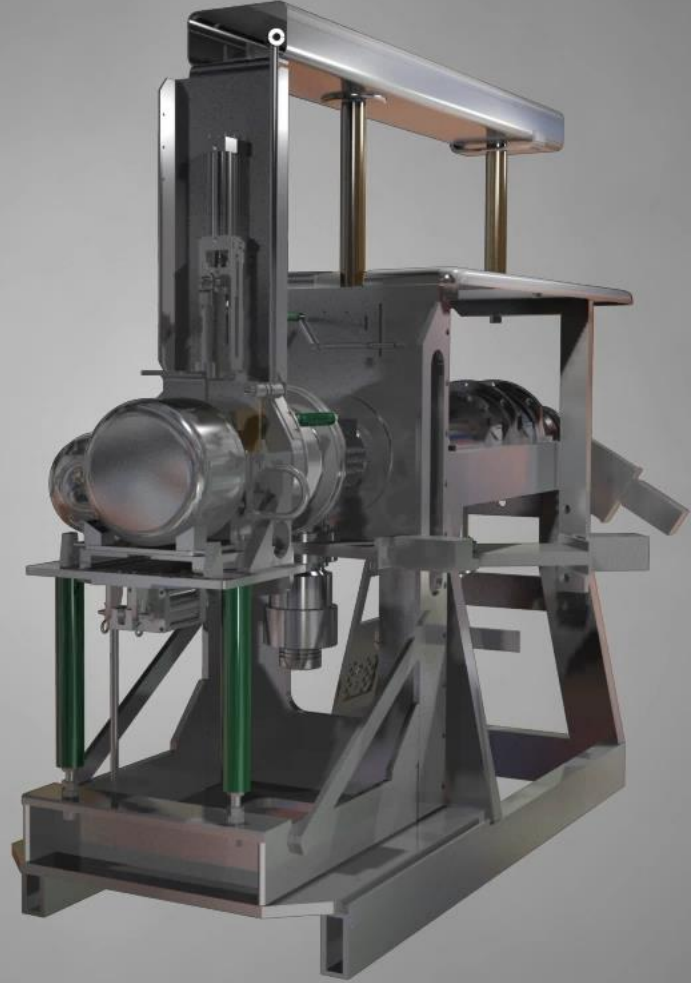




Nuclear physics Back to the ROOTs





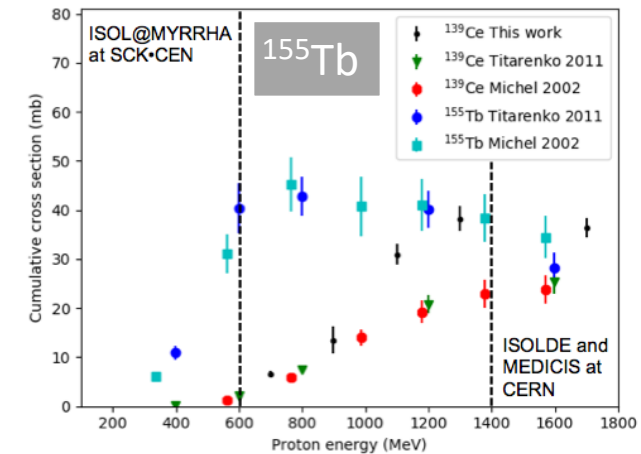
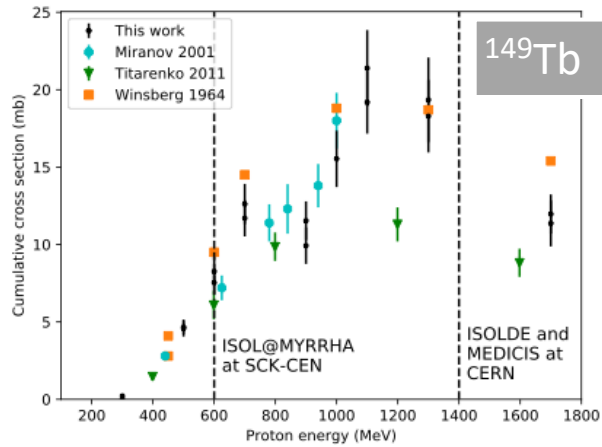
The ISOL recipe

1. Mix the ingredients
2. Cook on high temperature ($\sim 2000^{\circ}\text{C}$)
3. Serve



Back to start: nuclear cross sections

- It all starts with the nuclear reaction and its cross sections.



