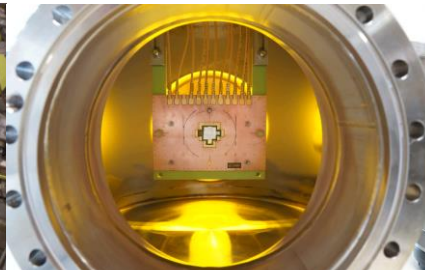
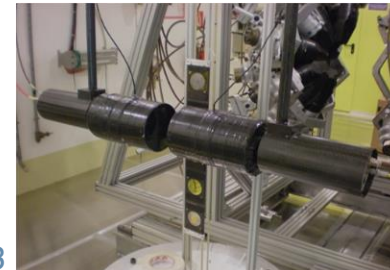
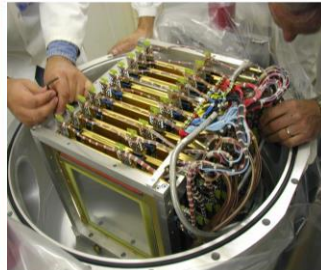
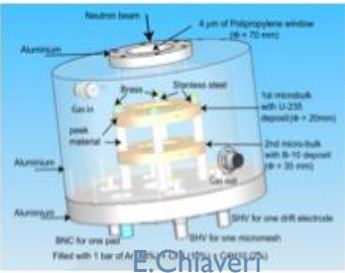
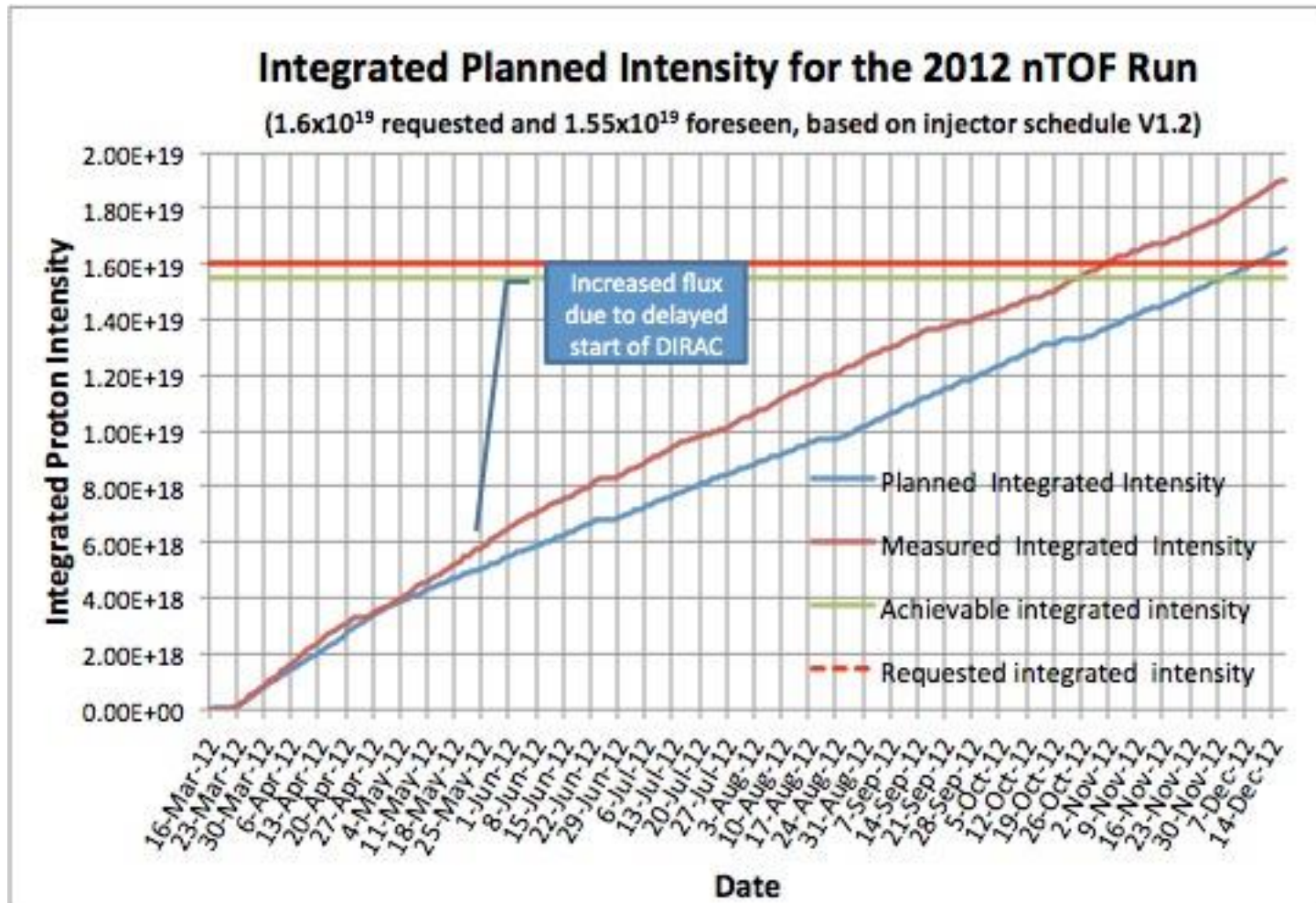


Status of Experimental Area 2(EAR2) Project

Enrico Chiaveri

Spokesperson of n_TOF Collaboration





THANKS TO THE PS TEAM !



1. **Neutron capture cross section of ^{25}Mg and its astrophysical implications** (CERN-INTC-2012-003 / INTC-P-320)
1. **Micromegas detector for $^{33}\text{S}(n,\alpha)$ cross section measurement at n_TOF**(CERN-INTC-2012-006 / INTC-P-322)
1. **The (n, α) reaction in the s-process branching point ^{59}Ni**
(CERN-INTC-2012-011 / INTC-P-327)
4. **Fission Fragment Angular Distributions in the $^{234}\text{U}(n,f)$ and $^{236}\text{U}(n,f)$ reactions** (CERN-INTC-2012-016/INTC-P-303)
5. **Measurements of neutron-induced capture and fission reactions on U-235: cross sections and alpha ratios, photon strength functions and prompt gamma-ray from fission**(CERN-INTC-2011-045 / INTC-P-309)

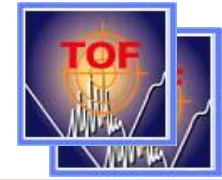


- 6. **Neutron capture cross section of ^{93}Zr** (CERN-INTC-2011-046 / INTC-P-310)

- 6. **Measurement of the fission cross-section of ^{240}Pu and ^{242}Pu at CERN's nTOF Facility**(CERN-INTC-2010-042; INTC-P-280)

- 6. **Spin assignments of nuclear levels above the neutron binding energy in ^{88}Sr** (CERN-INTC-2011-030 / INTC-P-304)

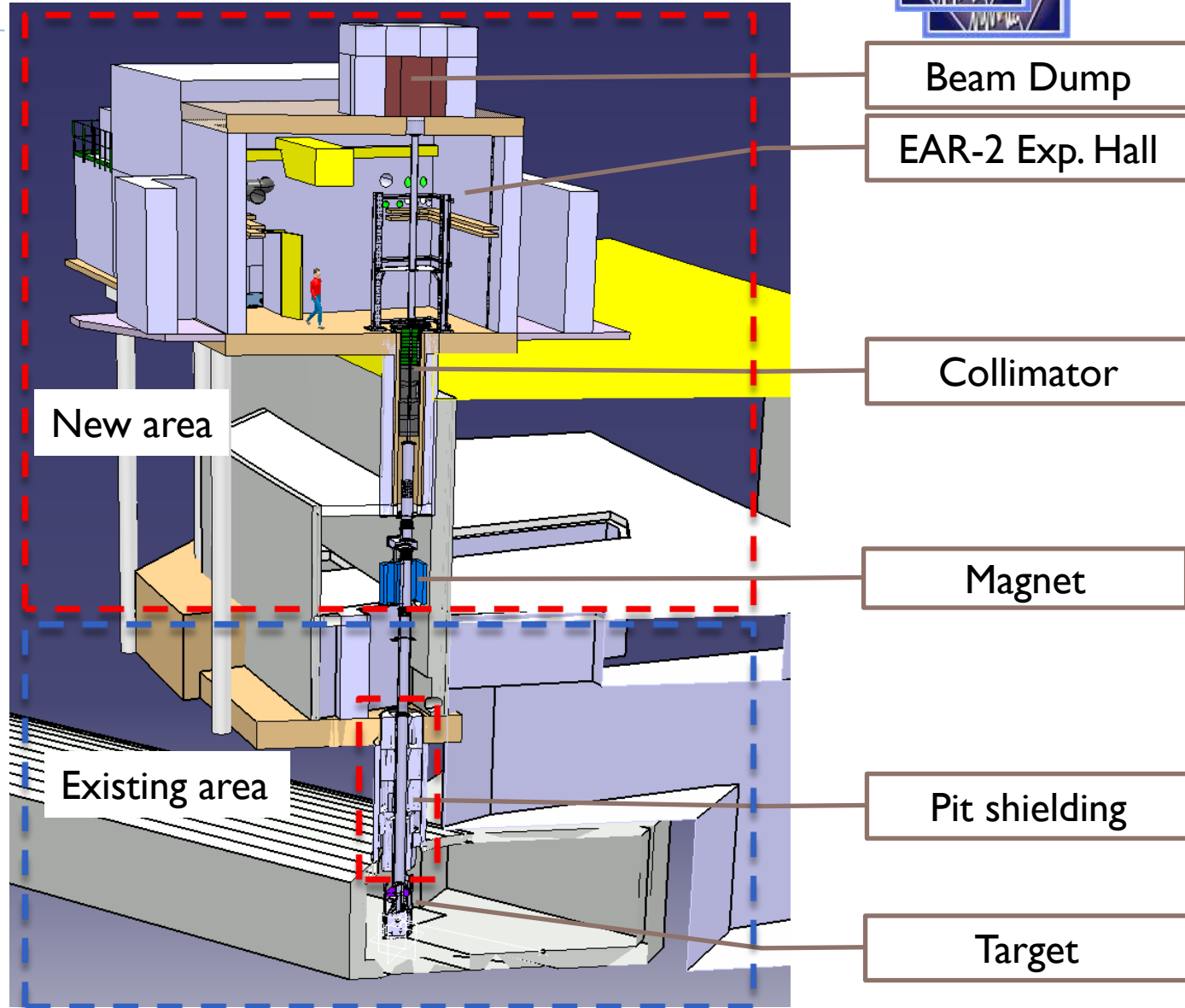
EAR2 design



Start of construction work by May 2013.

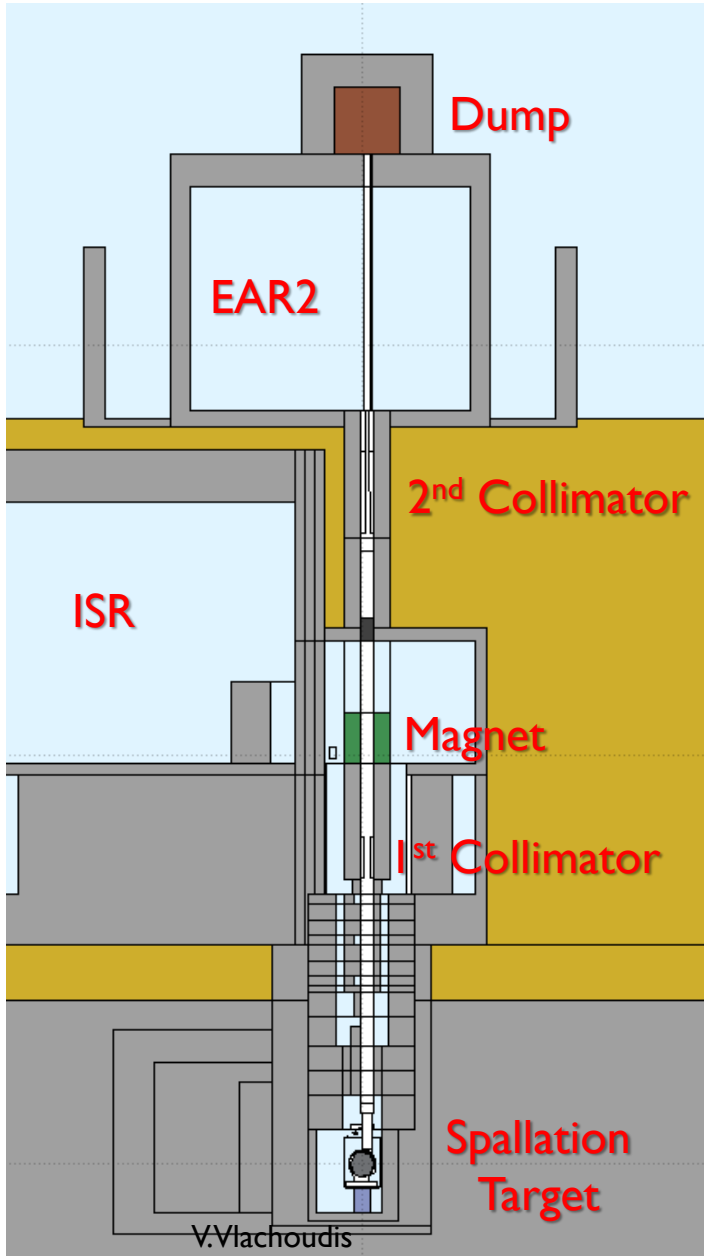
Ready in April 2014.

