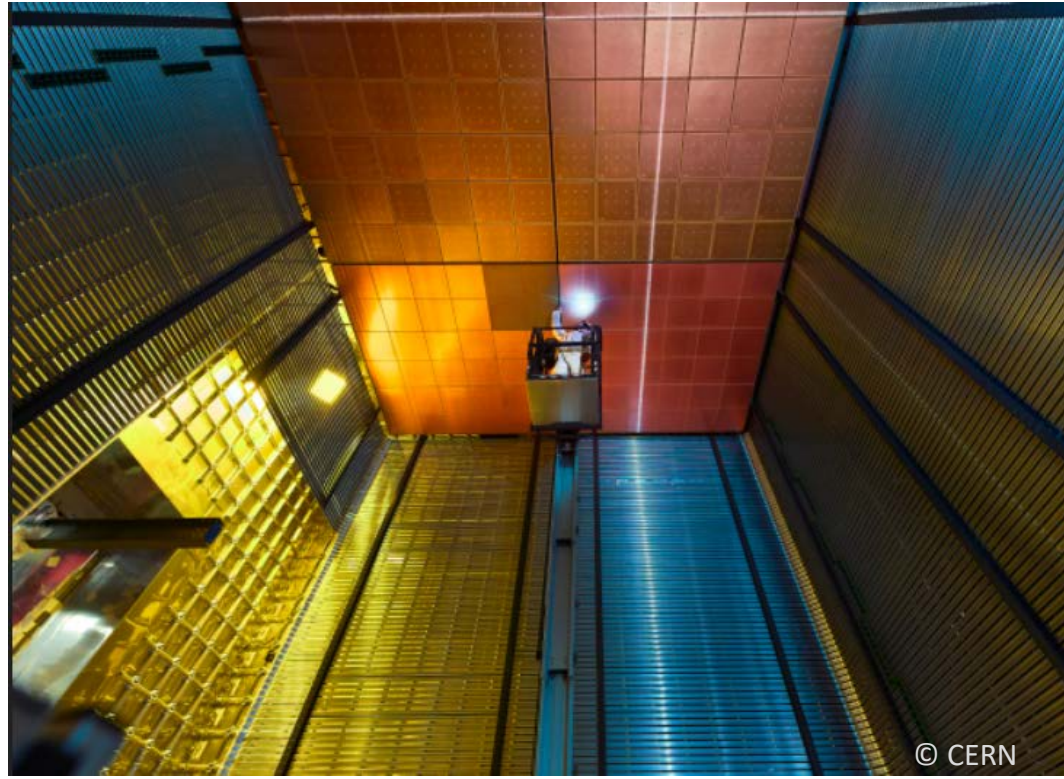
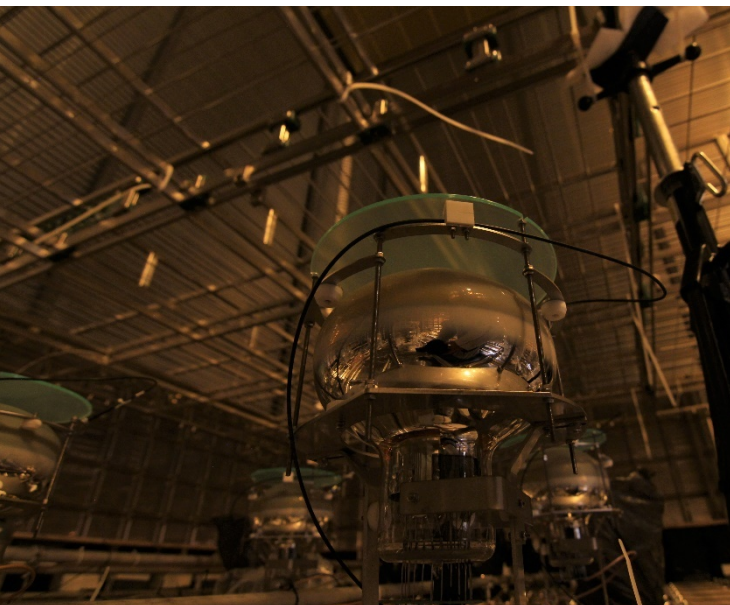


