

Neutrino Platform activities on protoDUNE-DP

Filippo Resnati (CERN)

Topics

Building and infrastructures

Cryostat

Insulation and membrane

Cryogenics

Proximity racks

Clean room buffer

Counting and control rooms

Computing, storage and DAQ

Field cage

H2 beam extension

Offline computing

Safety

Offices

EHN1 extension

Construction of the extension of the EHN1 building, infrastructures and services: cranes extensions, electricity, ventilation, metallic structures, access system, barracks, ...

Yesterday's status

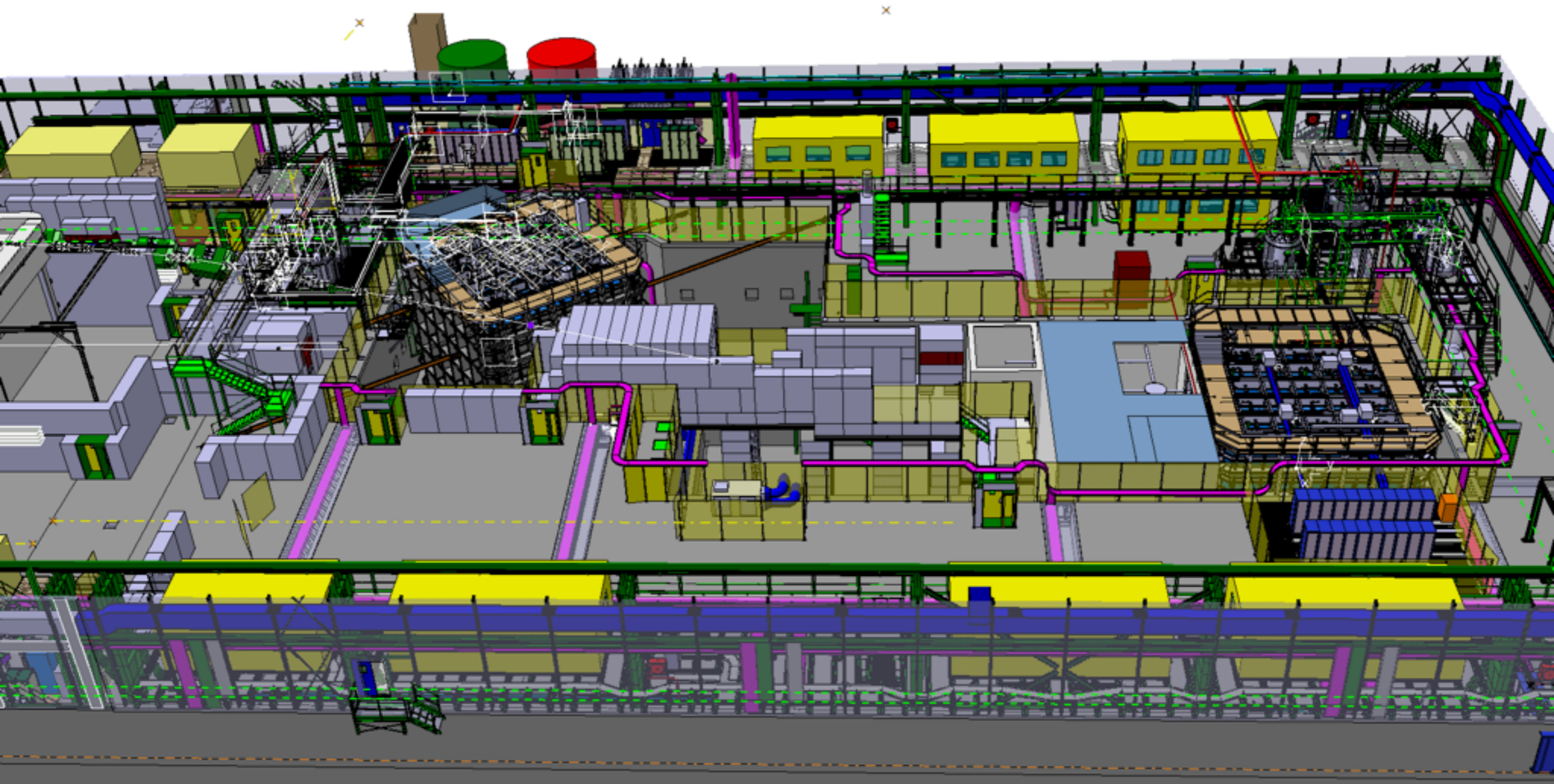


CERN contributors:

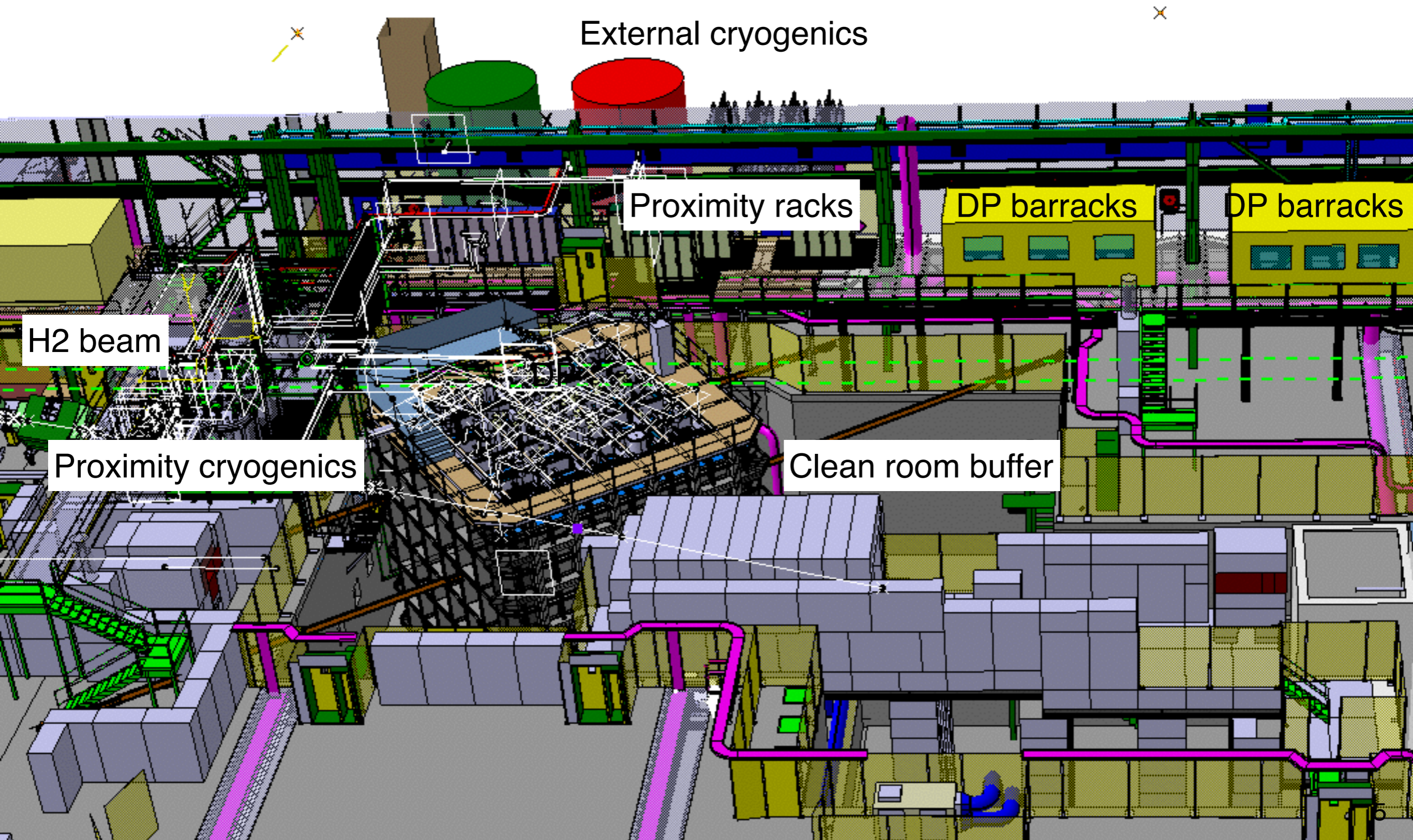
Marzio Nessi, Johann Poirot, Dimitar Mladenov, Filippo Resnati, Domenico Campi, Eleonora Seletskaya, Benoit Lacarelle, Olga Beltramello, Letizia Di Giuglio, John Etheridge, Gerad Cumer, Lau Gatignon, Ilias Eftymiopoulos, Jean-Christophe Gayde, Ingo Ruehl, Sylvain Girod, Quentin Bouirek, Jerome Philippe Rodary, Thierry Octave, Michel Arnaud, Estelle Fontaine, Anastasia Lopez, Martin Manfredi, Caterina Bertone, Franck Daclin, Guillaume Gros, ...