C. Duchemin et al.

Applied Radiation and Isotopes 178 (2021) 109983

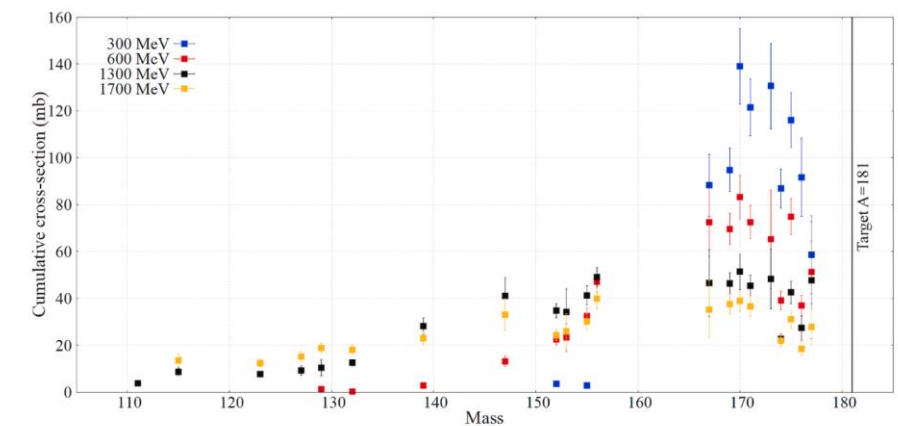


Fig. 7. Cumulative cross-sections for the last radionuclide of the decay chain as a function of mass and beam energy.

H. Verhoeven et al., NIMB 463 (2020) 327-329.

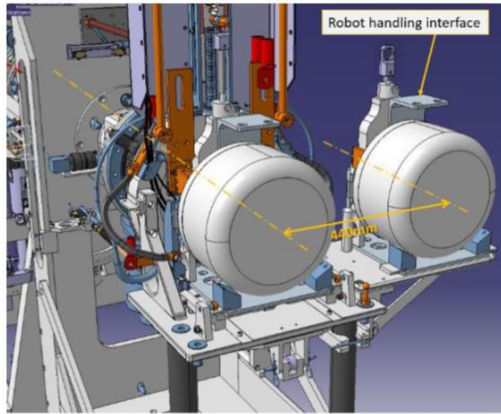
C. Duchemin et al., Frontiers in Medicine 8 (2021) 625561.

C. Duchemin et al., Applied Radiation & Isotopes 178 (2021) 109983.

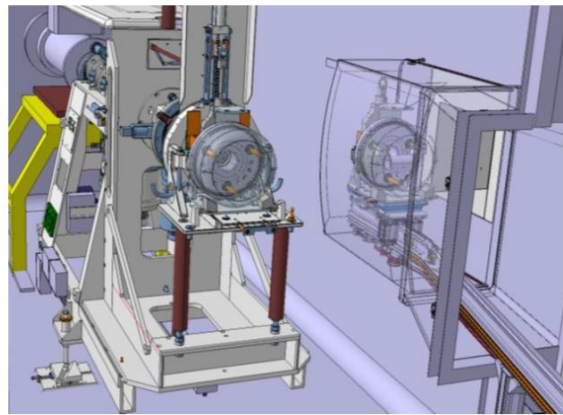


Shooting on target...

- It is all in the aim...



(a) GPS irradiation position.

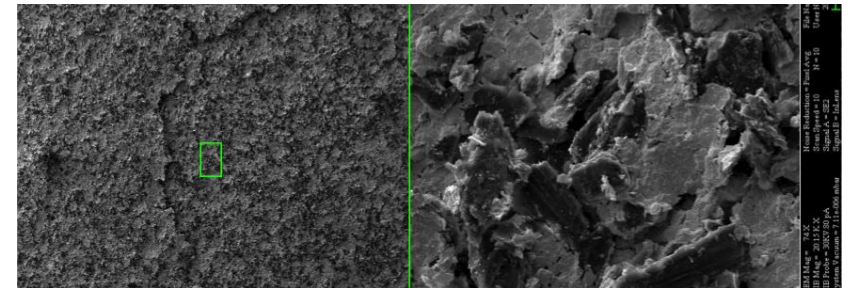
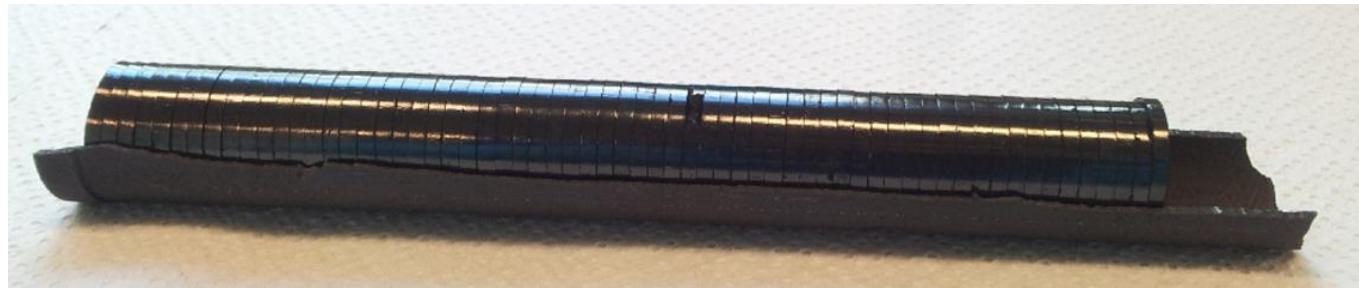
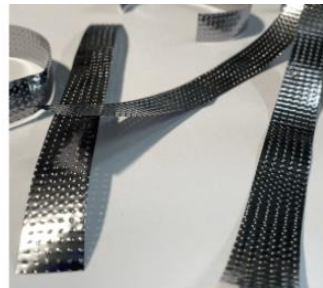
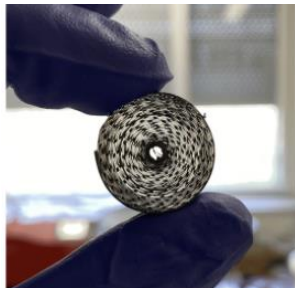


