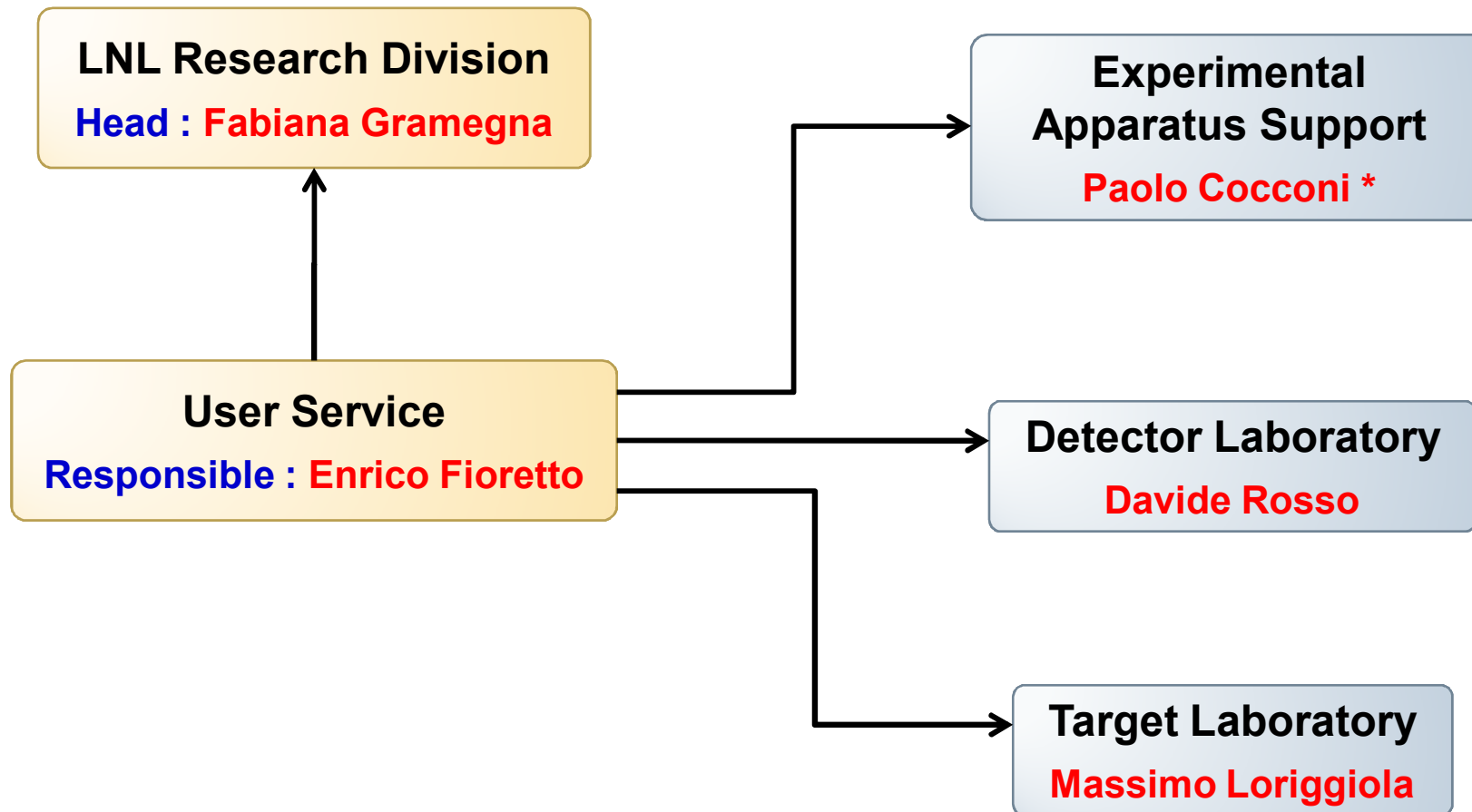


Status and activities of the LNL User Service

E. Fioretto

Organization chart

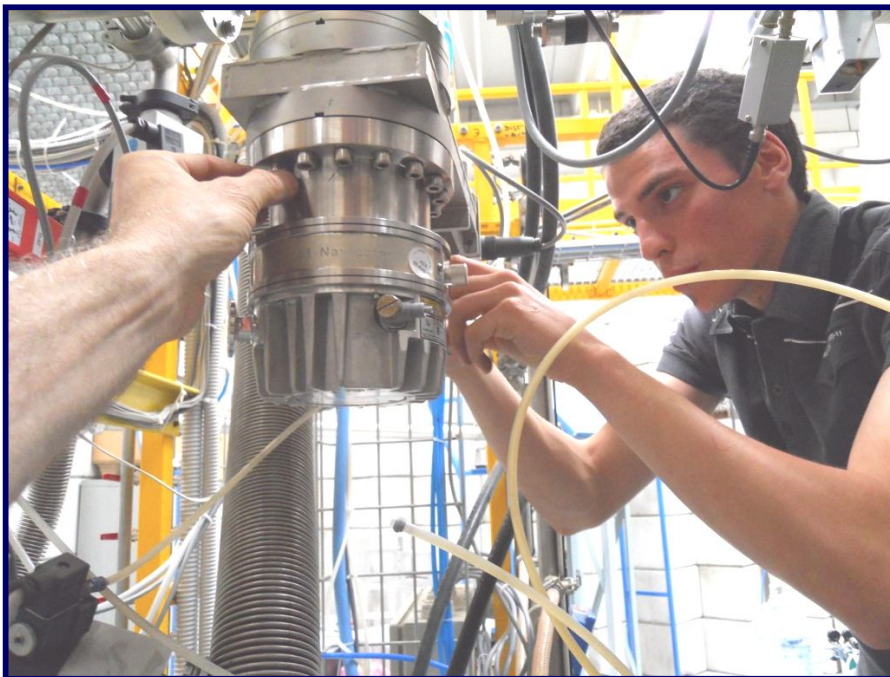


* Luciano Costa retired since 1st October 2014

The **support for vacuum systems** to experiments in data taking is provided by **Andrea Conte** belonging to the **Unit “Vacuum Technologies”** of the **Accelerator Division**.

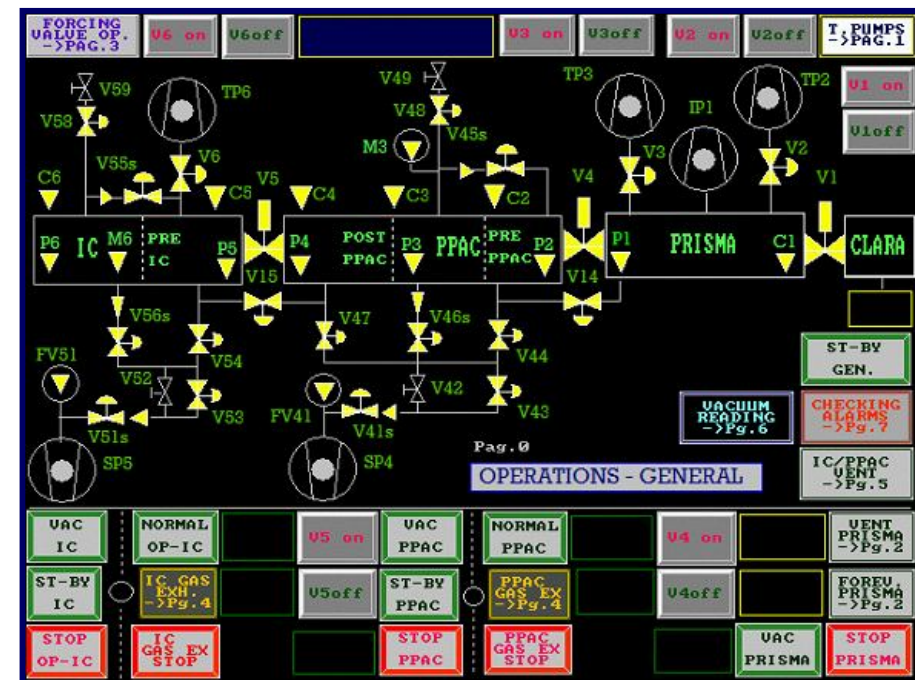
Experimental Apparatus Support

