

# The reSPECT project for a flexible and fast total body nuclear imaging diagnoses with high-Z organic scintillators

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In this contribution we present a new total body SPECT gamma detector concept that relies on a tungsten metal frame, that serves both as a collimator and as a container for the scintillator segments, organized in a grid geometry with holes of few millimeter (diameter). The active material is organic scintillators enriched with high-Z elements allowing to profit of the extremely fast scintillation process and a reduction in costs. The enriched scintillator produced for this reSPECT project have been loaded with Bismuth in concentration from 2 up to 10%. The results are promising in terms of light output and photon-interaction probability via photoelectric effect. A readout system that can properly integrate the short signals and handle high event rates is needed; we therefore considered a custom design tuned for fast scintillation events with an independent channel for each scintillator segment allowing for possible applications of SPECT in advanced theragnostic. Multiple FPGA-based modules will combine the readout channels and pre-process the data in real-time. Images from patients of Policlinico Umberto I Hospital have been exploited as starting point for a Montecarlo based reconstruction study with the aim of optimizing the detector geometry and of evaluate the achievable performances. In this contribution, the expected performances of a total body system will be presented together with the results obtained with the first prototypes.

## Field

Systems and applications

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