

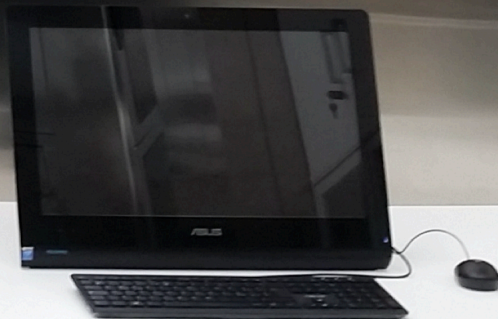
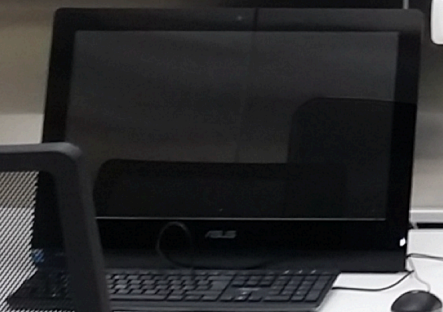
Activity in Napoli

Bologna 12/11/2021 DUNE-Italia meeting

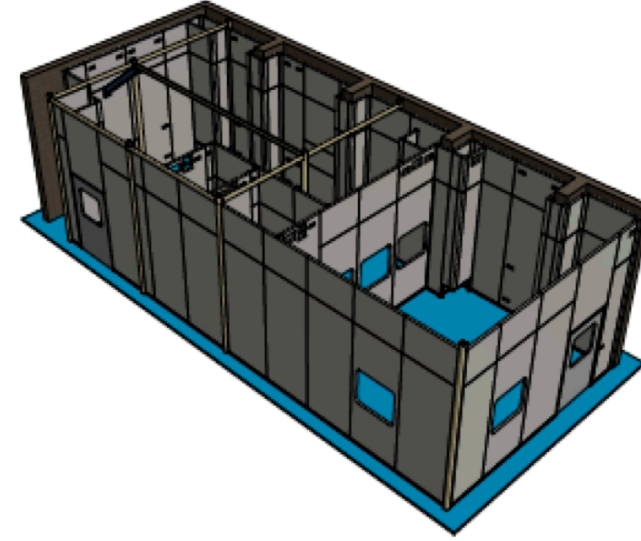
F. Di Capua

on behalf of Napoli group

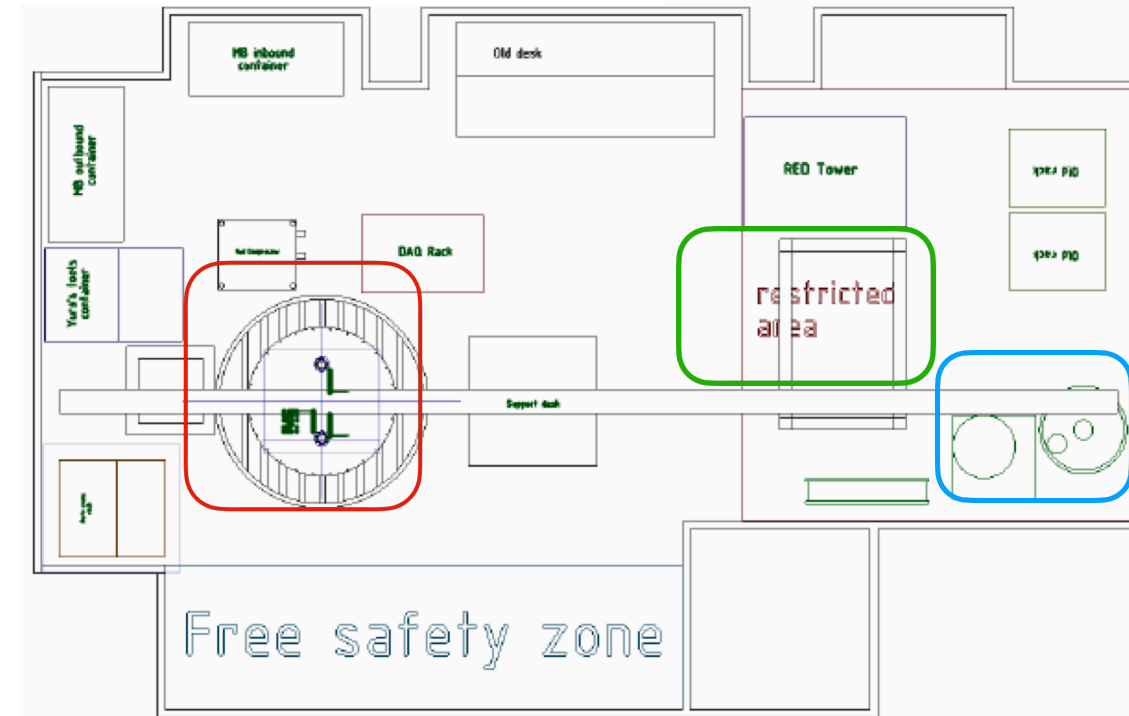
CRYOLAB



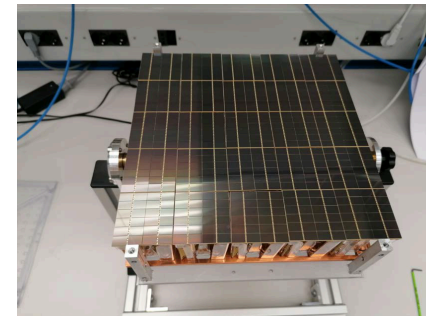
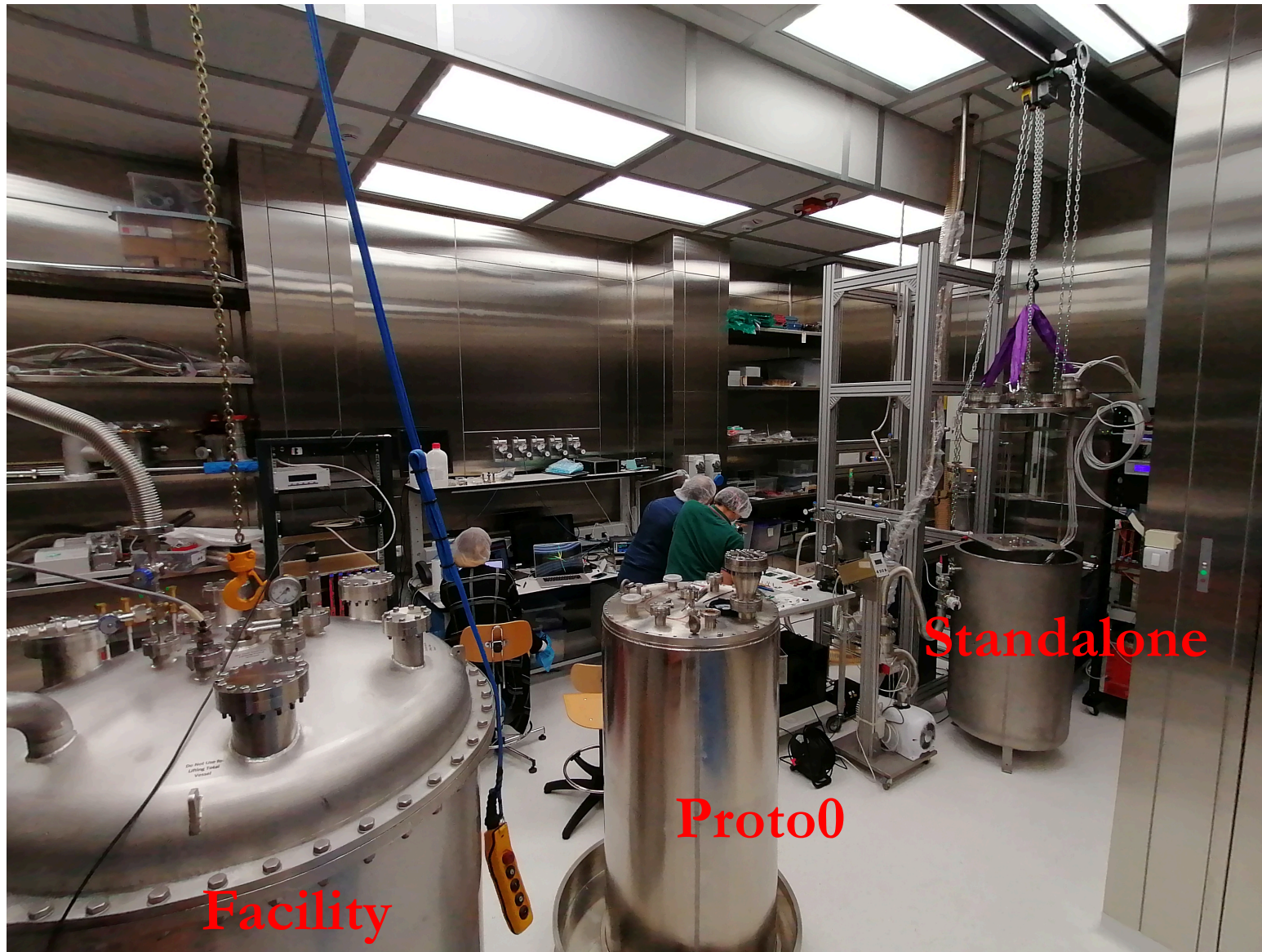
ORGANIZATION OF LABORATORY



- Two independent filling lines which can be used for both LN₂ and LAr
- Three different main test systems:
 - A **large cryostat (Facility)** equipped for darkside PDU qualification tests (in use for next two years)
 - **Proto-0** system (independent system with LAr condenser from gas and purification system): darkside prototyper with TPC in assembly phase (it will take data throughout 2022)
 - **Standalone system**: used for short term tasks (could be used in 2022 for possible DUNE activities)
- Small cryostat for low scale tests and a dry system chamber



