

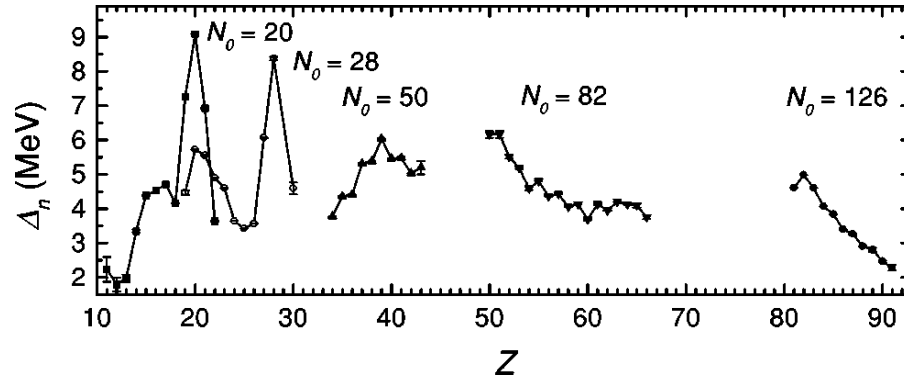
Elodie Morin
Supervised by
Enrique Minaya Ramirez

18/03/2021

Study of $N = 82$ shell closure with silver isotopes ($Z=47$) high precision mass measurements ($A = 124-129$)

- Nuclear structure :

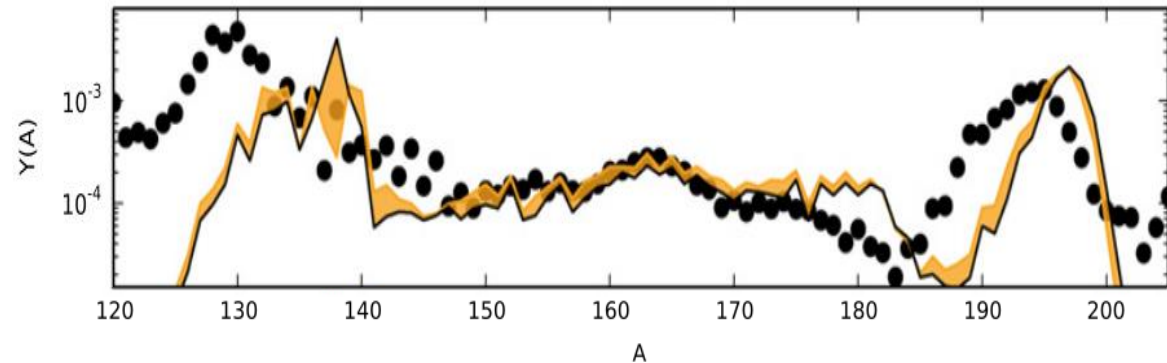
- Evolution of the two-neutron separation energy
- Shell gaps evolution



Lunney, Pearson, Thibault / Review of modern physics 75 (2003)