(b) HRS irradiation position (trolley low position shown)



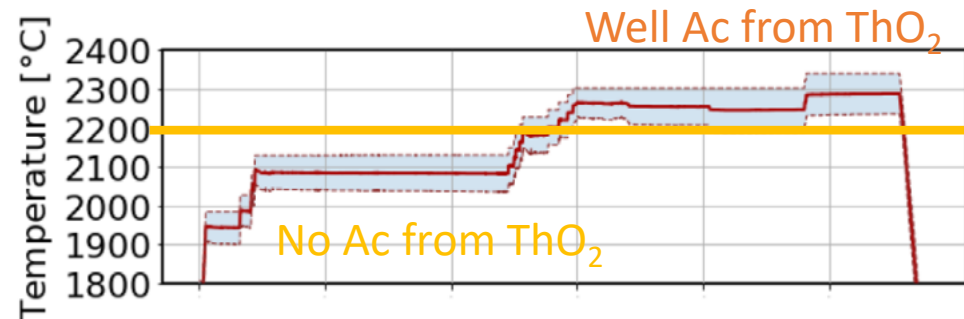
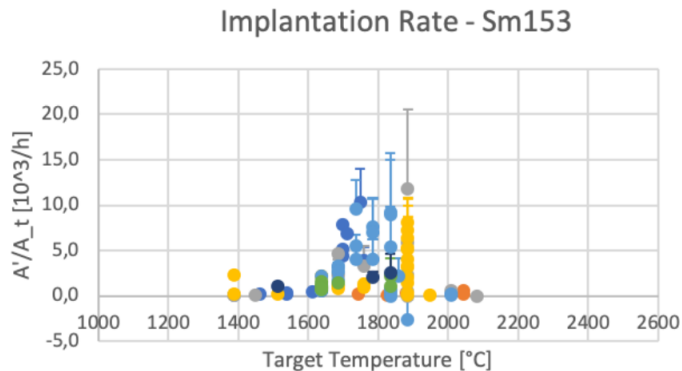
Next ingredient: the target

- ISOLDE has a big pantry of targets where we can 'shop', but we can also make something new...

