

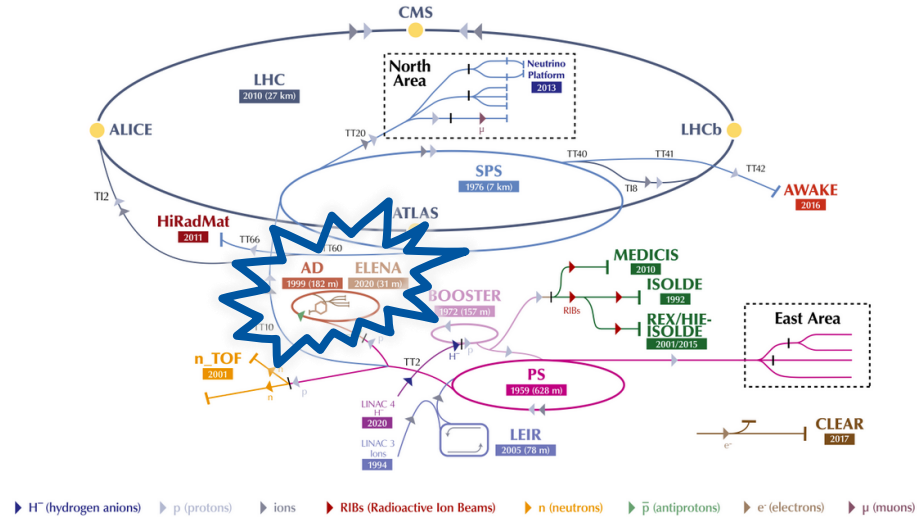
Status of PUMA beam lines @ ELENA and ISOLDE

- WHERE ARE WE?
- WHAT WE DO?
- MOTIVATION
- TRANSPORT
- BEAM LINE @ ELENA
- BEAM LINE @ ISOLDE
- SCHEDULE



WHERE ARE WE?

The CERN accelerator complex
Complexe des accélérateurs du CERN



LHC - Large Hadron Collider // SPS - Super Proton Synchrotron // PS - Proton Synchrotron // AD - Antiproton Decelerator // CLEAR - CERN Linear Electron Accelerator for Research // AWAKE - Advanced WAKEfield Experiment // ISOLDE - Isotope Separator OnLine // REX/HI-ISOLDE - Radioactive Experiment/High Intensity and Energy ISOLDE // MEDICIS // LEIR - Low Energy Ion Ring // LINAC - LInear ACcelerator // n_TOF - Neutrons Time Of Flight // HiRadMat - High-Radiation to Materials // Neutrino Platform

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ANTIMATTER
FACTORY

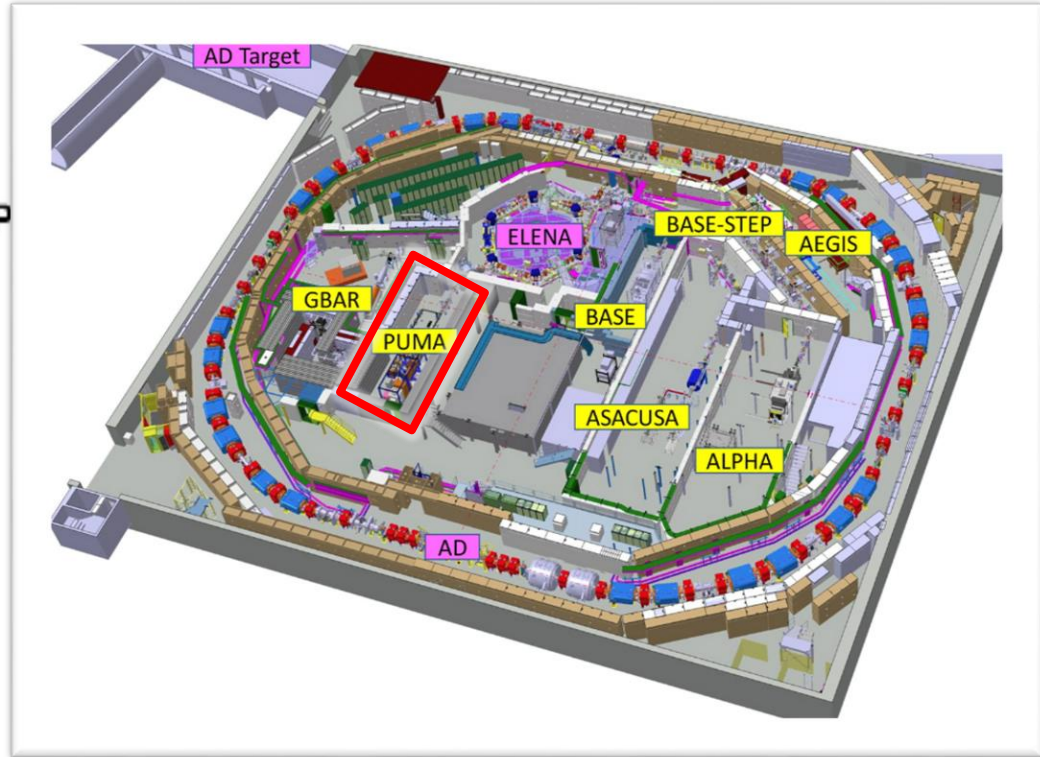


ELENA



WHAT WE DO?

