Advapix TPX3 detector with Realsense L515 Lidar Camera for Localization and Characterization of Hotspots.

Mattias Simons[1,*], David De Schepper[2,3], Lowie Brabants[1], Eric Demeester[2,3] and Wouter Schroeyers[1]

1. Hasselt University, CMK, NuTeC, Nuclear Technology – Faculty of Engineering Technology, Agoralaan Building H, B-3590 Diepenbeek, Belgium
2. KU Leuven, Faculty of Engineering Technology, Department of Mechanical Engineering, Campus Diepenbeek, ACRO Research Group, Wetenschapspark 27, 3590 Diepenbeek, Belgium
3. Core Lab ROB, Flanders Make @ KU Leuven, Belgium

* Corresponding author, mattias.simons@uhasselt.be

Introduction

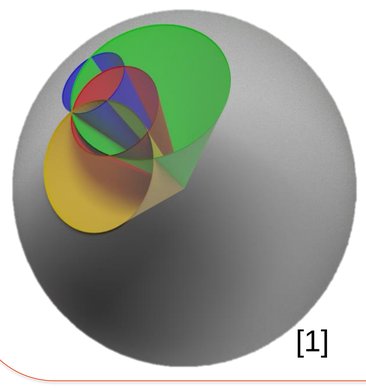
In nuclear decommissioning projects, localising and characterising hotspots is critical to prevent risks. Compared to classical measurement devices, a Compton camera can extract **directional information** about the hotspot, eliminating the need for repeated measurements. An advacam tpx3 camera with 1000 µm CdTe was used as a **single-layer Compton camera,** and a Realsense L515 lidar camera was added to this setup. The **lidar point cloud** was **superimposed** with the Compton camera to visualise the radioactive sources in 3D and measure the source-to-detector distance. Activities were estimated using this source-to-detector distance.

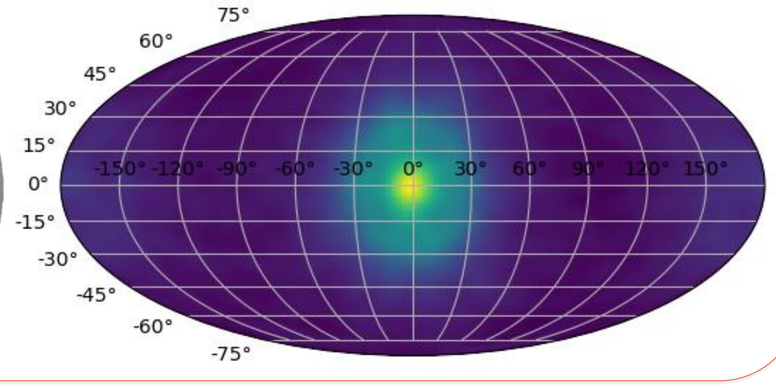
Materials and Methods

Single-layer Compton camera

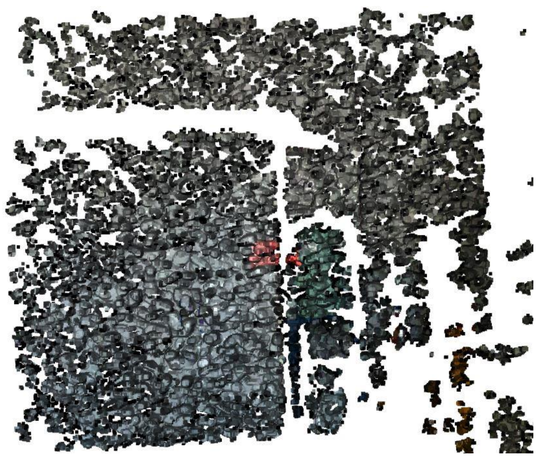
Realsense L515 lidar camera

Back projection in spherical coordinates


[1]



Superposition and alignment point cloud



Results

Activity estimated
-> ±30% error
Activity
-> 14 MBq
Distance
-> 3,95m
Positional error
-> ±10 cm
Measurement time
-> 5 hours

Conclusions

This method has several advantages

- **improved visualisation with the lidar camera.**
- **a 360-degree measurement of the room possible**
- **Improved activity estimation.**

Further research will optimise measurement times and measurement parameters to increase sensitivity of the setup.

[1] Anouk Michiels, Position determination of a gamma ray point source using a single layer Compton Camera, M.S. thesis, FIIC, Uhasselt, Diepenbeek, 2023

This work was supported by the fund for Scientific Research Flanders [Fonds Wetenschappelijk onderzoek (FWO)] scholarship nr 1SA2621N hosted by Hasselt University

mattias.simons@uhasselt.be