ProtoDUNE-DP Installation status

D. Duchesneau
on behalf of the ProtoDUNE-DP collaboration

- CRP installation
- Cathode, ground grid
- Light detection system
- Summary

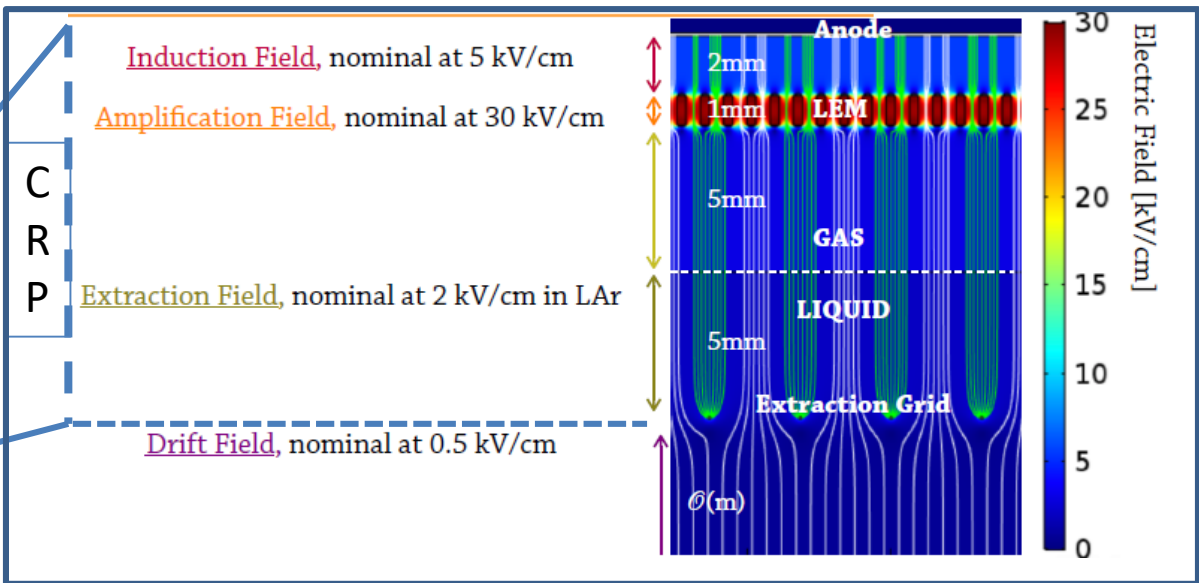
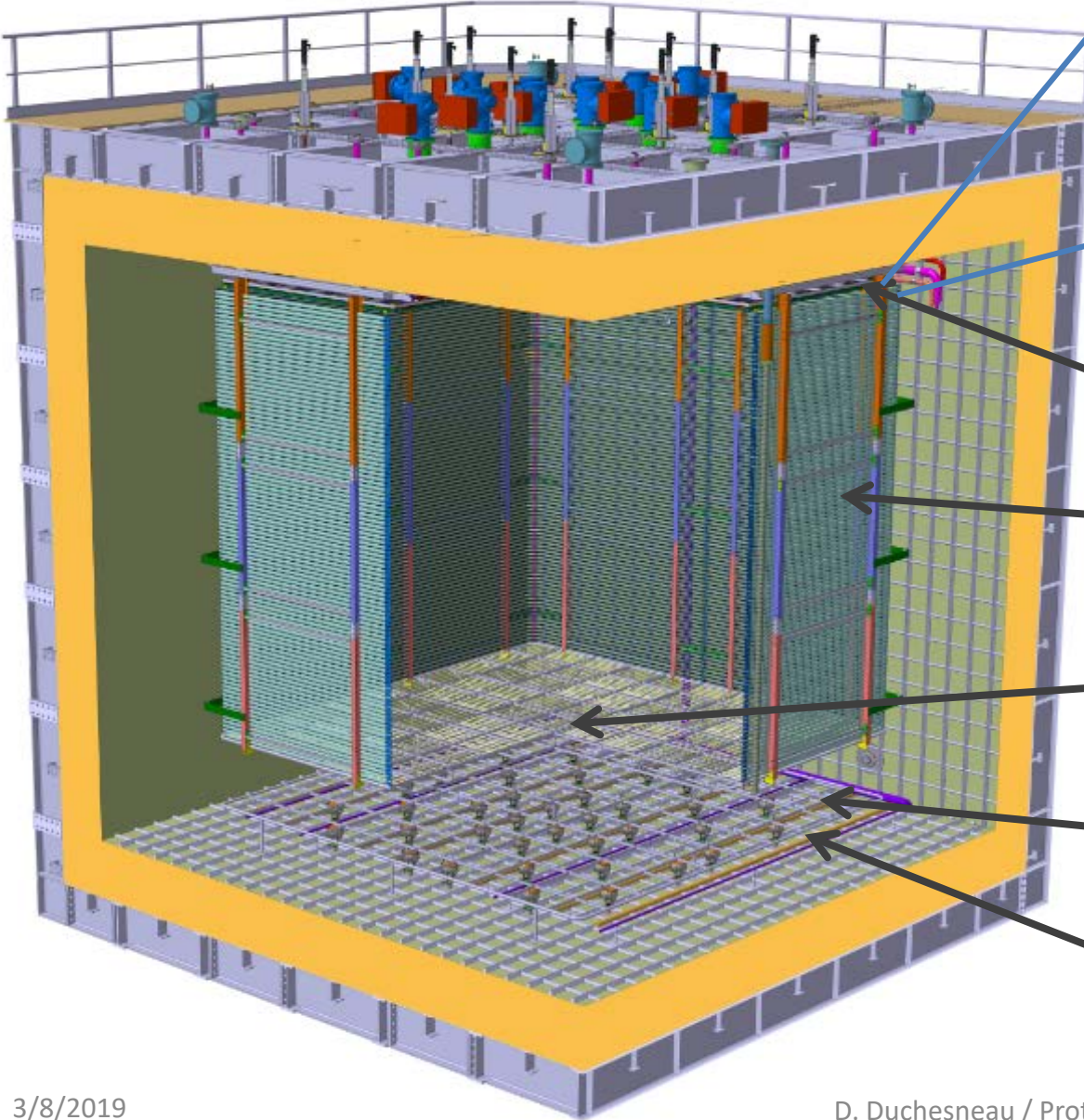


3/8/2019

DUNE collaboration call meeting
March 8th, 2019

ProtoDUNE-DP (NP02)

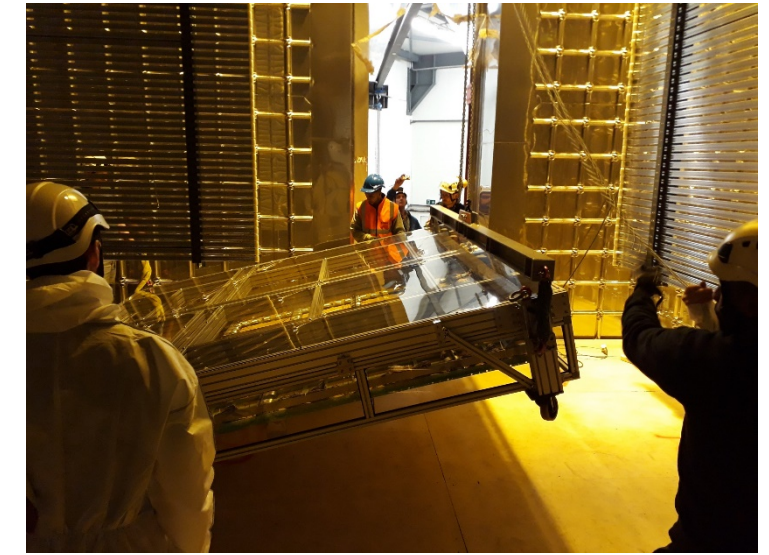
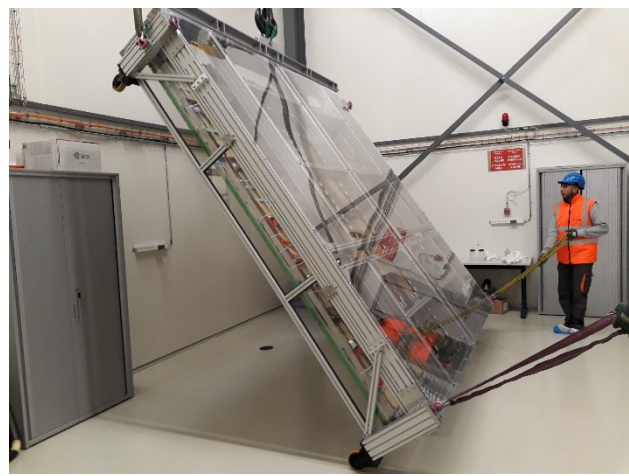
Components and operating conditions



