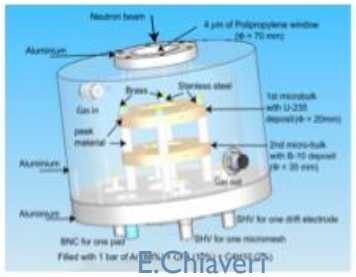
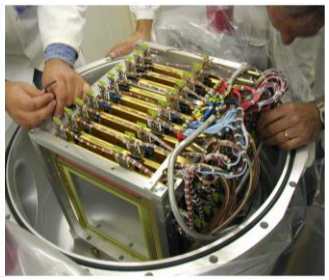
The n_TOF Collaboration,
http://www.cern.ch/nTOF

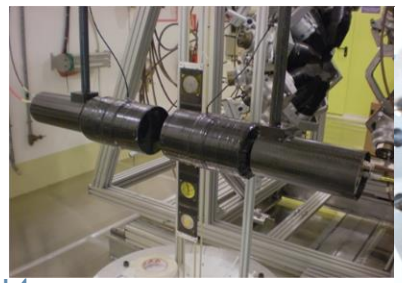
Status of n_TOF Experiment

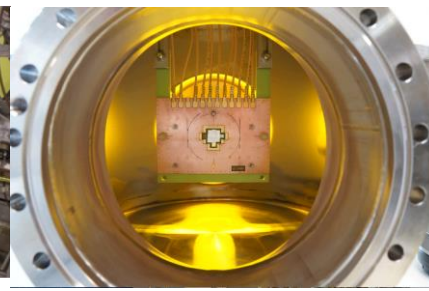
Enrico Chiaveri

Spokesperson of n_TOF Collaboration









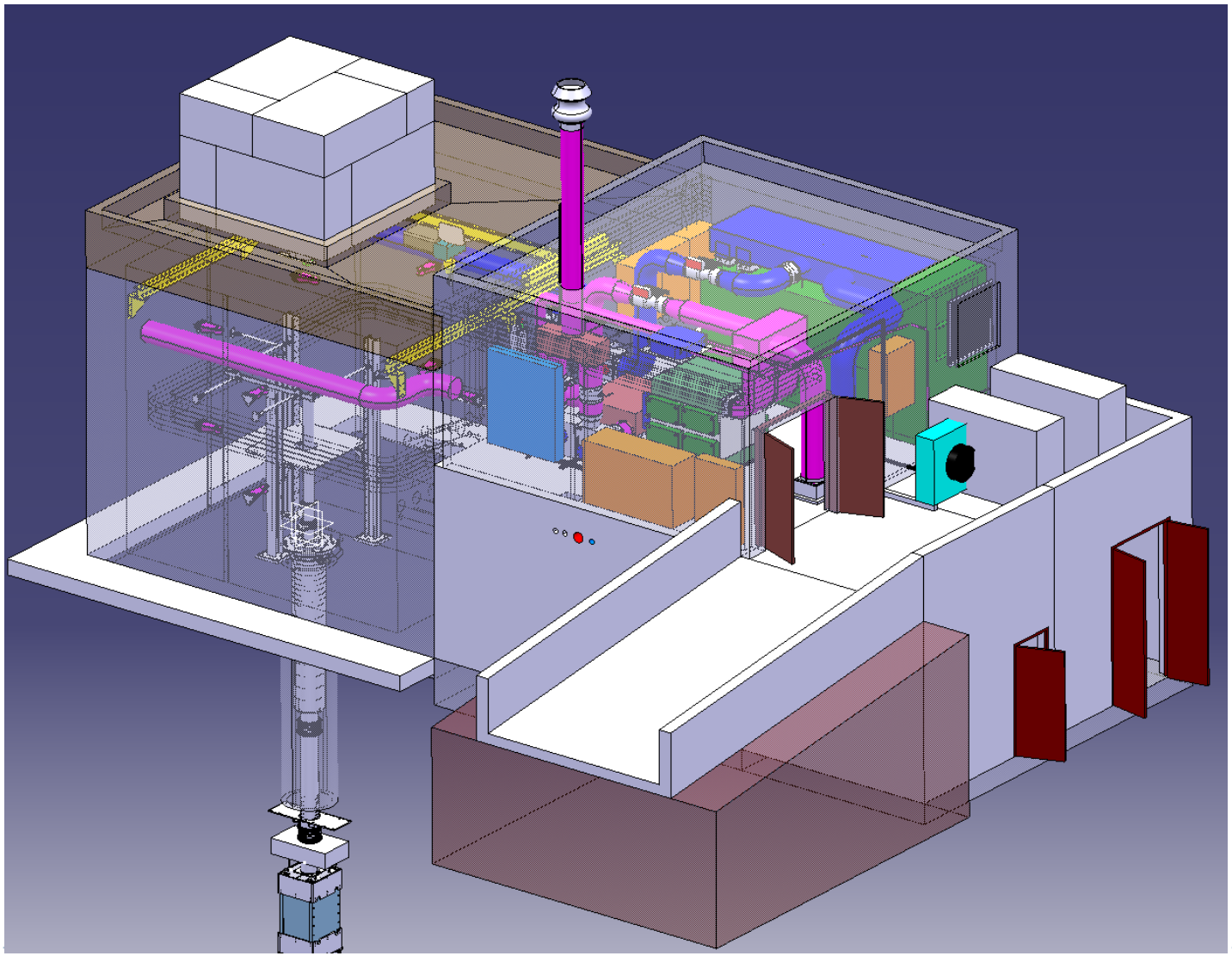
ITEMS

- ✓ Status of Experimental Area EAR-2 Project
- ✓ Status of n_TOF Beam Line
- ✓ Removal of 1st n_TOF Target
- ✓ List of Proposals EAR-1 and EAR-2

Experimental Area(EAR 2) Project

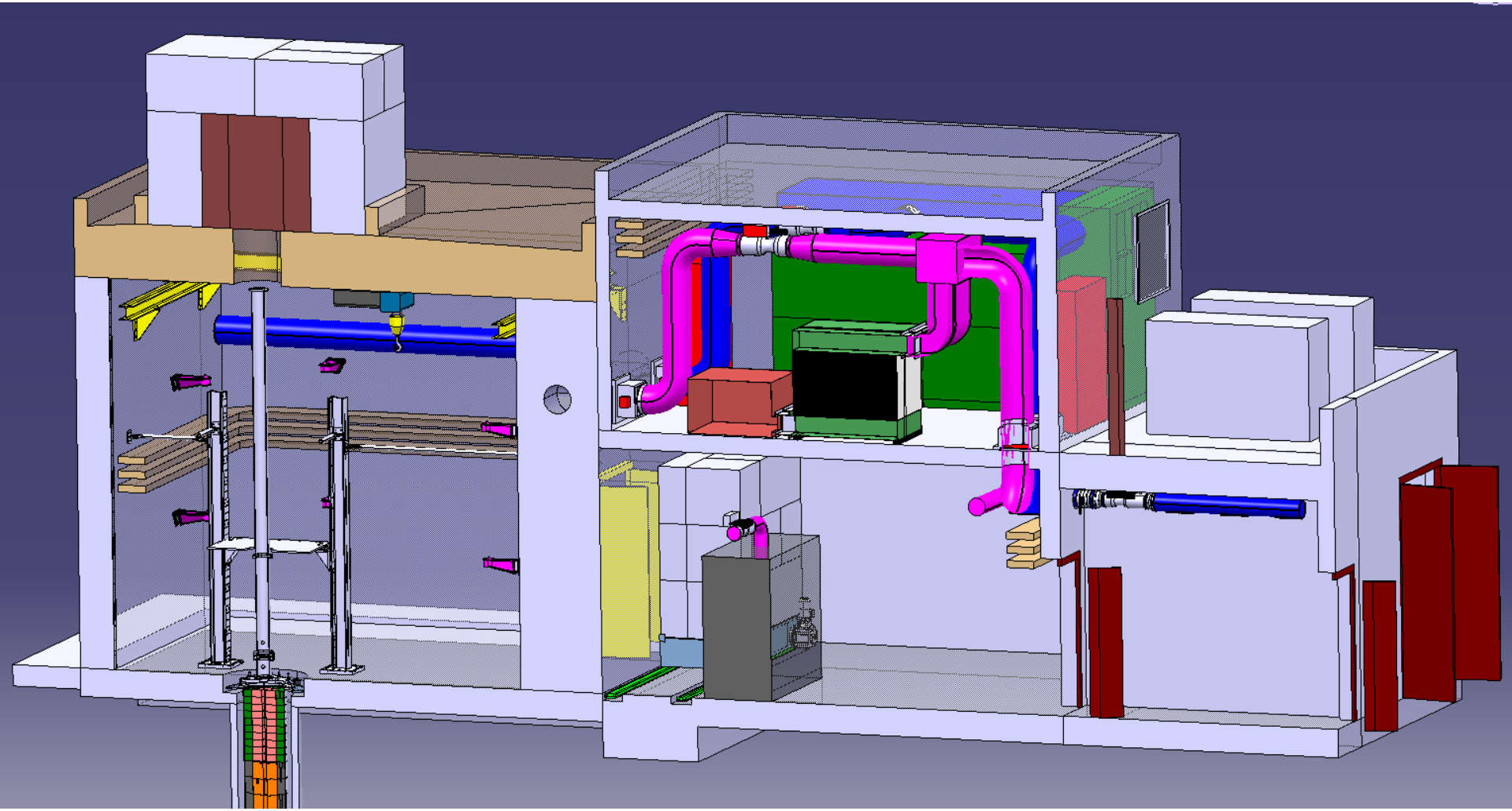
- Civil Engineering ✔
- Ventilation ✔
- Electrical Infrastructure ✔
- Permanent Magnet ✔
- Simulations work ✔
- Beam Line to EAR2 ✔

