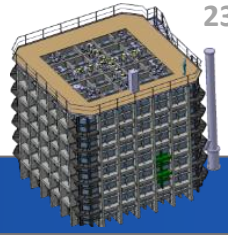
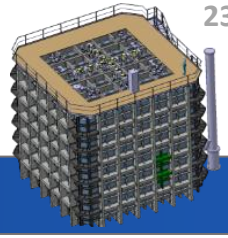
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Racks, monitoring, power distribution and cabling



OUTLINE

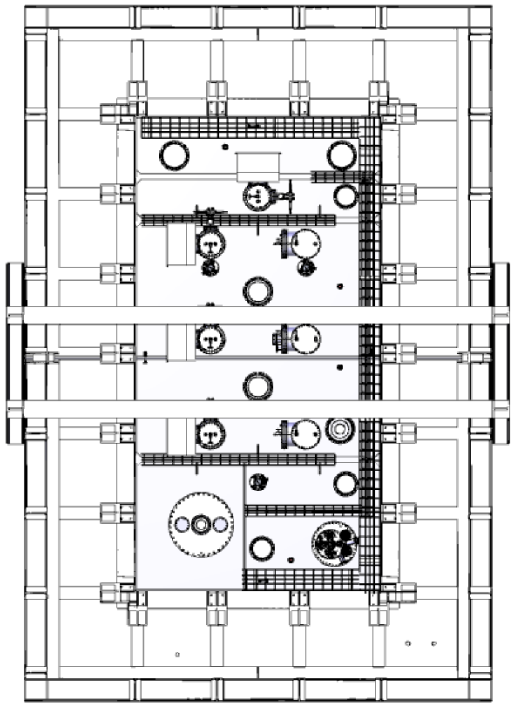
- Lessons learnt from 311
- Insulation principle & racks location
- Power distribution
- Existing racks
- DAQ Racks
- Monitoring