Neutron fluence increase by a factor 18-25 wrt. EAR-1

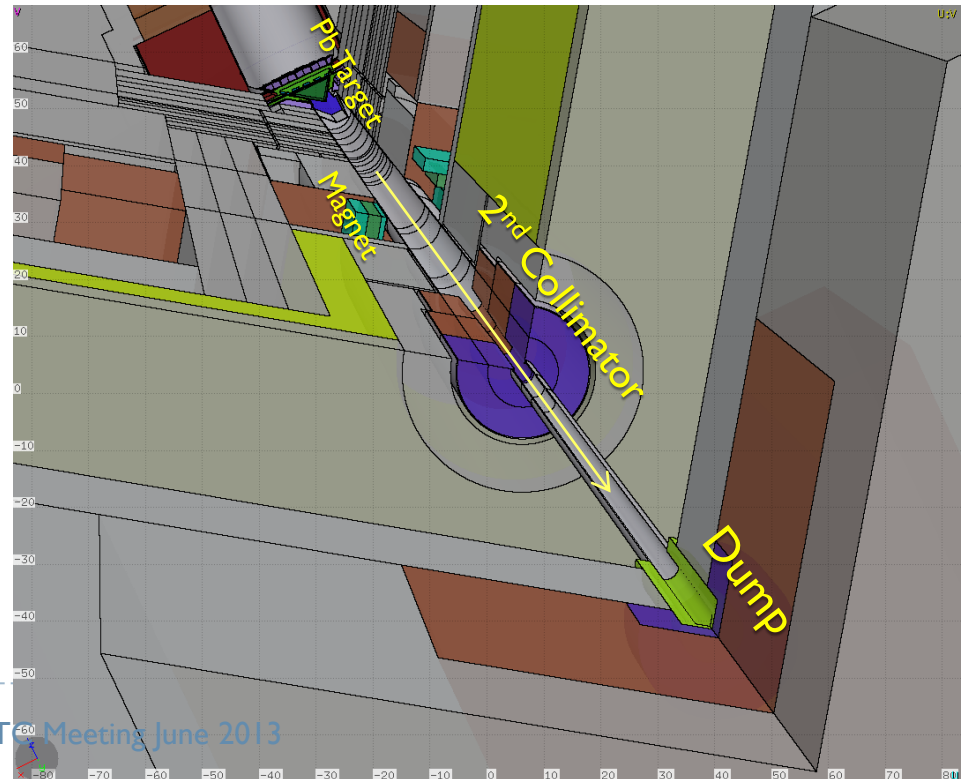


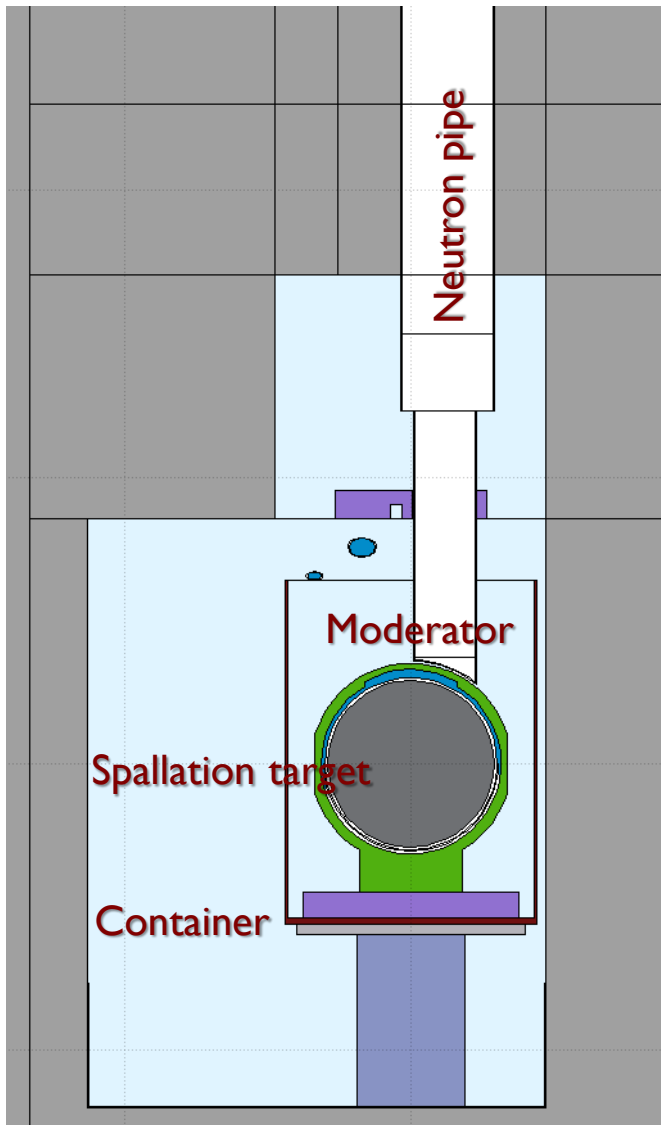
Experimental Area(EAR 2) Project

- ▶ Simulations work ✓
- ▶ Civil Engineering ✓
- ▶ Radiation Protection ✓
- ▶ Cooling & Ventilation ✓
- ▶ Electrical Infrastructure ✓
- ▶ Permanent Magnet ✓
- ▶ Access ✓
- ▶ General Infrastructure ✓
- ▶ Safety file ✓

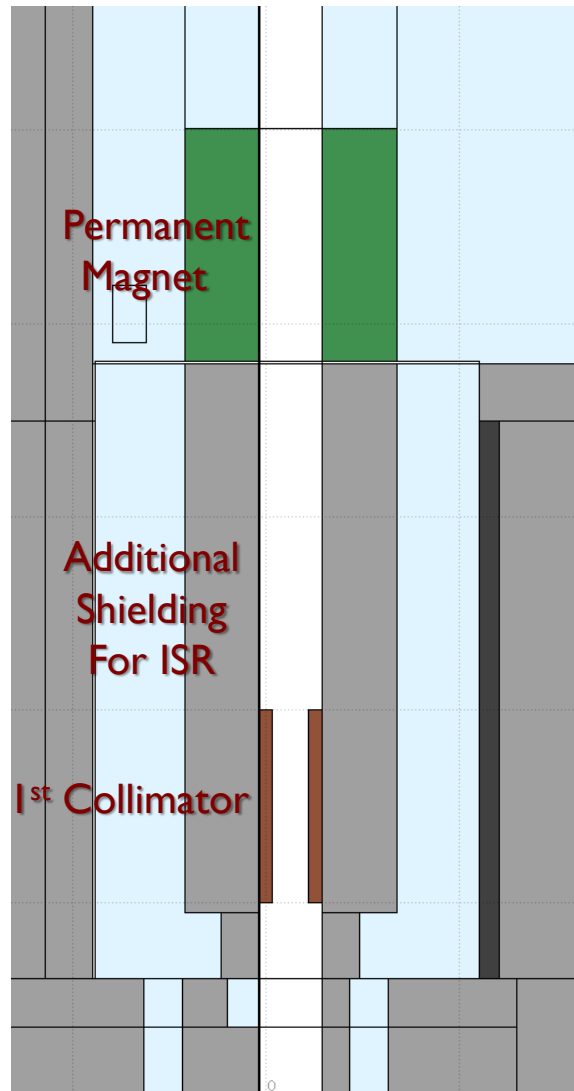


- ▶ Detailed geometry description in FLUKA
- ▶ Groups of Simulations:
 - Spallation Target
 - ISR, Access gallery, Permanent magnet
 - Collimators
 - Experimental Area and Dump

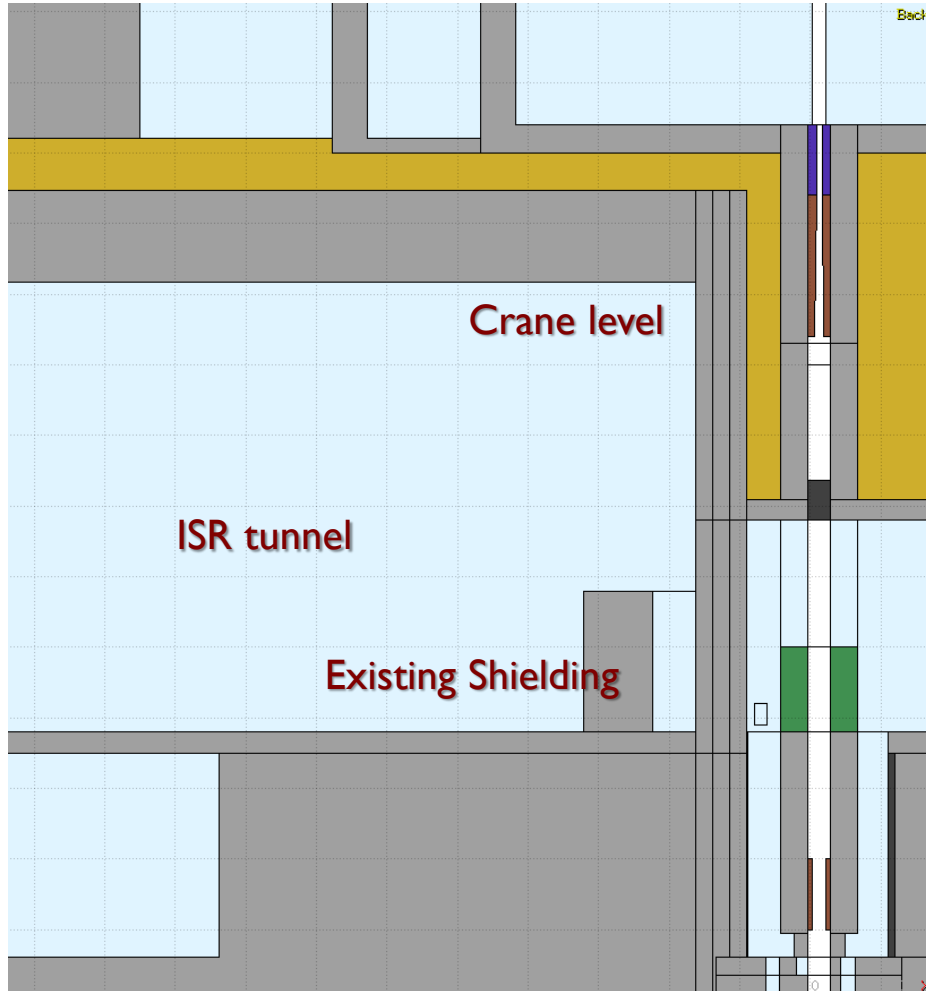




- Neutron moderator
- Beam pipe layout
- Fluence and resolution estimation
- Dose to electronics
- Optimization of the neutron target for future upgrade
- Determination of neutron gain by shifting the vertical pipe to neutron maximum
- Activation calculation of the present spallation target and container for a possible decommissioning in 2018
- γ -flash