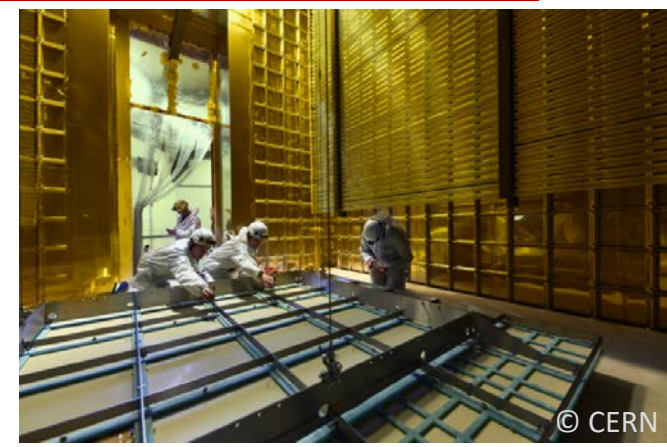
- Charge Readout Planes (CRP) Installed and cabled
- Field Cage Fully completed
- Cathode Assembled and installed
- 300 kV HV extender positioned for tests
- Ground grid Constructed and inserted
- Photomultipliers Installed and cabled

CRP transport, Installation and metrology in Cryostat:

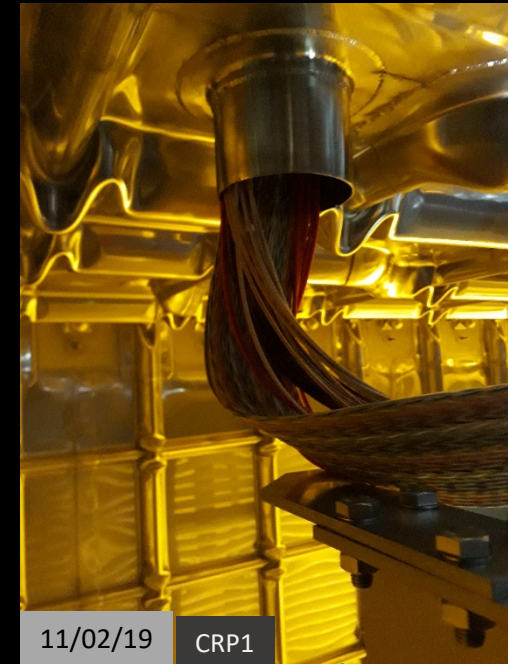
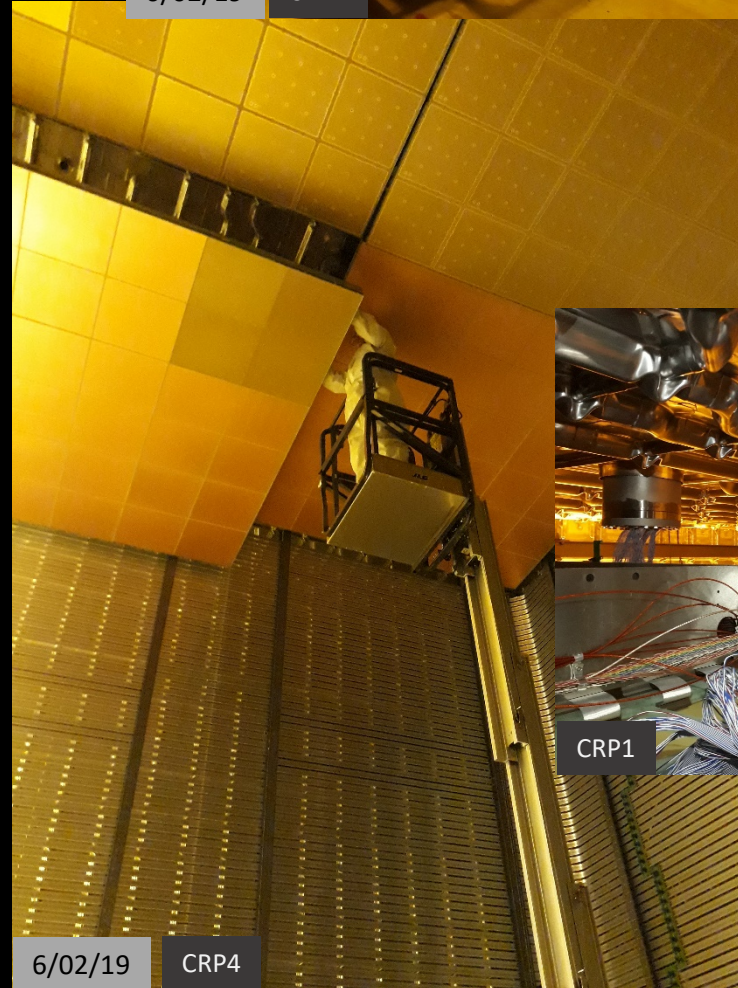
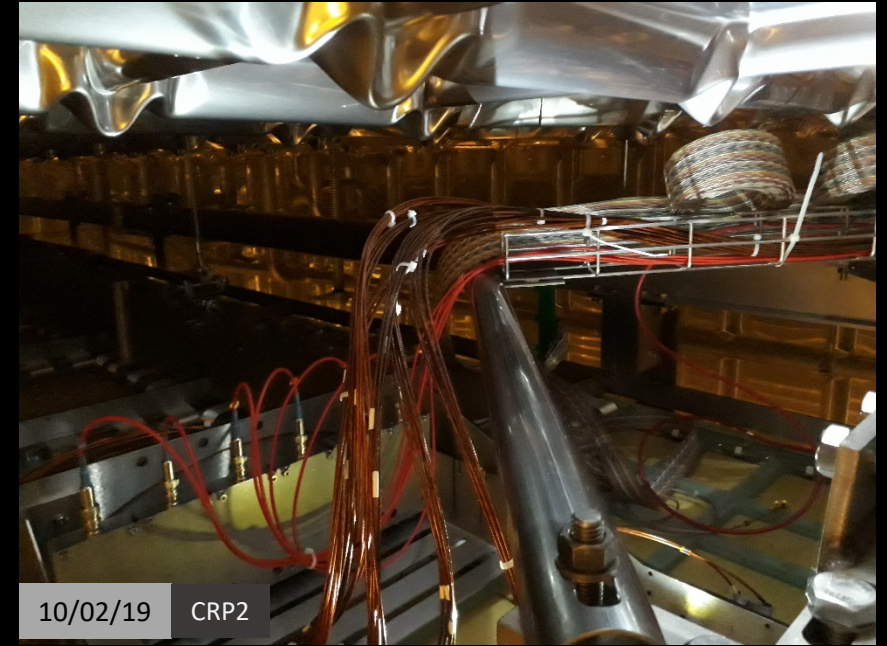
Inserted in the cryostat following a delicate manipulation procedure to avoid any shaking of the structure