Building 380 general view

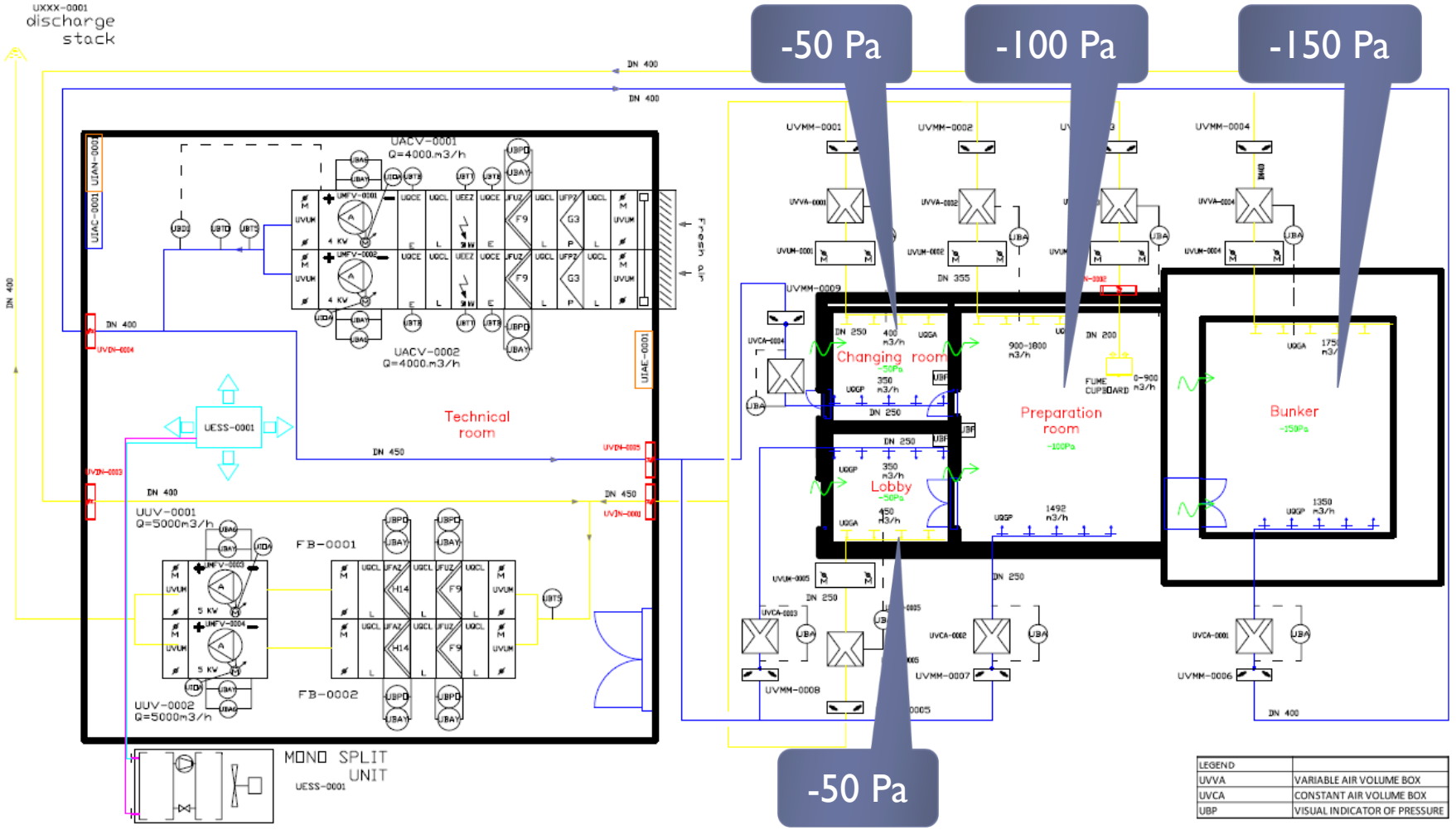



COMPLETED!

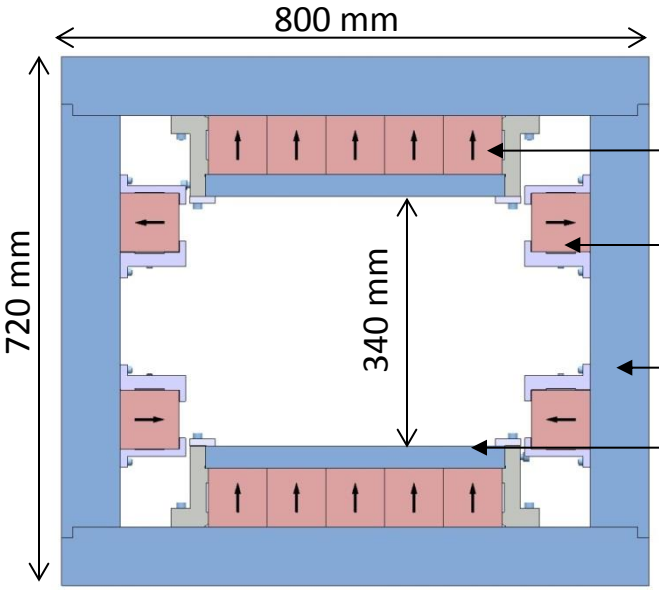
EAR2 access & configuration



Ventilation System



Permanent magnet dipole n_Tof EAR2



Permanent magnet blocks Sm_2Co_{17}, as a flux generator.

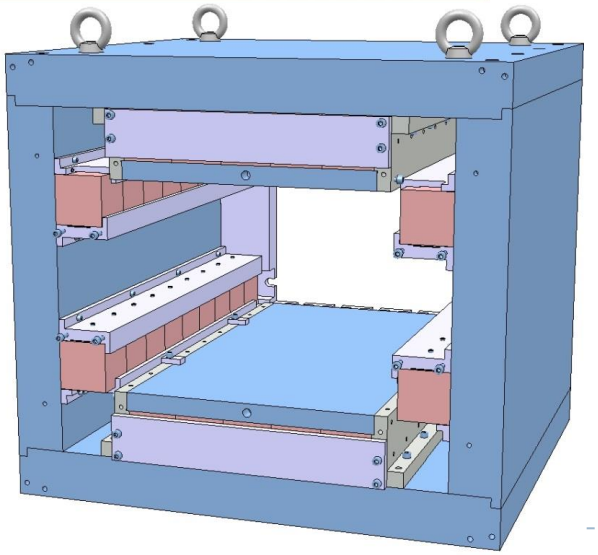
Permanent magnet blocks Sm_2Co_{17}, compensate radial stray field to improve field quality in Good Field Region.

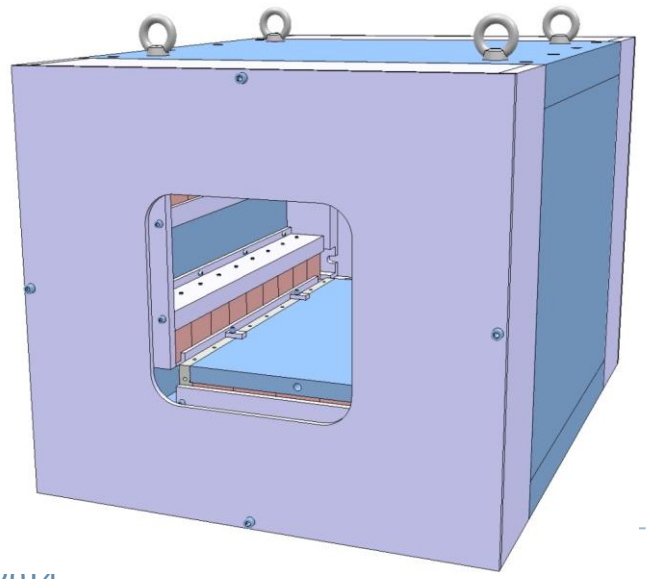
Return yoke C10R steel.

Pole tip C10R steel, smooth the possible differences on the easy axis orientation of the permanent magnet blocks.