- ✓ **Maintenance and upgrade** of vacuum and **electrical equipment** of set-ups operating in the experimental areas of LNL accelerators
- ✓ **Installation of new experimental set-ups** (electrical and hydraulic plants) **and/or new vacuum systems**
- ✓ **Designing, assembling, commissioning and maintenance of vacuum control systems** on request of the experimental groups



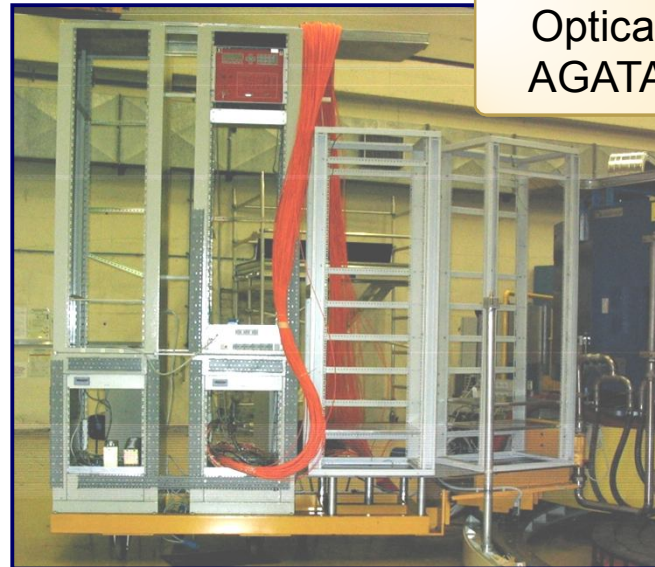
Maintenance and repairing of vacuum systems

