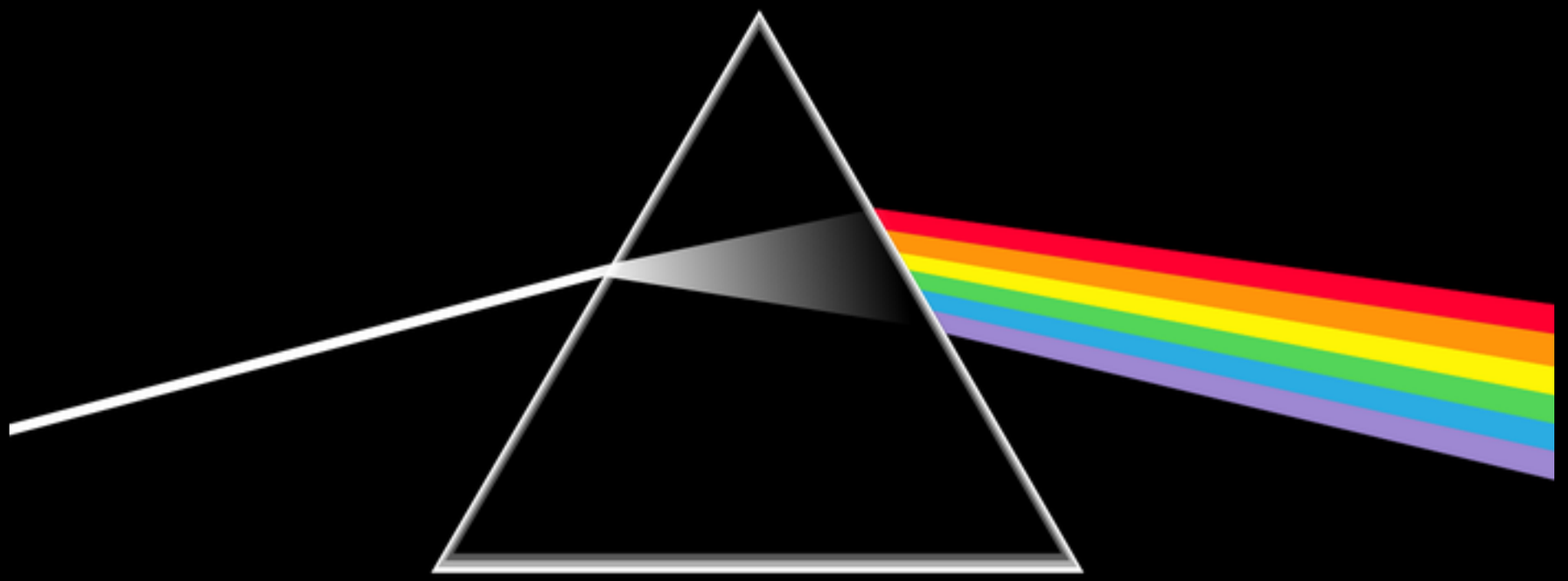
THE ~~DARK~~ *other* SIDE OF THE ARPG



AN UPDATE ON PROBE-LAND

2-5-19 - F. COLLAMATI

WHO ARE WE?

A WIDE, MULTI CENTRIC* COLLABORATION!

*Marconi 3rd floor,
Marconi 2nd floor,
Segrè Lab

WHO ARE WE?

- HONORARY PRESIDENT
- PR
- FOUND RISER
- SPOKE PERSON

- CEO
- MC DIVISION
- MEETING
- PLANNER

A WIDE, MULTI CENTRIC* COLLABORATION!

*Marconi 3rd floor, Marconi 2nd floor, Segrè Lab

- TECHNICAL COORDINATOR

+ Carlo
- SUBMITTER

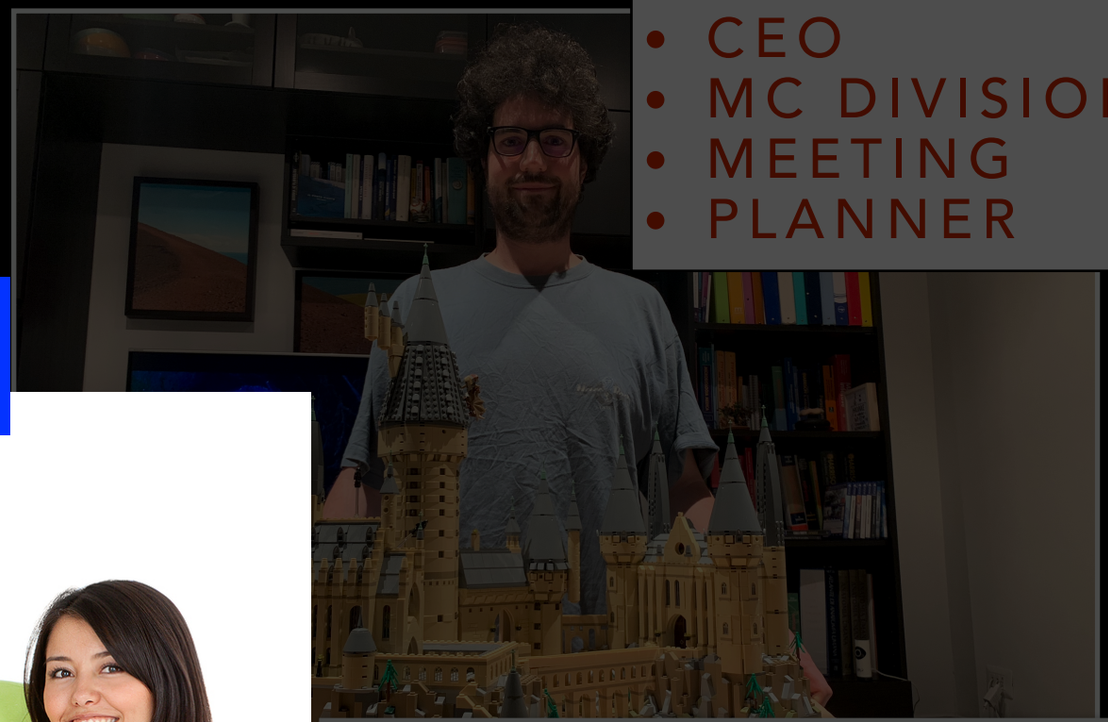
+ Elena
- EDITORIAL REVIEW BOARD

WHO ARE WE?

+ Lots of Students

- SPOKE PERSON

*Marconi 3rd floor, Marconi 2nd floor, Segrè Lab



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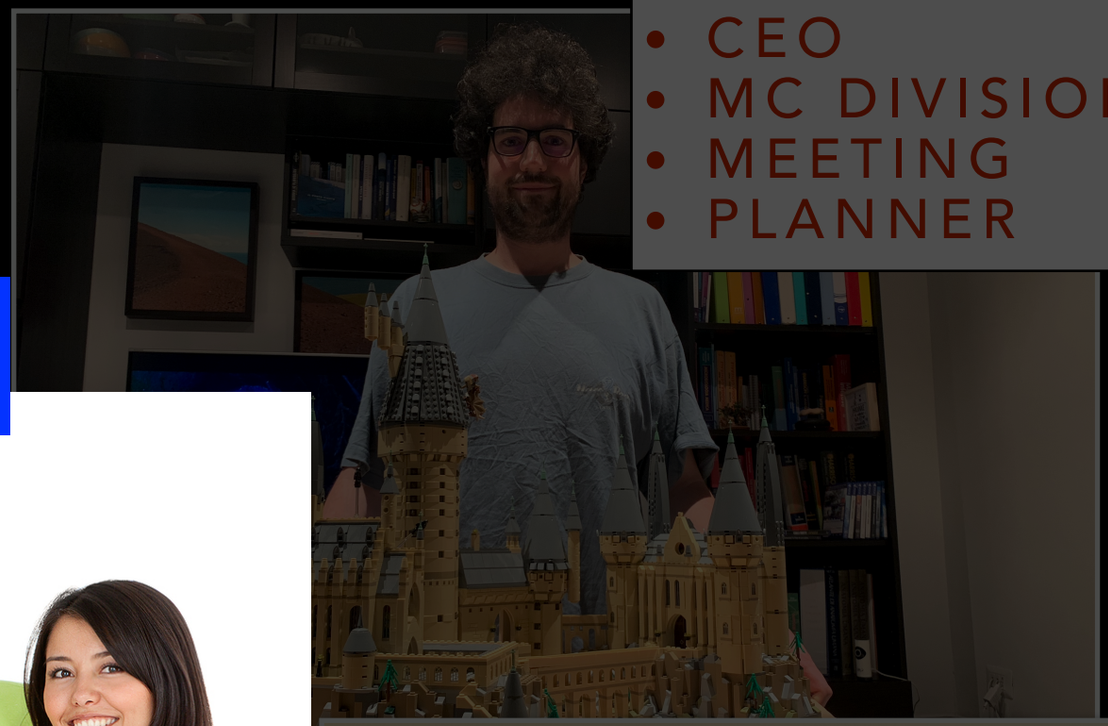