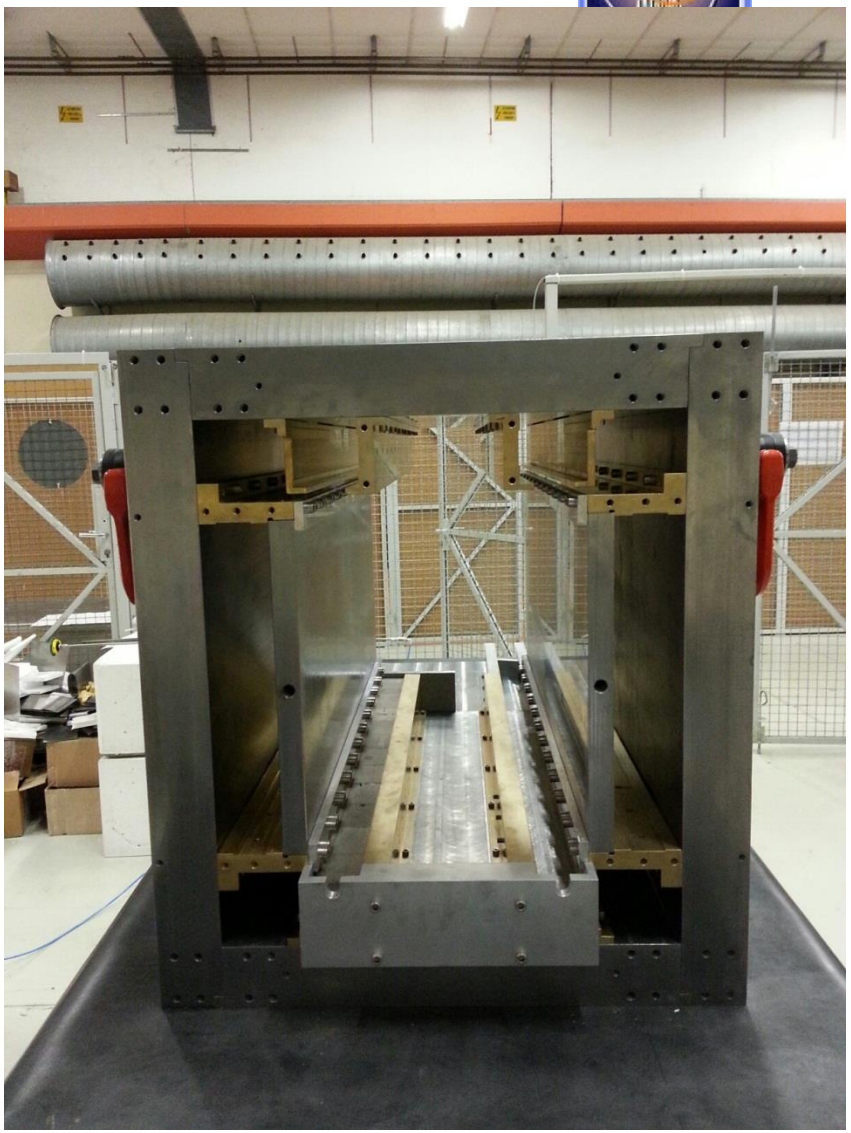
Magnet weight ≈ 2000 kg

Pictures

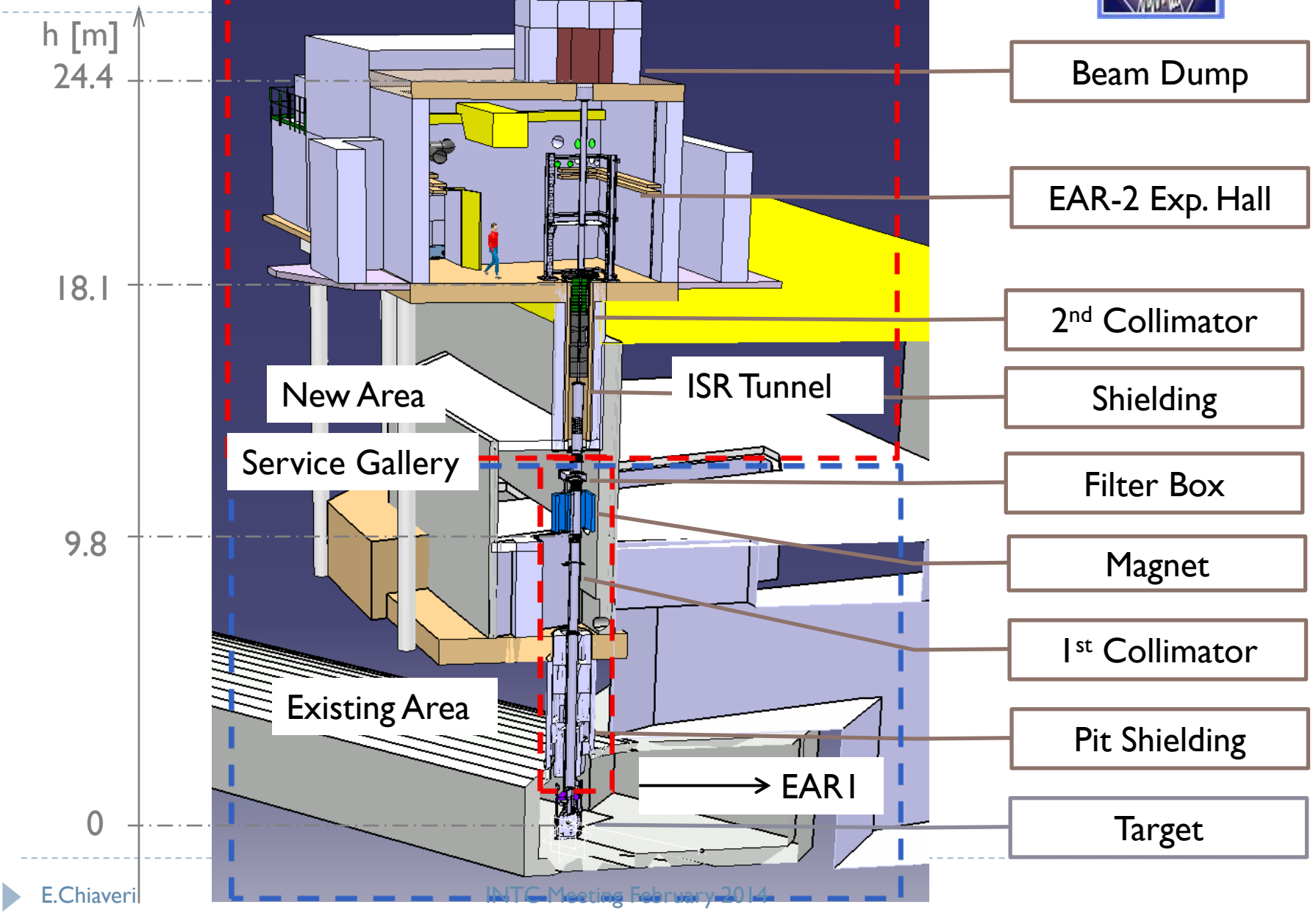




Insertion of permanent magnet blocks

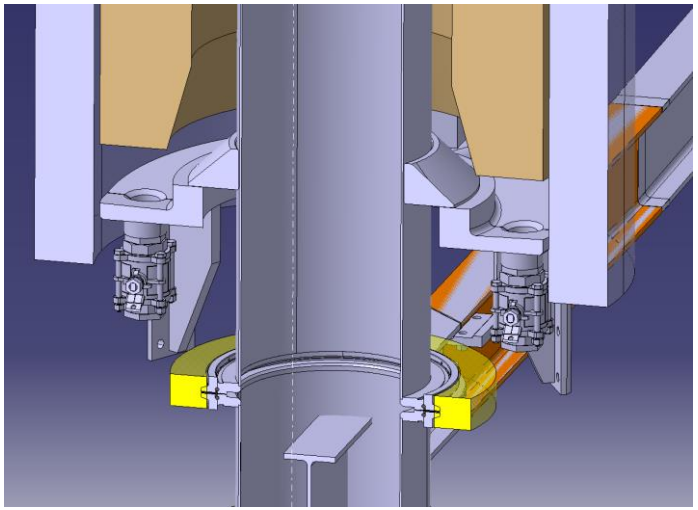


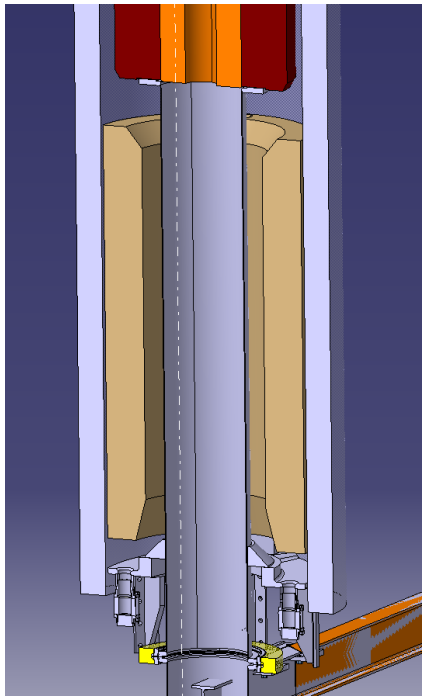
EAR2 Beam Line

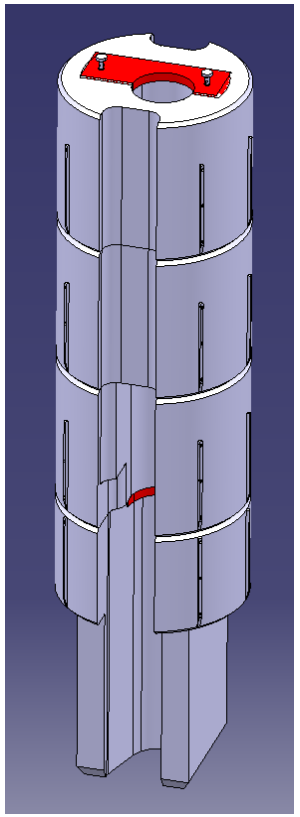


EAR2 Beam Line Shielding Solutions

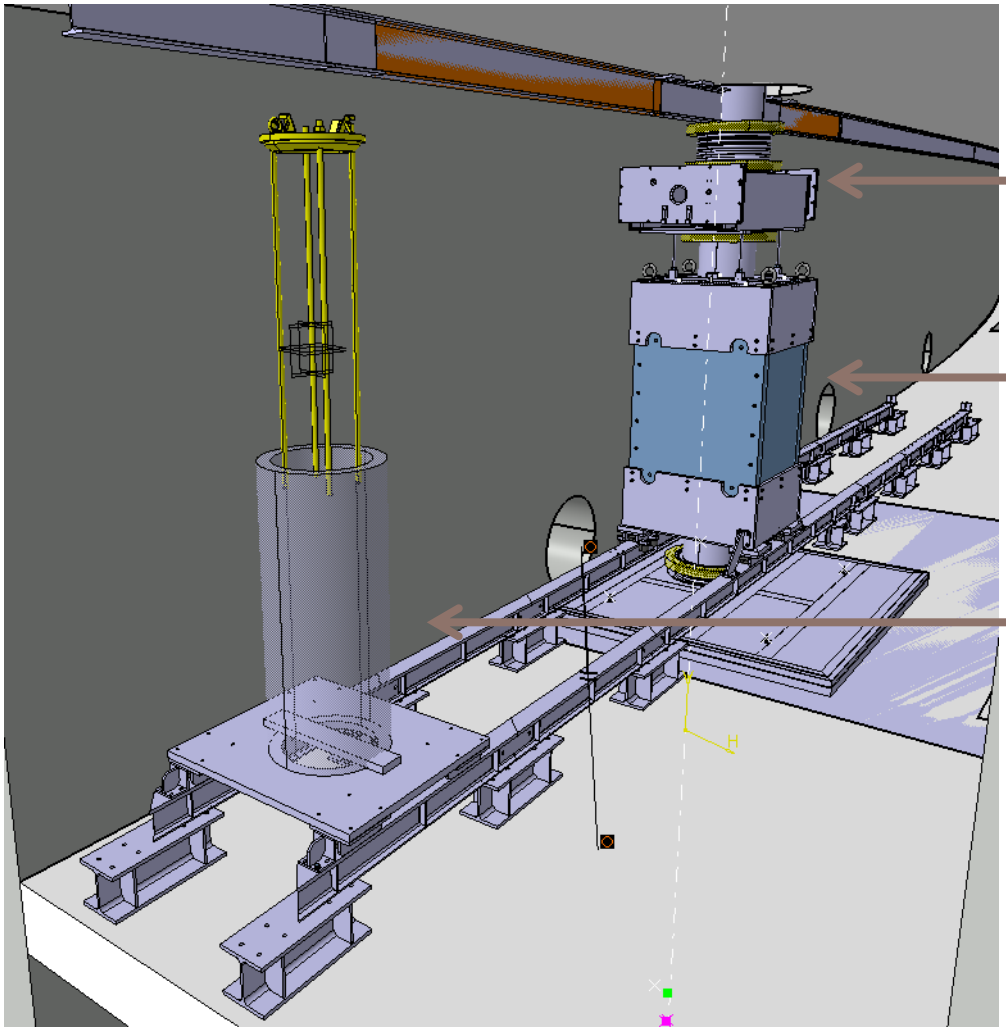
- Various shielding solutions along the beam line
  1. Concrete blocks above target
  2. Concrete ring above magnet
  3. Steel spheres above magnet
     with special retain system:







EAR2 Beam Line Service Gallery



Filter Box:
- design on-going

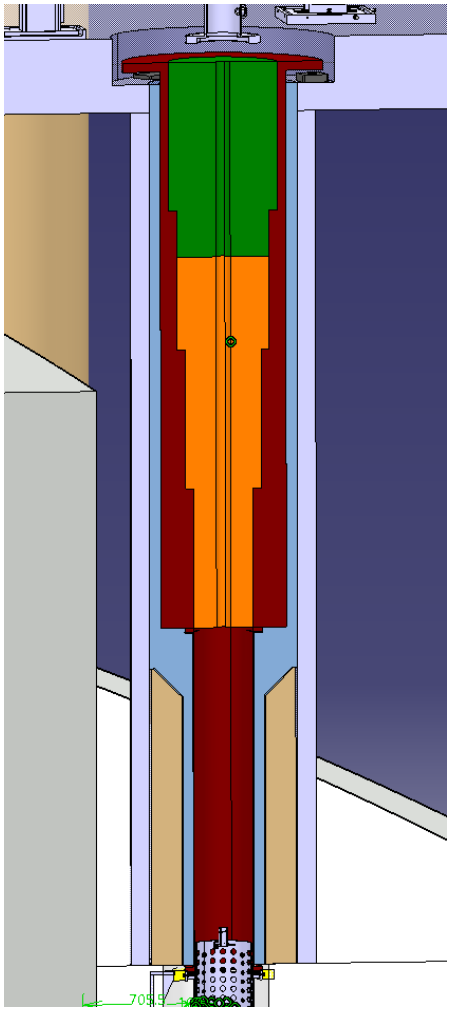
Magnet:
