

SPES^{α β γ δ} MED

Laboratori Nazionali di Legnaro – INFN

Hands-on Workshop on IRIS Control Software

Introduction to the ISOLPHARM Radionuclide Implantation Station (IRIS)

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September 17th, 2025

Today outline

10:00	→ 10:05	Welcome	⌚ 5m	📍 Sala Rostagni
		Relatori: Alberto Andriguetto (Istituto Nazionale di Fisica Nucleare), Emilio Mariotti (Istituto Nazionale di Fisica Nucleare)		
10:05	→ 10:25	Introduction to the ISOLPHARM Radionuclide Implantation Station (IRIS)	⌚ 20m	📍 Sala Rostagni
		Relatori: Aurora Leso (Istituto Nazionale di Fisica Nucleare), Davide Serafini (University of Siena & INFN-LNL)		
10:25	→ 11:00	The IRIS fancy GUI	⌚ 35m	📍 Sala Rostagni
		The target of this presentation are beginners, so the pace will be slow and every step will be explained. Feel free to ask questions during the presentation.		
		Relatori: Daiyuan Chen (Istituto Nazionale di Fisica Nucleare), Massimo Giuseppe Martello (INFN-LNL)		
11:00	→ 11:20	Coffee break	⌚ 20m	📍 Sala Rostagni
11:20	→ 12:20	IRIS hands-on at SPES	⌚ 1h	📍 SPES
		Volunteers will operate IRIS to perform <i>collection + measurement</i> cycles at SPES.		
12:30	→ 14:00	Lunch break	⌚ 1h 30m	📍 Canteen
14:00	→ 15:00	IRIS hands-on at SPES	⌚ 1h	📍 SPES
		Volunteers will operate IRIS to perform <i>collection + measurement</i> cycles at SPES.		
15:00	→ 15:40	Debriefing	⌚ 40m	📍 Sala Rostagni
		Discussion starting from the presentation of the known open issues and from the feedbacks from the audience.		

Outline

- Introduction
- IRIS at SPES
- Conceptual workflow
- Detector focus

Production techniques

- ISOL
- Nuclear reactor
- Cyclotron



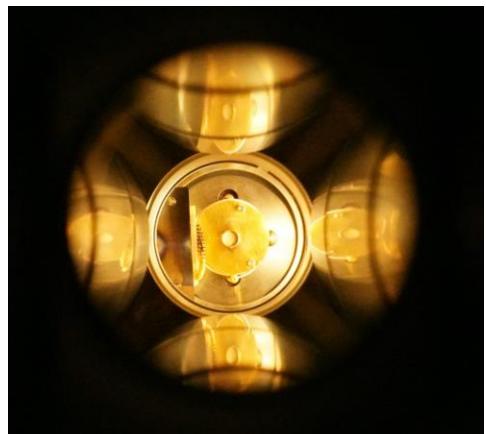
SPES cyclotron

LENA reactor

SPES ISOL bunker

Radioisotope Service for Medicine
and Applied Physics (RMFA):

