

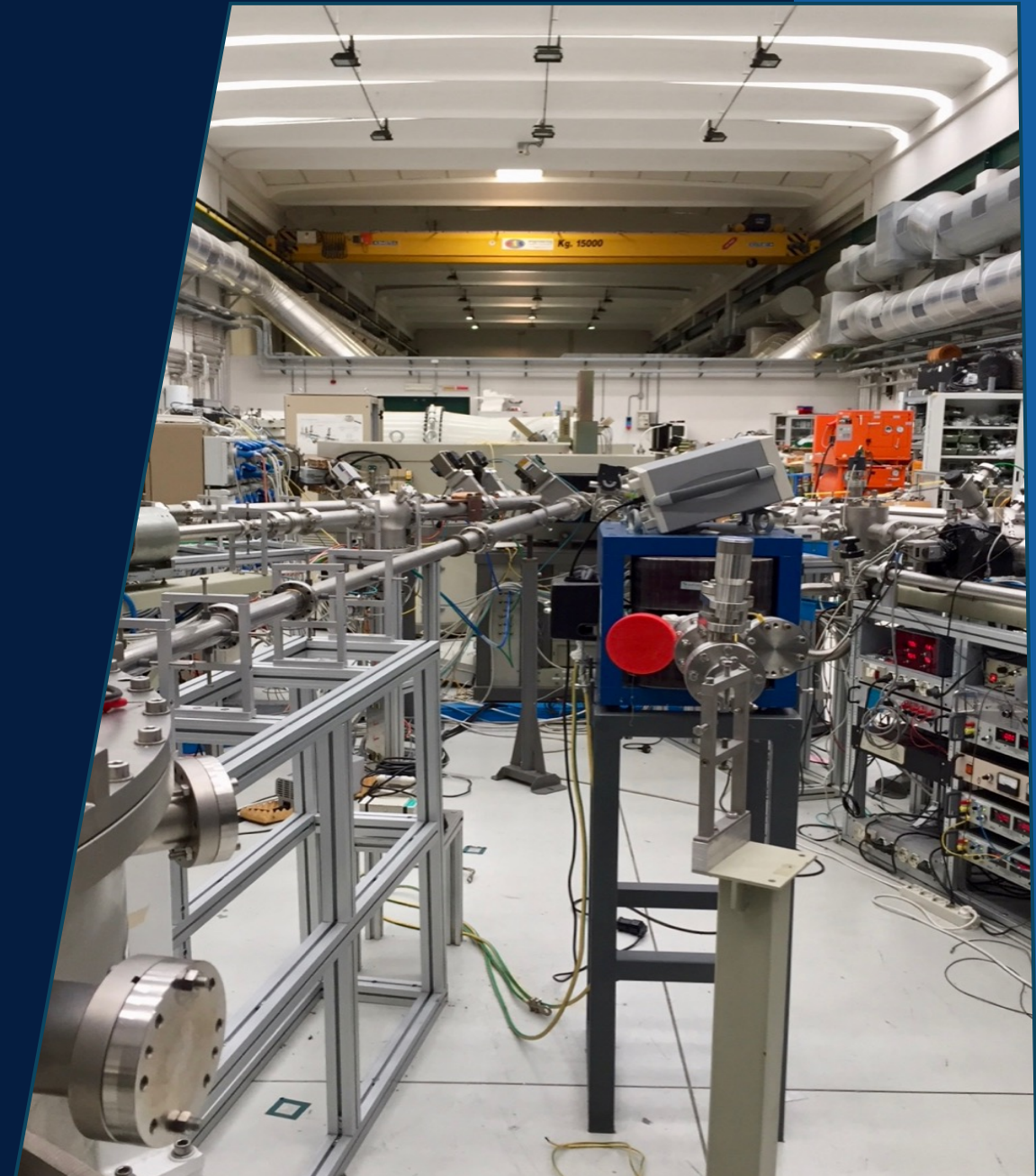
Attività LABEC su acceleratori: stato e prospettive

