Group A: who we are and what we learned

ATSOA 2024

Konrad Altenmüller

Accelerator physicist at ESS Bilbao

Previously in astroparticle physics

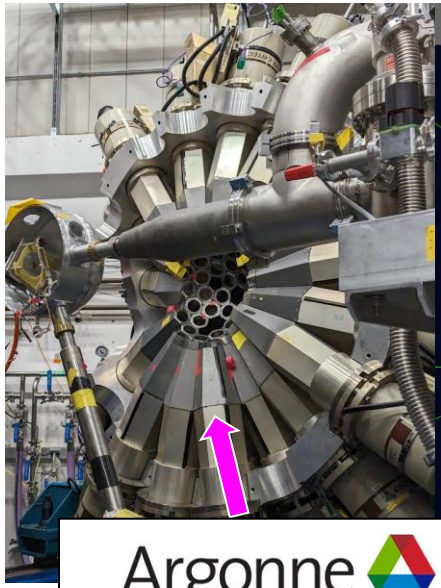
PhD about sterile neutrinos at TUM Munich / Université Paris-Saclay

Postdoc in BabyIAXO (axion dark matter) at University of Zaragoza

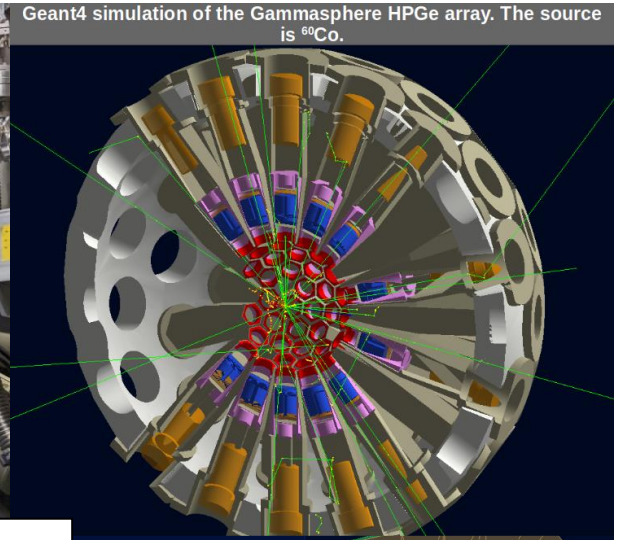
Greg

gw00431@surrey.ac.uk

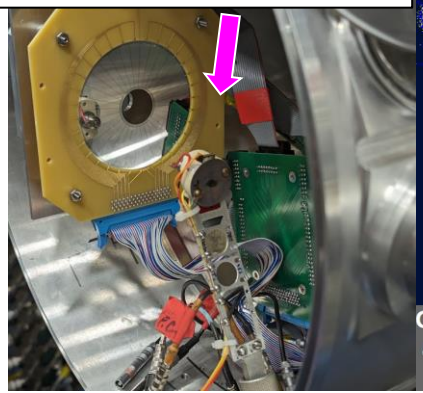
- 1st year PhD at University of Surrey
- Experimental nuclear physics: Nuclear structure (Coulomb excitation)
- Background in Geant4 sims, not accelerators!

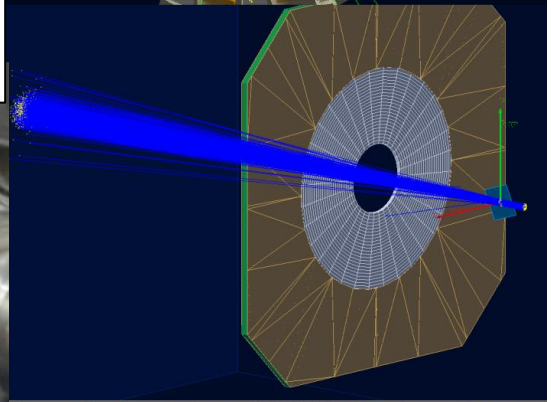


Geant4 simulation of the Gammasphere HPGe array. The source is ^{60}Co.



Argonne NATIONAL LABORATORY





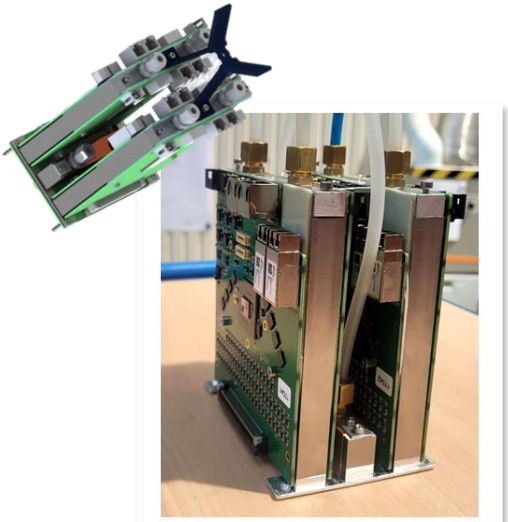
Geant4 simulation of 200Hg impinged onto a natural Ti target upstream of a S3 DSSD ion detector.

UNIVERSITY OF SURREY

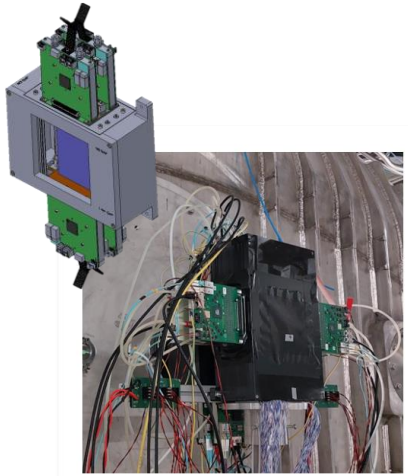
Pablo - My Background

Industrial engineer - Specialized on mechanical engineering (UVigo)

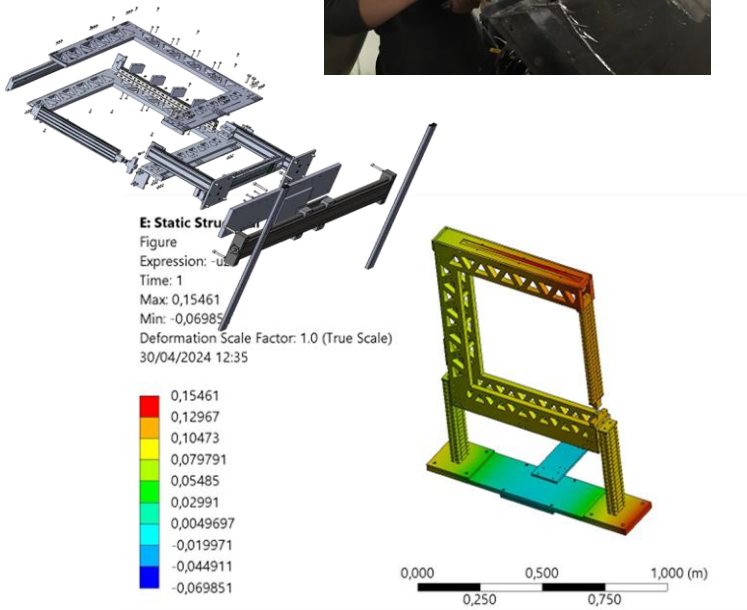
Currently Phd student - developing mechanics and cooling system for the new generation of SiPMs based detectors in R3B (GSI-Fair)



