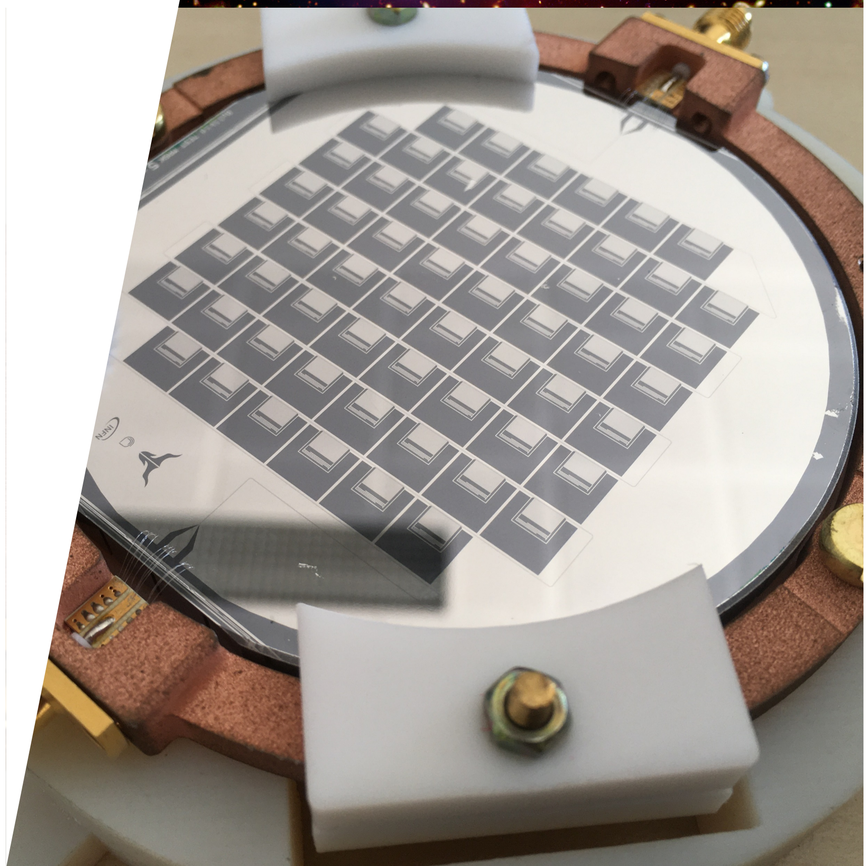
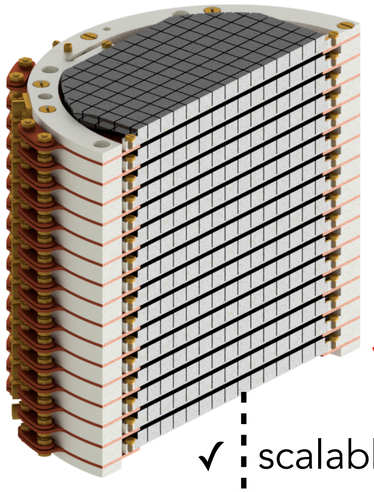
Istituto Nazionale di Fisica Nucleare
Laboratori Nazionali del Gran Sasso

Status at LNGS



Antonio D'Addabbo (LNGS INFN)
Bimonthly digest, 27 March 2025

Overview

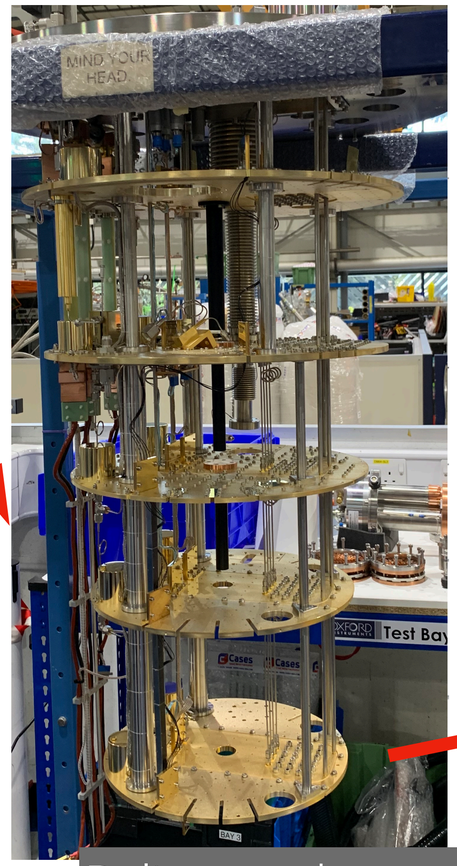


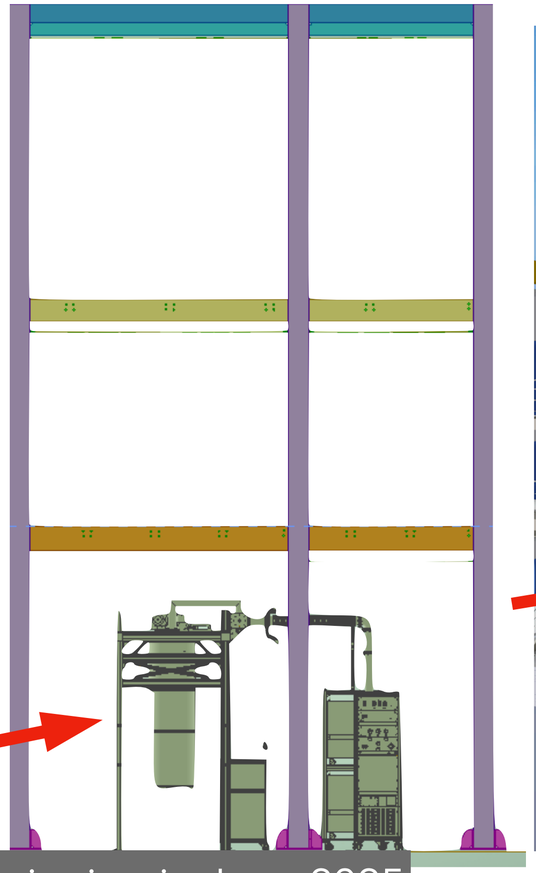
✓ scalable

Detector

- ✓ 800 g of silicon target
- ✓ 2300 detector units (dice)
- ✓ No inert material in detector vol
- ✓ fully active
- ✓ fiducialization (600 g)

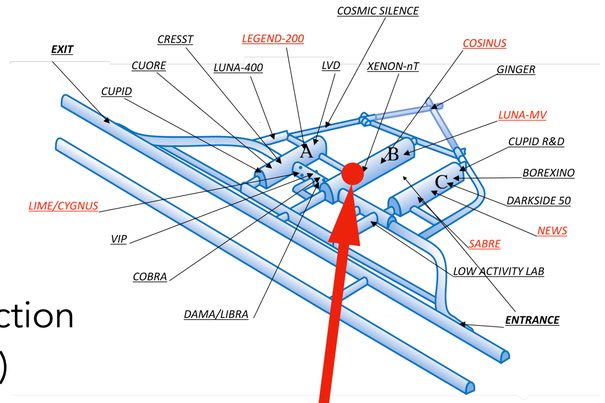
ProteoxMX dilution cryostat
by Oxford Instruments





