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The Medium-Centrifugally Tensioned Metastable Fluid Detector Table-Top Prototype Design, Construction and Qualification

A flexible, low-cost, multi-armed fluid detector system offers high-sensitivity, gamma-blind detection for neutrons and alpha recoil in special nuclear materials.

Nuclear particle detectors are very important in the field of national security and are used for detecting, tracking, and identifying high-energy particles. Current detectors for particles of interest, such as neutrons, use interaction events to create a charge that can be amplified as an electrical pulse for signal processing. The use of an electrical pulse makes these detectors sensitive to gamma interference that can cause misrepresentation of neutron events and limit active interrogation techniques.

Researchers at Purdue University have developed a table top prototype of a previously designed multi-armed, centrifugally tensioned, metastable fluid detector system (MAC-TMFD) that avoids many of the drawbacks associated with conventional particle detectors. The MAC-TMFD uses an induced negative pressure to put fluid in a metastable state that reacts when exposed to sufficient energy deposed by nuclear particles. Because the system does not rely on electrical signaling, the MAC-TMFD can be used for neutron source discrimination and alpha recoil detection of special nuclear materials while remaining blind to gamma interference. The MAC-TMFD also maintains a high sensitivity to radiation through the use of multiple arms that are capable of independent detection. This technology's flexibility, inherent gamma-blind nature, and low cost, make the MAC-TMFD design ideal for nuclear particle detection and rival current detectors.

Advantages:

-Gamma-blinf detection of neutrons and alpha recoil

-High detection sensitivity

Technology ID

2014-TALE-66651

Category

Aerospace & Defense/Defense Electronics & Surveillance Technologies

Biotechnology & Life Sciences/Analytical & Diagnostic Instrumentation

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-Flexible and low cost application

TRL: 5

Intellectual Property:

Provisional-Patent, 2014-08-28, United States | PCT-Patent, 2015-08-28, WO | NATL-Patent, 2017-02-28, United States | NATL-Patent, 2017-02-28, Japan

Keywords: Nuclear particle detectors, multi-armed, centrifugally tensioned, metastable fluid detector, MAC-TMFD, gamma-blind detection, neutron detection, alpha recoil detection, special nuclear materials, high detection sensitivity, Analytics, Chemical Engineering, Sensors