PARTE 1

Mariaelena Fedi

INFN Sezione di Firenze
INFN-CHNet Cultural Heritage Network

PER IL LABEC



About us



Environment
(particulate
matter)



Heritage
Science



Materials



Technological
developments



Communication and Outreach

About us

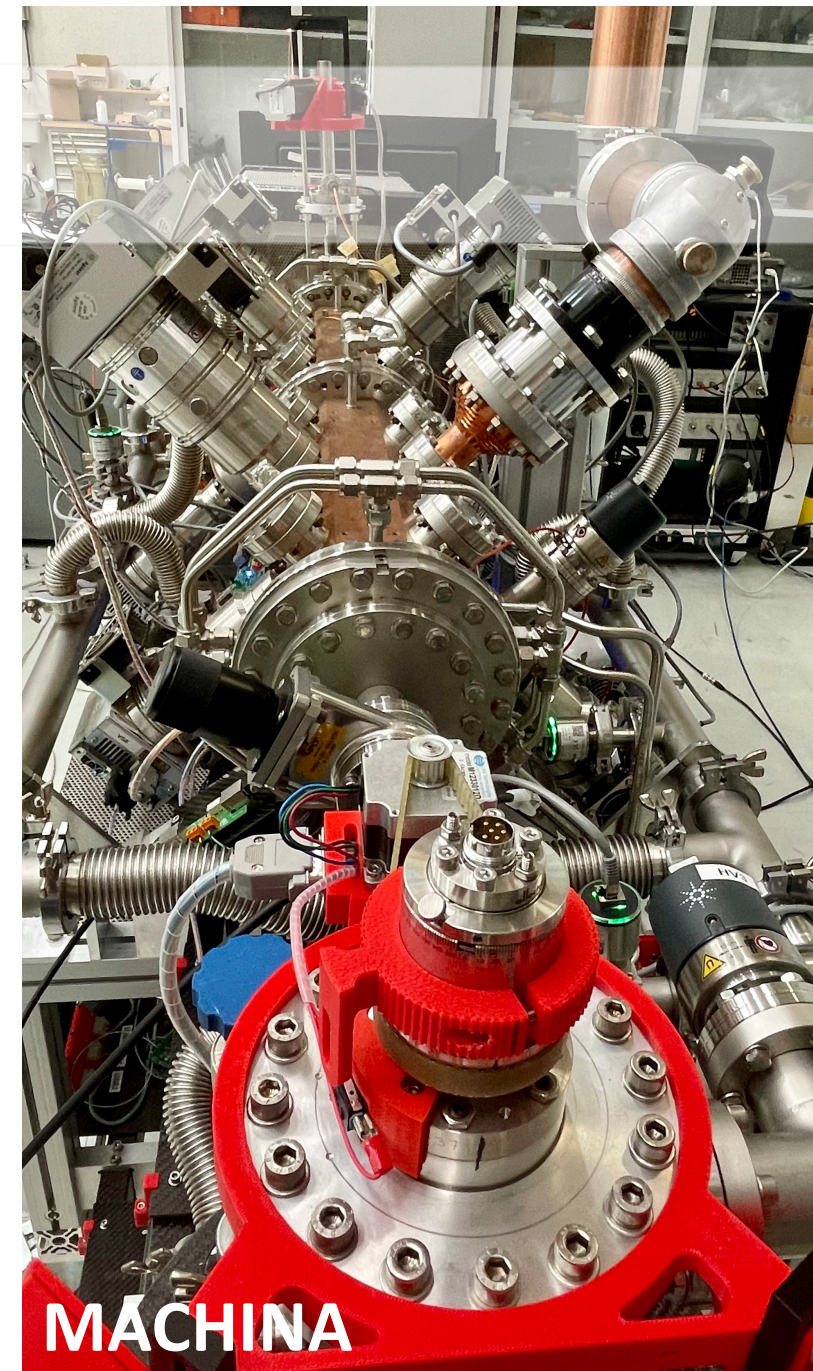
- LABEC is jointly managed by INFN and the Department of Physics and Astronomy of the University of Florence
- Physicists, conservation scientists, chemists and technicians are full time involved in the laboratory activities (also considering initiatives which are not based on accelerators)



