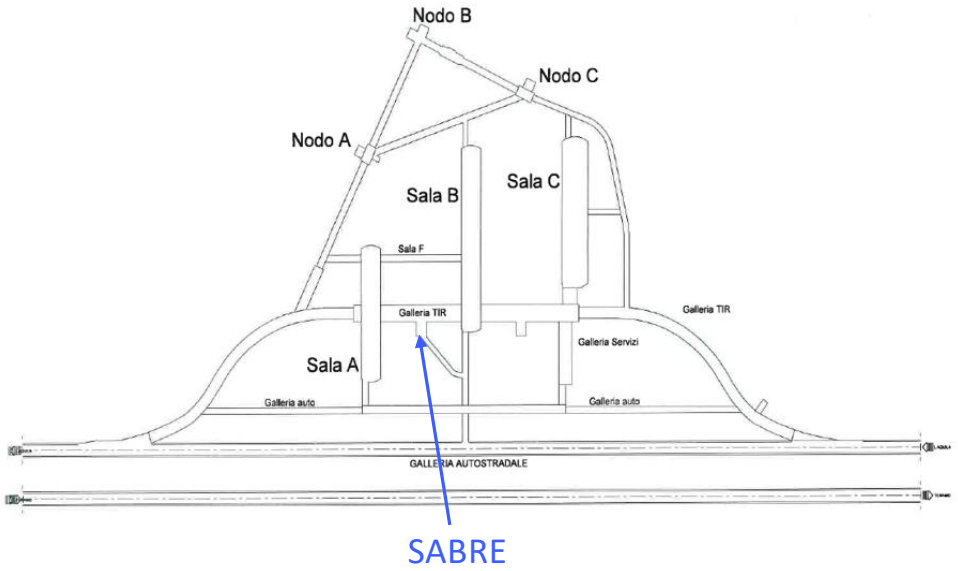
SABRE AREA

Chiara Vignoli

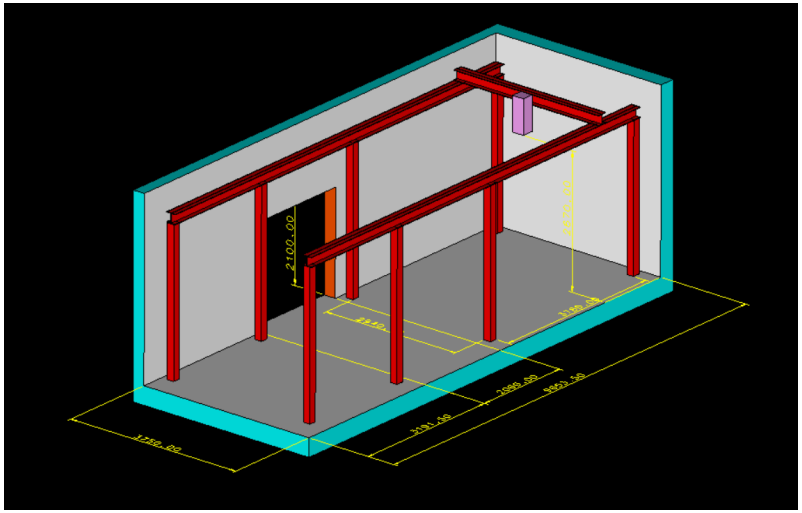
SABRE Meeting, Lecce, Nov 27-28 2024

New SABRE Area

- Previous COBRA experiment area in the “Tir Tunnel” between Hall B and Hall A
- The building is composed by:
    1. Ground floor for the experimental set-up + test stands
    2. Control Room + Counting Room at the first floor