Cooling bodies with reed-out electronics
Jun 23



Fibers distance prototype positioned
Dec 23

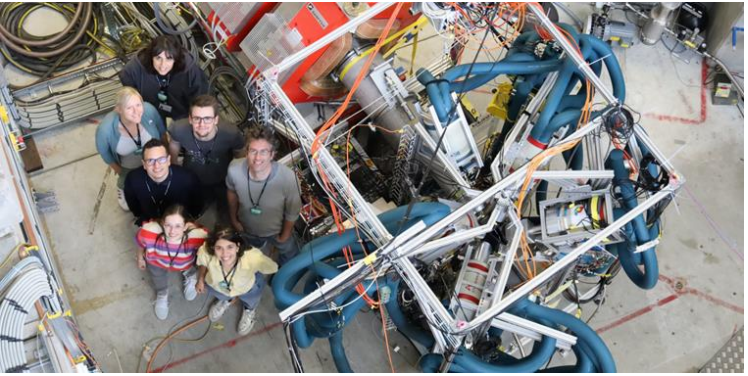


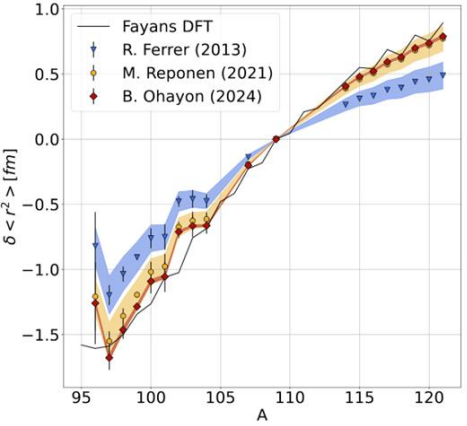
Marie

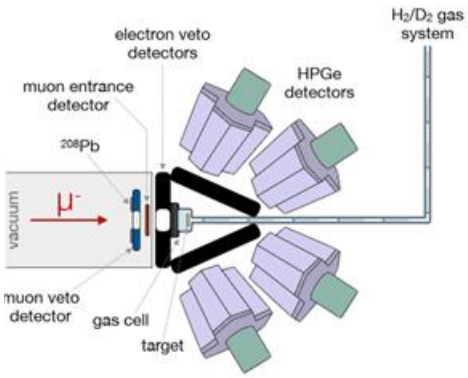
KU LEUVEN

fwo Research Foundation Flanders
Opening new horizons

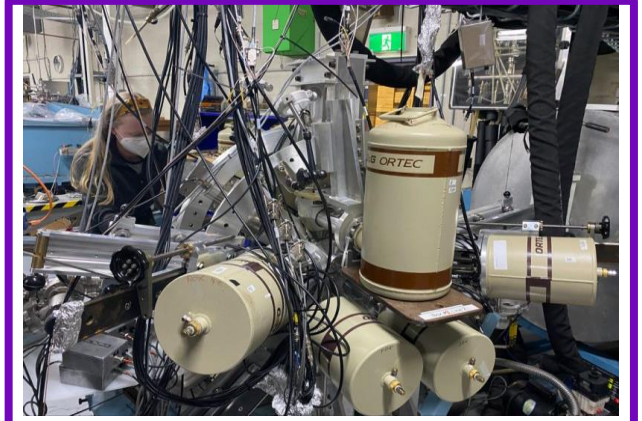
R2 Reference Radii

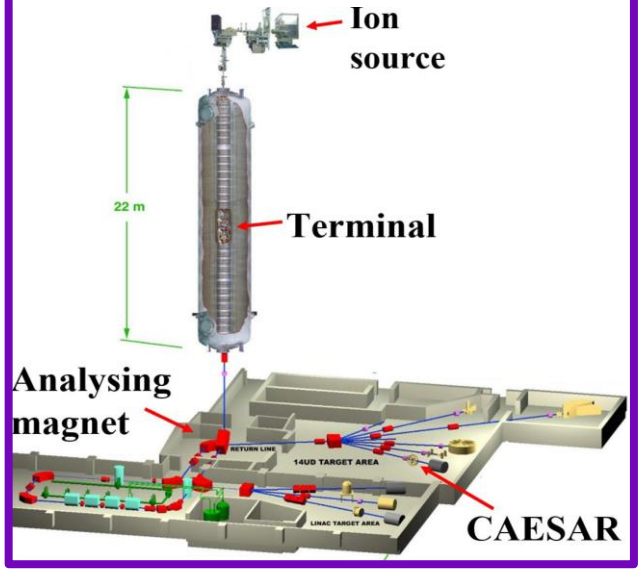




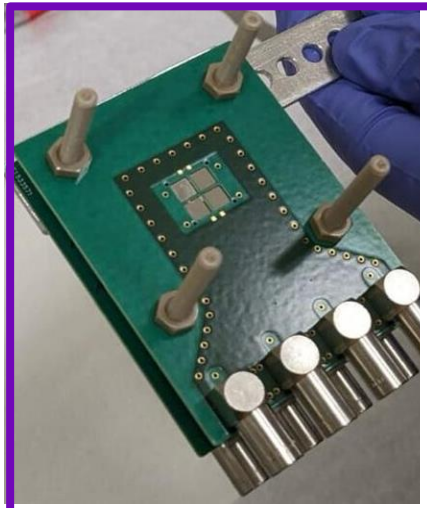


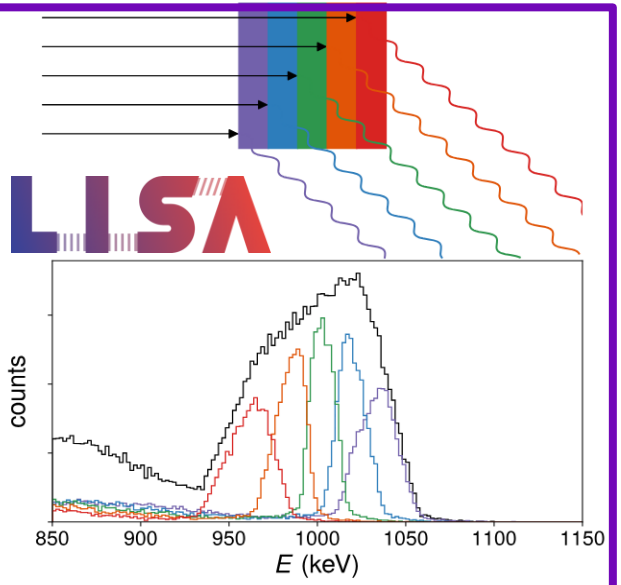
Undergrad/Honours @ANU

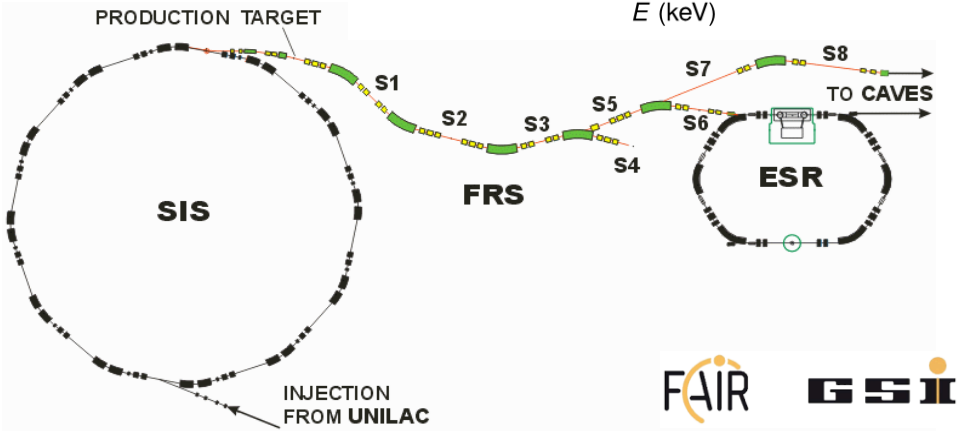




PhD @GSI (Started Sept 2023)







Vicente: Where do I come from?

- Nuclear Physicist.
- Last year PhD student:
  - **Nuclear Reactions with Astrophisical interest: CMAM, Madrid local facility (5 MV Tandem)**
  - Near Coulomb barrier elastic scattering of ^{15}C: SEC (HIE-ISOLDE), CERN.

Grupo de Física Nuclear Experimental

Contact: vicente.garcia@uam.es

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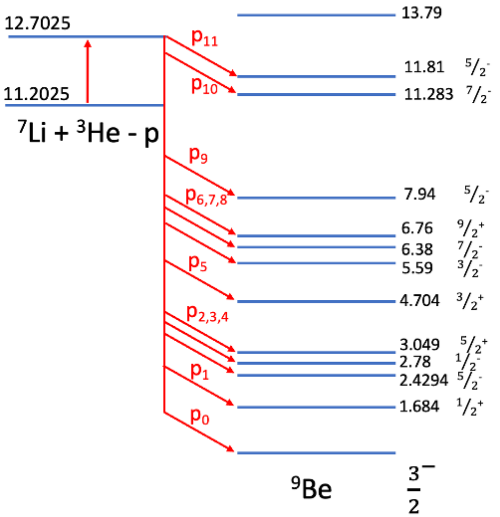
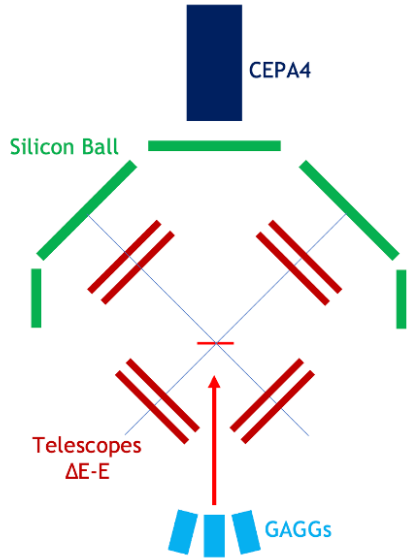
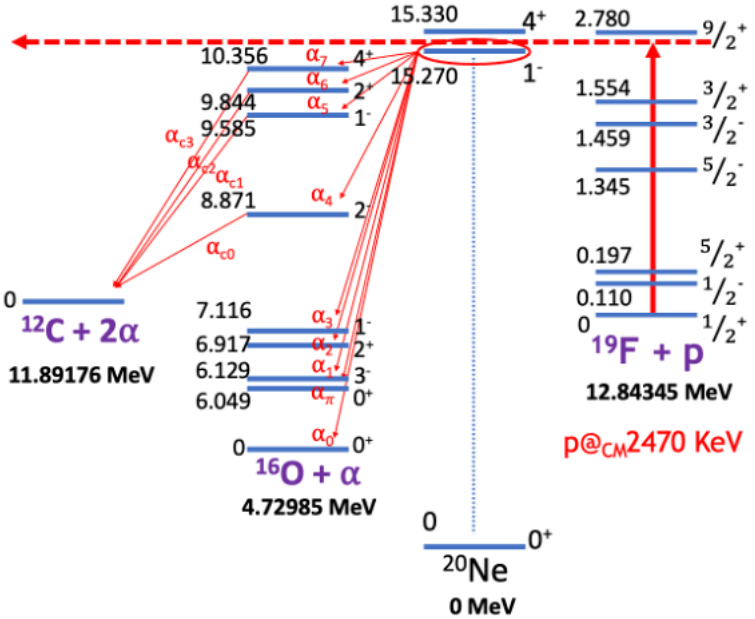
Grupo de Física Nuclear Experimental

$^{19}F(p,\alpha)^{16}O$ $p@_{Lab}$ 2600 keV

$^{7}Li\ (^{3}He, p)\ ^{9}Be$ $^{3}He@1.5$ MeV







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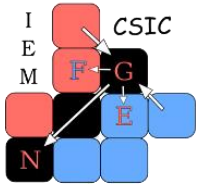

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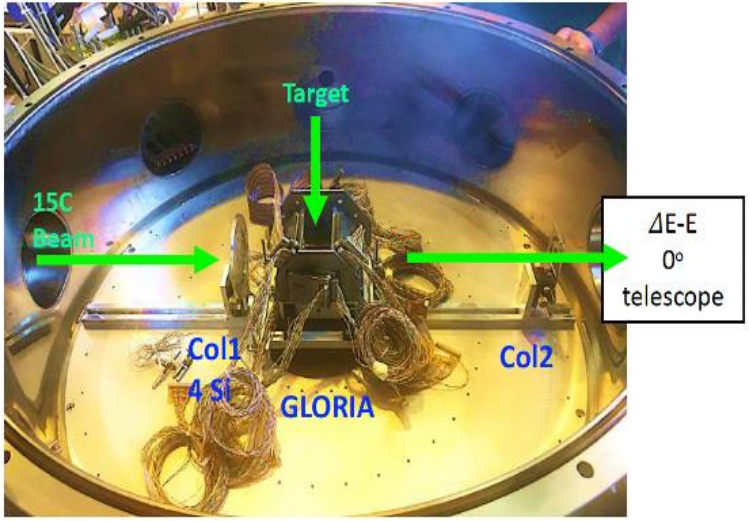