- Nuclear astrophysics

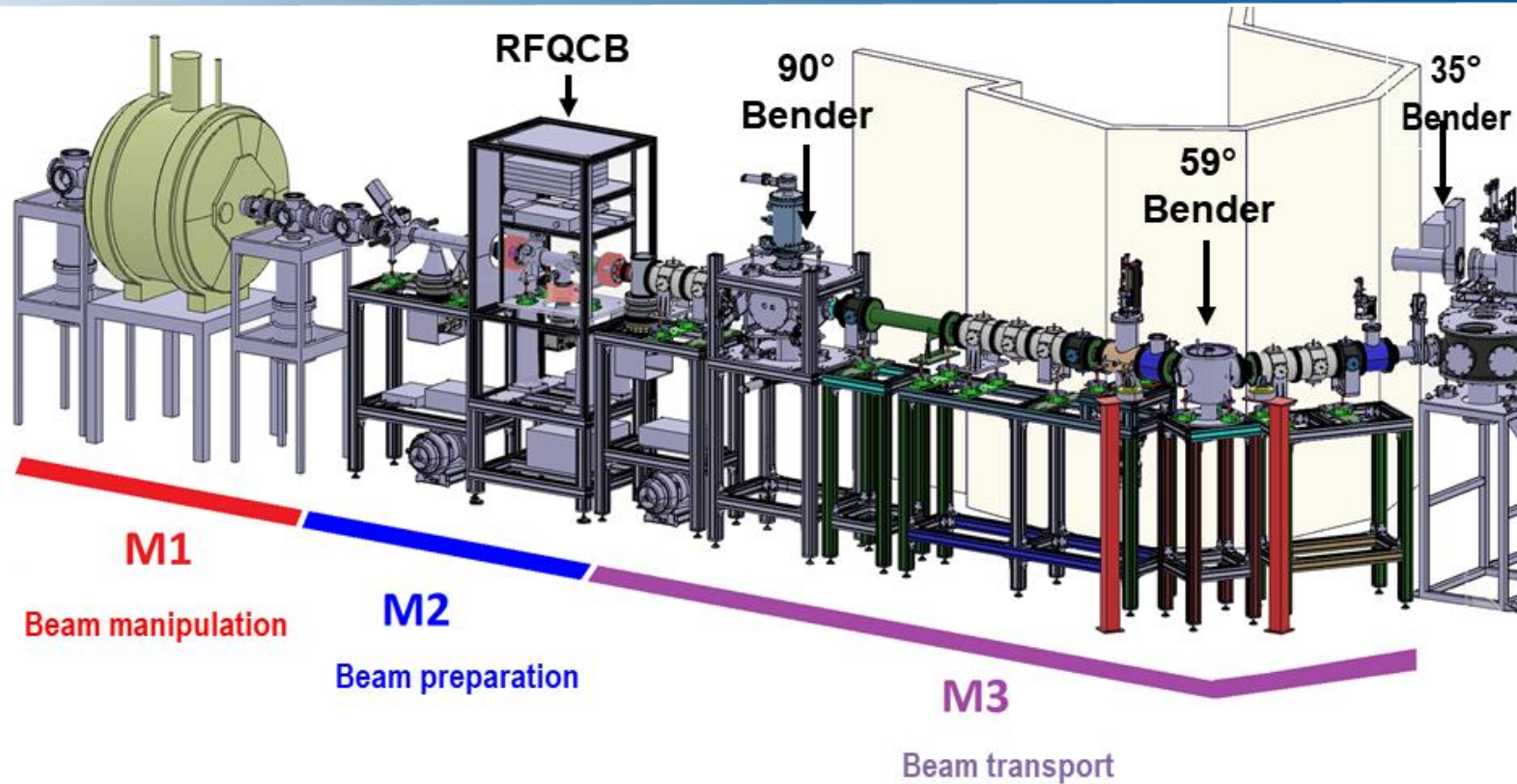
- Inputs for r-process path evolution models
- $N = 82$ could be linked to $A = 130$ solar abundance peak for r-process



M.R. Mumpower et al. / Progress in particle and nuclear physics 86 (2016)



MLLTRAP at ALTO



people involved at Orsay from

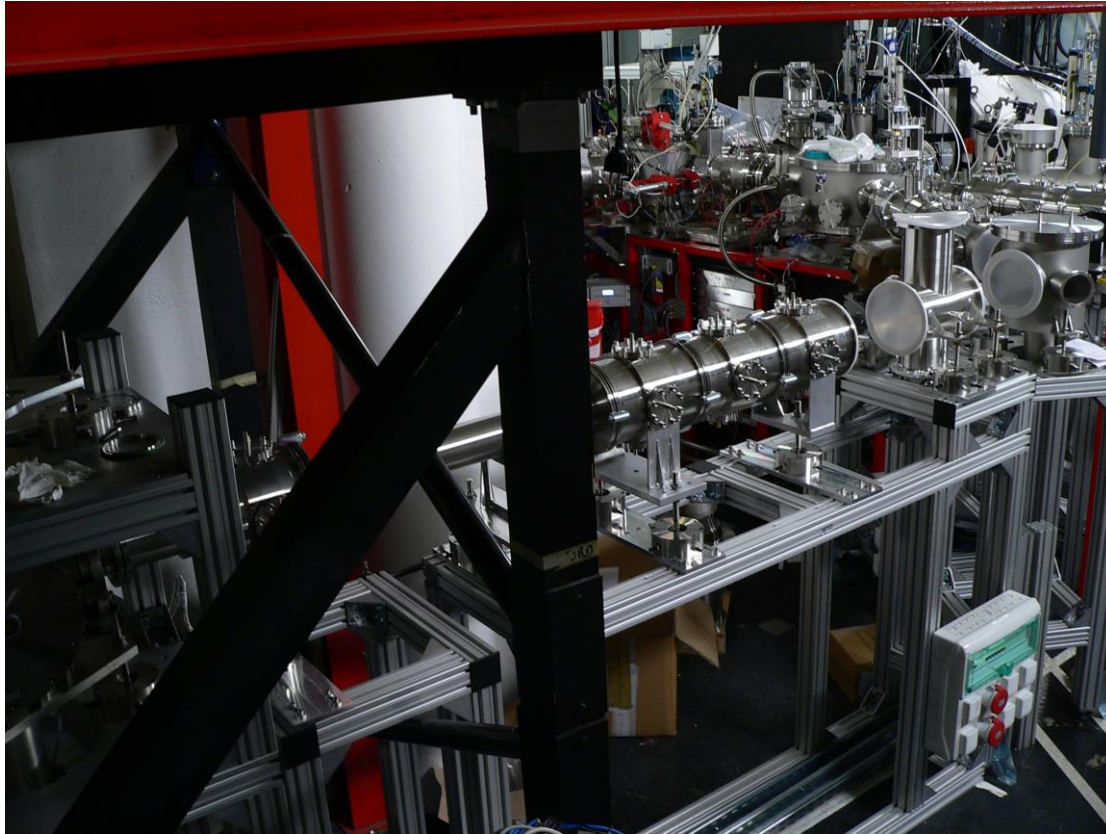
Scientific poles :
- Nuclear Physics
- Accelerator Physics