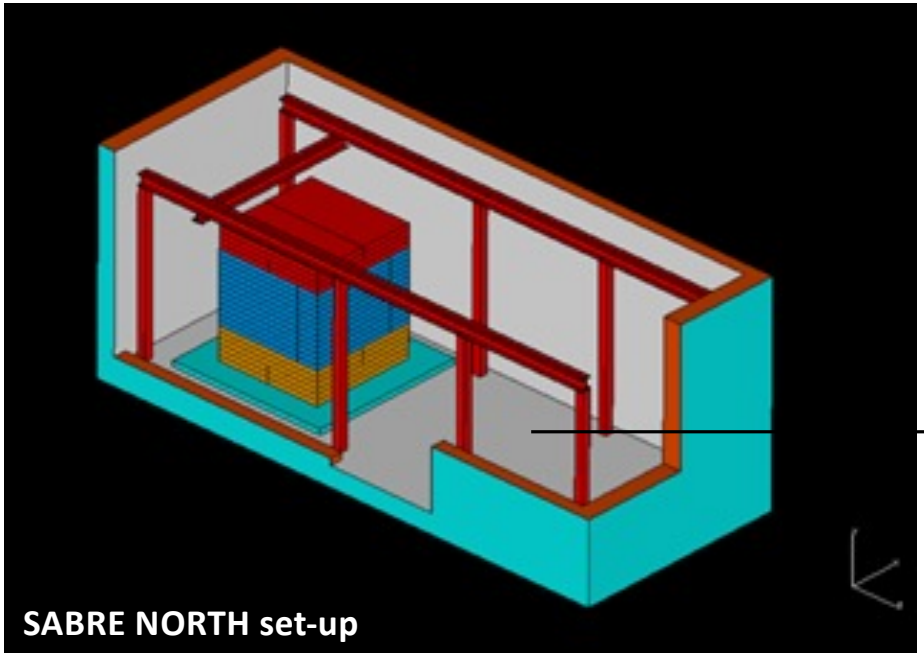


Ground Floor



- The area at ground floor is equipped with a 2 t crane.
- The overall area is :
  ≈ 9.3 m long
  ≈ 3.5 m wide (2.94 m considering the crane pillars' clearance)
  ≈ 3.63 m high (2.67 m high under the 2 t crane hook)

SABRE set-ups



- SABRE NORTH set-up is being designed to be adapted to the new area.
- New "cube" dimensions ≈ 2 x 2 x 2.4h m^3
  - Outer shielding: PE of SABRE PoP (machined)
  - Inner shielding: low quality (outer) /high quality copper in bricks/slabs (SABRE + Xenon-100)
  - 9 crystal array inside a copper box
  - GN2 purging inside Anti-Rn box and crystal enclosures
  - Calibration source insertion system
- Base: copper slabs (previous OPERA copper)

A new SABRE test set-up was installed in the new area.
Dimensions ≈ 1.7 x 1.4 x 1 h m^3
Capable to host up to 2 crystal enclosures per time.
The construction of a new Rn-box in Lexan is in progress.

Area refurbishment

- We have repeatedly discussed with LNGS Director and Coordination Service:
  - SABRE technical request
  - Needed plants
  - Overall building and plants' refurbishment works.
- 2 formal documents by SABRE:
  - *Technical Requests and Specifications"* (Sep26, 2023)
  - TDR (Jun 30, 2024)
- In principle major works had to be done BEFORE our transfer.
- BUT the removal of COBRA was done in delay and only preliminary basic interventions were carried out before SABRE transfer
- SABRE completed its transfer in April 2024 due to "urgent" need of our former area.
- A full refurbishment has still to be carried out
- INFN CSN2: refurbishment on LNGS charge while SABRE funds only for dedicated works and plants. No funds given for this part.