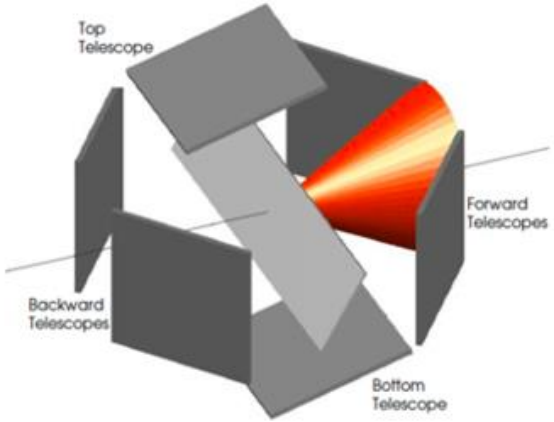

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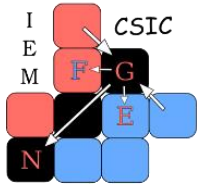

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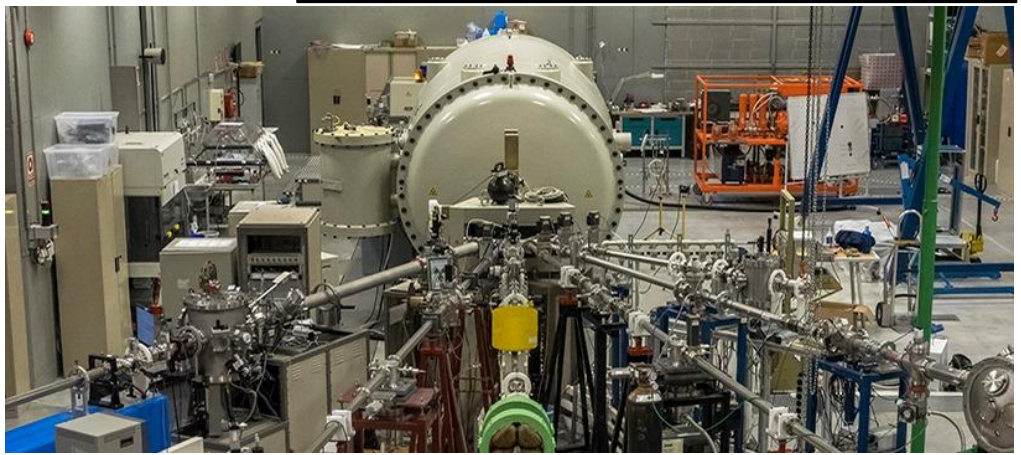
- **Research & Development Engineer at CMAM (UAM).**
  - Nuclear Studies.
  - Materials Analisys and Research.
  - Medical Physics Research.
  - Technical work and development.
  - RP Supervisor.
  - Beam operator.

Contact: vicente.garcia@uam.es

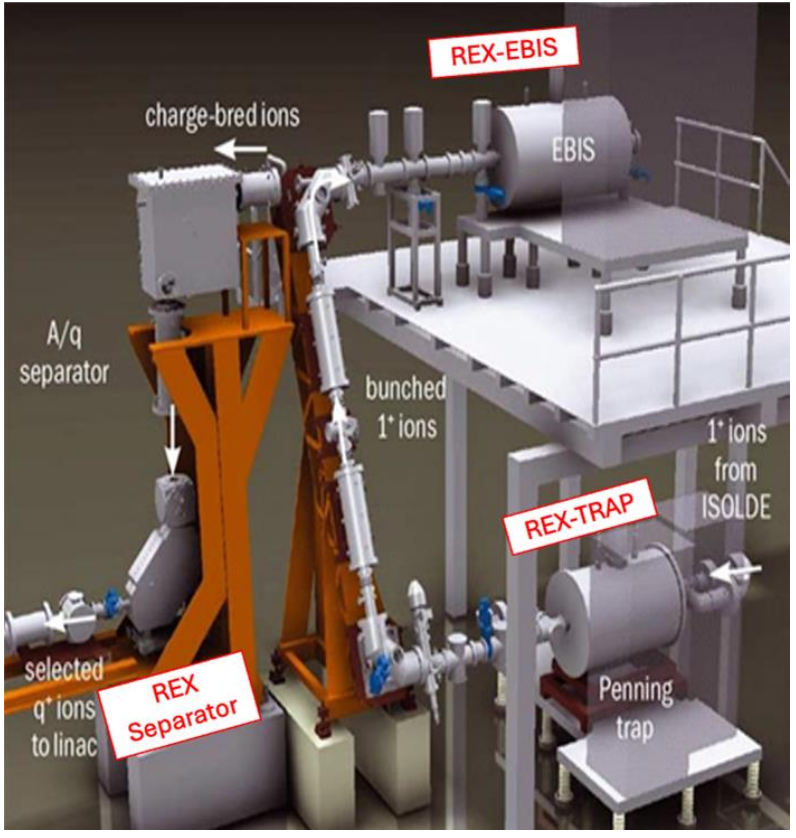


Vicente: What do I take from ATSOA?

- Basic and advanced knowledge of ion beam tuning, mass separating and beam optics.
- **Highlight: REX-EBIS**

- Electron beam tuning and optics.
- Highlight: solution to get homogeneous beam and application to medical therapy.

- Complex beam tuning and sophisticated beam diagnostic.
- Highlight: beam injection.



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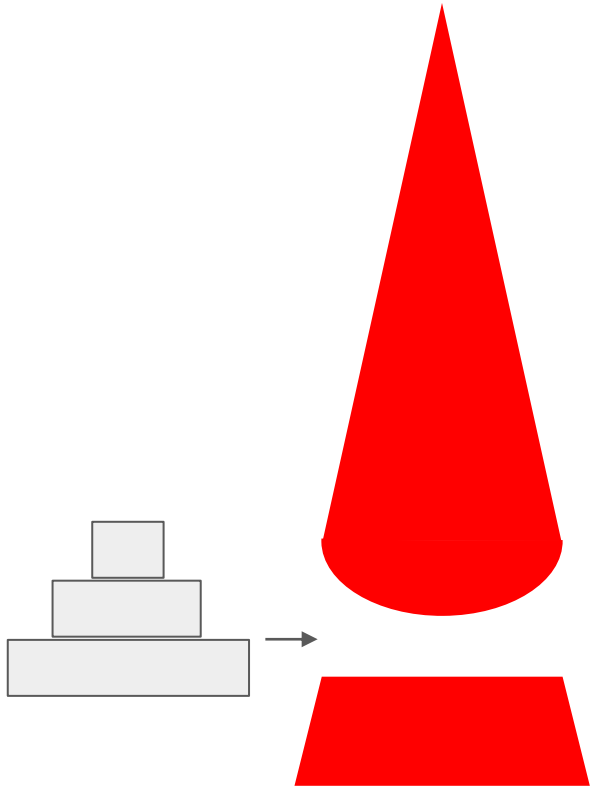

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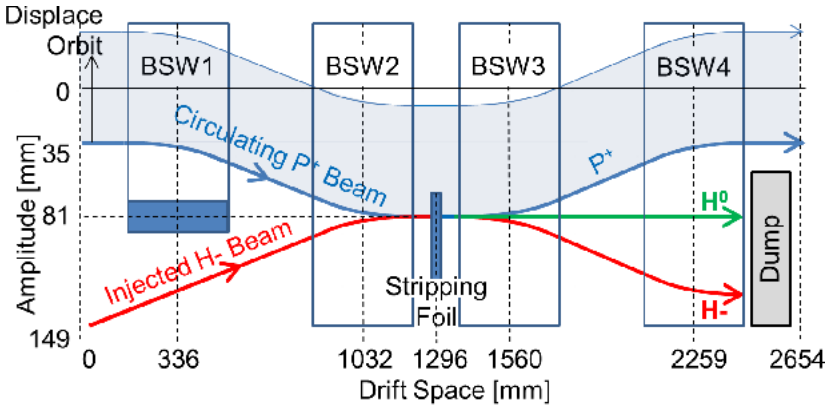

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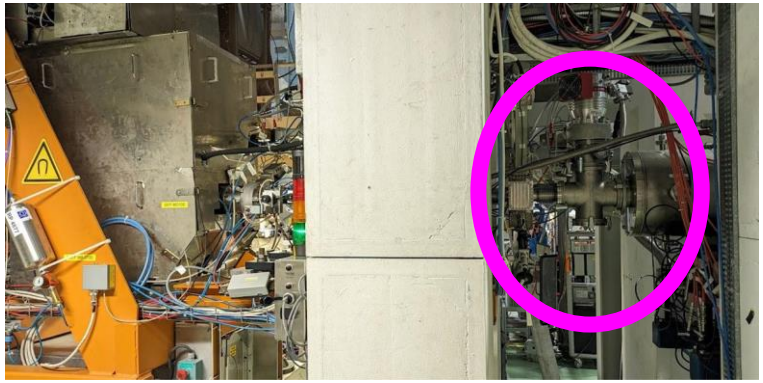
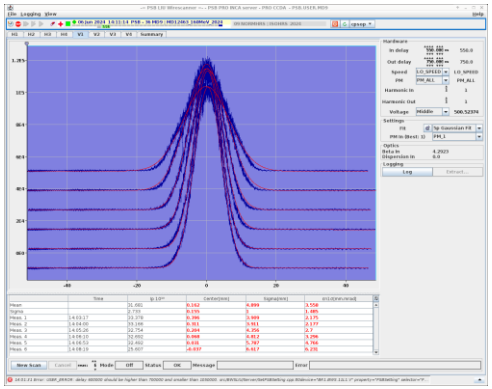
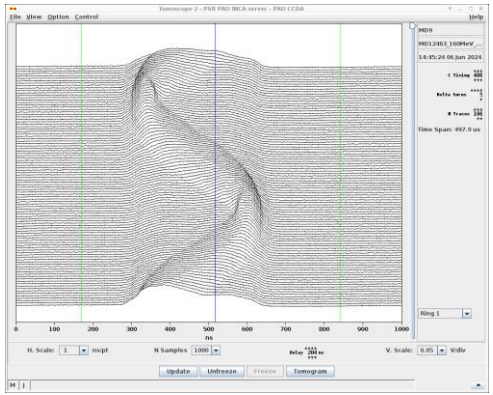
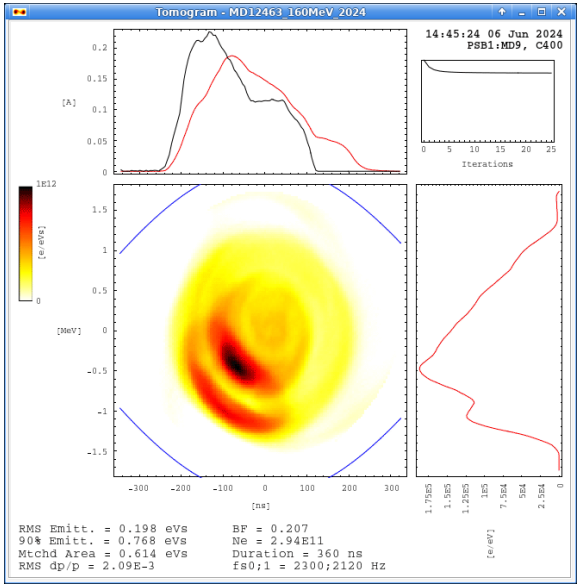
Konrad - what I learned