EHN1 extension

Full integration



EHN1 extension



External cryogenics

Proximity racks

DP barracks

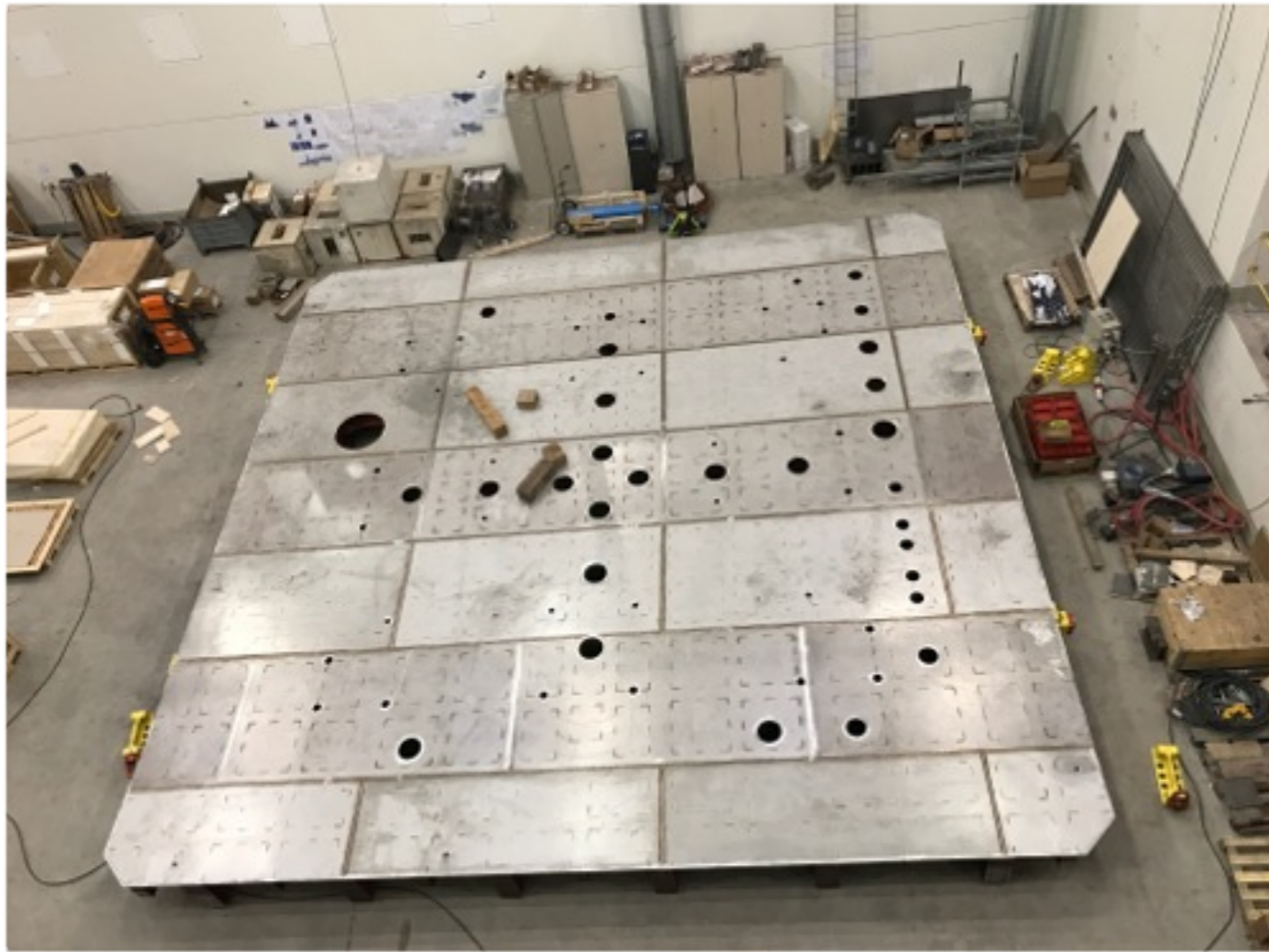
DP barracks

H2 beam

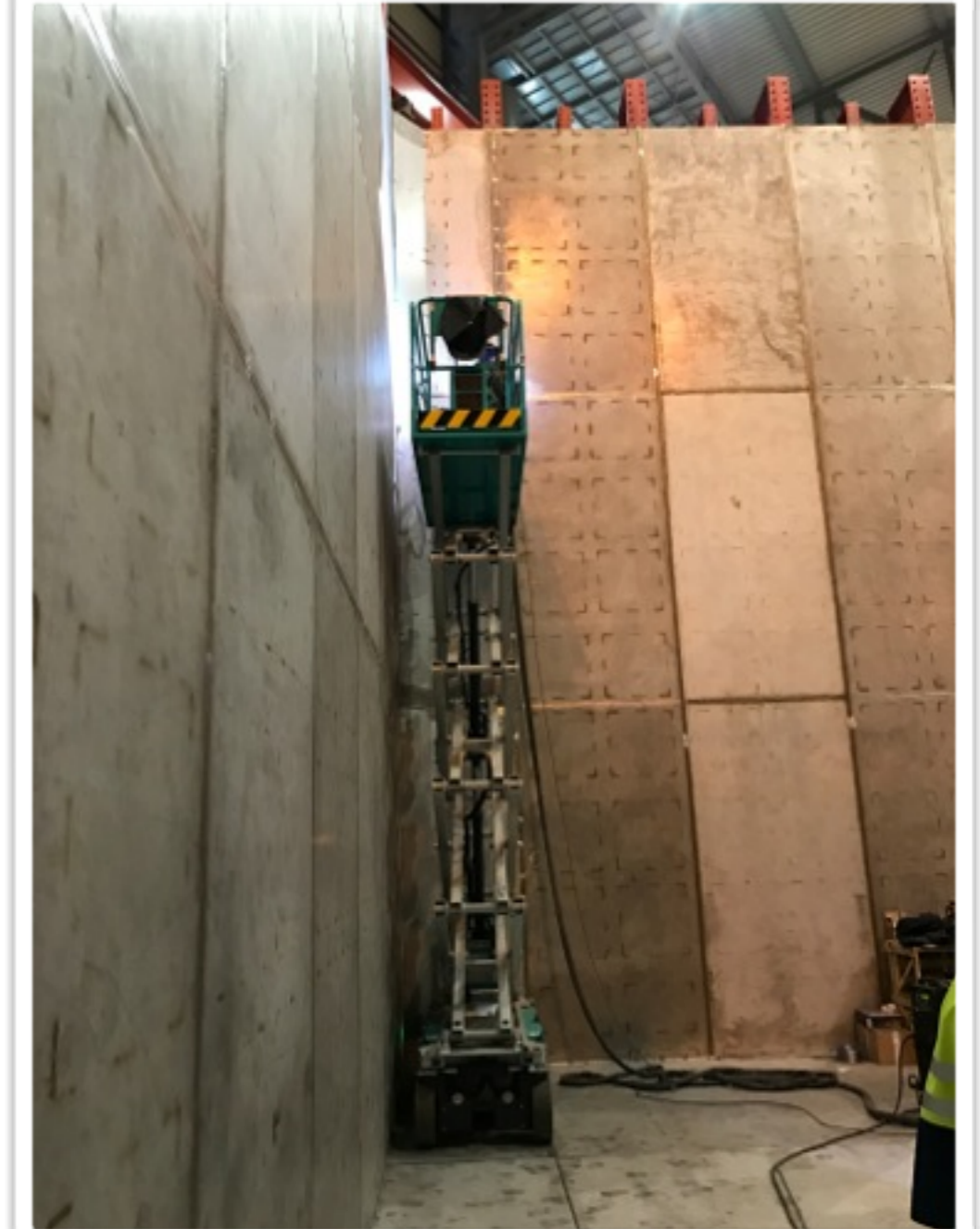
Proximity cryogenics

Clean room buffer

Cryostat



More than 250 m of double-pass welding
that will be leak checked

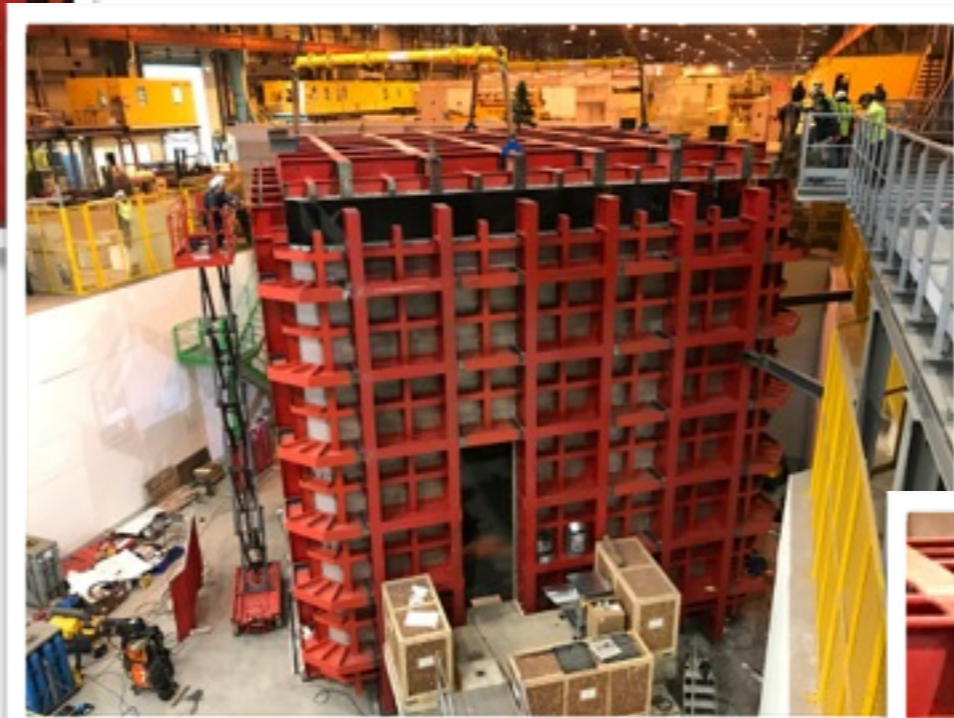


CERN contributors:

Dimitar Mladenov, Johann Poirot, Diamanto Smargianaki, Olga Beltramello, Letizia Di Giuglio, John Etheridge, Anatoly Popov, David Givre, Branislav Bagin, Yuri Khromov, Vlastimil Zamazal, Ivan Troeglazov, Yury Filippov, Mito Tasevsky, Mikhail Serochkin, Sergei Mokrenko, Igor Chubrikov, Alexander Ivanov, Franck Morgadinho, Ace Ordanov, Jean-Luc Agostini, Laurent Anchisi, Yohan Greget, Franck Daclin, Eleonora Seletskaya, Benoit Lacarelle, Dirk Mergerkuhl, Konstantinos Nikolitsas, Marzio Nessi, Filippo Resnati, Andrea Zani, Francesco Pietropaolo, Ivo Lobmeier