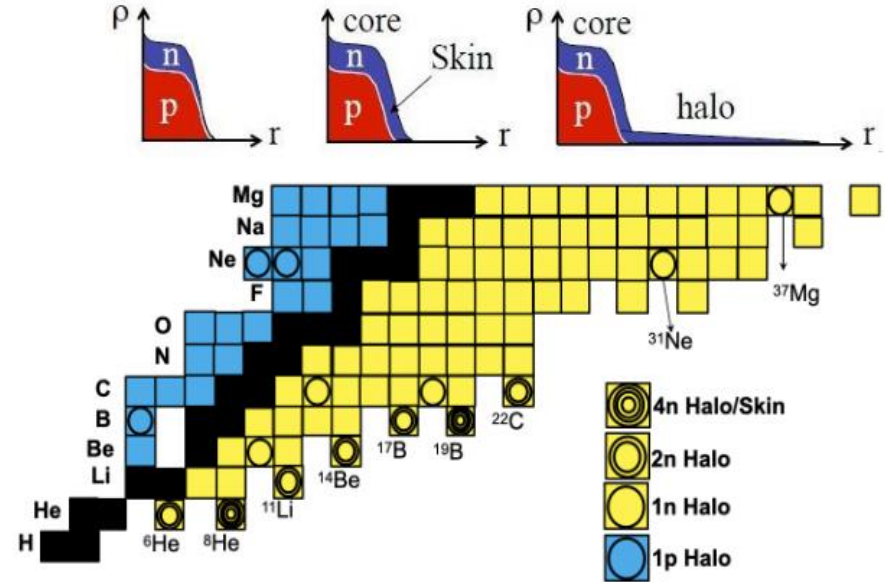
The Antiproton Low Energy Antiproton (ALEX) is coupled to AD that produces low energy antiprotons that can be trapped into studies of antimatter experiments.



PUMA MOTIVATION



- Provide a new observable for nuclear density tail
- Characterize and evidence halos and skins
- Quantify correlations in low density