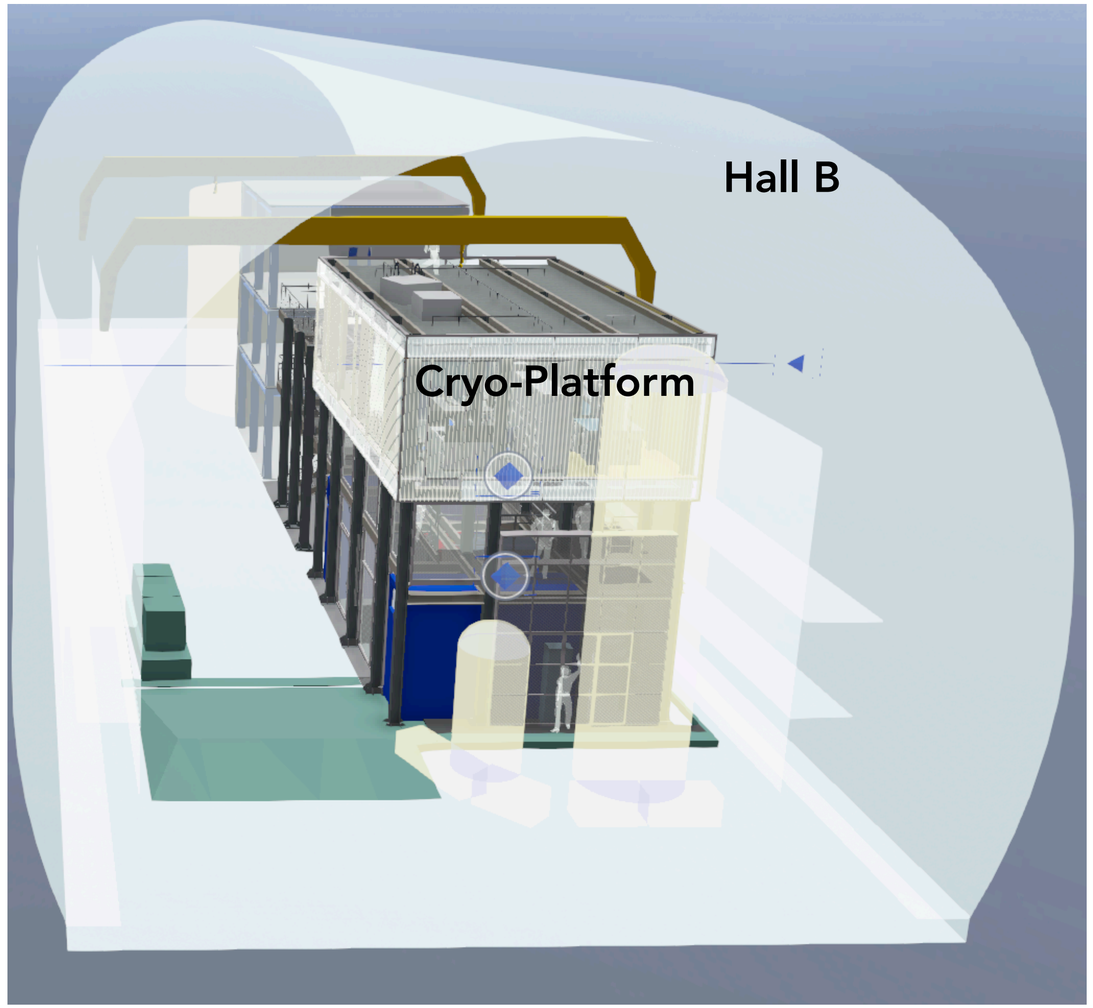
Delivery and commissioning in June 2025

Cryo-Platform facility under construction
in the LNGS underground (Hall-B)