Maintenance of PLC-based control systems for vacuum equipment

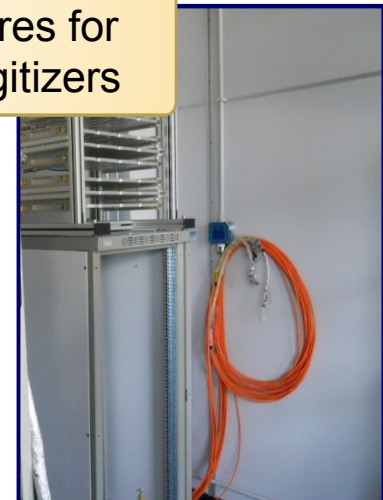


Experimental Apparatus Support

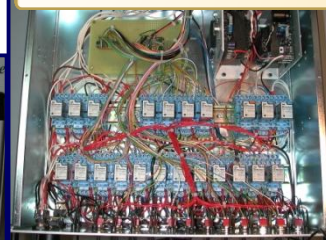
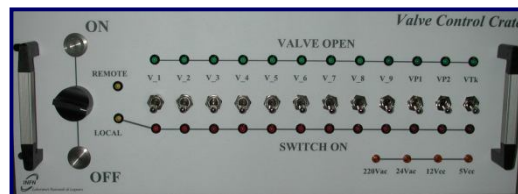
- ✓ **Infrastructures of experimental set-ups** – cryogenic plants, wiring and labeling of cables (signals, LV e HV), installation of optical fibres, etc.
- ✓ **Repairing and/or modifications of commercial or home-made electronics**
- ✓ **Support to the maintenance of instrumentation of other labs of the User Service**
- ✓ **Support to the activities of the other laboratories of the User Service**



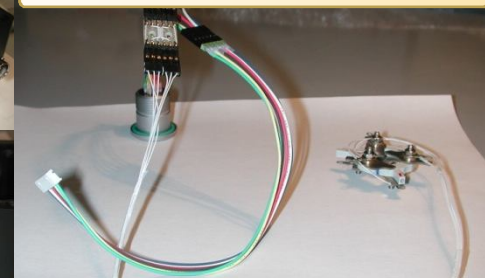
Optical fibres for AGATA digitizers



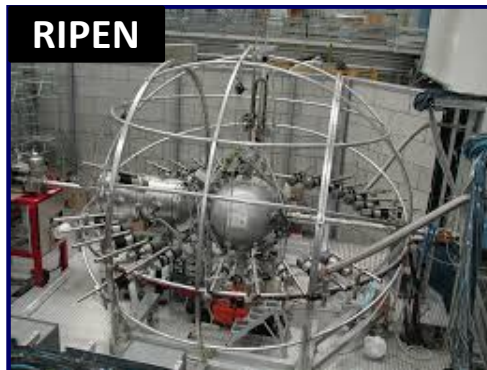
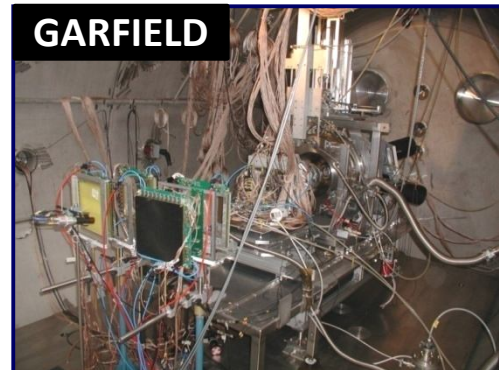
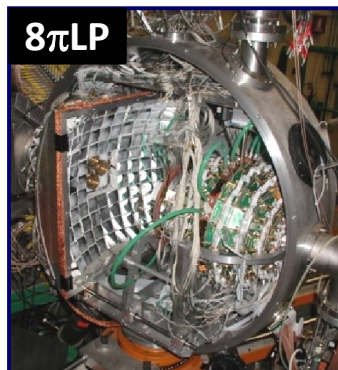
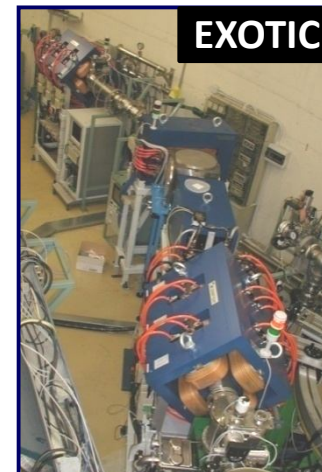
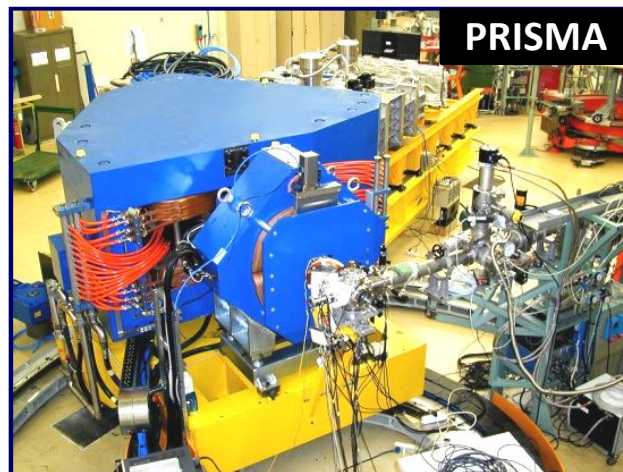
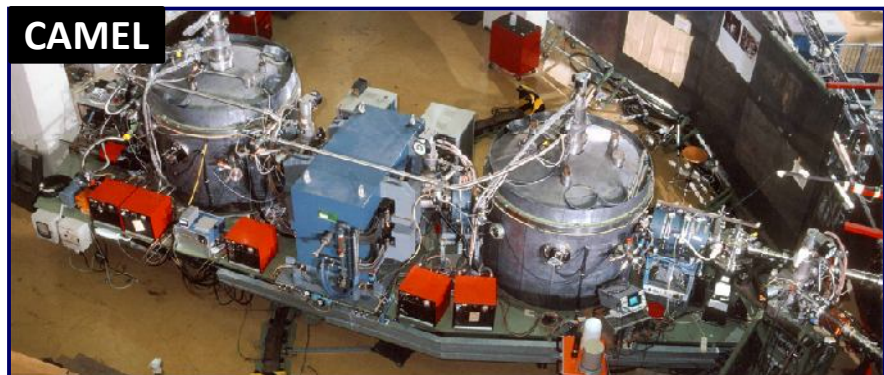
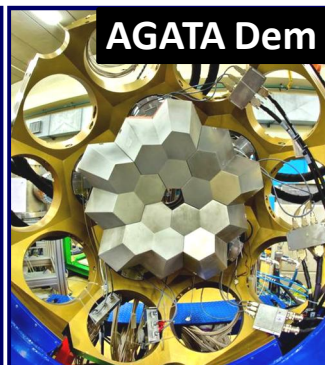
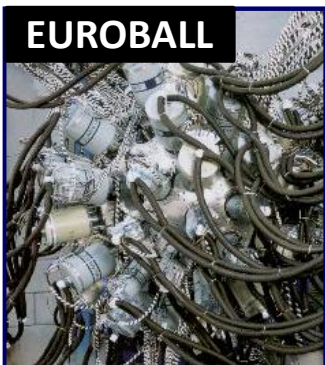
Valve control of AGATA