Engineering pole
- Design office

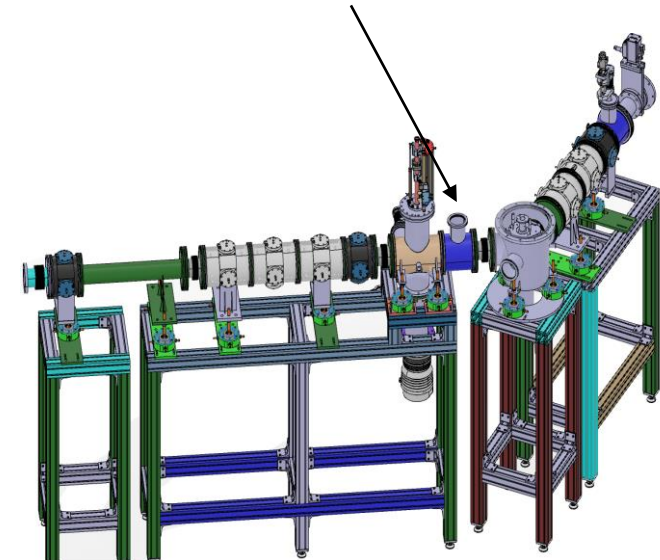
Platform :
- ALTO



M3 Section – Beam transport

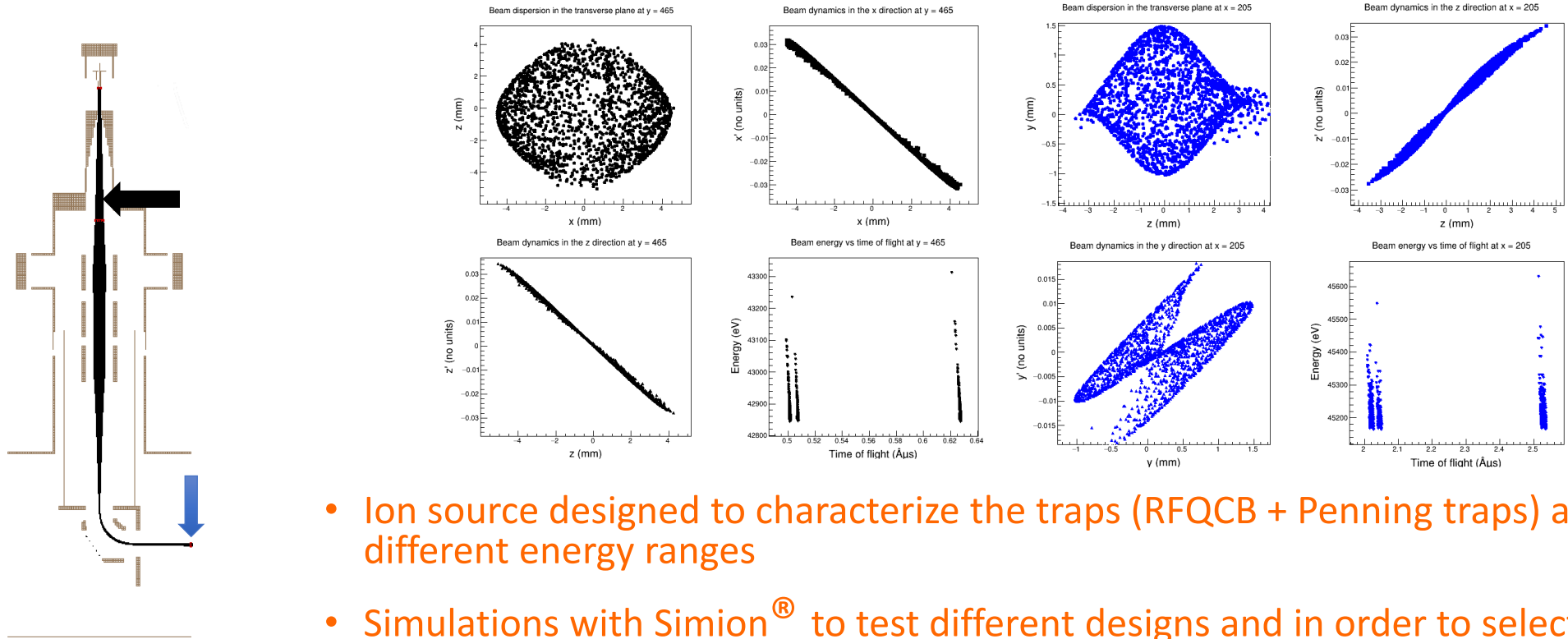


- All the steerers and quadrupoles installed (2019), other vacuum chambers in progress
- Alignment in progress (small orders in 2020)
- Ion source (Rb and Cs) designed to characterize the traps





M3 Section – High voltage ion source



October 2019 –
Middle 2020

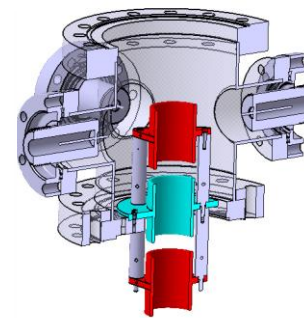
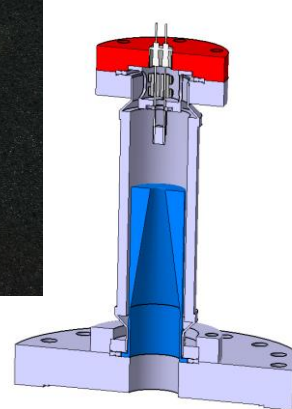
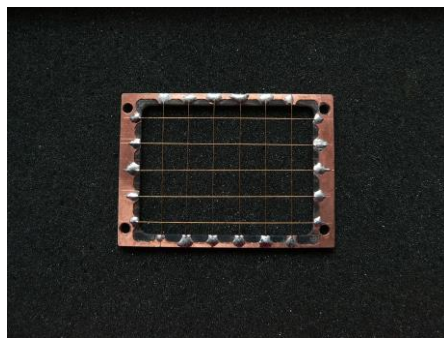