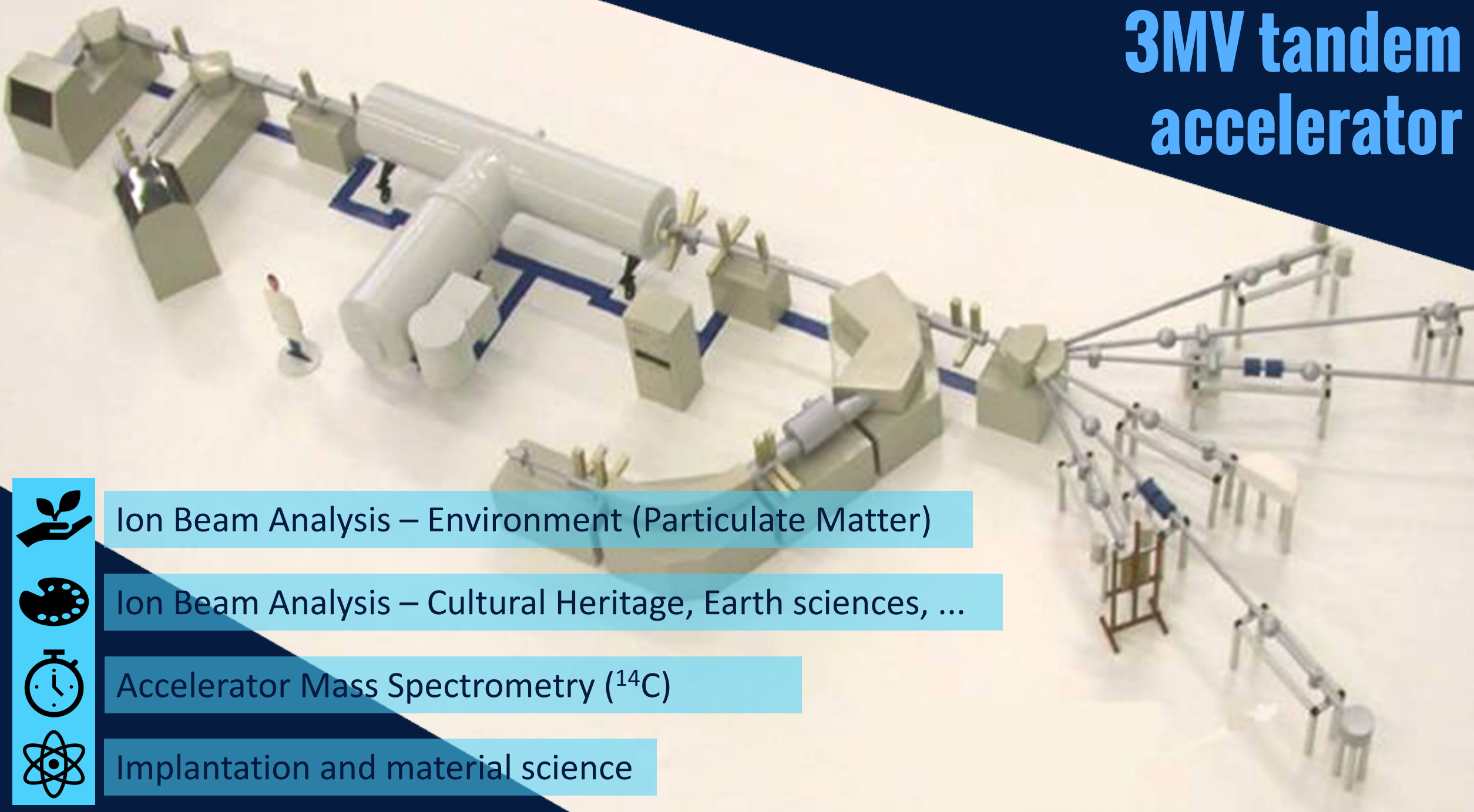
Users of the lab mainly coincide with LABEC staff

