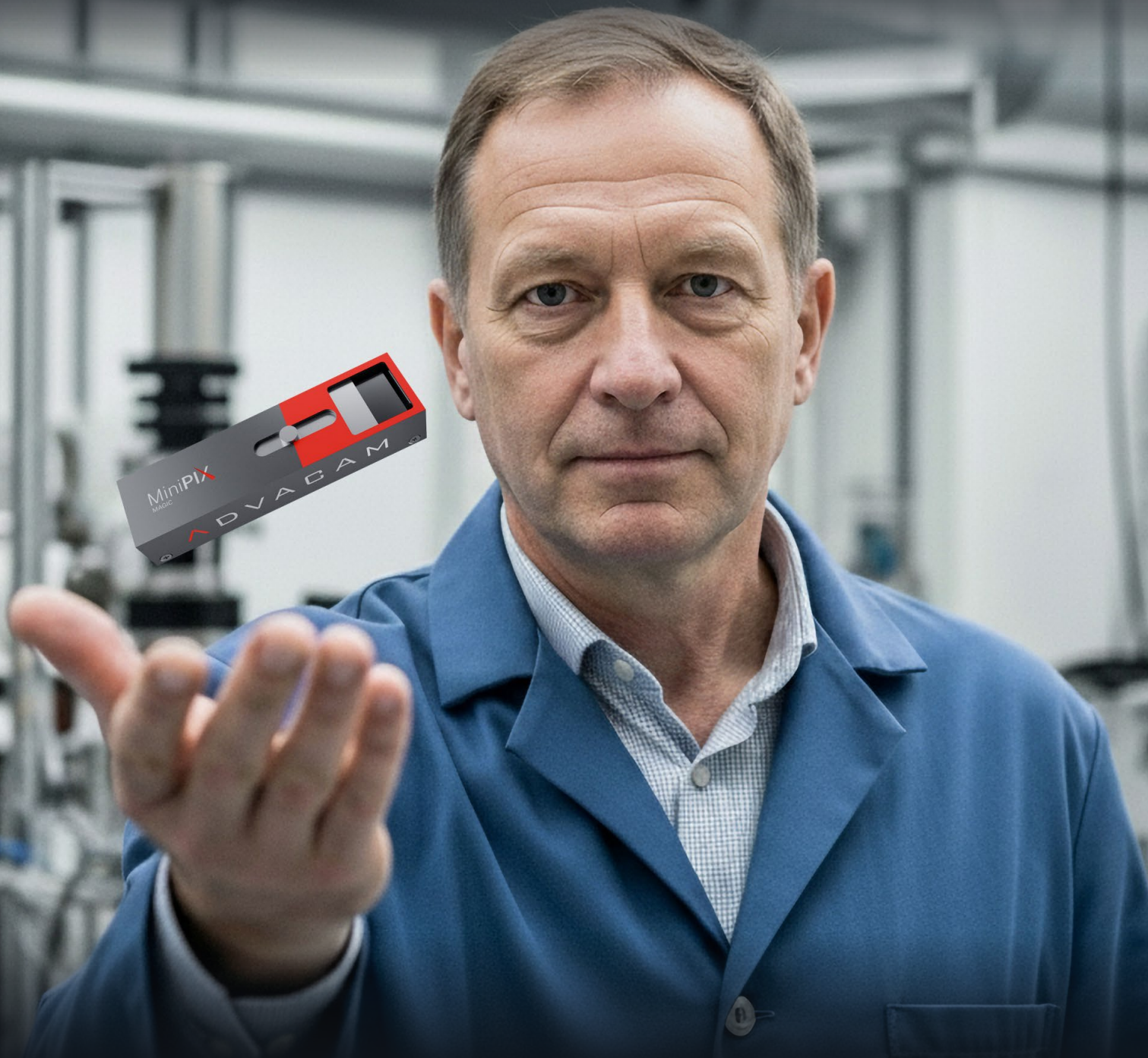


NUCLEAR

ADVACAM
Imaging the Unseen

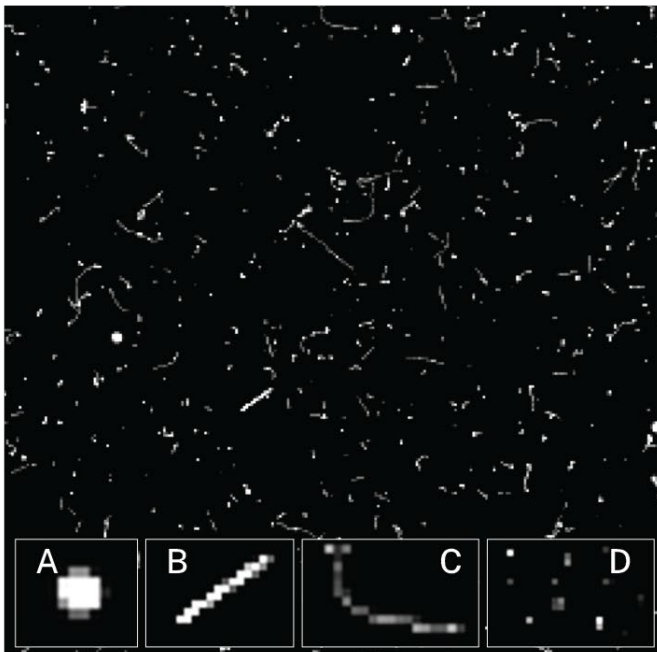


EVERY PARTICLE COUNTS

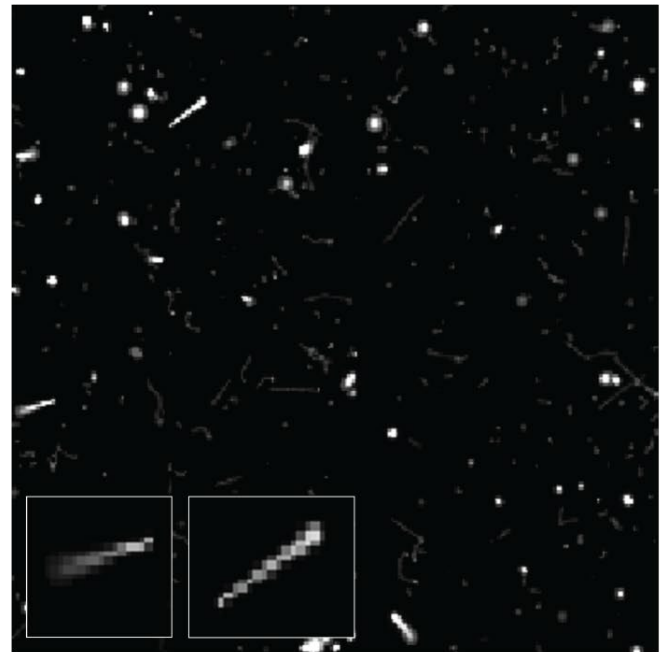
Source localization, radiation field monitoring and contamination detection in a portable photon counting package.

RADIATION FIELD RECOGNITION

ACTIVE NUCLEAR EMULSION



Radiation background

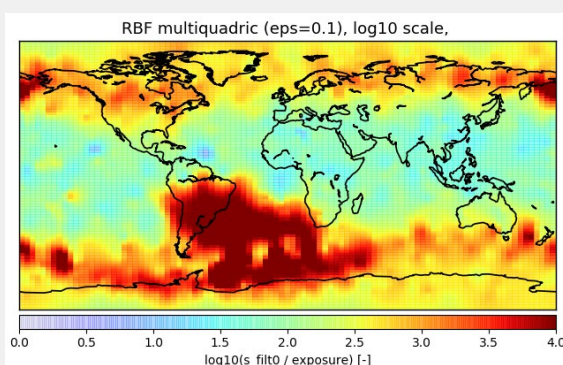
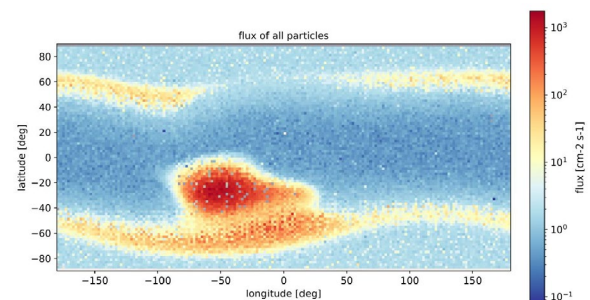


Protons recoiled by fast neutrons

Particles can be identified from shape of their tracks as in formerly used nuclear emulsions

SPATIAL MAPS

Based on a detailed analysis of the radiation field, it is possible to construct spatial maps of the distribution of individual particle types. This approach not only enables the characterization of mixed radiation fields but also allows the identification and precise localization of areas with increased radiation.