- assembly on-going at CERN

1st collimator (storage position):
- collimator ordered
- shielding design to be approved (RP)

EAR2 Beam Line Collimators

Configuration for all measurements:

Collimator & Shape	Inner Diameter [mm]
2nd: conical (2 m Fe + 1 m PE+B)	d_2 = 20 d_1 = 69
1st: cylindrical (1 m Fe)	d_0 = 200

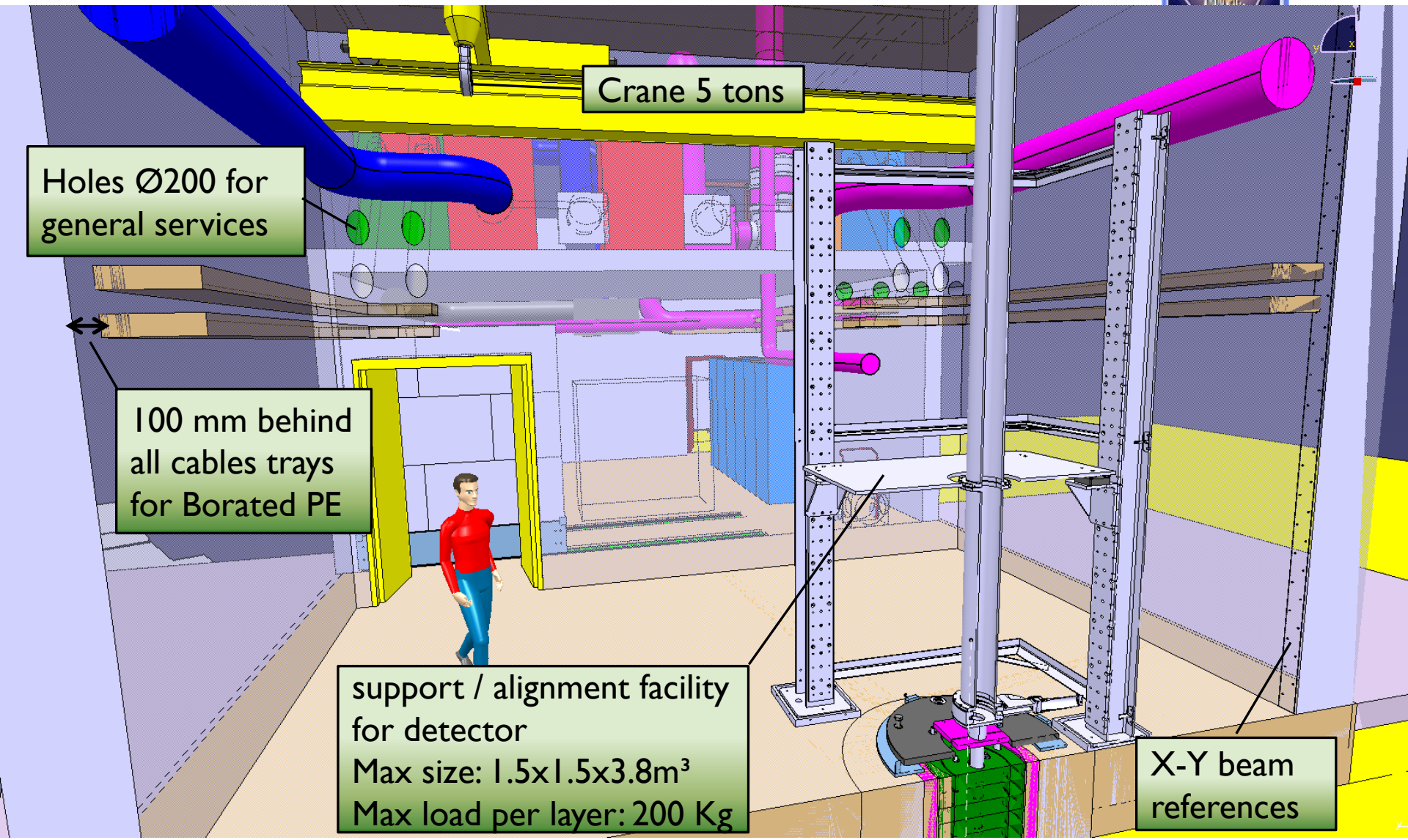


Both collimators in production resp. ordered

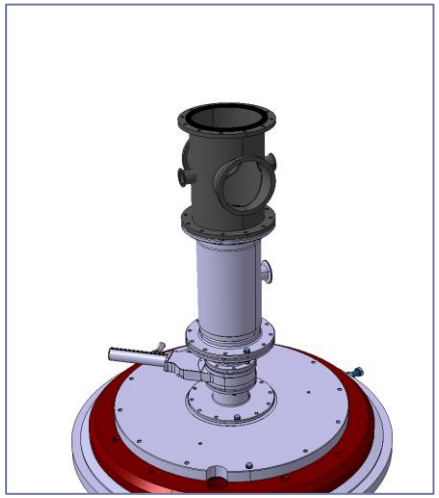
1st collimator installed below EAR2 floor, inside the vacuum tube for beam shaping and shielding

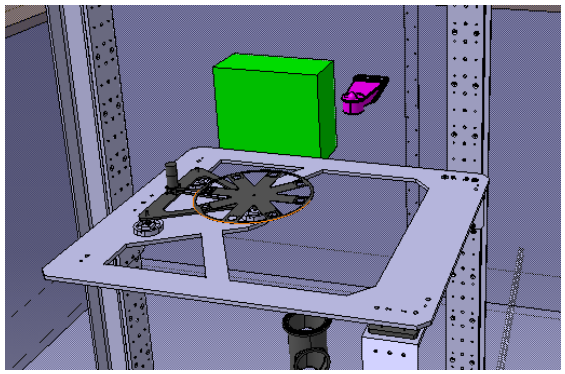
2nd collimator installed below EAR2 gallery, inside the vacuum tube for beam shaping and shielding