Cryostat

Roof installation



Cryostat



Roof installation: 3rd of March
Cryostat completed in about two months,
about half of the time taken for the NP-04

Cryostat



Roof installation: 3rd of March
Cryostat completed in about two months,
about half of the time taken for the NP-04

In a well defined order



Insulation and membrane

13th of March beginning of the installation of the insulation



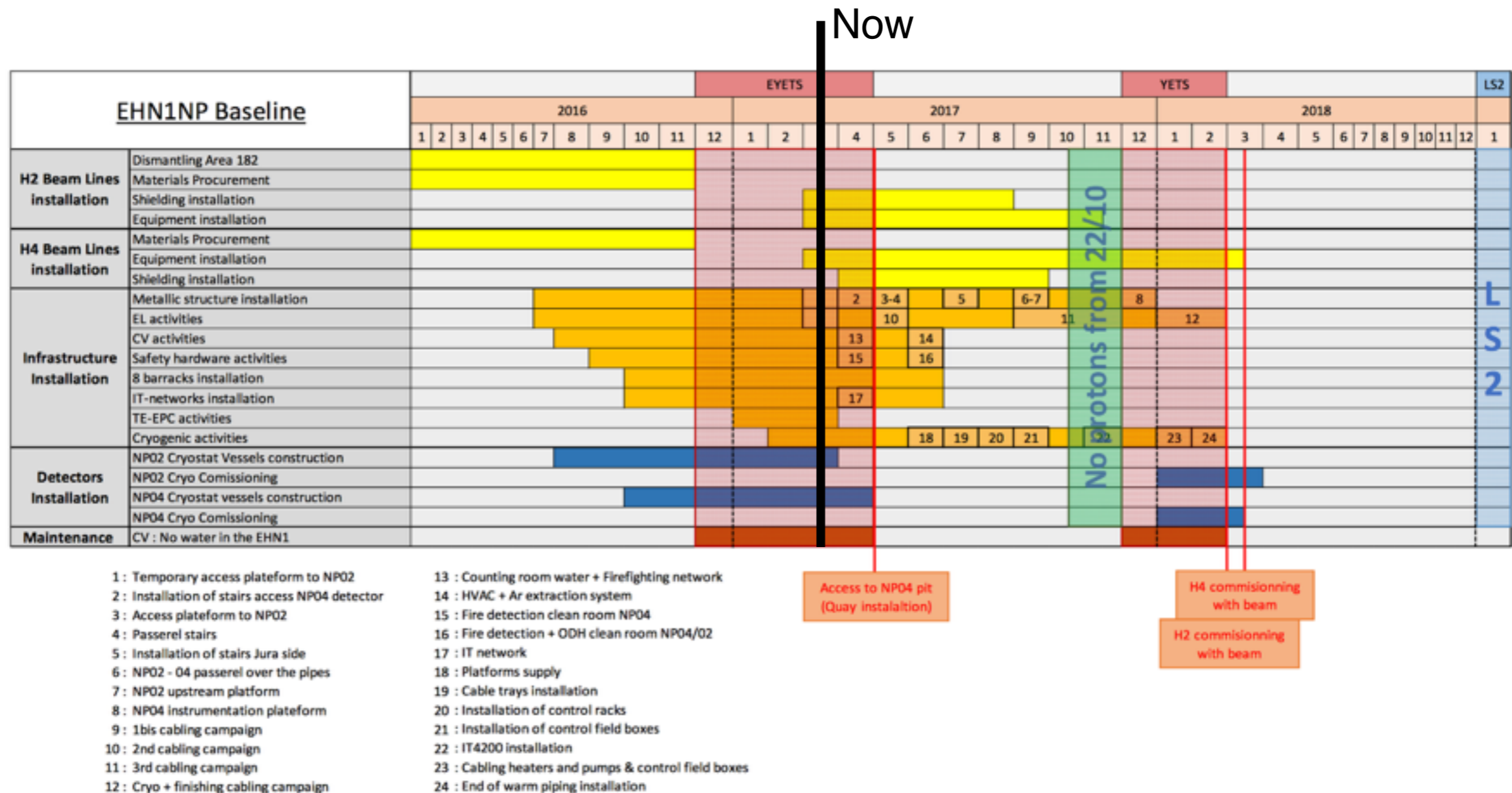
About 10 technicians from GABADI and GTT involved GTT for the quality control of the installation

Profit from the experience gained with the NP-04 and the materials already present

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Status of the NP-04

Infrastructure milestones



https://edms.cern.ch/ui/file/1761317/1/Baseline_schedule_EHN1NP_27022017.pdf

Cryogenics

Design, procurement, installation of the LAr cryogenics, LN cryogenics and internal cryogenics

Main cryogenics contract awarded. Step by step design review with the firms.

Still to be worked on:

- Warm gas piping
- Warm valves
- Liquid argon delivery

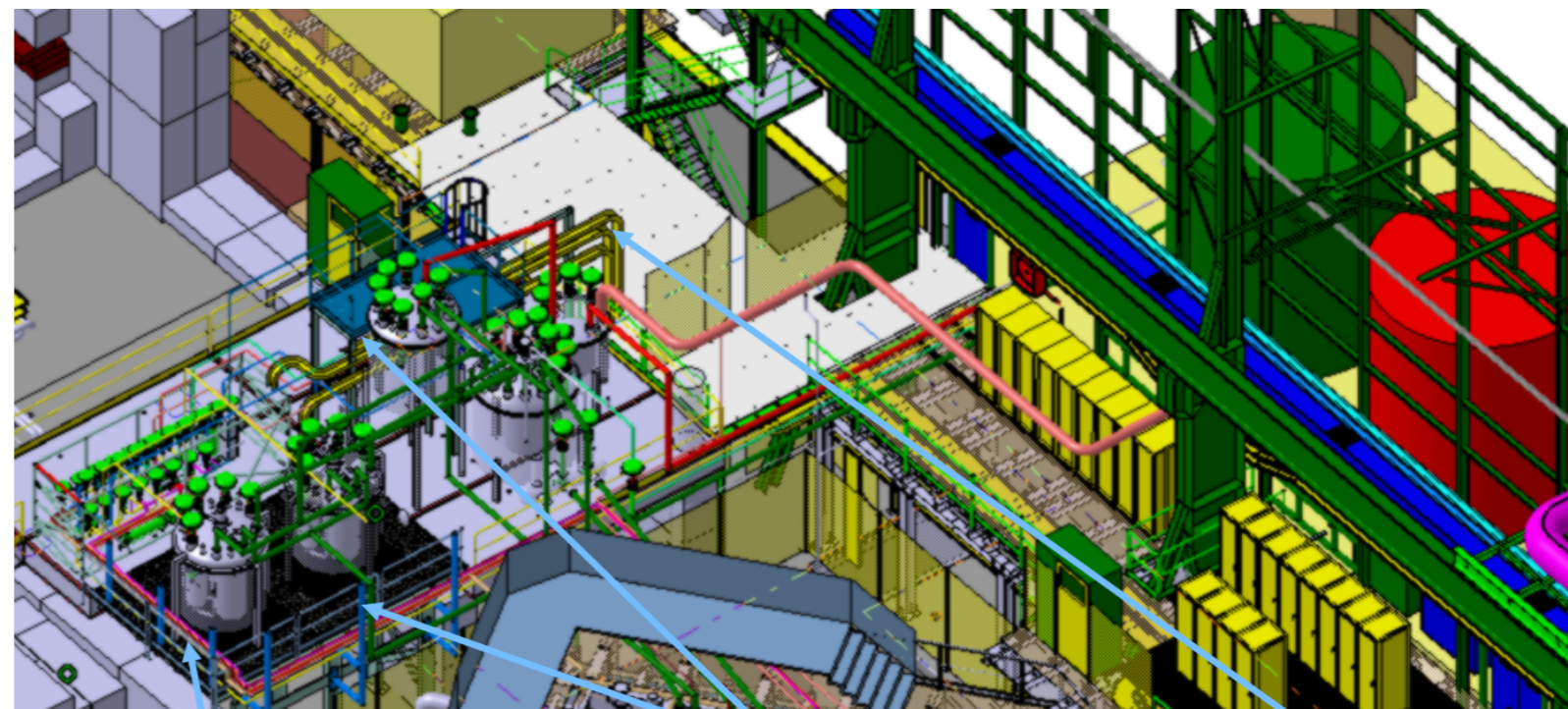
Definition of equipment has been made, necessary space has been reserved in the EHN1

Installation schedule under discussion

Internal cryogenics:

Contract awarded by CERN for both cryostats, production has started

Beginning of the installation in NP-02 foreseen at the end of June.



INTEGRATION OF
WARM PIPING

DETAIL DESIGN
OF PLATFORMS

INTEGRATION OF
CABLING

CERN contributors:

Redouan Abdenmour, Johan Bremer, Michel Chalifour, Pascal Chambouvet, Loic Davoine, Caroline Fabre, David Montanari, Roberto Orlandi, Marco Pezzetti, Joaquim Creus Prats

Proximity racks

Detector racks, DCS racks, HV, ...

Fully isolated, and on the same grounding as the detector

Copper cables to the detector, optical fibres to the outside (DAQ, ...)

Implementation of double-shielded transformers worked out with

L. Bagby and T. Shaw (FNAL) for both detectors

In the process of clarifying the safety implications

DCS racks:

Entire setup operational for the 3x1x1 m³ demonstrator in building 182 will be moved to protoDUNE-DP area



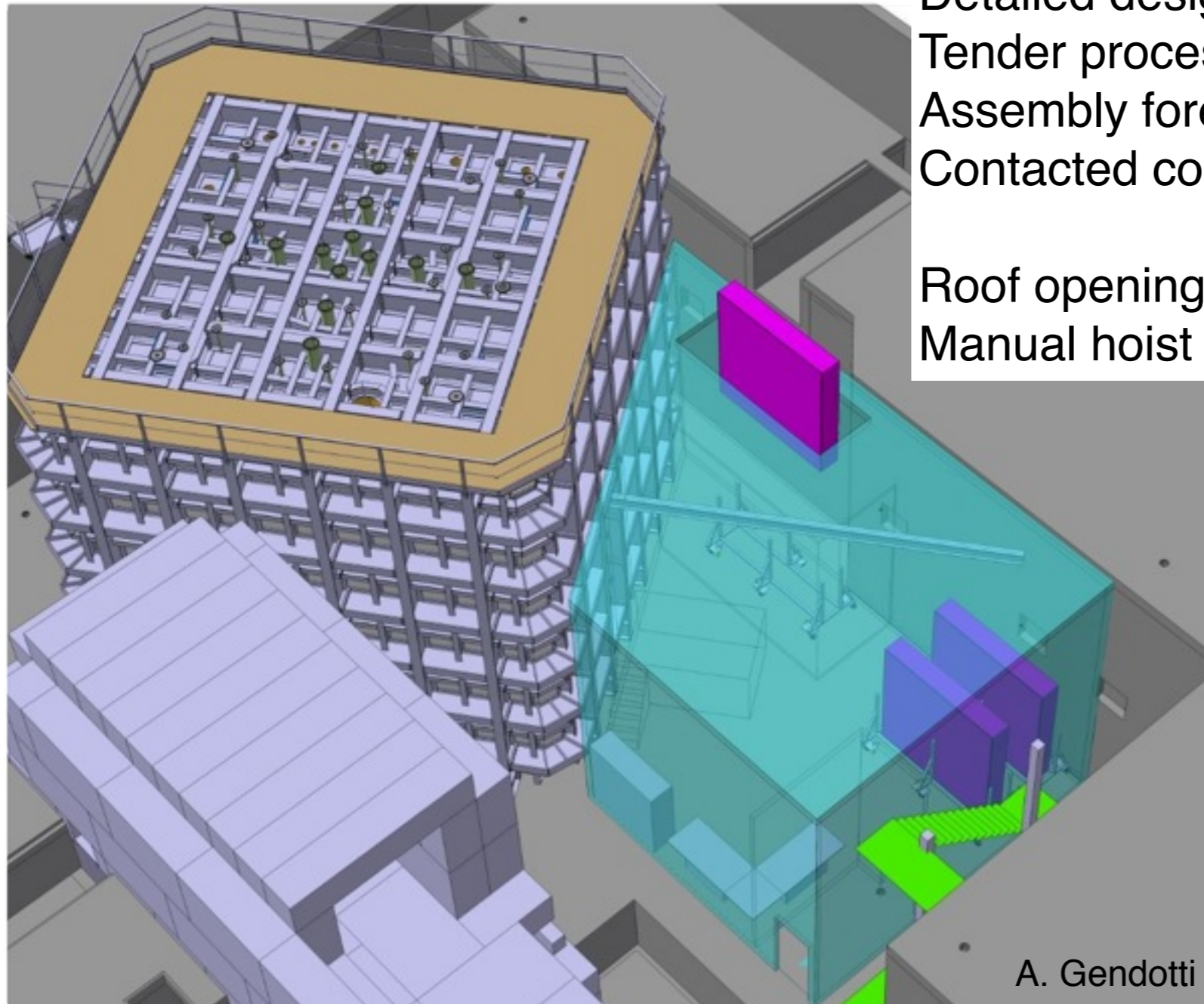
CERN contributors:

Nicolas Bourgeois, Giovanna Lehmann Miotto, Xavier Pons, Sylvain Ravat, Domenico Campi, Enrico Gamberini, Voica Radescu, Roland Sipos, Dorota Stefan, Filippo Resnati, Marzio Nessi

Clean room buffer

Detailed design of the metal structure is started.
Tender process starting at the beginning of April.
Assembly foreseen from the second half of May.
Contacted company for the installation of the walls.

Roof opening for material access.
Manual hoist (also used for insulation installation).



CERN contributors:

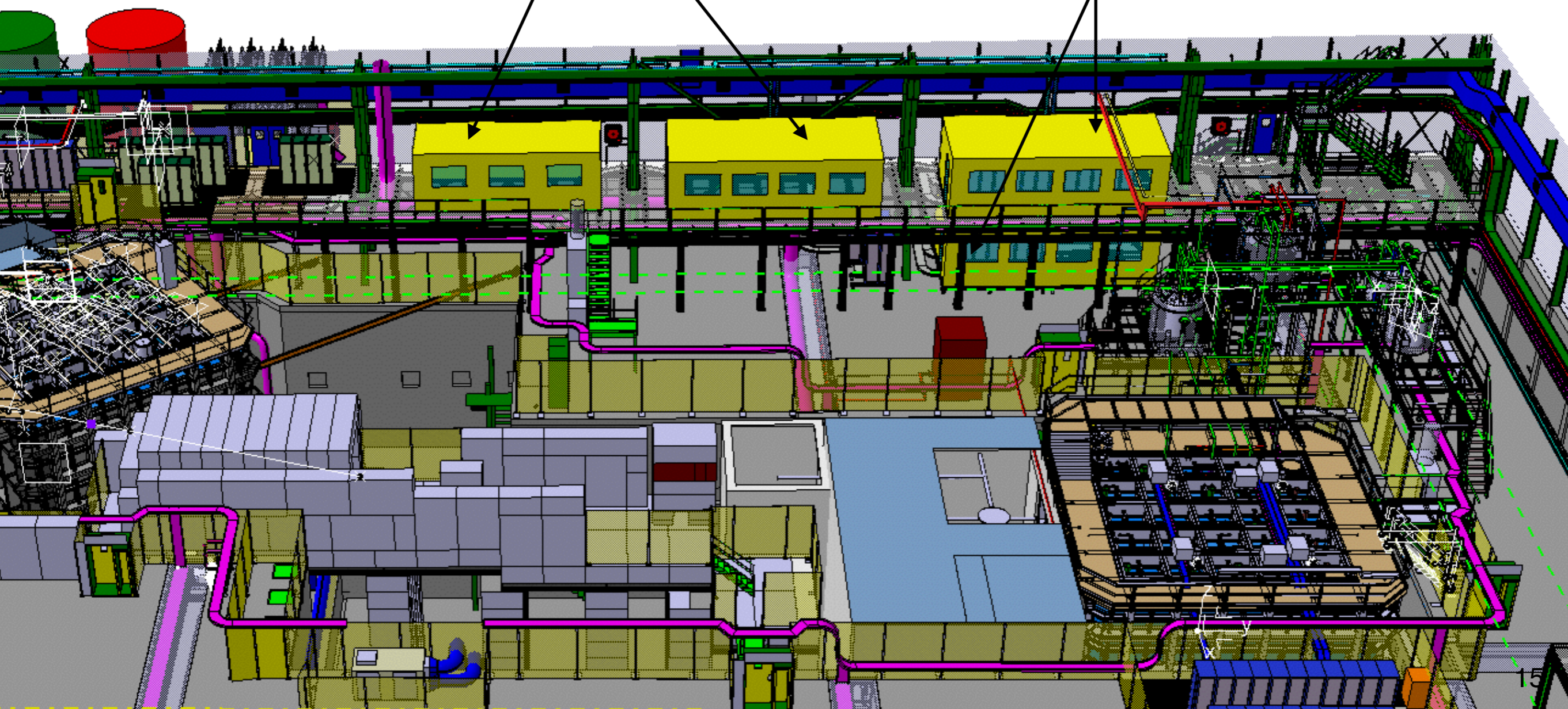
Andrea Zani, Benoit Lacarelle, Filippo Resnati, Marzio Nessi, Raul Ortega, Dimitar Mladenov.

In collaboration with Adamo Gendotti, Sebastian Murphy and Dario Autiero

Barracks

DP control and counting rooms

Computing, storage and DAQ rooms



Computing and DAQ

18 water cooled racks, 19', 42 U, 18 kW cooling power, 1200 mm deep.
12 above for the computing and storage, 6 below for DAQ.
Ordered and delivery foreseen in mid April.

Electrical distribution plan proposed, and being validated by CERN EN/EL.

Power distribution units (PDU) within racks being evaluated.
Offers received for several models.
Timescale compatible with the racks procurement.

Racks and power will be controlled and monitored via DCS.
E.g. staggered rack turning on to account for the inrush currents.

In the process of defining with CERN IT all the needed services (network, DBs, EOS, ...)