- X-suite with very nice tutorial / template
- Seeing the spot at ISOLDE where to put the multiharmonic buncher I’m working on
- Impressive beam diagnostics at PSB: wire scanner, beam position monitors, tomograph









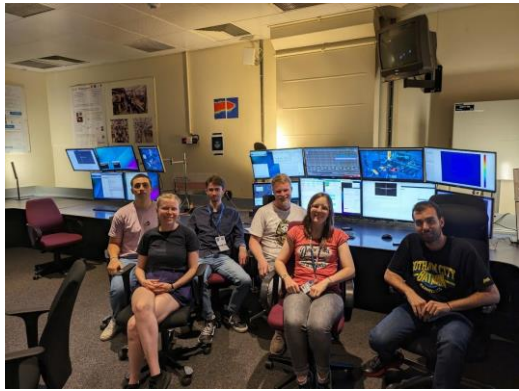
Take away:

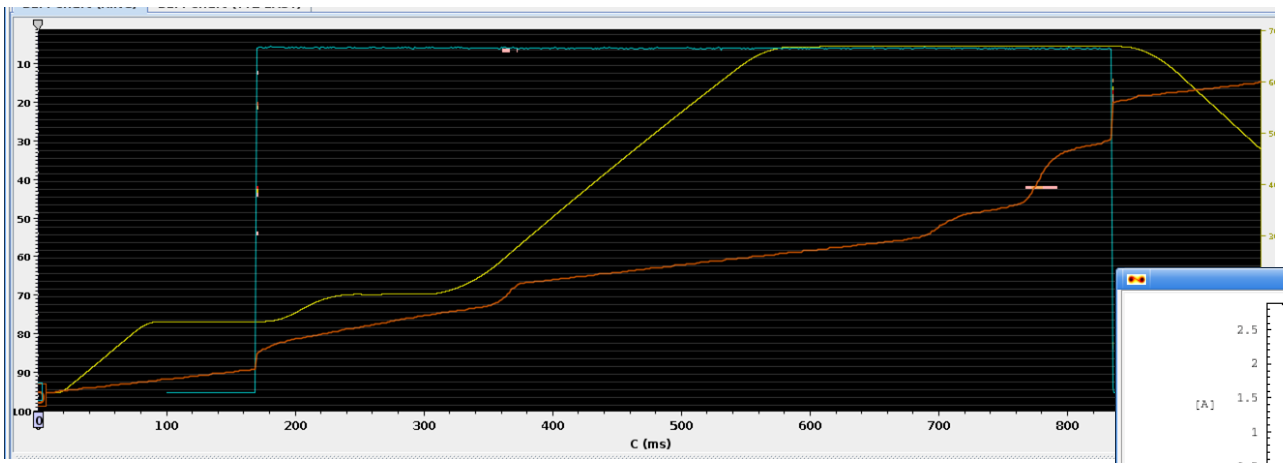
Better understanding of beam dynamics:

- How imperfections of the hardware and intrinsic effects change the dynamics
- The necessary hardware to control the beam
- The control processes during operation

Many ideas for our accelerator in Bilbao!

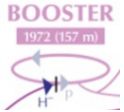
- New connections and motivation!