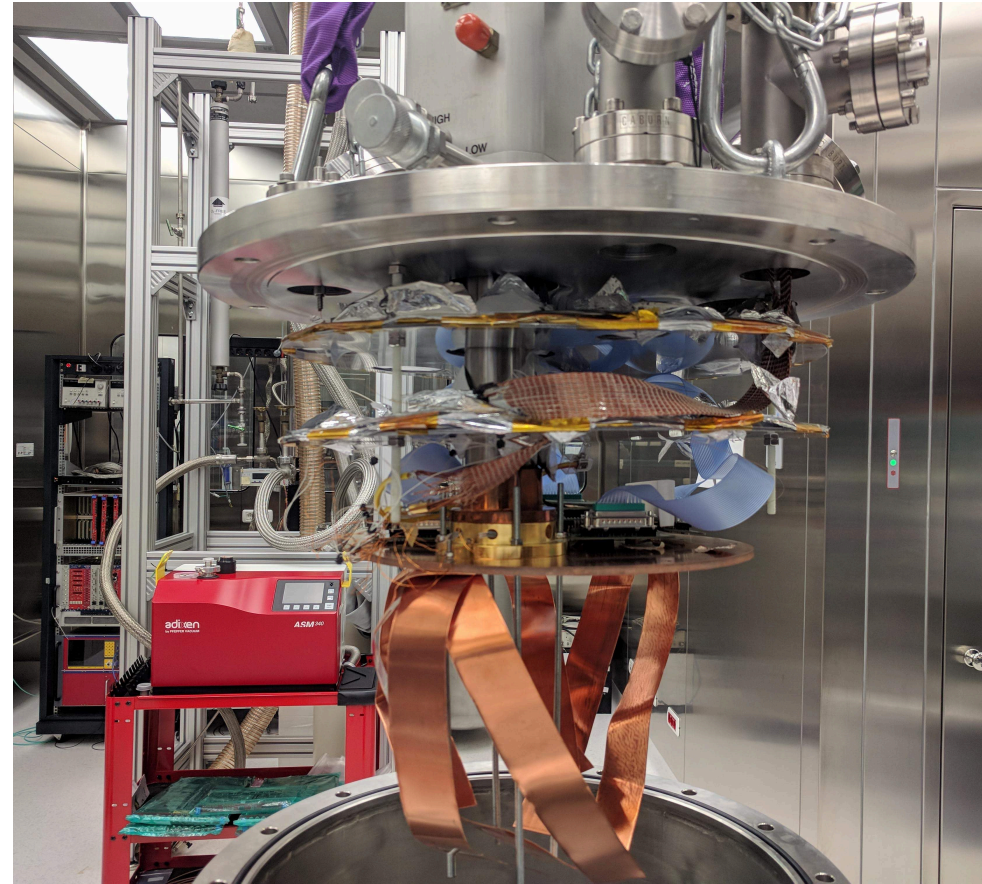
ONGOING ACTIVITIES



Standalone system:

since two month LN₂ test for SiPM burst investigation on a 25x25 cm² PDU

Dry system



- Cryocooler PT60
- Heater system to modify the temperature
- System to be refurbished