- TECHNICAL COORDINATOR

- SPOKE PERSON

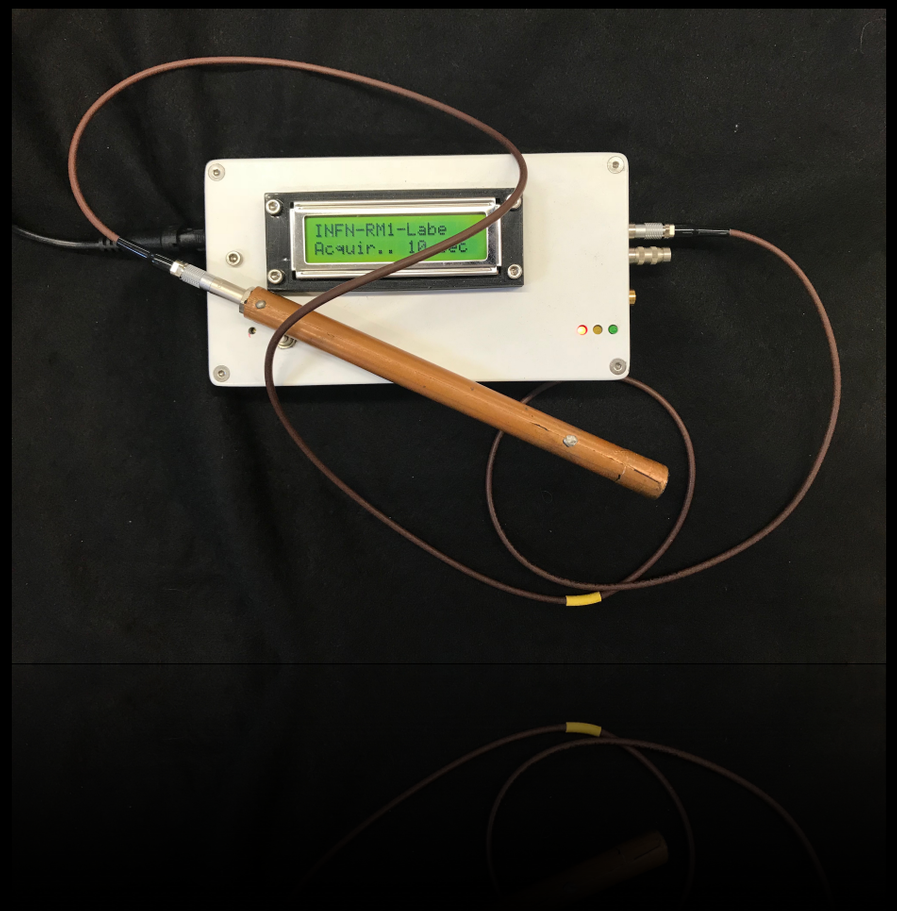
*Marconi
Marconi
Segre

Well, actually looking more like

+ Carlo • SUBMITTER

+ Elena • EDITORIAL REVIEW BOARD

You may have stopped following us here…

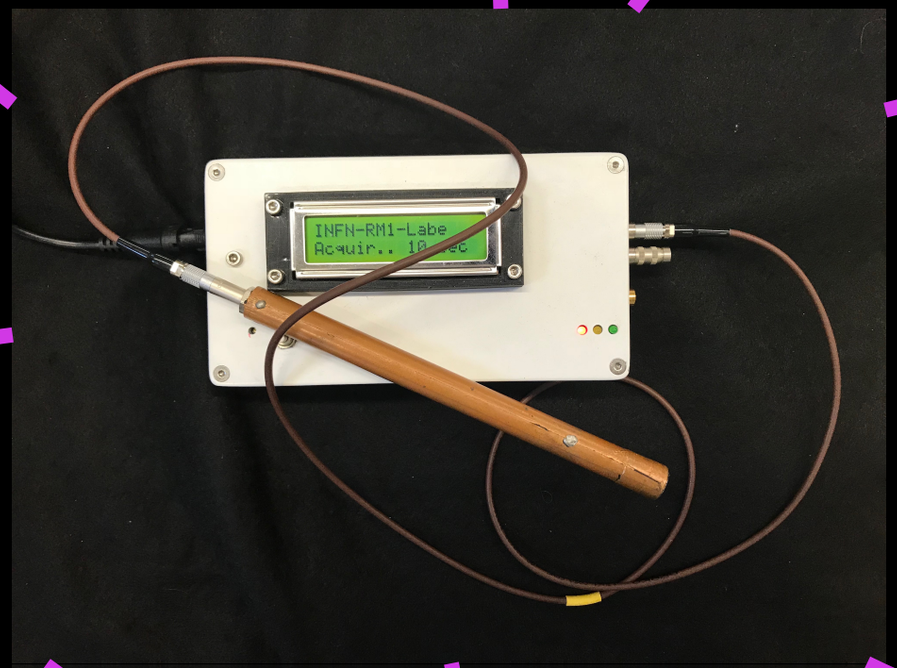


…but

CMOS

TOPI

EX-VIVO TESTS



LAPAROSCOPIC PROBE

UPGRADED PROBE

IN-VIVO TESTS

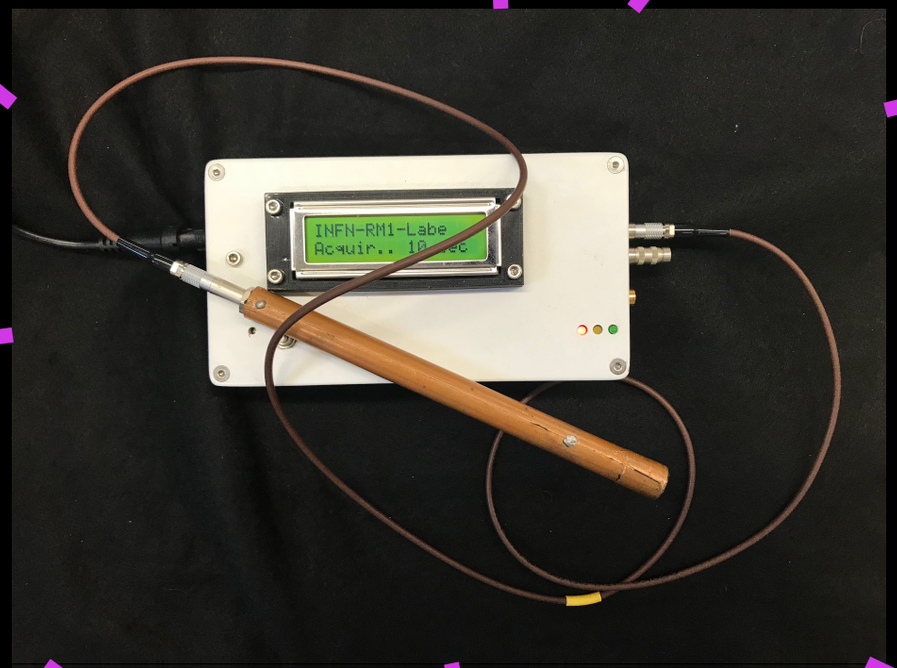
PUBLICATIONS

TALKS

TOPI

CMOS

EX-VIVO TESTS



LAPAROSCOPIC PROBE

UPGRADED PROBE

IN-VIVO TESTS

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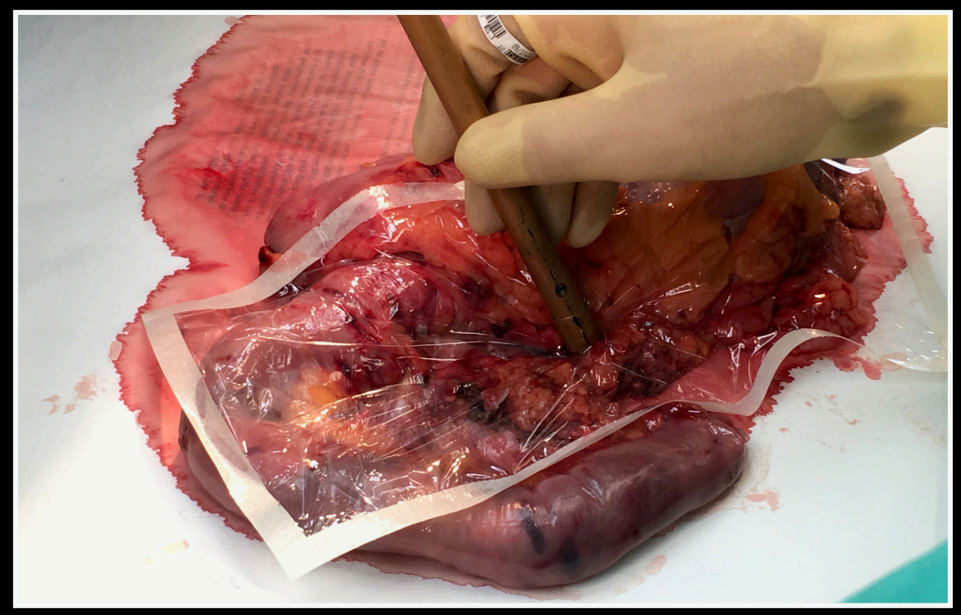