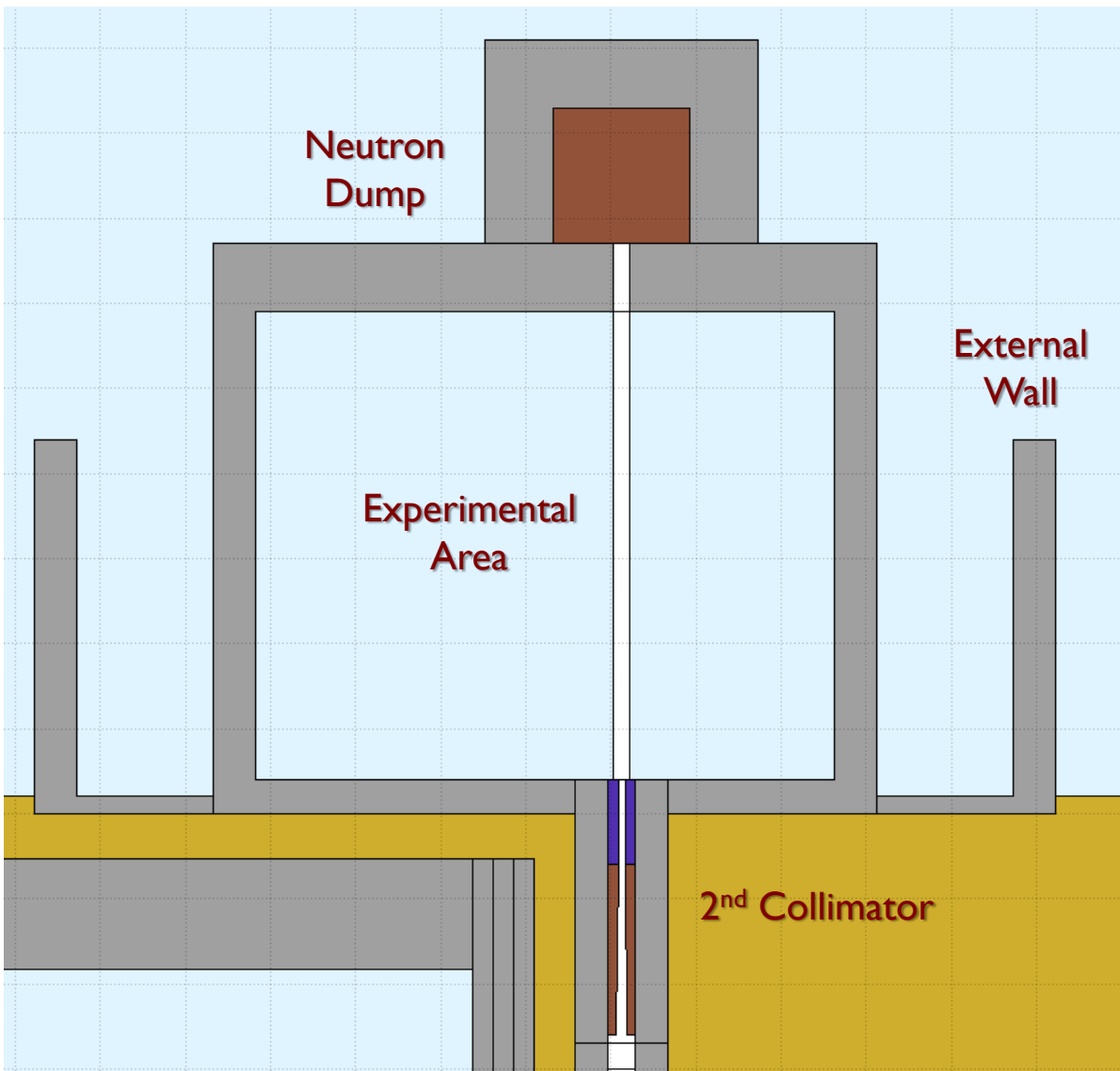


- Introduction of a **removable** 1st collimator:
 - Shaping the beam for the capture collimation setup
 - Background reduction in ISR
 - Magnet protection
- Permanent magnet
 - Field intensity needed
 - Dose (degradation of magnet)
 - Activation calculation



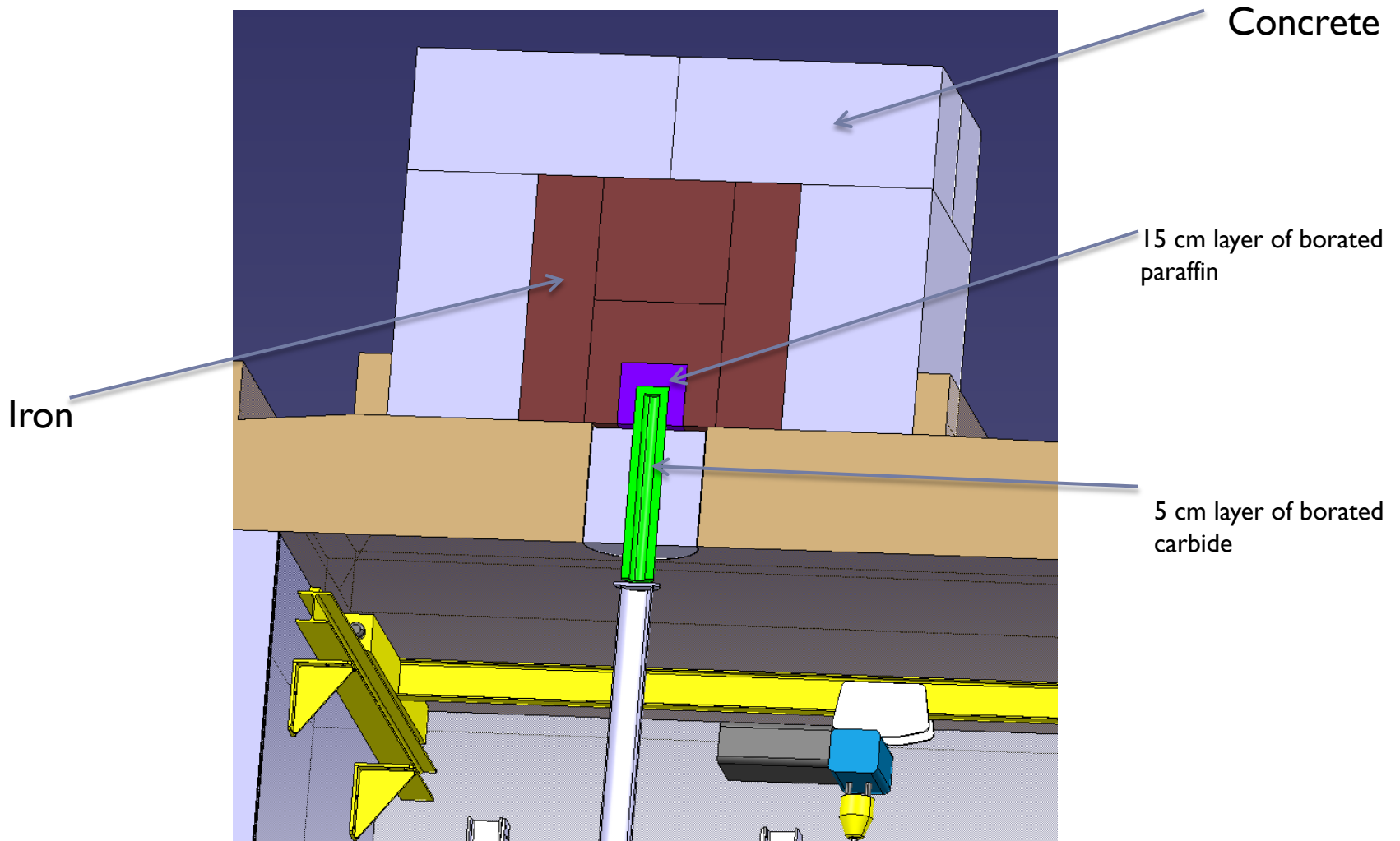
- Dose reduction in ISR tunnel
 - Permanent work place <math>< 0.5 \mu\text{Sv/h}</math>
 - Non-permanent work place <math>< 2.5 \mu\text{Sv/h}</math>
- Lot's of constraints:
 - Keeping the existing crane
 - Amount of shielding
 - Existing cables/piping
 - n_TOF PS-line controls
- Numerous shielding options have been evaluated

Second Collimator, EAR, Neutron Dump



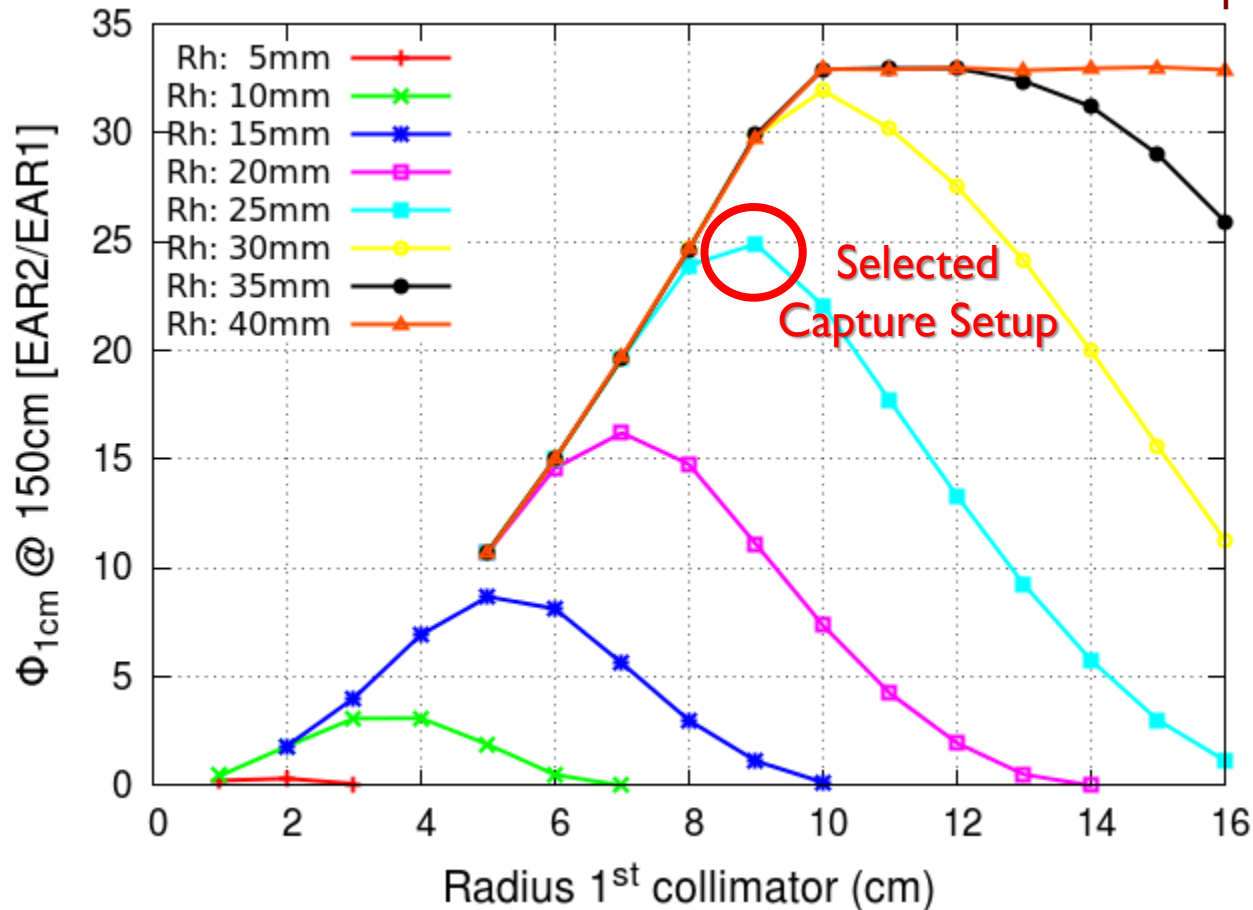
- Ongoing Collimator study
 - Capture
 - Fission setup
 - Minimize Background
 - Beam Profile
 - Detector response
- Optimization of Neutron dump
- External shielding wall
- Dose due to skyshine
- Residual dose rate and air activation

Optimized beam dump for capture measurements





For a simplified setup

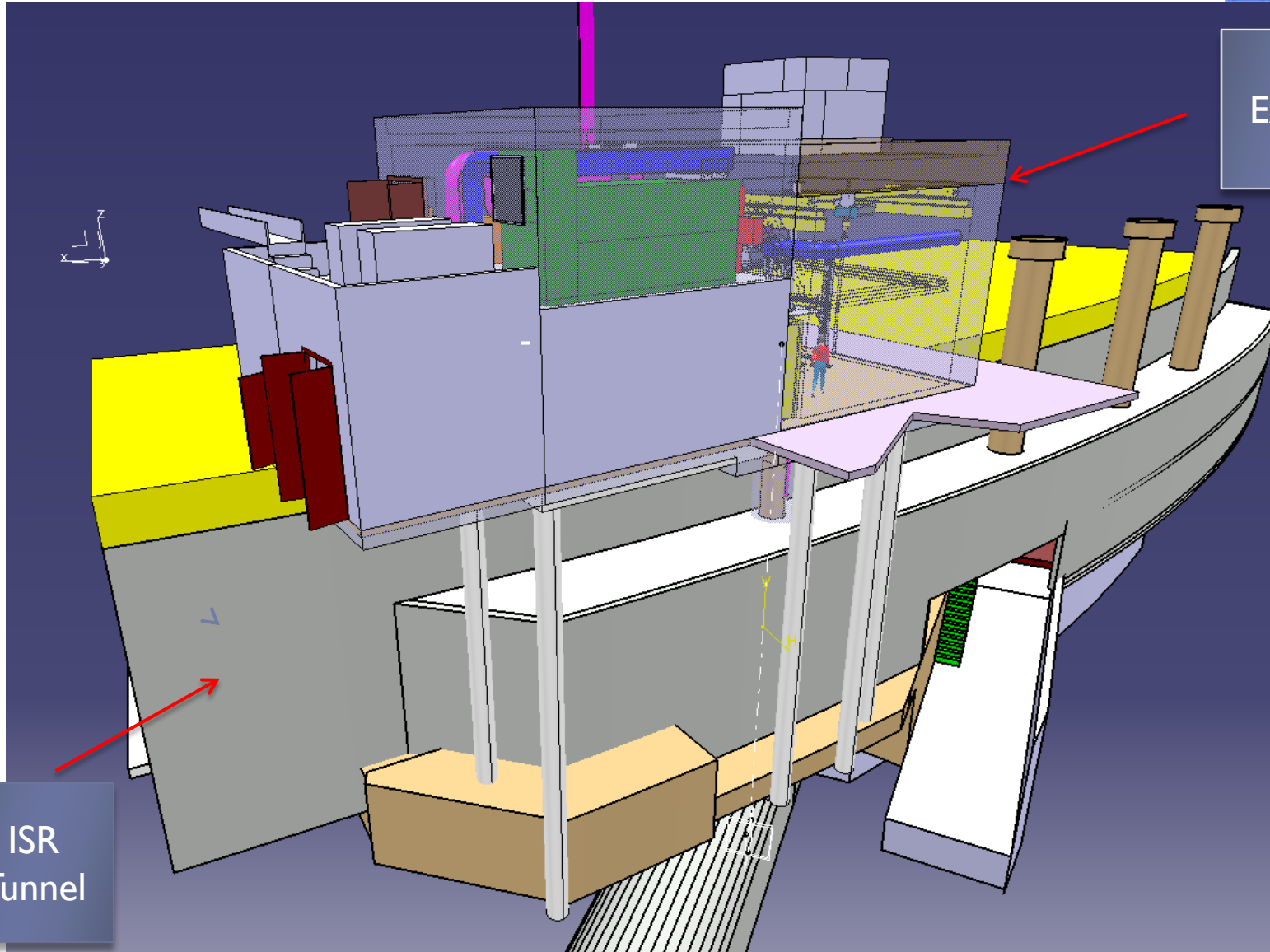


Flux- $\varnothing 1\text{cm}$ at 150cm distance in the center of beam (Neutron Energy eV-keV) for various collimator/halo configuration versus radius of 1st collimator