- LARAMED -> cyclotron
- ISOLPHARM -> ISOL



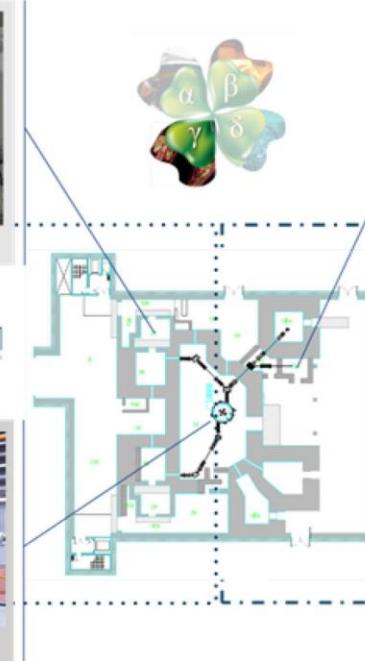
SPES front end



ISOLPHARM
SPES exotic beams for medicine



SPES cyclotron

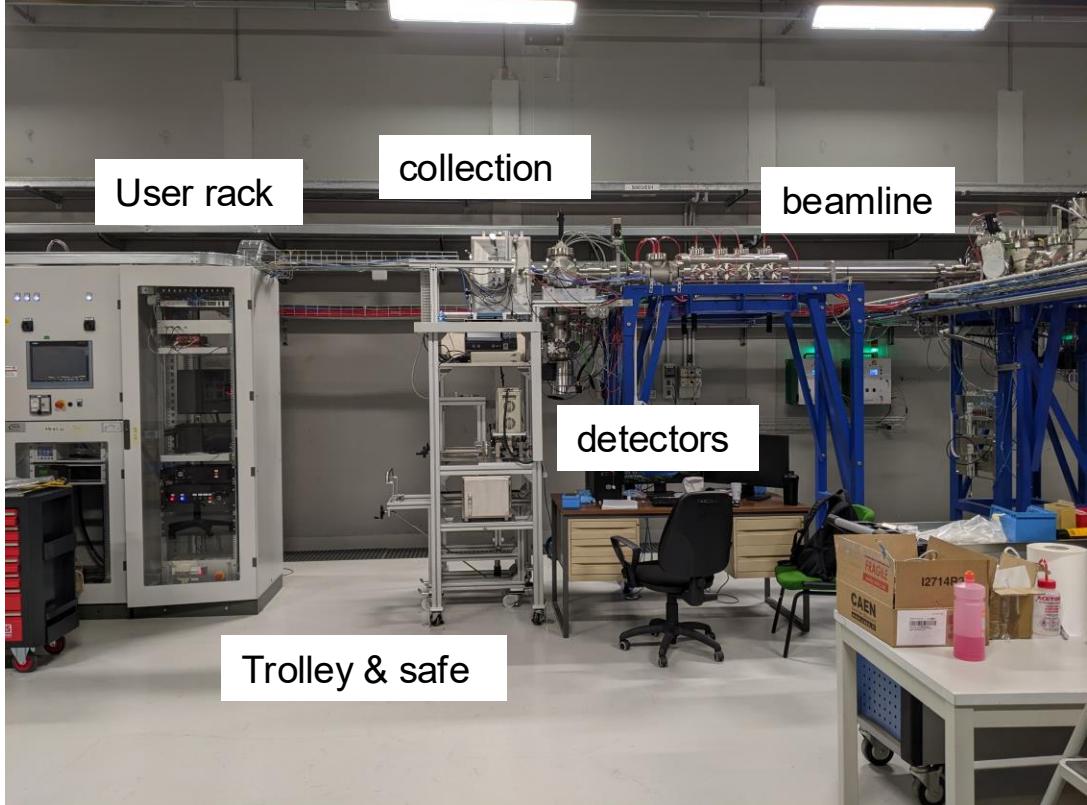


LARAMED bunker for nuclear cross section measurements

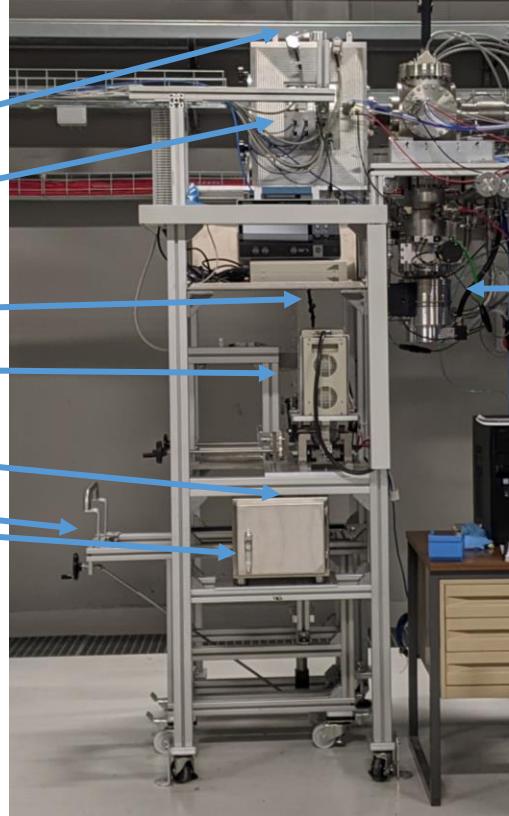


IRIS is in S003, beamline at 0°

- Updated pic of the beamline



IRIS collection and detection

- Top loading slider
 - Irradiation site
 - Bottom unloading slider
 - Detectors
 - Vial
 - Trolley
 - Lead safe
- 
- A photograph of the IRIS collection and detection system. The apparatus is a tall, stainless steel frame mounted on wheels. At the top, there is a complex assembly of pipes, valves, and a small chamber. Below this, a vertical tube extends downwards through several horizontal platforms. The middle