Ready by fall 2025

Cryo-Platform

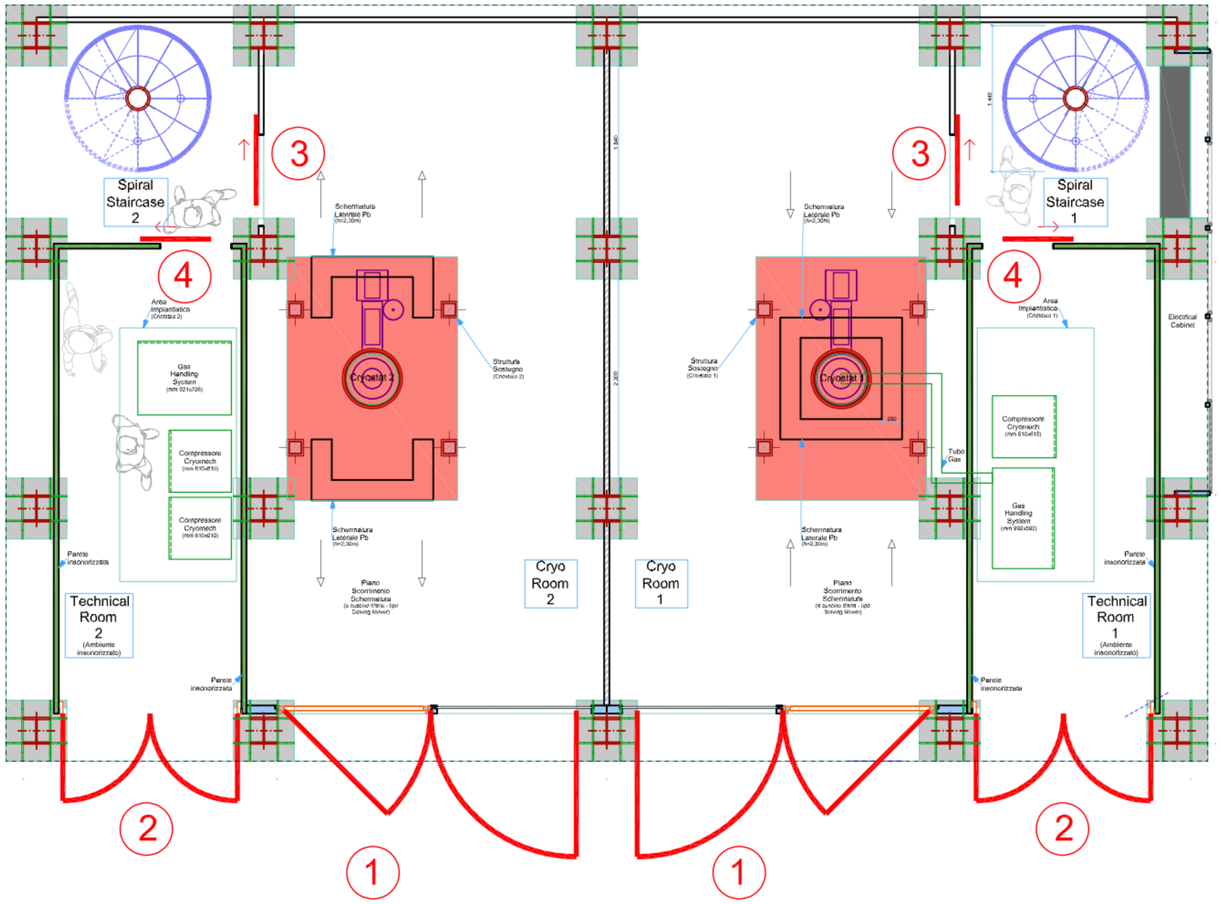


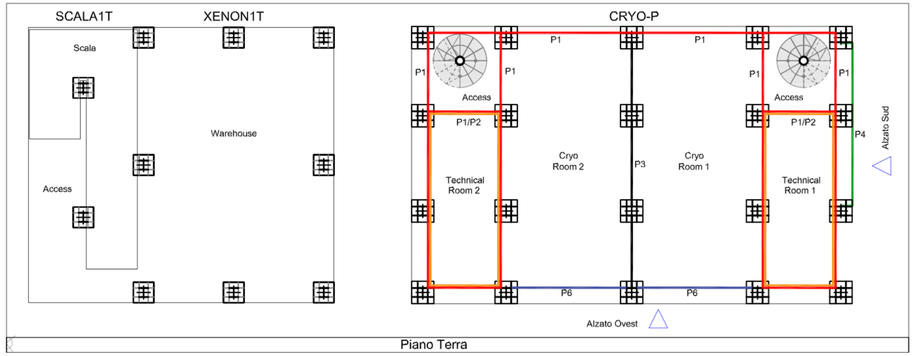
Cryo-P area: late 2024

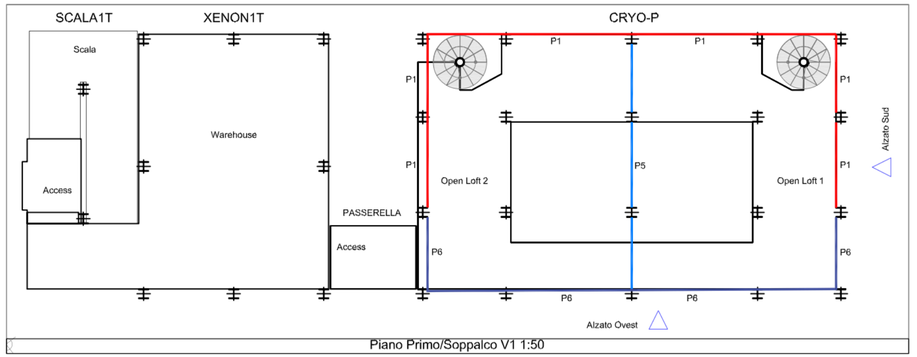
Cryo-P area: early 2025

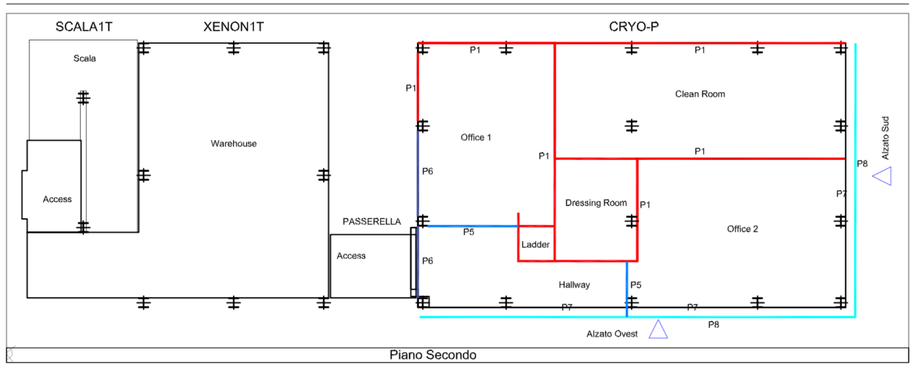
Cryo-P utilities

- Definition of infill walls, partitions and ceilings
- Definition of fixtures and lighting

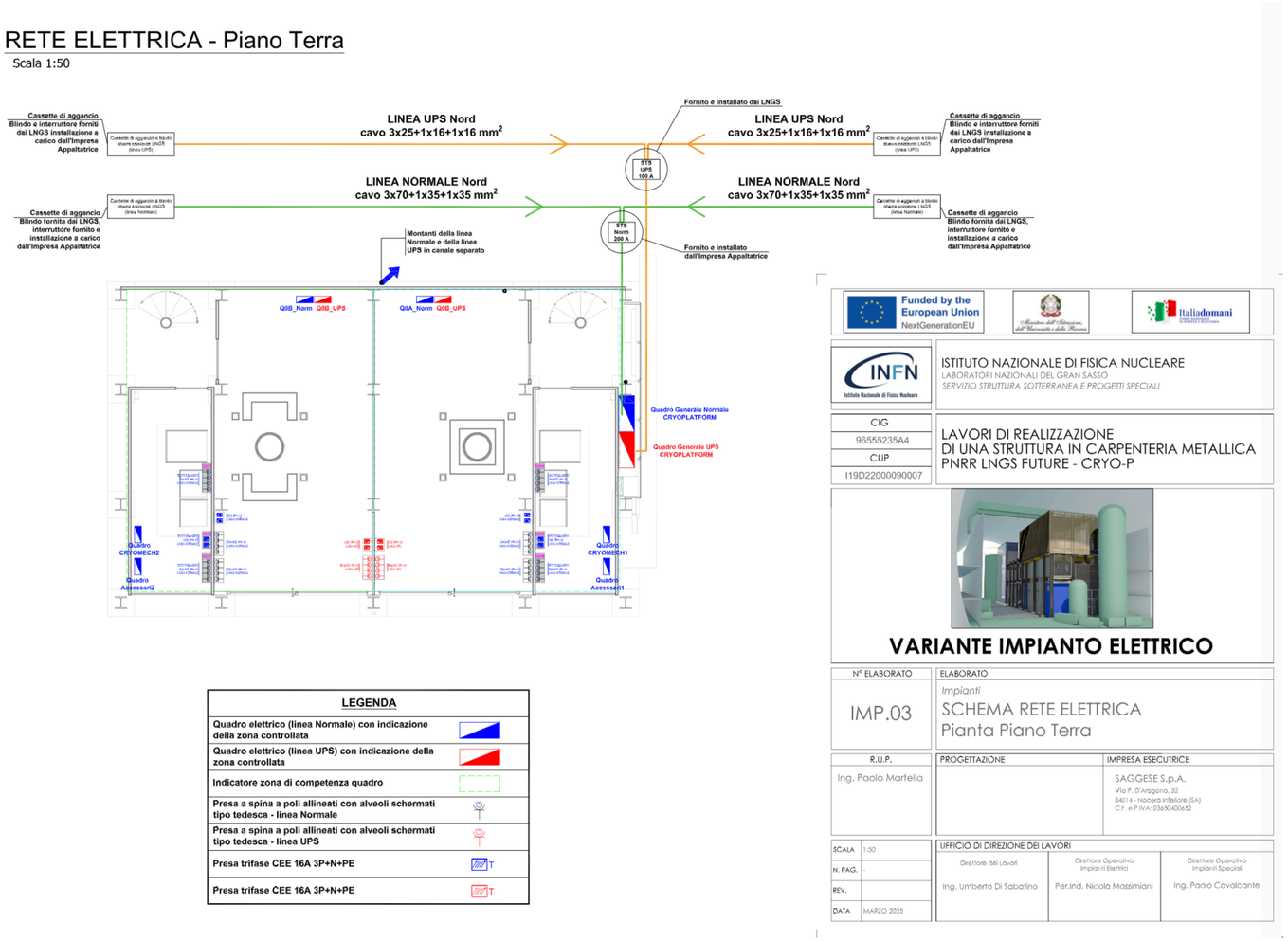








Cryo-P utilities: electrical and network



Funded by the European Union NextGenerationEU

ISTITUTO NAZIONALE DI FISICA NUCLEARE
LABORATORI NAZIONALI DEL GRAN SASSO
SERVIZIO STRUTTURA SOTTERRANEA E PROGETTI SPECIALI