Experimental Area 2 design



EAR-2



ISR
Tunnel



TOF tube coring

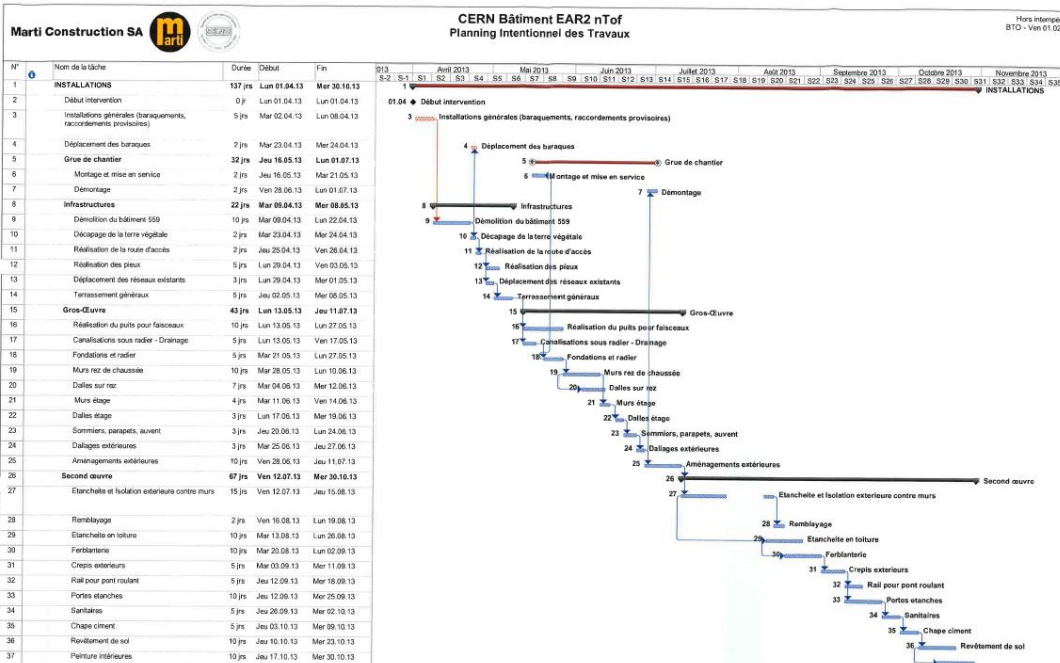
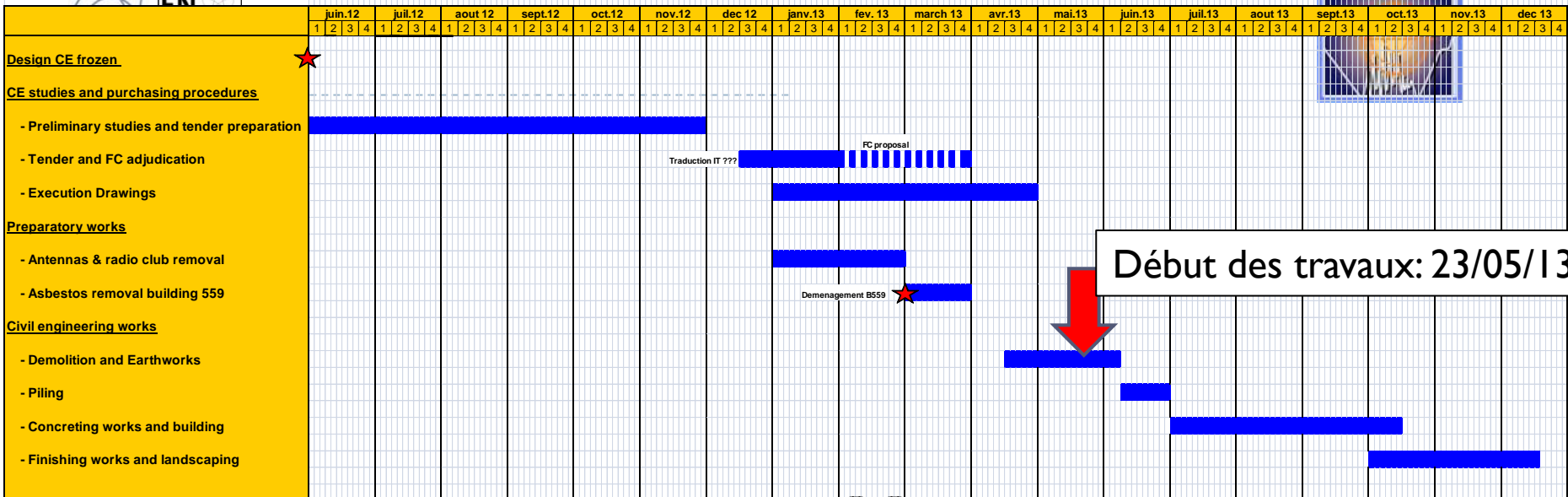


Support of the coring from technical gallery



TOF tube towards technical gallery



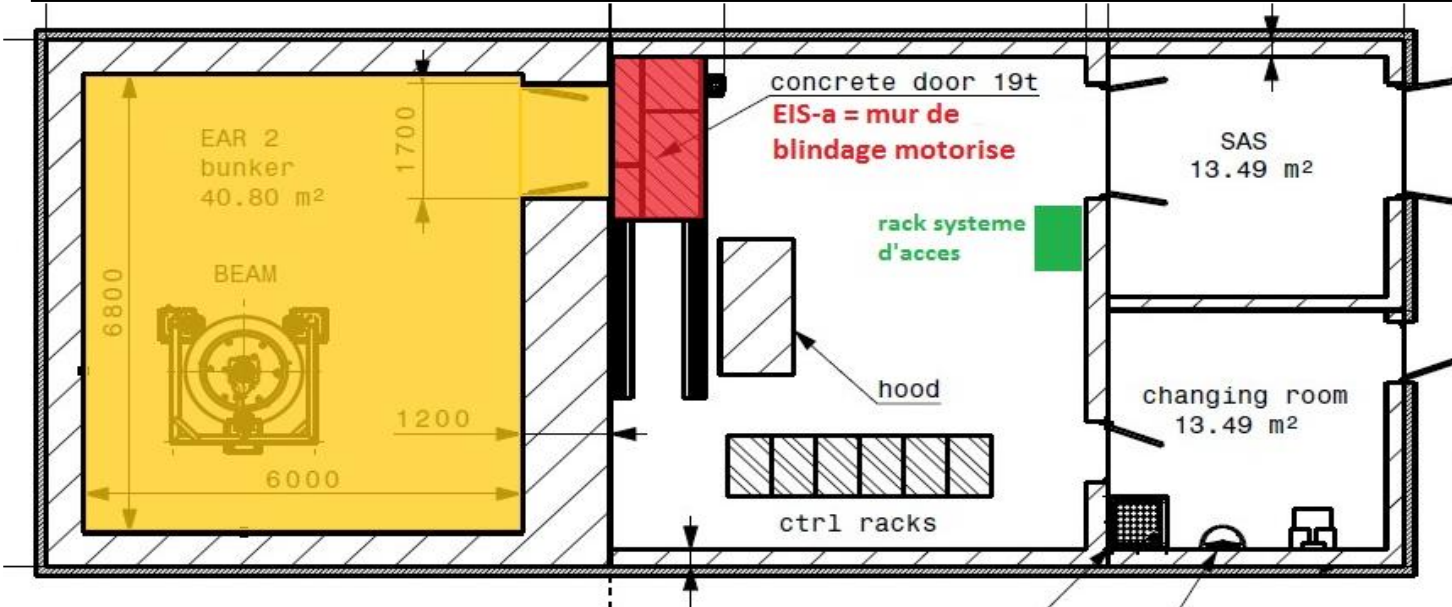
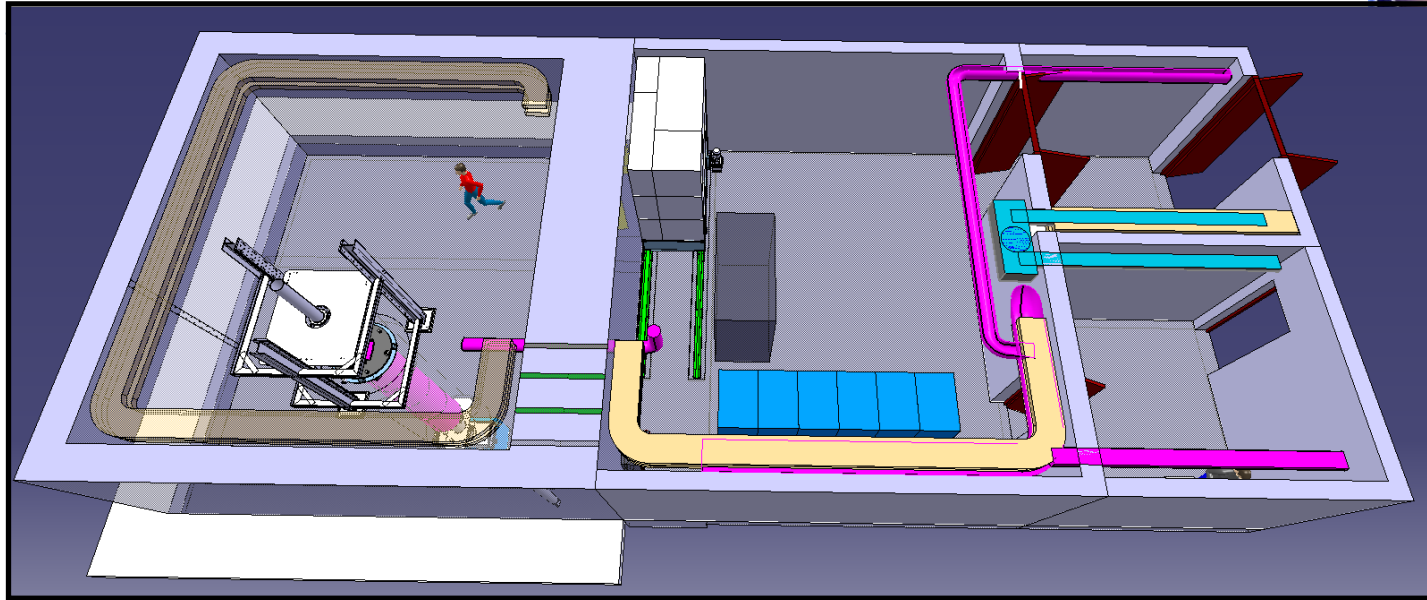


Planning intentionnel de l'entreprise = 7 mois



- ▶ Benefit from operating experience of EAR-1 (since 2010)
- ▶ EAR-2 will be Work Sector Type A like EAR-1
- ▶ Allow handling of unsealed radioactive sources
 - ▶ Access changing room with decontamination facility
 - ▶ Radiation monitoring
 - ▶ Ventilation
 - ▶ Working procedure
- ▶ Fume cupboard:
 - ▶ Used to install/remove samples in/from detectors
 - ▶ Limit the need for transport (currently done in ISOLDE)

