



User service

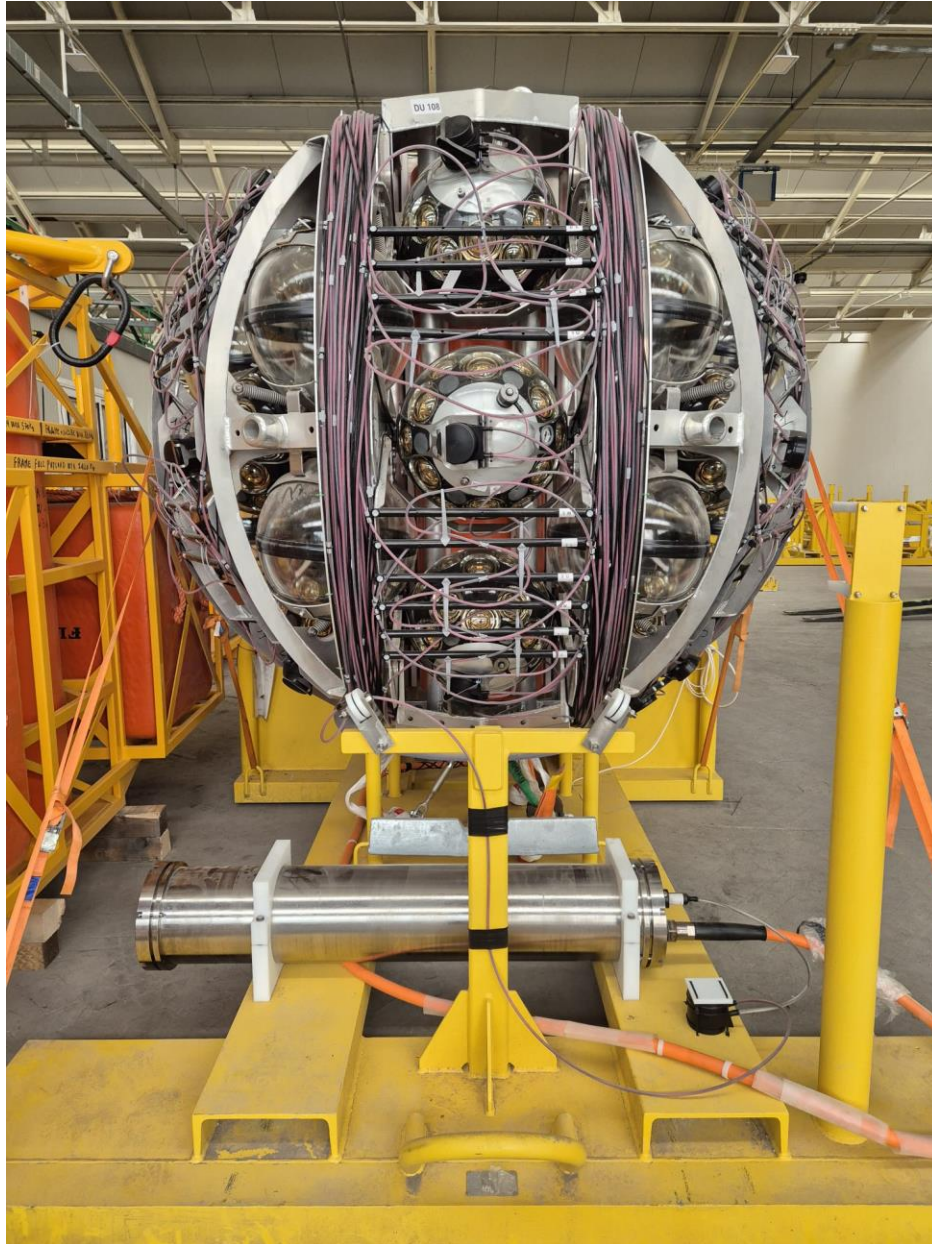
Management and  
development of  
research infrastructures



# Reparto Tecnologie Marine

- Antonio Grmek
- Giorgio Cacopardo
- Felice Fabiano
- Carmelo D'Amato
- Riccardo Tangorra Cascione

# Reparto Tecnologie Marine



Activity: project KM3NET( <https://www.km3net.org>)

The Marine Technologies department is engaged in the integration of the strings for the Km3Net detector, in the development of positioning subsystems, in multidisciplinary projects: Ipanema-Pnnr Itineris, Emso- Eric, Focus- Erc.