- Ion source designed to characterize the traps (RFQCB + Penning traps) at different energy ranges
- Simulations with Simion[®] to test different designs and in order to select the best one for the final design
- Simulation covered a large energy range : 1, 10, 30 and 50 kV were validated
- Work with the design office to fix the final design



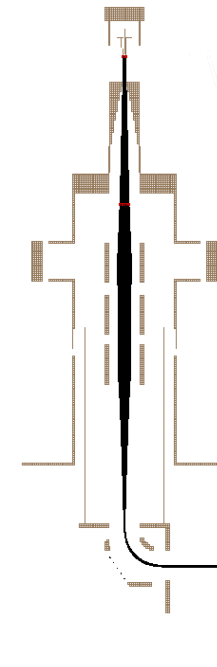
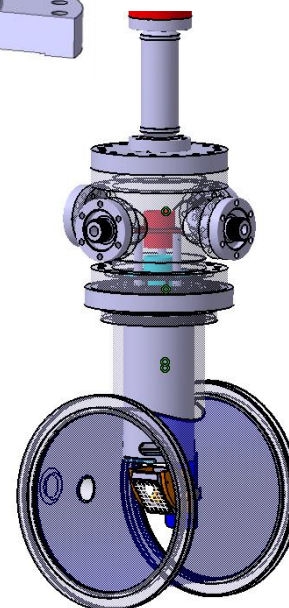
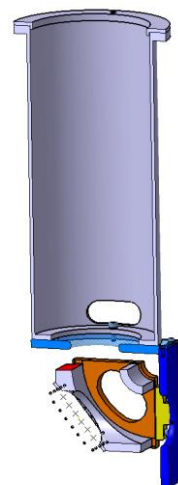
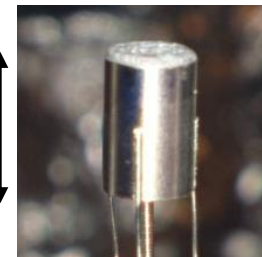
M3 Section – High voltage ion source