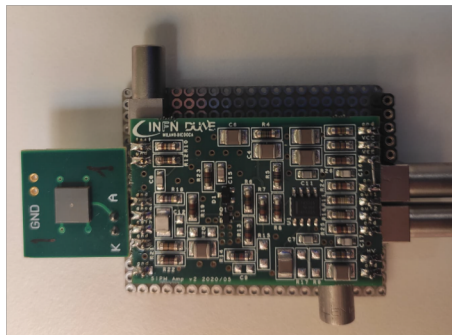
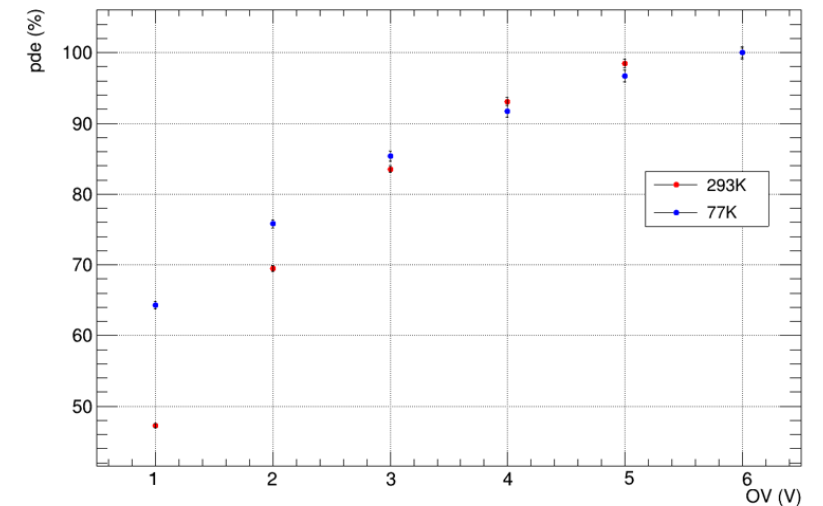
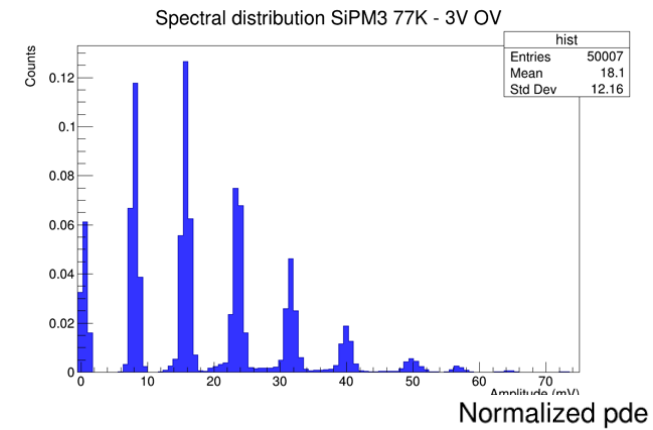
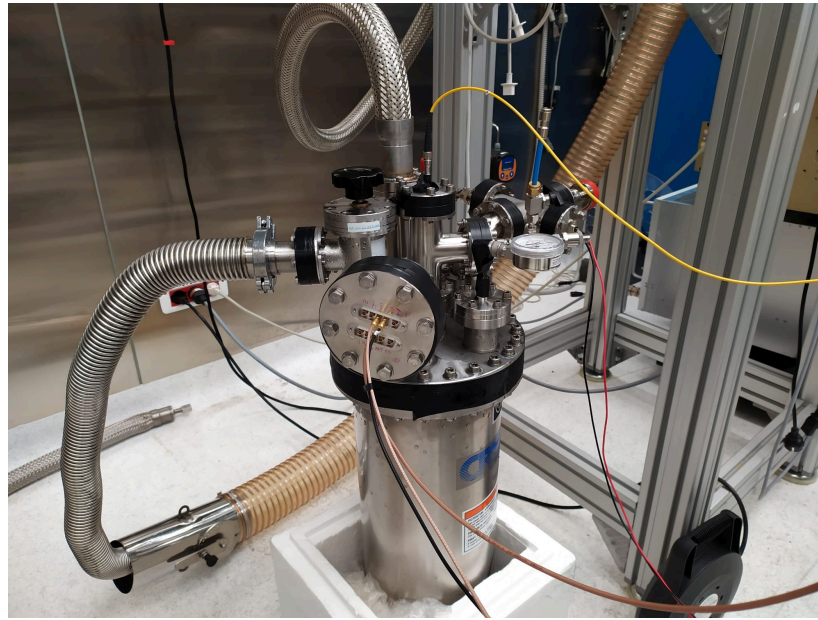
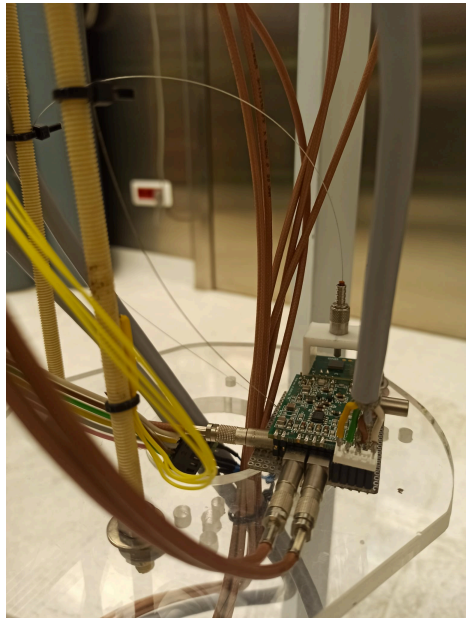
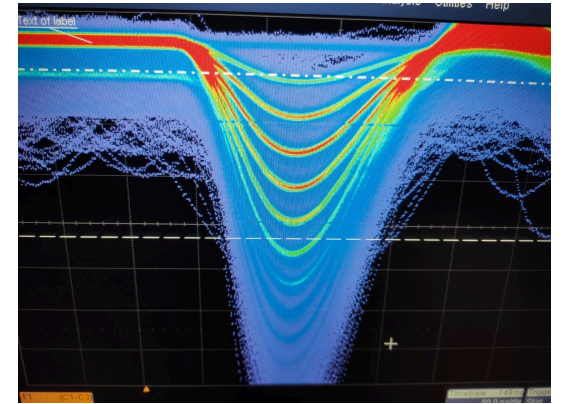
..some problem at beginning of 2021

- water flooding from extremely heavy rain in the clean room