GALILEO collimator



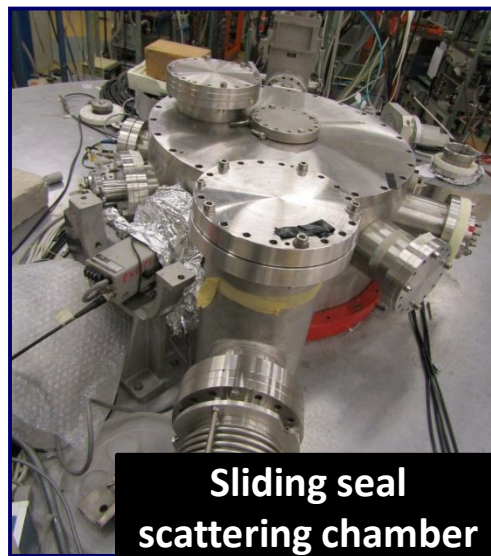
Experimental Apparatus Support



Experimental Apparatus Support



GAMPE



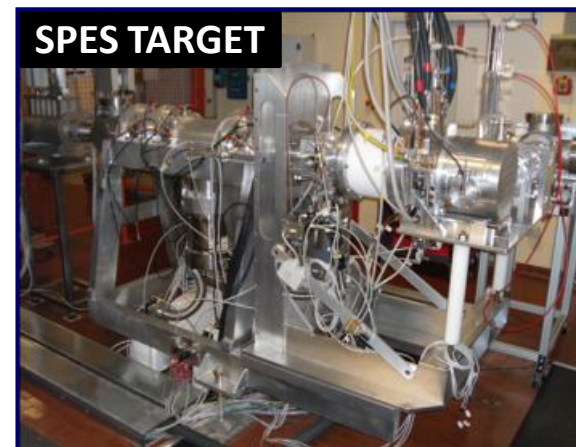
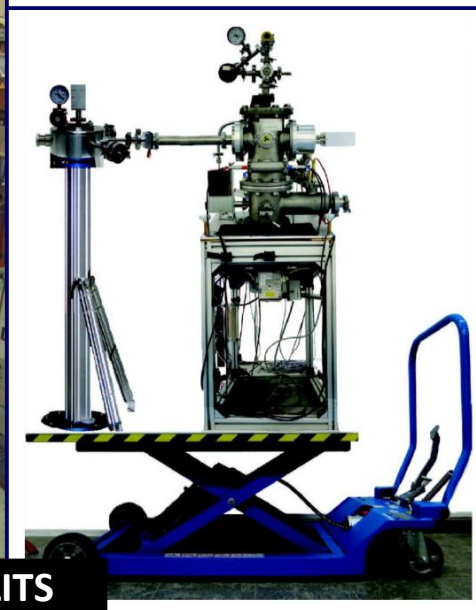
**Sliding seal
scattering chamber**



STARTRACK



ILITS



SPES TARGET

Experimental Apparatus Support

Due to more pressing administrative rules, since last year it was not possible to activate a specific annual contract for maintenance of electrical plants in the **experimental areas**. Thus, the Research Division had to use the contract activated by the Technical Division with the external companies **Boscaro** and **S. Marco** for the maintenance and modifications of **electrical** and **hydraulic plants**, respectively.