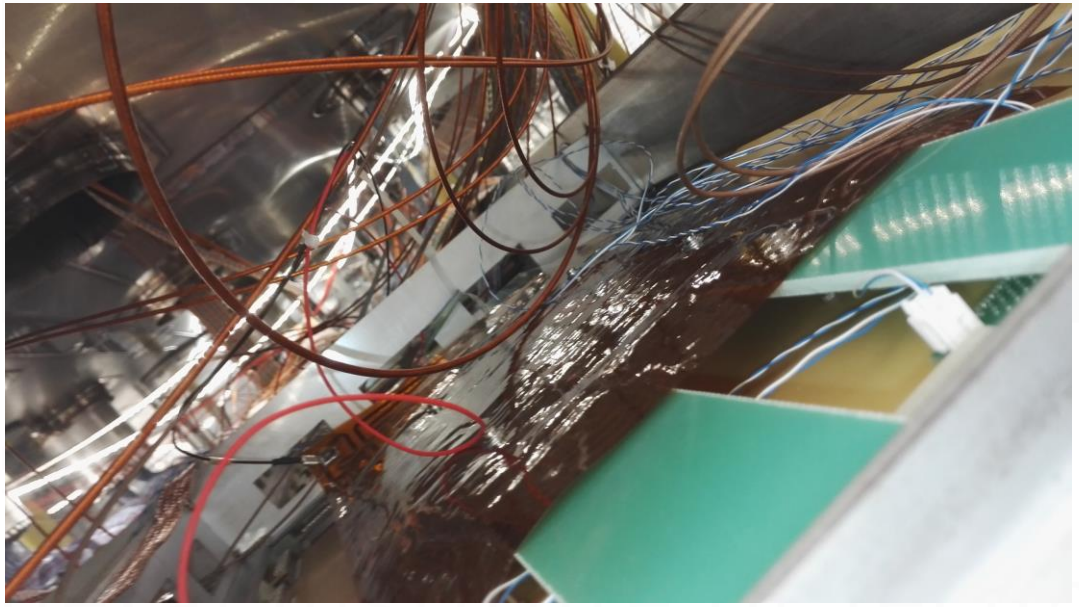


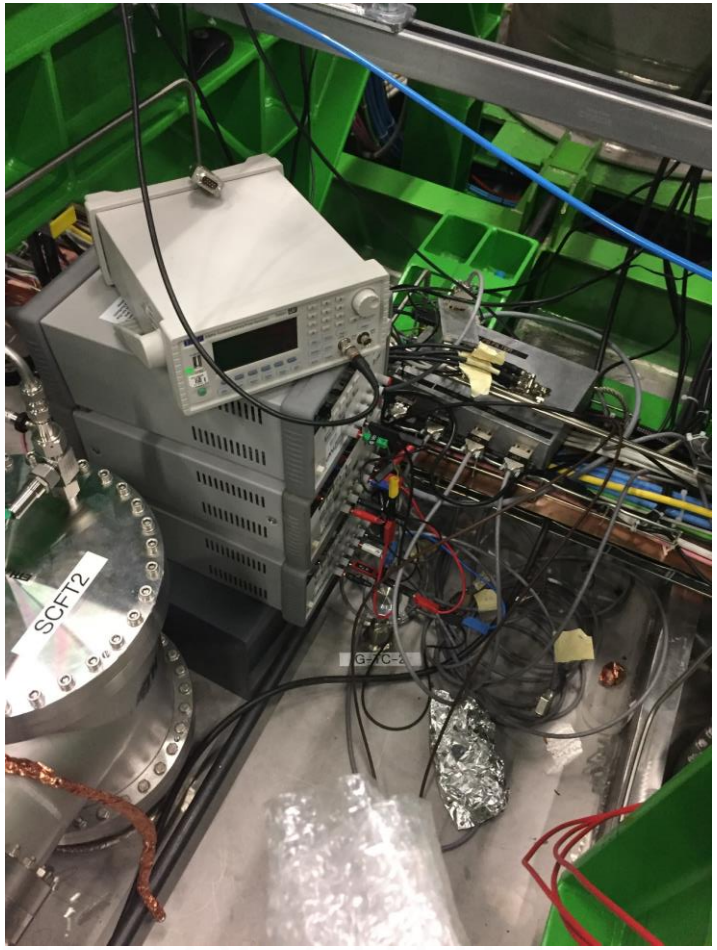
LESSONS LEARNT FROM 3m x 1m x 1m

With the construction of the **3m x 1m x 1m**, we had now a huge experience of “How to construct a neutrino detector?”.

We know also how to improve our design.

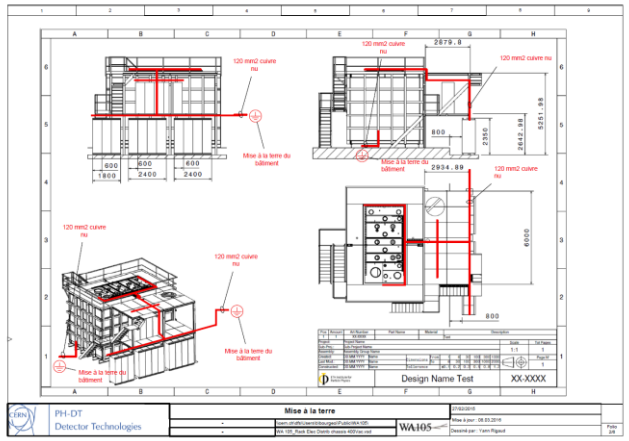


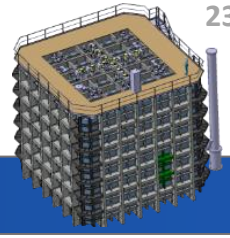




LESSONS LEARNT FROM 3m x 1m x 1m

We learnt also more about noise requirement, for example to minimize the noise we had installed copper plates for GND and use some shielded cables to improve the system.