Ordered at the end of 2020

Delivery scheduled on March 22nd 2021

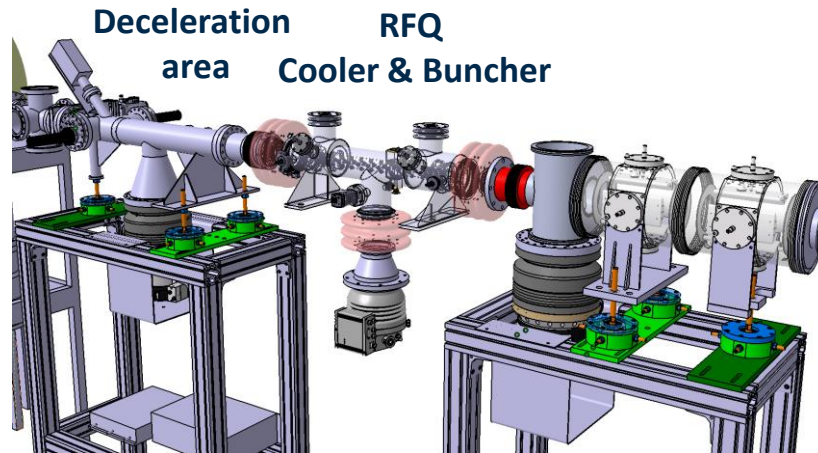
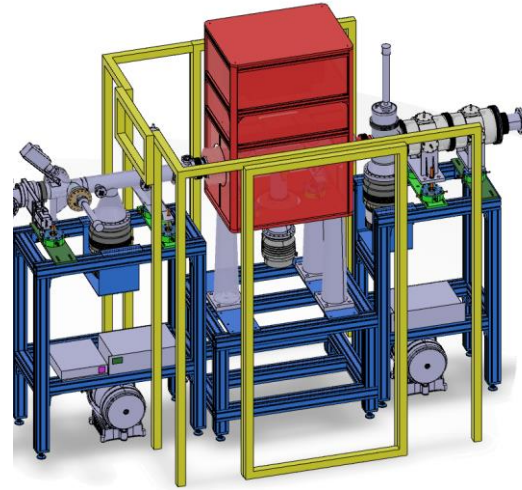


10 mm





M2 section – Beam preparation



- Call for tender was not entirely successful in particular for mechanical part
- Several months to find a company to make mechanical parts (2020)
- Electronics and pumping material received with a large delay (2020)
- Some pieces of deceleration area already made
- RFQCB and frames are still in construction (delivery in April-May 2021)
- RF Generator in construction
- First tests by the end of 2021