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

DocID	Rev.	Validità
	5.0	draft

Riferimento

Via G. Acitelli, 22 – 67100 Assergi (AQ), Italia

15-07-2022

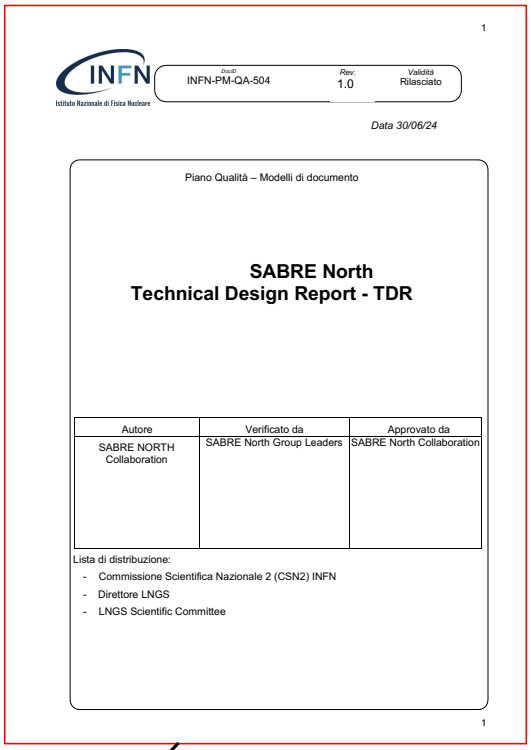
Template

Technical Requests and Specifications

Il presente documento mira ad ottenere le richieste e informazioni tecniche da parte delle Collaborazioni/ Gruppi Sperimentali per lo sviluppo e lo svolgimento di interventi in Progetti Sperimentali presso i LNGS

Sigla/Nome Progetto: SABRE NORTH
Fase di Progetto: Approval
Definizione Intervento: Nuovo Progetto

Autore	Verificato da	Approvato da
Chiara Vignoli Giuseppe Di Carlo	**Responsabile SGA:** Raffaele Adinolfi **Responsabile SGS e SPP:** Marco Tobia **Responsabile Div. Ricerca:** Carlo Bucci **Responsabile Div. Tecnica:** Augusto Goretti	**Direttore:** Ezio Previtali



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INFN Istituto Nazionale di Fisica Nucleare

DocID	Rev.	Validità
INFN-PM-QA-504	1.0	Rilasciato

Data 30/06/24

Piano Qualità – Modelli di documento

SABRE North
Technical Design Report - TDR

Autore	Verificato da	Approvato da
SABRE NORTH Collaboration	SABRE North Group Leaders	SABRE North Collaboration

Lista di distribuzione:
- Commissione Scientifica Nazionale 2 (CSN2) INFN
- Direttore LNGS
- LNGS Scientific Committee

1

We propose lining both the floor and the walls with AISI304 stainless steel plates (5 mm and 1.2 mm thick respectively) to improve the level of cleanliness. In addition, we foresee installing a 15 cm thick steel casing (made of 2 mm thick sheet metal) on the three inner walls surrounding the detector, which will provide further passive shielding when filled with water.

Floor refurbishment

LNGS: Removal of the present “false floor” (pads, insulating material, lead frame), concrete treatment for planarity and rugosity, resin treatment.
SABRE: Stainless steel lining in case of need. NOT FUNDED.

Walls refurbishment

LNGS: Removal of the present covering panels, wall resin/painting treatment.
SABRE: Stainless steel lining and casing for water in case of need. NOT FUNDED.

Plants' refurbishment

- Several plants needed:
  - Power plant (normal + UPS)
  - Ventilation
  - Lights, phone, network,…
  - Safety plant (O2, fire detectors,…)
  - ✓GN2 production system
  - ✓Fluid handling system
  - Temperature stabilization plant

Open points

- CR1 and glove box
  - CR1 not accessible during BX dismantling
- Refurbishment work definition and schedule
  - Define work details, max allowed time frame for SABRE to be givemto LNGS
  - Require credible schedule for LNGS works
- Test set-up dismantling, material removal, material storage
  - Material removal only when we are sure about LNGS activities
  - Coordination to define collaboration availabilities to dismantle the set-up and pack materials

Area refurbishment

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- In principle major works had to be done BEFORE our transfer.
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- A full refurbishment has still to be carried out
  - Rimozione copertura pavimento a PT, resinatura + rivestimento pareti in SS e cassonature in acqua)
  - Nuovi impianti (elettrico, ventilazione, GN2, sicurezza)
- 2 formal documents:
  - *Technical Requests and Specifications"* (Sep26, 2023)
  - TDR (Jun 30, 2024)
- INFN CSN2