CIG	LAVORI DI REALIZZAZIONE DI UNA STRUTTURA IN CARPENTERIA METALLICA PNRR LNGS FUTURE - CRYO-P
96555235A4	
CUP	
I19D22000090007	

VARIANTE IMPIANTO ELETTRICO

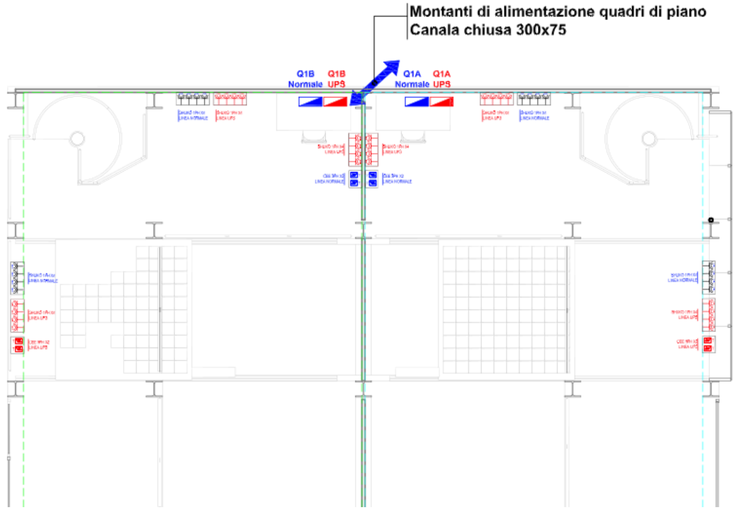
N° ELABORATO	ELABORATO
IMP.03	*Impianti* SCHEMA RETE ELETTRICA Pianta Piano Terra

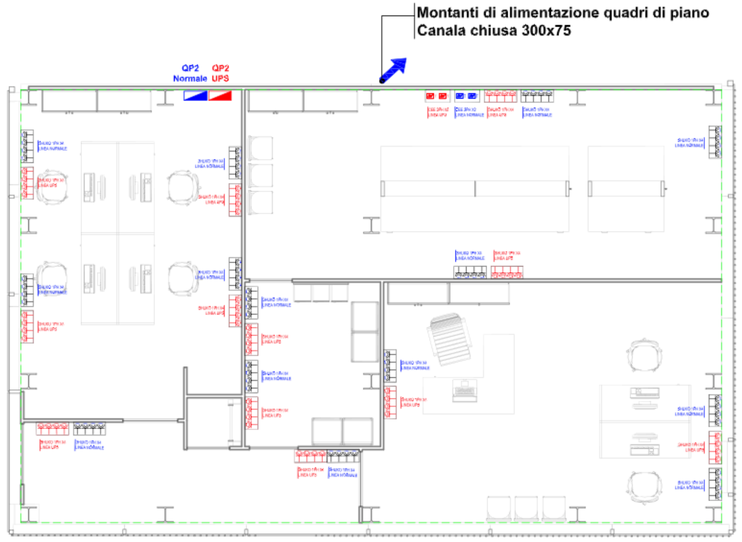
R.U.P.	PROGETTAZIONE	IMPRESA ESECUTRICE
Ing. Paolo Martella		SAGGESE S.p.A. Via F. D'Aragona, 32 84014 - Nocera Inferiore (SA) C.F. e P.IVA: 03650400652

SCALA	1:50
N. PAG.	-
REV.	
DATA	MARZO 2025

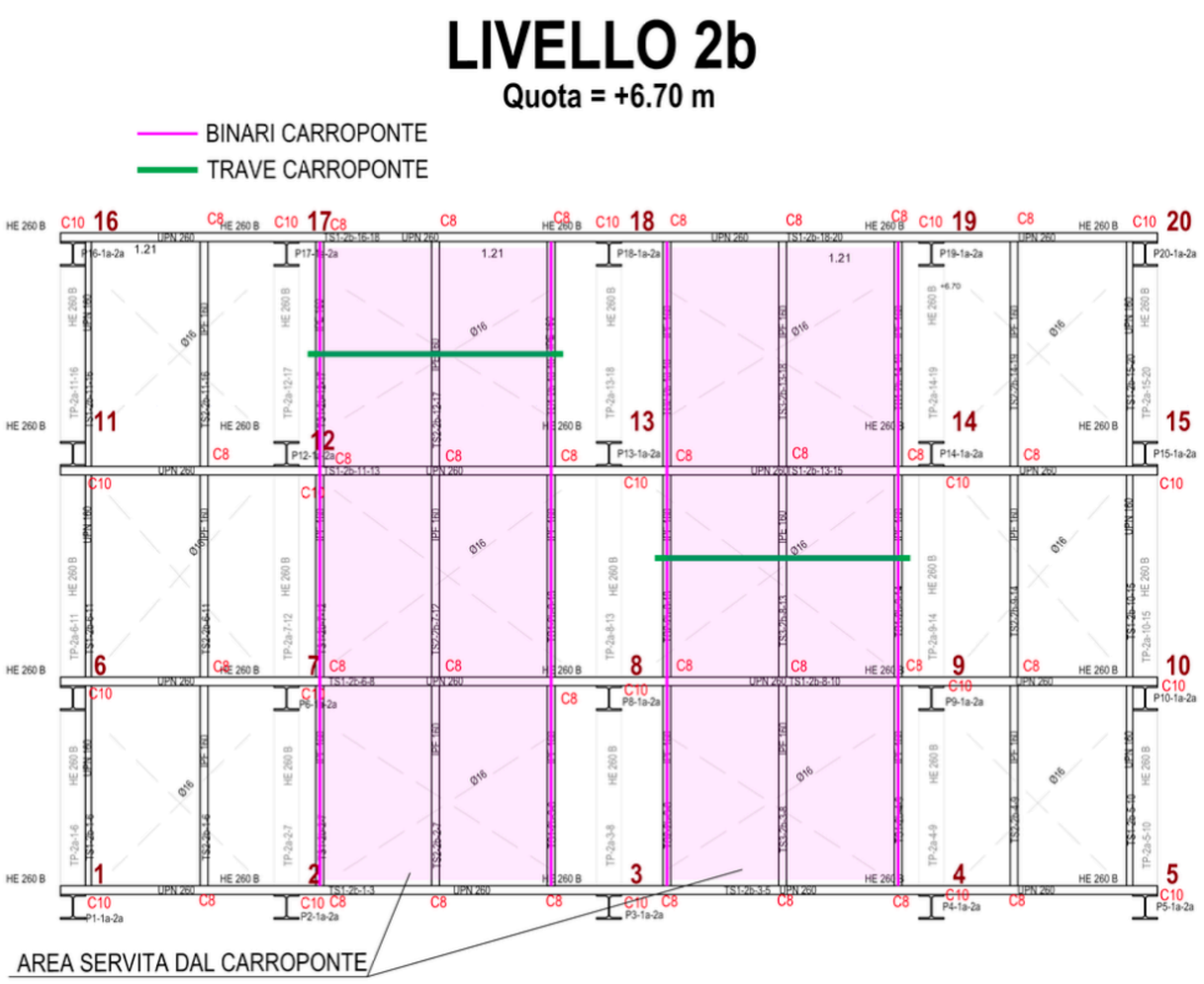
UFFICIO DI DIREZIONE DEI LAVORI

Direttore dei Lavori	Direttore Operativo Impianti Elettrici	Direttore Operativo Impianti Speciali
Ing. Umberto Di Sabatino	Per.Ind. Nicola Massimiani	Ing. Paolo Cavalcante