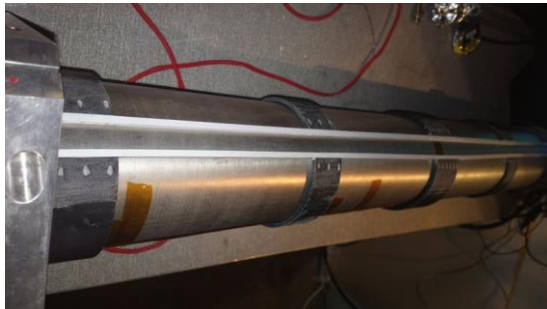


M1 Section – Magnetic field monitoring

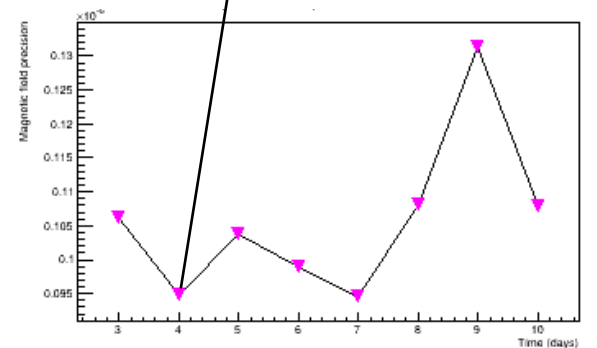
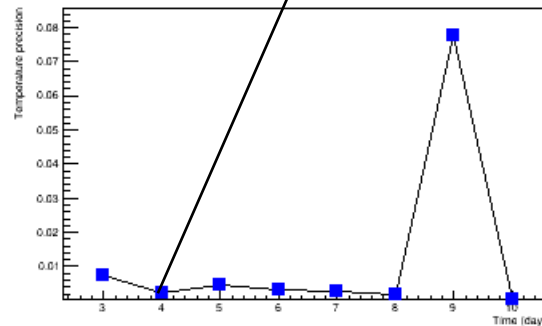
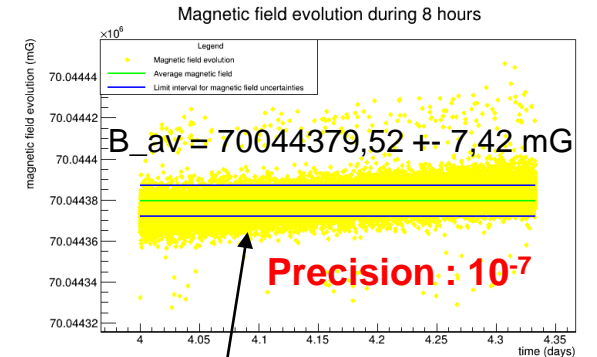
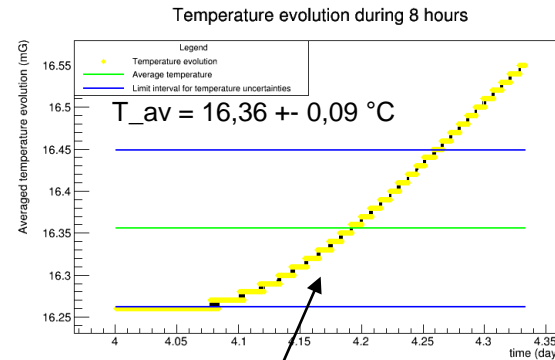
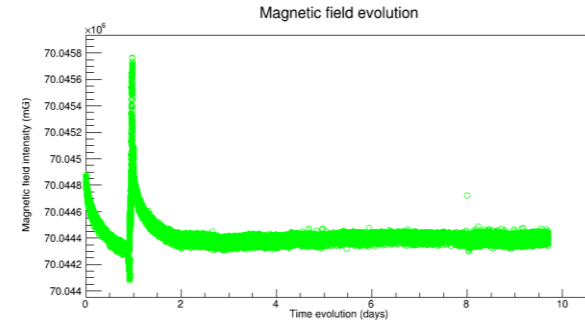
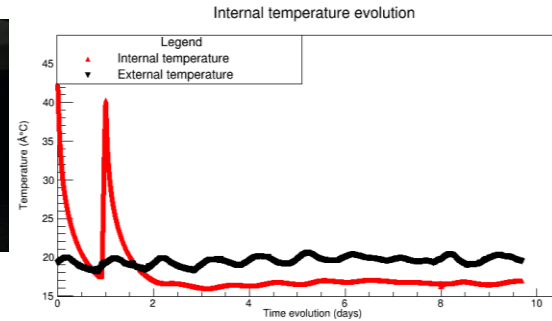


June - December 2020 : tests of the probe

- Magnetic probe developed by Caylar to track magnetic field evolution in real time (2018) → validated in September 2020
- Coupled to the bore temperature



- Delay for section M1

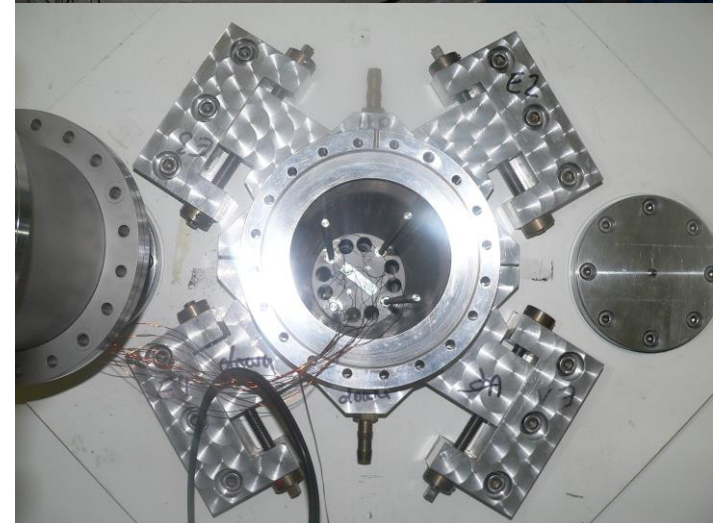
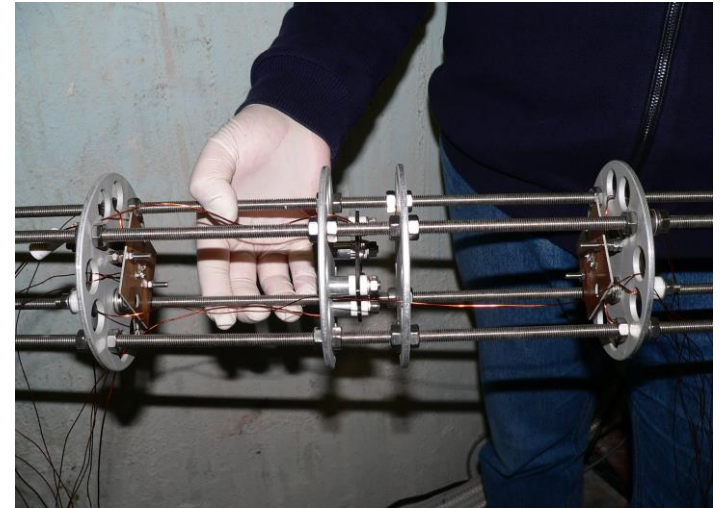