EAR2 access & configuration



EAR2 access & configuration

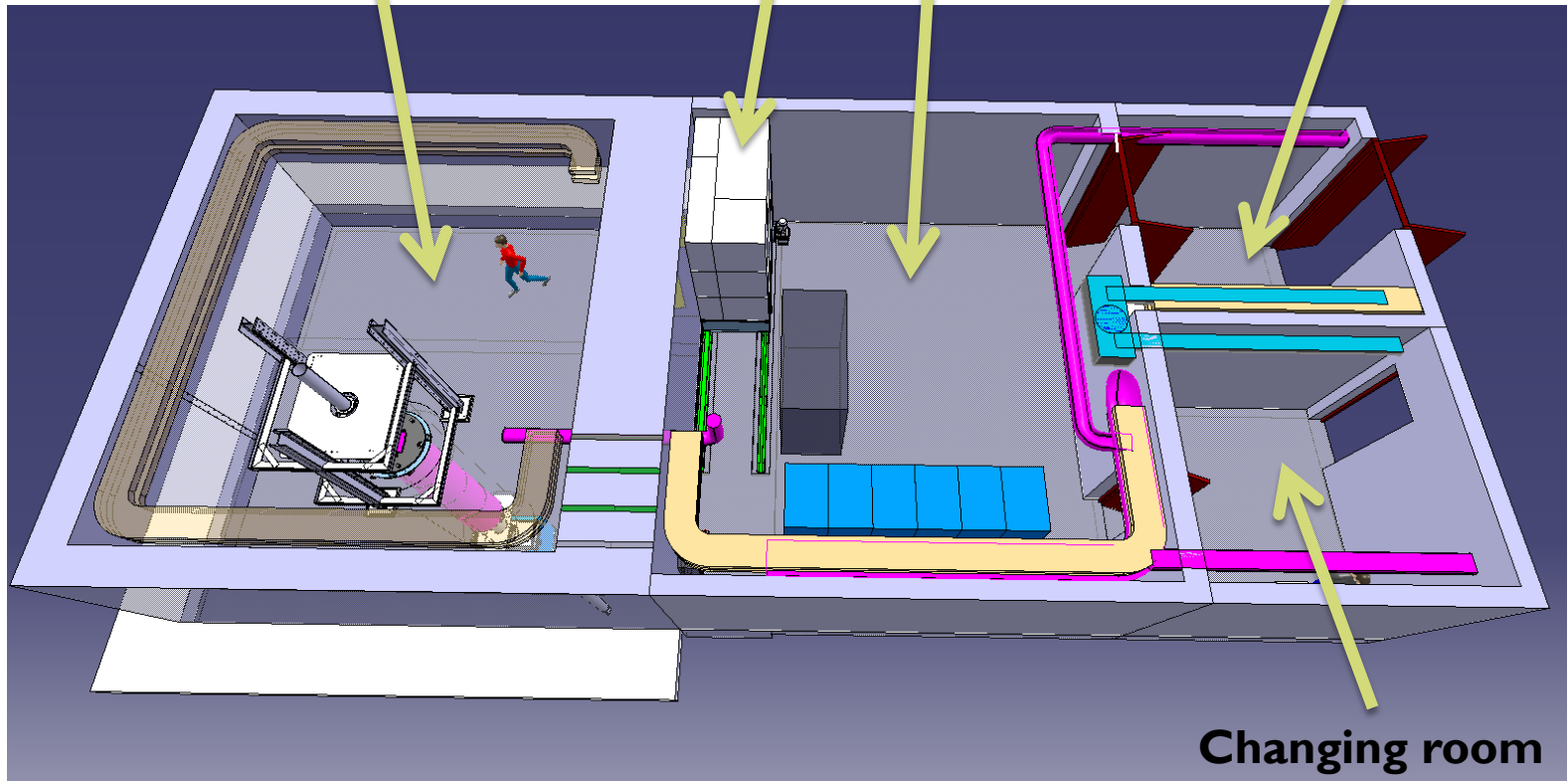


Access door interlocked with beam

EAR2 (also class A)

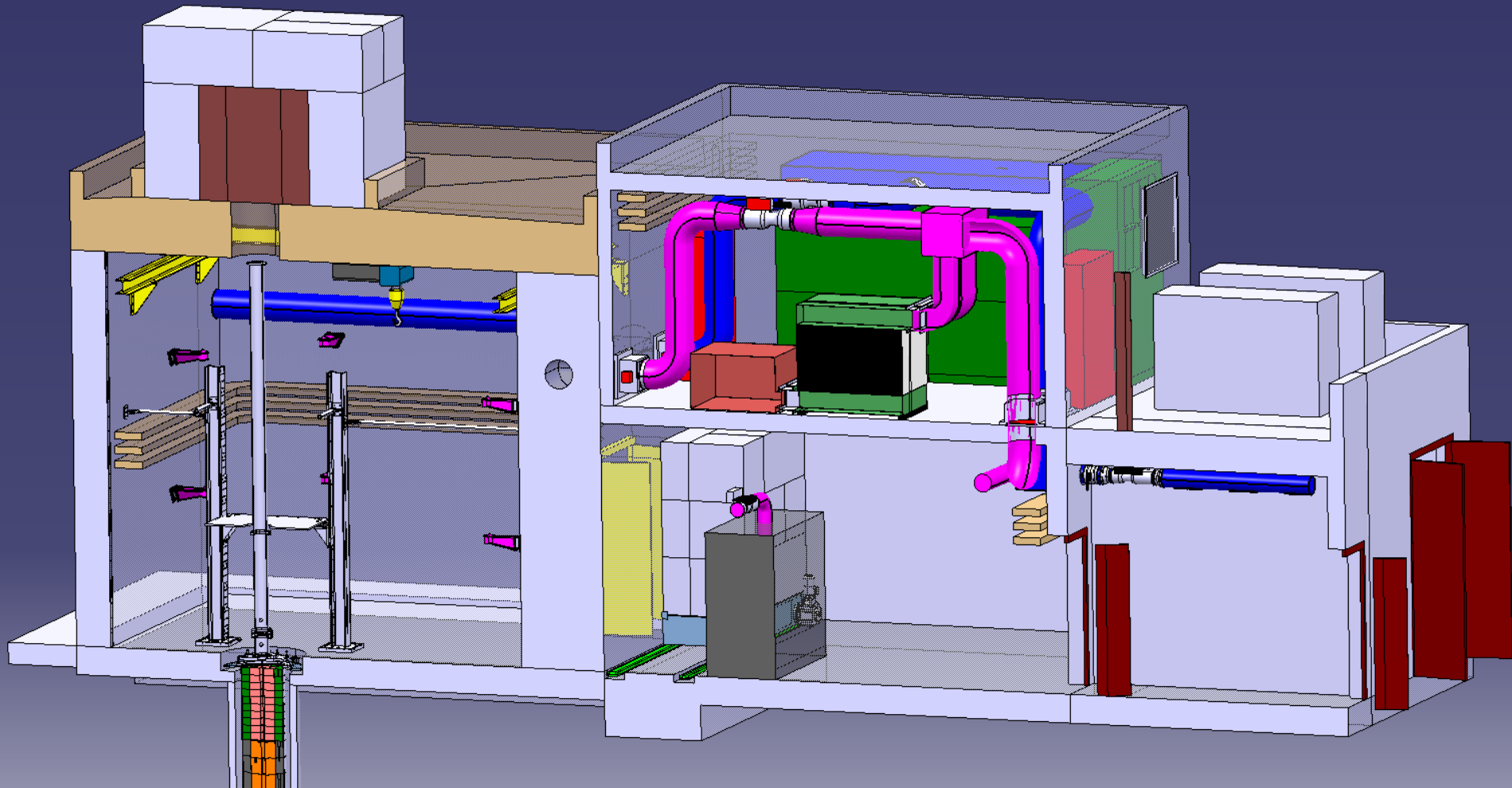
Class A lab

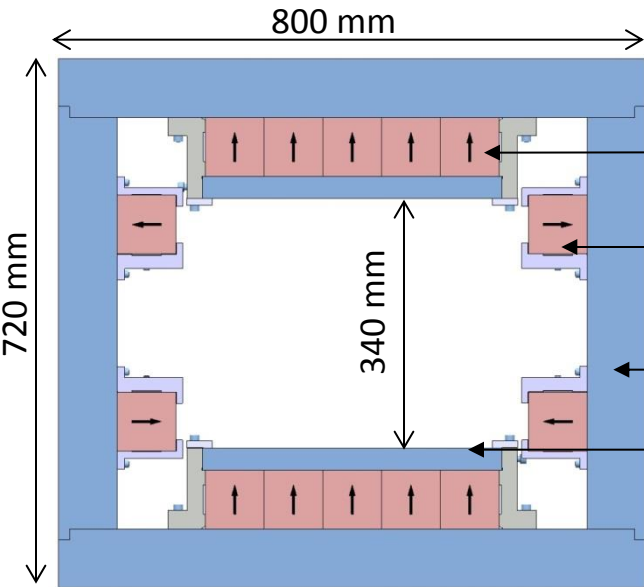
Material entrance



Changing room

EAR2 - Building 380

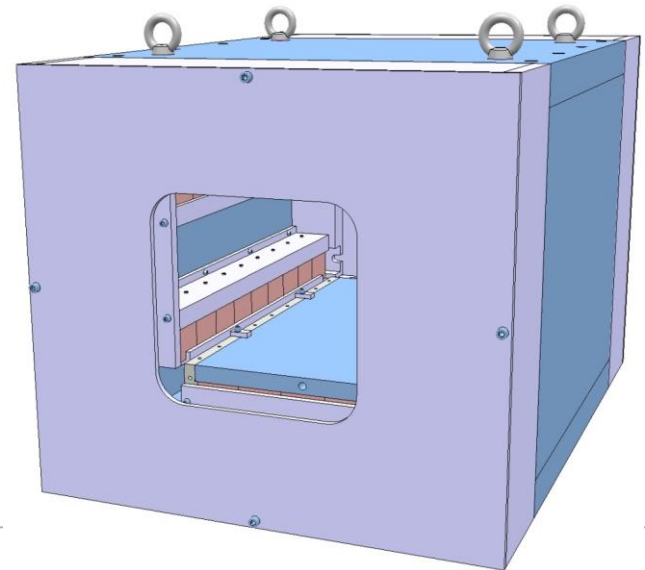
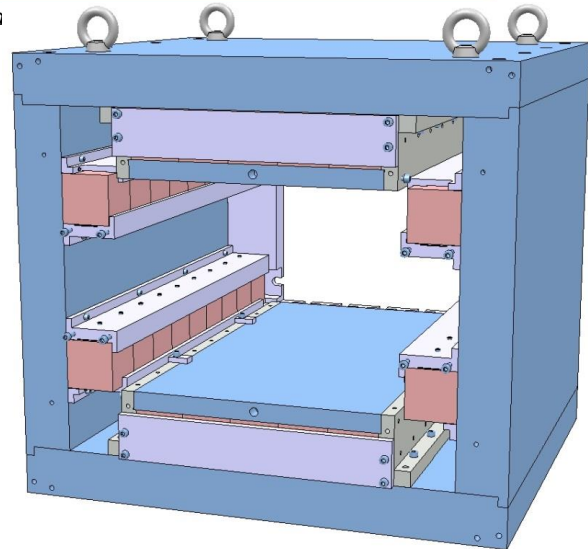




