Internship M2

Enhancing localisation of radiation source with machine learning techniques and a novel directional spectrometer

Groupe GrAMM, LPC Caen - UMR 6534, ENSICAEN, Université de Caen

The task of mapping accurately radiation fields is central to many activities at nuclear facilities or at healthcare settings where personal dose needs to be accurately monitored. In environments where the radiation fields are unknown or needs monitoring, mapping 3D fields helps with planning and protecting people from hazardous level of radiations.
In all these settings, mapping the radiation fields is a time consuming task and done with detectors that mostly record counting rates.

Taking advantage of a multimode detector system called nFacet 3D which provides directional and spectrometric information, a more rapid localisation of the source and dose mapping can be implemented.

We propose a research project to improve on the current performance of the nfacet system to localise, identify and infer the dose from gamma-ray and neutron radioactive sources using deep learning algorithms. You will automate and run Monte Carlo simulation, use deep learning-based techniques with the goal to reconstruct the corresponding quantities, estimate the dose equivalent from a variety of gamma-ray and neutron radiation sources.

You will be working in a dynamic group of two researchers and PhD students. You will have access to both real data and simulated one and you may be travelling to perform tests in the field. You should have a M2 level in subatomic physics or equivalent, should have knowledge in nuclear physics, particle physics and radiation-matter interactions. A good to very good level in software with some knowledge of Python ML libraries, sensing and imaging would be a very good start. You will have access to to modern GPUs for this project.

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