A Gaseous Compton Camera for Gamma Imaging

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Compton Cameras have been pointed as a possible Anger Camera competitor due to their enhanced sensitivity in imaging radioactive sources, primarily due to the absence of a mechanical collimator. This advantage holds the potential to, not only, improve the quality of nuclear medicine imaging and, simultaneously, to minimize patients' radiation exposure. Their configuration enables the detection of scattered photons and recoil electrons, as well as their energy determination, which allows the construction of a conic surface indicative of the primary photon's interaction site. By intersecting these conic surfaces, it becomes possible to pinpoint the most probable location of interaction. Within the DRIM group, a Compton Camera based on Gaseous Detectors is being developed [1]. The proposed Compton Camera concept has the potential to increase sensitivity when compared to other solutions due to the ability to detect scattered photons across a 4π solid angle using only one detector, unlike other designs that require two detectors. In this scope, a simulation study was conducted with a radioactive point source to evaluate the feasibility of the proposed solution. We will present the study results, particularly, the obtained images, that confirm the set-up viability.

[1] C. D. R. Azevedo *et al.*, "A Gaseous Compton Camera using a 2D-sensitive gaseous photomultiplier for Nuclear Medical Imaging," *Nuclear Instruments and Methods in Physics Research, Section A: Accelerators, Spectrometers, Detectors and Associated Equipment*, vol. 732, pp. 551–555, 2013, doi: 10.1016/j.nima.2013.05.116.

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