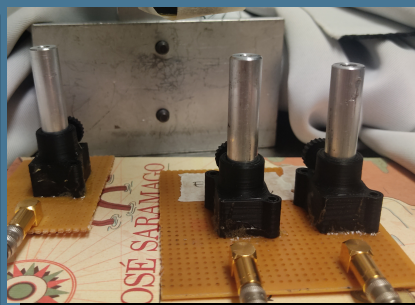
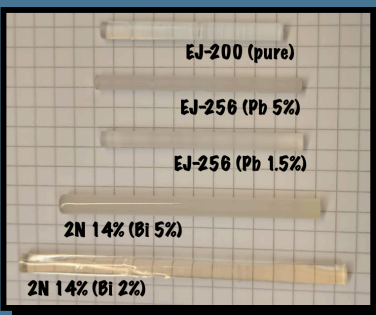


The reSPECT project for a flexible and fast total body nuclear imaging diagnoses with high-Z organic scintillators

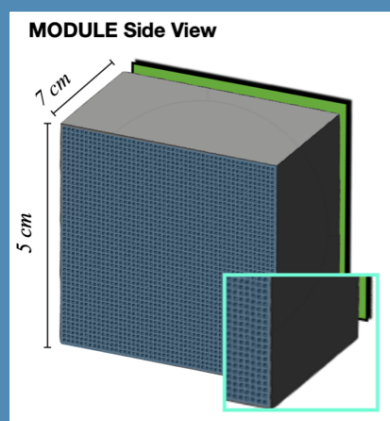
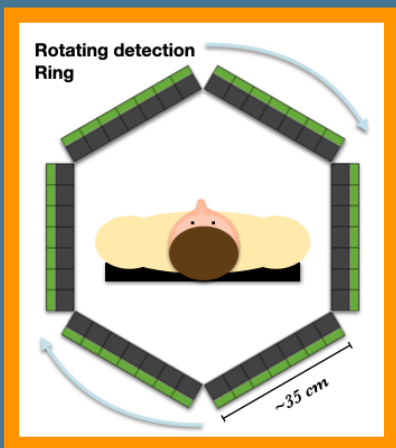
- ▶ Use plastic scintillators instead of inorganic crystals to profit from their fast signal, ease of manipulation and low cost.
- ▶ Plastic scintillators are not optimised for the detection of gamma rays via photoelectric effect.
- ▶ The idea is to enrich our organic scintillators with high-Z impurities (e.g. Bismuth or Cerium) [1]

[1] Mattiello L.; Patera V.; Belardini A.; Rocco D.; Marafini M.
Organic Scintillator. *Patent*
WO2023156957A1, 2023.



Sample	Measured #photoelectrons
EJ-256 (Pb 5%)	45 ± 10
EJ-256 (Pb 1.5%)	14 ± 1
2N 14% (Bi 5%)	42 ± 3
2N 14% (Bi 2%)	17 ± 2
2N 14% (Bi 1%)	21 ± 1

- ▶ We produced samples of high-Z organic scintillators polymerised in TEFLON in order to study the matching with this material
- ▶ Results show a very good collection efficiency and transparency



System performances

SPECT DETECTION SYSTEM	SENSITIVITY PER MODULE @140 keV	SYSTEM SPATIAL RESOLUTION (FWHM) @10 cm	DECAY TIME	RATE CAPABILITY	TOTAL COST	MRI COMPLIANCE	RADIOMETABOLIC DOSIMETRY COMPLIANCE
Anger Camera (NaI) FoV: 53 x 39 cm ²	170 cpm/μCi	7.4 mm	250 ns	0.25k-3k cps/cm ²	\$\$	✗	✗
CZT FoV: 39 x 51 cm ²	190 cpm/μCi	7.6 mm	350 ns	30k-700k cps/cm ²	\$\$\$	✓	✗
reSPECT 6 rotating blocks, FoV: 35 x 35 cm ²	184 cpm/μCi (energy cut @80 keV)	8.9* mm (2 mm pixels)	2-5 ns	50M-200M cps/cm ²	\$	✓	✓

*The spatial resolution can be improved by adjusting the geometrical parameters.