Vacuum tube

October 2021 : Alignment of the vacuum tube with an electron gun

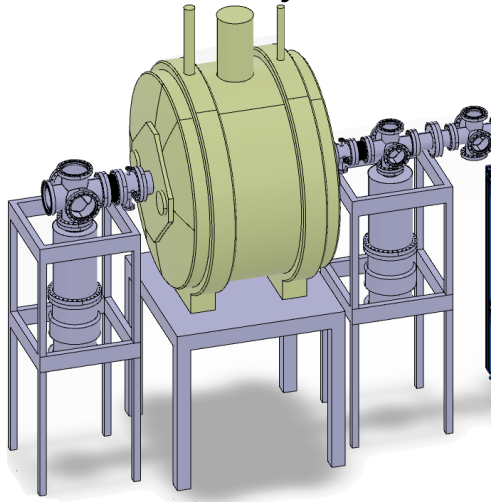
- Alignment of the vacuum tube axis with magnetic field lines
 - Affected by 2020 lockdown and restrictions and the validation of the magnetic probe
 - Purchase of equipment for alignment and installation of the traps → delays
 - Alignment almost finished but stopped because of vacuum problems
- > Delay in the installation of the Penning traps



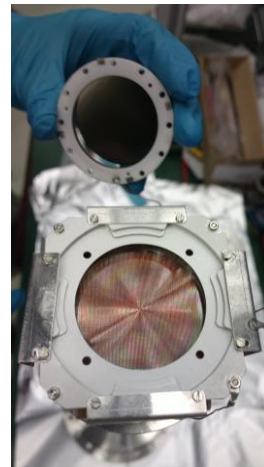
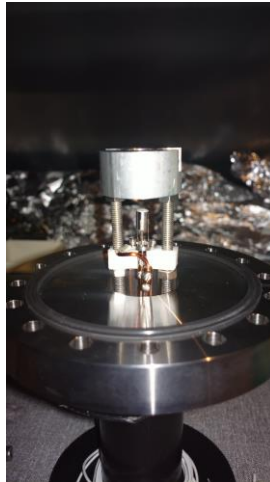


M1 Section – Beam manipulation

Injection and ejection sections

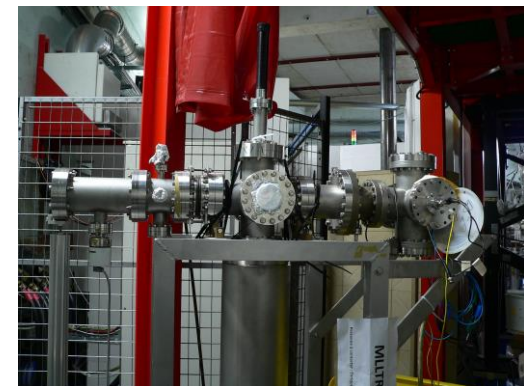
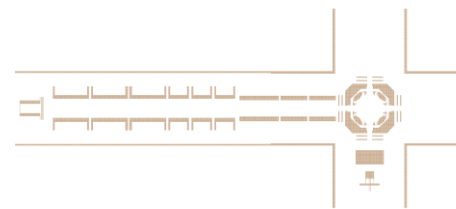


- MCP Delay line delivered (electronics and detector) in July 2020
- New scroll pump ordered
- Future budget required :
 - New turbo pumps for injection and ejection parts
 - Upgrades of the control system