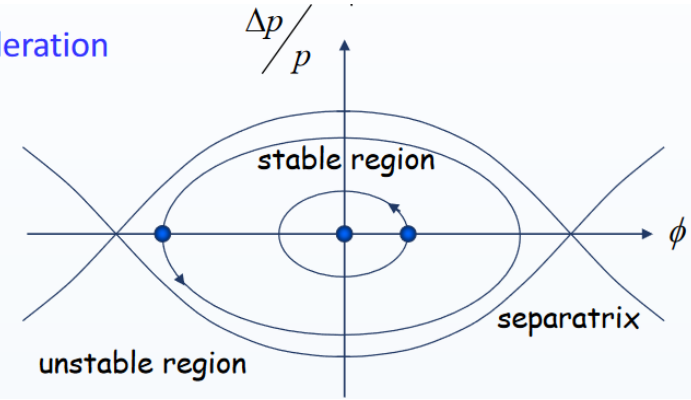


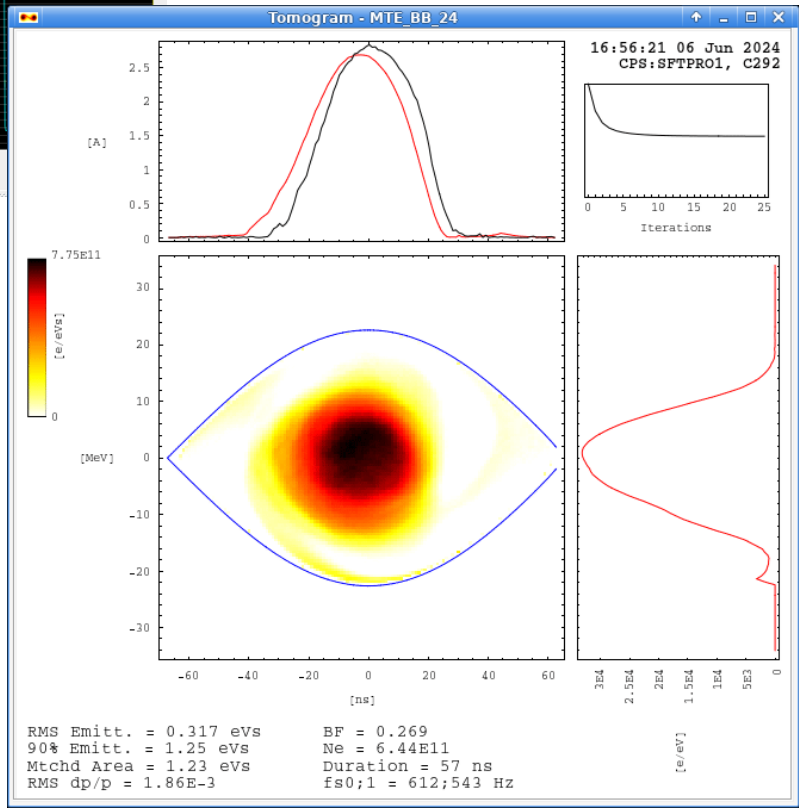
Injection

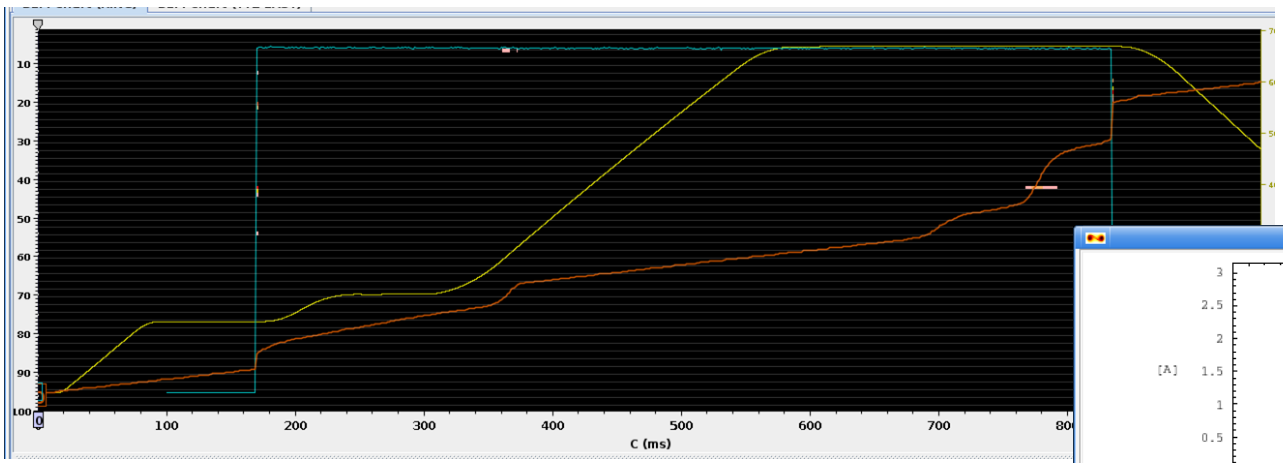
PBS



No Acceleration







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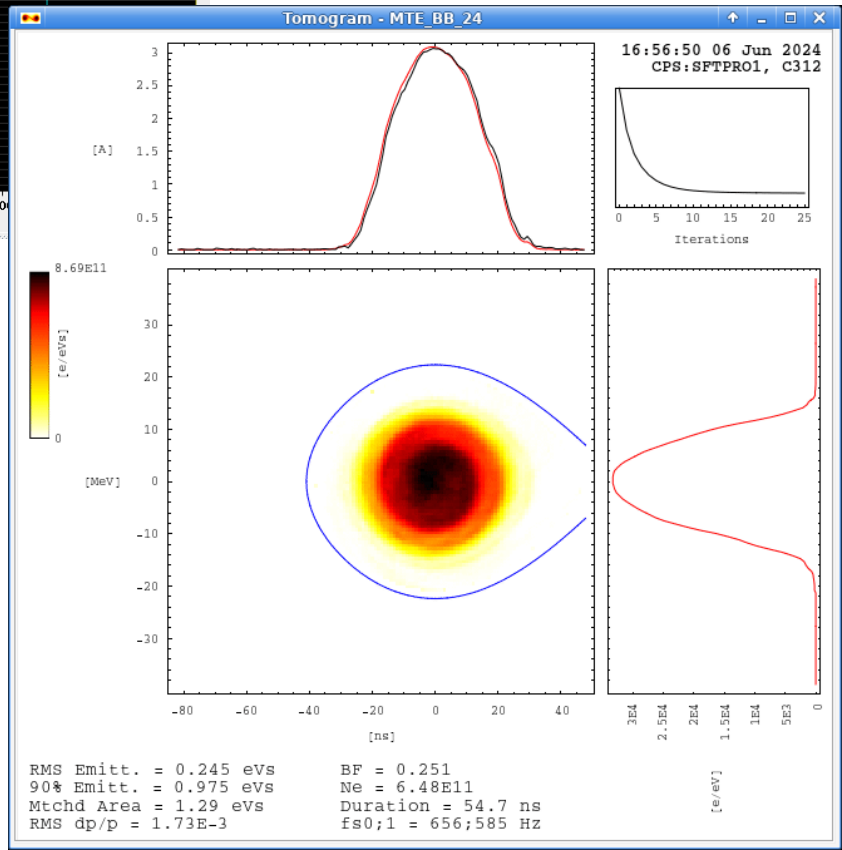
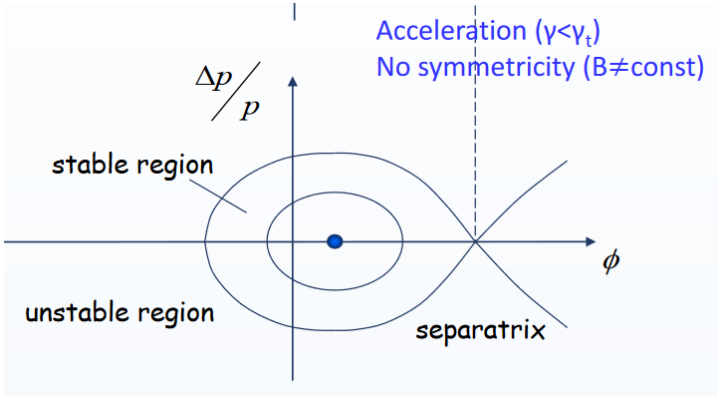
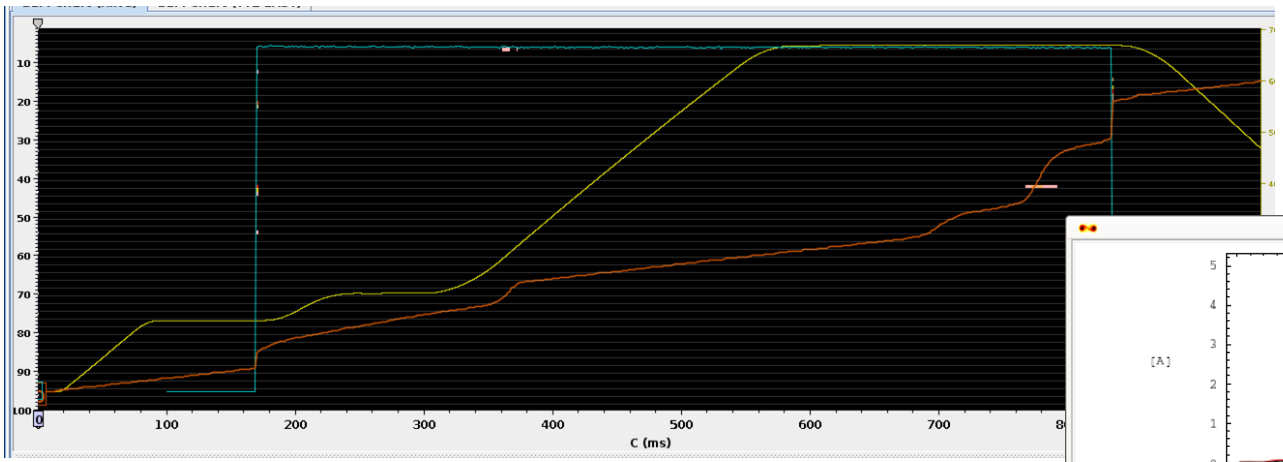


PBS

BOOSTER
1972 (157 m)





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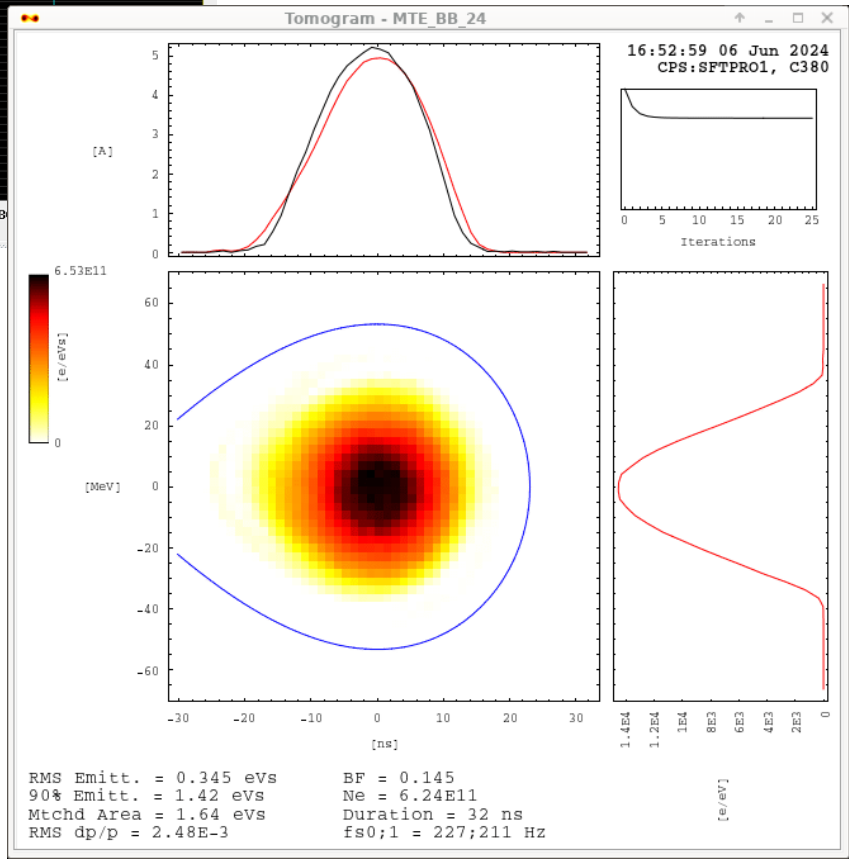

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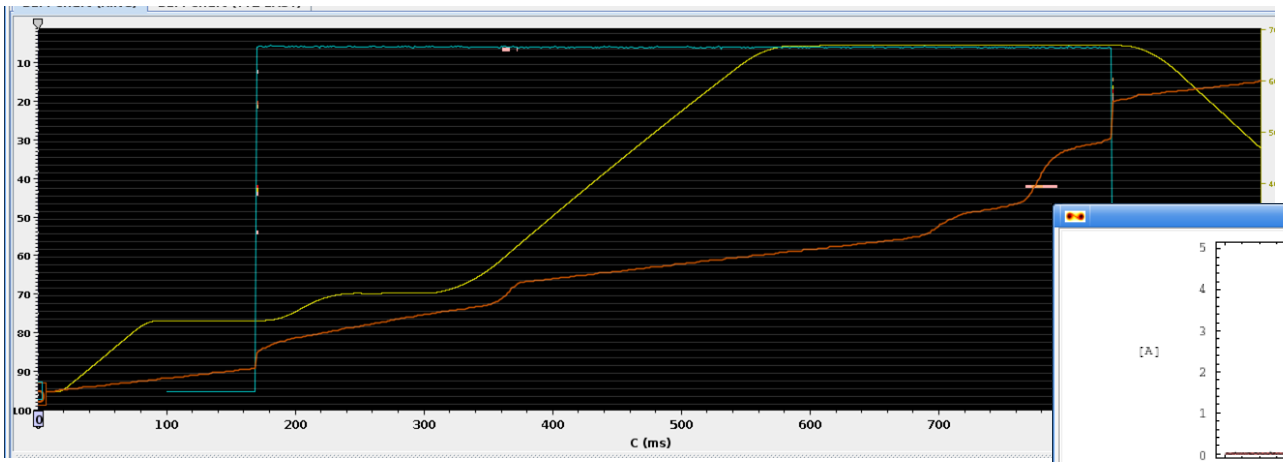
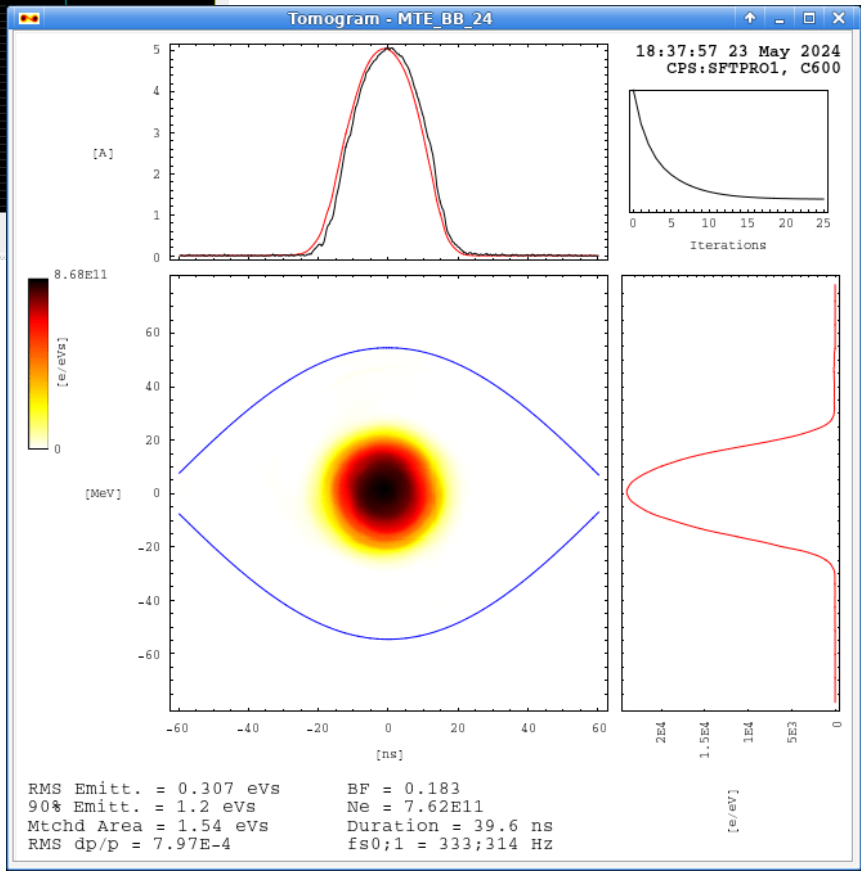