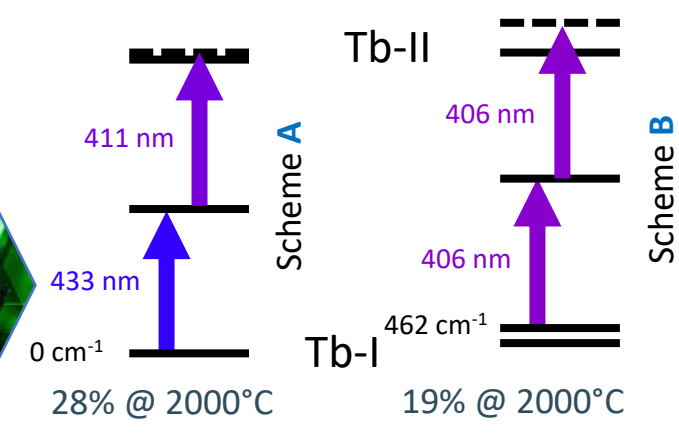
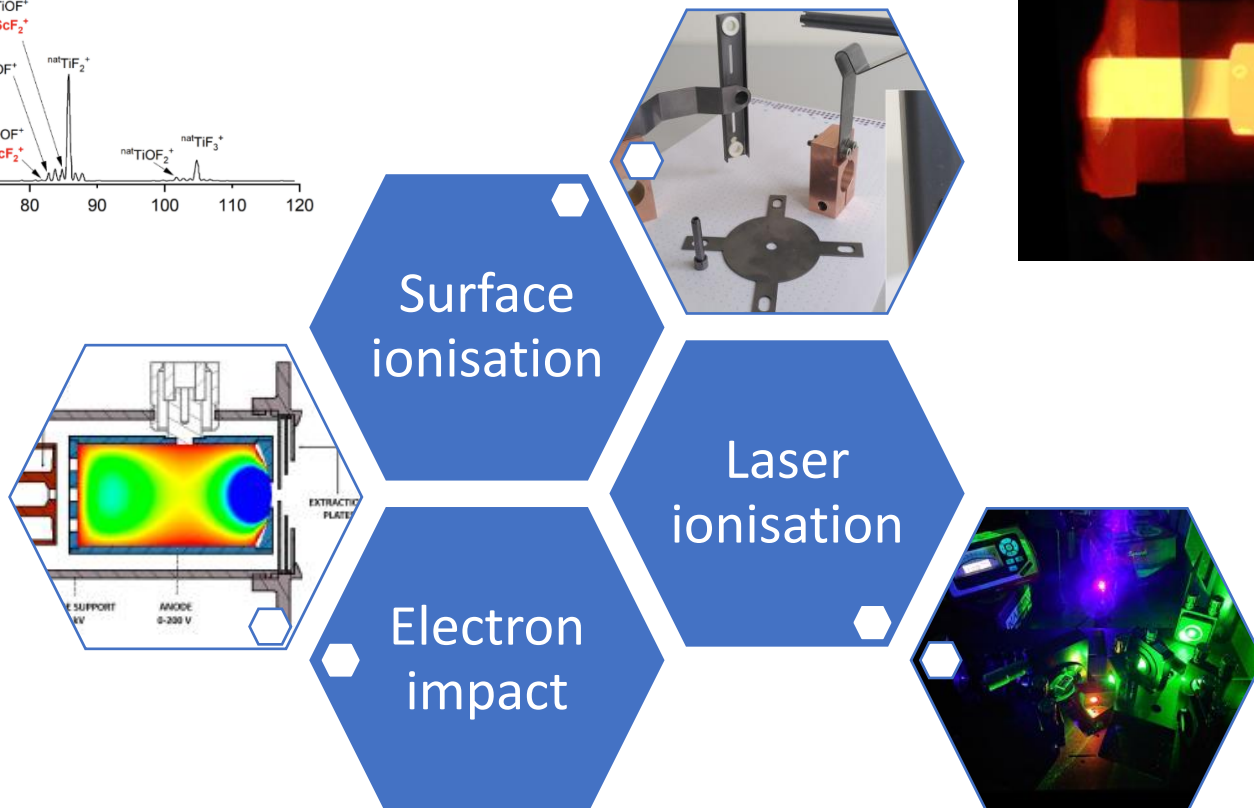
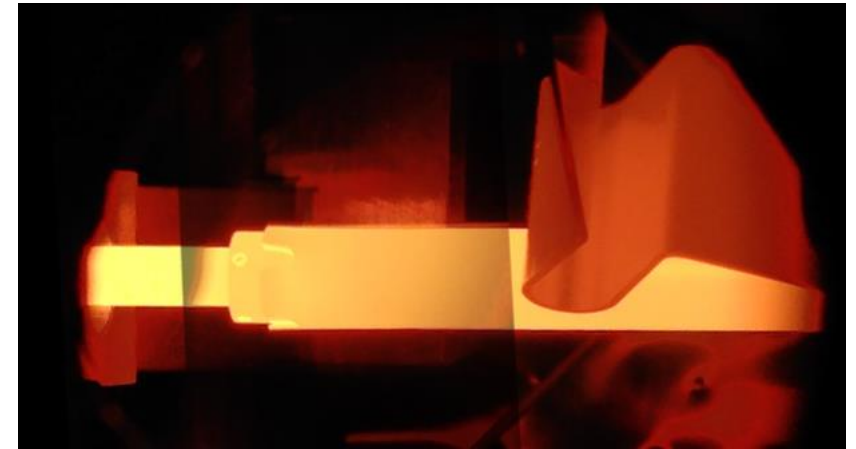
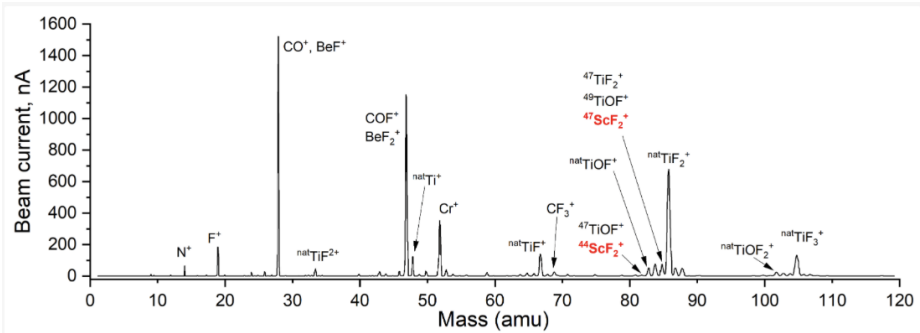