What doing for changes in the experimental areas or new installations →

The responsible of the experimental set-up has to:

- **define the kind of intervention to be done in the experimental area** (with the support of the “Experimental Apparatus Support”)
- **identify a contact person** who will discuss the kind and the procedure of intervention with the external company
- **ask for a cost estimation** to be sent to the Service “Plants Management & Safety”.

The User Service will support the works from the economical point of view in case of infrastructures of competence of LNL.

The experimental group will be supported by the “Experimental Apparatus Support” during the carrying out of the works.

Detector Laboratory

It **supports the experimental campaigns of γ -arrays** in data taking at the Tandem/PIAVE-ALPI accelerator complex (**GASP, EUROBALL, CLARA, AGATA Demonstrator, GAMIBE, GALILEO**).

In particular, the laboratory is involved in the following activities:

- ✓ **test of HPGe detectors**
- ✓ **annealing of HPGe detectors**
- ✓ **repairing of electronics on-board of HPGe detectors**
- ✓ **maintenance of critical parts of γ -arrays** (such as **LN2 filling systems** and **HVs, wiring and labeling of cables**)
- ✓ **maintenance of the laboratory equipment**
- ✓ **improving changes to the laboratory infrastructures**
- ✓ **support to the activities of other laboratories of the User Service**
- ✓ occasionally also **interventions** on HPGe detectors of different types requested **by other INFN Departments or by other institutions**. These requests are routinely supported in low priority by informing the LNL Director. Related expenses, due to the replacement of electronics components, are in charge to the experimental group.

Detector Laboratory : Equipment



Glove-box



Equipment for the annealing and the recovery of HPGe



Electronics for detector tests



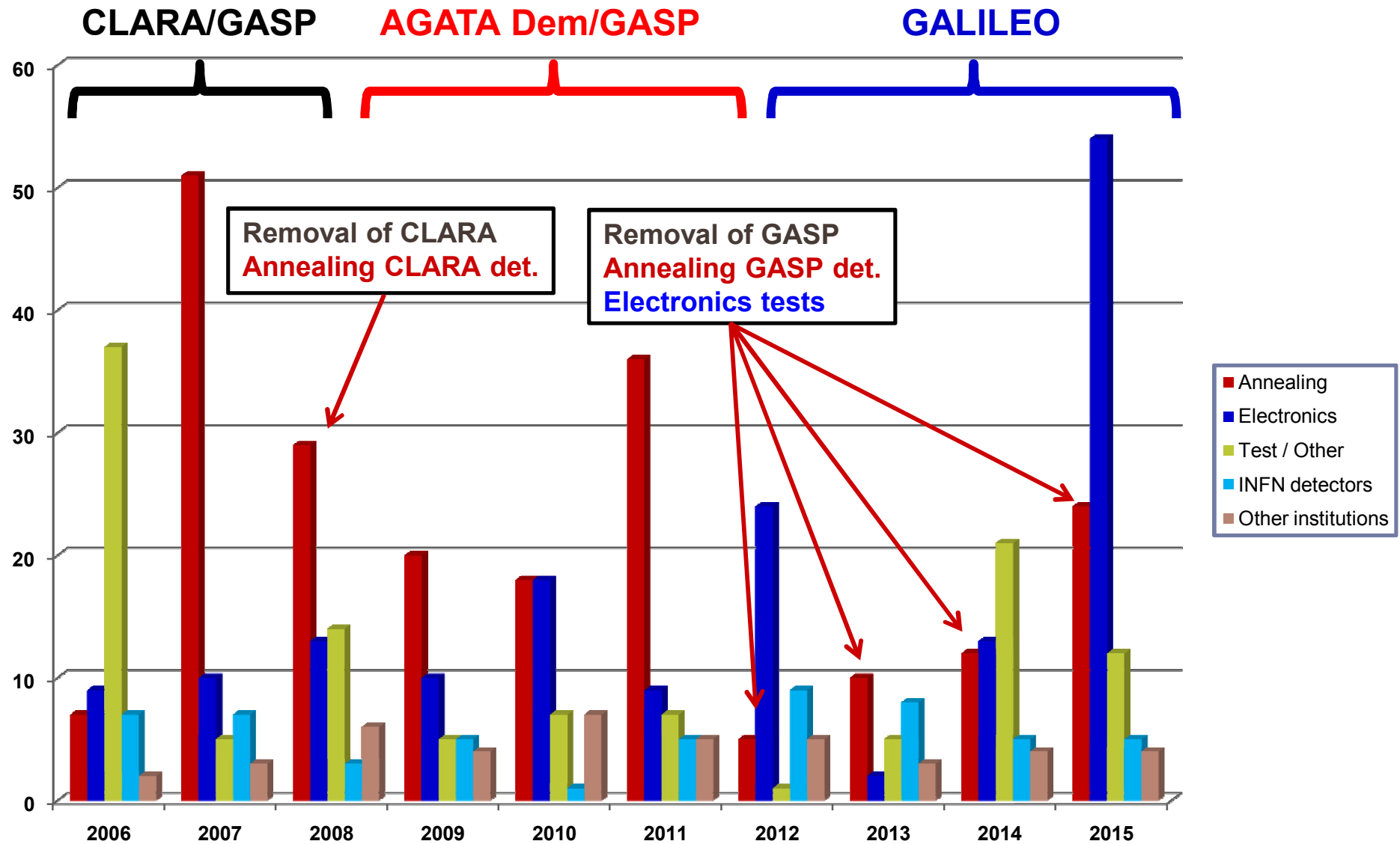
Automatic system for the LN2 filling of HPGe detectors



