



Contribution ID: 68

Type: Oral Presentation

## #6-68 OMNISCINTI™: From quintuple discrimination scintillator to prototype detection head.

*Wednesday, June 11, 2025 2:40 PM (20 minutes)*

When facing unknown sources of radiation, first responders are often confronted to the problem of choosing an apparatus to evaluate the nature of the contamination. Multiple detection solutions exist but all are specialized or assume some kind of knowledge of the targeted radiation nature. From the past three years, we developed the Omniscinti™ technology to answer this challenge.

Omniscinti™ is a layered organic scintillator able to discriminate the five main types of radiation: alpha, beta, gamma, fast neutron and thermal neutron. Each layer is designed to enable simultaneous detection and separation of the five emitters' contributions using the Pulse Shape Discrimination (PSD) method. The Omniscinti™ technology is a combination of several developments from our team expertise,

- 6Li doping in plastic scintillator for thermal neutron detection
- High concentration of fluorophore for fast neutron / gamma discrimination
- Phoswich geometry for alpha and beta difference in penetration
- Tunable decay time of plastic scintillator for better phoswich PSD

Previous presentation reported optimizations and performances of each layer in ideal benchtop situation. We present here our latest advances in integration and design towards a fully functional detection head.

We discuss the influence and optimization of alpha and beta detection of our system with different aluminized Mylar® layers to ensure optical isolation. After optimization a fully functional detection head is fabricated keeping in mind the final application constraints. Its performances in quintuple discrimination are tested indoor and the results show comparable alpha's and beta's efficiency to commercial detectors. Gamma and neutron energy calibration is underway and will be discussed. We will also present our strategy to implement this detection head in a fully functional prototype with dedicated electronics, HMI and power supply.

This crucial final design step is also the opportunity to probe the larger community about this technology outside of the envisioned first responder application.

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**Session Classification:** #06 - Nuclear Safeguards, Homeland Security and CBRN

**Track Classification:** 06 Nuclear Safeguards, Homeland Security and CBRN