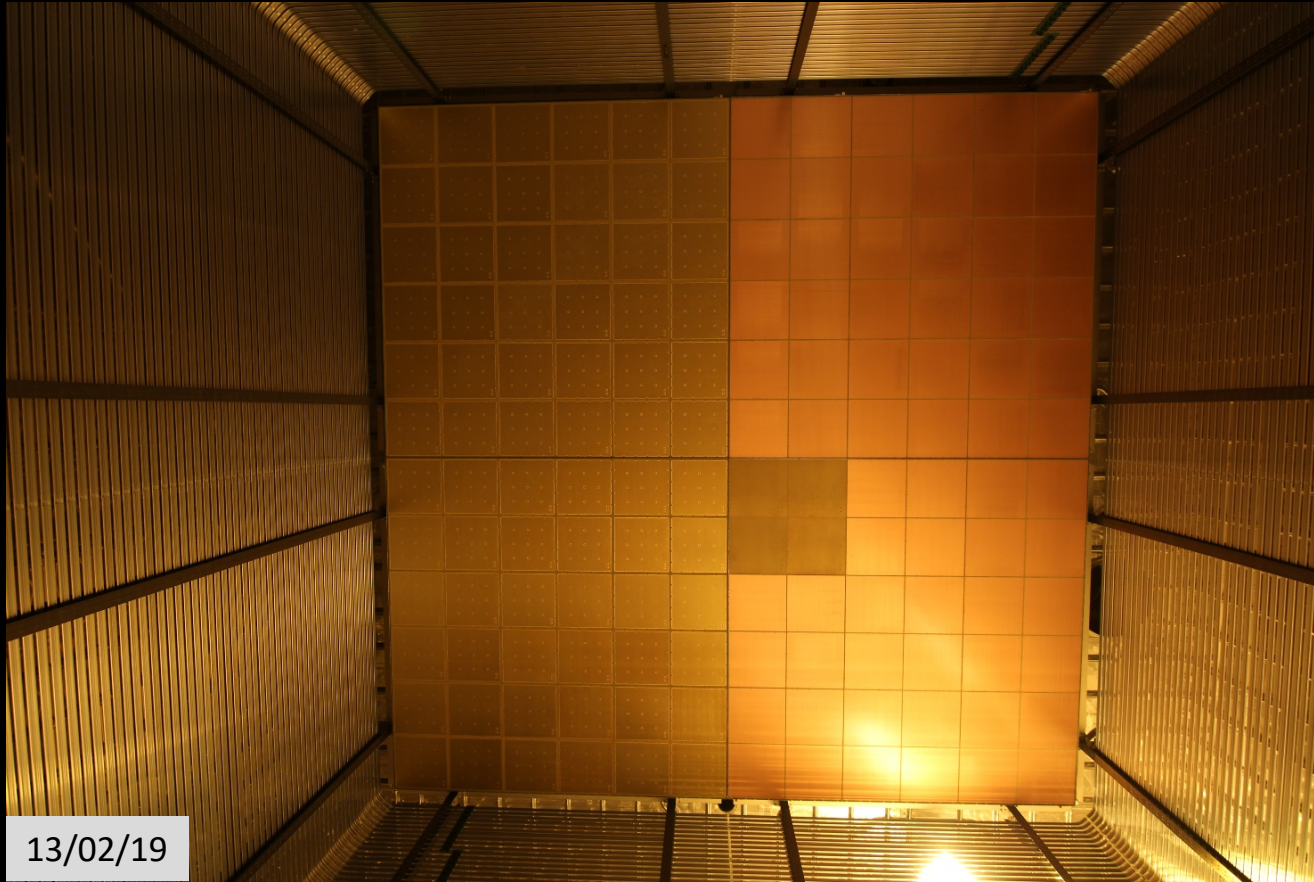
Planarity tuning of the last CRP in the cryostat:



CRP installation and cabling in cryostat



CRP after metrology and final positioning



13/02/19

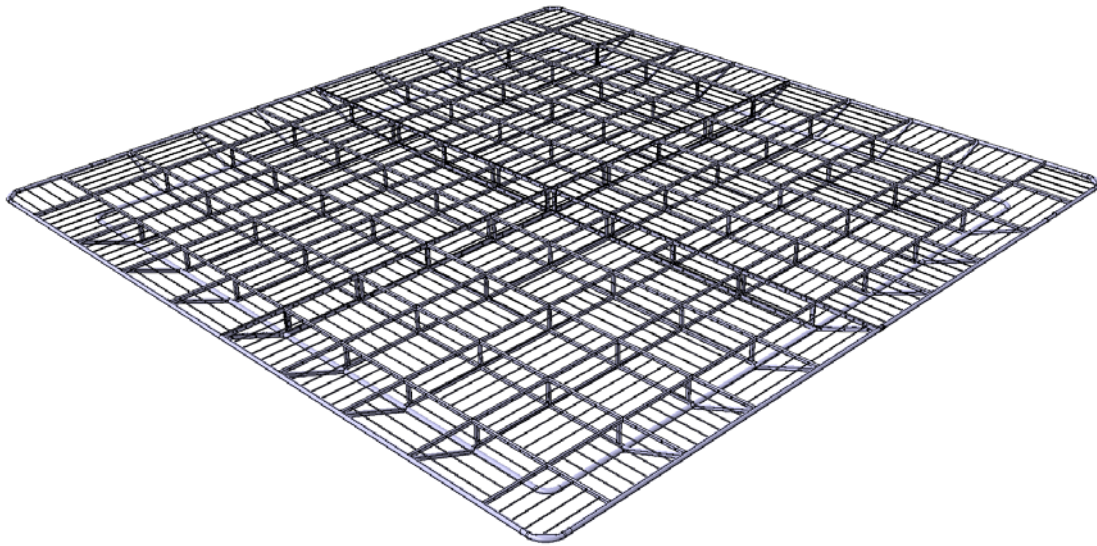


13/02/19

3/8/2019

Cathode module assembly in EHN1

- Cathode will be powered at -300 kV.
- Composed by 4 identical sections mechanically assembled together during installation.
- Electrically the 4 parts are connected via damping resistors.
- 6 m x 6 m cathode is held only at the edges (scalable concept).

