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Radionuclide therapy assessment with MACACO III+

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The IRIS group at IFIC (Valencia, Spain) continues the development of Compton cameras and their application to radionuclide therapy with successful results.

The previous prototype, MACACO III, was composed of three detector planes. Each plane features one LaBr3 crystal of size 25.8 mm x 25.8 mm x 5 mm, coupled to a SiPM array. The system was initially tested with phantoms filled with FDG and I-131, as well as thyroid cancer patients in collaboration with La Fe Hospital (Valencia). Following these tests, studies with alpha emitters were also conducted. In addition to Monte Carlo detailed simulations that indicated the potential for imaging Ac-225, this isotope was also successfully imaged experimentally in collaboration with the Léon Bérard hospital in Lyon.

However, these measurements evinced the lack of efficiency of MACACO III which has prompted the use of larger detector planes. MACACO III+ is a two-plane system in which the first plane is the same as in MACACO III and the second plane is composed of four such detectors. Simulations show the benefits of this improvement in the reconstructed images. MACACO III+ has been tested experimentally with Derenzo-like phantoms and also with mouse phantoms and live mice. Further tests are foreseen and another four-detector plane is under development.

Abstract

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