CERN contributors:

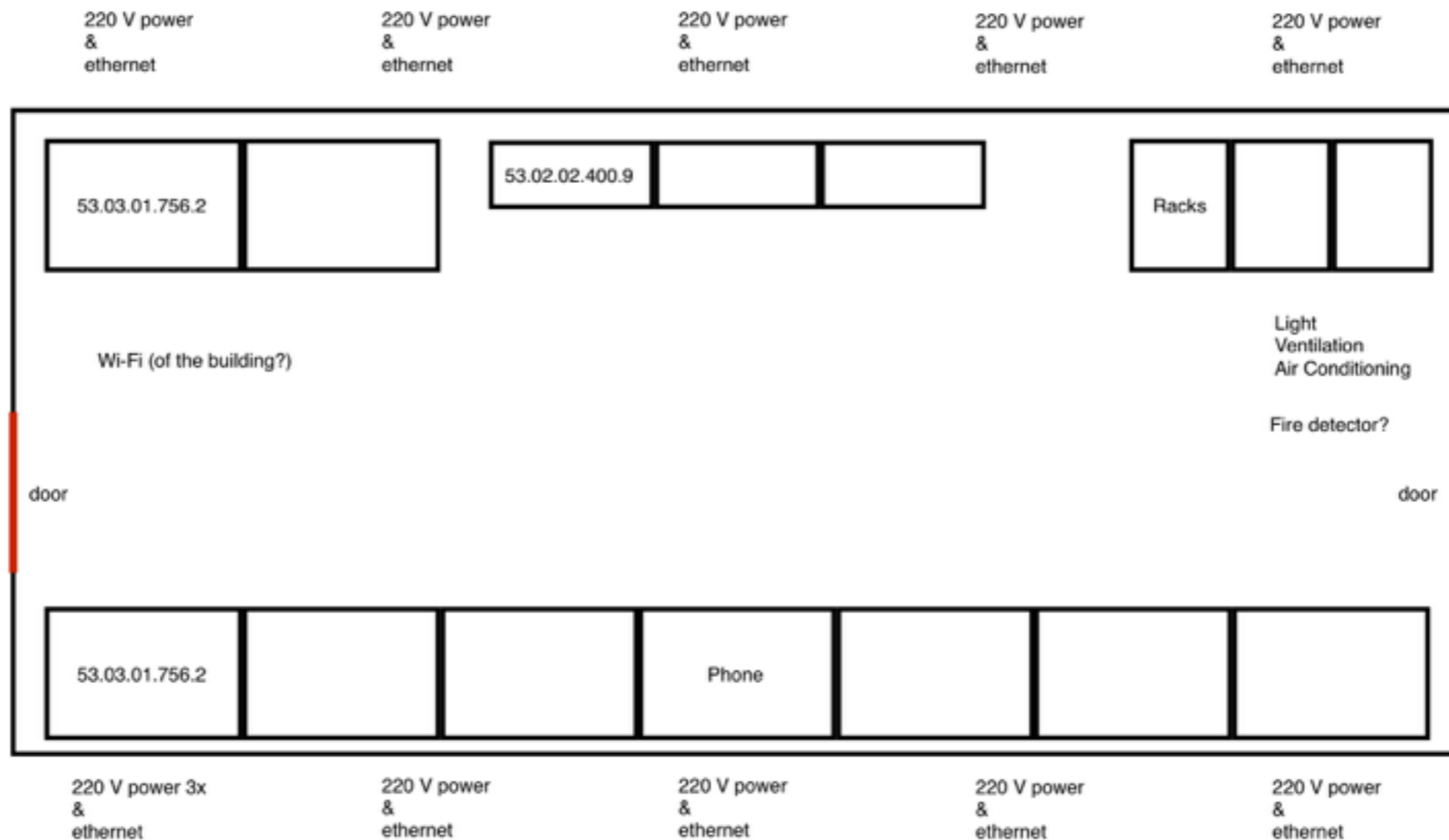
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Control and counting rooms

Power, Wi-Fi, ethernet, tables and chairs, and possibly screens, cabinets, standards racks, ...

Possibly one additional shared barrack in the Salève side.

Still to be defined: meetings, recreation, temporary working post, ...



Field cage profiles

R&D:

Tests have been performed at the ICARUS/WA104 50 litre LAr-TPC installation at CERN:

- validate the proposed field cage principle in pure LAr
- verify the compatibility of aluminium as material for HV electrodes
- verify that HV performance are not degraded due to surface finishing (roll-formed vs extrusion), oxidation layers, scratches during assembly, ...

Design:

Optimisation of aluminium extruded profiles, bending procedure, locking system and clips.

Production of prototypes:

Started at MIFA (Netherland) with different aluminium alloys and with conductive coating.

Final qualification of the bending process.

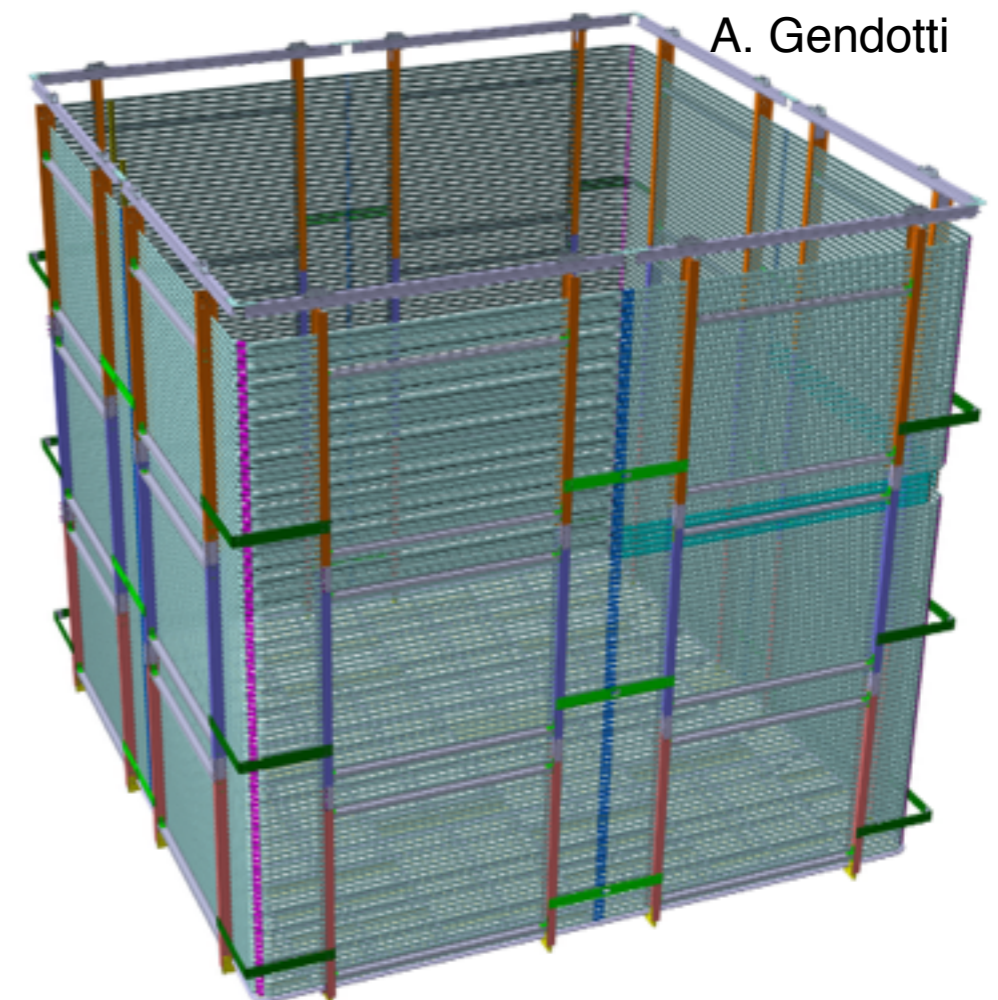
Then ready to send out the full production order.