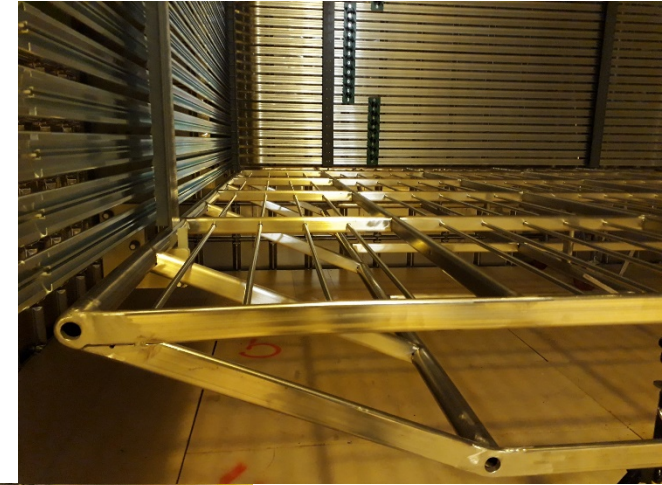
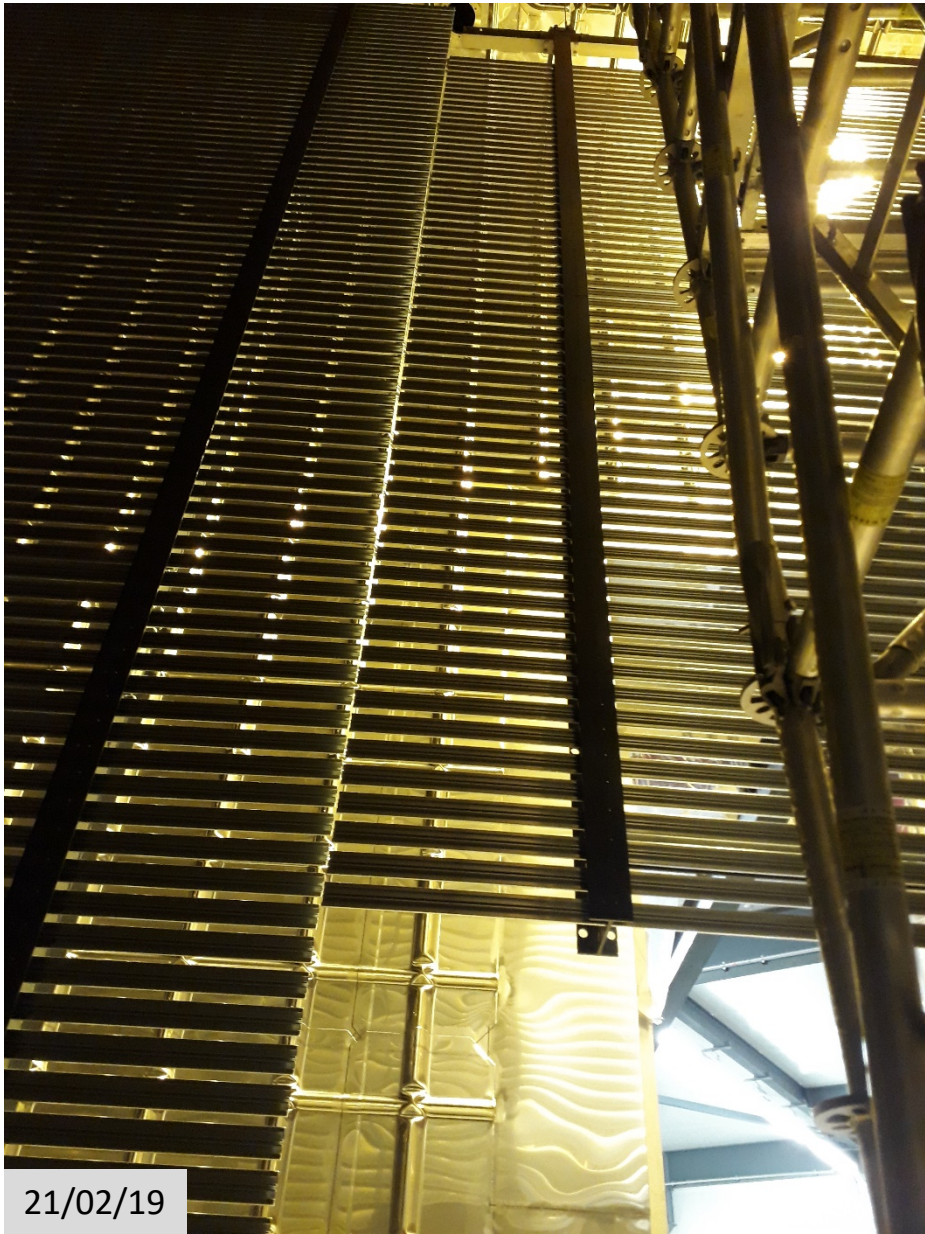


The 4 ground grid modules + remaining cathode module were inserted in the cryostat
And put below the installed modules

