clarke, Sara A. Pozzi



www.elsevier.com/locate/nima

PII: S0168-9002(17)30007-4
DOI: <http://dx.doi.org/10.1016/j.nima.2017.01.009>
Reference: NIMA59564

To appear in: *Nuclear Inst. and Methods in Physics Research, A*

Received date: 21 November 2016
Revised date: 11 December 2016
Accepted date: 3 January 2017

Cite this article as: Marc Gerrit Paff, Angela Di Fulvio, Shaun D. Clarke and Sara A. Pozzi, Radionuclide identification algorithm for organic scintillator-based radiation portal monitor, *Nuclear Inst. and Methods in Physics Research, A* <http://dx.doi.org/10.1016/j.nima.2017.01.009>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain

Radionuclide identification algorithm for organic scintillator-based radiation portal monitor

Marc Gerrit Paff*, Angela Di Fulvio, Shaun D. Clarke, Sara A. Pozzi

**Department of Nuclear Engineering and Radiological Sciences,
University of Michigan, Ann Arbor, MI, USA**

mpaff@umich.edu

*Corresponding author. Marc Gerrit Paff Department of Nuclear Engineering and Radiological Sciences
University of Michigan 2355 Bonisteel Blvd, Ann Arbor, MI 48109 +1 (734) 936-0266

Abstract

We have developed an algorithm for on-the-fly radionuclide identification for radiation portal monitors using organic scintillation detectors. The algorithm was demonstrated on experimental data acquired with our pedestrian portal monitor on moving special nuclear material and industrial sources at a purpose-built radiation portal monitor testing facility. The experimental data also included common medical isotopes. The algorithm takes the power spectral density of the cumulative distribution function of the measured pulse height distributions and matches these to reference spectra using a spectral angle mapper.

F-score analysis showed that the new algorithm exhibited significant performance improvements over previously implemented radionuclide identification algorithms for organic scintillators. Reliable on-the-fly radionuclide identification would help portal monitor operators more effectively screen out the hundreds of thousands of nuisance alarms they encounter annually due to recent nuclear-medicine patients and cargo containing naturally occurring

Download English Version:

<https://daneshyari.com/en/article/5493103>

Download Persian Version:

<https://daneshyari.com/article/5493103>

[Daneshyari.com](https://daneshyari.com)