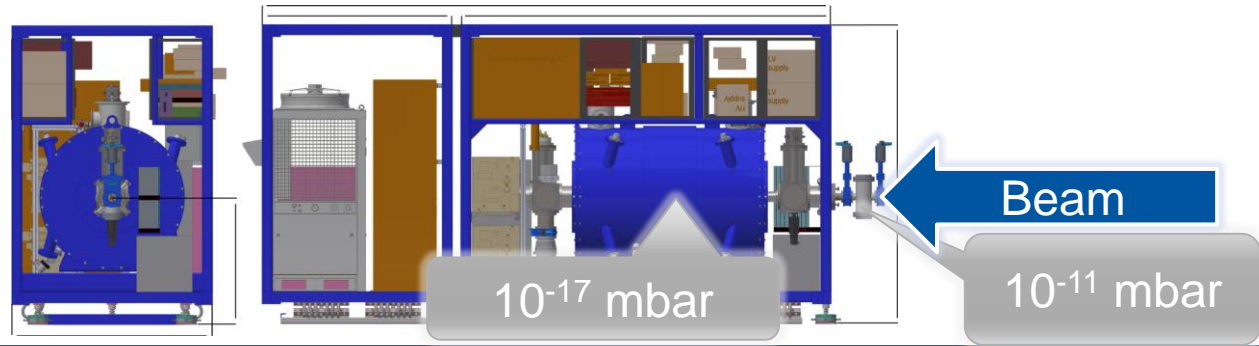


PUMA : antiProton Unstable Matter Annihilation

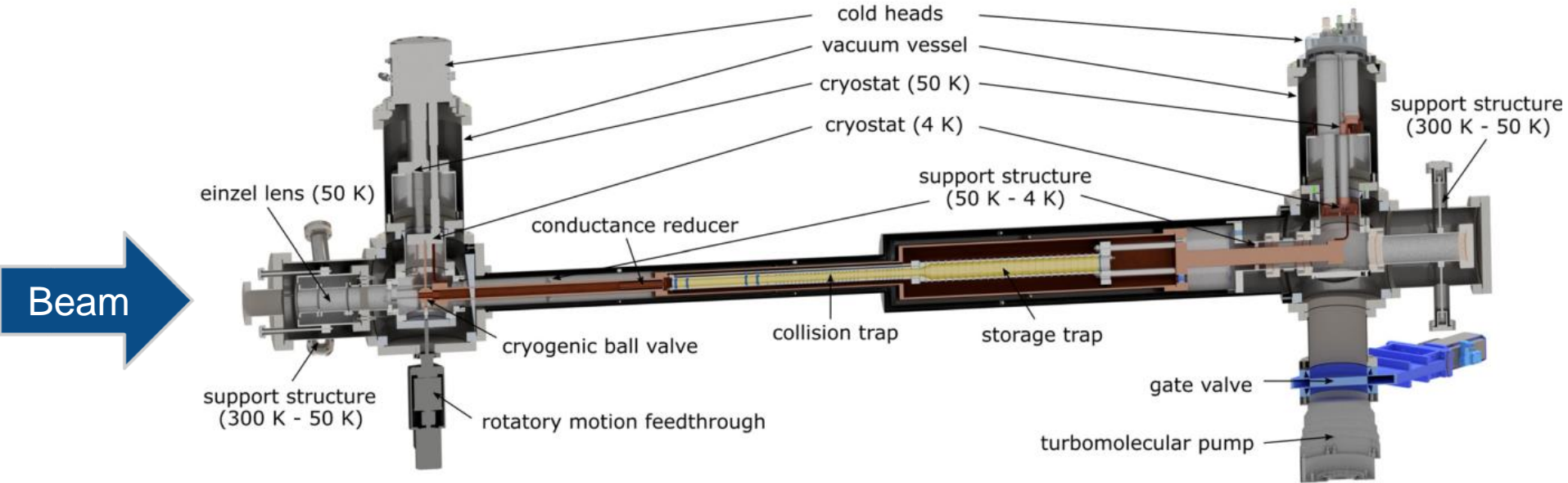


PUMA Trap

- Transport antiprotons from ELENA to ISOLDE
- Store 10^9 (First phase at 10^7) antiprotons at ELENA
- Vacuum requirement

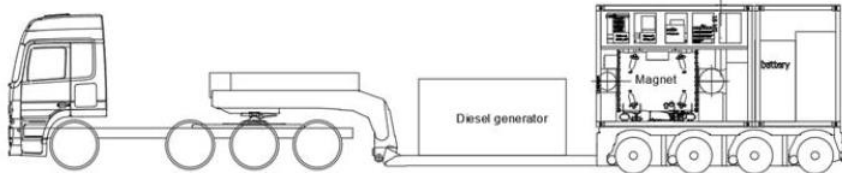


PUMA Trap



TRANSPORT

- Trap transfert AD Hall
- Truck AD to ISOLDE
- First time on 2023



BEAM LINE @ ELENA

CERN
CH-1211 Geneva 23
Switzerland



EDMS NO: **2151516** REV: **1.0** STATUS: **RELEASED**

REFERENCE
AD-LJ-EC-0011

Date: 2021-09-02

ENGINEERING CHANGE REQUEST

An Experimental Area at AD for PUMA

BRIEF DESCRIPTION OF THE PROPOSED CHANGE(S):
It is proposed to set up an experimental area at AD for the new PUMA experiment. This ECR details the modifications required.

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ELENA-Approval e-group

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[approved at the 131th EATM
meeting]

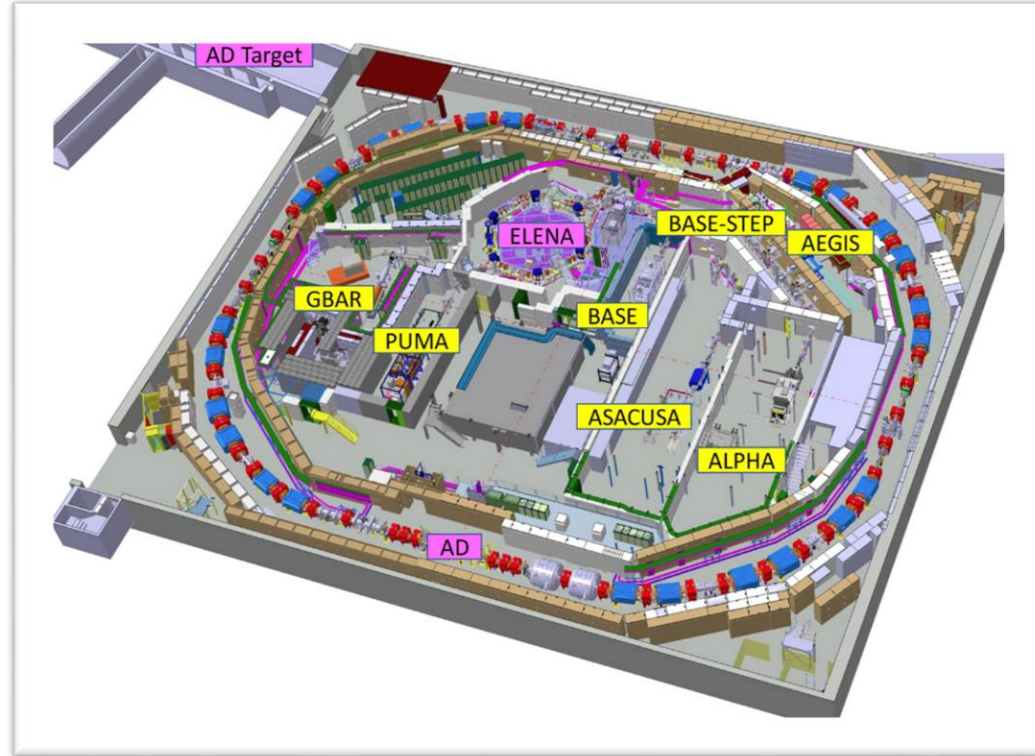
B. Goddard [SY] and
M. Meddahi [ATS]
[approved at the 292th IEPIC
meeting]

DOCUMENT SENT FOR INFORMATION TO:

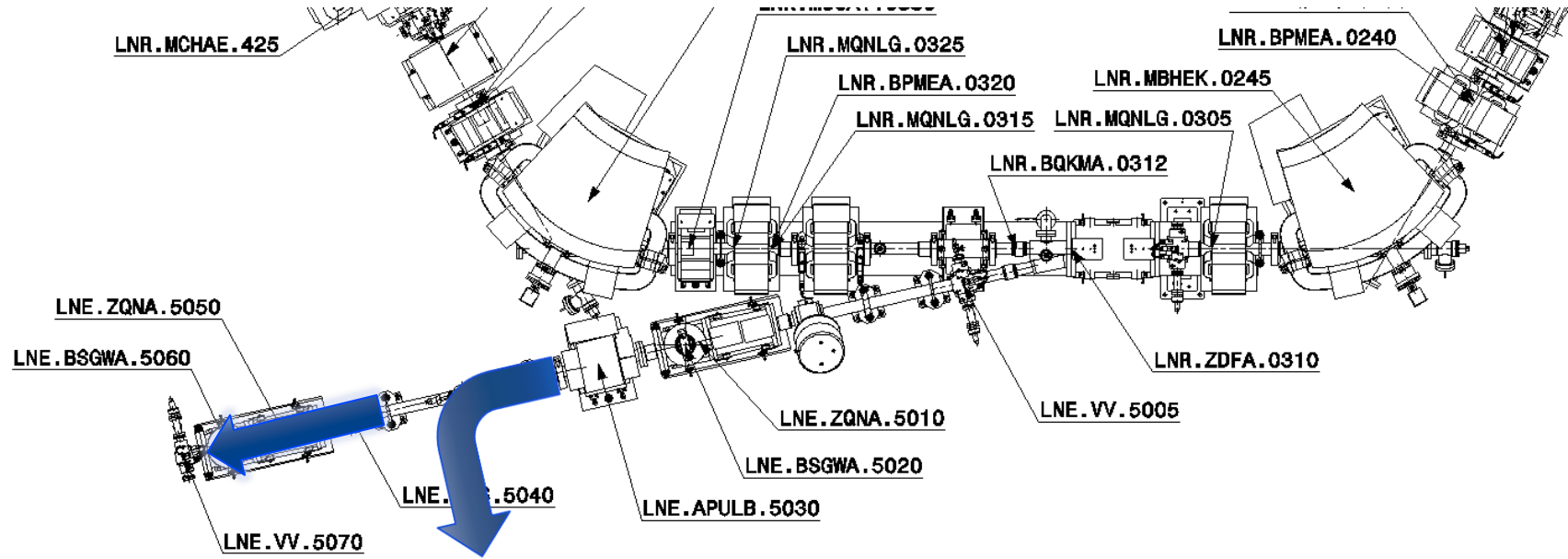
- EATM
- IEPIC

SUMMARY OF THE ACTIONS TO BE UNDERTAKEN:

Note: When approved, an Engineering Change Request becomes an Engineering Change Order.
This document is uncontrolled when printed. Check the EDMS to verify that this is the correct version before use.