- floor damages: need to rebuild
- delay in darkside scheduled activities



DUNE activities in CRYOLAB

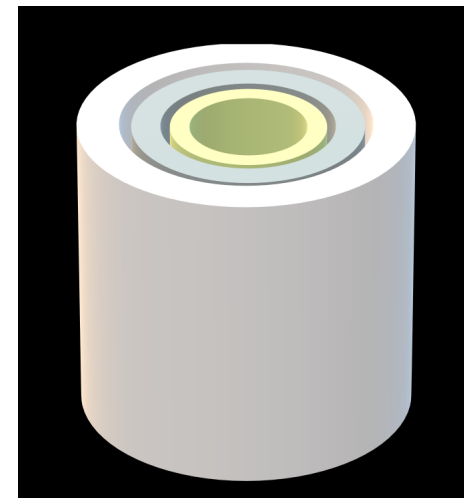
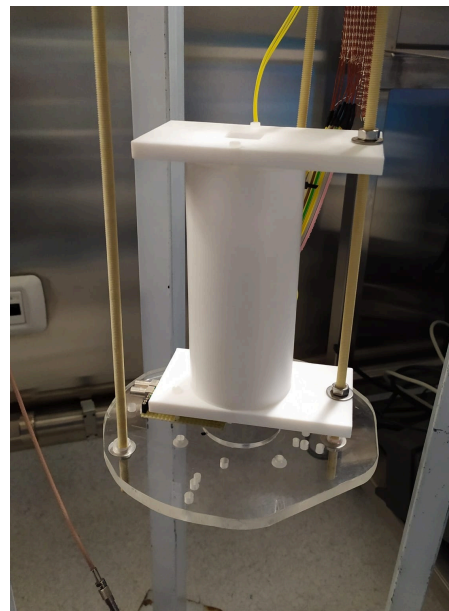
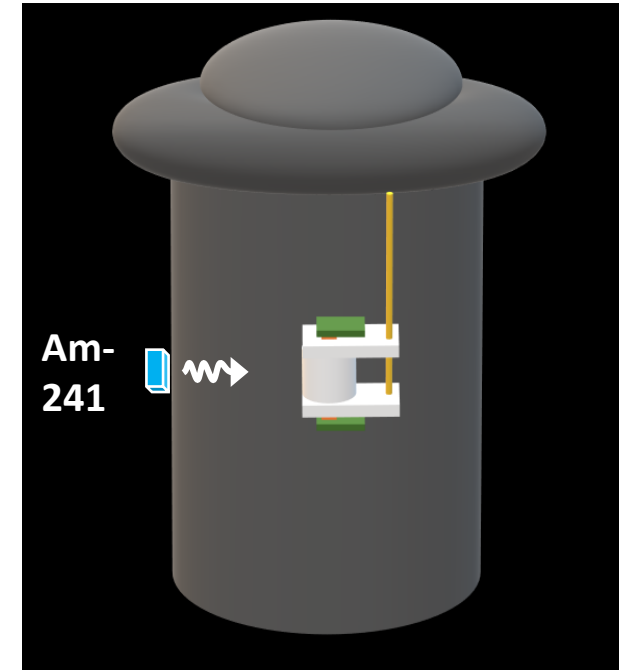
- Equipped a small cryostat for single SiPM tests
 - optical and electrical feedthroughs
 - temperature monitoring






