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## **3 $\gamma$ Imaging with $^{44}\text{Sc}$ : Advances in the XEMIS2 Liquid Xenon Compton Telescope and High-Flux Photodetector Validation**

The new 3 $\gamma$  imaging technique, based on the use of the radionuclide  $^{44}\text{Sc}$ , enables the direct three-dimensional reconstruction of a radioactive source from the simultaneous detection of three gamma photons. This approach has the potential to reduce both acquisition time and injected activity compared to conventional nuclear imaging methods. To investigate this concept, a liquid xenon Compton telescope named XEMIS2 is currently under development. The assembly and calibration of the detector are nearing completion, and dedicated data analysis tools are being designed to process raw signals into reconstructed images. A high-flux calibration test campaign has been conducted, successfully validating the stability of the photomultiplier-based detection chain under extreme counting rates. These ongoing developments, that i will show at the “bi-national conference on Detectors R&D”, represent a key step toward the experimental validation of 3 $\gamma$  imaging and its future application in preclinical medical imaging.

### **Title**

### **Topic**

Photosensors

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