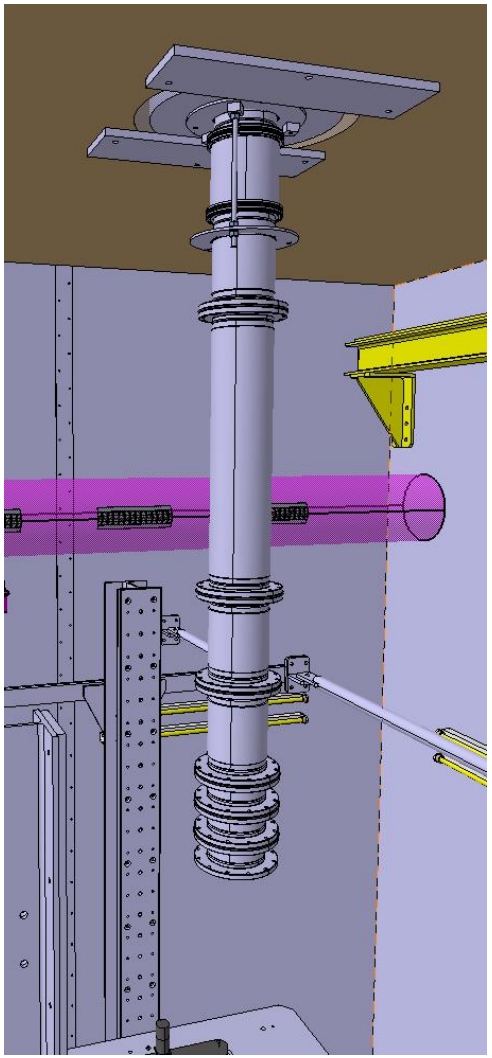
EAR2 bunker


Crane 5 tons
Holes Ø200 for general services
100 mm behind all cables trays for Borated PE
support / alignment facility for detector
Max size: 1.5x1.5x3.8m³
Max load per layer: 200 Kg
X-Y beam references

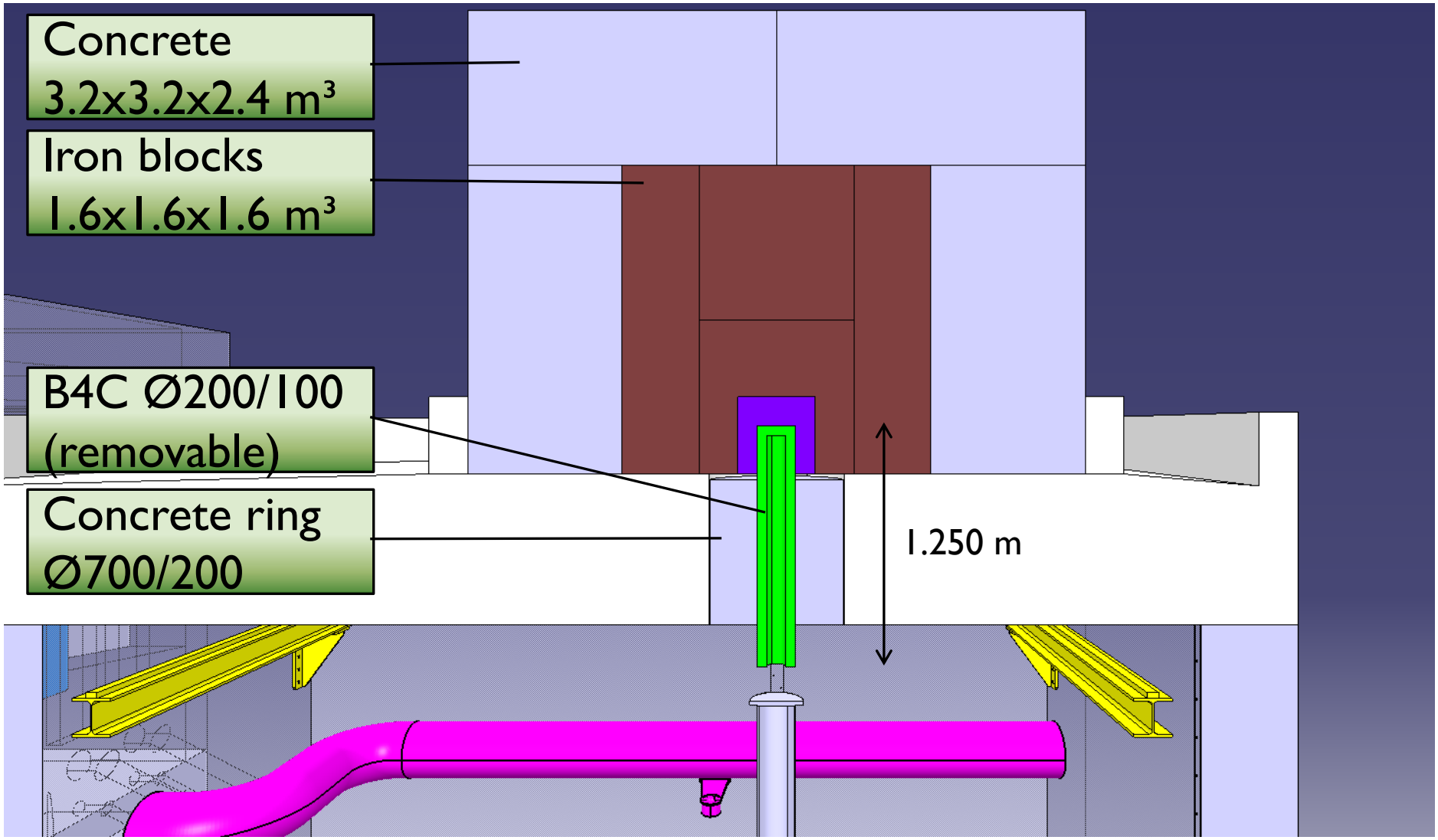
- Work on-going for integration of:
  1. Various detector systems
  2. Sample changer
  3. Independent alignment system
  4. Additional shielding