Releasing all the flavours at high T

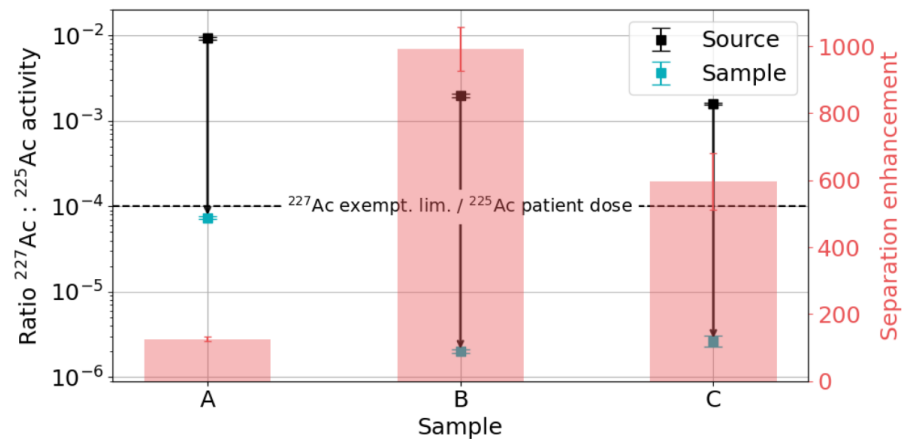
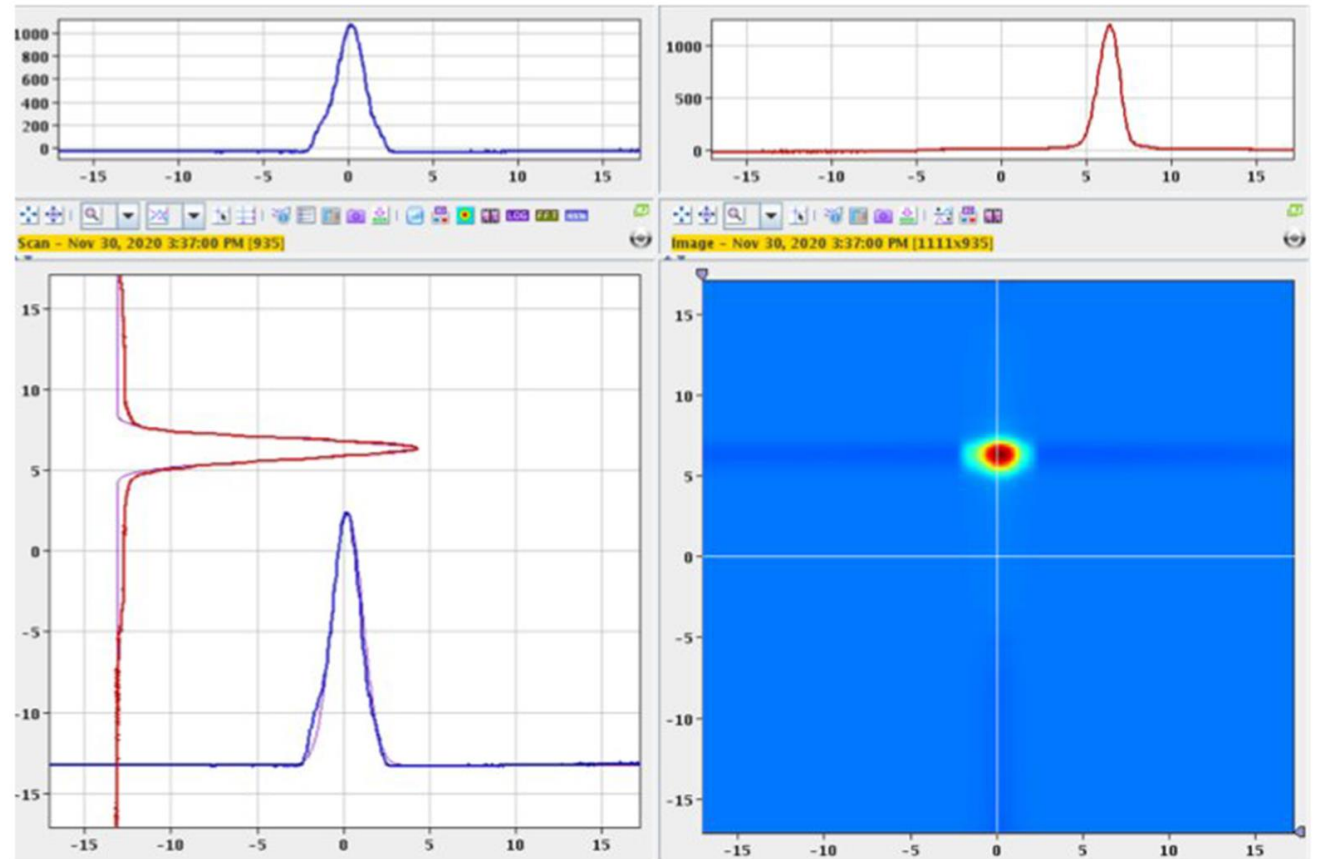
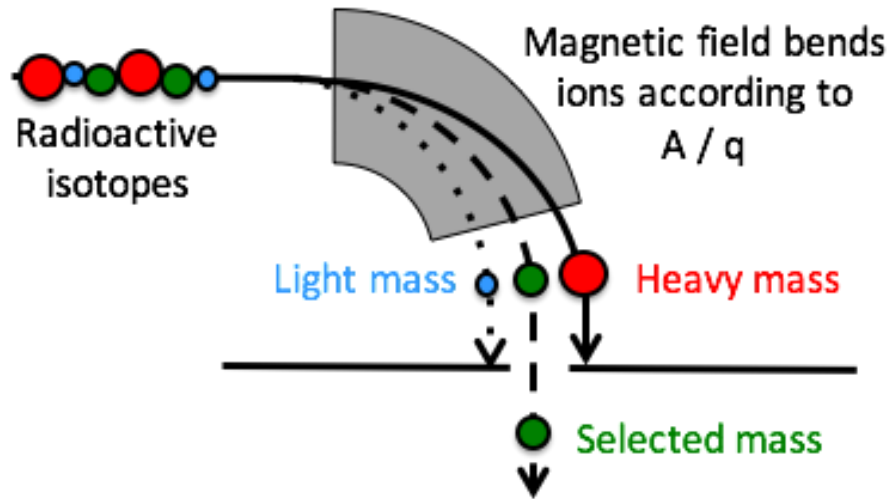
- From the target material to the ion source, there are two steps: **diffusion** & **effusion**
- It is full of chemistry and weird stuff: true cooking skills are required.
- From sublimating Sm to AcO ceramics, we have faced many forms of unexpected!



