

# Nuclear terrorism could be intercepted by neutron-gamma detector that pinpoints source

May 19 2021

---



Researchers, from left, Jana Petrovic, Bo Cederwall and Alf Gök test the new imaging technology on a mock-up of radioactive waste drum scanner. Credit: Biswarup Das

Scanning technology aimed at detecting small amounts of nuclear

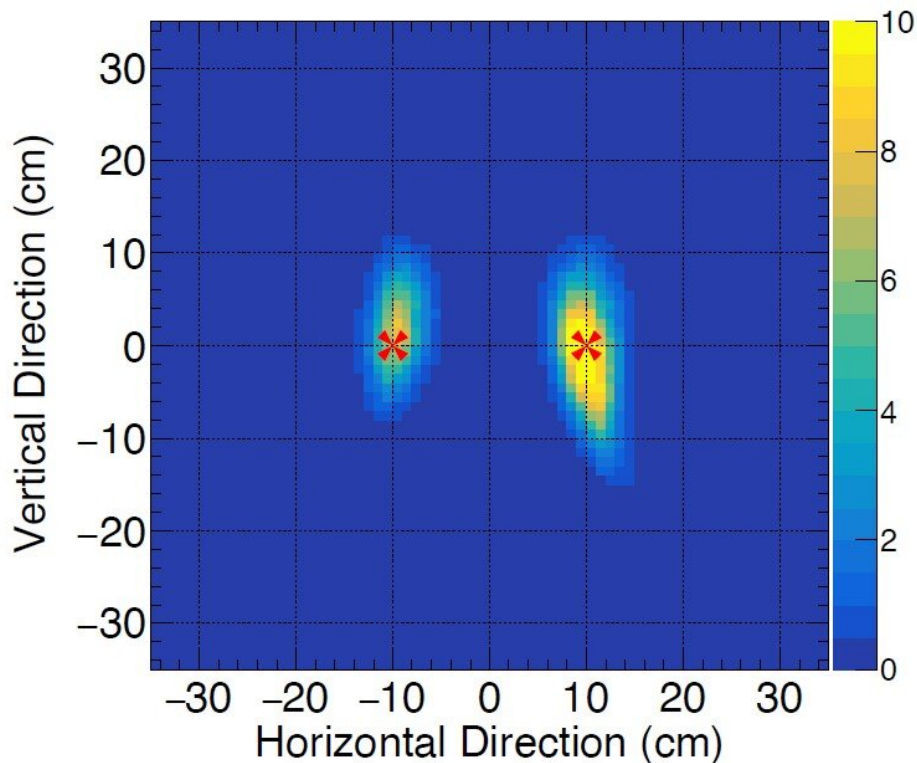
materials was unveiled by scientists in Sweden today, with the hope of preventing acts of nuclear terrorism.

Bo Cederwall, a professor of physics at KTH Royal Institute of Technology, says the technology can be used in airports and seaports for routine inspection of passengers and goods. The research is published and featured in the journals *Science Advances* and *Science*, respectively.

A form of tomography, the system enables quick 3D imaging of the source of neutron and [gamma ray emissions](#) from weapons-grade [plutonium](#) and other special nuclear materials, Cederwall says.

The so-called Neutron-Gamma Emission Tomography (NGET) system goes beyond the capabilities of existing radiation portal monitors, by measuring the time and energy correlations between particles emitted in [nuclear fission](#), and using machine learning algorithms to visualize where they're coming from. The system looks for coincidences of neutron and gamma ray emissions—which when mapped together in real-time allow pinpointing their origin.

"The technology has a very [high sensitivity](#) and can within a few seconds detect gram-amounts of plutonium depending on the application and the plutonium isotope composition," Cederwall says. "It takes a little longer to get a really good picture so you can see exactly where the plutonium is. However, this can be done completely automatically."



A 3D representation of how two sources of radiation of different strengths would appear when imaged at the same time. Credit: Bo Cederwall

But NGET isn't only for [nuclear weapons](#) and radiation-dispersing "dirty bombs"—it can be used to detect environmental radiation too, such as leaks from nuclear facilities or even natural sources. Cederwall says the research group is looking into equipping drones with the NGET system for this purpose.

"In case of a radiological emergency, It is extremely important to be able to quickly map the [radioactive contamination](#) in the environment in order to protect the population in the best possible way," he says.

**More information:** Jana Petrović et al, Rapid imaging of special nuclear materials for nuclear nonproliferation and terrorism prevention, *Science Advances* (2021). [DOI: 10.1126/sciadv.abg3032](https://doi.org/10.1126/sciadv.abg3032)

Provided by KTH Royal Institute of Technology

Citation: Nuclear terrorism could be intercepted by neutron-gamma detector that pinpoints source (2021, May 19) retrieved 23 April 2024 from <https://phys.org/news/2021-05-nuclear-terrorism-intercepted-neutron-gamma-detector.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.