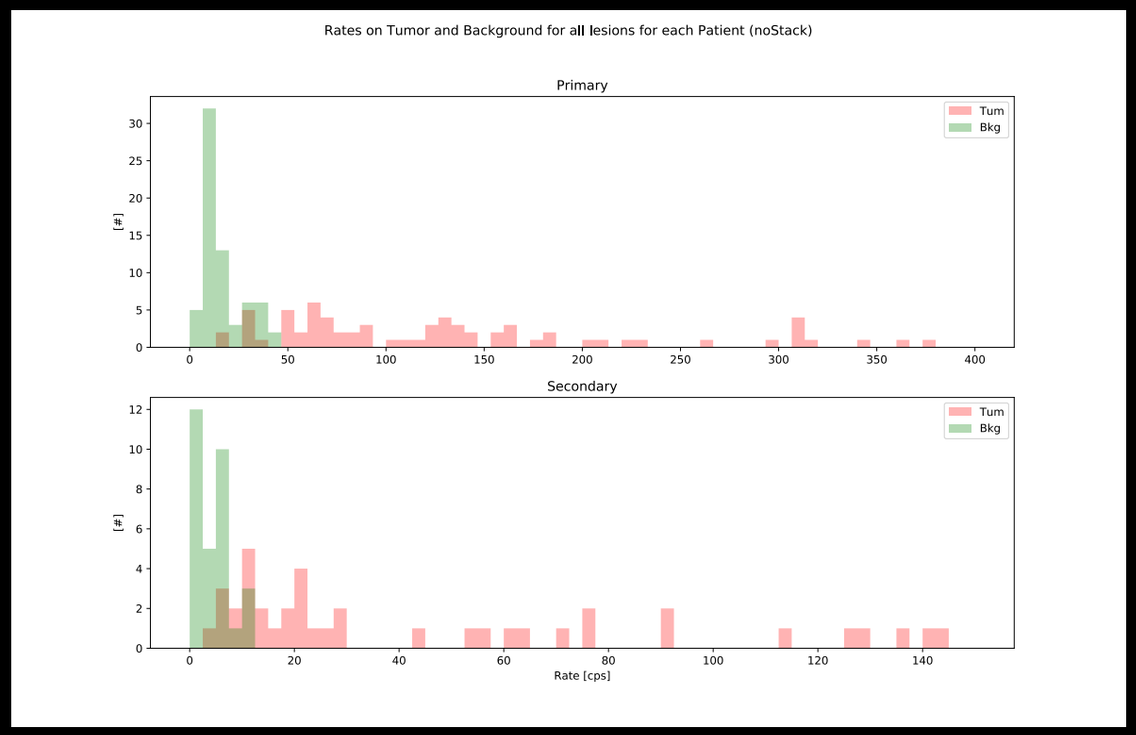
EX-VIVO TESTS: GEPNET

- We completed (nov-18) the 5th and last GEP-NET patient @IEO
- **Very useful tests**!
  First "w/ bkg benchmark"!
- Results:

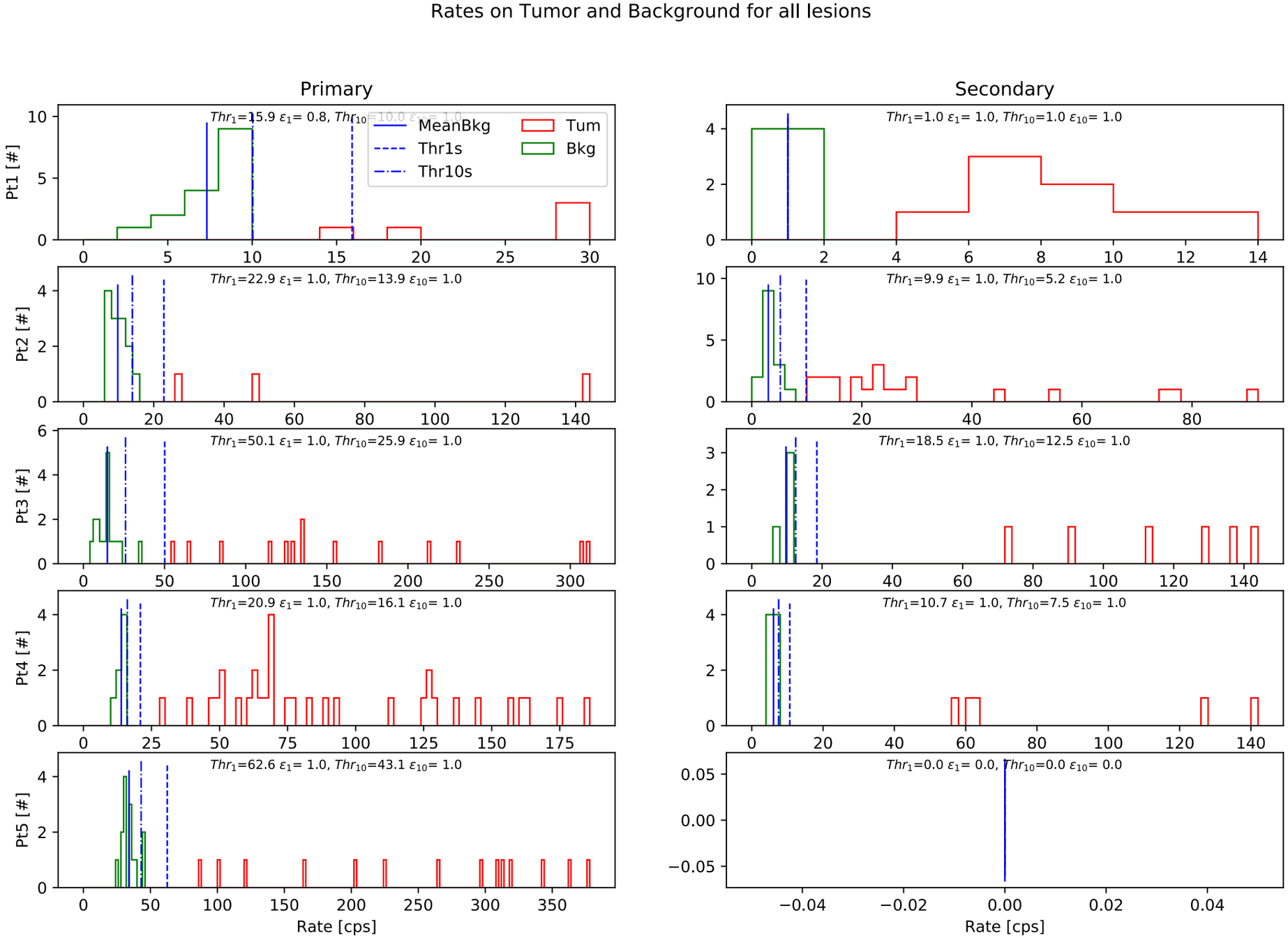




The good statistics (~100 lesions) allowed to define an algorithm to identify a patient-location-dependent **cutoff**

$$C_{Thr} = \mu_{Bkg} + 5 \times \sigma_{Bkg}$$

EX-VIVO TESTS: GEPNET



EX-VIVO TESTS: GEPNET

- Results are under publication.. in 2 different papers!