Shooting it away: the ion source

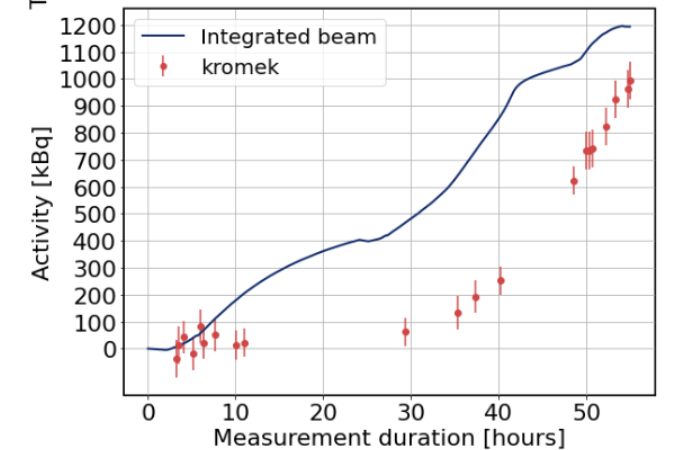
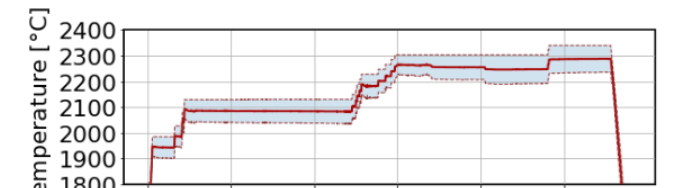
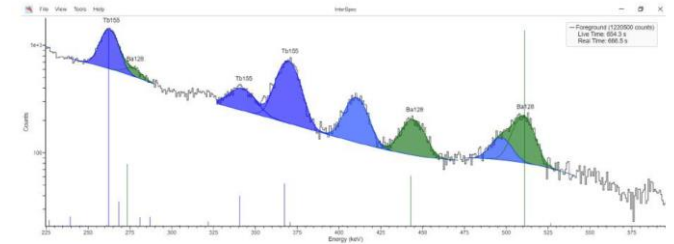