Single stage cold amplifier

DUNE ongoing activities

- Test in LAr
 - PTFE with symmetric geometry
 - two SiPMs to be monitored at two sides
 - electronic with first and second stage amplifier
 - test with PEN and TPB wls
 - including LAr cartridge
 - assembly is ongoing and first data in next month
(master thesis to be completed within March 2022)



	PTFE – 15.3 mm
	REFLECTOR Vikuiti Enhanced Specular Reflector (ESR) – 65 μ m
	PEN - 50 μ m

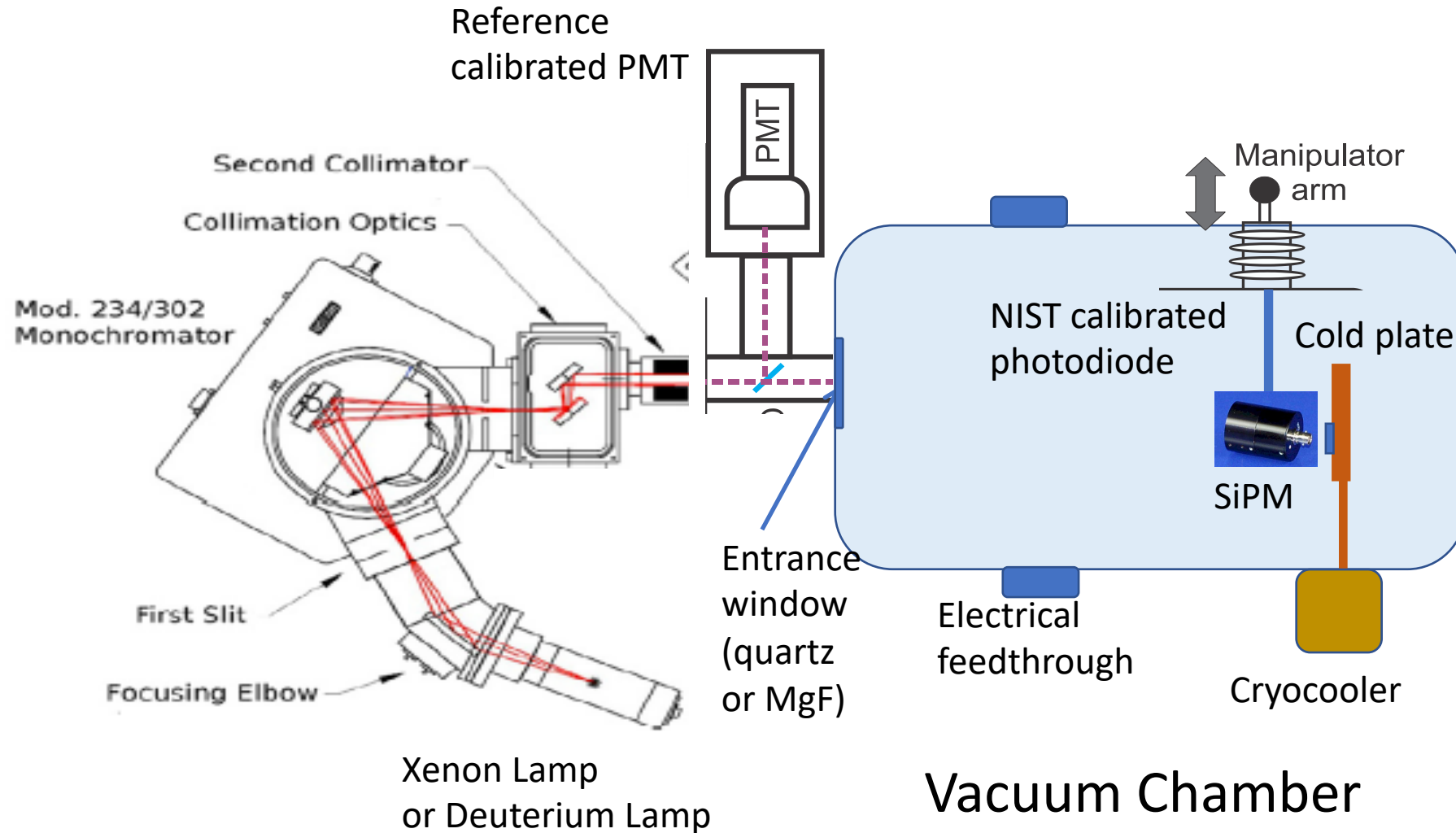
Absolute PDE system: the project

- McPherson mod 234/302 Monocromator and controller
- Focusing elbow and collimation optics
- Deuterium Lamp
- Xenon Lamp
- NIST calibrated photodiode
- Grating
- Cryocooler
- Vacuum chamber
- Vacuum system
- Vacuum Linear Translator
- Calibrated PMT

- Available
- Funded in 2021
- Not funded

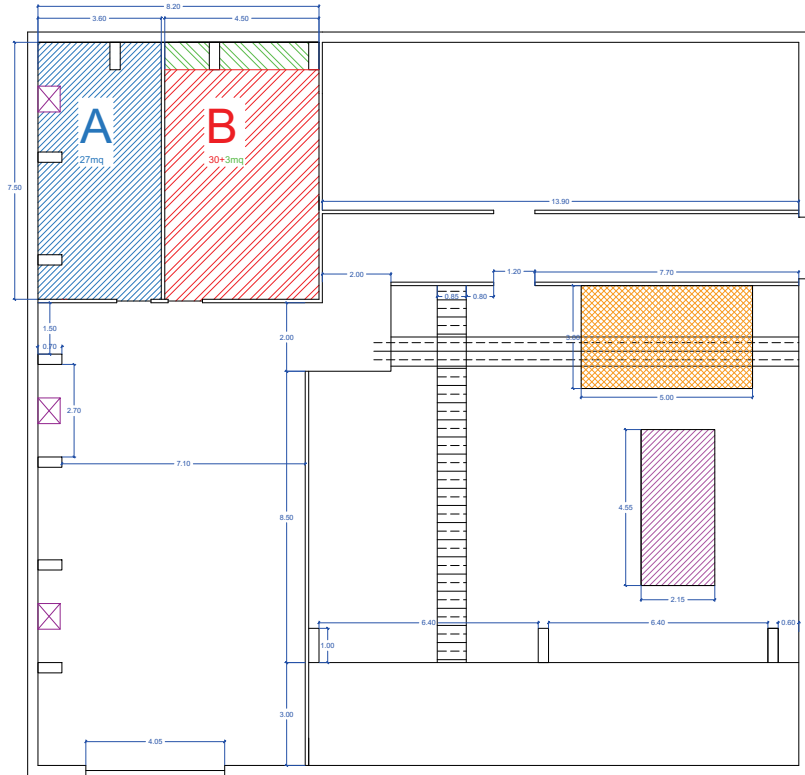


Absolute PDE system: the project

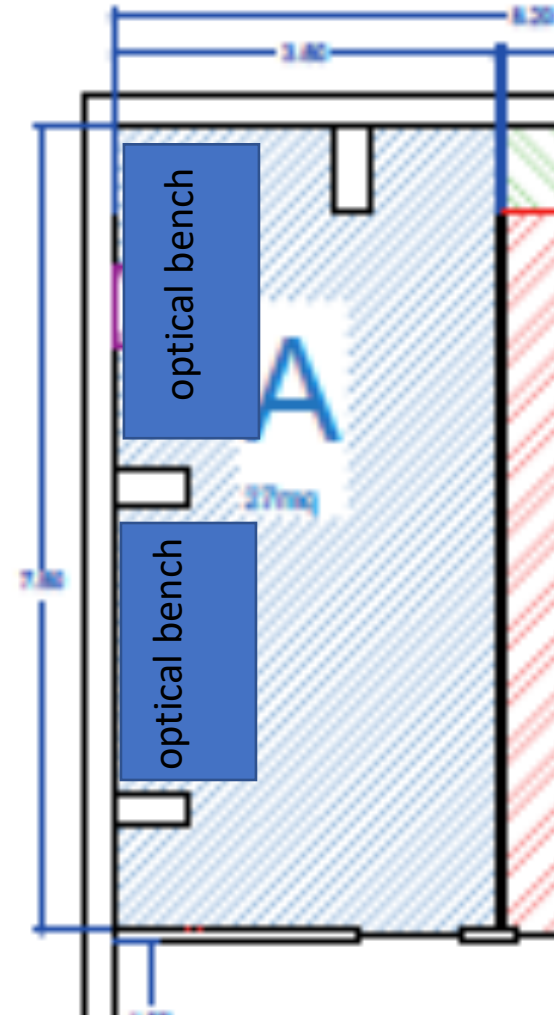


No space in CRYOLAB for the PDE system: (no space for an optical table!!!)