INFN LNGS
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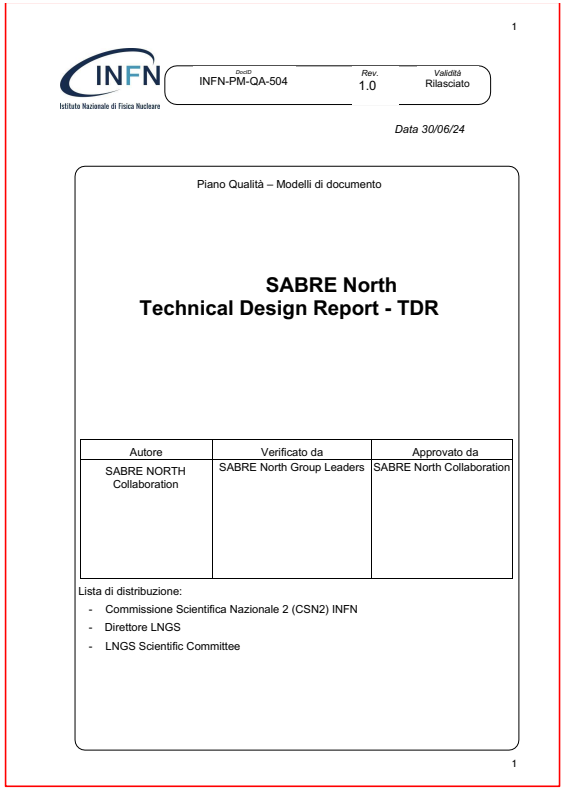

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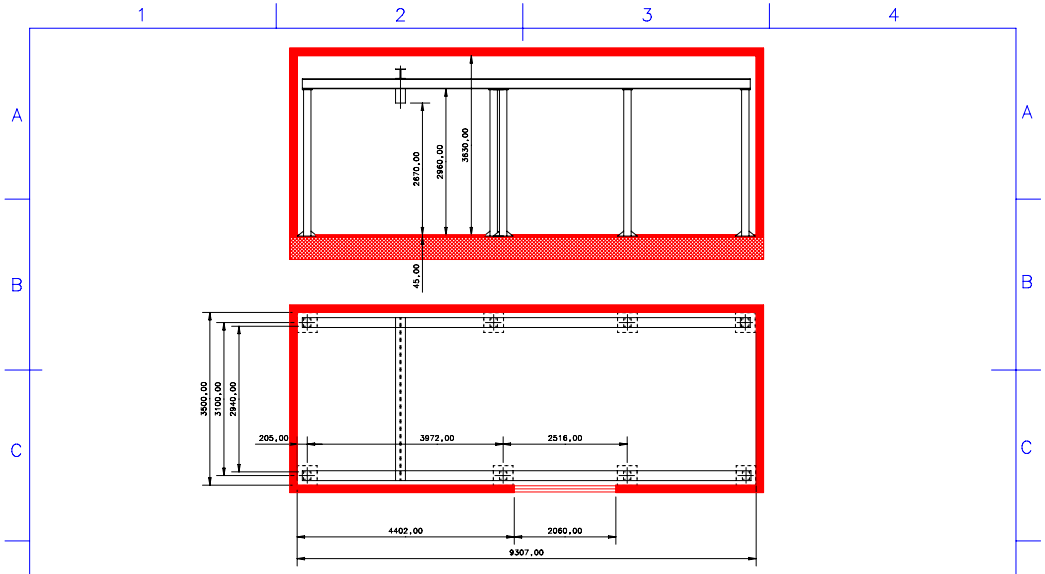