LESSONS LEARNT FROM 3m x 1m x 1m

Others things…

galvanic insulator

sensors position

Cabling convention

flanges connector

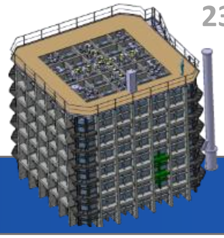
standardization

sensors choice

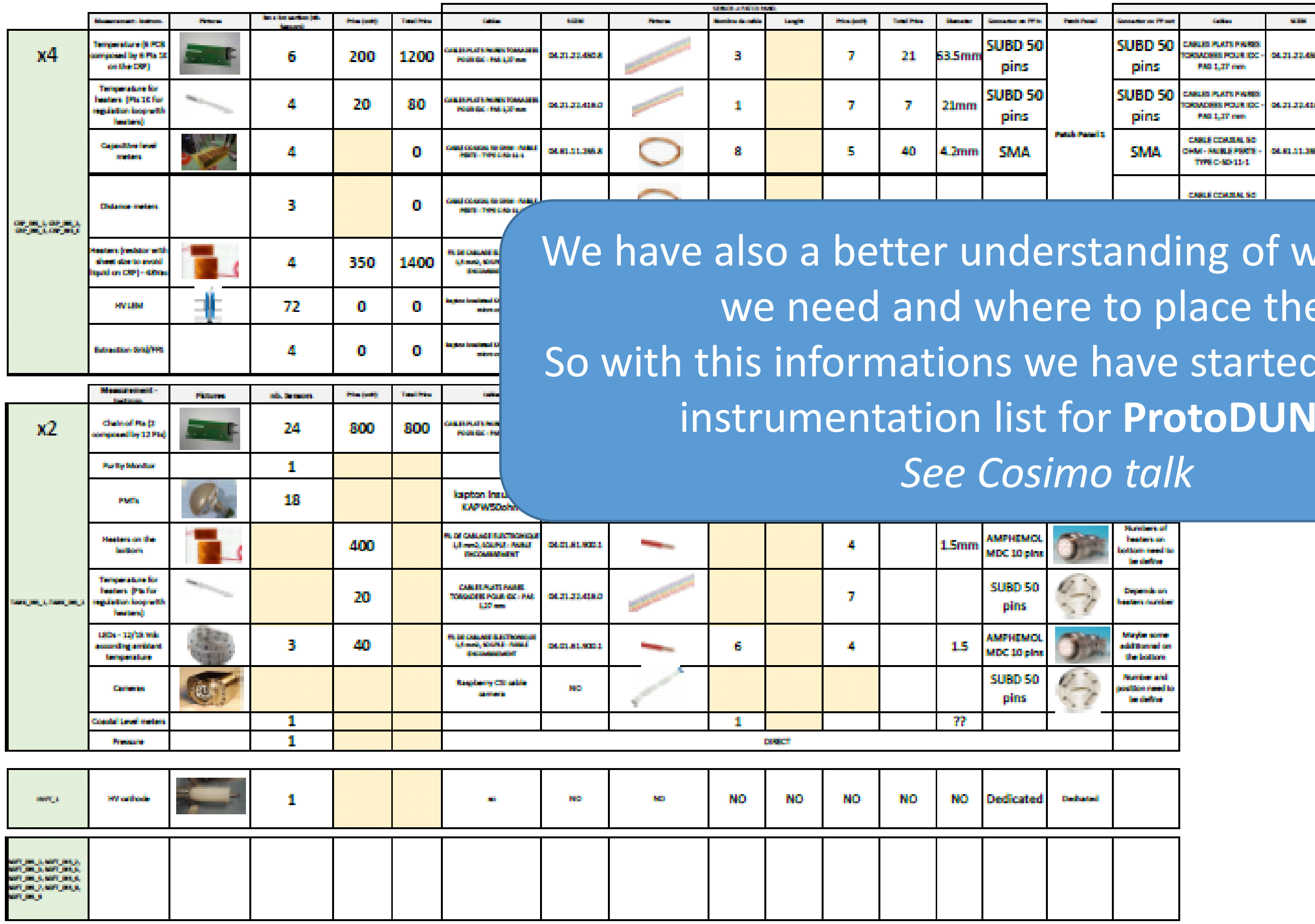
precision

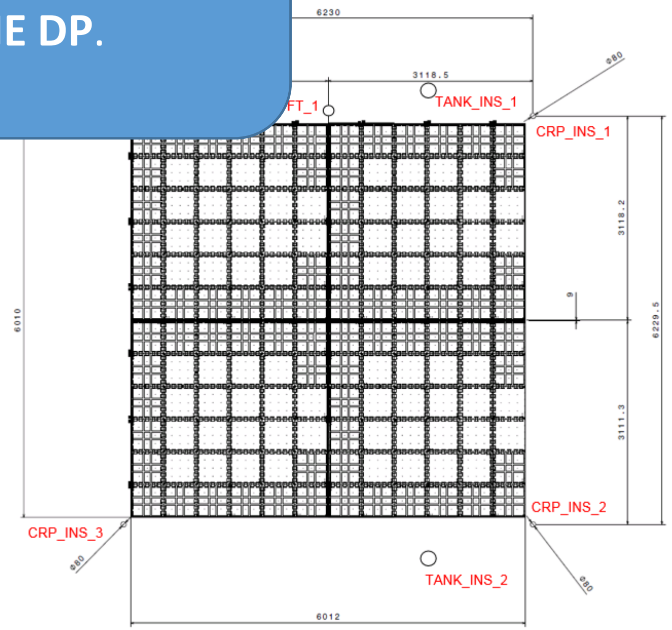
sensors type

…



LESSONS LEARNT FROM 3m x 1m x 1m

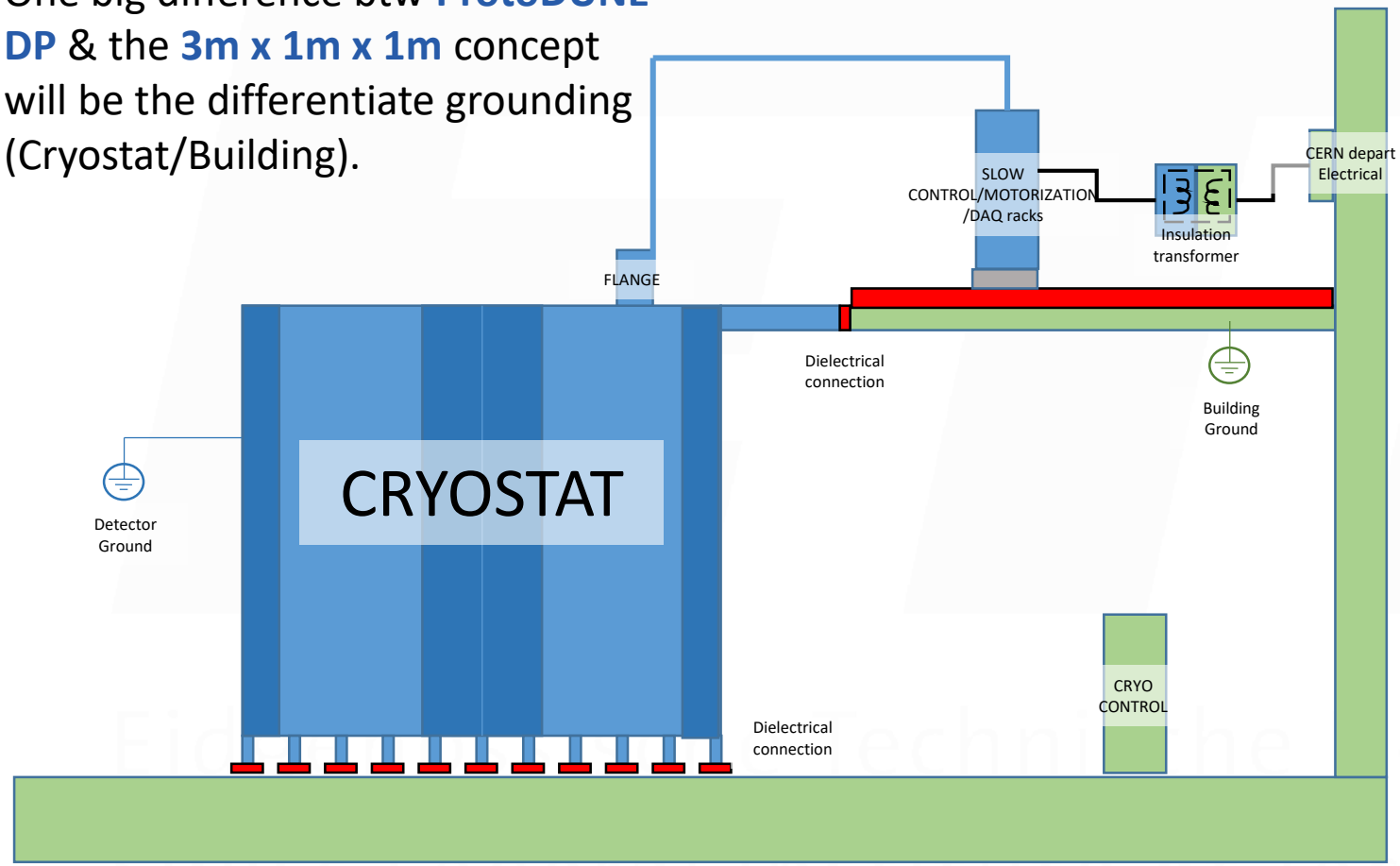


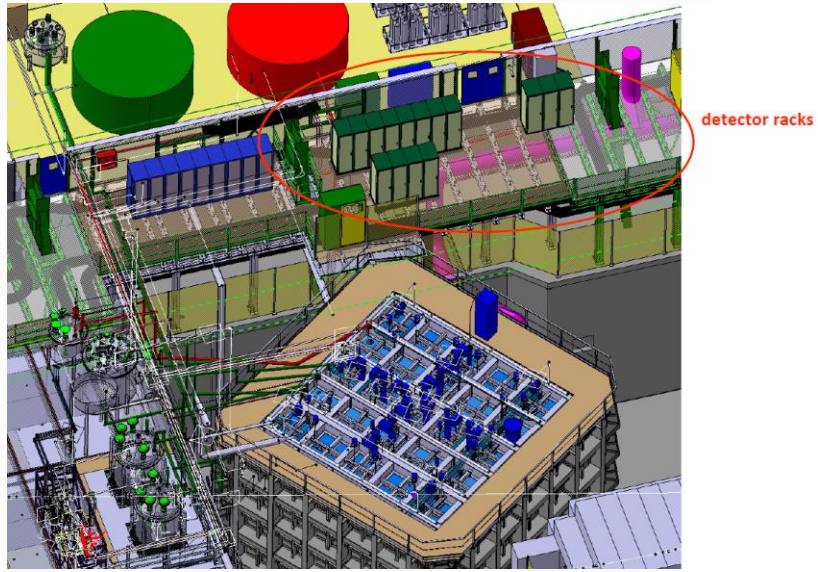