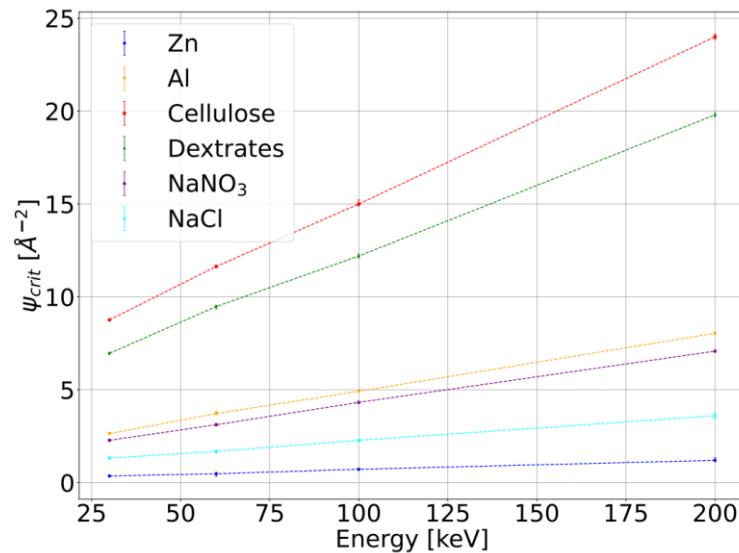
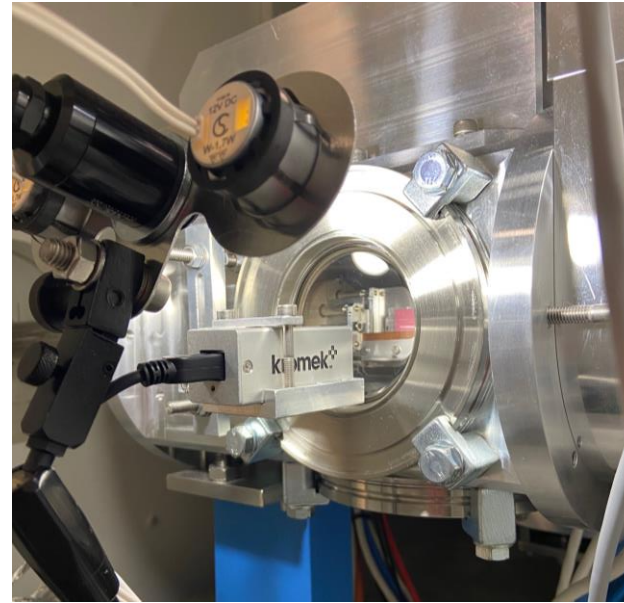
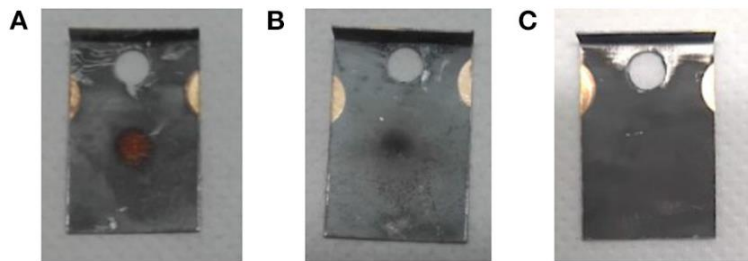
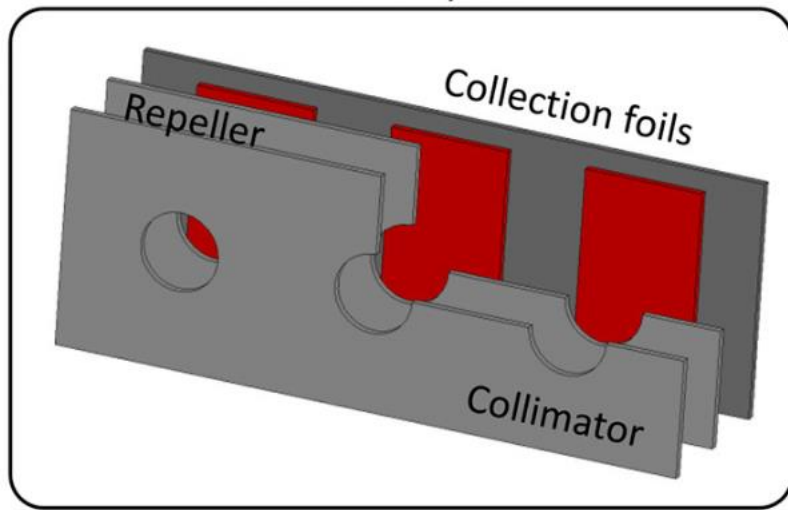