The laboratory is adopting new managing systems in order to take part to new network infrastructures for users

The LABEC accelerators



3MV tandem accelerator



Ion Beam Analysis – Environment (Particulate Matter)



Ion Beam Analysis – Cultural Heritage, Earth sciences, ...

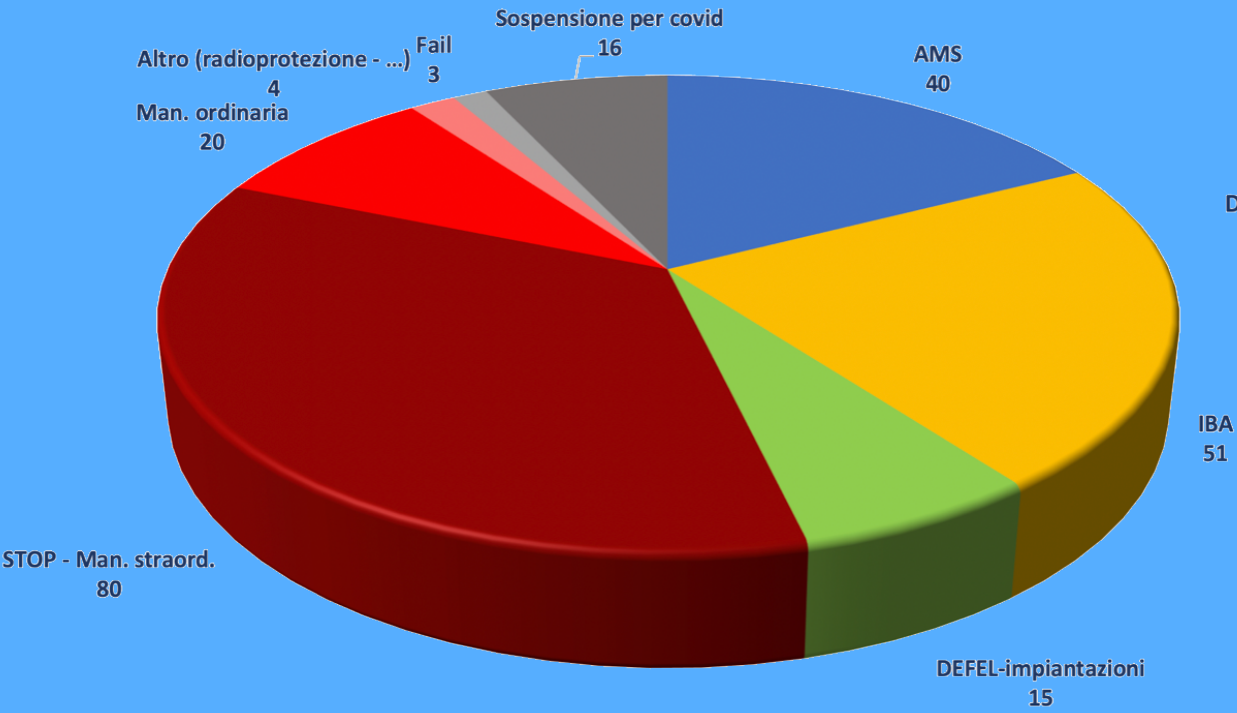


Accelerator Mass Spectrometry (^{14}C)