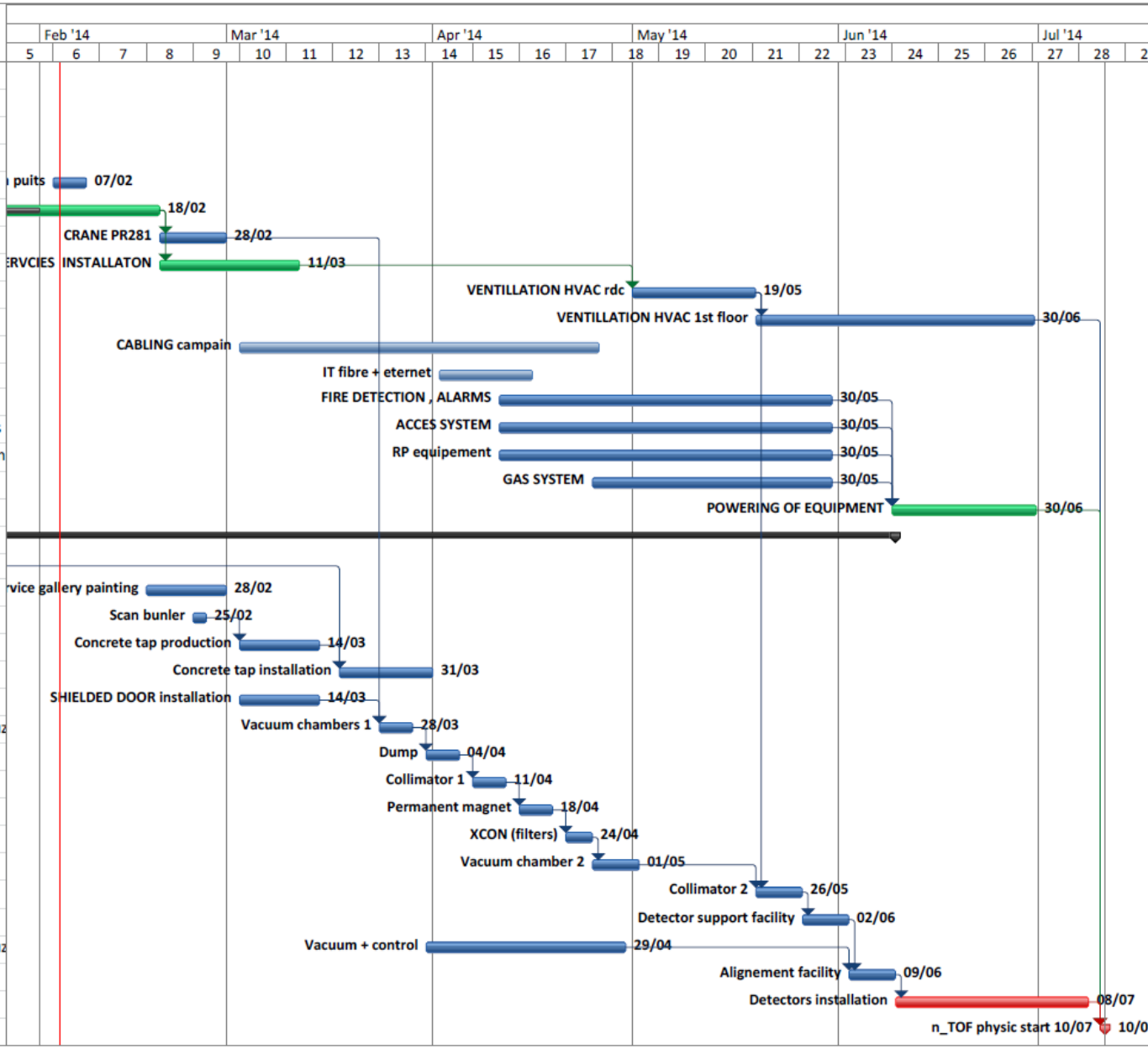


Beam Dump

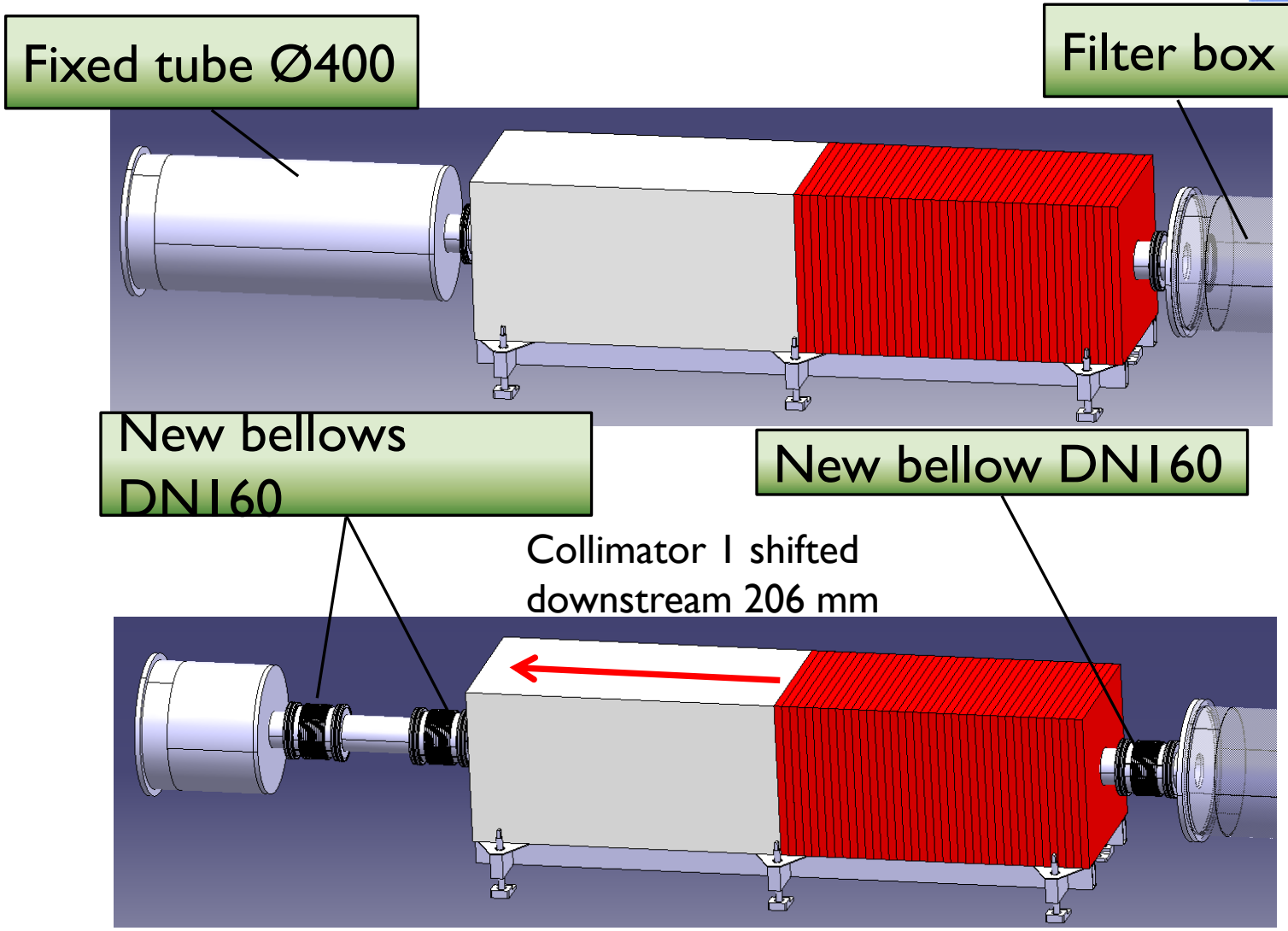

Concrete
3.2x3.2x2.4 m³
Iron blocks
1.6x1.6x1.6 m³
B4C Ø200/100
(removable)
Concrete ring
Ø700/200
1.250 m

EAR2 Beam Line Planning

ID	Task Name	Dep-Grou	In charge
1	**CIVIL ENGINEERING**	GS-SE	N. Lopez
2	Concreting works and building		
3	Finishing works and landscaping		
4	**POWER LINES TO Bldg. EAR2**	EN-EL	J. Gomez
5	**plaque protection puits**	EN-MEF	C. Bertone
6	**CABLE TRAYS**	EN-EL	J. Gomez
7	**CRANE PR281**	EN-MEF	C. Bertone
8	**GENERAL SERVCIES INSTALLATON**	EN-EL	J. Gomez
9	**VENTILLATION HVAC rdc**	EN-EL	M. Obrecht
10	**VENTILLATION HVAC 1st floor**	EN-EL	M. Obrecht
11	**CABLING campain**		
12	IT fibre + eternet		
13	**FIRE DETECTION , ALARMS**	EN-CV	D. Raffour
14	**ACCES SYSTEM**	GS-ASE	D. Chappuis
15	**RP equipement**	GS-ASE	E. Berthoum
16	**GAS SYSTEM**	PH-UNT	F. Fayet
17	**POWERING OF EQUIPMENT**	EN-EL	J. Gomez
18	**BEAM LINE INSTALLATION**	EN-MEF	S. Girod
19	open target pit		
20	service gallery painting	EN-HE	S. Girod
21	Scan bunler	EN-HE	S. Girod
22	Concrete tap production	EN-HE	S. Girod
23	Concrete tap installation	EN-HE	S. Girod
24	SHIELDED DOOR installation	EN-MEF	S. Girod
25	Vacuum chambers 1	TE-VSC	T. Mongelluz
26	Dump	EN-MEF	S. Girod
27	Collimator 1	EN-MEF	S. Girod
28	Permanent magnet	TE-MSC	A. Thonet
29	XCON (filters)	EN-MEF	S. Girod
30	Vacuum chamber 2	EN-MEF	S. Girod
31	Collimator 2	EN-MEF	S. Girod
32	Detector support facility	EN-MEF	S. Girod
33	Vacuum + control	EN-MEF	T. Mongelluz
34	Alignement facility	BE-ABP	T. Dobers
35	**Detectors installation**	EN-STI	n_TOF
36	**n_TOF physic start 10/07**	EN-STI	n_TOF