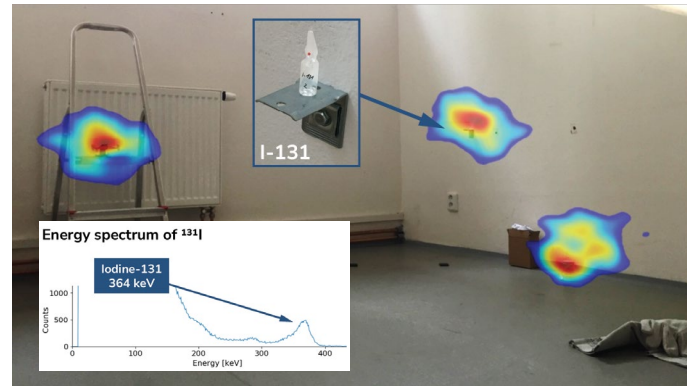
RADIATION MAP MEASURED ON BOARD OF VZLUSAT2

The main task of the Czech technological nanosatellite VZLUSAT-2 developed by VZLU AEROSPACE is to verify technologies for later missions of the planned Czech satellite constellation. VZLUSAT-2 is the only Czech satellite capable of taking high-resolution images of Earth.

LOCATING RADIOACTIVE SOURCES

COMPTON CAMERA BASED LOCALIZATION

We successfully located three iodine 131 sources in a room. The use of a Compton camera bypasses the need for heavy collimators. This significantly increases detection efficiency while reducing the weight and dimensions of the entire device.



Reconstruction of position of three ^{131}I gamma sources (364 keV)



Done in collaboration with CEA

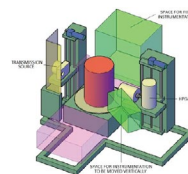


GAMMA CAMERA BASED LOCALIZATION

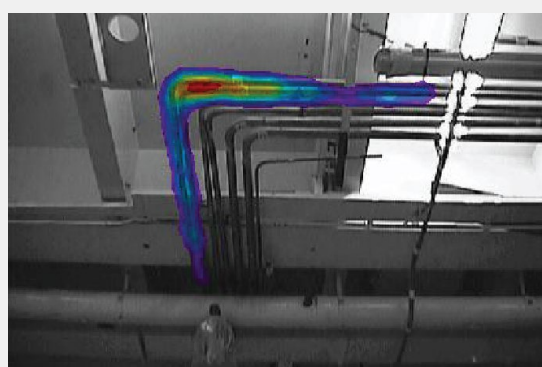
MiniPIX MAGIC is a spectrally sensitive detector which, in combination with a coded aperture, enables accurate localization of radioactive sources. This design results in a simple, lightweight, and compact tool suitable for practical use in the field and in the laboratory.

WASTE MANAGEMENT

Compton cameras and coded aperture detectors provide the tools to reliably locate and visualize the distribution of radioactivity. Combining these methods provides a compact, portable, and highly effective system for monitoring and characterizing radioactive waste.



This project has received funding from the Euratom research and training programme 2014–2018 under grant agreement No 847641



CONTAMINATION OF PIPES

These systems can be used not only to reliably locate radiation sources and display their spatial distribution, but also to detect contamination. This includes the detection and mapping of contamination in piping systems.

“COMPACT”

MiniPIX MAGIC

Speed Parameters:	2.35 Million hits/s
Pixel Pitch:	55 μm
Number of Pixels:	65 536
Readout Chip:	Timepix3
Dimensions:	80 x 21 x 14 mm
Weight:	40 g



Miniaturized and low-power

The small and portable Timepix3 detector can recognize radiation fields by identifying particle tracks. Photons form small clusters, electrons curved tracks, protons short dense lines, heavy ions thick straight tracks, and neutrons appear indirectly via converters. By analyzing track shape and energy, Timepix3 maps particle types and energies in real time, offering more detail than standard dosimeters. Machine learning further improves classification in complex radiation environments.

Spectral visualization tracks in sensor plane for each class