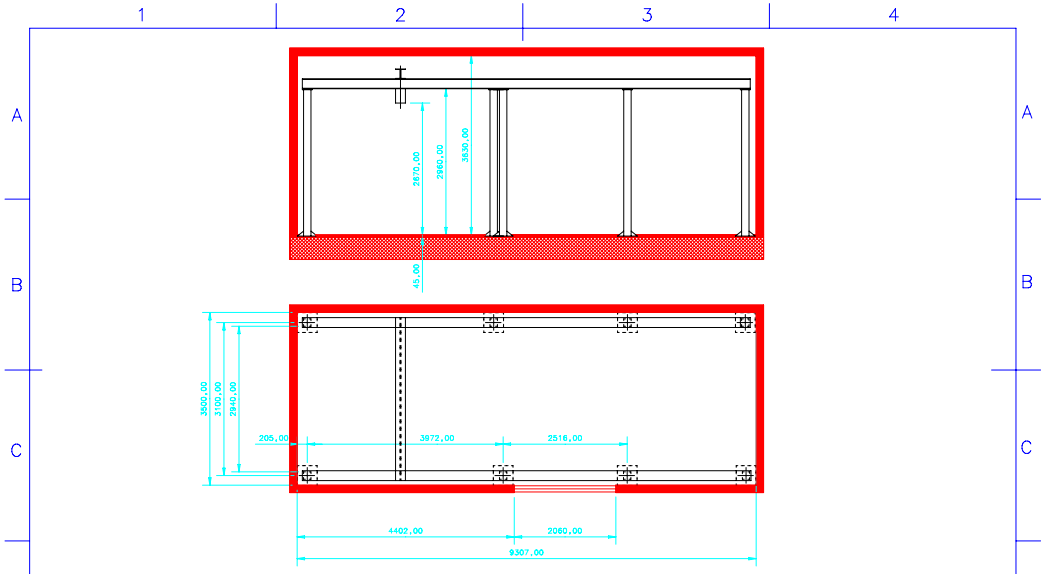
PARTS LIST

ISTITUTO NAZIONALE DI FISICA NUCLEARE
SEZIONE DI LECCE

SABRE

A3

SCALE : 50



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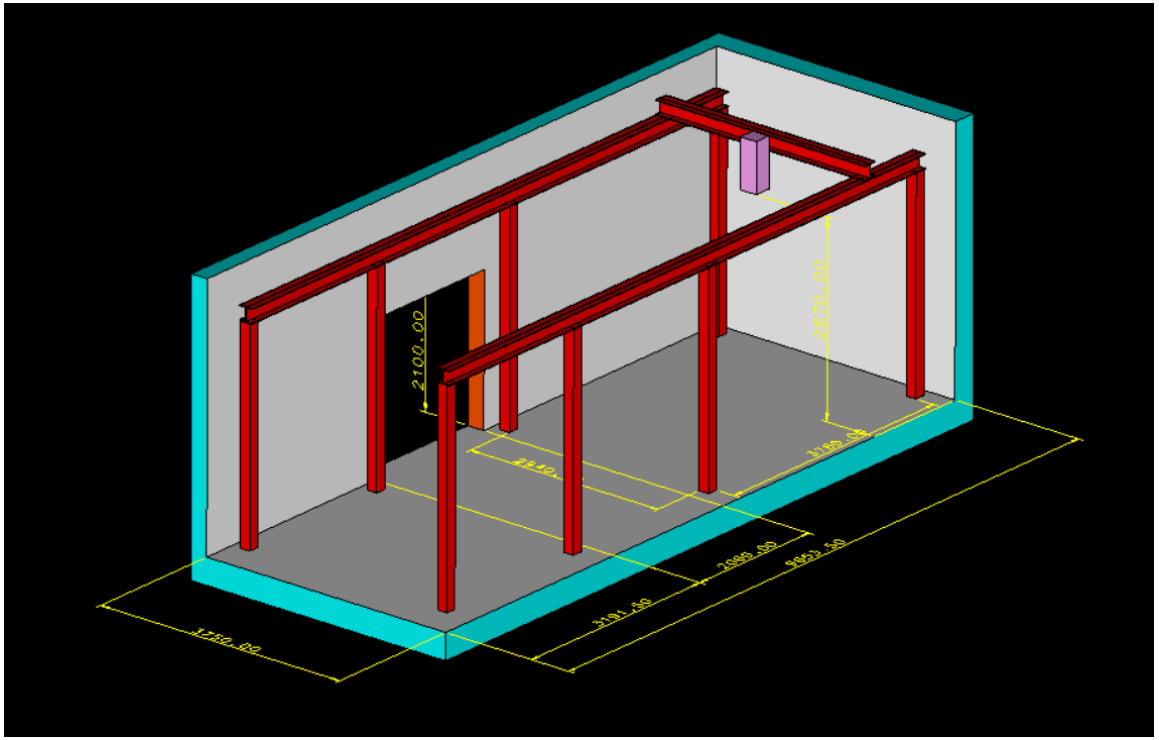
