Contribution ID: **167** Type: **Mini Oral and Poster**

Enhancing Neutron/Gamma Discrimination in the Low-Energy Region for EJ-276 Plastic Scintillation Detector Using Machine Learning

Tuesday 23 April 2024 12:35 (20 minutes)

Pulse Shape Discrimination (PSD) techniques, particularly the widely employed charge integration ratio method (Qratio), have conventionally proven effective in distinguishing fast neutrons from gamma rays in organic scintillation detectors. However, the utility of Qratio diminishes in the low-energy region (below 100keVee) due to overlapping signatures, leading to a suboptimal Figure of Merit (FOM). In this study, we employ machine learning techniques to enhance neutron/gamma discrimination and compare the results with the traditional charge integration ratio in the low-energy region threshold. Our investigation centers on the EJ-276 plastic scintillator, a commercial product of ELJEN technology acclaimed for its adept separation of gamma and fast neutron signals based on timing characteristics. Experimental data were acquired using Cf-252 and Co-60 radioisotope sources. A comprehensive comparative analysis between the traditional Qratio method and machine learning algorithms is conducted across varying energy thresholds (50keVee to 2000keVee). The primary objective is to rigorously evaluate and enhance neutron/gamma discrimination capabilities in the critical low-energy region.

Minioral

Yes

IEEE Member

Yes

Are you a student?

No

Author: Dr HONG HAI, Vo (University of Science, Vietnam National University-Ho Chi Minh City)

Co-authors: Dr THI KIEU TRANG, Hoang (University of Science - Vietnam National University-Hochiminh City); Mr MINH DANG, Nguyen (University of Science - Vietnam National University-Hochiminh City); Mr TRI TOAN PHUC, Nguyen (University of Science - Vietnam National University-Hochiminh City); Prof. MASAHARU, Nomachi (Osaka Univeristy); Dr LE HOANG SANG, Phan (University of Science - Vietnam National University-Hochiminh City); Prof. THI HONG LOAN, Truong (University of Science - Vietnam National University-Hochiminh City)

Presenter: Dr HONG HAI, Vo (University of Science, Vietnam National University-Ho Chi Minh City)

Session Classification: Poster A

Track Classification: AI, Machine Learning, Real Time Simulation, Intelligent Signal Processing