It provides support the accelerator division with the development of the new CS magnetic field probe. It has provided support to the experiment DUNE.

# The DU integration activity is divided into six processes:

- **Process 1:** assembling DU (Detection Unit). The VEOC (Vertical Electrical- Optical Cable) is integrated with the DOM (Digital Optical Module). i.e. optical fiber and connectors of the DOM are connected with the ones of the VEOC, to form the DU



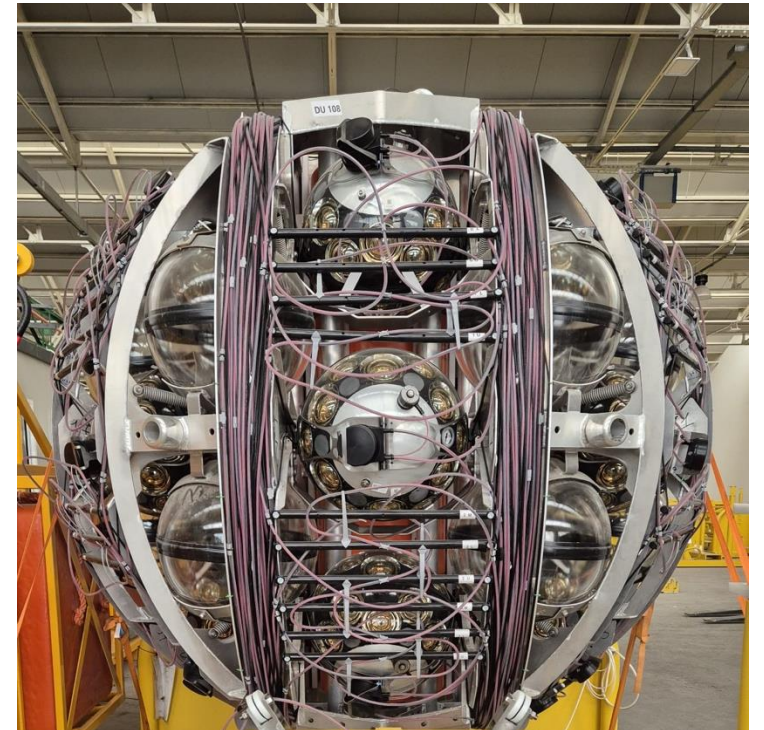
- **Process 2:** the Base Module is integrated with the DU



- **Process 3:** calibration in the dark box, placement of the DU in the dark box for following tests



- **Process 4:** DU winding on LOM (Launcher for Optical Modules), the operation allows to house inside and around an Aluminum sphere with a radius  $\simeq 1$  meter, 750 meters long electro-optical ropes and cables, 18 DOM and a buoy.



**Process 5:** the Km3Net ARCA DU is prepared for positioning. The system consists of the anchor on which hosts the LOM. Dyneema ropes are fixed to the anchor, which also houses a hydrophone, the Base Module (BM), the basic BOB (Breakout Box), the release system. After the LOM is released, thanks to its buoyancy, it unwinds releasing the 18 DOM and the buoy. The release system is operated by a ROV.



**Process 6:** DU preparation procedures for positioning Hydrophone  
Integration Laser beacon integration (optional)  
Hydrophone connections, laser beacon  
DOM pressure control



# Km3Net

- Design, construction and integration of the autonomous-beacon support-tripods for acoustic positioning
- Design and implementation of support systems for the junction box electronics
- Design, construction and integration of the mechanical structures of the KM3NeT instrumentation unit for the measurement of the oceanographic and acoustic properties of the water column (base, parking frame, buoy supports, instrument supports on the line, rotator for line laying)