Pick & choose: mass separation



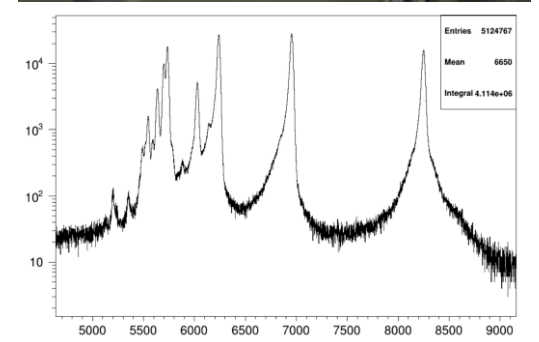
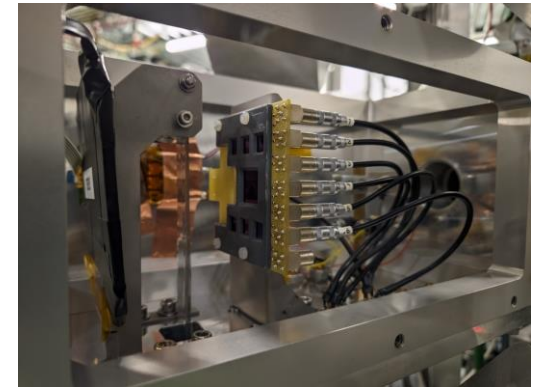
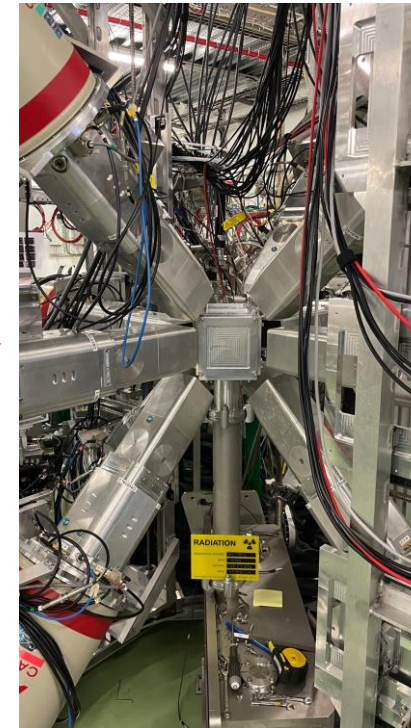
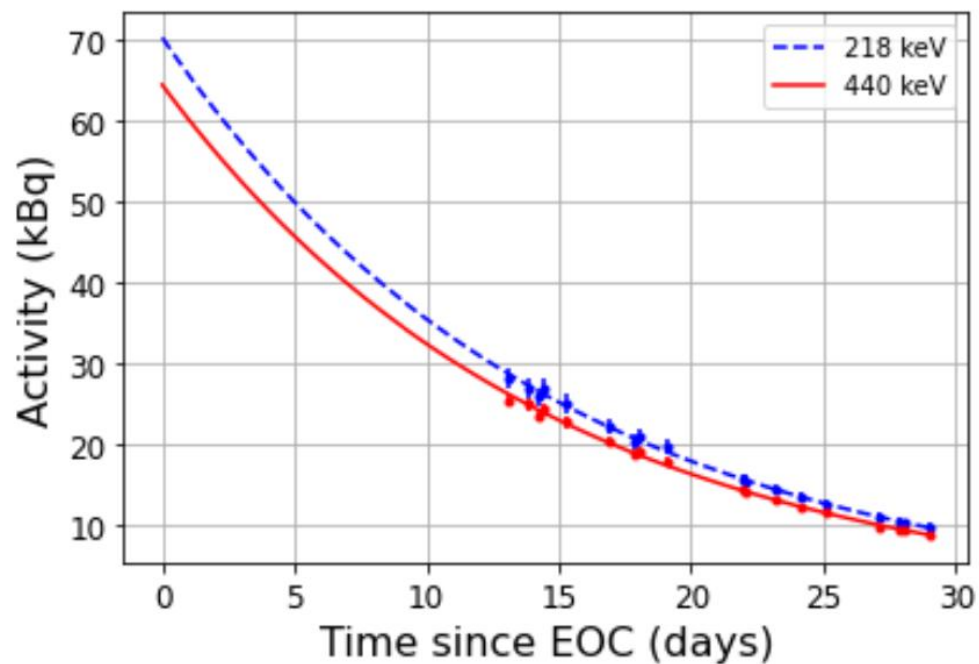
Ready to serve?

- Implantation is not trivial!



And what do we have here?

- The nuclear data on many of these medical radionuclides are actually insufficiently known for use in clinical settings!



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