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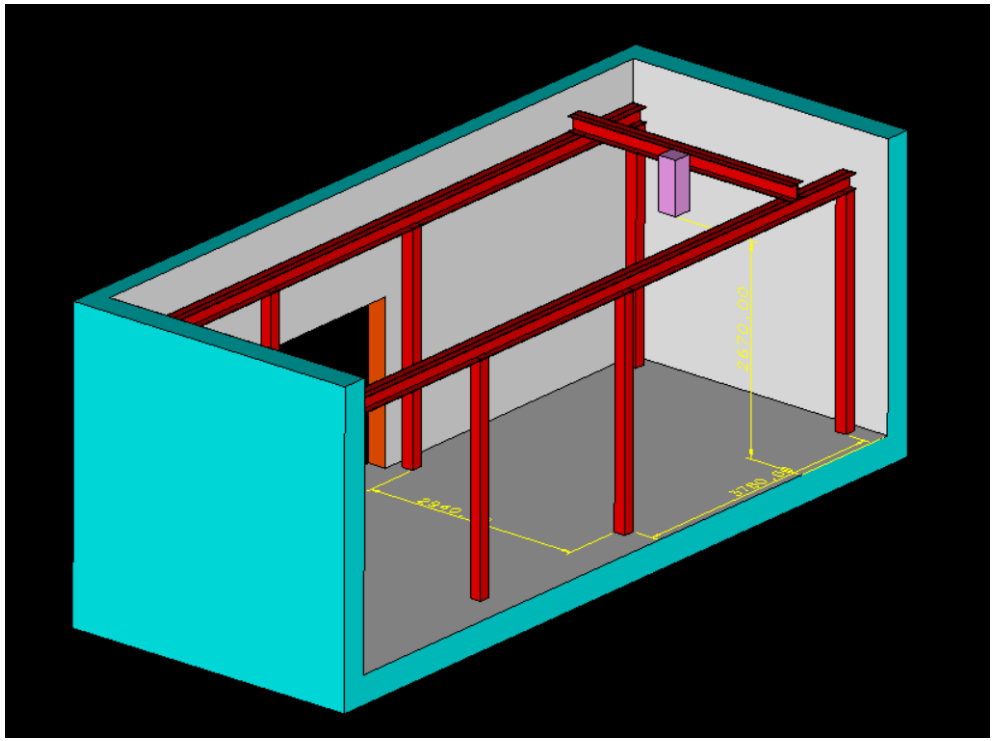
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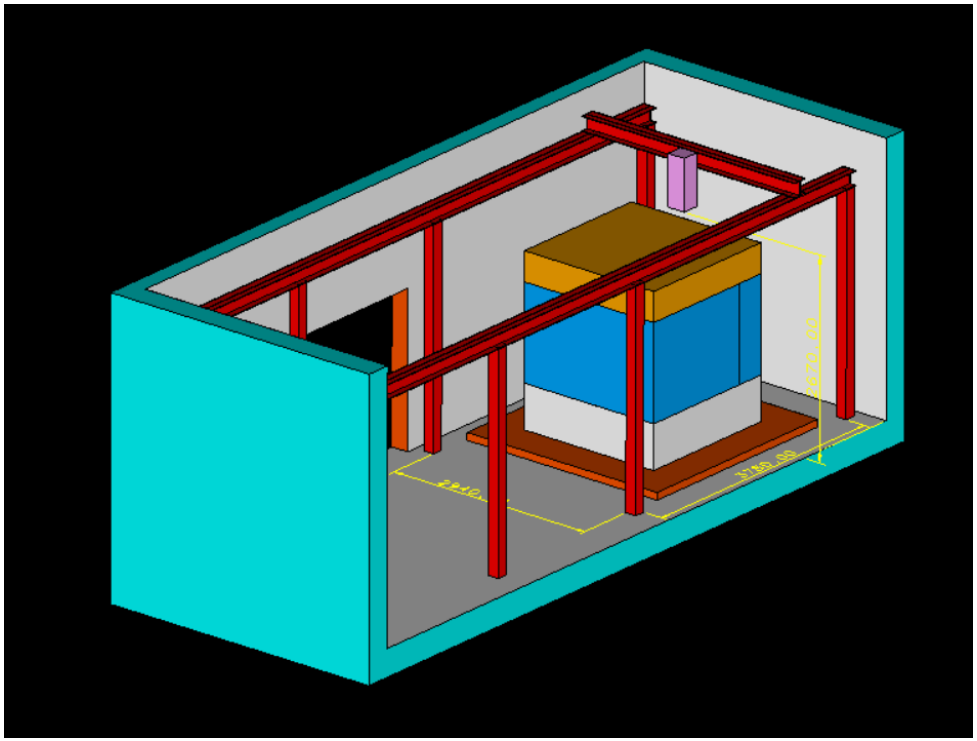
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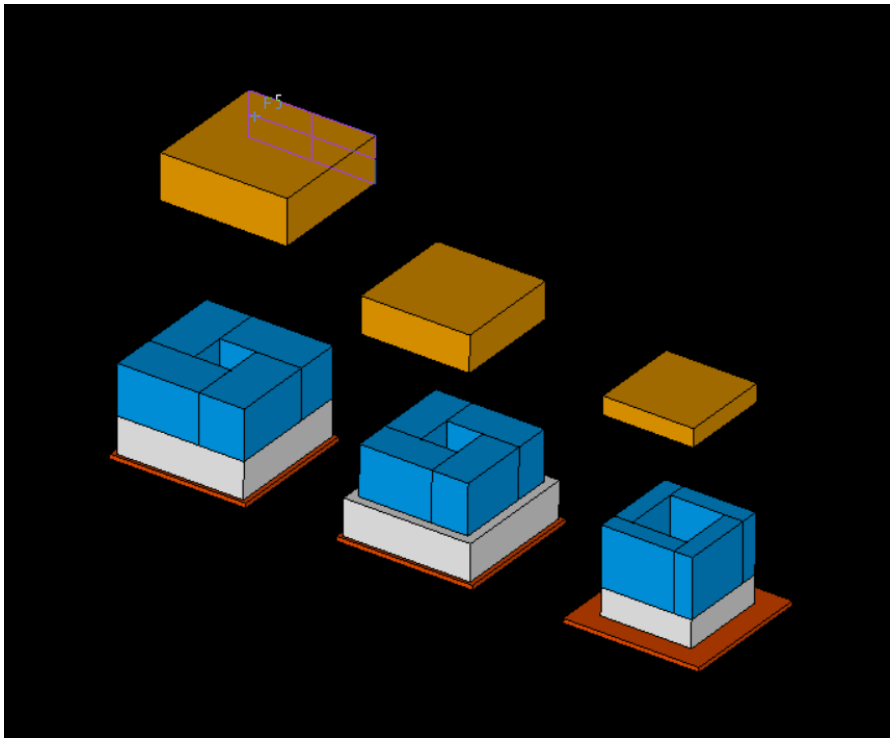

possibili arrangiamenti ottimali di n cristalli
(enclosure da 146mm di diametro)

num crist	dim scatola	area	area/crist
8	45 x 50	2250	281
9	50 x 50	2500	278
10	55 x 55	3025	302
11	65 x 45	2925	266
12	65 x 50	3250	271
14	65 x 55	3575	255
16	65 x 65	4225	264

quello standard e' il 9 cristalli