Flat top



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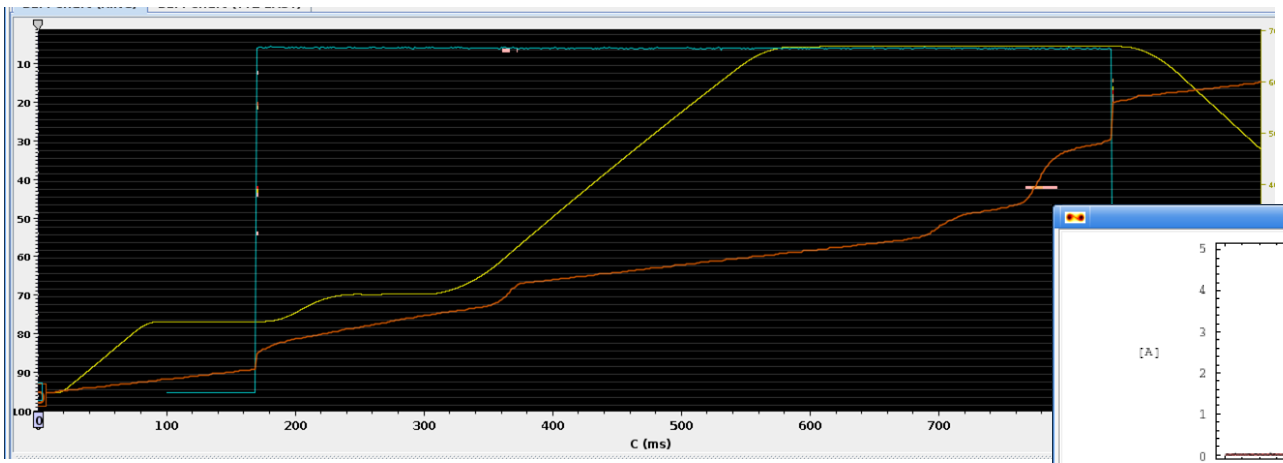

Flat top

BP	User	Pls	Inj.	Acc.	b.Ej.E10	Ej.E10	Dest.
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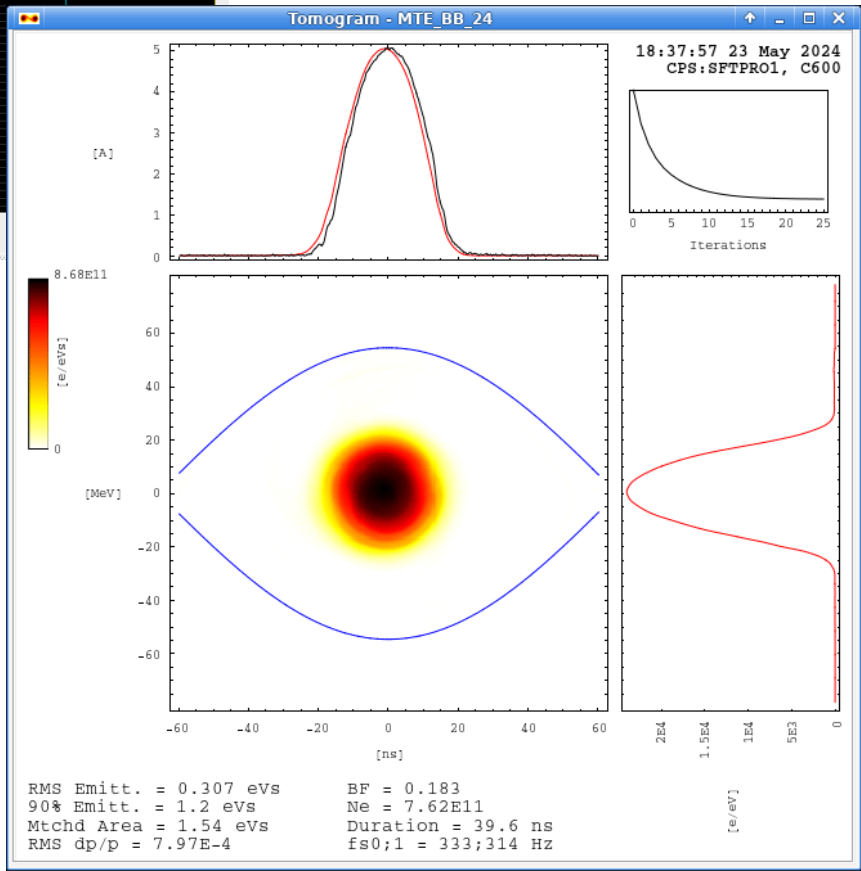
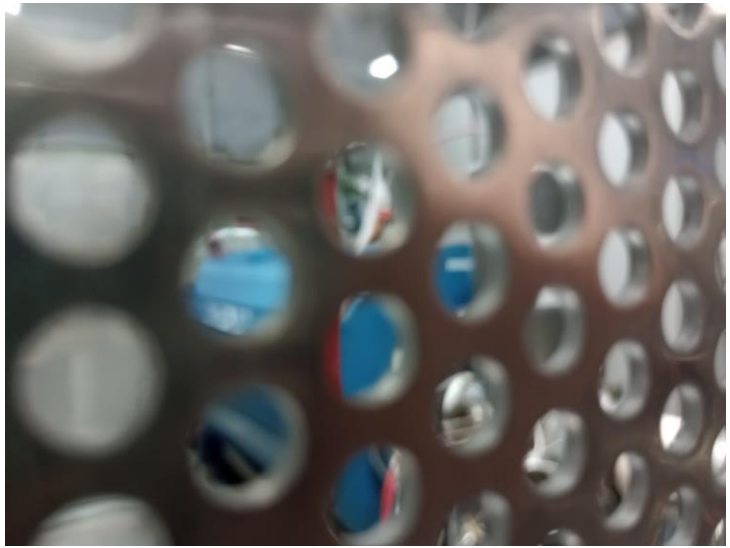
16	EAST_N_2024	2	○●●○	○●●○	387	387	EAST_N_24
17	ISOHRS_2024	19	●●●●	●●●●	3004	2983	ISOHRS
18	ISOHRS_2024	19	●●●●	●●●●	3007	2974	ISOHRS
19	TOF_2024	23	○●○○	○●○○	868	863	TOF_24
20	ISOHRS_2024	19	●●●●	●●●●	3006	2979	ISOHRS
21	EAST_T8_2024	25	○●●○	○●●○	411	414	EAST_T8_24
22	ISOHRS_2024	19	●●●●	●●●●	3006	2999	ISOHRS
23	TOF_2024	23	○●○○	○●○○	865	847	TOF_24
24	ISOHRS_2024	19	●●●●	●●●●	3008	2973	ISOHRS
25	MTE_2024	20	●●●●	●●●●	1052	1061	MTE_BB_24
27	ISOHRS_2024	19	●●●●	●●●●	1052	1061	MTE_BB_24
	AD_5b_2024						PS