New photosensor laboratory in Napoli

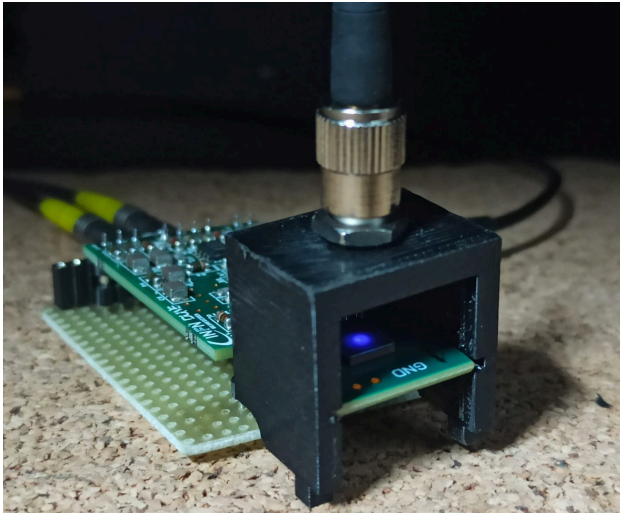


Napoli physics department:
hangar area

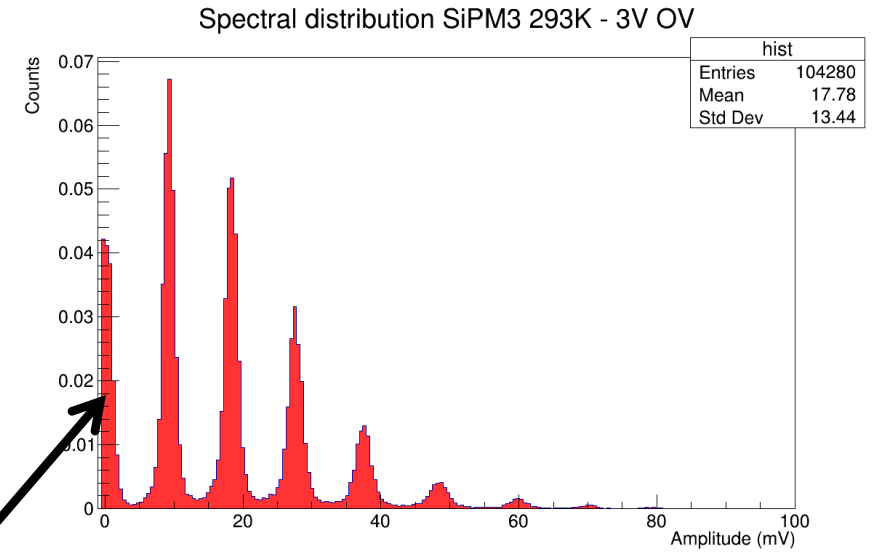
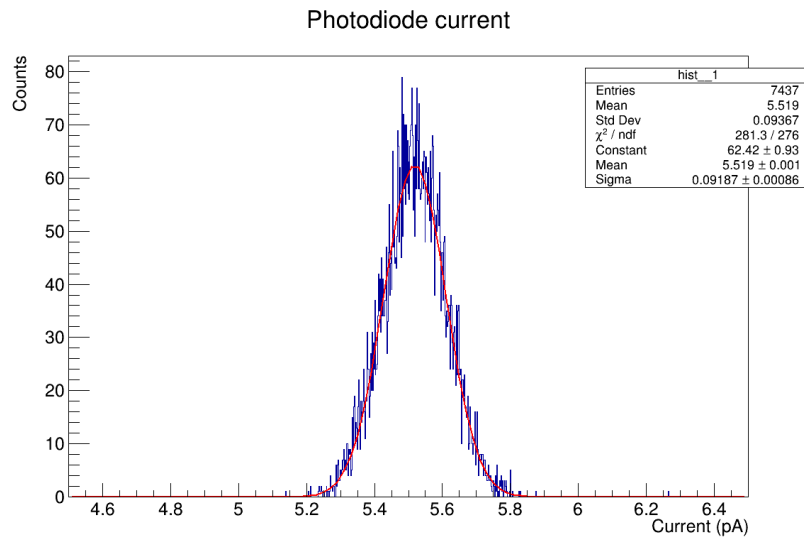


- Project approved
- Works on delimitation and new flooring will begin early 2022
- Two optical tables are going to be bought in few next days