A "TECHNICAL" ONE

Characterisation of a β^- Detector for Radio Guided Surgery on ex-vivo Neuro Endocrine Tumors samples.

A "CLINICAL" ONE

Detecting small intestinal neuroendocrine tumors by using a new β- probe and ^{90}Y-DOTATOC: a pilot study.

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First quick elastic scattering on JINST, we will move to Physica Medica

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A "CLINICAL" ONE

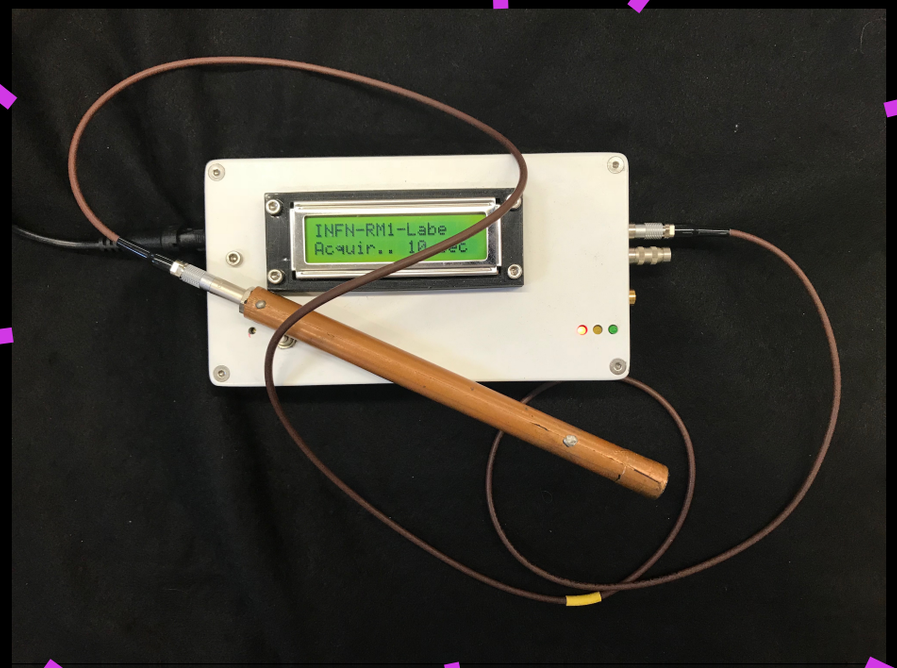
Detecting small intestinal neuroendocrine tumors by using a new β- probe and ^{90}Y-DOTATOC: a pilot study.

Unknown status, but please note that **we managed** to trigger enough interest **to make physicians actually write a paper on their own!!**

CMOS

TOPI

EX-VIVO TESTS



LAPAROSCOPIC PROBE

UPGRADED PROBE

IN-VIVO TESTS

PUBLICATIONS

TALKS

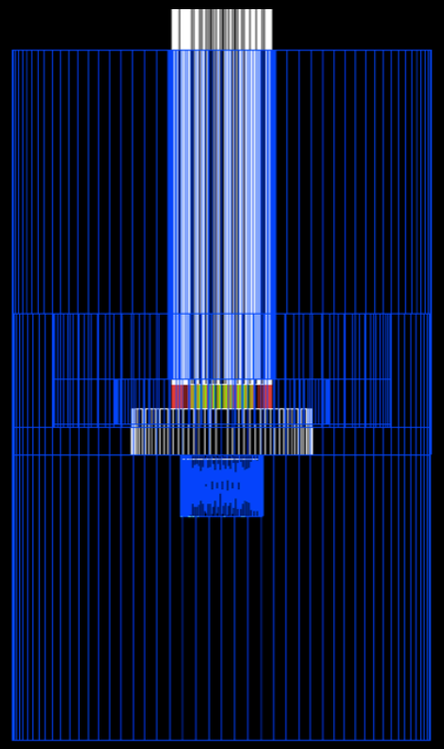
UPGRADED PROBE

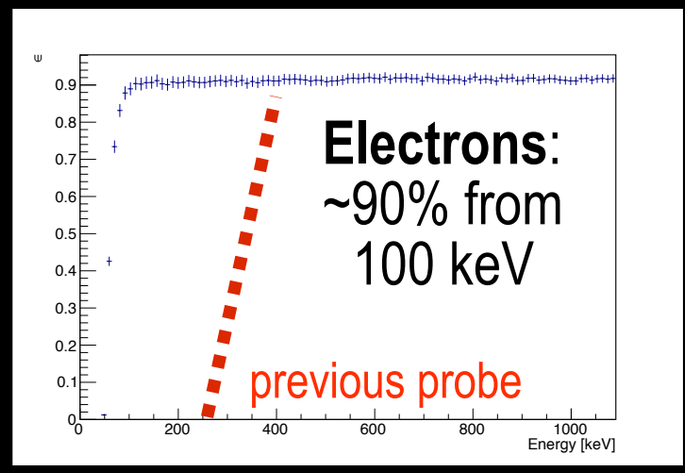
- A student's thesis investigated the performances of the probe in possible application with Ga68 (beta+)

The "same" PTER probe, but:
- x9 area SiPm
- Better coupling

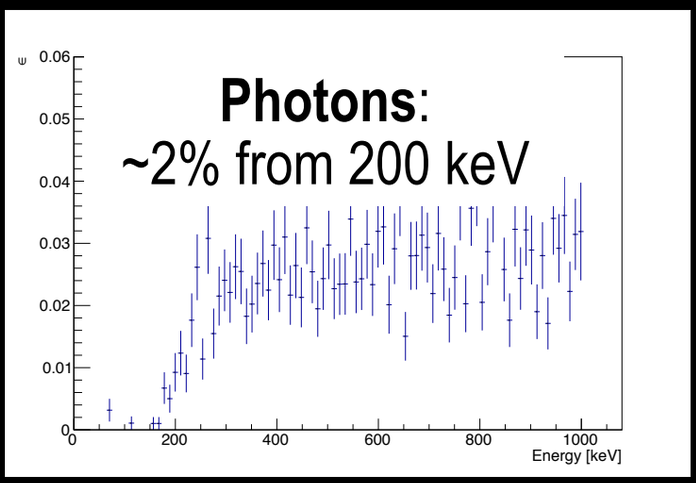
TESTS ON LIQUID SOURCE @GEMELLI

MONTE CARLO TUNING





EFFICIENCY CURVES

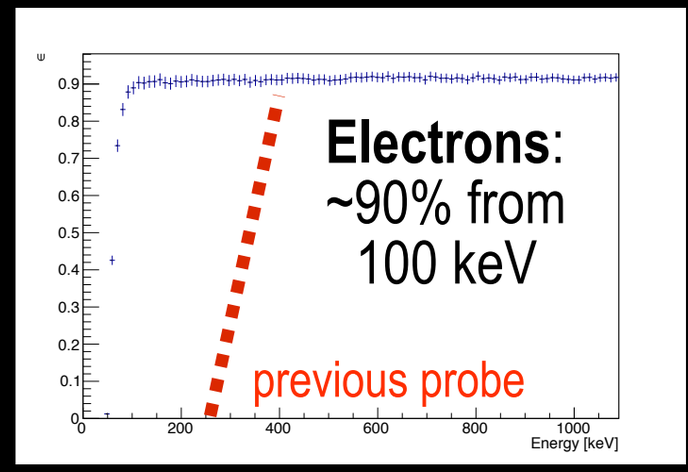


UPGRADED PROBE

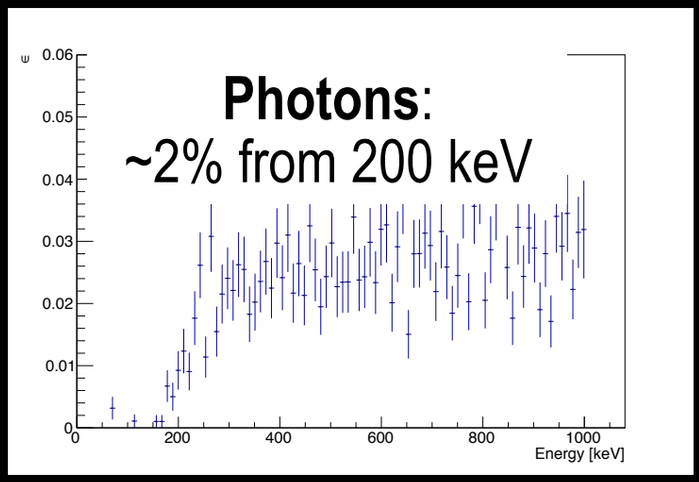
- A student's thesis investigated the performances of the probe in possible application with Ga68 (beta+)