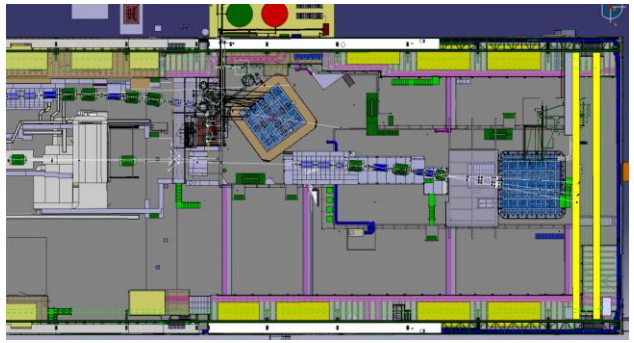
We have also a better understanding of which sensors we need and where to place them.
So with this informations we have started to build the instrumentation list for **ProtoDUNE DP**.
See Cosimo talk

INSULATION PRINCIPLE / RACK LOCATION

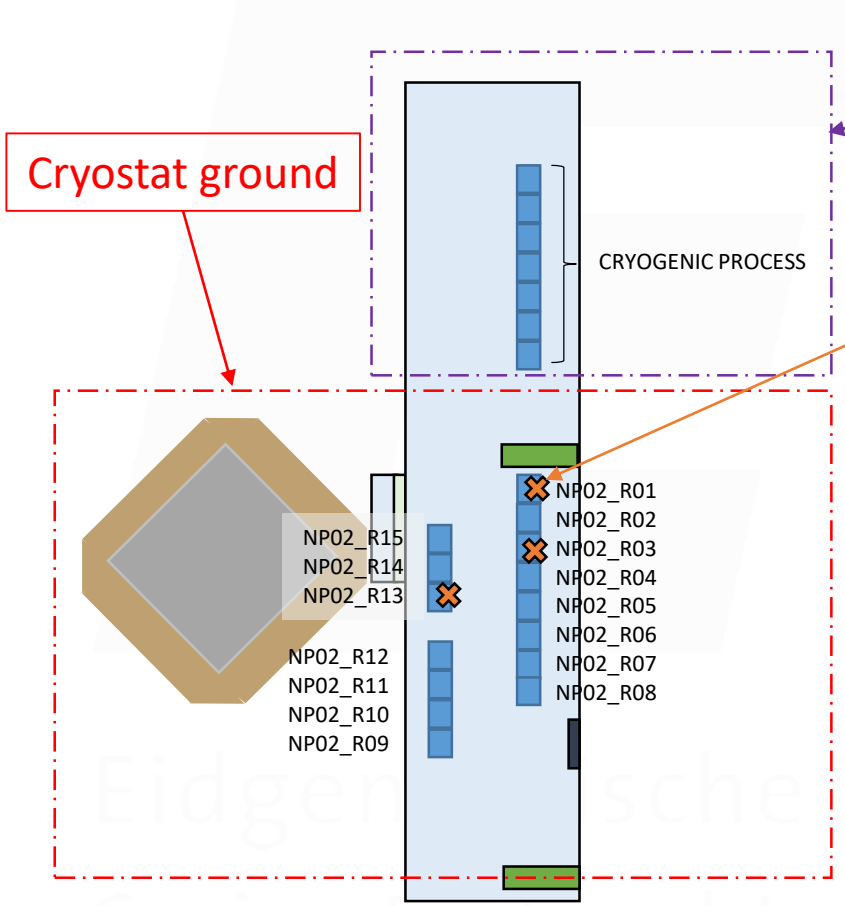
One big difference btw **ProtoDUNE DP** & the **3m x 1m x 1m** concept will be the differentiate grounding (Cryostat/Building).







