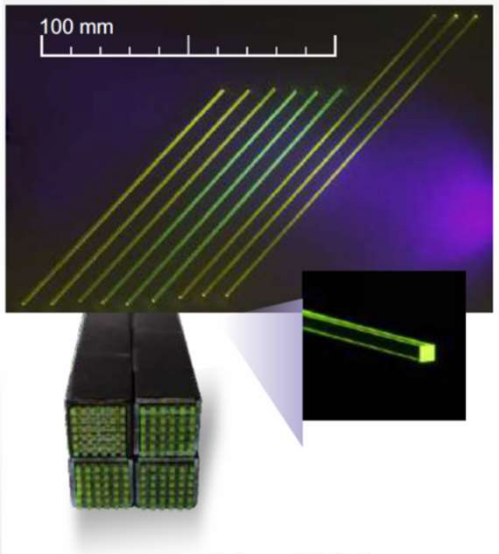
CCD + scintillator
screen fiber
optics connection

crytur

USA

Crytur scintillation detectors

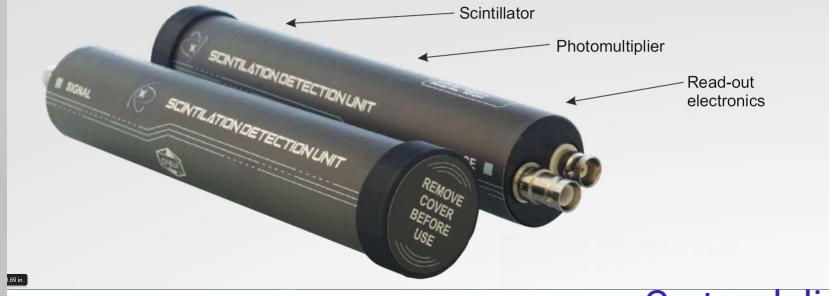
Combines many years of crystal growing detectors (CZ) and radiation detectors development (Crytur USA)



LuAG:Ce and YAG:Ce
array concept and design study
pixel: 1x1x100 mm
for highly segmented calorimeter

Scintillation detection units

Scintillation detectors manufactured in Crytur are produced as standardized and custom-based units modified to fit the specific application in which they are used - radiation monitoring, security or geological survey.



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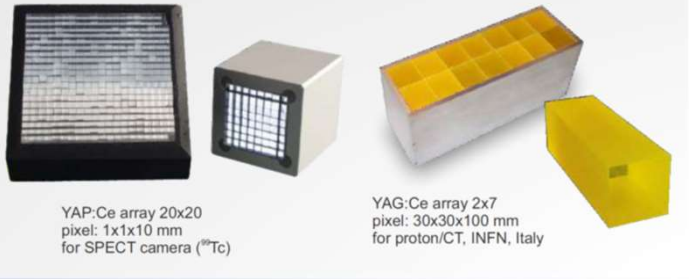


YAP:Ce array 20x20
pixel: 1x1x10 mm
for SPECT camera (^{99}Tc)

YAG:Ce array 2x7
pixel: 30x30x100 mm
for proton/CT, INFN, Italy

Crytur delivers scintillation detectors based on a combination of in-house grown crystal scintillators with PMTs and SiPMs and readout electronics

Competencies:

- Crystal development and production
- Scintillator arrays
- High precision machining
- Crystal-photodetectors coupling
- Crystal surface compensation for light collection optimization
- AR, reflective coatings
- Clean room assembly
- Comprehensive testing

Crytur PWO + SiPM detector

Concepts for discussion

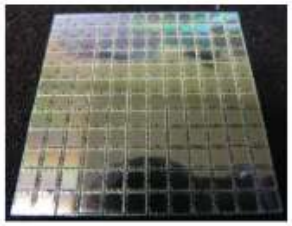
Goals

Develop an integrated scintillation detector taking full advantage of PWO crystals, SiPM's rich features set, and modern electronics/packaging techniques.

SiPM

We have seen a shift from classic PMT toward SiPM

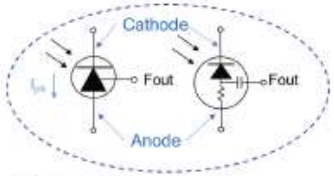
(ON semi brochure)



- Easier to use (Low voltage bias, gain is stable and easy to compensate).
- Compact, rugged, standard packaging, well known assembly techniques.
- Come in various size, pixels count and density.
  -> Rise/fall times can be selected to match crystal characteristics and application requirements.
- Fast channel (capacitively coupled) available (ON semi)

Packaging

- Considerably smaller window size provides opportunities for innovative packaging and architecture:
- Discrete and separable -> can be placed only "where it counts" with optimal filling.
- Arrays can be placed on multiple faces ("Origami" style packaging).
- Surfaces are not limited to planes.



Support Electronics

- Low power/size requirements allow each SiPM chip (or sub-group) to drive dedicated analog front end to maintain speed and accommodate variability.
  - All preamplifier signals can be separately routed (multiple acquisition channels) or added to a final summing node (single acquisition channel).
  - Dual sided (or rigid-flex) printed circuit boards allow co-locating SiPM and supporting analog electronic

Acquisition

- Final DAQ (trigger or triggerless) may not be needed right away (and for production / quality control)
- Triggered acquisition can be emulated with a high speed / high resolution digital oscilloscope (12 bit, 1Gsps +) with Data post processing.
- Crytur could supply more economical acquisition units but additional information would be needed to define the optimal DAQ solution.

Final Thoughts

- Excitation

Considering the complexity of the experiment and the high energy levels of the particules detected,
Would a portable battery powered optical exciter (LED or laser diode optically coupled to crystal/SiPM) be of any interest ?
This exciter could be also be wireless controlled and networkable.

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