Characterisation of a β detector on positron emitters for medical applications

F. Collamati[a], R. Moretti[*a,b], A. Cartoni[f], V. Bocci[a], A. Collarino[g], M. De Simoni[a,b], R. Faccini[a,b], M. Fischetti[a,c], A. Giordano[g,h], D. Maccora[g,h], C. Mancini-Terracciano[a], R. Mirabelli[a,b,d], E. Solfaroli-Camillocci[†a,b,e], T. Scotognella[g], G. Traini[a,b,d], S. Morganti[a]



EFFICIENCY CURVES



Ready for submission to Physica Medica

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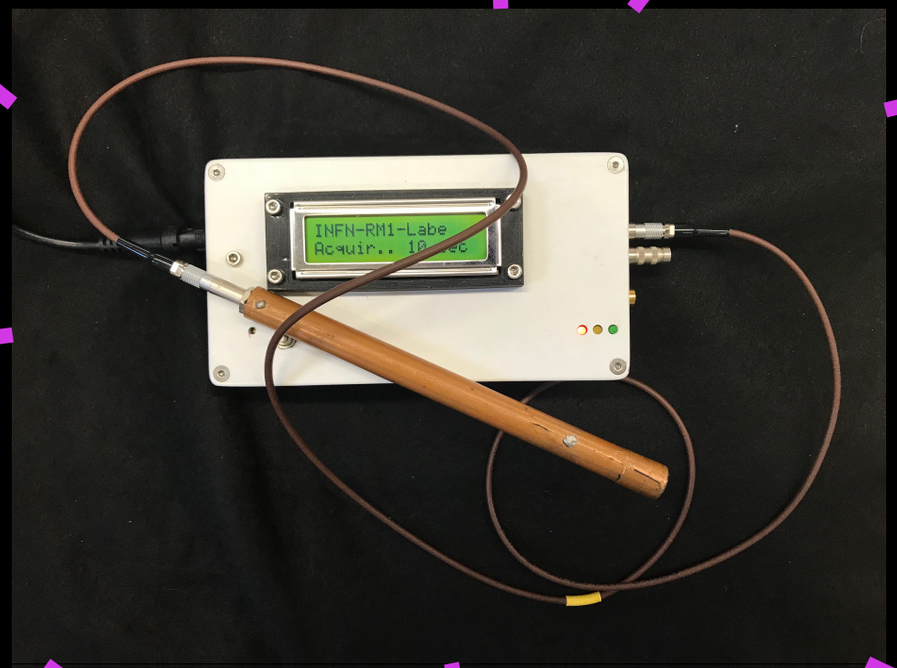
EX-VIVO TESTS



LAPAROSCOPIC PROBE

UPGRADED PROBE

IN-VIVO TESTS

PUBLICATIONS

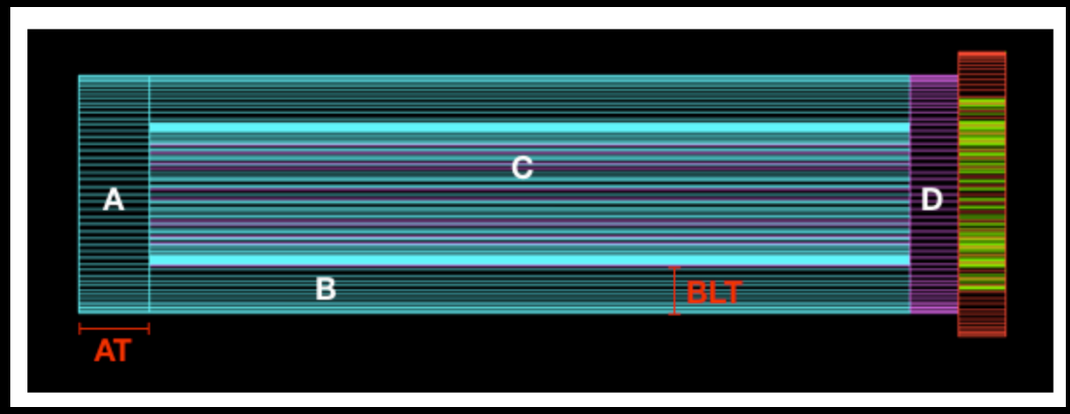
TALKS

LAPAROSCOPIC PROBE

- One year ago we started a collaboration with **Leiden** University (NL), which has the possibility (expertise + authorisations) to insert us in a similar trial to have “quickly” our probe inside an actual patient

LAPAROSCOPIC PROBE

- Besides Silvio "classical" implementation of a laparoscopic probe, we developed a simpler one fitting in the Leiden in-vivo "drop-in" case



LAPAROSCOPIC PROBE

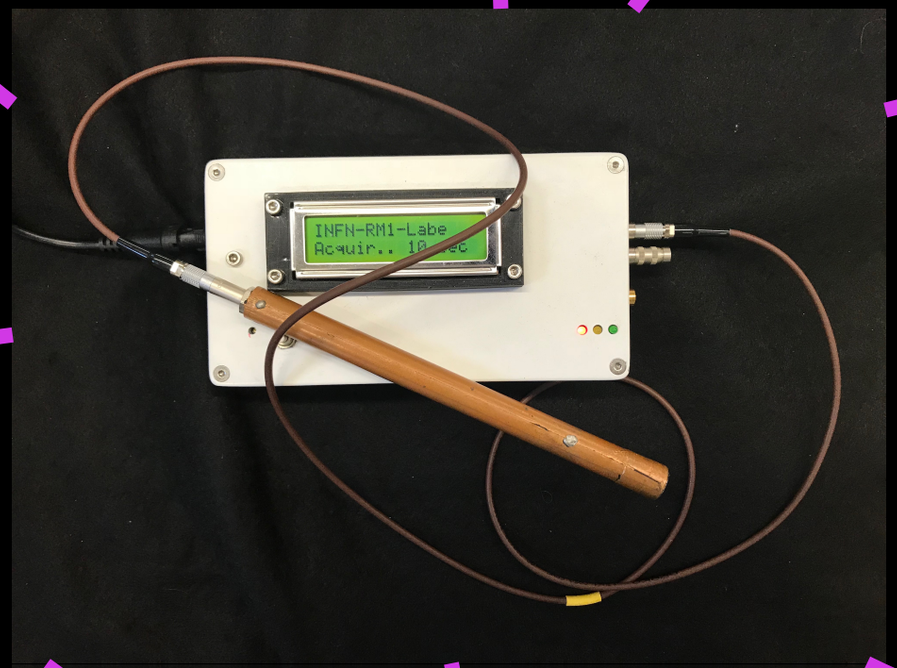
- Besides Silvio “classical” implementation of a laparoscopic probe, we developed a simpler one fitting in the Leiden in-vivo “drop-in” case

WITH THE “NL-PROBE”
WE ARE READY TO GO
FOR THE FIRST EX-VIVO TRIAL
(“NEXT WEEKS”)