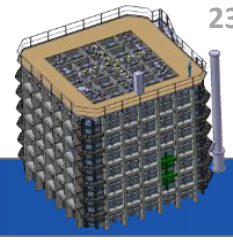
RACKS LOCATION



400Vac inputs (NP02_R01, NP02_R03, NP02_R13)

Num.	G	Technical Name	Name	Category	Function	Consumption
Rack 01		NP02_R01	GEN - Alim	General	Power distribution for PCS, General , DCS and DSS (400Vac, 220Vac, and 24Vdc) - Filters, UPS, redundancy and analysis are also installed in this rack to ensure protect	20kVA
Rack 02		NP02_R02	GEN - Com	General	This rack is composed by switch, computers, keyboard, screen; it allowed to have an access to the control/security system and create a network	
Rack 03		NP02_R03	MOT - 01	CRP Motorisatio	CRP Motorisation system	20kVA
Rack 04		NP02_R04	MOT - 02	CRP Motorisatio	CRP Motorisation system	
Rack 05		NP02_R05	PCS - Main	PCS	Main cRIO controller for PCS (Rack A, B, C & D); it collect every data from PCS and allowed to avoid multi-cabling system	
Rack 06		NP02_R06	Interface	General	Level Meter system + *Spare for electronics system*	
Rack 07		NP02_R07	DSS	DSS	CRIO controller dedicated to safety (interlock, logic…)	
Rack 08		NP02_R08	DCS	DCS	Power distribution for HV (PMTs, FFS, GRID, LEMS…) it will be composed by to CAEN chassis and HV filter boxes	
Rack 09		NP02_R09	PCS - A	PCS	Proximity rack - Resistive measurement (Thermometer and resistive chain) 1/2	
Rack 10		NP02_R10	PCS - B	PCS	Proximity rack - Resistive measurement (Thermometer and resistive chain) 2/2	
Rack 11		NP02_R11	PCS - C	PCS	Proximity rack - Heaters & LEDs control / Pressure measurement	
Rack 12		NP02_R12	PCS - D	PCS	Proximity rack - Heaters & LEDs power / insulation transformer for Raspberry power	
Rack 13		NP02_R13	DAQ - CRO	DAQ	CRT + power distribution for DAQ + Communication	20kVA
Rack 14		NP02_R14	DAQ - PMTs	DAQ	Light readout	
Rack 15		NP02_R15	DAQ - CRT	DAQ	Charge readout	
Rack 16		NP02_R16	Cathode	DCS	Rack system design by Heinzinger (power supply for cathode)	

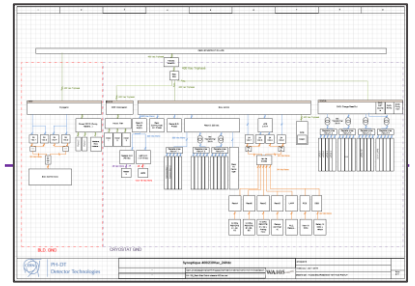
POWER DISTRIBUBUTION (SIMPLE VERSION)



CERN STARPOINT

INSULATION TRANSFORMER

75kVA (WITH MARGIN)



REPARTITION BOX

CRYOGENIC PROCESS

20kVA
MOTORIZATION PROCESS

Rack LAPP 01

Rack LAPP 02

20kVA
SLOW CONTROL PROCESS / DCS / COM / DSS

Rack ALIM

Rack COM

Rack PCS

Rack INT.