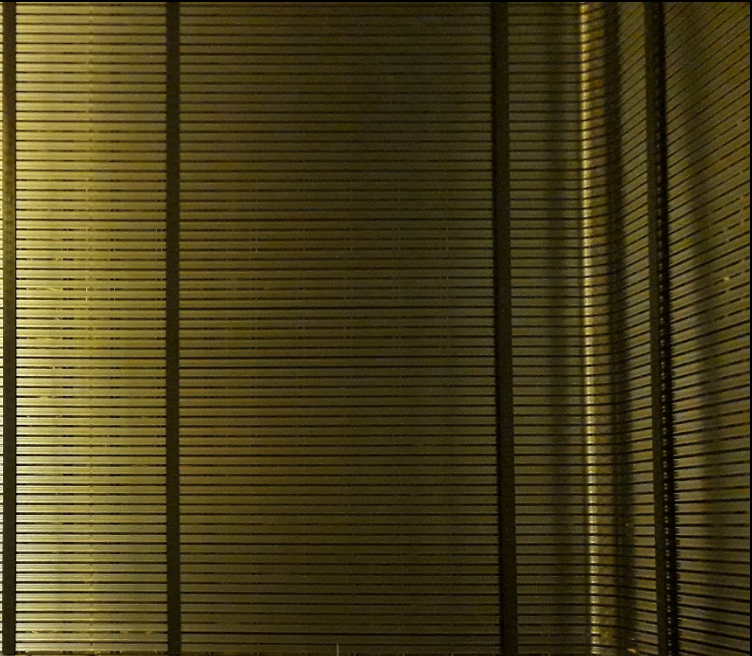
3 modules were installed on 20/02/19



Field cage closing and last cathode module assembly in the cryostat



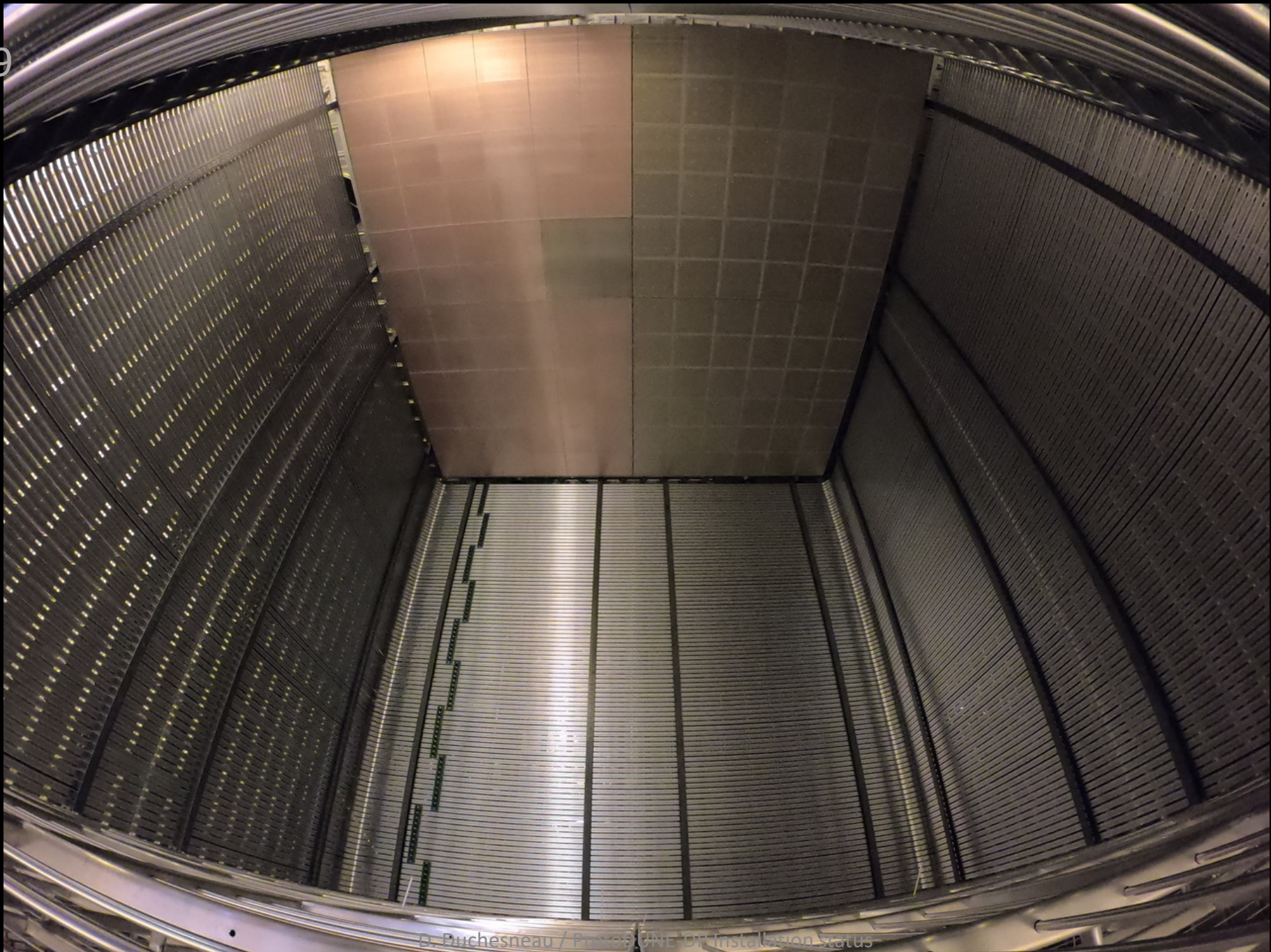
Complete field cage and cathode installation Feb. 24 2019



3/8/2019

D. Duchesneau / Protocole DUNE-DR 23/02/2019

23/02/2019



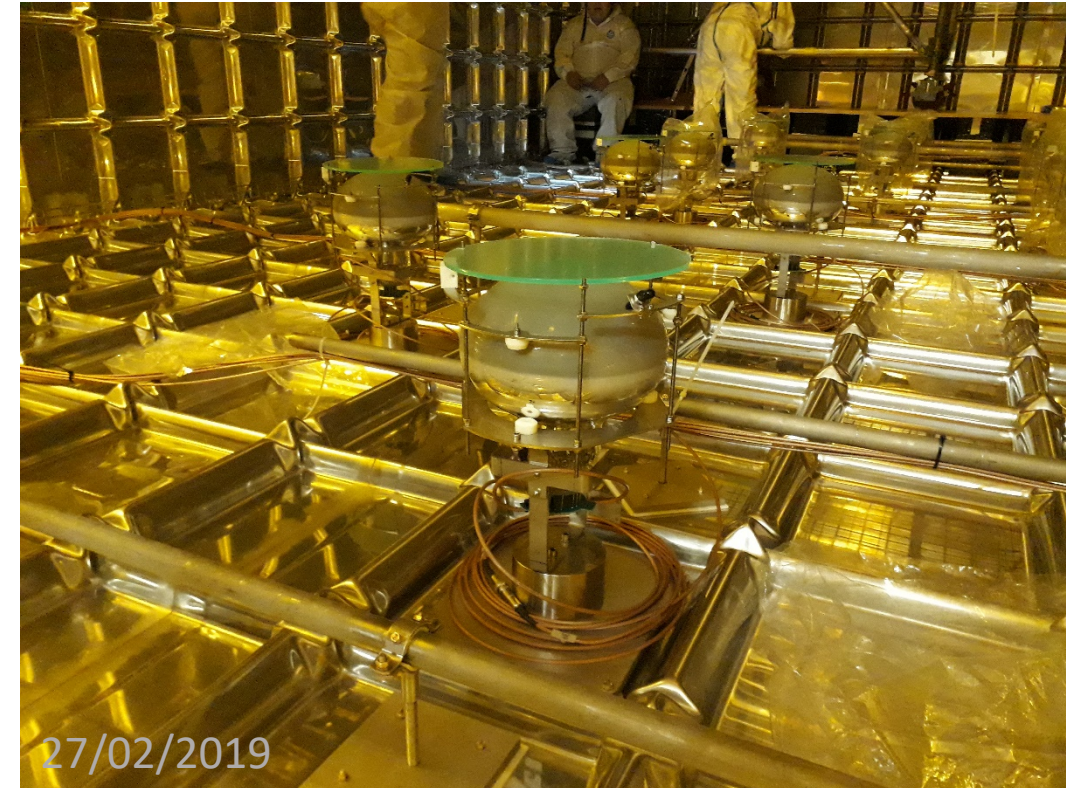
GoPro snapshot

3/8/2019

D. Duchesneau / Photos ONE-DT Installation status

Photon Detection System

→ All 36 PMTs have been installed and cabled in the cryostat on Feb. 25-28th



NP02 HV distribution

- **Heinzinger 300 kV Power Supply:**

- 300 kV HV Cable (Silicon based insulator).