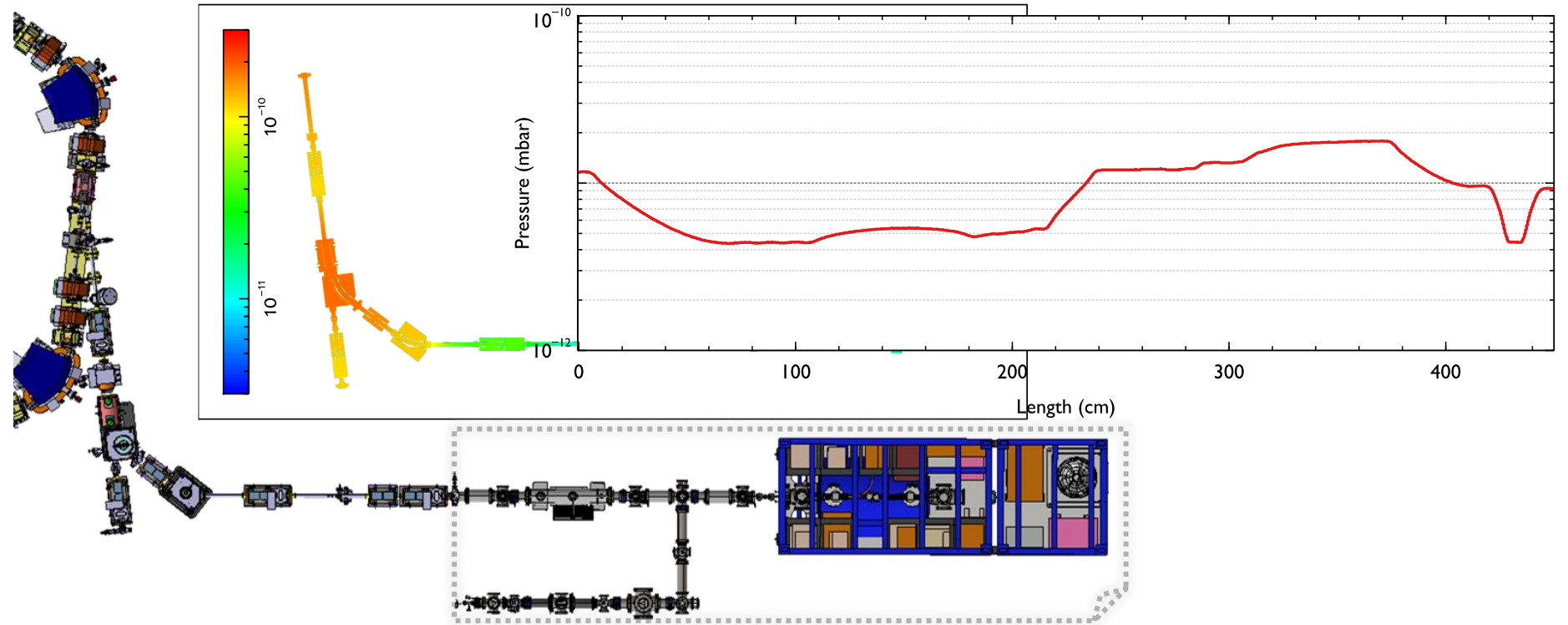


BEAM LINE @ ELENA



From LNE 50 to LNE 50+51

BEAM LINE @ ELENA



BEAM LINE @ ELENA

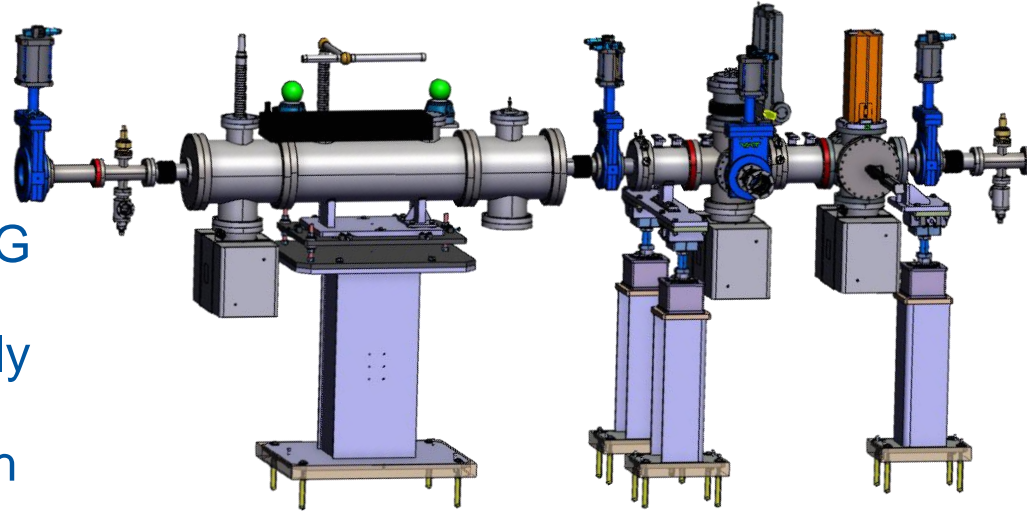


BEAM LINE @ ELENA



Support Experiment

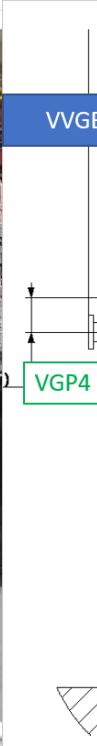
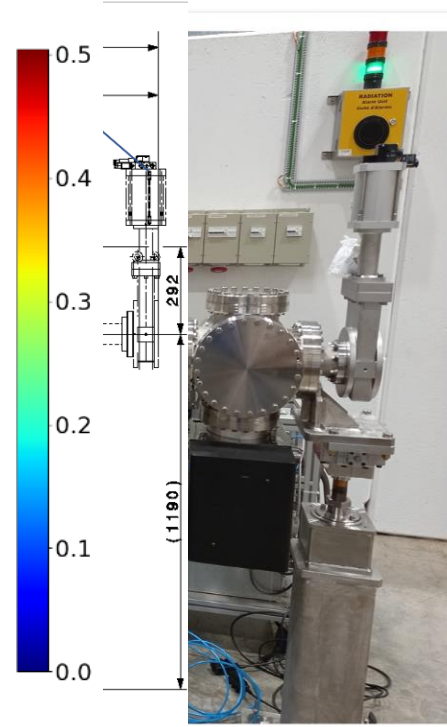
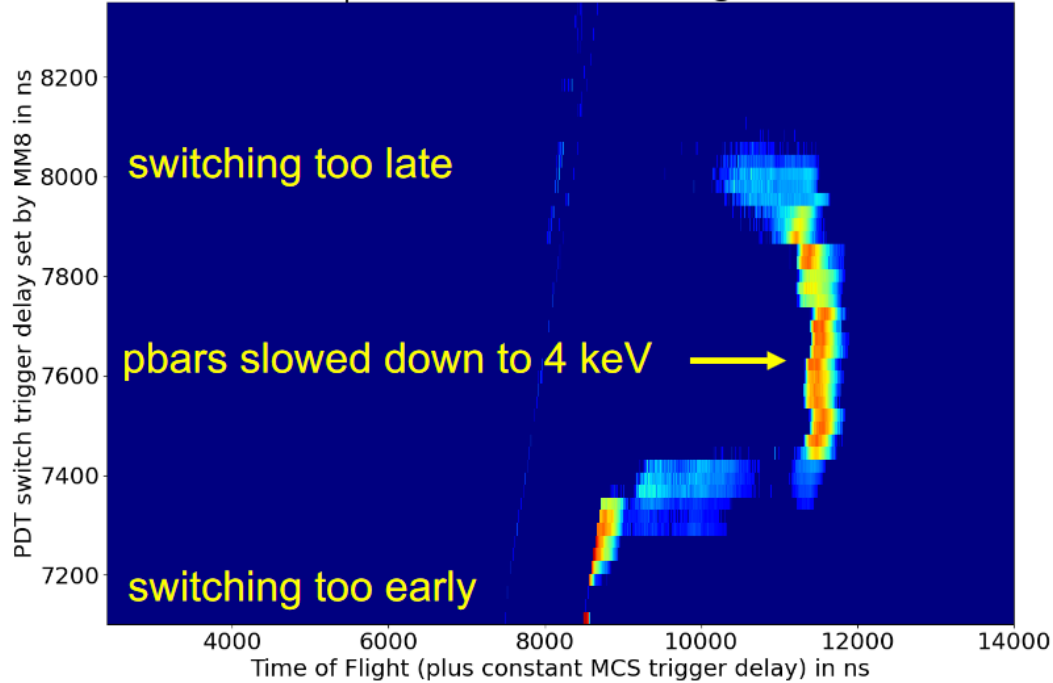
- Help with design/simulation
- Cleaning facility, Vacuum firing
- NEG Coating of PDT vacuum chambers
- Procurement of the valves, NEG cartridge, controls
- Acceptance test of subassembly before installation
- Controls Installation on site with Iker (ICM)