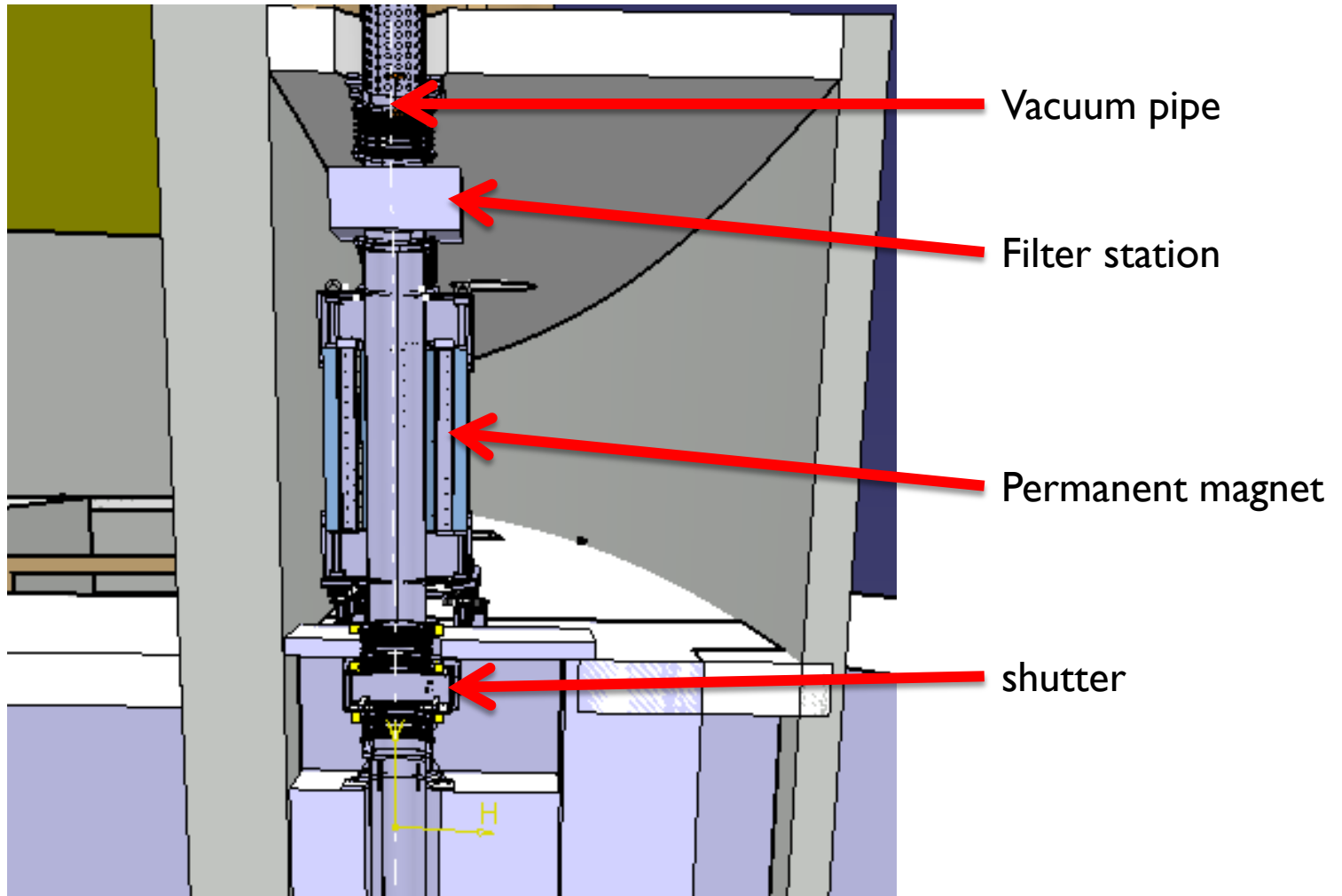
- Permanent magnet blocks $\text{Sm}_2\text{Co}_{17}$, as a flux generator.
- Permanent magnet blocks $\text{Sm}_2\text{Co}_{17}$, compensate radial stray field to improve field quality in Good Field Region.
- Return yoke C10R steel.
- Pole tip C10R steel, smooth the possible differences on the easy axis orientation of the permanent magnet blocks.

Magnet weight \approx 2000 kg

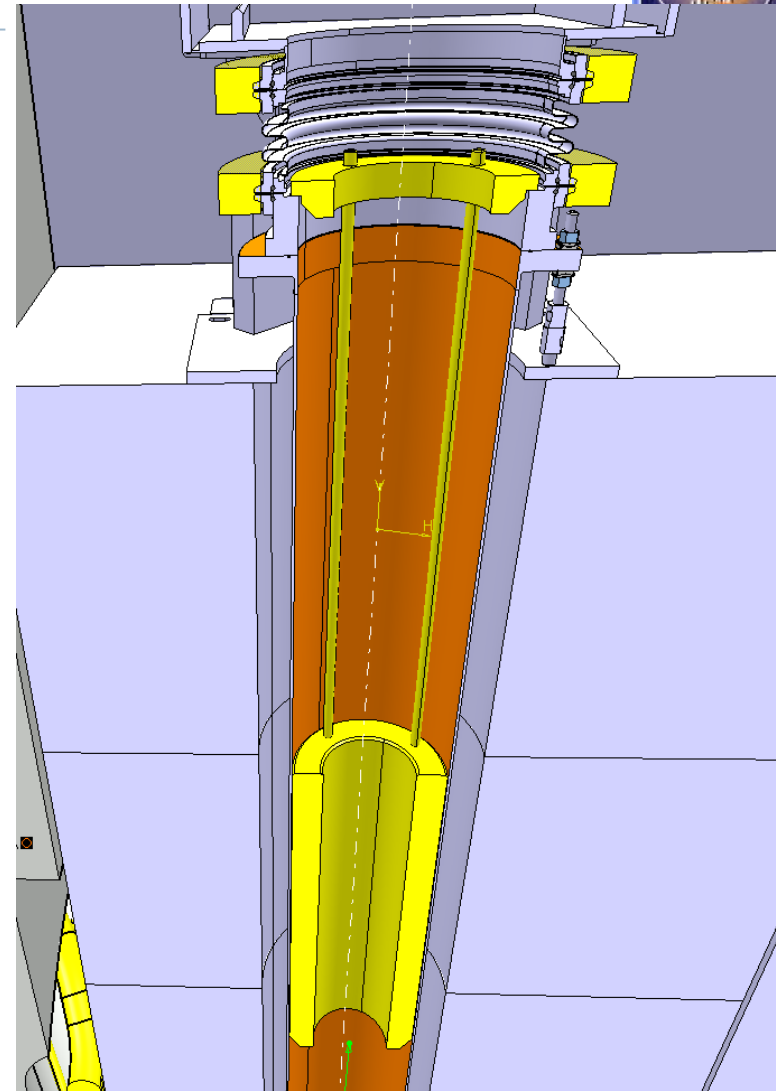
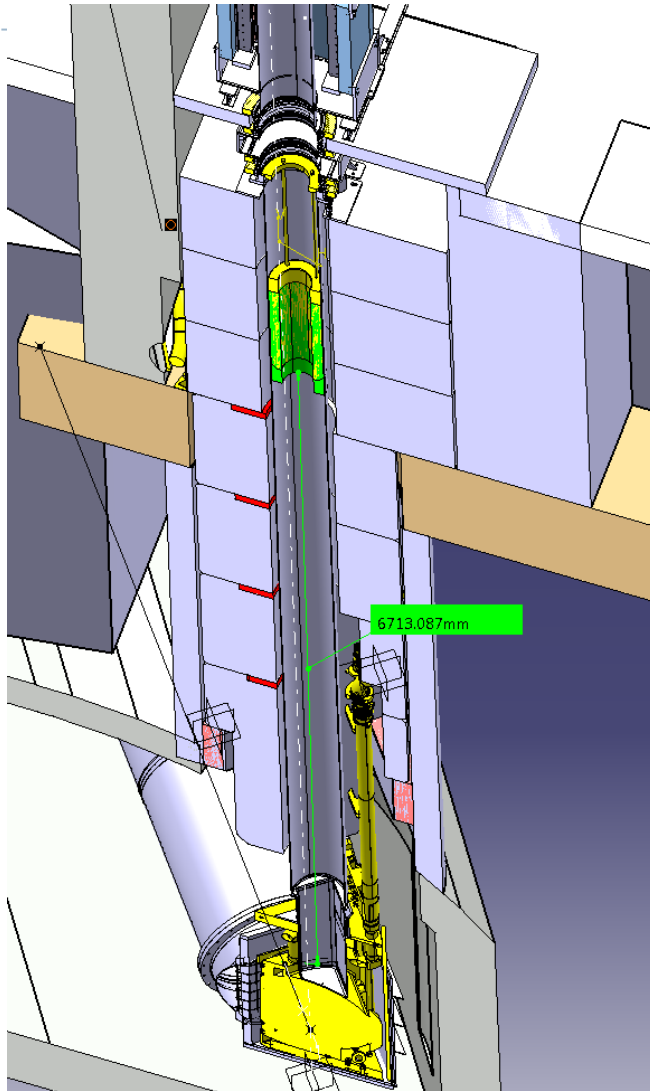
Picturea



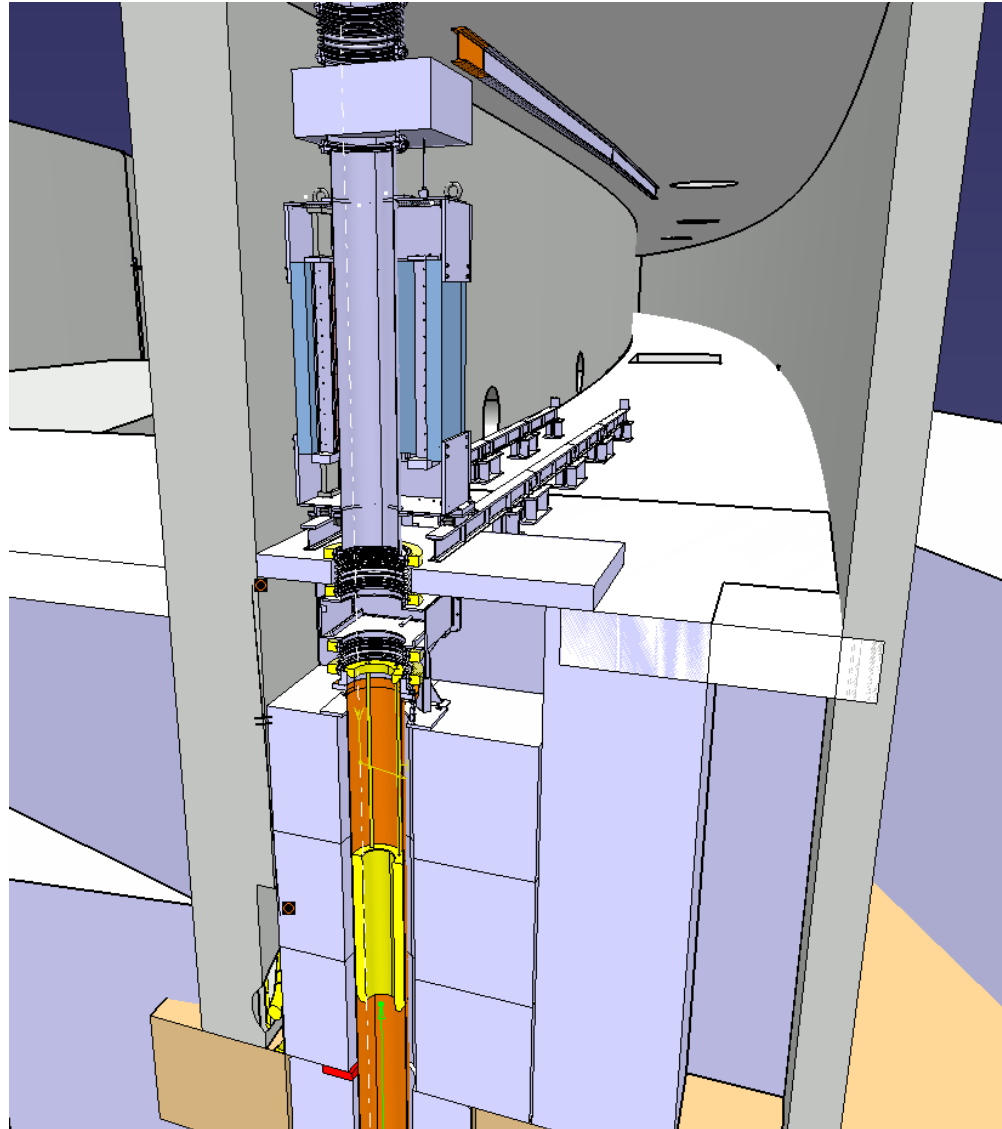
Access gallery (375/T8-202) overview



Collimator 1



Installation of Collimator 1





Service gallery

Additional flange

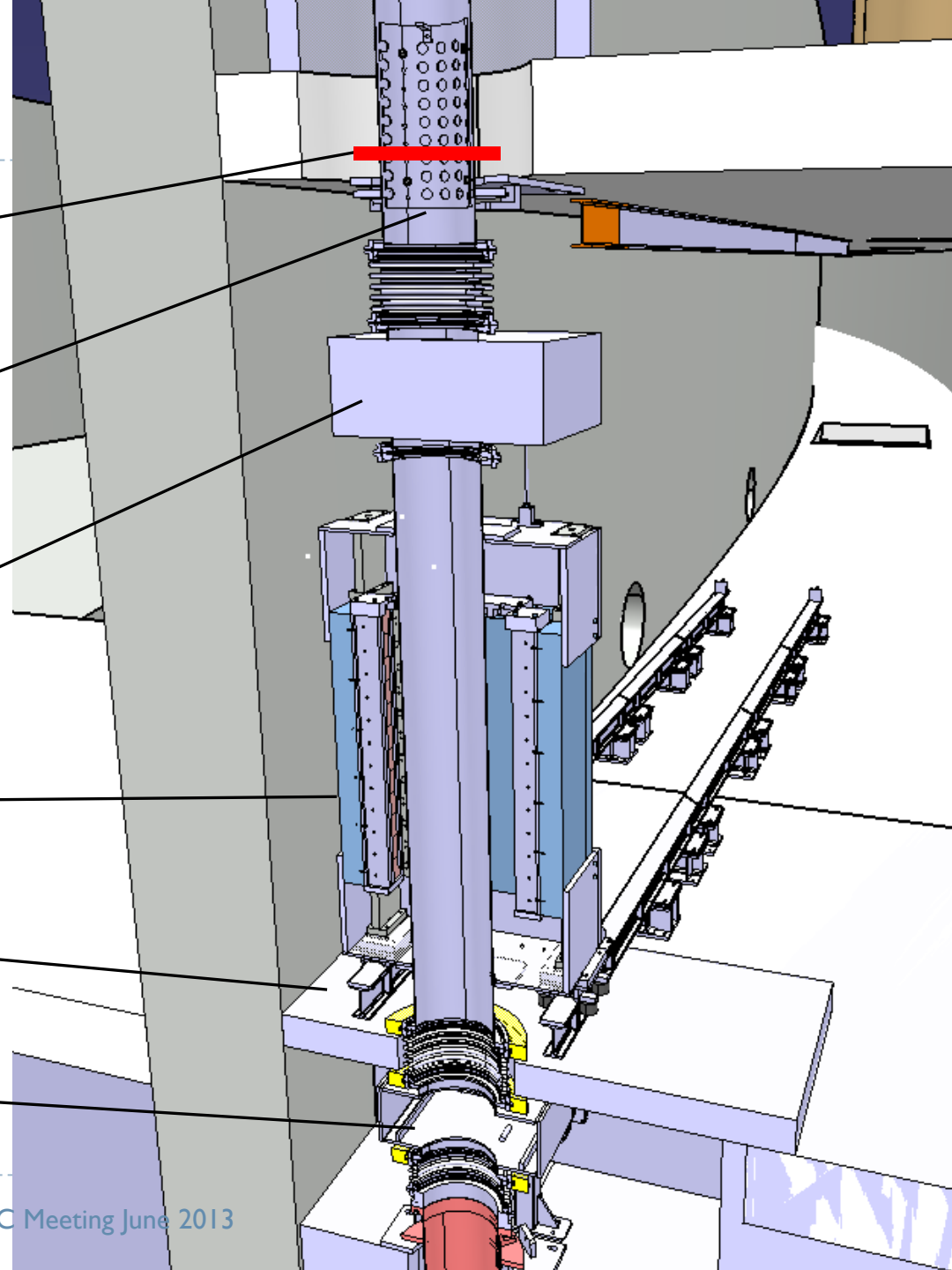
Monorail installation
without EAR2 shaft
modification

