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A gamma-ray imaging camera for NORM radioactivity detection

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Gamma imaging is a technique based on the position reconstruction of gamma-ray radioactive sources. It is widely studied in the field of nuclear physics and has several applications in other fields, such as in medical physics and in oil well safety control. We built a prototype of a portable gamma camera for real-time and in-situ analysis based on the coded mask technique. The prototype consists of a 4x4 scintillator (CsI:Tl) matrix coupled with photomultiplier tubes (PMT), equipped with a CAEN digitizer V1725 readout system. The energy resolution of the detector was studied in detail using different radioactive sources, while its spatial reconstruction capability and detection sensitivity were investigated using a nuclear waste barrel. Experimental results are presented and compared with Monte Carlo simulations.

Primary author(s) : DI VENERE, Leonardo (INFN Bari); Dr. FANCHINI, Erica (CAEN s.p.a. - Viareggio, Italy); Prof. GIORDANO, Francesco (Università and INFN Bari); Dr. LOPARCO, Francesco; Dr. MORICHI, Massimo (CAEN s.p.a. Viareggio, Italy); Prof. SPINELLI, Paolo (Bari University and INFN); PANTALEO, Francesca Romano (INFN and Università degli studi di Bari); ALTOMARE, Corrado (INFN and University of Bari); Prof. SWIDERSKI, Lukasz (NCBJ Otwock-Swierk, Poland)

Presenter(s) : ALTOMARE, Corrado (INFN and University of Bari)

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