# IPANEMA

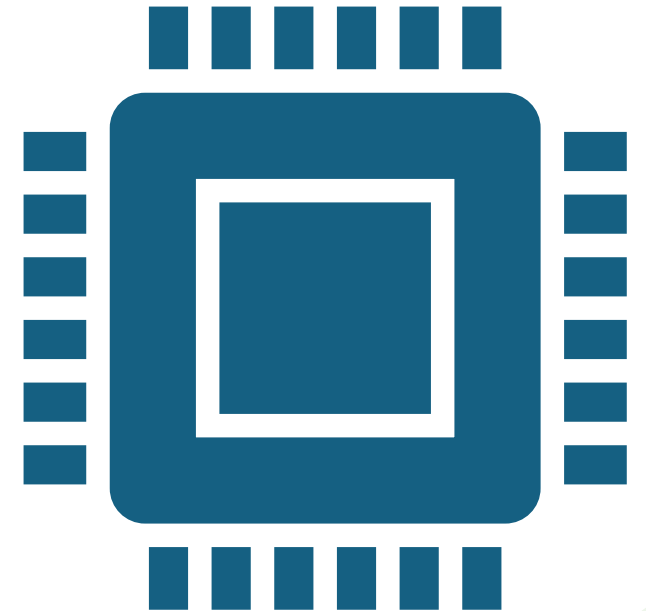
Project in collaboration with INOGS and INGV that aims at measuring CO2 emissions in the marine environment.

One shallow and one deep submarine stations installed respectively: at a depth of 20 m about 2 km off Panarea in the international ECSSEL laboratory; and at a depth of 2100 m 25 km off Catania in the LNS submarine test site. The first station, autonomous, houses 4 hydrophones and the related power supply system; the second station uses the data and power connection of the electro-optical cable of the test site and is equipped with 4 hydrophones and a CO2 sensor.



# Reparto Elettronica e Rivelatori

- [Pietro Litrico](#)
- [Claudio Calì](#)
- [Giuseppe Passaro](#)
- [Fortunato Giuseppe Caruso](#)
- [Davide Sciuto \(KM3NeT4RR TD scad. a 30 novembre 2024\)](#)
- [Luca Platania \(KM3NeT4RR TD scad. 14/05/2025\)](#)
- [Bernadette M. C. Cavallaro \(KM3NeT4RR TD scad. 14/05/2025\)](#)
- [Francesco Cammarata \(KM3NeT4RR TD scad. 14/05/2025\)](#)



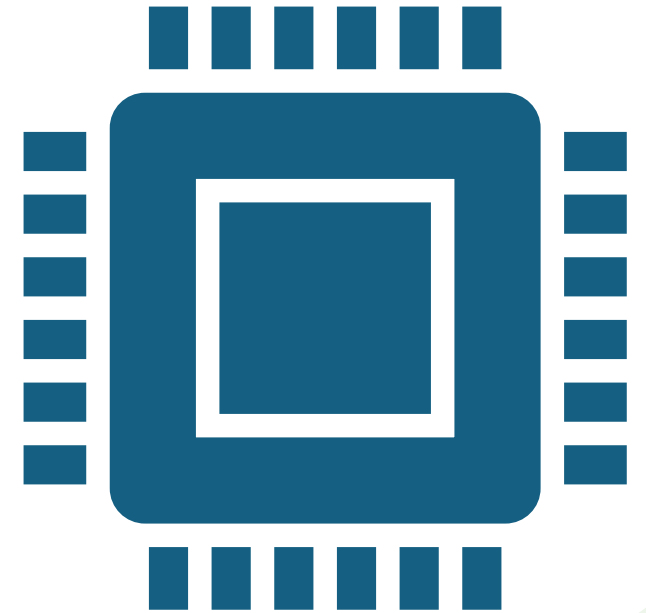
# Reparto Elettronica e Rivelatori

Mission: support to experimental activities related to electronics and detectors

- Designs electronic devices and PCB according to specifications provided by the research groups
- Design and implementation of control and automation systems
- Support to the activities of the experiments: KM3NeT - NUMEN-DUNE-nToF
- Participation in the design activities, cabling & grounding Data Acquisition and Collection (DAC) rooms

Manages:

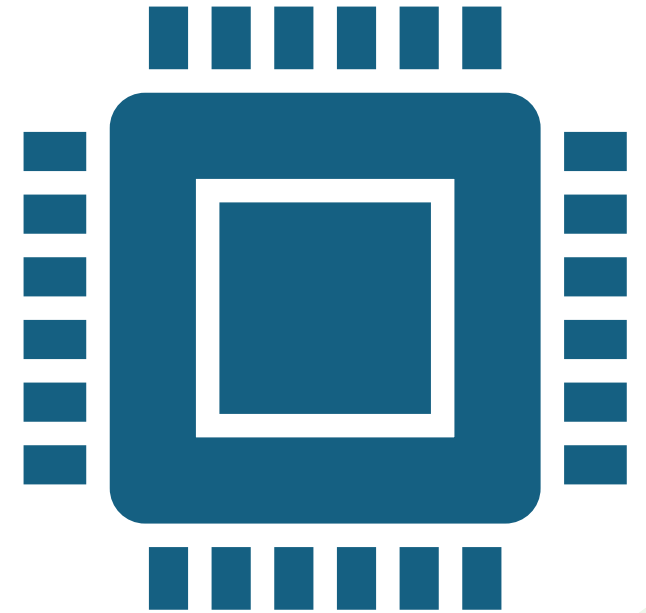
- the **Detector Laboratory** and provides support for its users
- Users Electronic pool
- Electronic components
- Meeting room audio-video devices





# Reparto Elettronica e rivelatori

- PID wall PCB Upgrade for NUMEN
- PCB design and signal picking system for annular detector within the acronym nTOF
- DUNE experiment: development of system for stress test of electronics at low temperatures
- Realization of MARINE-HAZARD test-bench
- ICE-PB board design for MARINE-HAZARD
- Support to Km3Net



# KM3NeT4RR ELRIV Team Activities

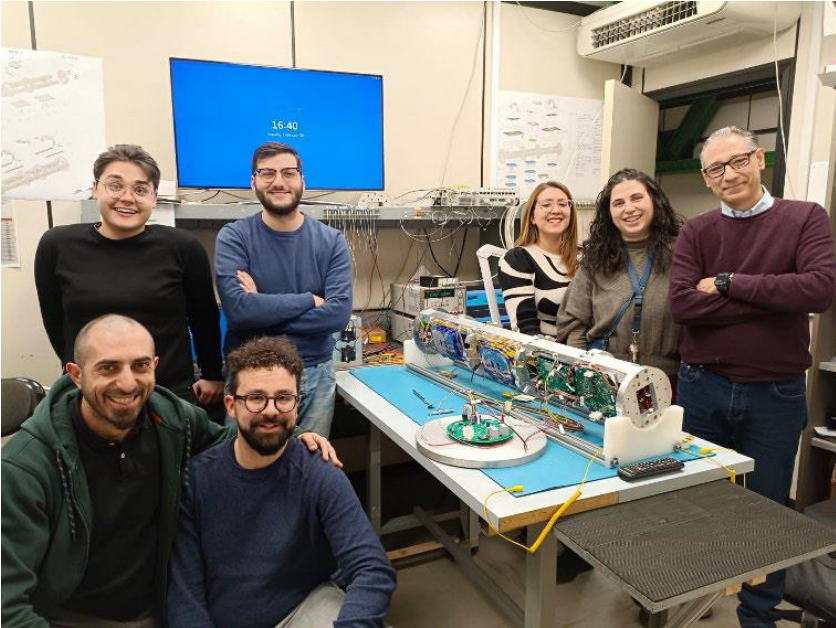
- Analysis and reconditioning of two Phase 1 Broadcast Detection Units
- Integration of five Phase 2 WWRS Detection Units (from process 1 to process 5, process 3 excluded)
- Interlink cable wrapping and JB-CTF cables in anchors
- Design and development of racks with optical and electrical components to carry out tests on site