section features a large rectangular opening with a grid pattern. Arrows point from the labels to specific parts of the machine: 'Top loading slider' points to the top assembly; 'Irradiation site' points to the central vertical tube; 'Bottom unloading slider' points to the lower part of the vertical tube; 'Detectors' points to the side panels; 'Vial' points to a small container on the left; 'Trolley' points to the base structure; and 'Lead safe' points to a wooden cabinet on the right.
- Beamlime Vacuum pump

IRIS user rack

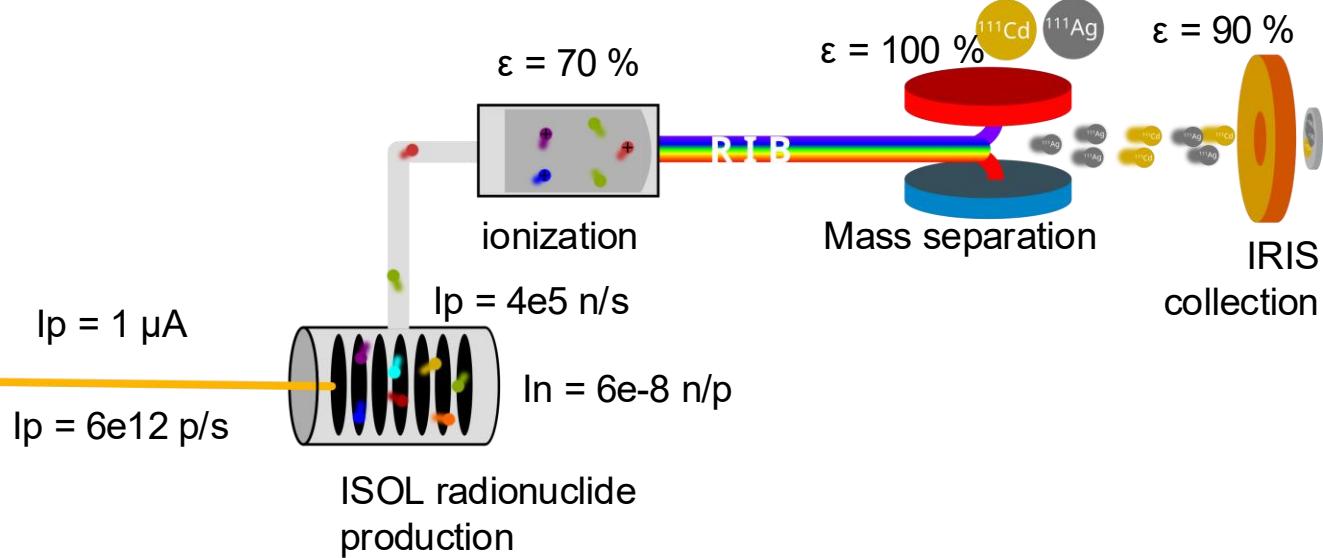
- Optical switch
- Network switch
- Detectors signals panel
- Digitizers and HV module
- Computer
- LED box
- Motors box
- MPS box



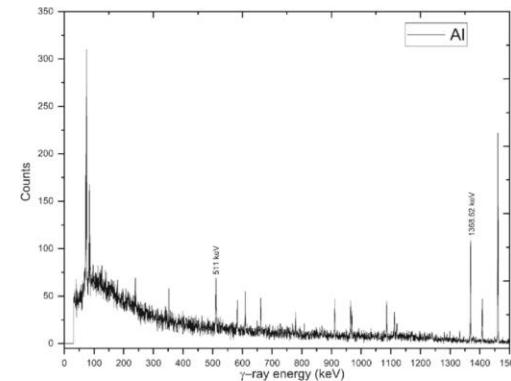
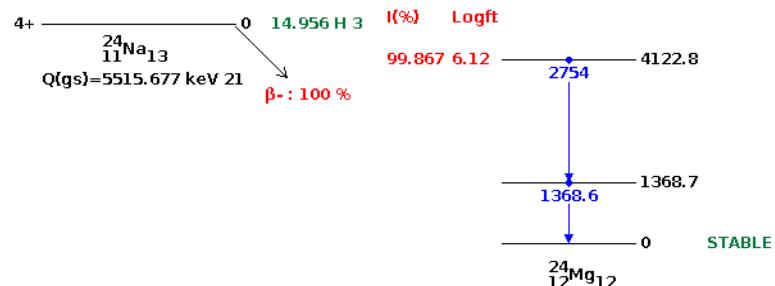
Physics example: Na-24



