Contribution ID: **66**   Type: **Oral Presentation**

HERGA: a High Efficiency fast-Response GAmma detector

Wednesday, 4 May 2022 11:50 (20 minutes)

The detection of natural radio-nuclides is of interest in several applications, for example for monitoring in natural or man-affected environments or for the identification and tracing of illegal radioactive materials. We designed and tested a camera for gamma-ray imaging based on the coded mask technique, able to detect a gamma-ray radioactive source with mrad precision. A first prototype consisting of 16 CsI(Tl) scintillators arranged in a 4x4 matrix and coupled to photo-multiplier tubes (PMTs) with a digital readout. We used a 7×7 mask composed of transparent and opaque tiles to encode and decode a radioactive gamma-ray point source image through a reconstruction algorithm. An upgrade of this detector will employ Silicon Photomultipliers directly coupled to the CsI(Tl) crystals, making the camera more compact and portable. In this contribution we will present the detailed geometry and working principle of the detector, as well as its performance in terms of energy and spatial resolutions and of minimum detectable activity.

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Session Classification: Thematic Session 2: Emergency Preparedness

Track Classification: Thematic Session 2 - Emergency preparedness