Digitizer

Extension of the lab for the AGATA Demonstrator

Detector Laboratory : Activity



Target Laboratory

The alchemy of target making



Techniques

- Resistive evaporation (Joule effect)
- Electron beam deposition
- Ion beam sputtering
- Mechanical rolling

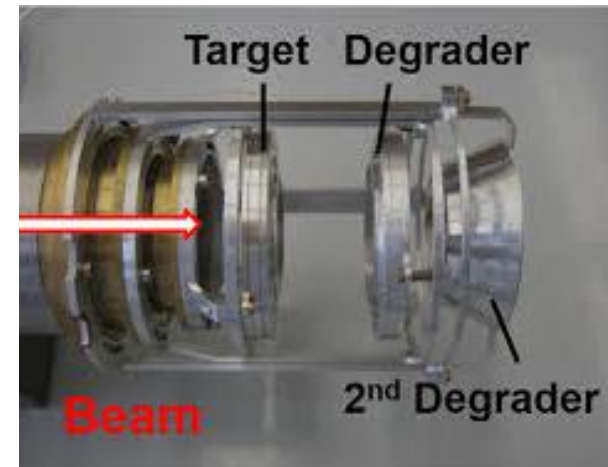
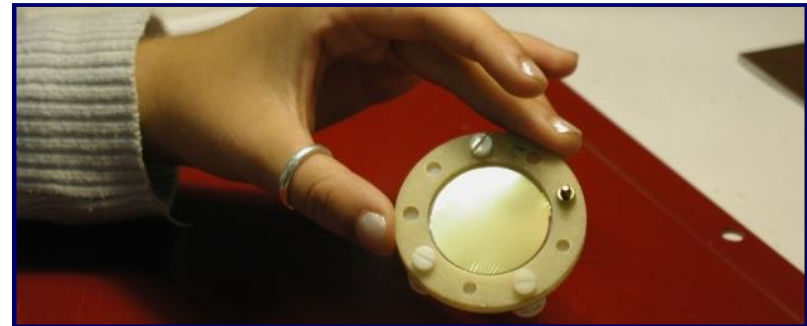
- ✓ **Production of targets** (self-supporting or deposited on different backing materials) for **nuclear physics** experiments at the **Tandem/PIAVE-ALPI** accelerator complex
- ✓ **Production of targets and depositions of thin film** on samples for **interdisciplinary physics** activities at the **CN** and **AN2000** Van der Graaff accelerators of LNL
- ✓ **Production of targets for experiments in other laboratories involving local groups** (occasionally and in low priority)

Target Laboratory

- ✓ **Stripper foils** for the XTU Tandem → (600 C foils 4 $\mu\text{g}/\text{cm}^2$ thick)
- ✓ **Backing foils**
- ✓ **Energy degrader foils**
- ✓ **Catcher & stopper foils**
- ✓ **Thin film depositions for windows and electrodes**

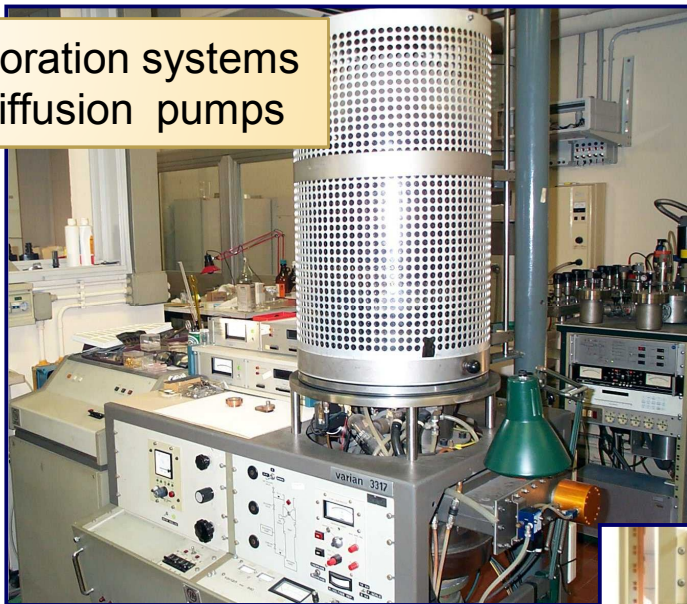
- ✓ **Maintenance of the equipment of the laboratory**
- ✓ **Improving changes to the laboratory infrastructures**