- **VHV feed-through:**

- tested in purified LAr at CERN for 5 hours with success in January
- No discharge recorded at nominal voltage (300 kV), provided that the LAr surface is quiet and no gas bubbles are formed along the feed-through

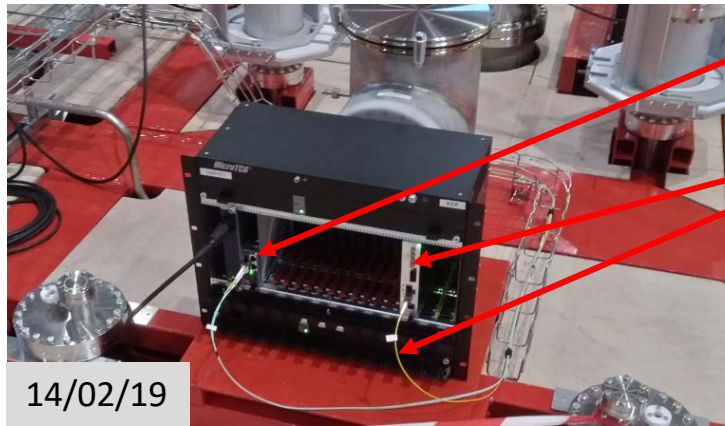
- **HV extender:**

- to connect feed-through to cathode;
- inner conductor (at max HV) surrounded by an insulator;
- metallic degrader rings installed on the insulator, electrically connected to the field shaping ring at the same height
- *Arrived in February and was positioned yesterday (07/03/19)*



Electronics and DAQ

- Optical fibers infrastructure installed and tested
- uTCA racks installed with data optical fibers connections cabled and tested to the event builders



MCH and data fiber connection to event builder

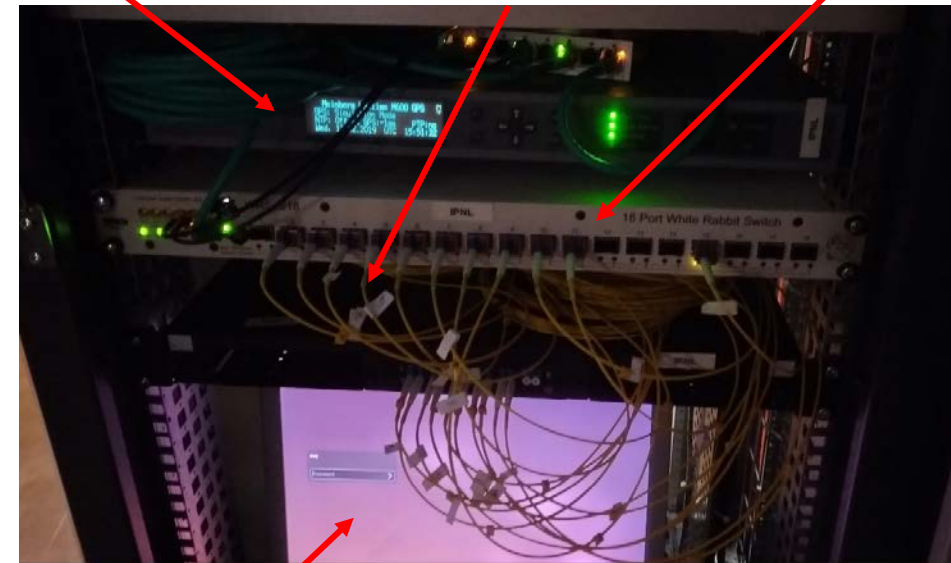
White Rabbit slave node and fiber connection to the WR network

- **Complete White Rabbit timing and trigger system** installed and commissioned : slave nodes in uTCA crates, WR optical fibers network, central timing system (WR Grand Master and GPSDO), trigger timestamping server and trigger network to event builders

GPS Disciplined Oscillator

Connections to WR Slave nodes in uTCA crates

White Rabbit Grand Master



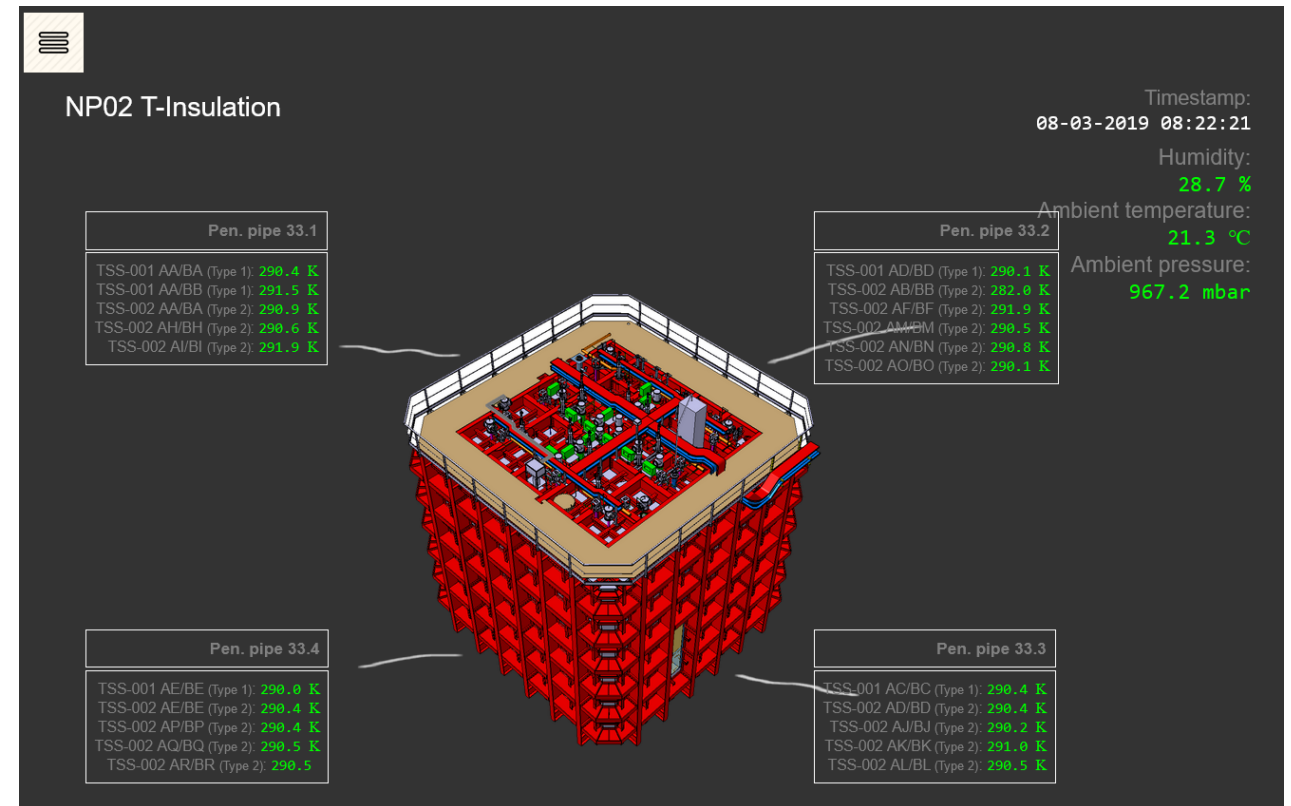
White Rabbit Trigger server and private Trigger network to event builders