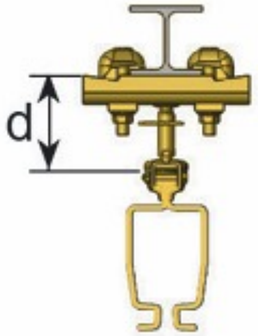




Cryo-P utilities: crane

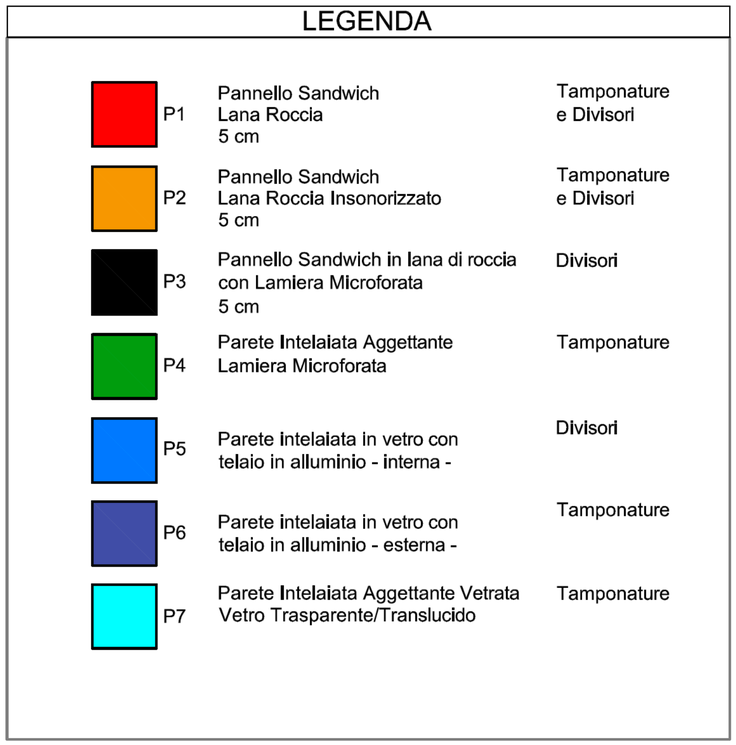


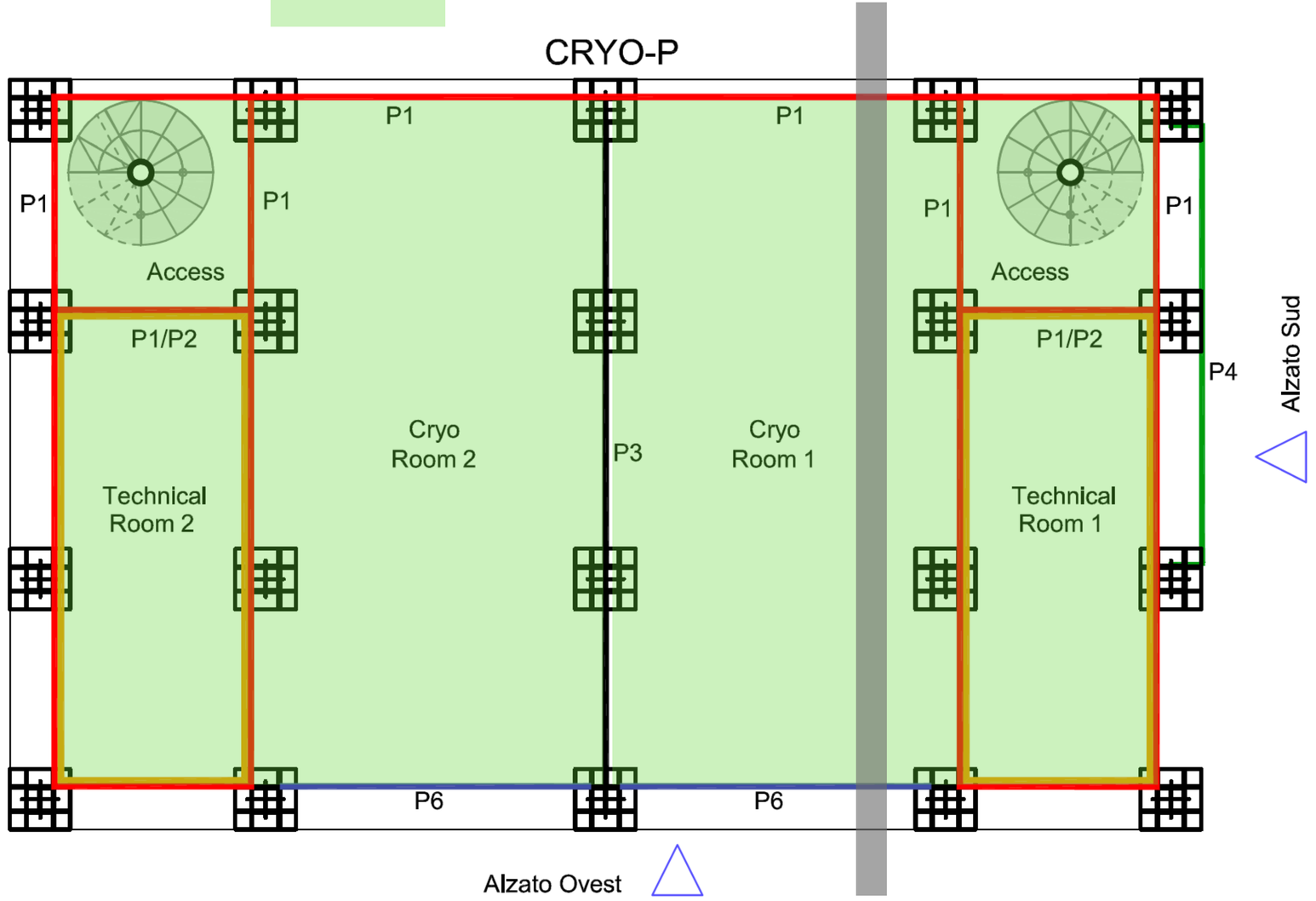
mechanical components, ecc.