Some preliminary measurement at warm

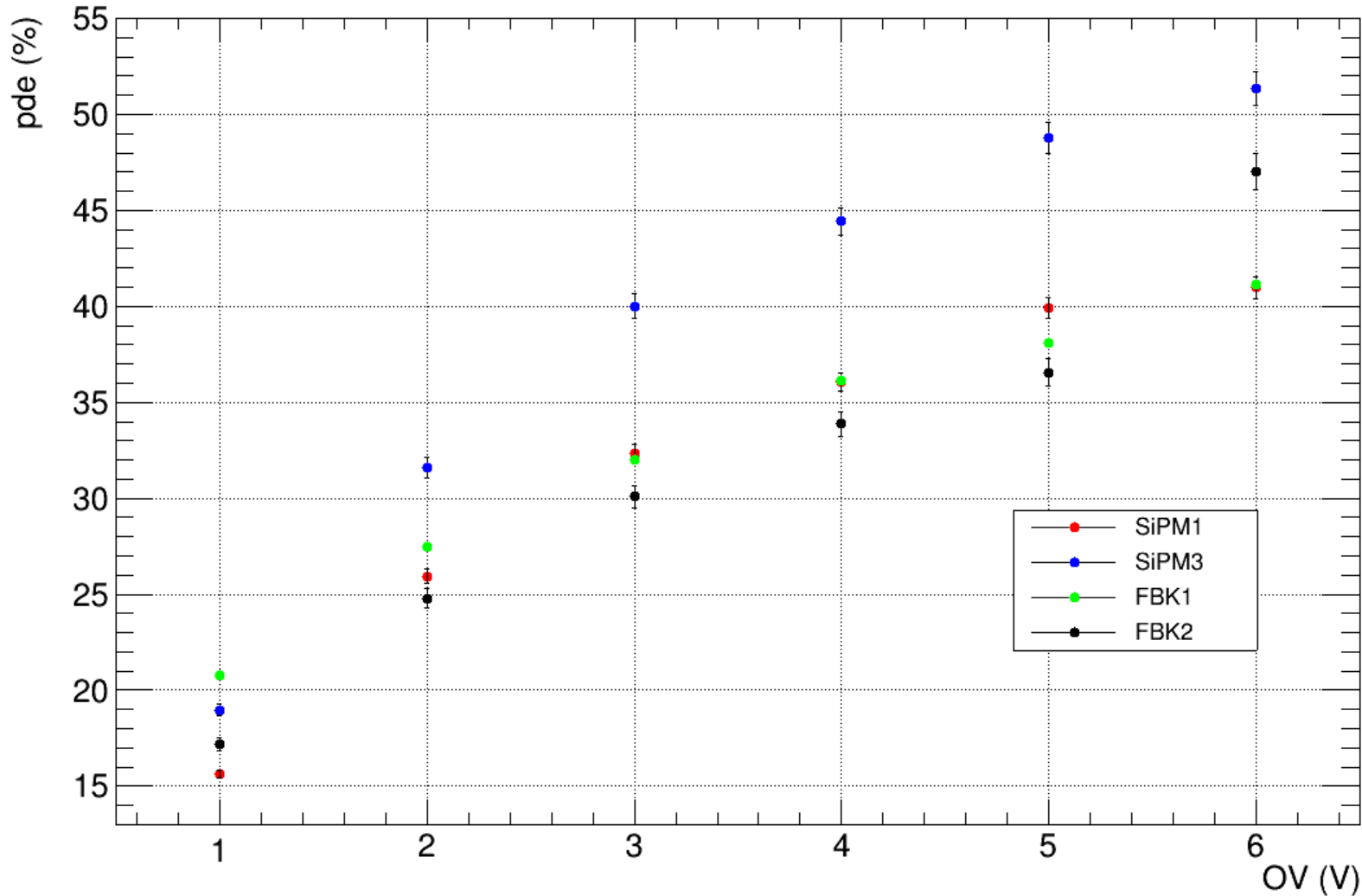


- SiPM illuminated with PLP Hamamatsu laser
- Laser spot contained in the SiPM
- Amount of light measured with the NIST calibrated photodiode

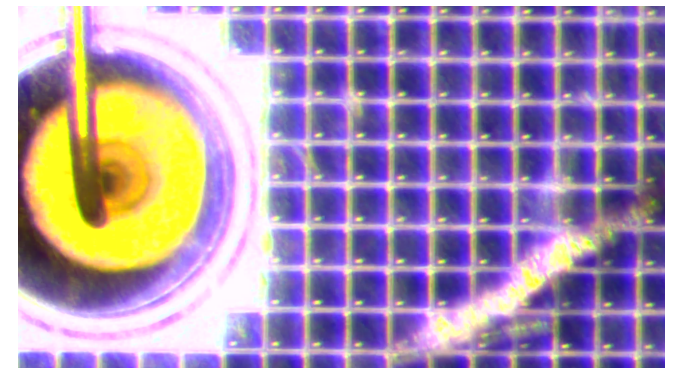


Events with zero detected photons

Some preliminary measurement at warm



- Illuminated small central SiPM region
- Possible alignment systematics
- Measurement will be repeated with an integrating sphere



DUNE research group composition

At the present:

- Giuliana Fiorillo (PO)
- Francesco Di Capua (RTDB)
- Yury Suvorov (RTDA)
- Emanuele Romeo (Master student)

In addition next year:

- A INFN permanent position of technologist
- One year scholarship for a young technologist (INFN)
- One year scholarship for a young researcher (INFN)
- One year scholarship for a young researcher (University)
- One additional master student

Conclusions and perspectives

CRYOLAB

- small-size experiments in LN₂ and LAr for relative PDE studies of single SiPMs
- Setup a small LAr chamber with PEN/PTB and Am241 source for relative PDE measurements
- A bigger cryostat (300 l) is already available, eventually, for DUNE activities: material testing, X-Arapuca, GRAIN?... (to be defined with other DUNE groups)
- After darkside PDU testing, the big 1 ton capacity cryostat will be available

Photosensor laboratory

- Assembly of the new PDE system with monochromator (warm part)
- Cold side: we will go on with the project also for not funded parts (we will manage to build a chamber from abandoned parts)

back-up

NIST Calibrated photodiode: OL-730-5C UV-enhanced silicon detector



- Laser at maximum repetition rate (100 MHz)
- Photodiode current measured with keythley 6485 picoammeter
- Current converted in Watt (NIST calibration) and then converted in number of photons per pulse
- Current measured at 10 MHz, SipM measurement performed at 10 KHz (current scaling verified)
- Setting laser in order to have about 6 photons per pulse
- During data taking light behaviour is monitored in a splitted optical line

Photodiode current