SPES cyclotron



Physics example: Na-24



What is IRIS useful for?

IRIS can:

- collect radionuclides
- Measure their activity

Putting together the information from the proton beam, it is possible to:

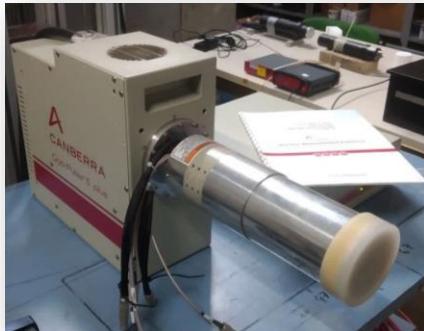
- estimate the yield of production

Or, assuming the calculations for the yield:

- Estimate the efficiency

Instruments

- **HPGe** detector
- **LBC** detector

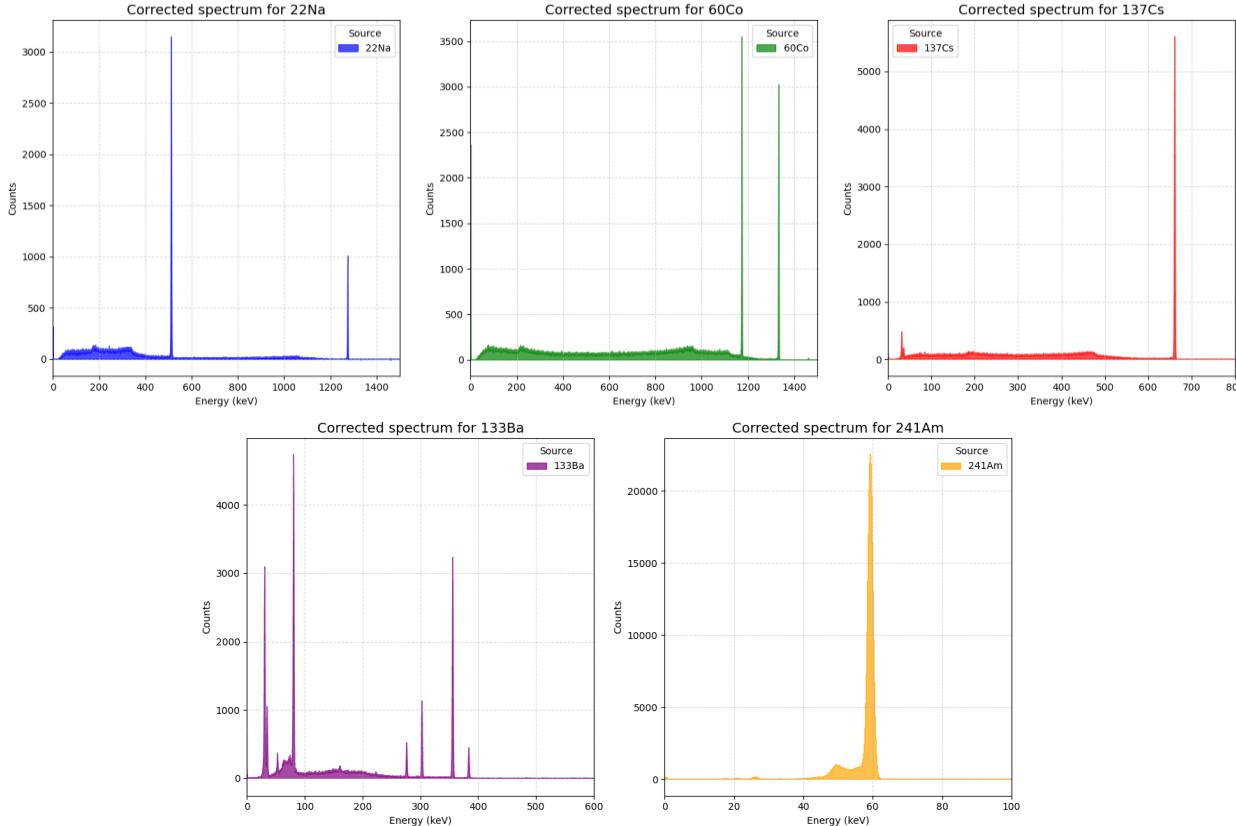


GOAL

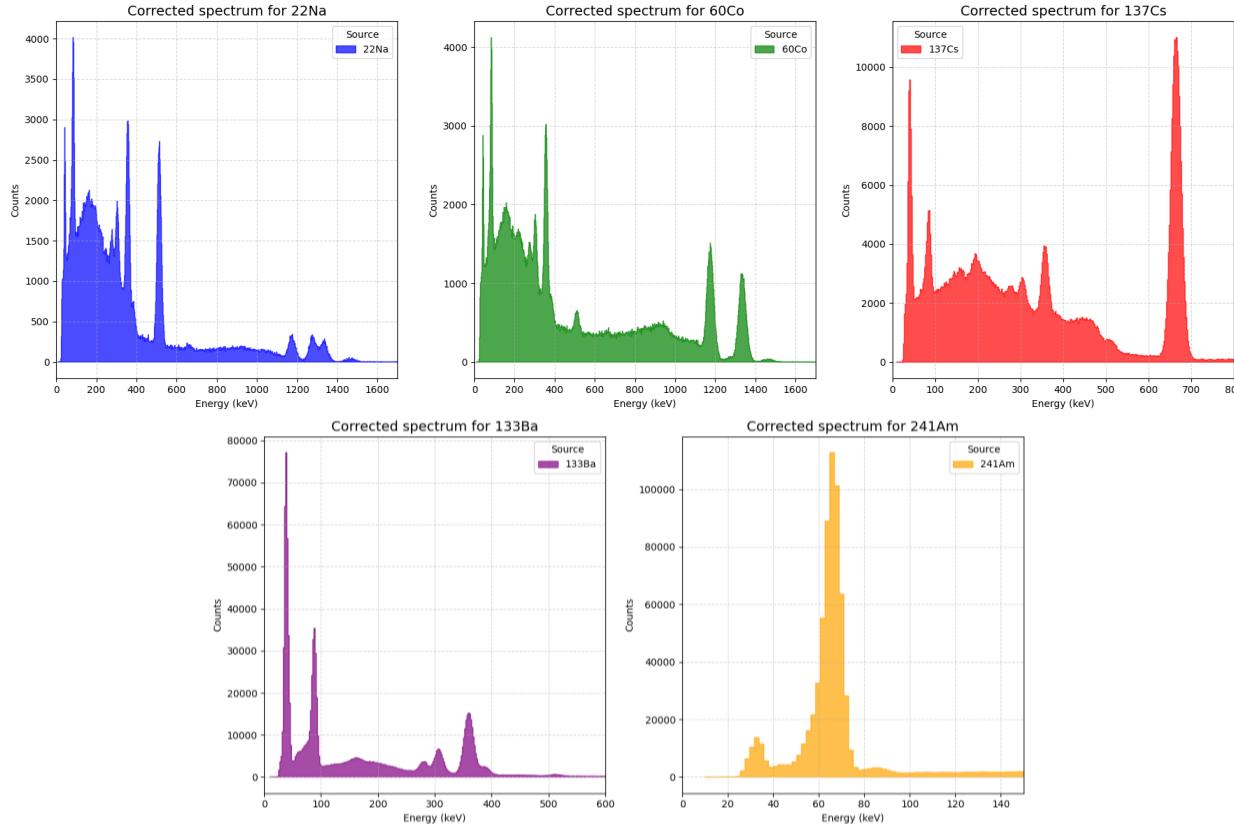
Having the **two detectors acquiring a gamma source at the same time** yet not in coincidence



The HPGe spectra ☺



The LBC spectra ☺



The two spectra: LBC and HPGe

100k

Combined calibration spectra for LBC detector



20k

Combined calibration spectra for HPGe detector



Thanks