TOPI

CMOS

EX-VIVO TESTS



LAPAROSCOPIC PROBE

UPGRADED PROBE

IN-VIVO TESTS

PUBLICATIONS

TALKS

IN-VIVO TESTS

- The success of the Netherland ex-vivo campaign should lead, together with the proceeding of the **certification procedure** ongoing with nucleomed, to first in vivo tests

- The reasonable time scale for this is:

IN-VIVO TESTS

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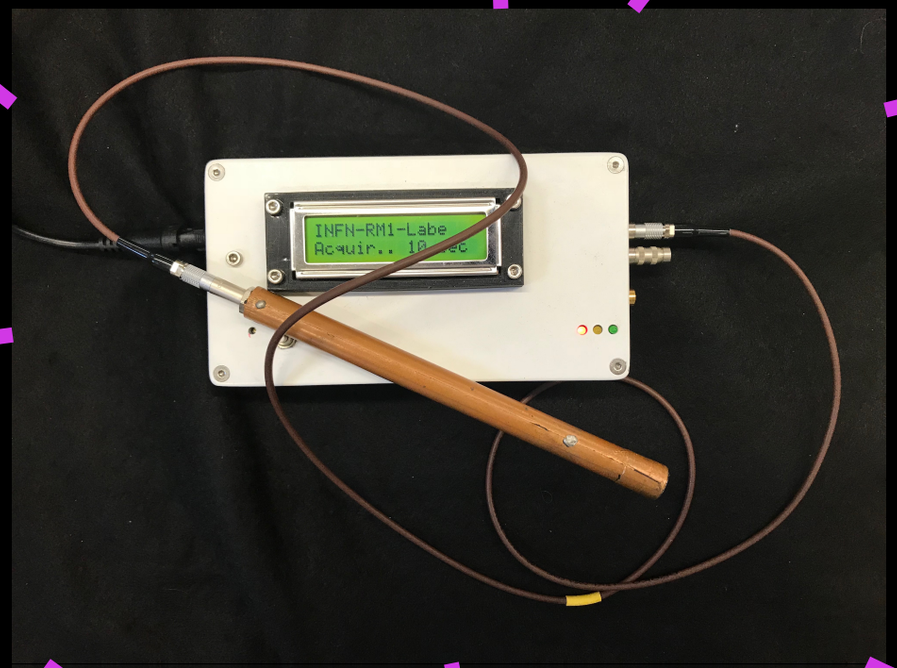
TOPI

CMOS

EX-VIVO TESTS



LAPAROSCOPIC PROBE

UPGRADED PROBE

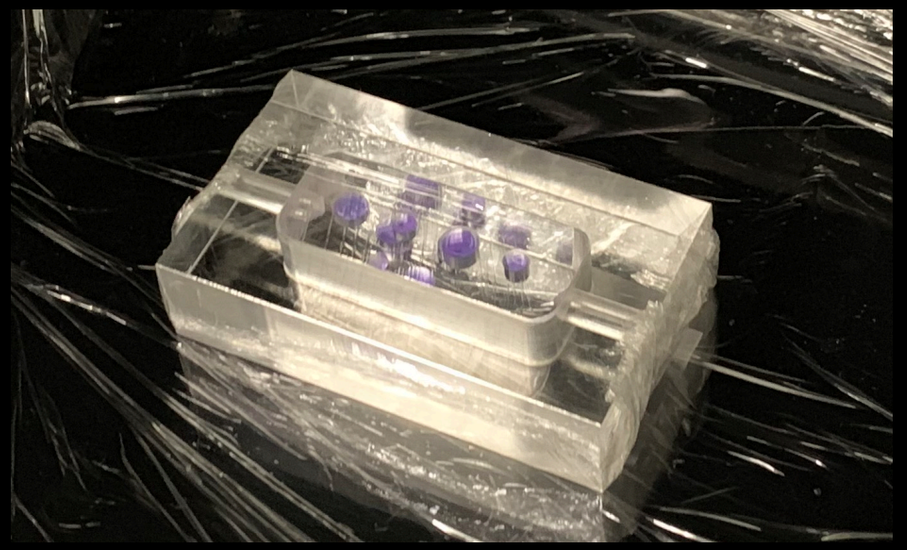
IN-VIVO TESTS

PUBLICATIONS

TALKS

TOPI

- Collaboration with Gemelli+Catania is ongoing to test new radiopharmaceutical on mice



~next months timescale

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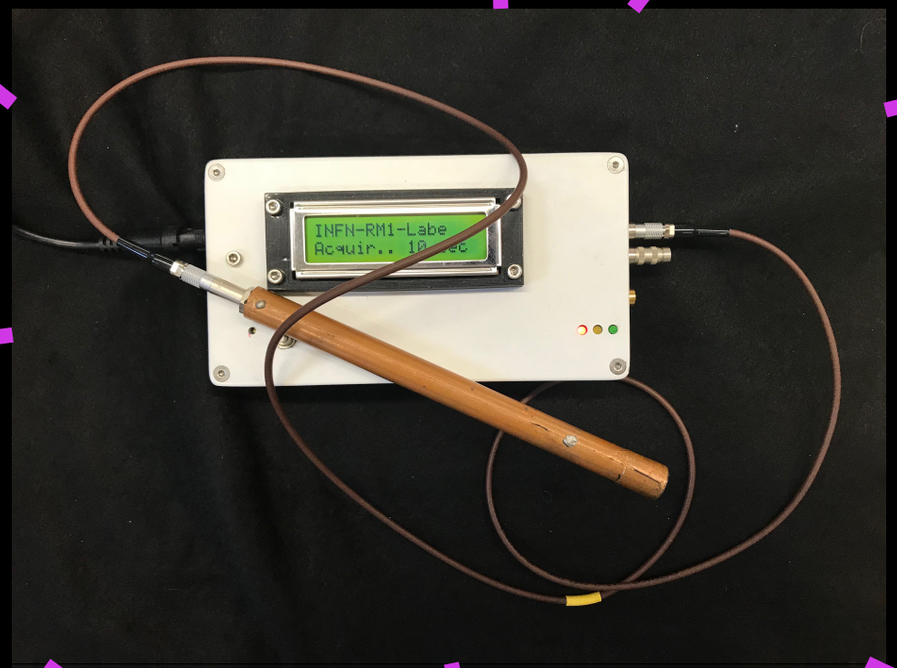
EX-VIVO TESTS



