ISOLPHARM CORE

INFN Istituto Nazionale di Fisica Nucleare LABORATORI NAZIONALI DI LEGNARO

SPES MED

Laboratori Nazionali di Legnaro – INFN

Hands-on Workshop on IRIS Control Software

Debriefing

The audience

September 17th, 2025

Today outline

10:00 → 10:05 **Welcome** — 5m — Sala Rostagni

Relatori: Alberto Andrighetto (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 *collection + measurement* cycles at SPES.

12:30 → 14:00 **Lunch break** — 1h 30m — Canteen

14:00 → 15:00 **IRIS hands-on at SPES** — 1h — SPES

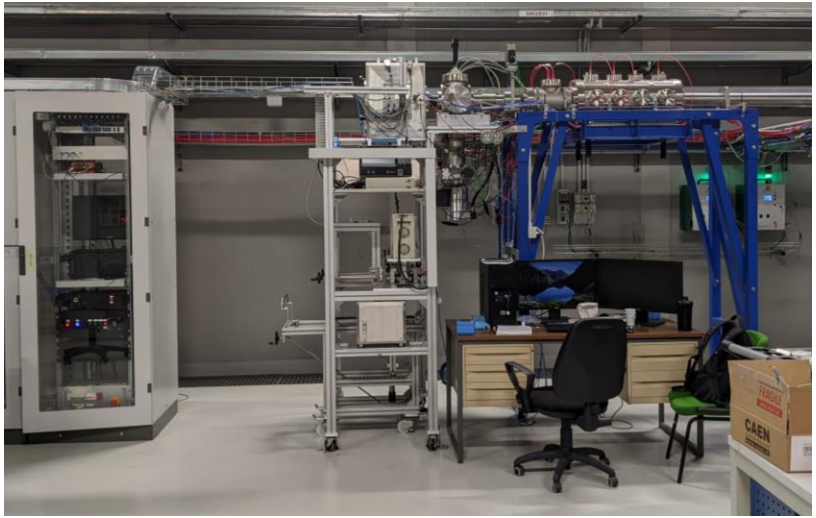
Volunteers will operate IRIS to perform *collection + measurement* cycles at SPES.

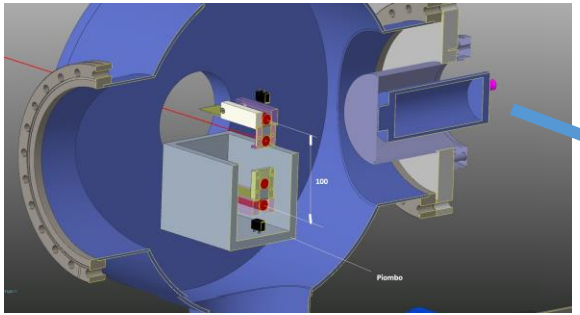
15:00 → 15:40 **Debriefing** — 40m — Sala Rostagni

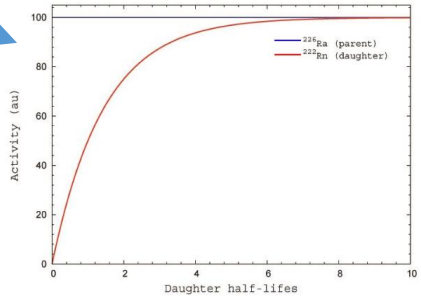
Discussion starting from the presentation of the known open issues and from the feedbacks from the audience.

Mechanics

- Simplify tablet movement sequence
- Add online detector for activity measurement during irradiation
- Add online beta detector for beta-gamma coincidence







Software

- Looking for an integrated solution
- Excel is:
  - Simple
  - Easy to check
  - But not smart

Column	Data
ID	Identifier for that "run"
A	Mass number
Element	Chemical name
Yield	Rate of isotope production through the system in units of /sec/μA
$t_{½}$	Halflife of the isotope
E_γ	Gamma-ray energy
b_γ	Absolute intensity of the gamma-ray
δb	Uncertainty in branching ratio
N_γ	Number of gammas observed
ΔN_γ	Uncertainty in N_γ
t-col'ct	Amount of time per cycle collecting the samples
t-move	Amount of time that the tape moves
t-delay	Amount of time that the observation cycle is delayed after collection, if any
t-count	Amount of time per cycle that the samples are observed
t-live	Percentage of time that the detector is "live"
Beam	Intensity of the accelerated beam on target, in nA
# cyc	Number of cycles
e	Index for the efficiency calibration to be used; two detector distances are available
	The other columns are used for calculations

Legend
IRIS control
nuclear database
detector
SPES control

Your ideas

- Study the sputtering in our configuration
  - Contribution to the collimation efficiency
- The irradiation time must be defined with the accelerator
  - The time in which the tablet is in position is the maximum possible irradiation time (time in which we are ready), but there can be differences
- The FC+C of the experiment is in control of the experiment
- The best way to stop the beam when you do not want it is to use the kicker
  - We should be able to control the kicker too
  - We should kick the beam when rotating the central movement
- We should be able to change the irradiation time on the run
  - The beam could be not-constant from spes
- The safety logic to avoid non-wanted machine states should be in the PLC and not in the GUI
  - GUI can be changed and the safety may be lost
- We could use python code to analyze the output of compass and automatically calculate the activity
  - The python code could be started from the GUI

Your ideas

- The GUI controls the machine, with offline detection is not important to have info on compass spectrum in the GUI, so excel is a fine start
- Venting is fast, making a new good vacuum can take time, minimize openings of the chamber
- Add cctv to control the trolley too and check that the tablets fell inside the vial
- Estimante minimum production rate that is measurable, in particular with Ag-111, assume that minimum is when SNR = 1
    - This is one of the objection often told to isolpharm

Thanks