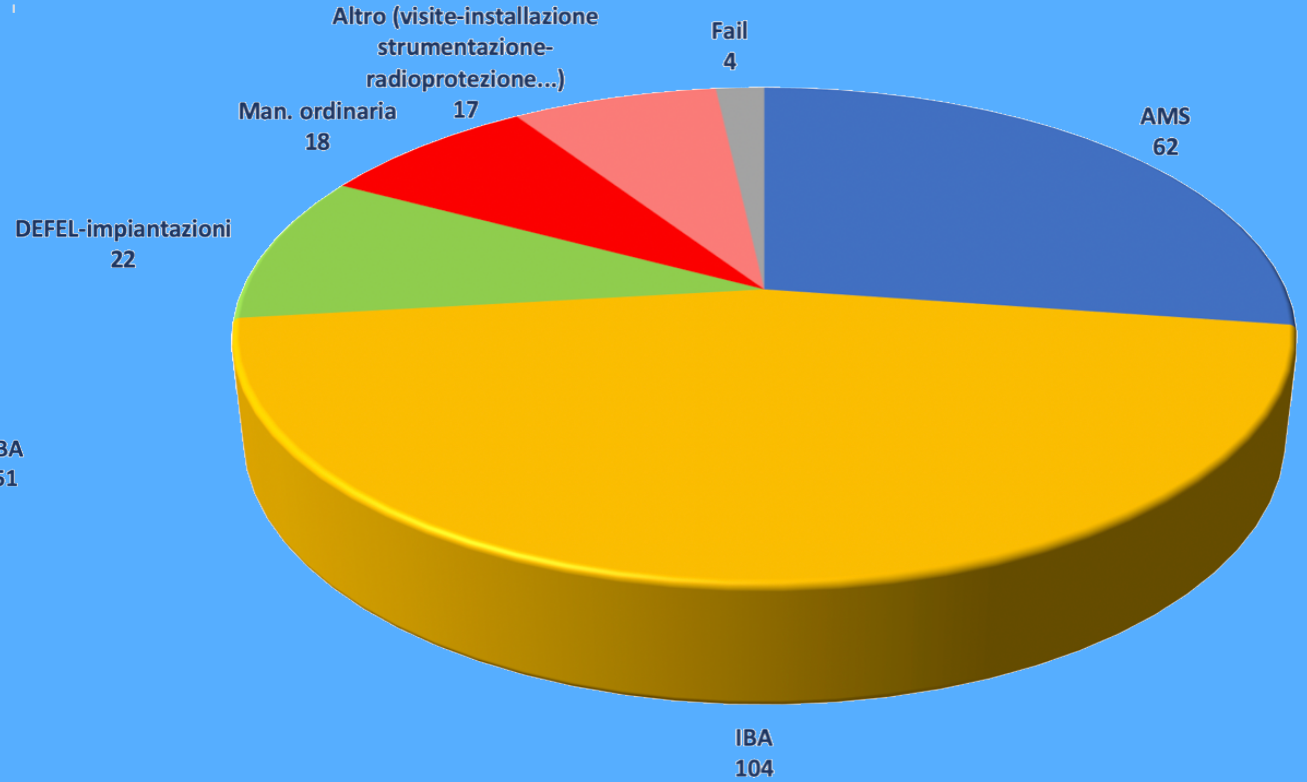


Implantation and material science

2021

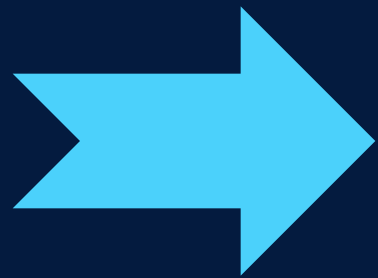


2022



Working @3MV accelerator

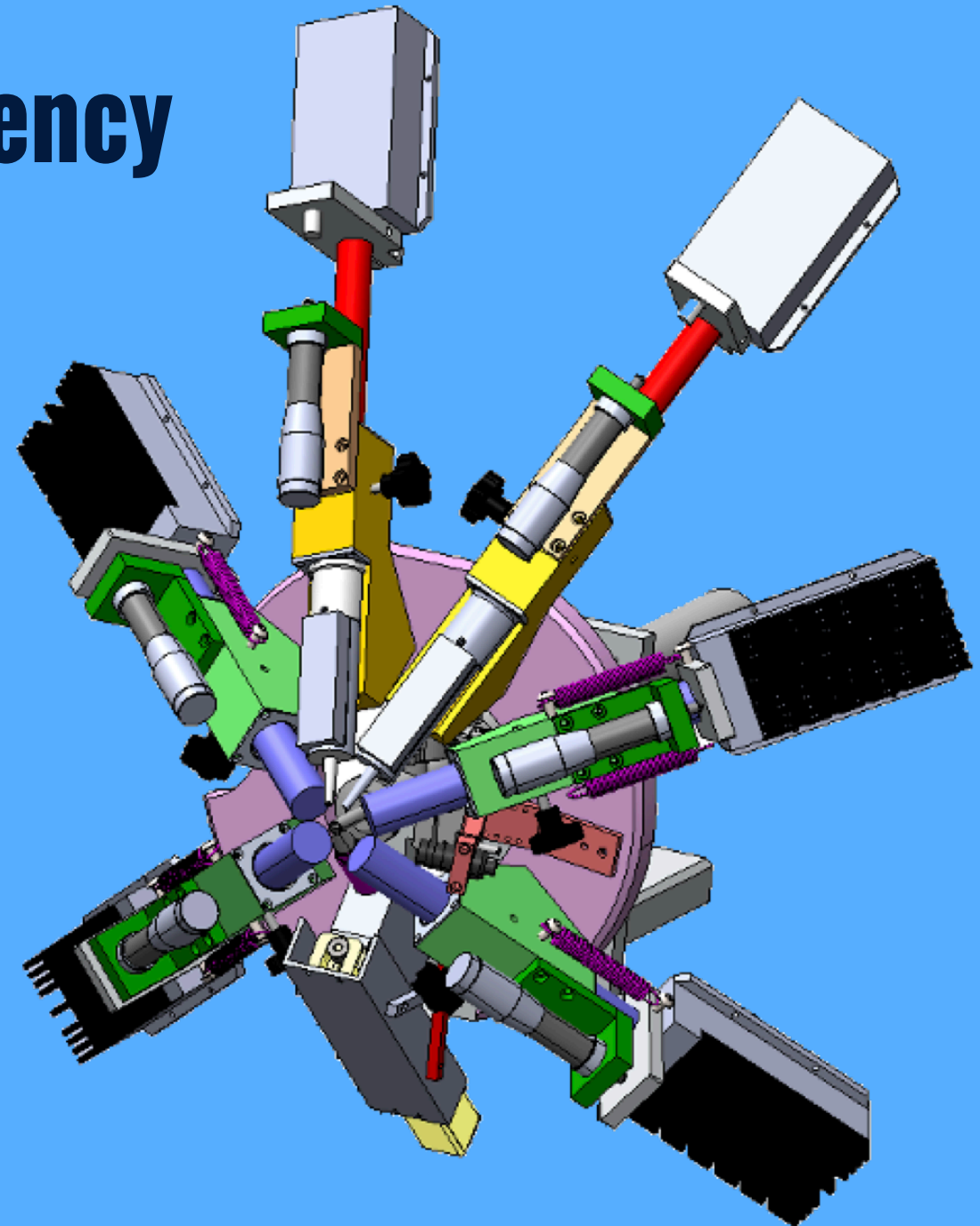
Hardware developments on 3MV



Setting-up and maintaining high efficiency instrumentations to be used in measurement campaigns when sensitivity, precision, accuracy and number of processed samples are fundamental