HI-ISOLDE



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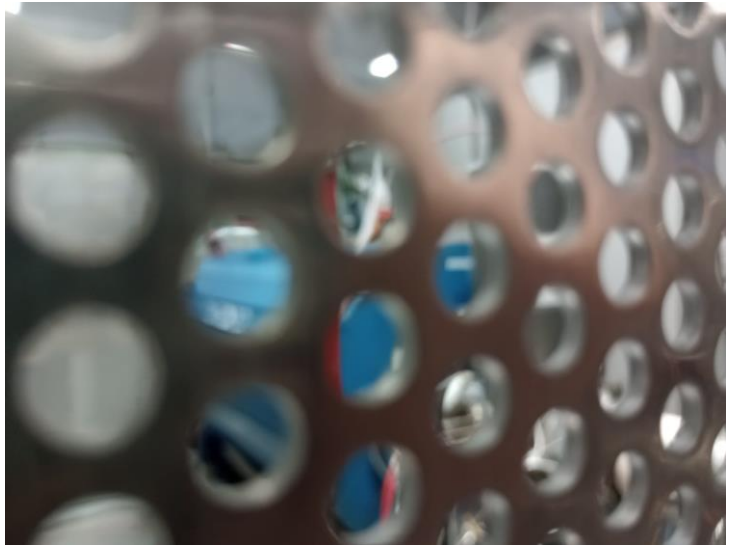
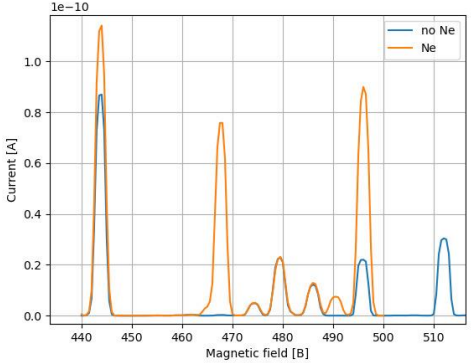
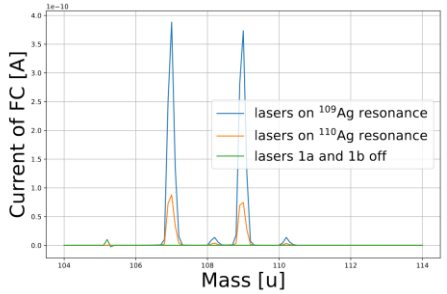
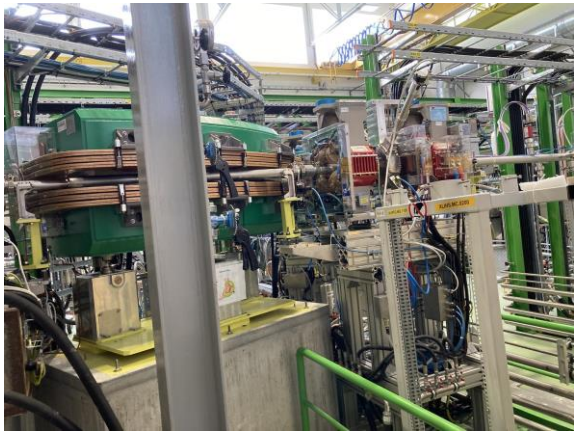
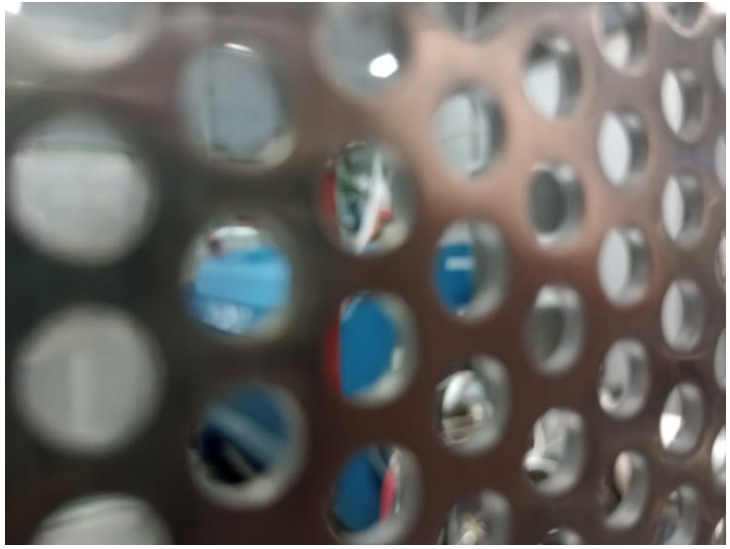


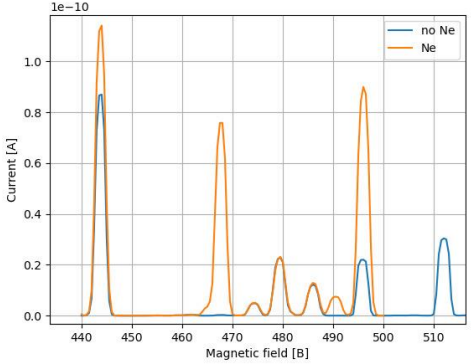

1e−10
no Ne
Ne
Current [A]
Magnetic field [B]

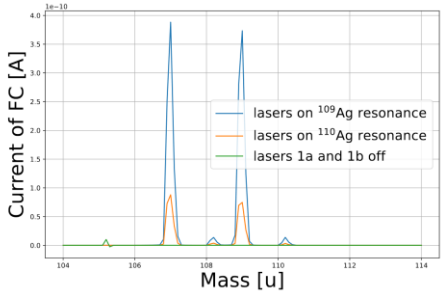

1e−10
lasers on ^{109}Ag resonance
lasers on ^{110}Ag resonance
lasers 1a and 1b off
Current of FC [A]
Mass [u]

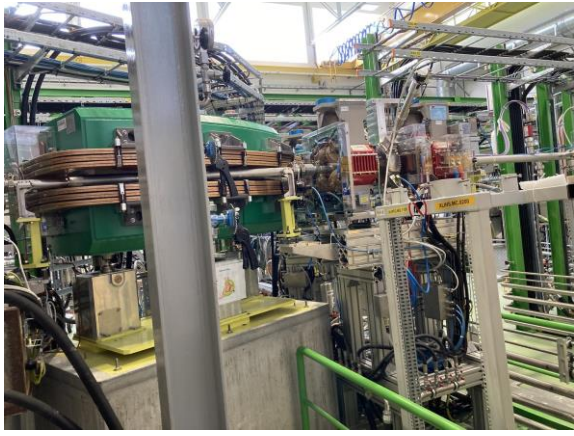


HI-ISOLDE









CLEAR

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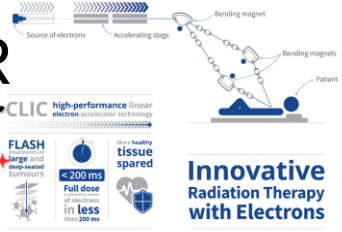

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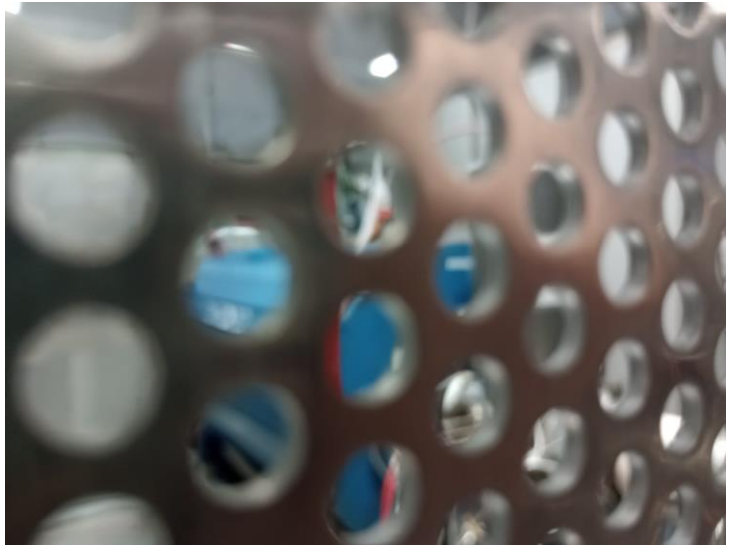
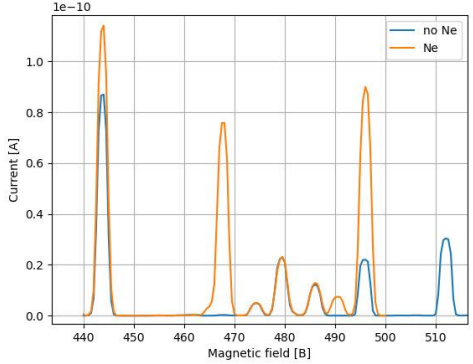
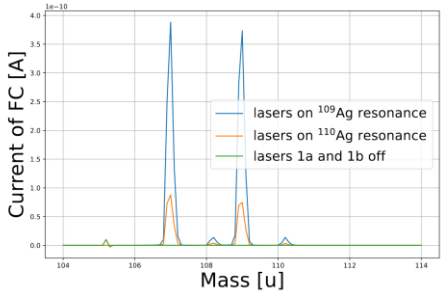
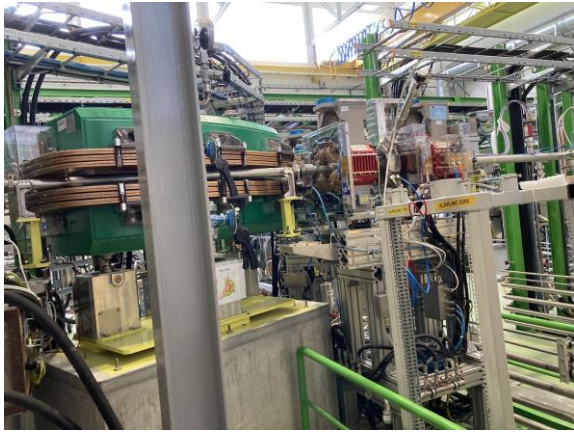
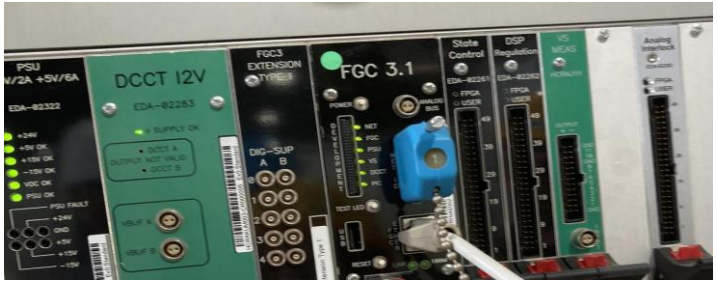


Blue mystery boxes









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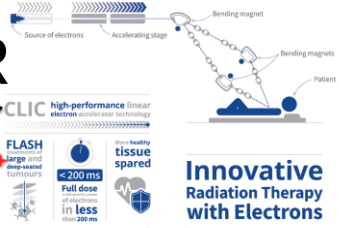
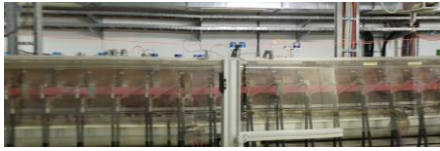
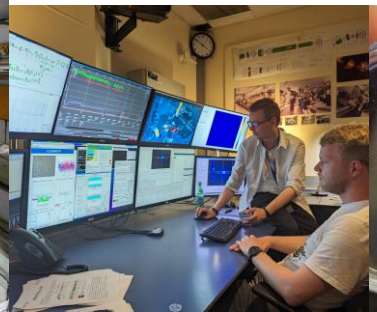