Cryo-P utilities: ground experimental area

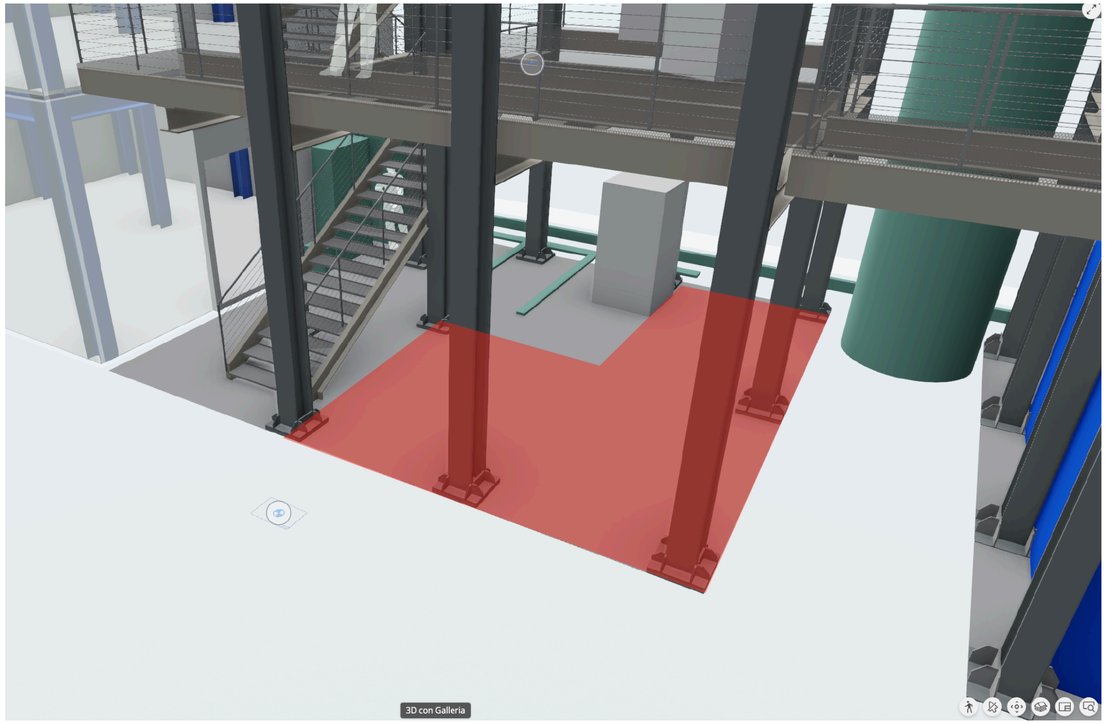
- Definition of levelling and resin coating of the walking surface at ground floor

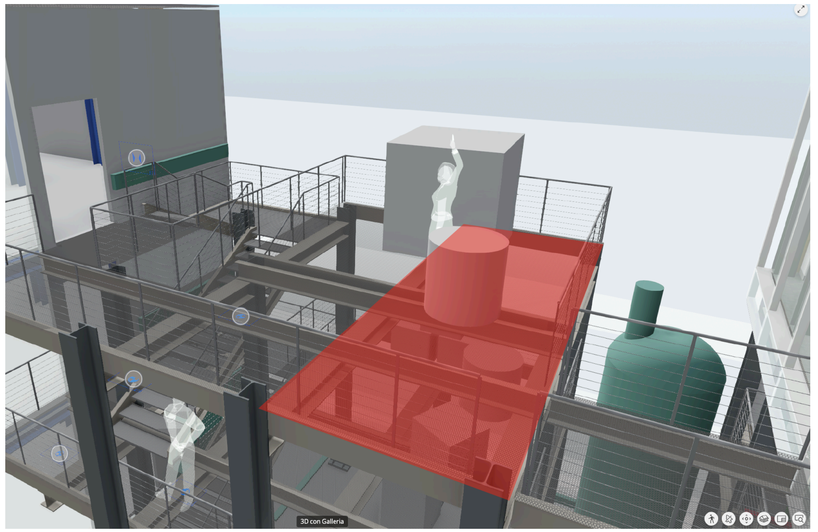


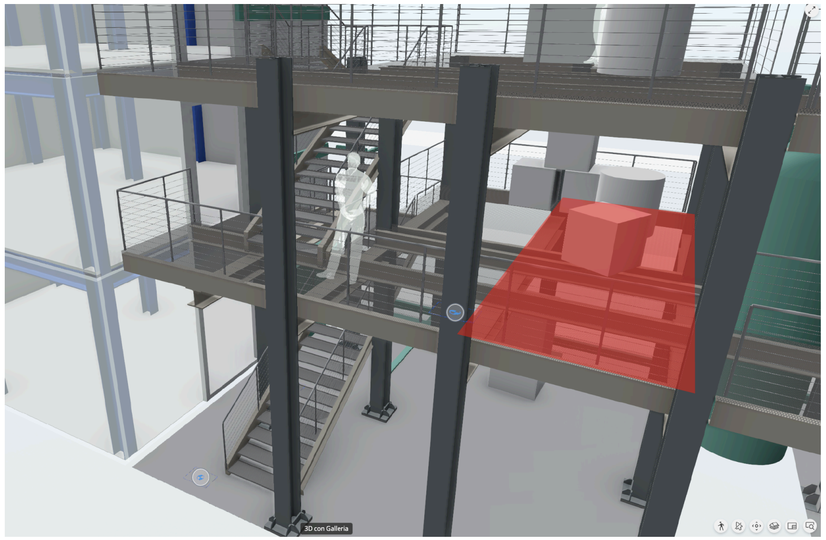


Cryo-P utilities: others

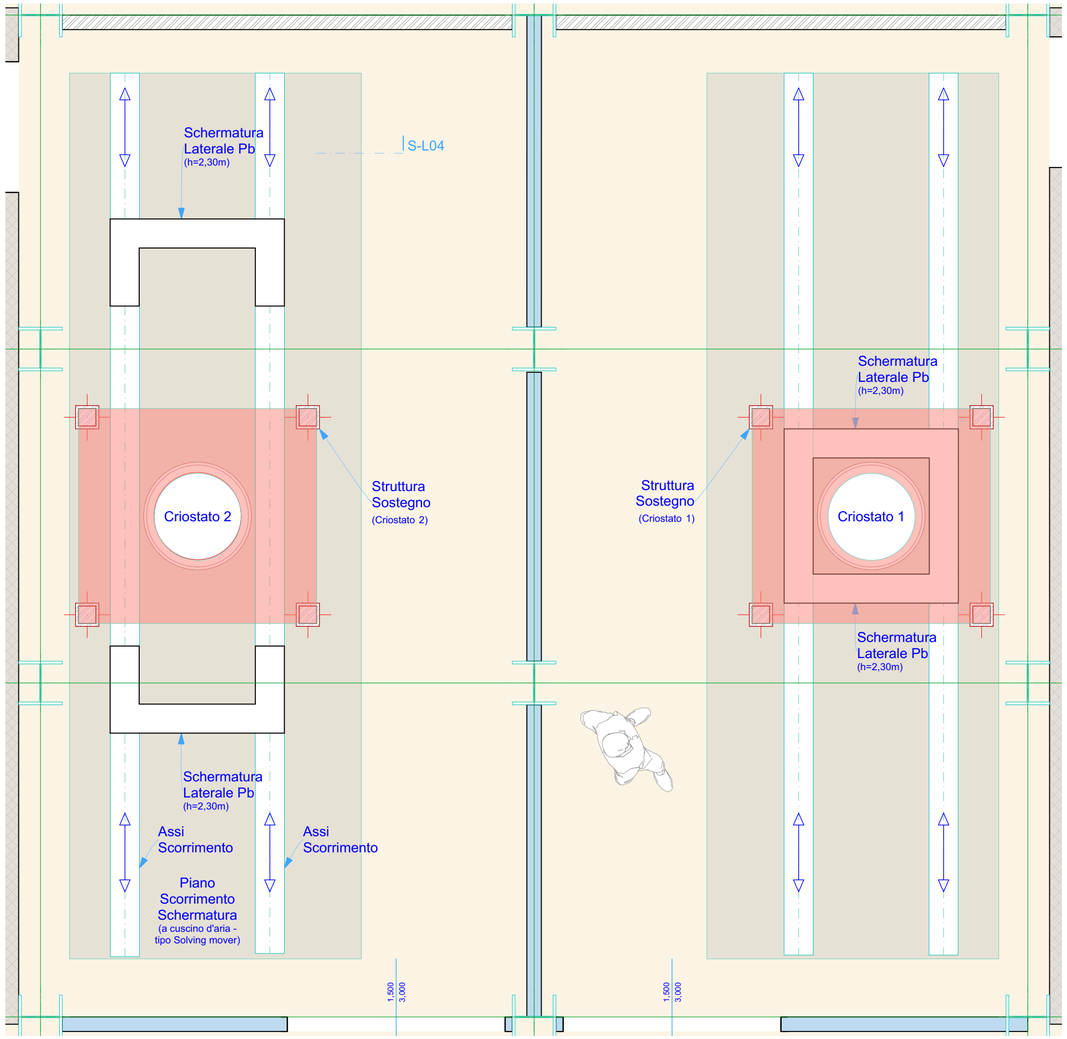
- Discussions have started for:
  - water cooling system
  - technical gas distribution system
  - ventilation and fancoil system