Rack DSS

Rack DCS

Rack A

Rack B

Rack C

Rack D

20kVA
DAQ

10kVA
Charge Read Out

2kVA
PMTs

8kVA
CRT

BLD. GND

CRYOSTAT GND

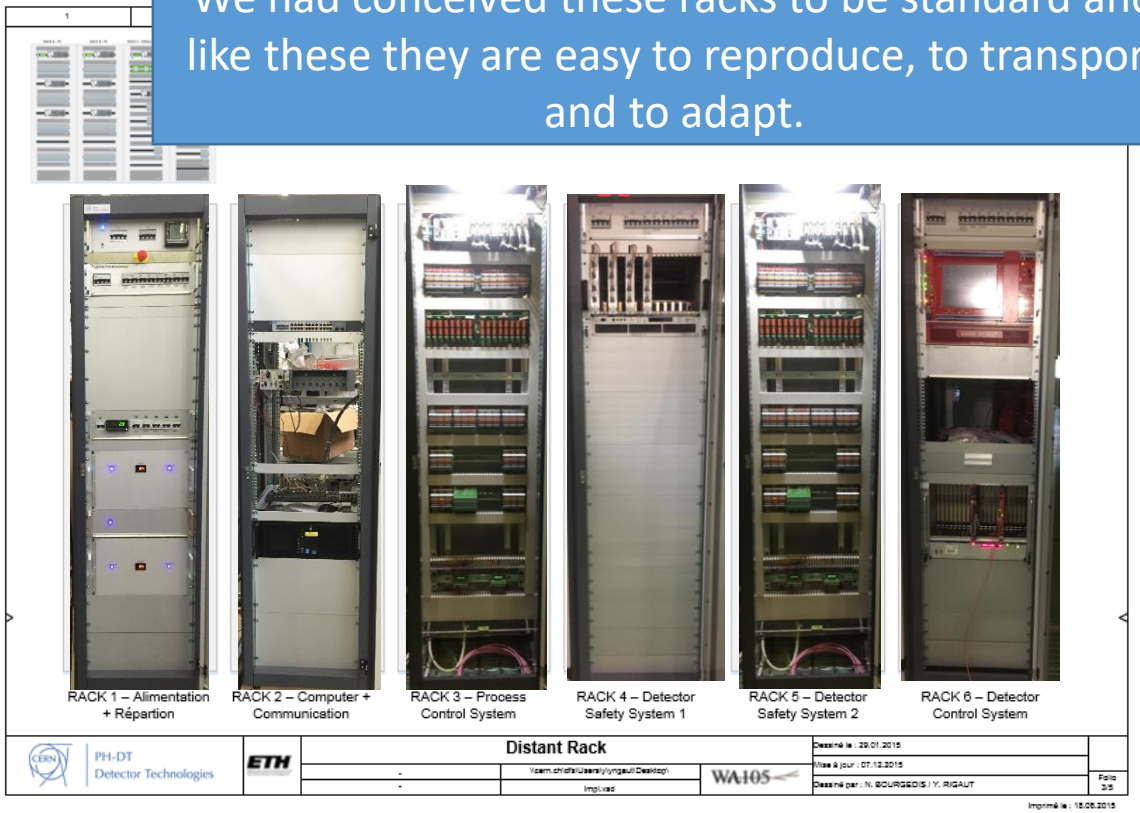
EXISTING RACKS

A large part of these rack are already built and functional. They are currently used for the **3m x 1m x 1m** since September 2016 and they will be moved when they will be available.

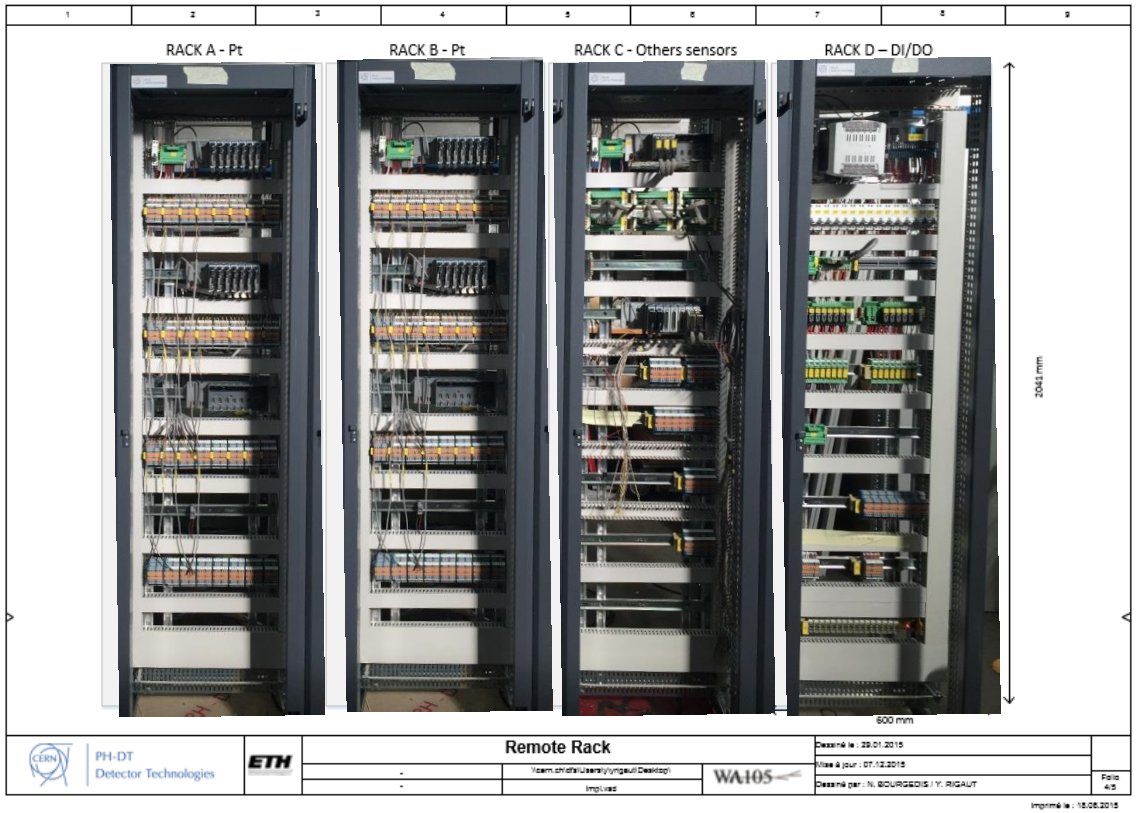
Only some minor modification to add more sensors and to improve the system are needed.