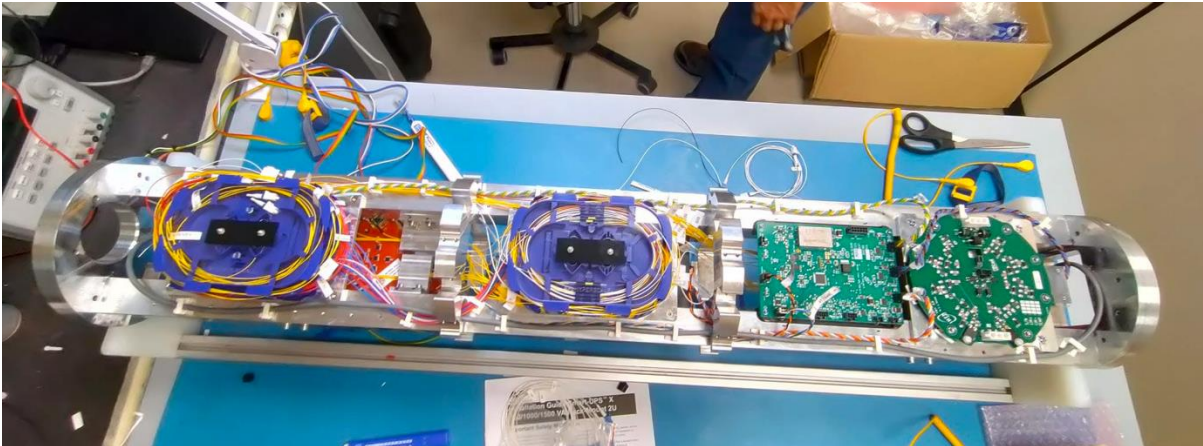
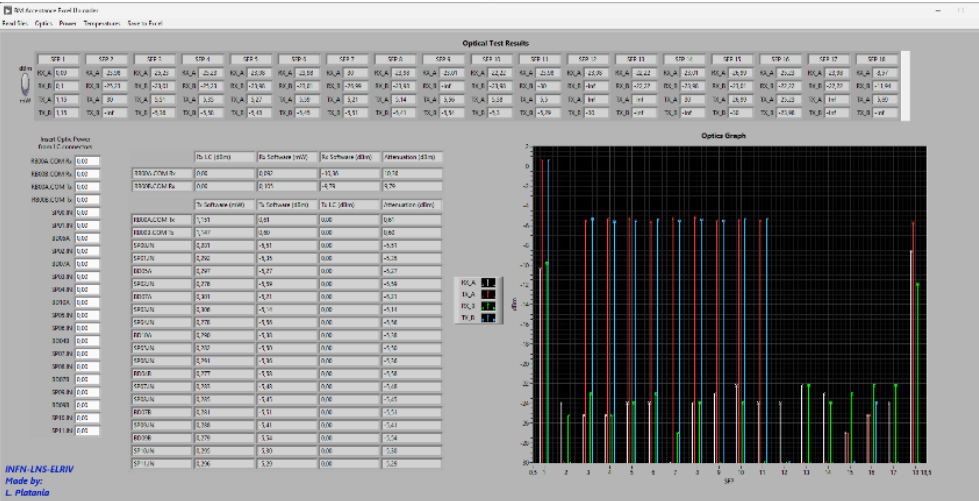
## DU Integration

# KM3NeT4RR ELRIV Team Activities

- Production of 4 Basic Modules
- Development of the software "BM Acceptance Excel Uploader"
- Replacement of the power boards of 2 Base Modules with related tests
- Creation of temperature-controlled chamber to recover a BM subject to humidity problems