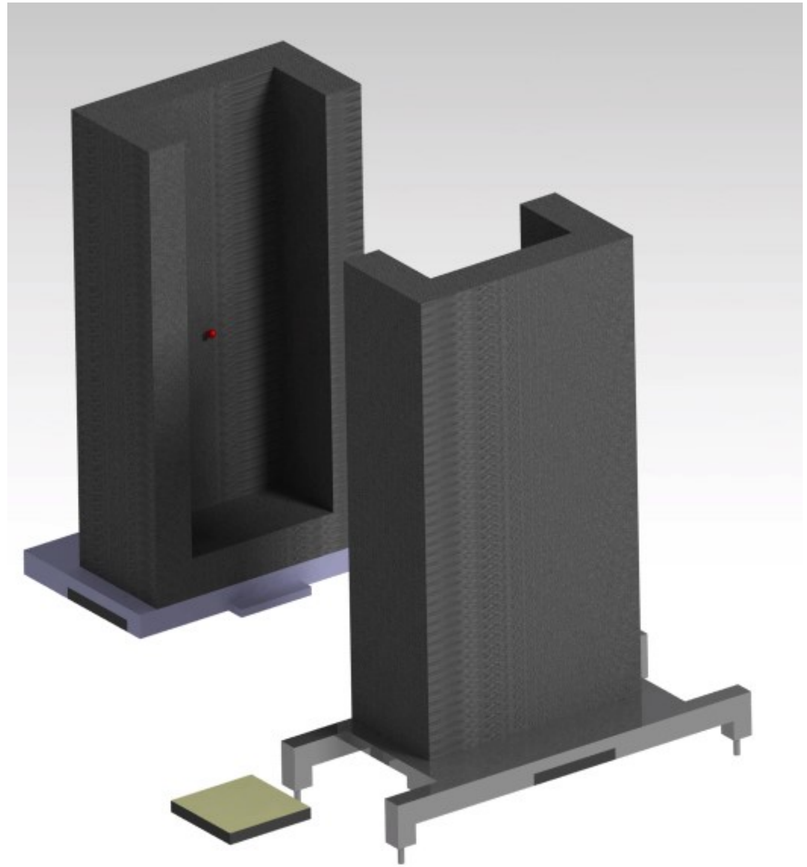






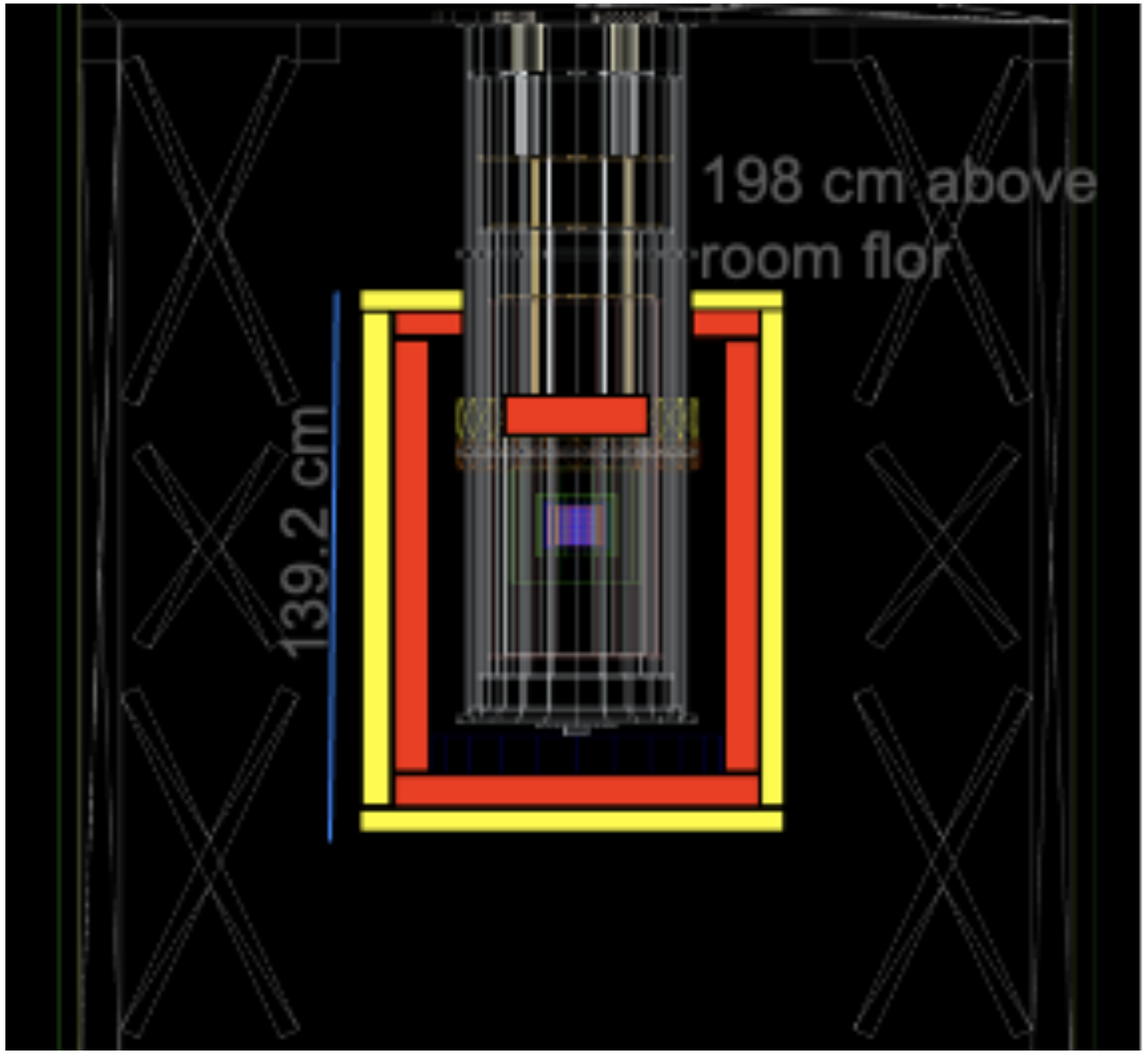
Sliding side lead shields: conceptual



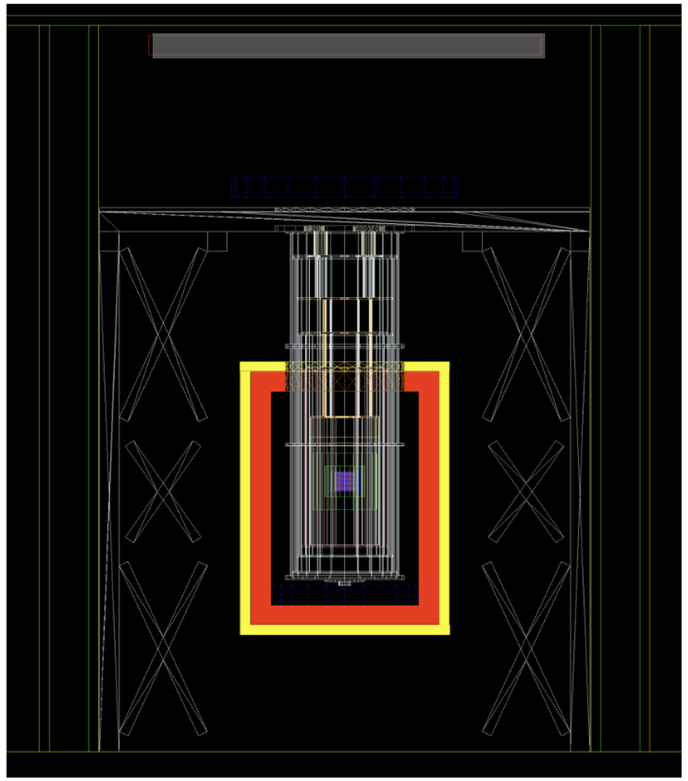


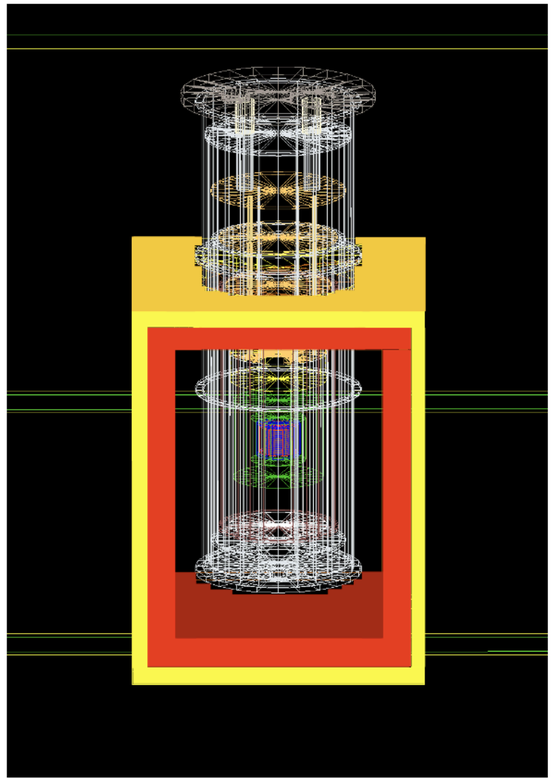
Sliding side lead shields: best case

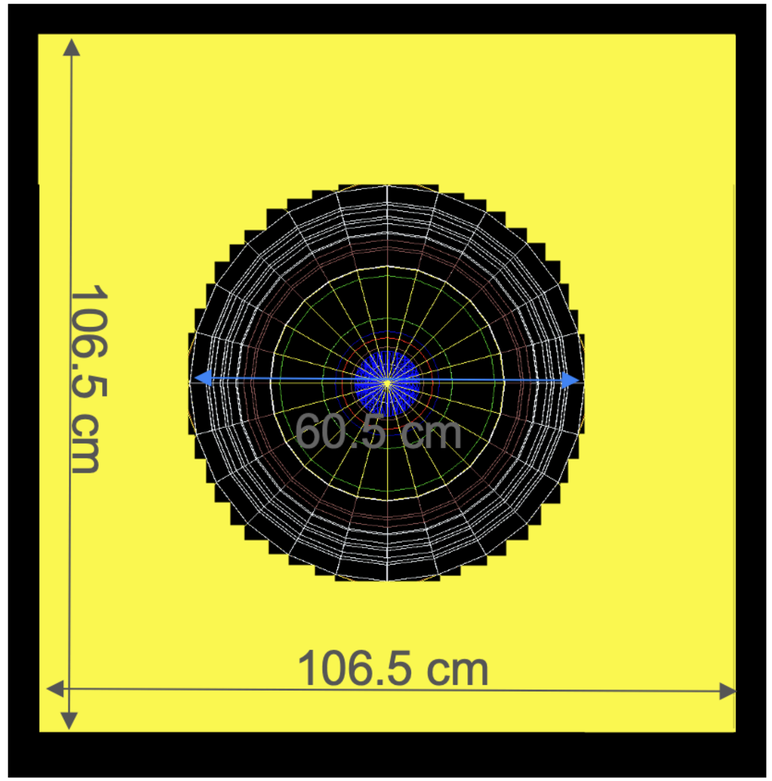
- Simulations performed by UNAM group
- Hp:
  - Pb activity set at OPERA Pb activities upper limits
  - Cu purity not considered
- Baseline (best case):
  10 cm Cu + 5 cm Pb
  - Cu mass: 4.72 T
  - Pb mass: 4.07 T
- Alternative:
  5 cm Cu + 10 cm Pb
  - Cu mass: 2.11 T
  - Pb mass: 7.41 T



Sliding side lead shields: conclusions







- Adding a hat shielding does reduce the background
- Most of the background comes from the empty spaces above BULLKID (inside the cryostat)
  - Lead thickness >6cm does not impact significantly the background
  - Top lead shielding with the current geometry does not impact significantly the background

Radiopurity of GSO (preliminary)

- Small GSO (Gd_3O_5Si) sample: volume 1.7 x 1 x 1 cm^3, mass ~12g

- Preparation of the GSO sample (solubilisation):
  - sample dissolved in phosphoric acid (ortho-phosphoric acid H_3PO_4)
  - etch with hydrofluoric acid and subsequent evaporation to eliminate the silicon present in the crystal (ok)
  - addition of nitric acid/hydrochloric acid mixture to dissolve the GSO without silicon (not ok)

- Measurements were performed with HR-ICP-MS Th and U in medium resolution and K in high resolution

- Results:

^{238}U	550 - 165 ppb
^{232}Th	< 200 ppb
^{39}K	10 - 5 ppm

INFN
LNGS
Istituto Nazionale di Fisica Nucleare
Laboratori Nazionali del Gran Sasso

Thanks