BEAM LINE @ ELENA



Antiproton Deceleration Scan @ -96 kV

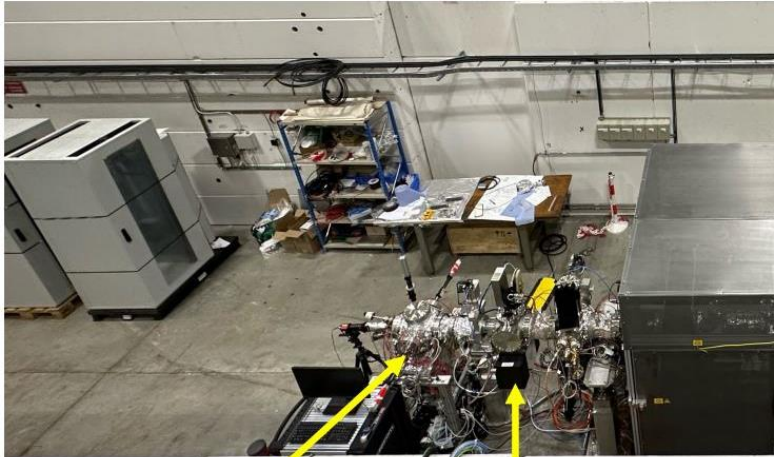


INTERVENTION @ ELENA



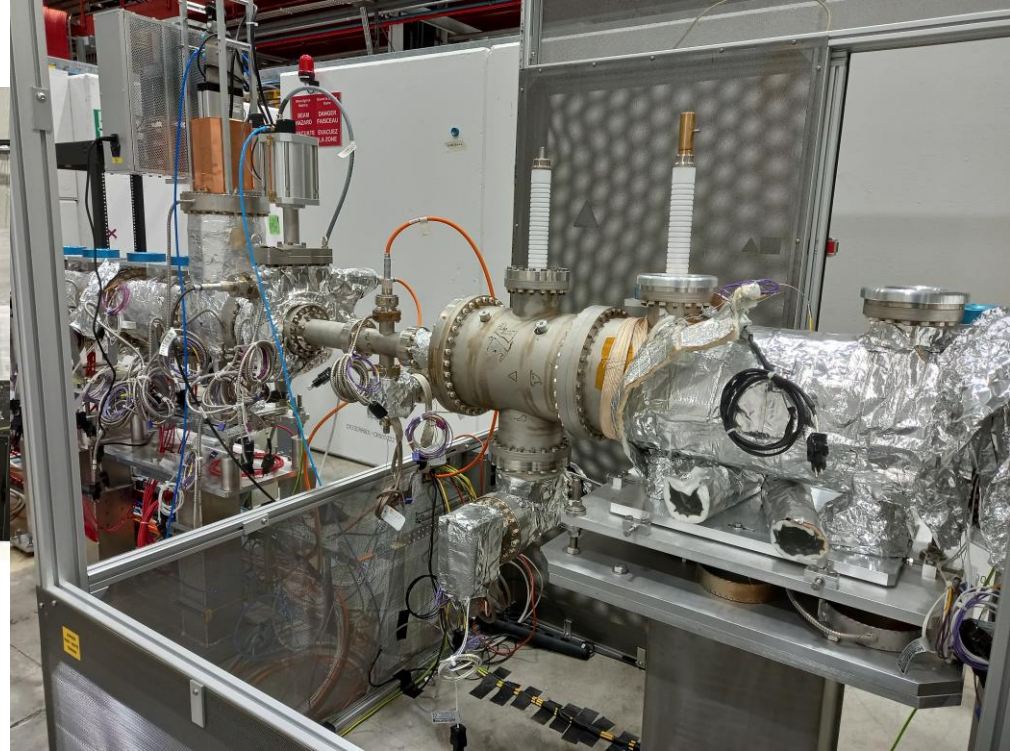
YETS 2022-23 :