LAPAROSCOPIC PROBE

UPGRADED PROBE

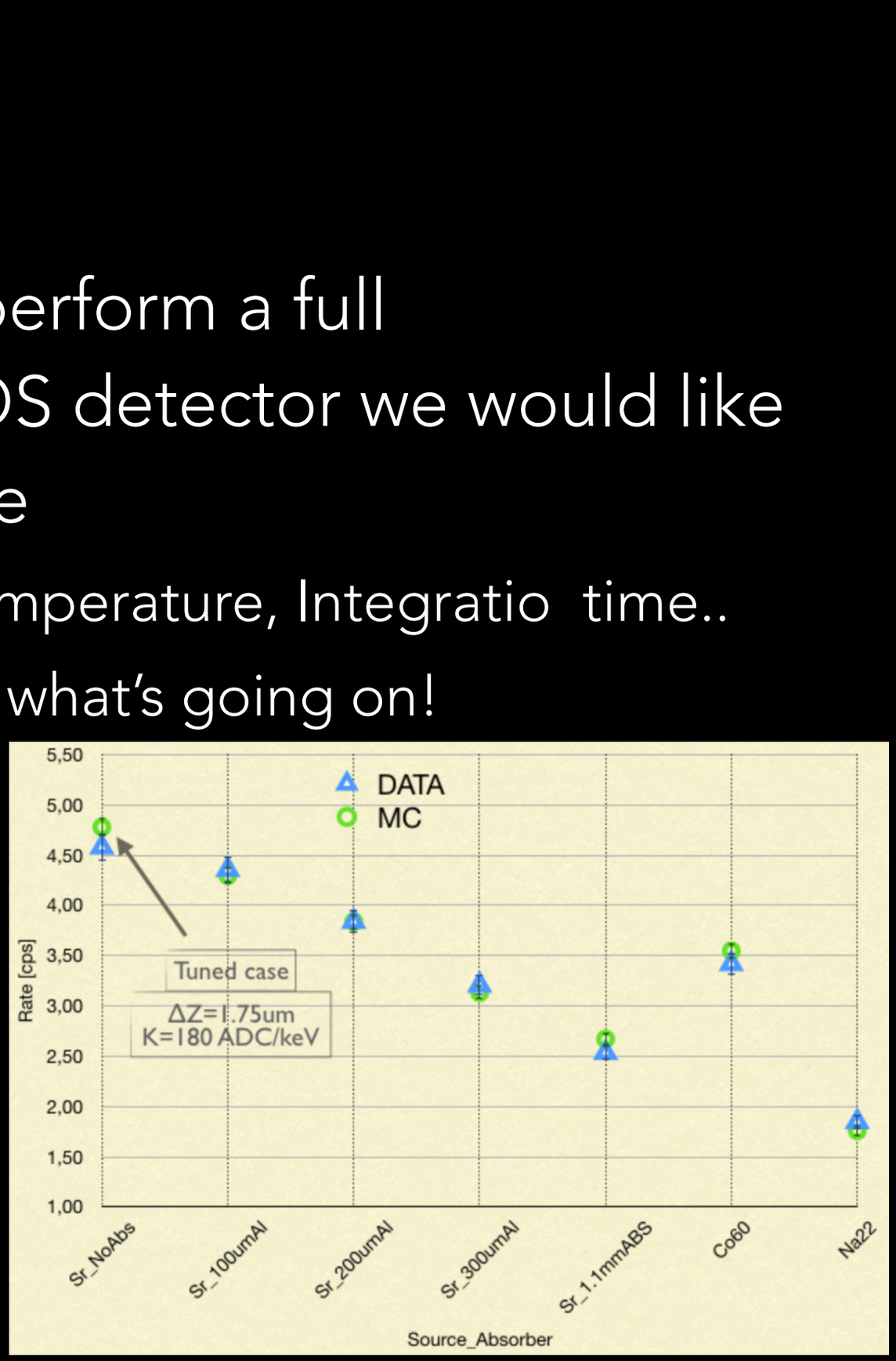
IN-VIVO TESTS

PUBLICATIONS

TALKS

CMOS

- A student thesis allowed to perform a full **characterisation** of the CMOS detector we would like to use in a “finger-like” probe
  - **Stability** against Gain, Time, Temperature, Integratio time..
  - Finally we are understanding what’s going on!
- **Monte Carlo** tuning
  - Very good **agreement**
  - **Efficiency** curves



CMOS

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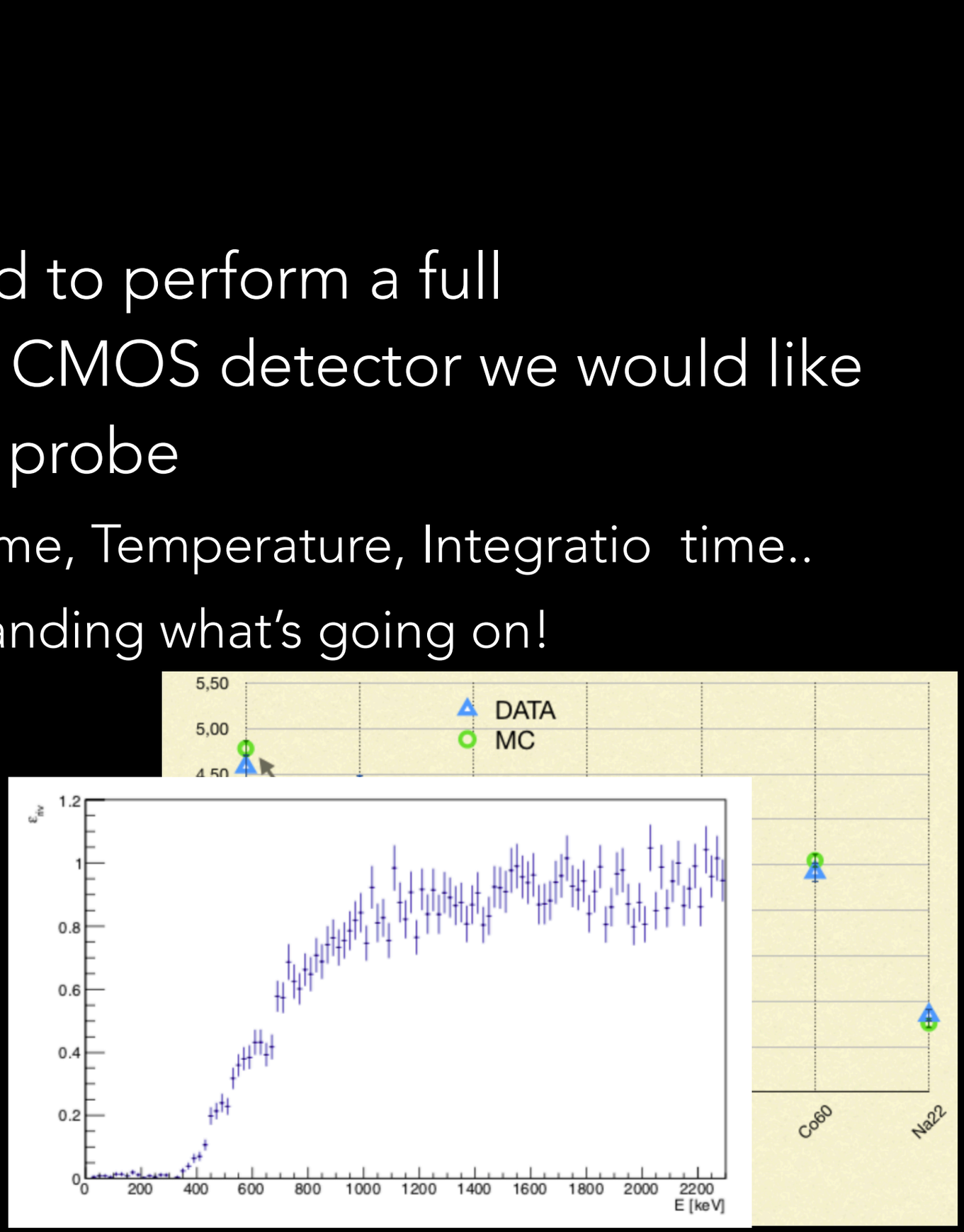
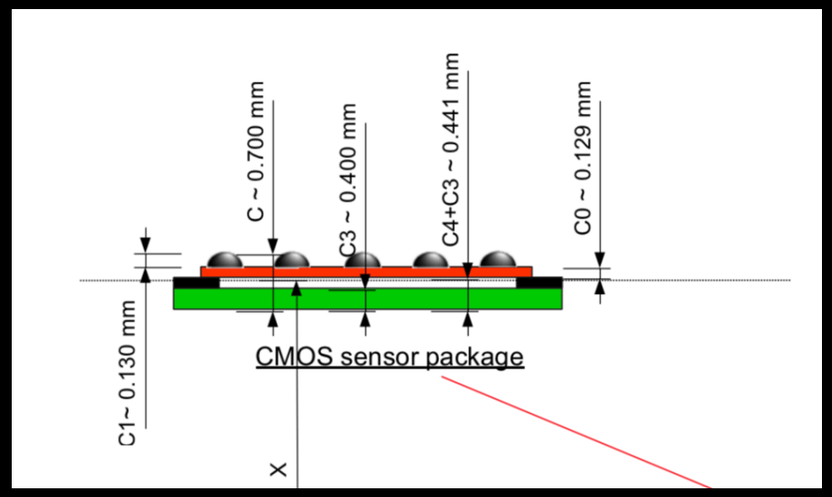
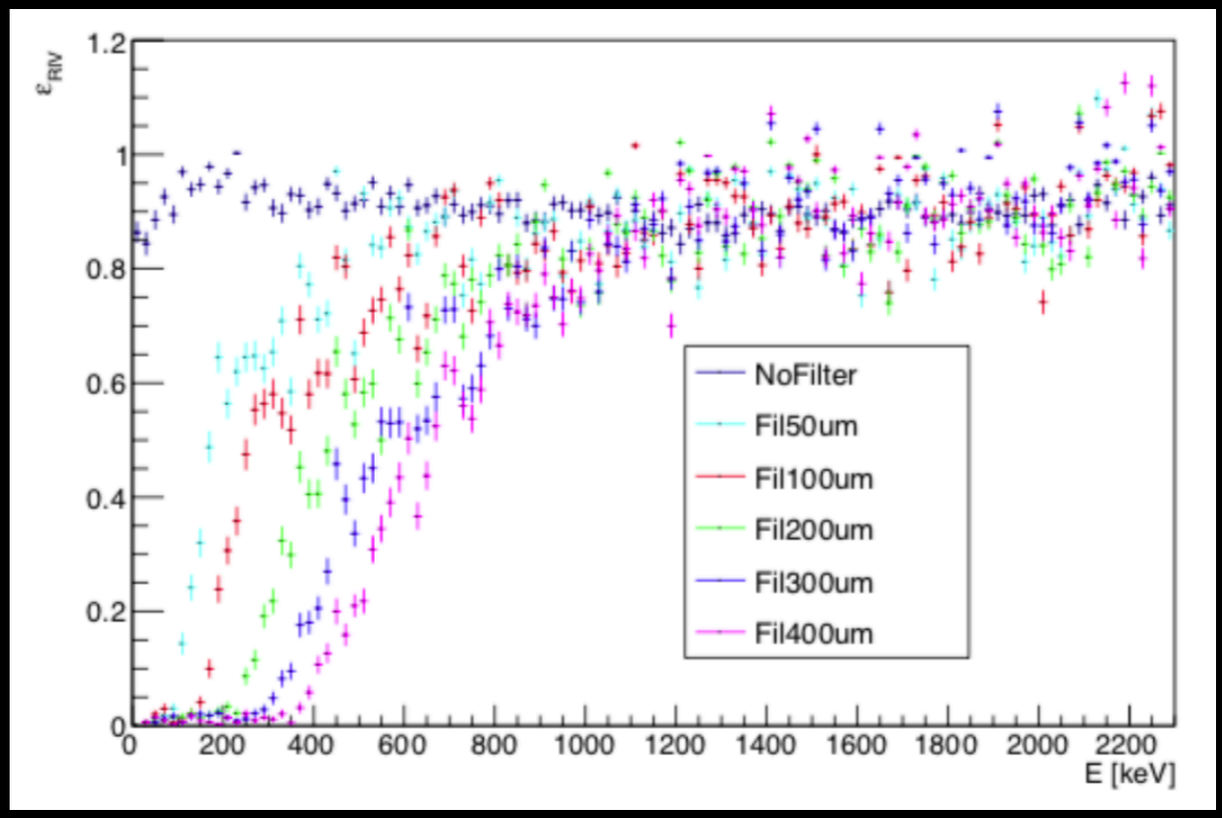