Filters box

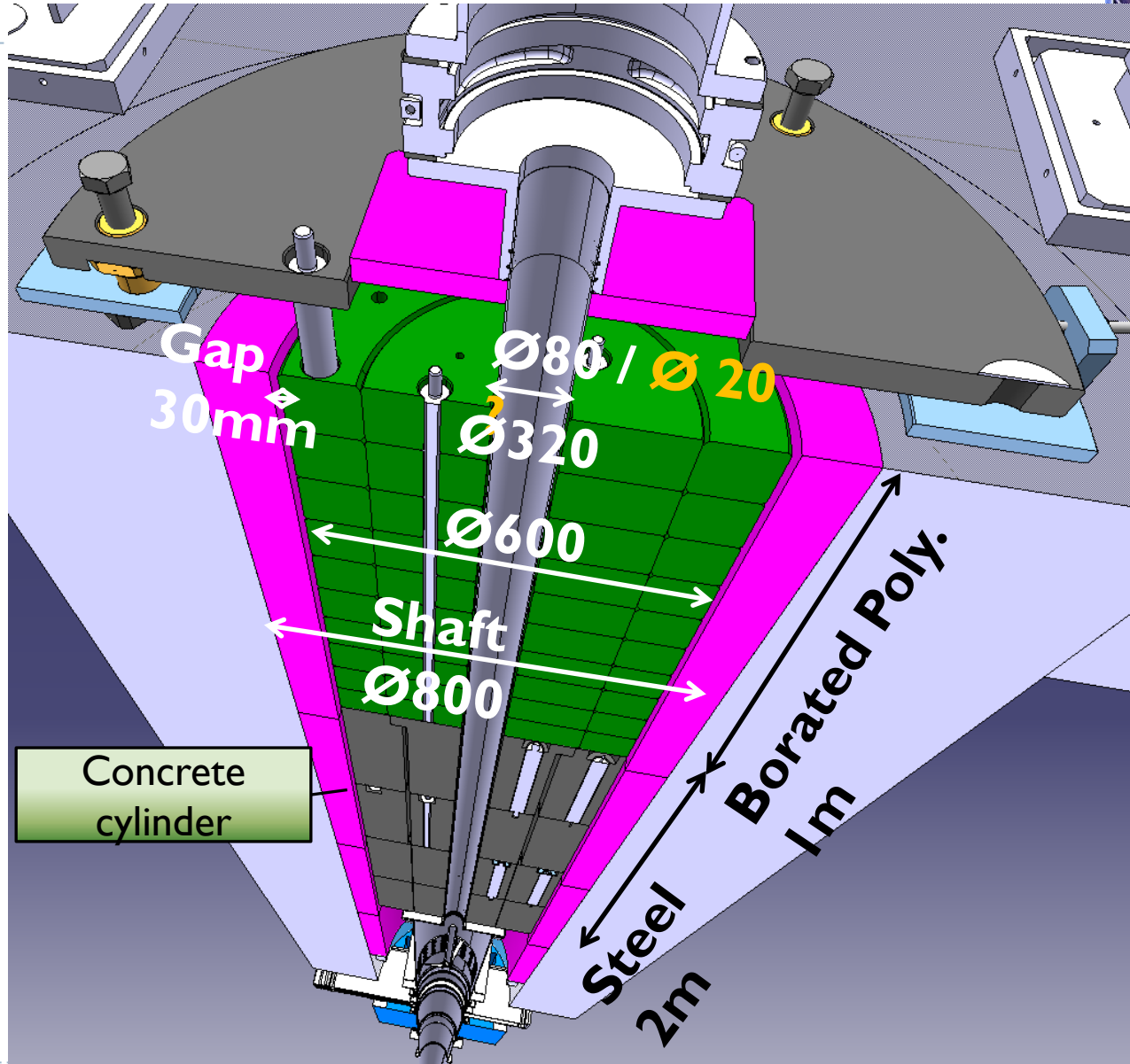
Magnet on rails

Air tight cover

Shutter



Collimator 2



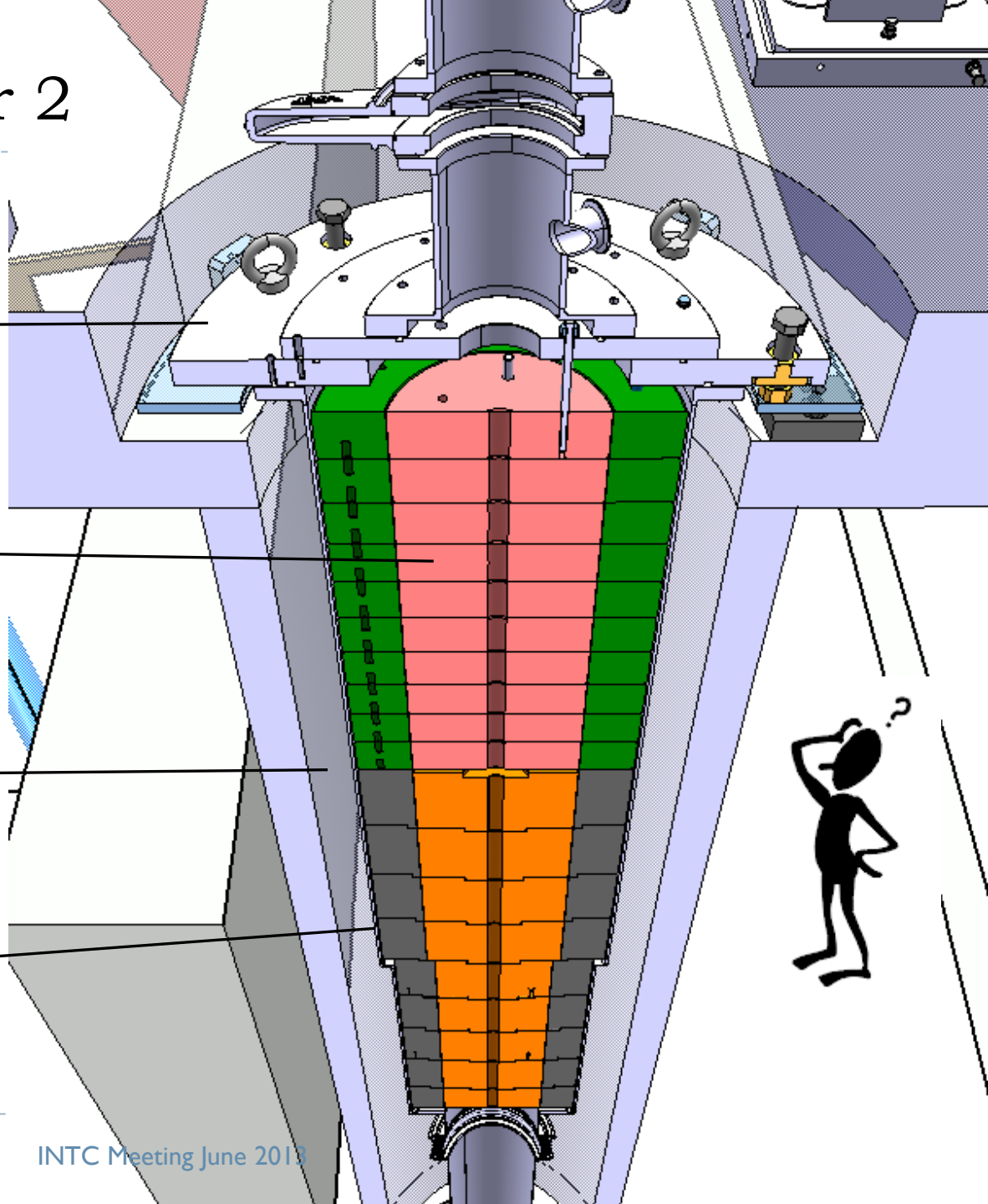
Collimator 2

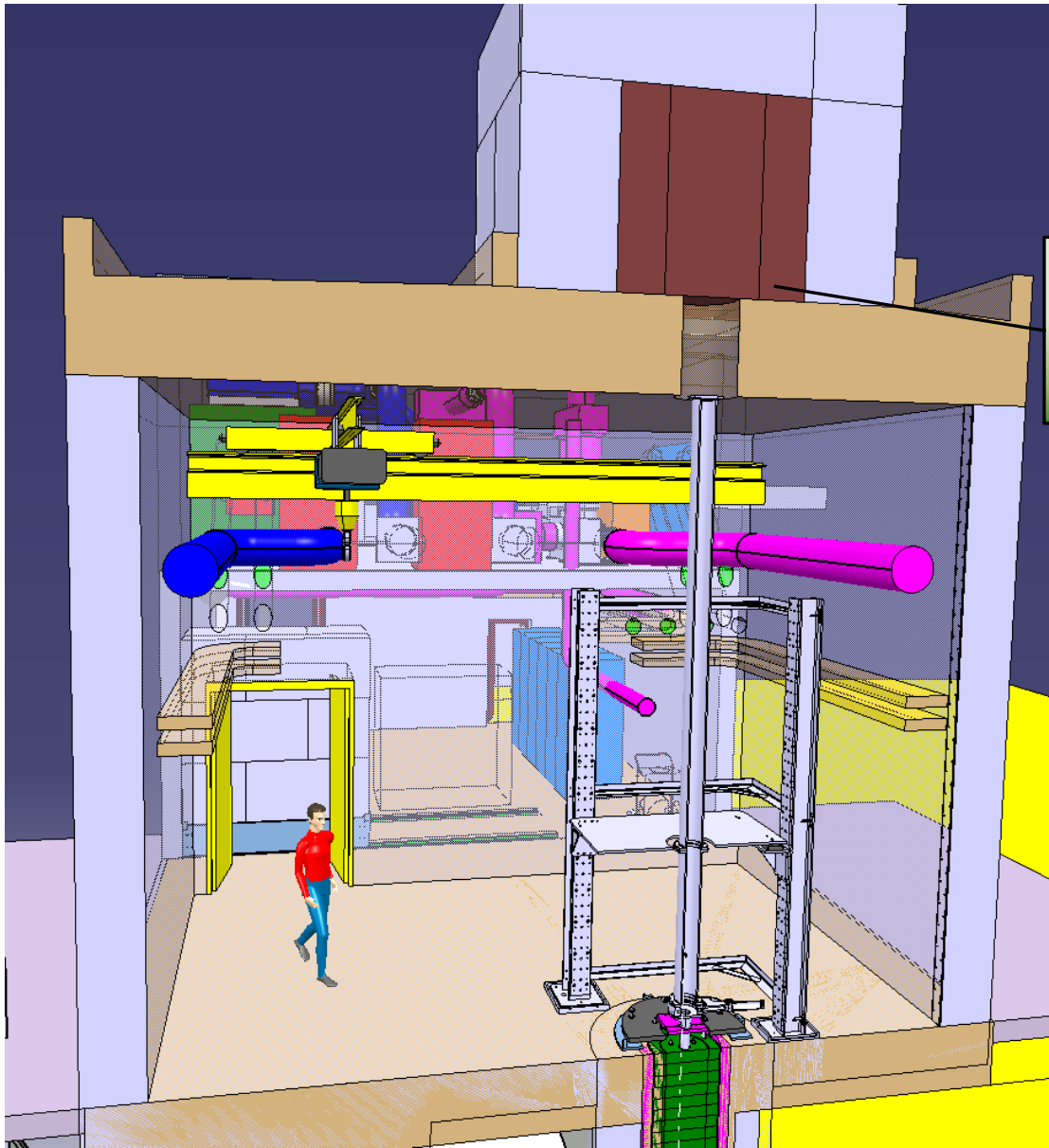
Alignment system engraved in EAR2 floor

Inner collimator exchangeable (1 day)