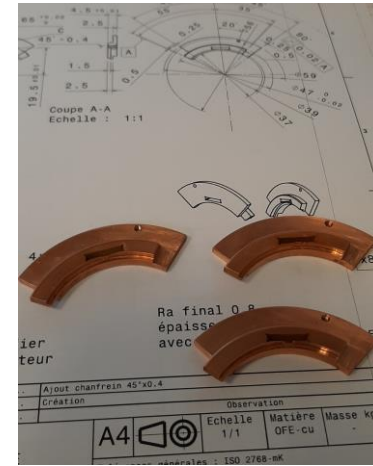
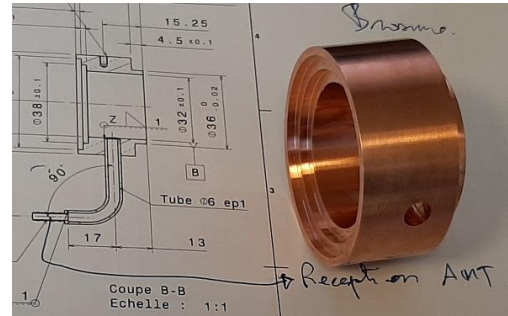
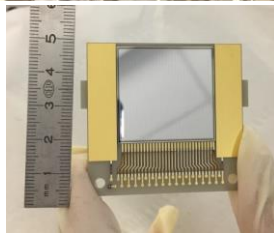
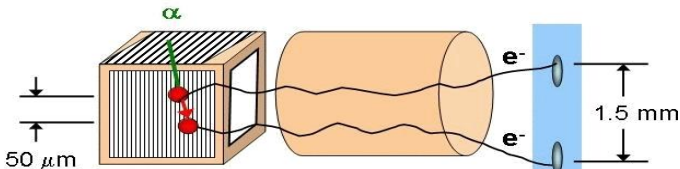
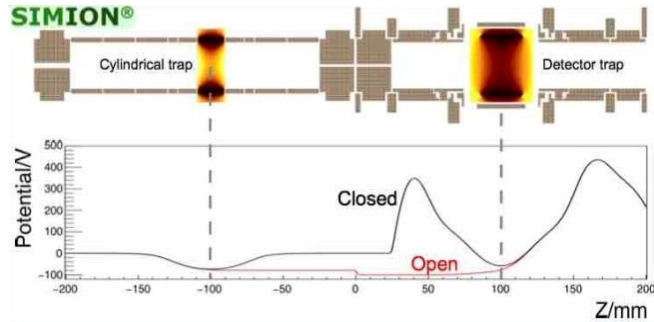
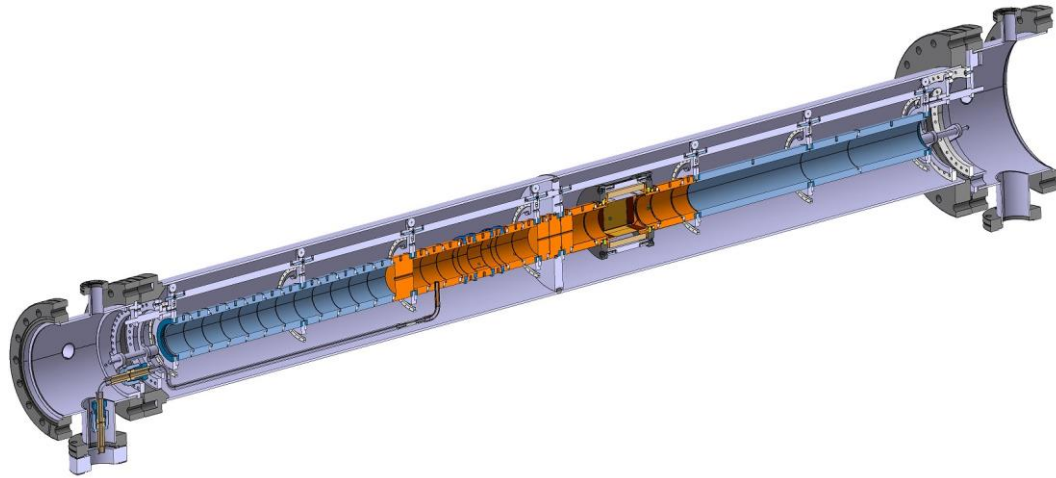
May 2019

- Bender, injection electrodes and diagnostic system (faraday cup and microchannel plate) operational
- Ion source developed, also operational
- This ion source was a prototype for M3 section
- Control system tested





M1 Section – In trap



Decay spectroscopy in trap

- Design fixed at the end of 2019
- Call for tender : October 2019
- All mechanical parts and insulators received in 2020
- Gold plating of the electrodes : ordering prepared in march 2021
- Future budget required :
 - Offline tests (Vacuum, electronics)



For 2021 :

- Installation of both traps (Penning and Paul)
- Beginning of the offline commissioning



Thank you for your attention !