Improving detection efficiency in IBA

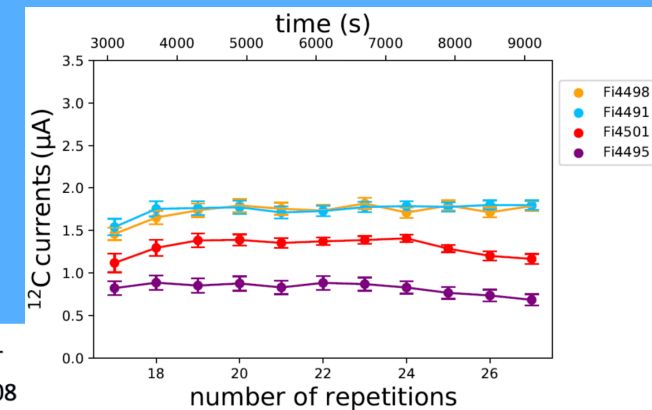
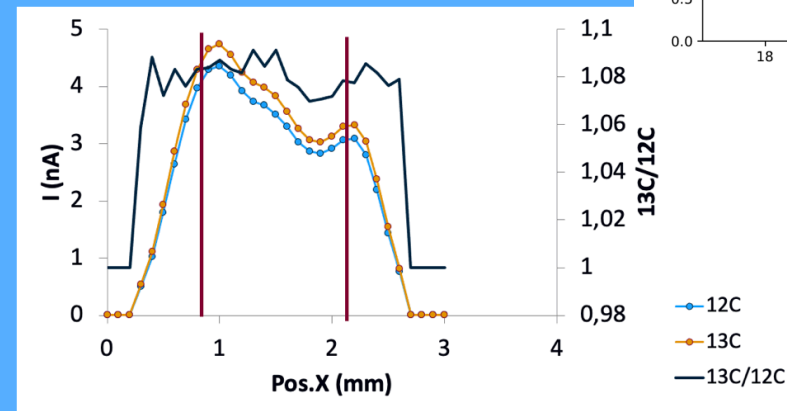
- PIXE (Particle Induced X-ray Emission) is a very powerful technique to study the composition of particulate matter (thus contributing to reconstruct the emission sources)
- New detection set-up integrating multiple SDD detectors to improve detection limit and the overall throughput of the measurements



Optimizing the AMS beam line to count ions in very small samples

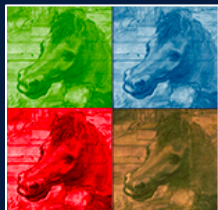
- Our typical ^{14}C -AMS samples are of the order of $700\ \mu\text{gC}$
- In the last few years we have developed a sample prep set-up and measurement procedure to measure samples as small as only $50\ \mu\text{gC}$

Developed through CSN5 experiments (CHNet_Lilliput and ISPIRA)



Measurement campaigns in international contexts

LABEC has been involved (and it is at present) in European projects giving TransNational Access to scholars and scientists of different disciplines



IPERION HS

*Integrating Platforms for the
European Research Infrastructure
ON Heritage Science*

>100 days dedicated to 14C-AMS
(sample preparation + AMS
measurements)
Just concluded (March 31st)



ReMade@ARI

*Ecyclable MAterials DEvelopment
at Analytical Research
Infrastructures*

400 hours (expected) for IBA
measurements on innovative
materials for the circular economy
Until 2026

What about the next?



Expected development on the hardware side

Also more on applications

LABEC is part of **ITINERIS** (*Italian Integrated Environmental Research Infrastructures System*, PNRR IR0000032, <https://itineris.cnr.it/>)
→ measurements access for users (250 hrs) for PIXE on particulate matter and developments

LABEC is part of **GAIA**, PRIN project (G. Calzolari, INFN Firenze, PI) → analysis and modelling of the particulate matter in the Arctic region by sampling at different latitudes to study climate change



Our colleagues are going to leave for the sampling campaign navigating along the North sea on next summer

German polar research vessel POLARSTERN-photo by Hannes Grobe, Alfred Wegener Institute

**All the LABEC activities are possible thanks to the
expertise and competences of all the people
working in the lab!**

... and now Parte 2!