## Base Module Integration



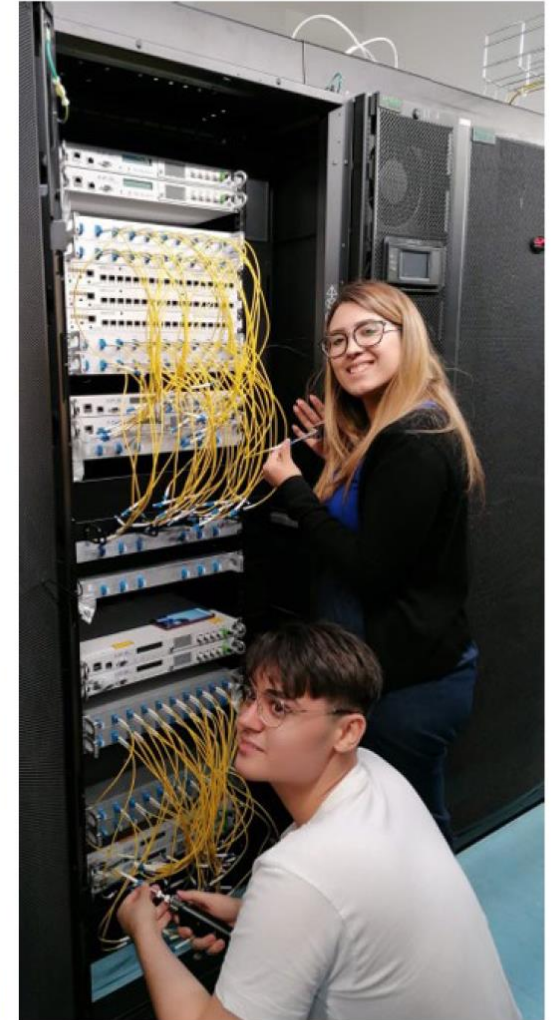
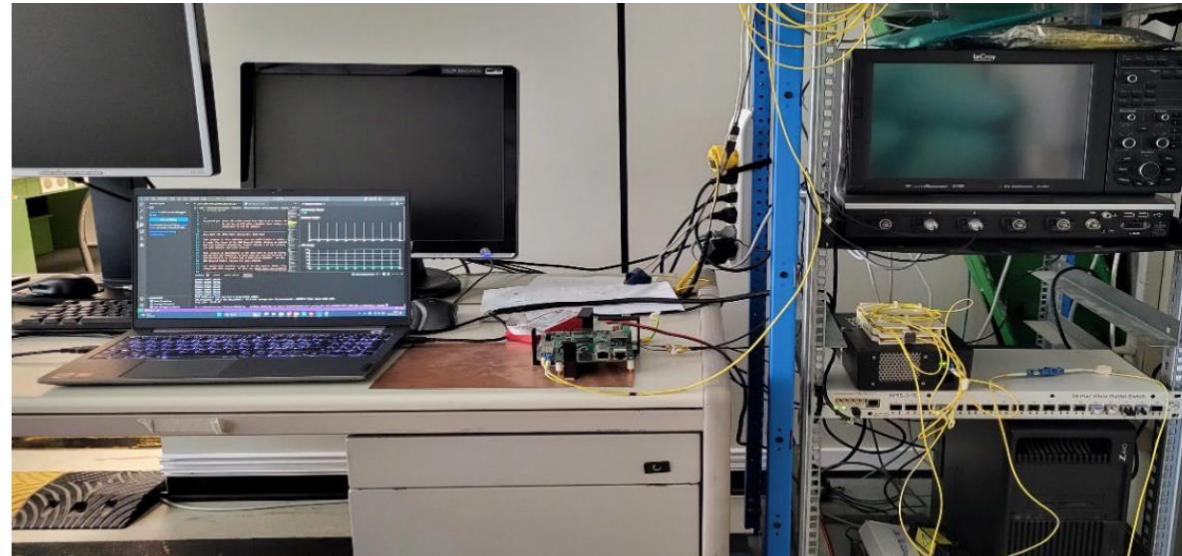
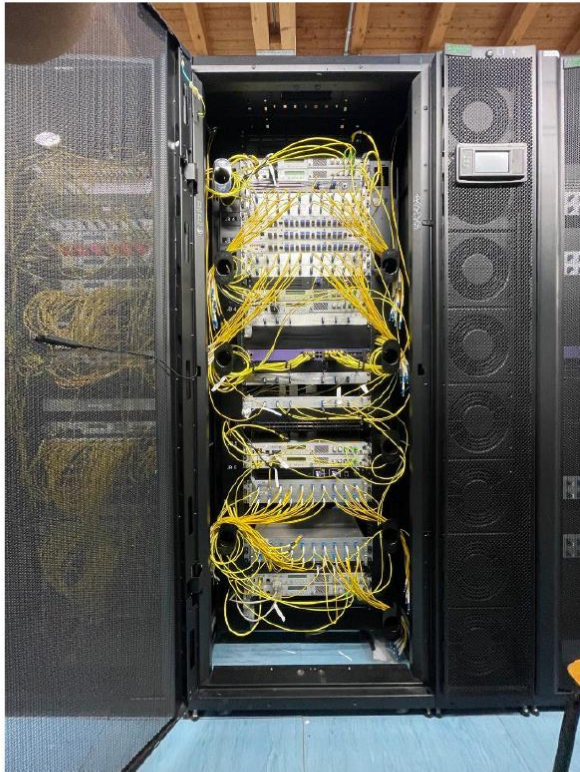
# KM3NeT4RR ELRIV Team Activities