Exc
wh
lim



Detection cross

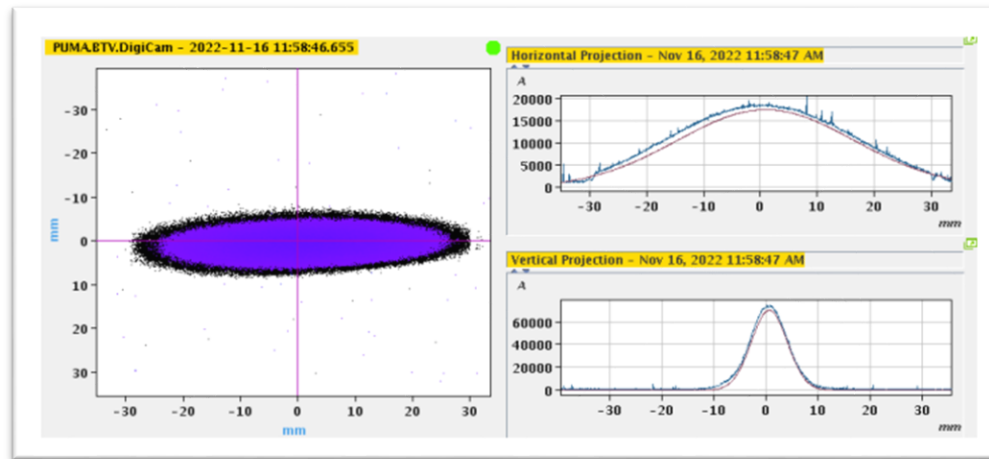
Phosphor screen



SCHEDULE @ ELENA



- **Summer 2023 :**
 - **Optimisation of PDT HV-to-ground distances**
 - **Measurement and optimisation of transmission with Pbars**