Greg - What did I learn from this week

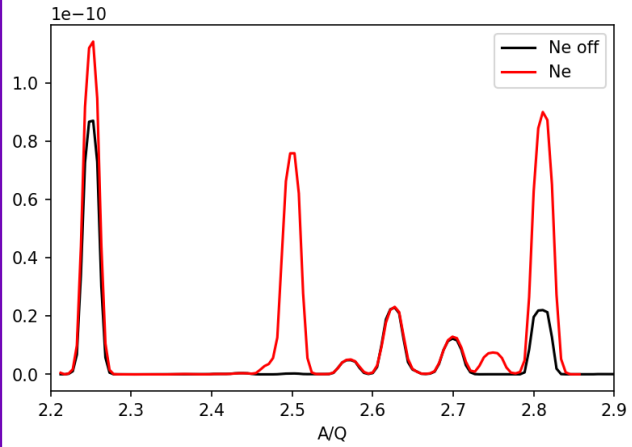
ISOLDE	CLEAR	BOOSTER 1972 (157 m) No logo? :(
• User beams don’t magically appear • Many A/Qs are contaminated • EBIS + separator have to be very finely configured (charge state distribution)	• Wide use cases of e^- beams • Gaussian shaped scatterer + • Gaus beam = flat beam afterwards	• Super cycles being so dynamic • Ring 1 is the best • Clarified the accelerator concepts covered in the lectures






Martha - what I learnt and what I thought was cool

- A/Q scan
- ways around A/Q contaminants
- Electrostatic elements for low energy

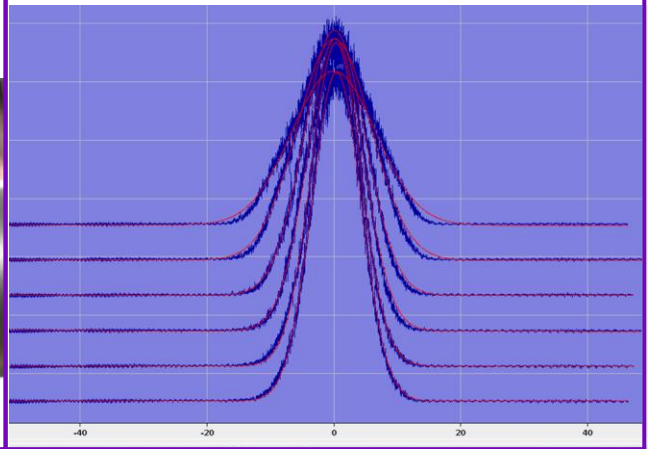


- Cool that it is stand-alone
- scatterer
- optical cable
- very convenient YAG screens

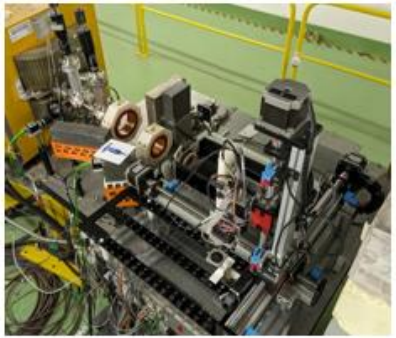
- Synchrotron tune, resonances, emittance

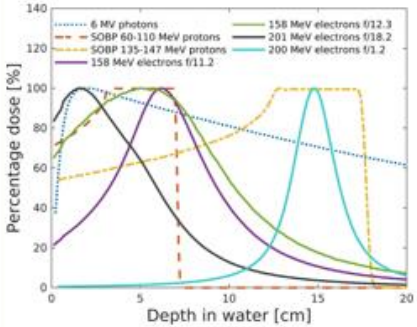
(the most new content for me)

- Has the best coffee



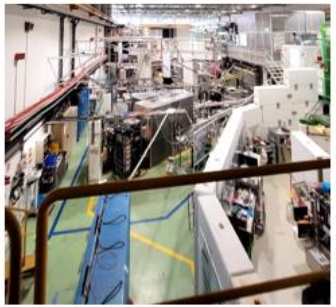
Pablo - My take aways





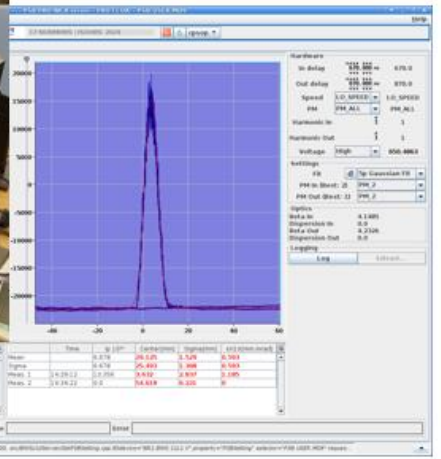
clear

ISOLDE

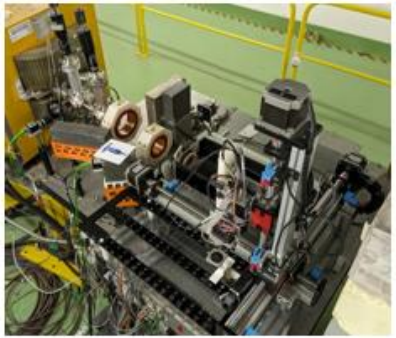


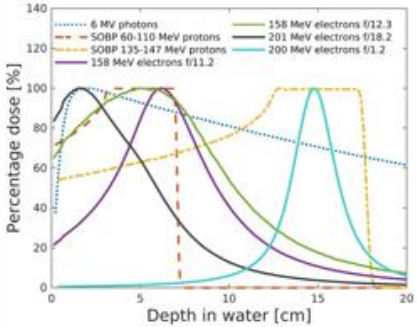
BOOSTER

1972 (157 m)



Pablo - My take aways





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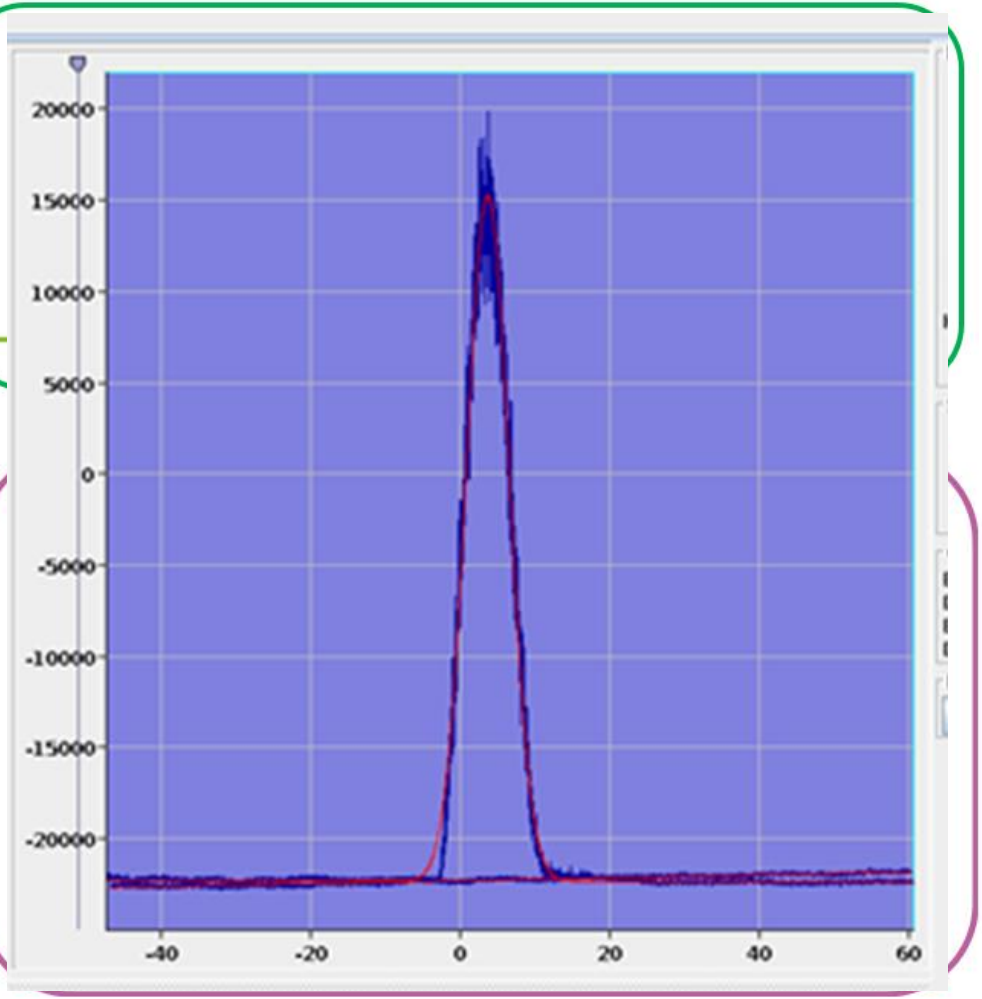
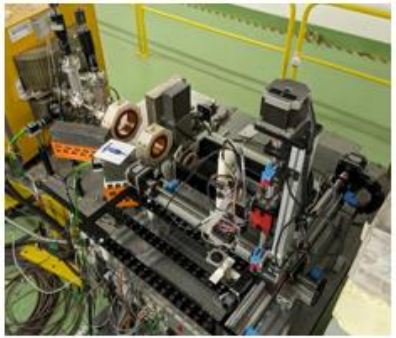
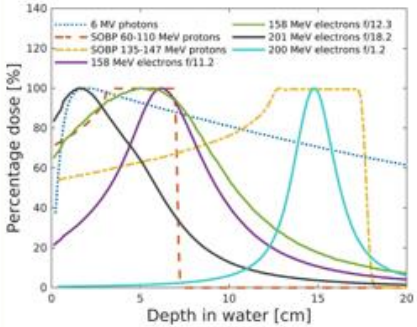


Pablo - My take aways





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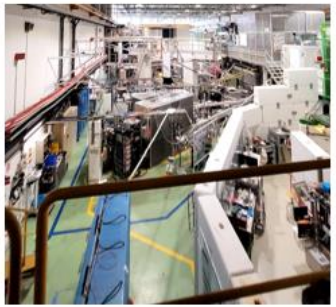
ISOLDE



BOOSTER

1972 (157 m)