Assembly:

Availability of infrastructure and manpower

CERN contributors:

Francesco Pietropaolo, Andrea Zani, Stefania Bordoni, Franco Sergiampietri, Rui De Oliveira, Claudio Montanari, Filippo Resnati, Marzio Nessi



H2 beam extension

Design and optimisation:

Beam simulation, including material effects and radio protection consequences

Tagging and monitor detectors developments

Beam lines construction, installation and commissioning

Optics and beam composition: CERN-EN-EA GEANT4 simulation

Effect of materials on the beam : FLUKA MC simulation

Common simulation with CERN-RP for shielding/radiation protection/beam halo

New beam monitors from CERN-BE-BI, used also for tracking and momentum measurement

Special electronics for application to ToF for PID at low beam momenta

Construction will be in collaboration with CERN-EP-DT

Supports, integration CERN-EN-EA

CERN contributors:

Neutrino Platform: Elzbieta Nowak, Paola Sala, Giovanna Lehmann, Nektarios Benekos

NP02 :Yannis Kariotakis

NP04: the DAQ group

CERN-BE-BI: Lars Spangaard, Inaki Ortega, Javier Serrano and his team for the White Rabbit

CERN-EN-EA: Nikolaos Charitonidis, Lau Gatignon

Tier-0 offline computing

The full size of the agreed resources will be made available from August 2017 onwards. The equipment will have a lifetime of 4 years. CERN internal agreement being signed.

3 PB of usable storage disk space in EOS (1 PB already available)

6 PB of tape space in CASTOR (already available)

1500 processing cores (500 already available)

Services (e.g. databases, logging, etc.)

40 Gbit/s LAN between north-hall and Meyrin CC

CERN contributors:

Nectarios Benekos, Giovanna Lehmann, Bernd Panzer, Marzio Nessi

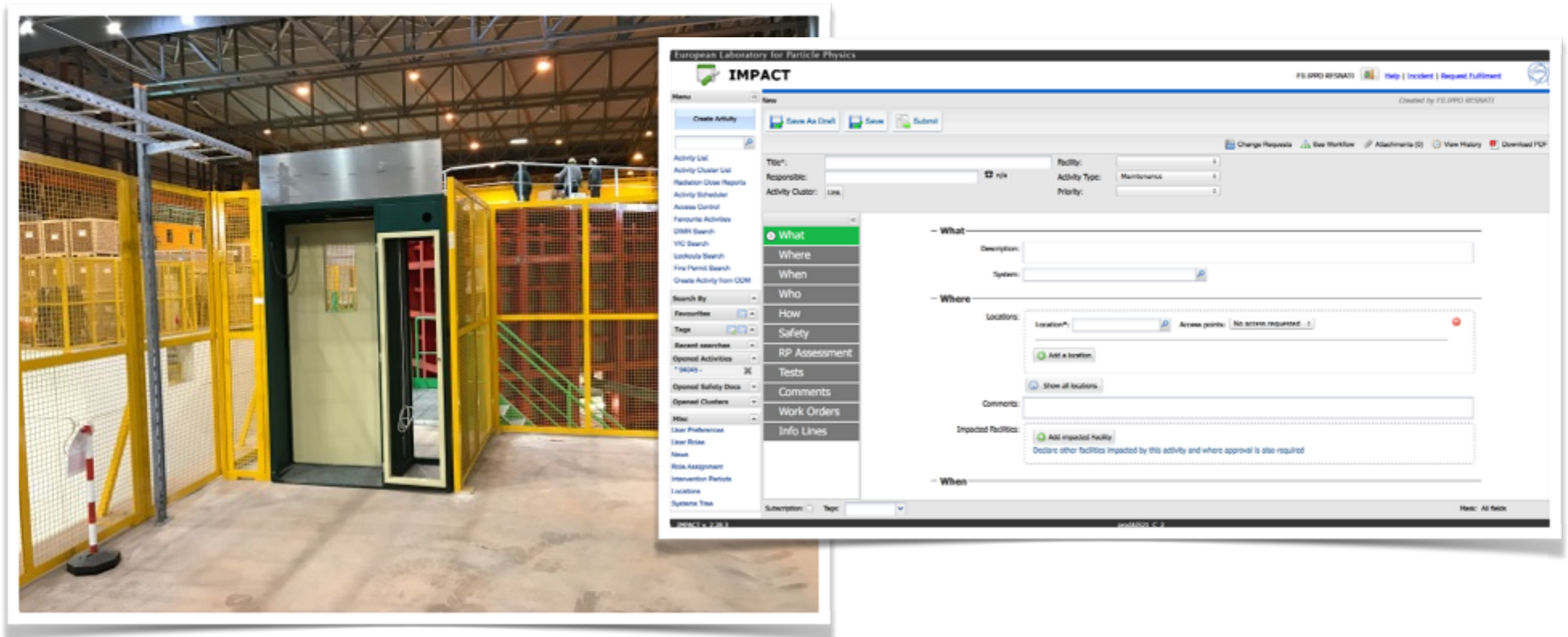
In collaboration with Geoffrey Savage (FNAL)

Safety

Safety follows the status and the activities in the EHN1 extension

Few examples:

IMPACT, PPE/PPX, oxygen monitors, fire detection, alarms, interlocks, emergency cutoff, radiation protection monitors, training program, evacuation plans, ...



CERN contributors:

Olga Beltramello, Letizia di Giulio, John Etheridge, Marzio Nessi, Filippo Resnati, Dimitar Mladenov, ...

Officies

NP-02

EHN1 extension



892/2-B07 and 892/2-B09
dedicated to protoDUNE-DP

892

Summary

Heavy hardware work is processing fast in the EHN1 extension

GTT and GABADI started the construction of the insulation layer

Infrastructure (metal structures, ventilation, power, IT connection, ...) progressing well

A large number of activity is ongoing at the same time to keep up the tight schedule

We encourage to go and see the progresses at the EHN1 extension