EXISTING RACKS

We had conceived these racks to be standard and like these they are easy to reproduce, to transport and to adapt.

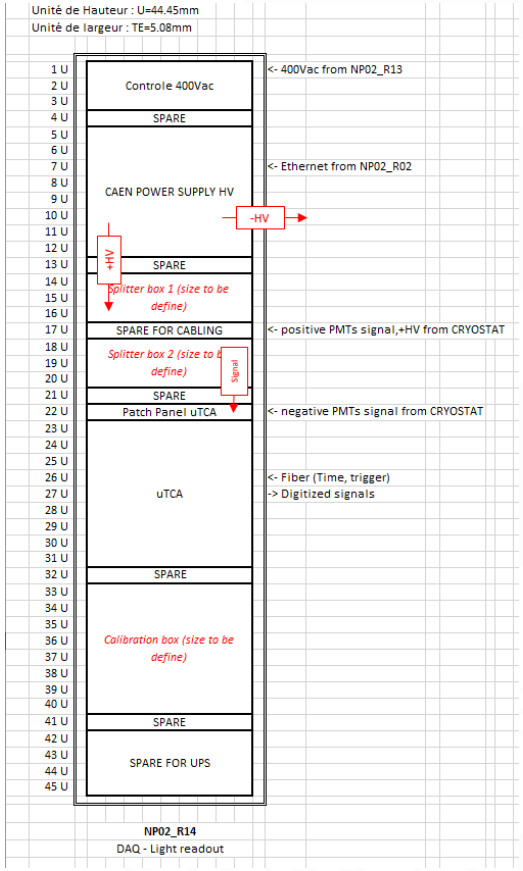


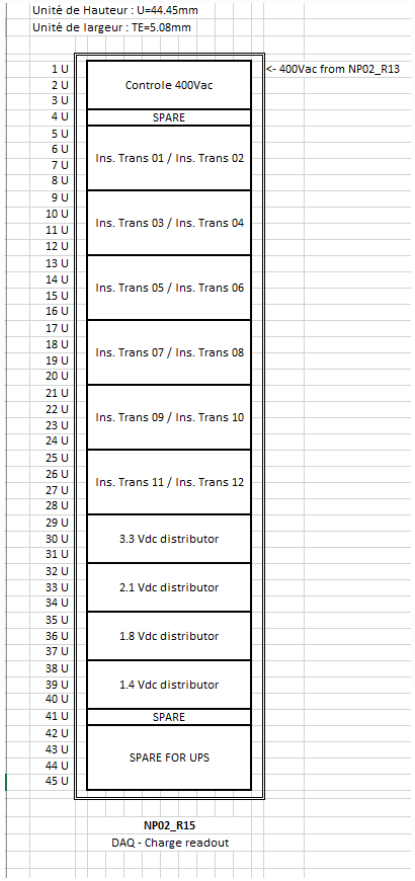
Distant Racks



Remote Racks

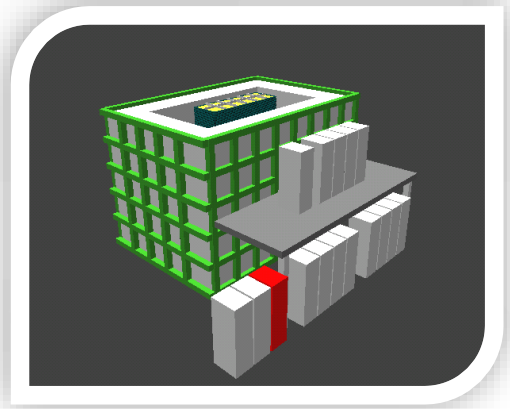
DAQ RACK STANDARDIZED

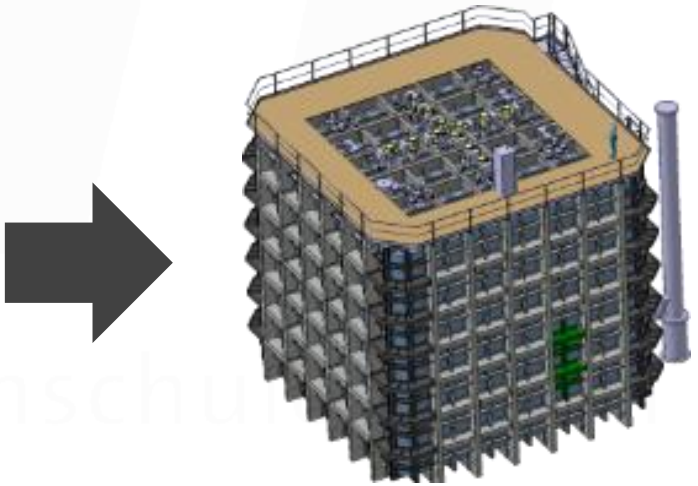




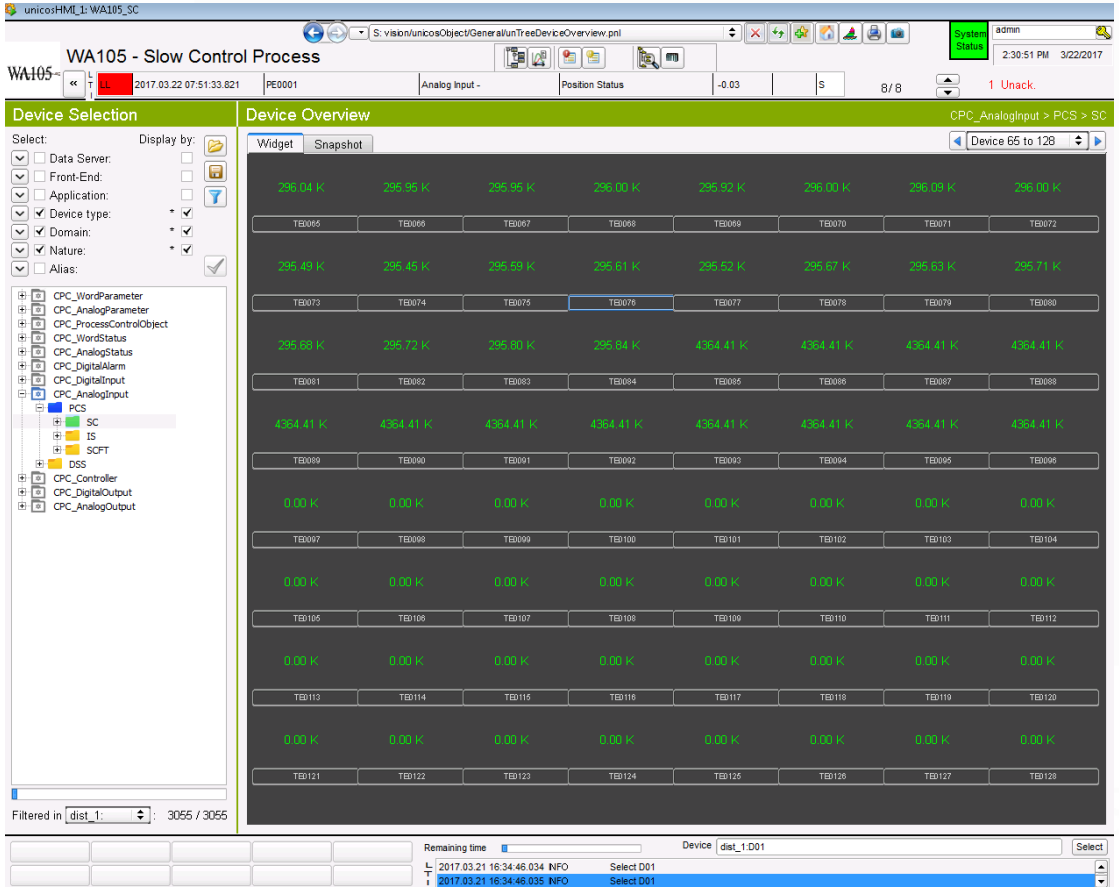
Work in progress for the design of the 3 DAQ racks.