## Optics Group

-Symmetry testing of optical filters for Base Modules, Junction Boxes and Shore Stations

-Glenair Fiber Optic Cable Inspection

- Assembly of Shore Station at Portopalo and rack Process 2 and 5



# KM3NeT4RR ELRIV Team Activities

## Power Group



- PS12V card testing with revamped test software
- Development of the "Lambda Control Panel" software
- Development of the software for the ESS test of the Phase 2 power cards
- ESS testing of 12 Phase 1 power cards (BPS)
- ESS testing of 31 Phase 2 power card kits (BPC+BPD+DUL)



# Reparto laboratorio di Tecniche Chimico Fisiche

- Antonio Massara
- Martina Ursino

The Chemical-Physical Techniques Laboratory mainly deals with:

- production of targets and thin film deposition for interdisciplinary physics activities;
- chemical treatments;
- chemical cleaning;

The laboratory provide support to the acceleration division when necessary.



**Landis:** application of over 100 different pictorial pigments on canvas and on microscopy slides with various techniques (dispersion with linseed oil, gum arabic, egg yolk);

**Pandora:** different types of targets;

**ASFIN:** 400mg/cm<sup>2</sup> thick LiF target on 40mg/cm<sup>2</sup> carbon backing; Development of new targets of Na as sodium tungstate and Sr as carbonate.

**HSMDIS:** Painting of plastic materials with electrically conductive nickel paint

**NUMEN:** Sn deposition test at different speeds, on graphite, graphene and HOPG supports and with different types of buffer; characterization of the uniformity of thickness of the backing and of the deposited material; Injector service: high vacuum cleaning of metal parts;

**BCT:** preparation of aqueous solutions of sodium hydroxide and acetic acid;

**KM3NeT:** chemical descaling of two string releases; Copper removal from FR4 base supplied;

**PNRR Samothrace project:** cold welding with conductive paint of 2 SiC detectors on PCB board.

# Radiochemistry

## Szilard-Chalmers reaction

For the first time at the alpha laboratory at LNS a radiochemistry experiment was held through which it was possible to isolate the  $^{128}\text{I}$  radioisotope starting from a liquid organic matrix containing natural iodine, iodoethane, irradiated at LNS with high intensity neutron source.

This activity was proposed by Prof. Ivano Lombardo, with the collaboration of the radioprotection service the experimental apparatus development department and the contribution of the Ing. Andrea Miraglia of the technical division.





- New In Vacuum Evaporating Thermal System



# Reparto Gestione e Manutenzione Apparati Sperimentali

- Daniele Rizzo
- Davide Passarello

Activity: The department plays a very important role in the management of all the experimental equipment present at the LNS.

- Deals with designing new mechanical solutions, their automation
- Provides technical assistance to various research groups so that they can carry out their research activities within LNS and also outside.
- Design of vacuum systems (e.g. vacuum systems for I-LUCE, Magnex...)

# Decommissioning of various experimental devices :

MEDEA



CICLOPE



SOLE



Installation of the new beam line at the DFA in Catania

Among the various activities, the department modified the vacuum system in the test bench #1 at the detector-test laboratory to allow the use of a high intensity  $^{228}\text{Th}$   $\alpha$  source



## 60° and 80° beam lines & CT-2000

### Work to be done:

- Polishing parts of the floor
- Replacing all roots and roughing pumps with new dry pumps (order already placed)
- Alignment of the CT200 chamber
- Mounting the platform to access the CT200
  
- Cleaning all vacuum elements (chamber, parts of beam lines...)
- Upgrade and reinstallation of the CT-2000 control systems
- Re-cabling
- .....



# Magnex



Mounting the poles with the refurbished surface coils onto the existing Magnex dipole

Removal of the scattering chamber to be replaced by a new one.  
Displacement of the quadrupole to allow the installation of the diopole elements