... but not only
targets

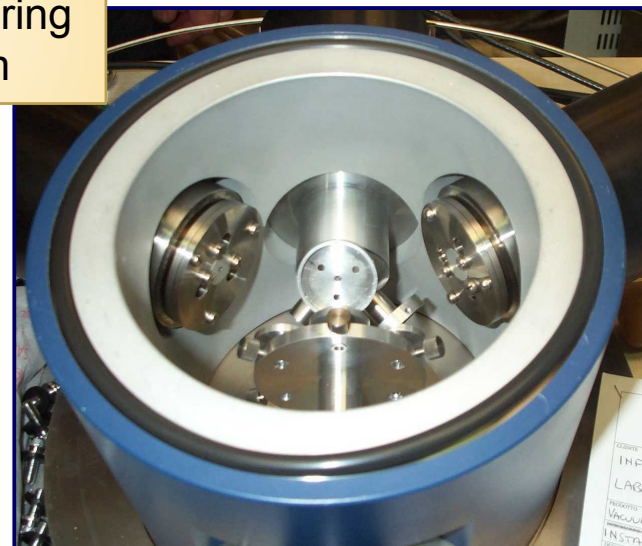


Target Laboratory : Equipment

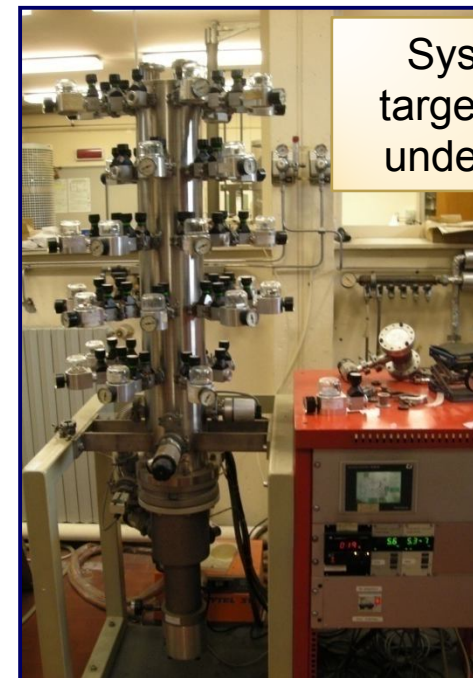
2 evaporation systems with diffusion pumps



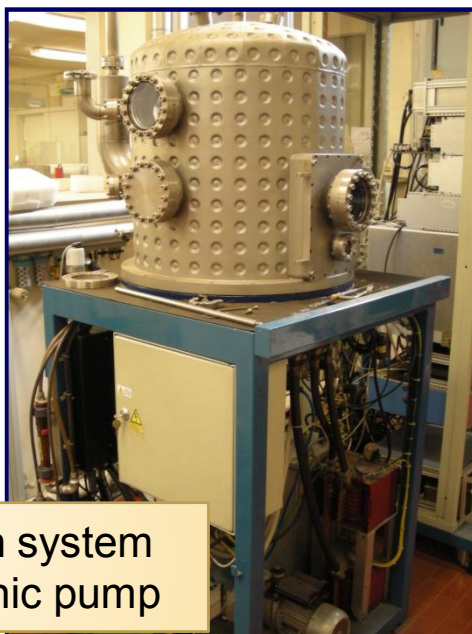
Ion sputtering system



Systems for target stocking under vacuum



Evaporation system with cryogenic pump



Target Laboratory : Equipment



Recirculation system
and gas purification



Glove-box



New gas distribution unit
+ O₂ sensors



Closet with exhaust fan
for isotope storage

Target Laboratory : Equipment



Equipment for weighing dusts
(Fume hood + precision balance)



Rolling mill



System based on the software
ImageJ for the thickness measure-
ments of films produced by rolling