When final design will be established it will be possible to start construction of the structure to be ready when we will move racks to blg. 887 (EHN1).

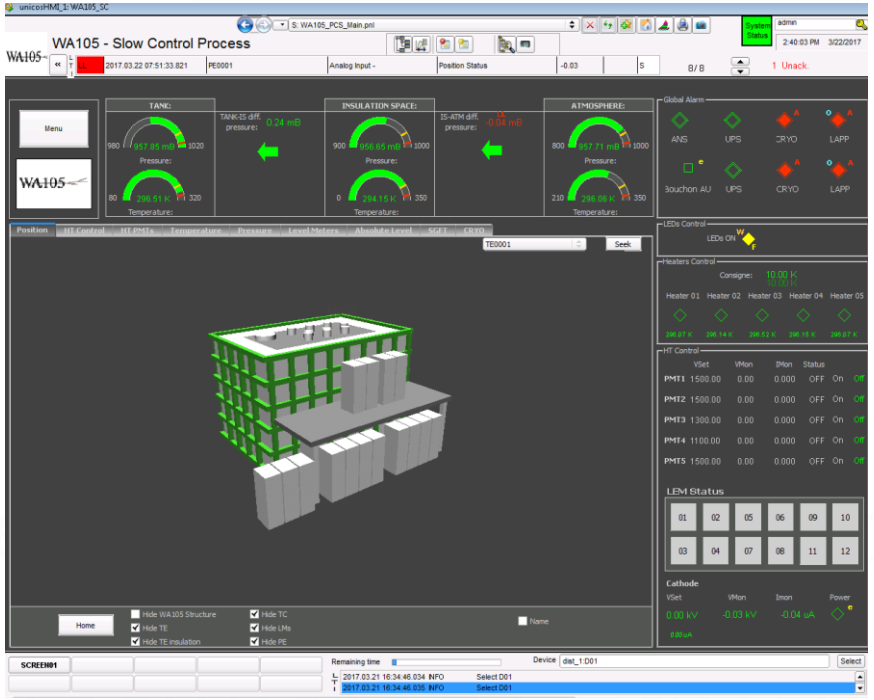


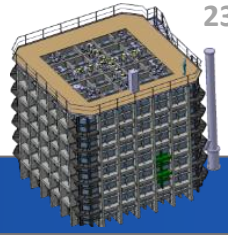


MONITORING



Every (RT+FPGA) parts are ready to display the **ProtoDUNE** version (some minor modifications will be necessary and a SCADA version dedicated for **ProtoDUNE DP**).





Thank you…

3m x 1m x 1m network