Detector General infrastructure: cable trays, flanges, grounding, sensors



- Cable trays are laid and grounded.
- Most of the detector feedthroughs are being finalised.
- Modifications have been done for the crosses, to add stress release for the cables.
- The building and detector ground monitor is running

- Slow control is being developed and general cryostat monitoring put in place
- The stress sensors and the position sensors on the cryostat are installed and cabled.
- The racks are installed, powered and cable trays laid.



Plan of the NP02 detector installation

DUNE collab. Meeting of 18/01/19

Schedule starts on Jan 7th with the CRP installation

- Before TCO closure : 45 days were foreseen

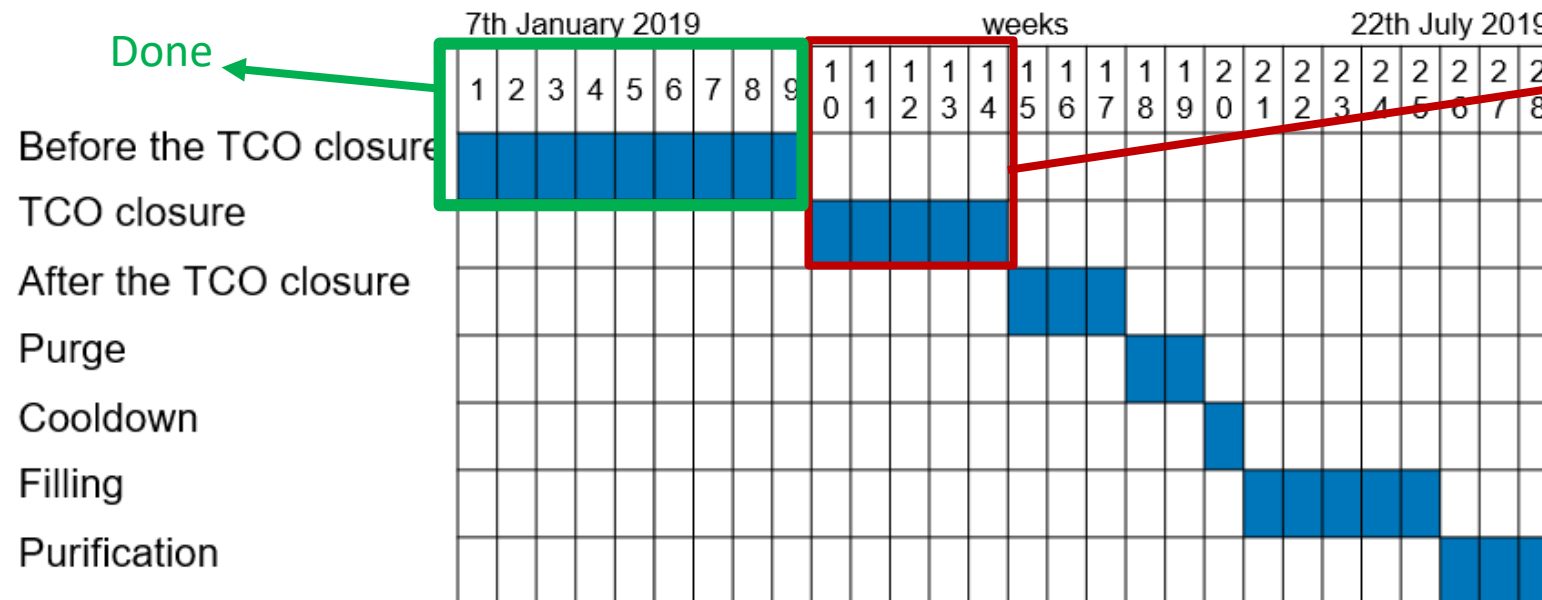
=> for installing CRP, Cathode, ground grid, HV feedthrough and PMT

The 4 CRP installation should be completed in 2 weeks from now.

- TCO closure: 5 weeks

- After the TCO closure: 15 days

=> to install remaining instrumentation, HV extender, ground grid small modules, clean up and remove scaffolding, false floor part etc...



Company cannot come to CERN before April 23rd => 4 weeks later than foreseen

Filling completed end of June => Start of commissioning

Summary:

- A lot of progress has been made in the ProtoDUNE-DP construction activity those last weeks.
- The four CRPs, the cathode, the field cage, the ground grid, the photon detection system, the HV degrader are now installed in the cryostat.

□ Since January 7th The installation schedule has been kept within a few days

- Exerpt from summary of last collaboration meeting on 28/01/19:

The next steps for ProtoDUNE-DP assembly in cryostat are :

- ✓ Raising to the final positions and cabling the CRPs in the cryostat beginning of February
 - ✓ Install the cathode, ground grid modules, the photomultipliers in February until beginning of March
 - Start the TCO closure ~~mid March~~ => April 23rd (delay imposed by the company)
 - Complete the detector instrumentation to be ready for purging by ~~May~~ => June
- End of filling and start of commissioning foreseen end of ~~June~~ => July

However we will try to minimise the activities after the closure of the TCO by completing before April 15th some instrumentation activities originally foreseen after the closure.



Thank You