CMOS

- Next steps:
  - Shrinking of the protective filter in front of the detector
    - We are sending some sensors to an industry…
  - Publication:



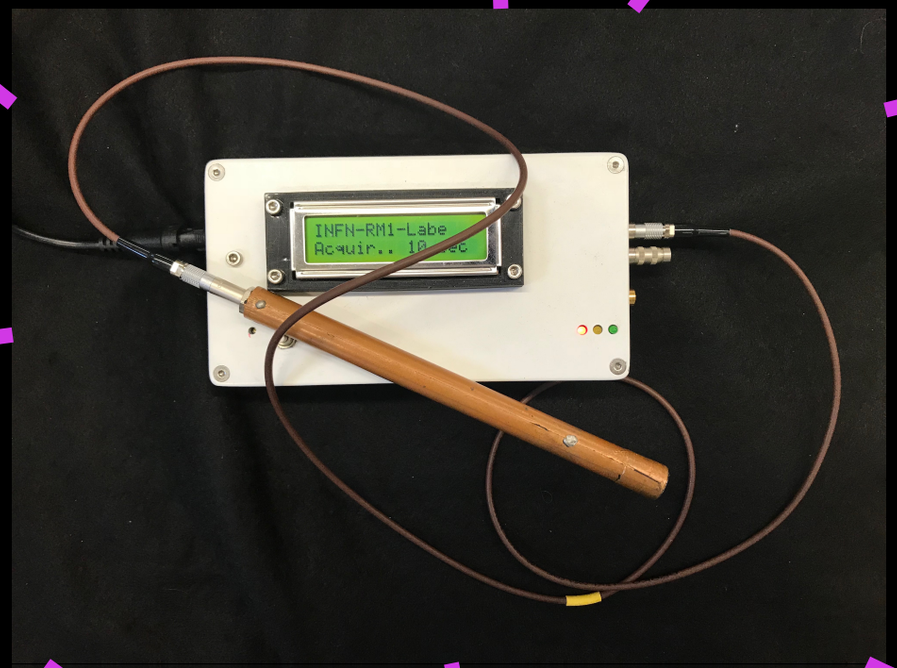


Stability and efficiency of a CMOS sensor as detector of low energy β and γ particles

CMOS

TOPI

EX-VIVO TESTS



LAPAROSCOPIC PROBE

UPGRADED PROBE

IN-VIVO TESTS

PUBLICATIONS

TALKS

PUBLICATIONS

- Besides the 3 aforementioned papers ready-to/under submission (Upgraded probe, GepNETs, CMOS), we have also submitted a paper on a feasibility study of beta^- RGS on pancreas (Study performed at Gemelli)

Radioguided surgery with β^- radiation in pancreatic Neuroendocrine Tumors: a feasibility study

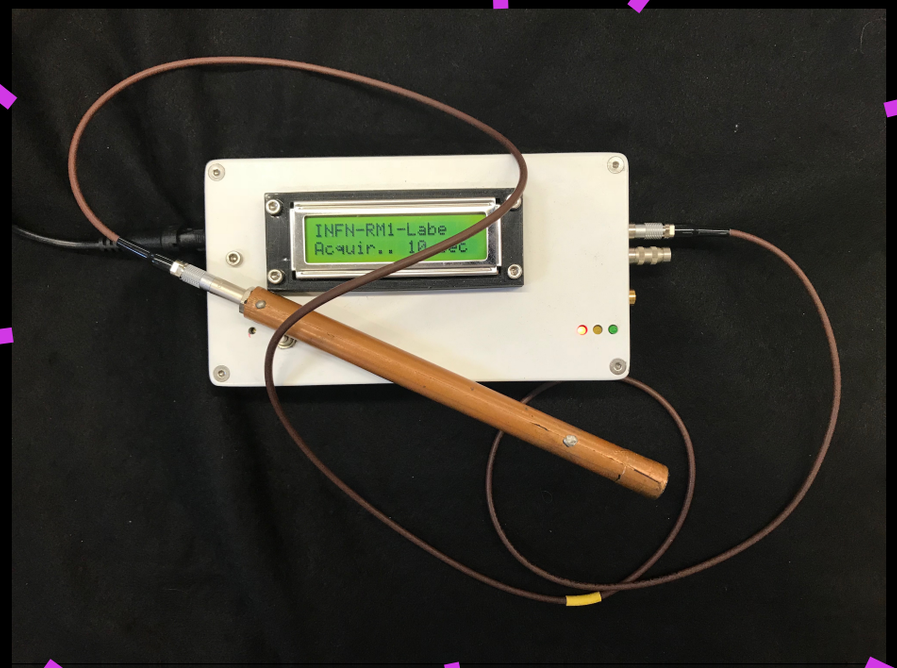
SUBMITTED TO JNM 🤞

- In a nutshell: our technique is so **effective** that we could perform it also in **pancreas**, were the **physiological uptake** is very high, and all other organs are nearby, and were **gamma-RGS gives a ~30% false positive**

CMOS

TOPI

EX-VIVO TESTS



LAPAROSCOPIC PROBE

UPGRADED PROBE

IN-VIVO TESTS

PUBLICATIONS

TALKS

TALKS

- Accepted as oral next month @

- Invited to give a talk this october @ Barcellona

EANM'19 October 12 - 16, 2019

TO SUM UP

- Even if the core of the probe idea (and its realisation) has been defined several years ago, **several expansion paths** are being investigated

- Always **sturdy interest** in medical/scientific communities **around us**

- What to do with the INFN sigla next year?

- We have an undeniable ("ineluttabile"? cit) **problem of man power**

  - 1.5y of work, 0.5y of publishing.. no parallelization is possible