Gap 100mm filled with concrete or balls (under study)

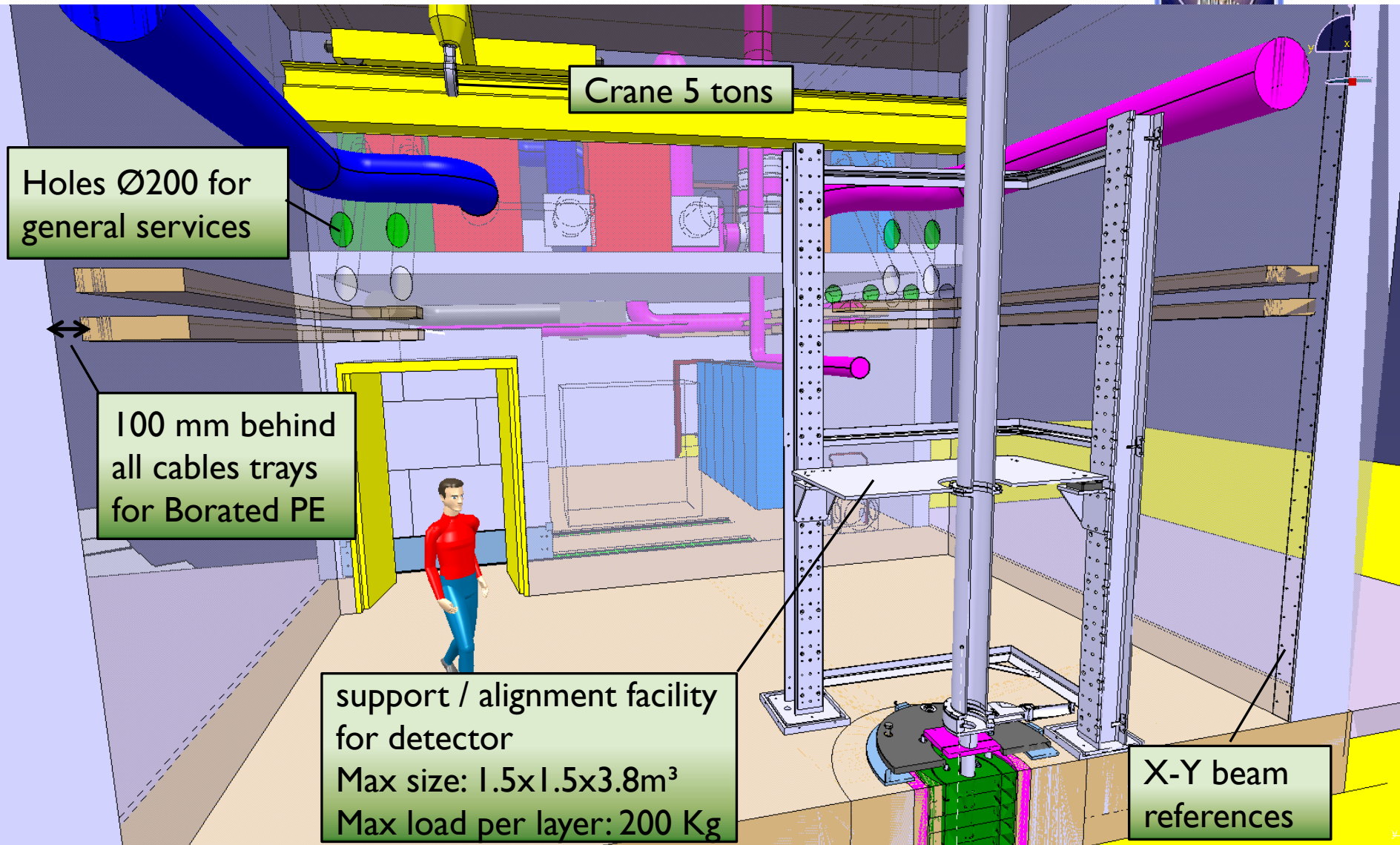
Collimator vacuum tank

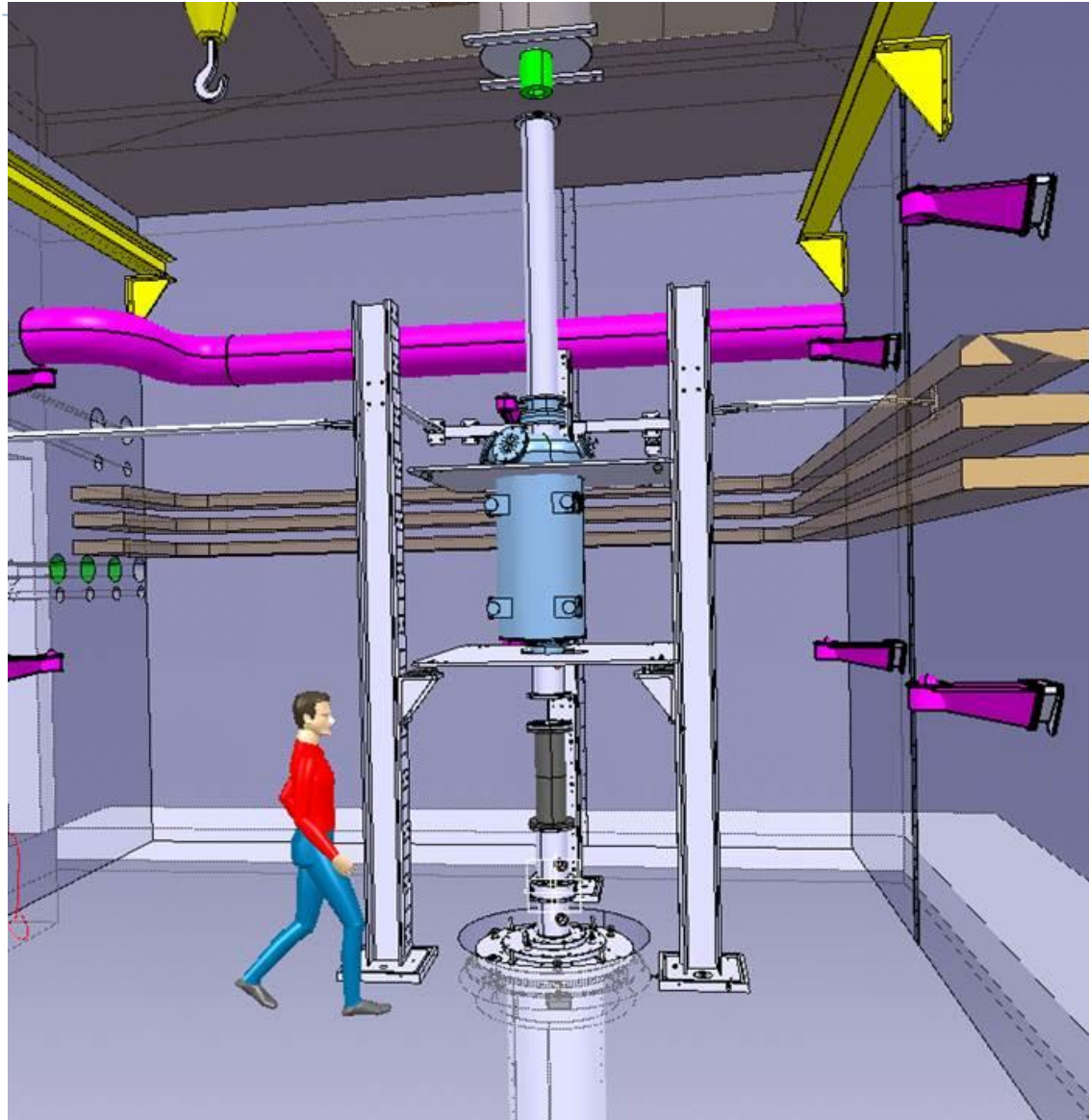




Dump:

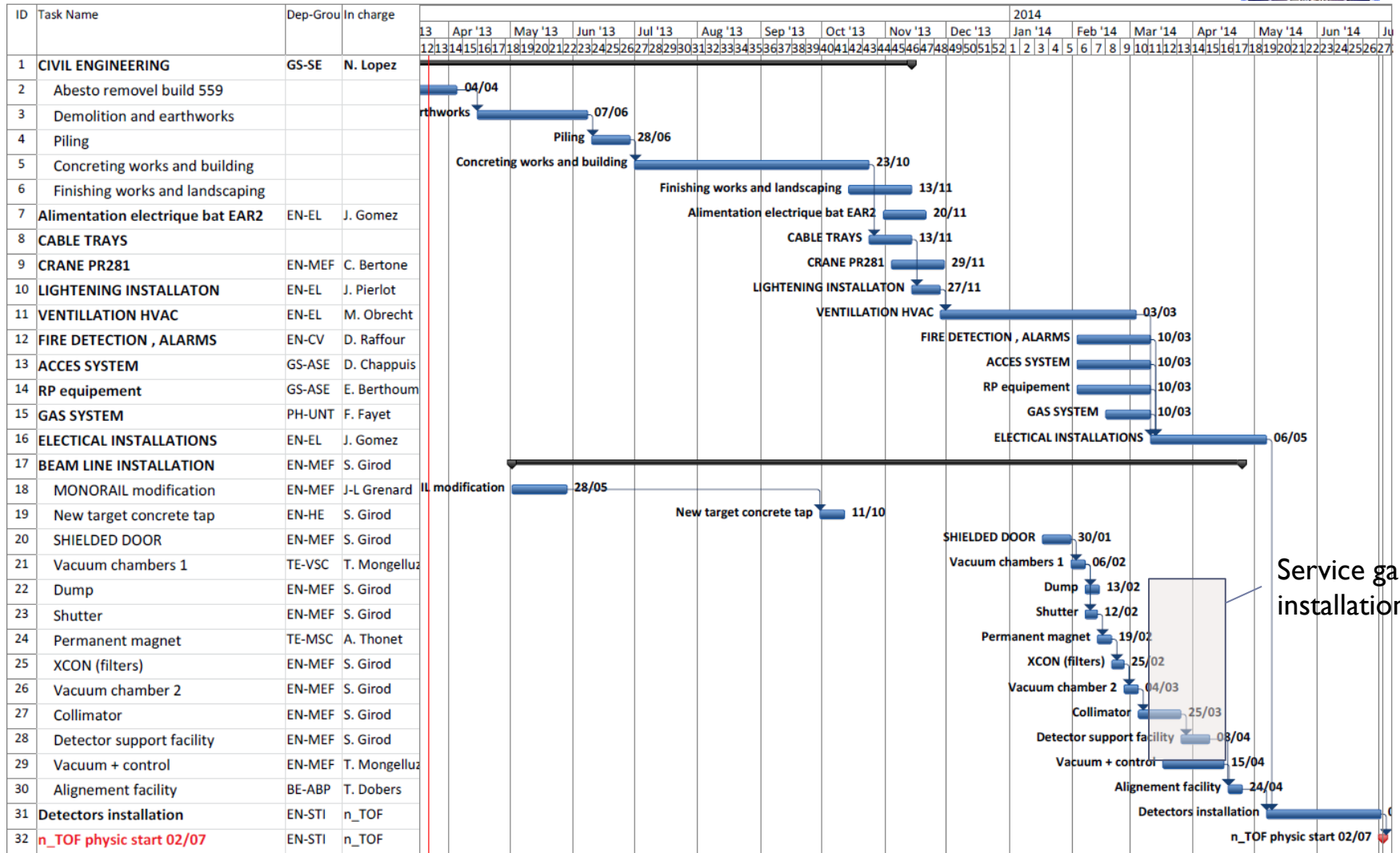
- 1.6x1.6x1.6 m³ steel
- 0.8 concrete all around







- ▶ **Started in Dec. 2012 the edition is in progress for the Descriptive Part**
 - Using contributions for the design and structure available in the [n_TOF](#) experiment folder in INDICO
 - Using the [document](#) *Safety Requirements and Safety File contents*, provided by DGS/SEE for the construction of the building 380
 - Expecting a Technical Design Report to be achieved with the final specifications of the experimental area within summer 2013
 - The other three Parts will be initiated in parallel over the next months



Service gallery installation

Conclusions



- ▶ **The 2nd experimental area EAR2 is under construction**
- ▶ **Most of the equipment are in construction phase**
- ▶ **The project will be completed at April 2014**
- ▶ **Proposal for Commissioning EAR2 will be presented at INTC October meeting**
- ▶ **Proposals for EAR1 will be presented at INTC October meeting**
- ▶ **Proposals for EAR2 will be presented at first INTC February 2014 meeting**