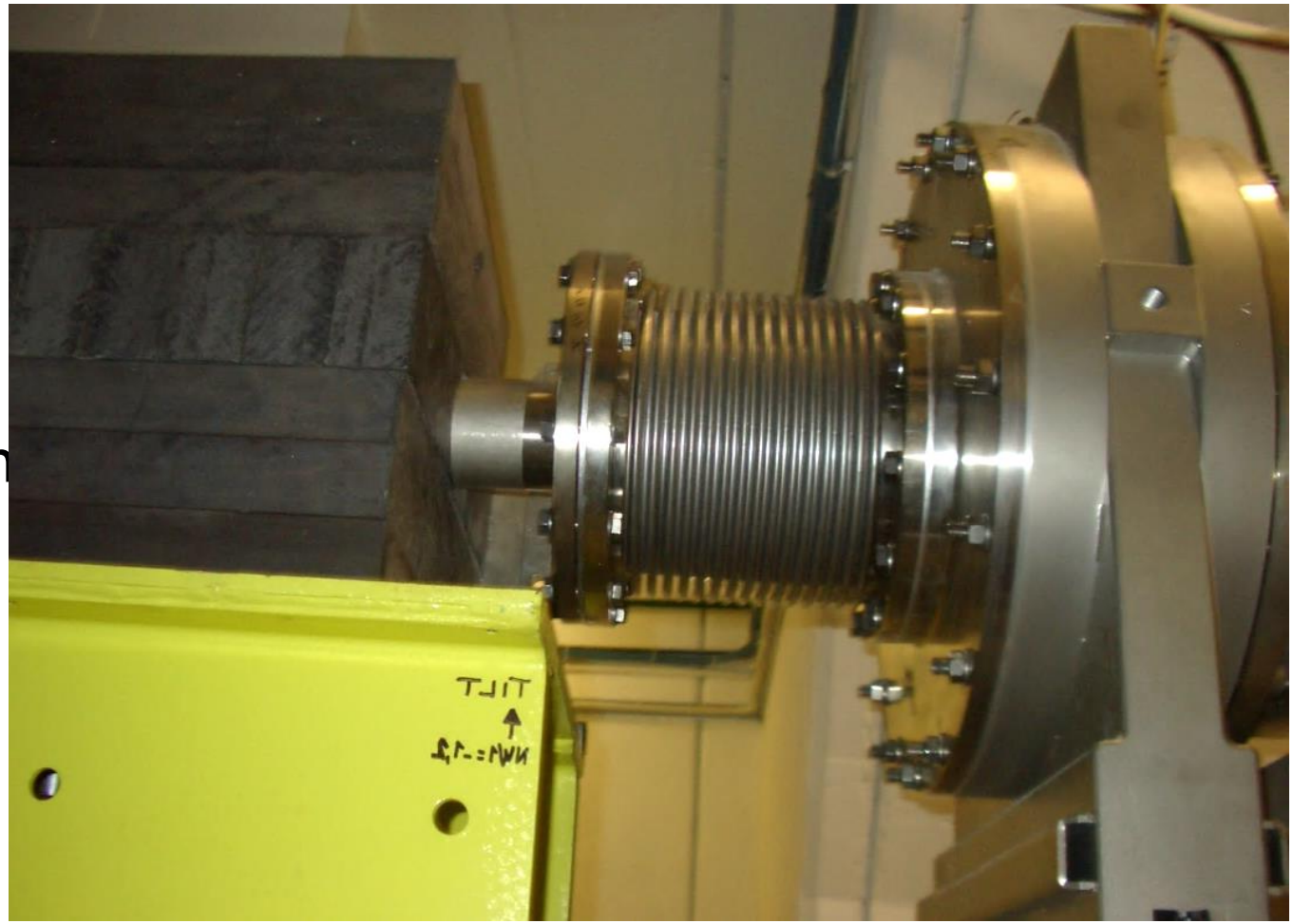


Collimator No. 1

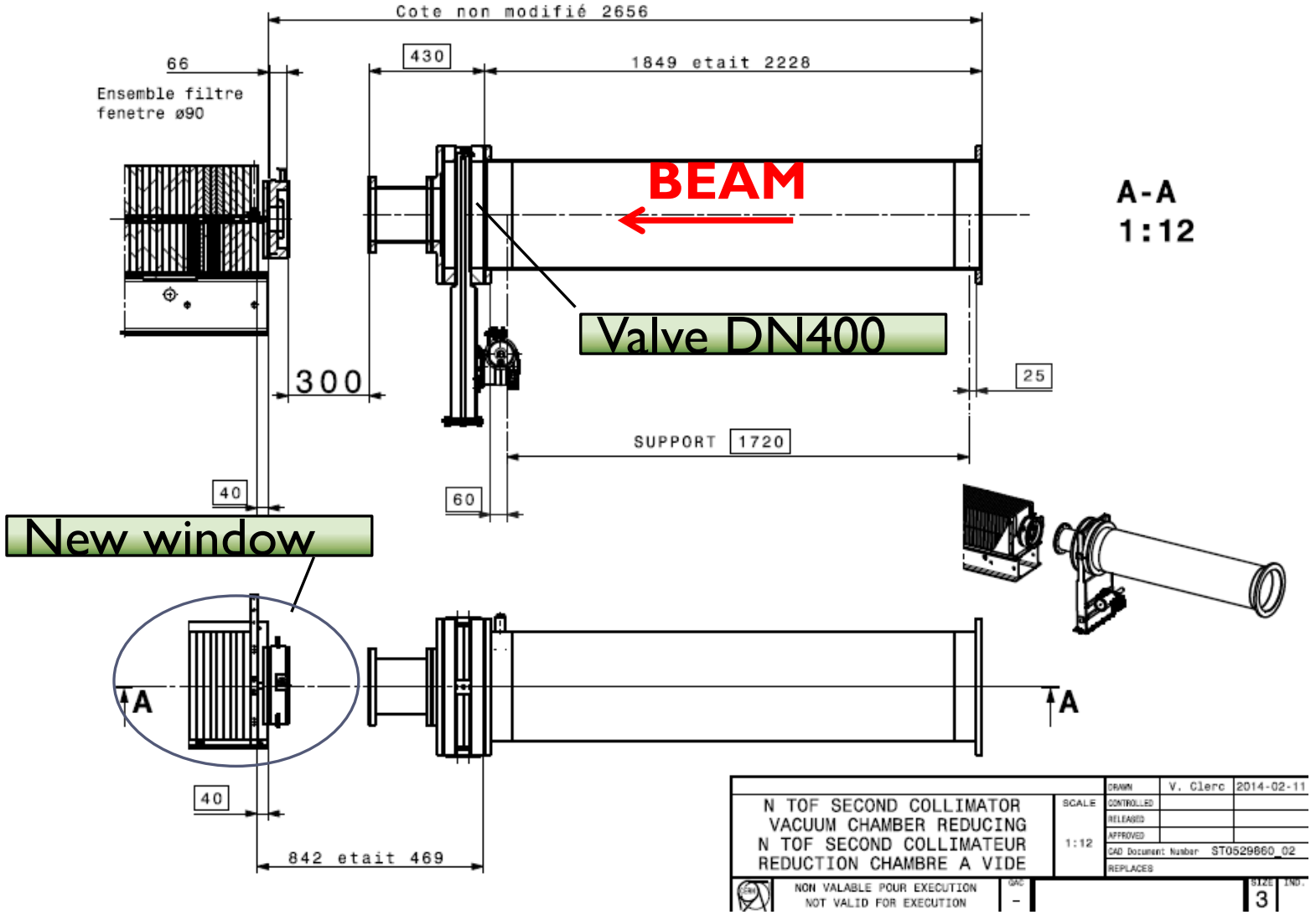


Vacuum window, sample holder

- Planned location for new vacuum window
- Sample holder for transmission measurements

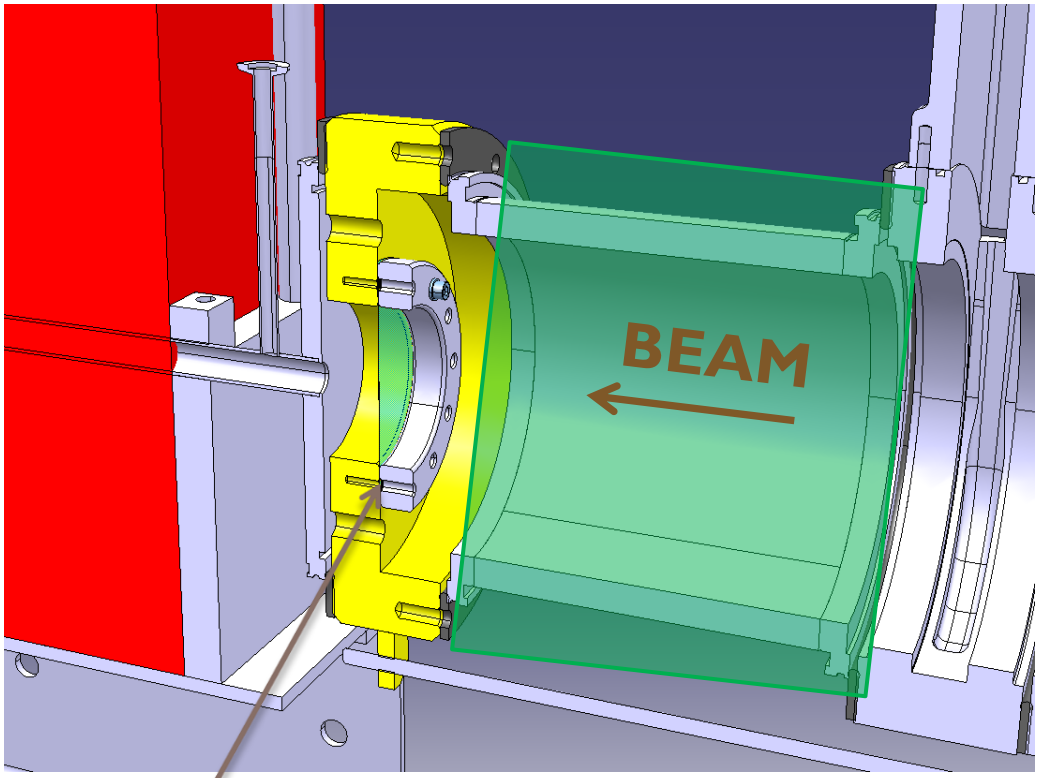


New vacuum window and space for sample holder



Vacuum window

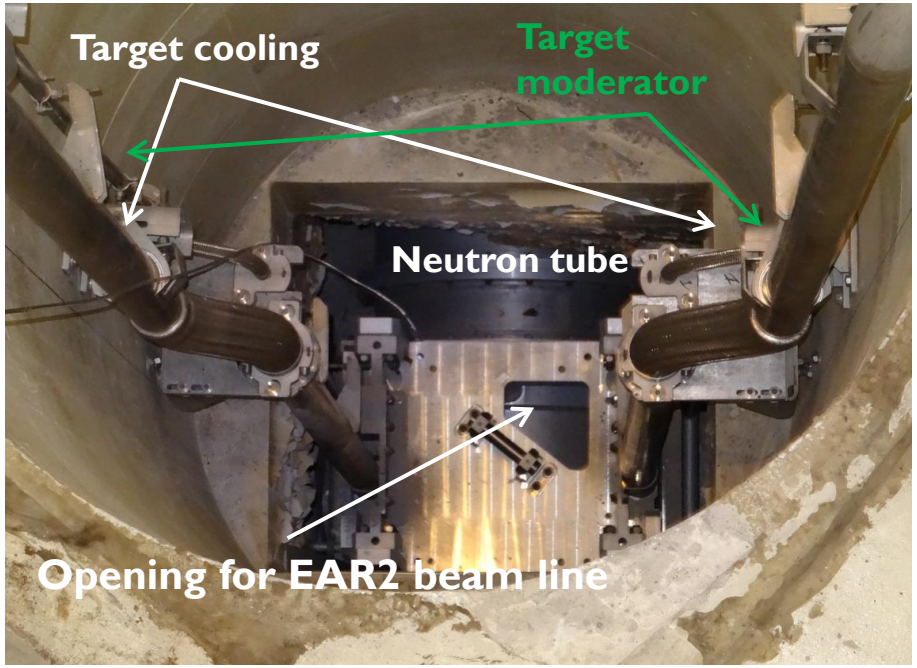
- Al window in front of collimator No. 2 (thickness 0.3 mm, Ø DN 100, compliant to resist a shock wave)
- Second window at the entry of EAR 1 still needed (Kapton, e.g. Ø 65 mm/0.1 mm)
- Keep DN 400 valve
- Prepare for a sample holder
  - Depending on dimensions, we need to shift the valve and bellow upstream
  Similar design as the filter box actuators

