Monte Carlo Simulation of a Gamma Camera and Experimental Validation

M. C. Abreu, B. Tomé, N. Santos, P. Rato Mendes, S. Rodrigues

University of Algarve

Abstract - **The purpose of this work was the Monte Carlo simulation of the *Siemens E.Cam Dual Head* Gamma Camera and consequent experimental validation, with the aim to further study and to improve the current understanding concerning the operation of these systems, this way contributing to the development of detectors with better energy resolution, sensitivity, spatial resolution and linearity.**

The geometry and characteristics of this Gamma Camera, physics processes involved, and necessary radiation sources were implemented in GEANT4 code, to be as realistic as feasible.

In Gamma Camera simulation, some performance characteristics were studied, such as energy resolution, sensitivity, spatial resolution and linearity. Simulation results were experimentally validated through measurements with the Gamma Camera mentioned above, which was installed in the Nuclear Medicine service of the "Unidade de Intervenção Cardiovascular", located in the "Hospital Particular do Algarve". Simulation with phantoms was also done in order to simulate their images with the Gamma Camera. These images were subsequently compared with the experimental measurements performed with phantoms.

It is intended with this work to contribute for the improvement of Gamma Camera characteristics from both hardware and software in order to develop detectors with better image quality for medical imaging.