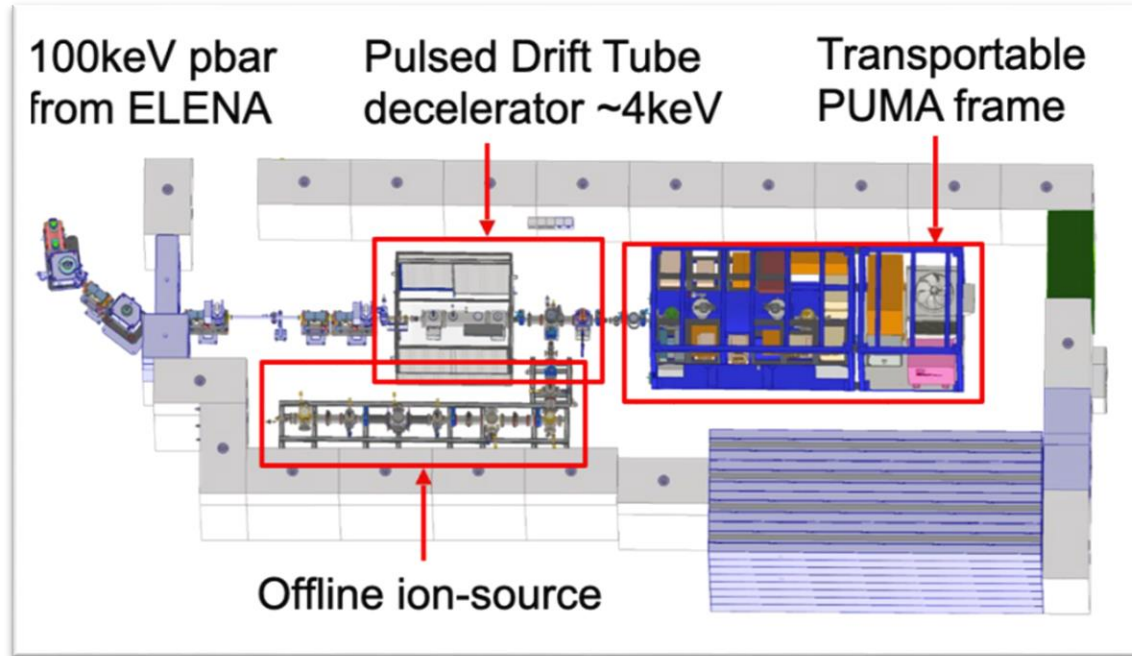


SCHEDULE @ ELENA

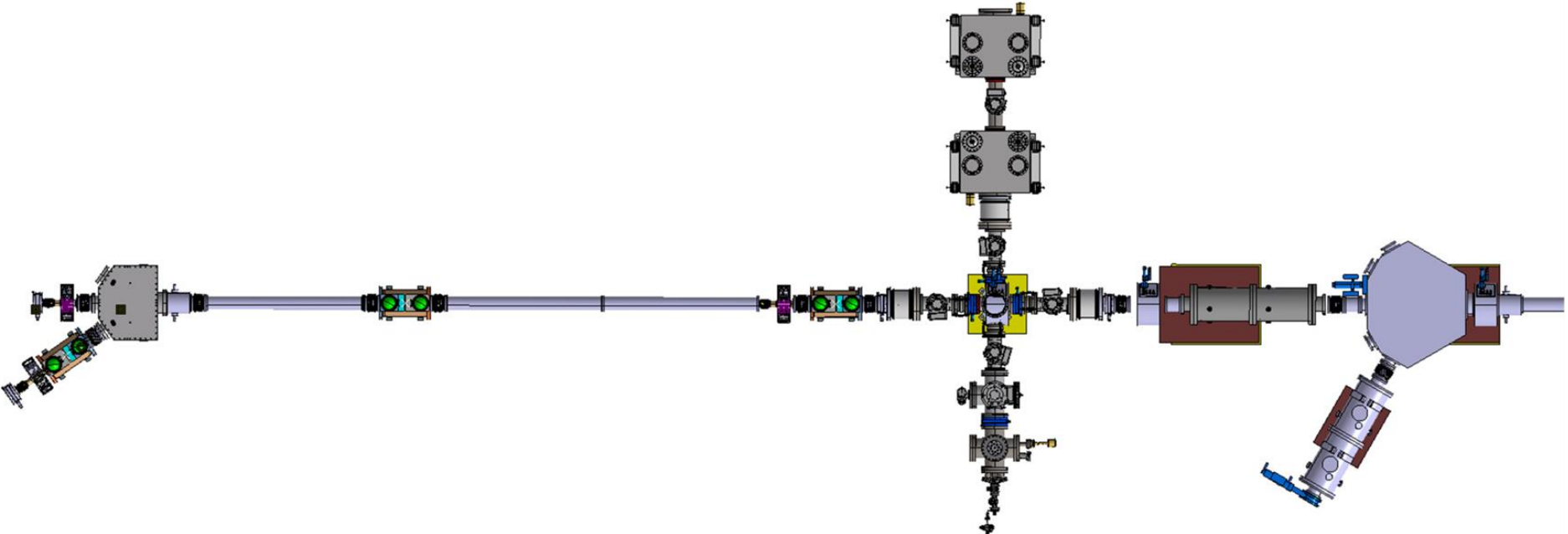


Milestones in 2023

- Offline ion source connection
- Trap assembly with installation



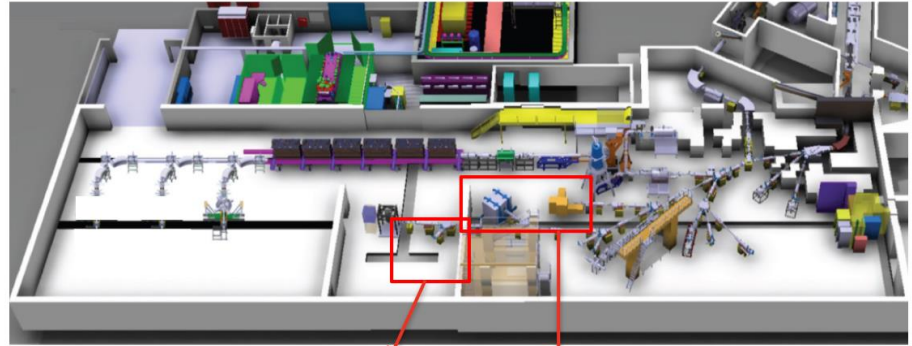
BR



BEAM LINE @ ISOLDE

CERN responsibility of the low energy beam line

- Vacuum and optics simulation
- Design completion
- Procurement of the beam line elements
- Measurement of He propagation at LA2
- Start beam line installation 2024



PUMA experimental zone

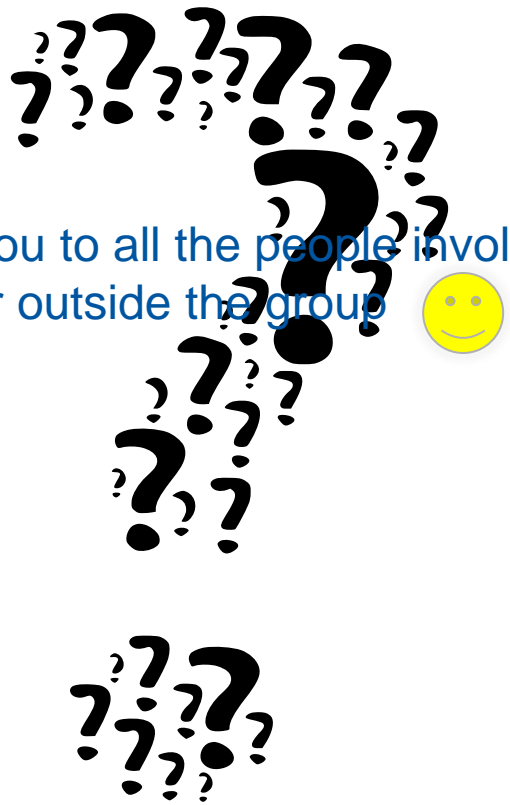
- XHV (10^{-11} mbar)
- Beam size < 2 mm

Low energy beam line

- Bunching (Paul trap)
- Isotopic selection (MR-TOF)
- UHV (better than $1 \cdot 10^{-8}$ mbar at HOP)



Thank you to all the people involved inside or outside the group 😊



References

SPSC 2021

SPSC 2023

PUMA, antiProton unstable matter annihilation

PUMA Experiments at CERN

PUMA: physics with antiproton at ISOLDE