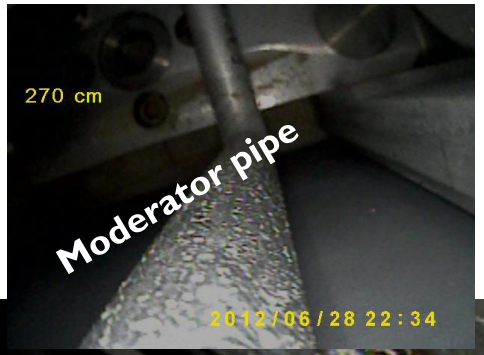


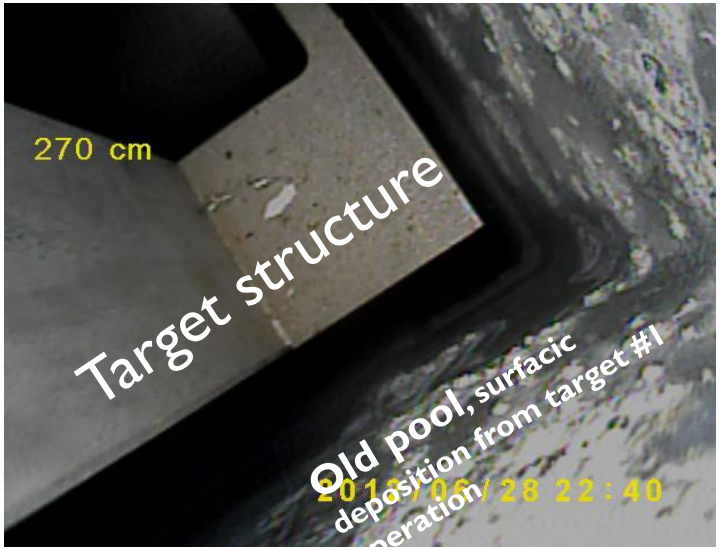
Window with vacuum bypass

Space gain of 300 mm to integrate sample holder

Inspection of present (2nd) target 12th December 2013



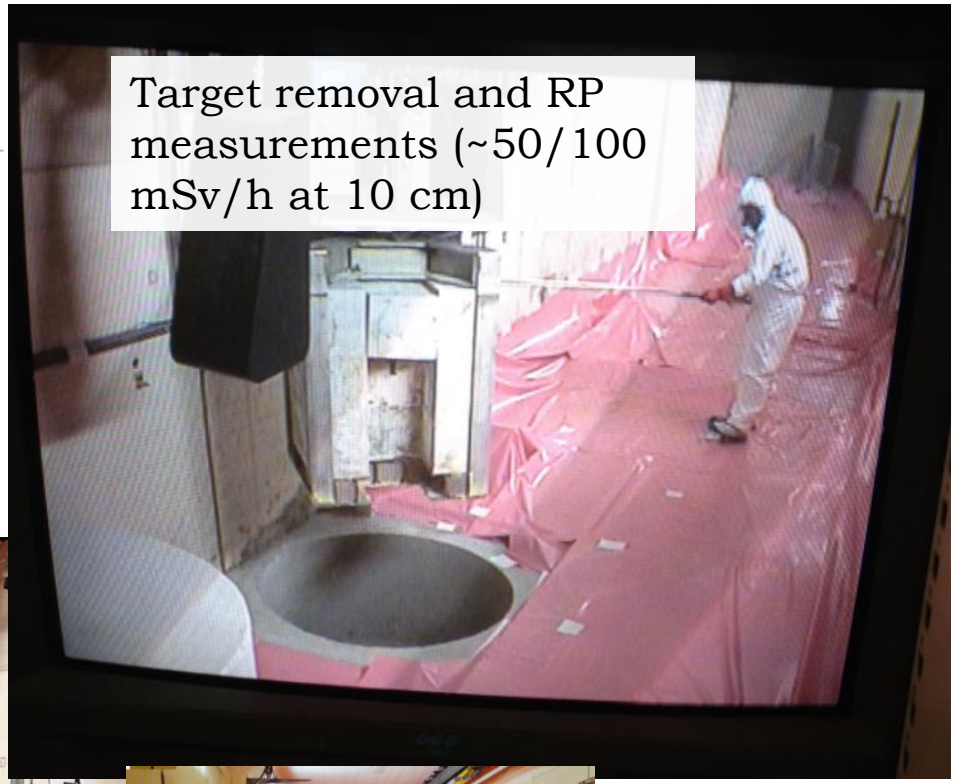




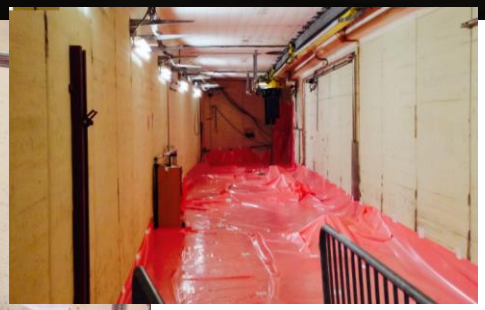
- Campaign to inspect the present operating target to address status and external corrosion
- Endoscope used to externally inspect the target
- No major issues observed:
  - No signs of water at the bottom of the pit
  - Oxidation stains on the external body (expected)
  - 2nd inspection will take place in February to check the status of the neutron window

Removal of 1st n_TOF target
4th December 2013

Concrete container from PSI to permanently house the spent target



Target removal and RP measurements (~50/100 mSv/h at 10 cm)



Preparation of the 375-T8 tunnel in order to contain surfacic contamination in view of target removal and movement

PROPOSAL EAR1

n_TOF EAR1 Proposal Document #	Field of interest	Protons	Year
Re-commissioning of n_TOF EAR1 CERN-INTC-2014-008 / INTC-P-407	Commissioning	3.9E+18	2014
Neutron capture at the s-process branching points 171Tm and 204Tl CERN-INTC-2014-003 / INTC-P-404	Astrophysics	7.5E+18	2014
Radiative capture on 242Pu for MOX fuel reactors CERN-INTC-2013-027 / INTC-P-387	Nuclear Tech.	3.5E+18	2014
Winter SHUTDOWN			
Neutron capture cross sections of 70;72;73;74;76Ge at n TOF EAR-1 CERN-INTC-2013-021 / INTC-P-381	Astrophysics	1.2E+19	2015
Measurements of neutron induced capture and fission reactions on 233U CERN-INTC-2013-041 / INTC-P-397	Nuclear Tech.	4.3E+18	2015
35Cl(n,p)35S for NCT *To be proposed (LOI Feb. 2014)*	*Medical App.*	*2.0E+18*	*2015*
Total # of protons (all proposals)		3.3E+19	

PROPOSAL EAR2

n_TOF EAR2 Proposal Document #	Field of interest	Protons	Year
Commissioning of n_TOF EAR2 CERN-INTC-2013-043 / INTC-P-399	Commissioning	9.8E+18	2014
γ-ray Energy Spectra and Multiplicities from the Fission of 235U using STEFF CERN-INTC-2014-004 / INTC-P-405	Nuclear Tech.	3.0E+18	2014
Winter SHUTDOWN			
Measurement of the neutron capture cross-sections of 53Mn at EAR-2 CERN-INTC-2014-012 / INTC-P-408	Astrophysics	3.5E+18	2015
Destruction of the cosmic γ-ray emitter 26Al by neutron induced reactions CERN-INTC-2014-006 / INTC-P-406	Astrophysics	5.0E+18	2015
Neutron capture at the s-process branching point 147Pm *To be proposed*	*Astrophysics*	*2.5E+18*	*2015*
14N(n,p)14C for NCT *To be proposed (LOI Feb. 2014)*	*Medical App.*	*2.0E+18*	*2015*
Feasibility of the (n,γ) on 235U and 239Pu with a fission tagging C6D6 setup *To be proposed*	*Nuclear Tech.*	*2.0E+18*	*2015*
The (n,α) reaction cross section measurement for light isotopes *To be proposed*	*Basic Physics*	*2.0E+18*	*2015*
Helium production in tungsten relevant to divertors in future fusion reactors *To be proposed*	*Nuclear Tech.*	*2.0E+18*	*2015*
Total # of protons (all proposals)		3.2E+19	

Conclusions

- The n_TOF **2nd experimental area EAR2 Project is according to the planning. Ready for commissioning July 2014**

- **Refurbishing n_TOF Beam Line ready for July 2014**

- **n_TOF Proposals :**
  - CERN-INTC-2014-003 / INTC-P-404 Neutron capture at the s-process branching points 171Tm and 204 Tl
  - CERN-INTC-2014-004 / INTC-P-405 γ-ray Energy Spectra and Multiplicities from the Neutron-induced Fission of 235U using STEFF
  - CERN-INTC-2014-008 / INTC-P-407 Re-commissioning of n_TOF EAR1
  - CERN-INTC-2014-012 / INTC-P-408 Measurement of the neutron capture cross-sections of 53Mn at EAR-2
  - CERN-INTC-2014-006 / INTC-P-406 Destruction of the cosmic γ -ray emitter 26Al by neutron induced reactions