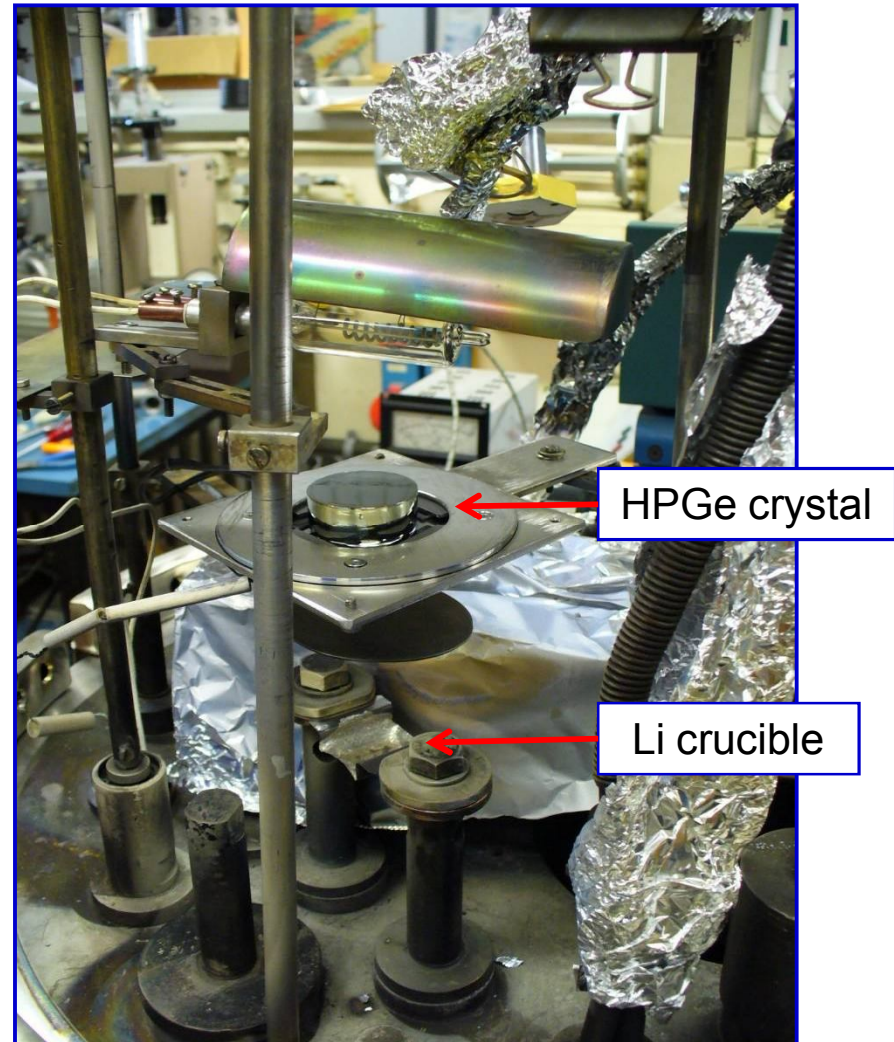
Target Laboratory : R&D of planar HPGe

The contact n^+ in HPGe detectors is routinely obtained through the Li diffusion.

A thin film of Li is evaporated on one side of the HPGe crystal which is then heated up to temperatures of the order of 300-400°C in order to enable the diffusion of the Li atoms inside the crystal.

The laboratory will be involved in the tests of production of Li-based contacts also for coaxial and segmented HPGe detectors.

S. Carturan, G. Maggioni, D.R. Napoli et al.



Target Laboratory : Form for target request

General Information

Experiment:

Acronym :		Title :	
Activity :		Accelerator :	

Only ~ 50% of experimental groups requires targets for experiments at LNL during the submission phase of the proposal

In some cases the request of targets is done up to one week before the date scheduled for the data taking !

Spokesperson:

Family name :		First name :	
Institution :			
Address :			
Phone :		Fax :	
E-mail :			

No feedback about the feasibility of targets for experiments to the scientific coordinator of the Tandem/PIAVE-ALPI accelerator complex

Targets

Target		Characteristics			Targets Number	Self supporting
Element, isotope, compound	Thickness	Allowance(%)	Uniformity(%)			
208Pb	150ug cm ² +50ug cm ⁻²	10	10	3	Y	
Backing		Characteristics				
Element, isotope, compound	Thickness	Allowance(%)	Uniformity(%)			

Continuous changes in laboratory planning

Radio Protection Service

RP service

Radiation Protection Service accomplishes his mission by:

- ✓ Establishing, adopting, and maintaining radiation protection standards for LNL accelerators, X-ray equipment and other radiation monitoring devices and radioactive materials
- ✓ Providing technical assistance to users of radioactive materials and radiation-emitting devices
- ✓ Conducting environmental radiological surveillance
- ✓ Assuring calibrated radiation detection equipment
- ✓ Providing on-call staff to respond to radiological emergencies and follow-up investigations
- ✓ Providing all calculations needed for shielding
- ✓ Keeping exposure records of the exposed LNL personnel.

Services include:

- ✓ Provision of personal dosimetry service for radiation workers
- ✓ Keeping exposure records of the exposed LNL personnel
- ✓ Guidance on radioactive source safety protocols and practices
- ✓ Surveys and source audits
- ✓ Collection and disposal of low-level radioactive waste.

RP Service : Access to controlled areas

Moreover, **access into an experimental hall in the presence of the beam** sometimes is necessary. This permission can be given by the LNL Expert Qualified under user request (at least 4 days in advance) to deliver at the Radiation Protection Service.

TANDEM SALE SPERIMENTALI: TUTTE

ENERGIE: quelle del TANDEM

FASCI ACCELERATI: tutti con $Z > 11$ **Mg**

CORRENTE: max 10 nA in F.C.7

ACCELERATORE AN2000

ENERGIE: quelle dell'AN2000

FASCI ACCELERATI: tutti escluso quello di deuterio

CORRENTE: max 10 nA sul bersaglio

TANDEM/ALPI SALE SPERIMENTALI: TUTTE

ENERGIE: quelle di ALPI

FASCI ACCELERATI: tutti con $Z > 14$ **P**

CORRENTE: max 1 PnA in F.C.7

ACCELERATORE CN

PER SOLI ESPERIMENTI DI RADIOBIOLOGIA

ENERGIE: quelle del CN

FASCI ACCELERATI: protoni e He

CORRENTE: max 5 nA sul bersaglio