



Presentation of vertical test cryostat, main interfaces, common mechanical adaptation

H. BAJAS
TE-MS-C-TF



SM18, 07-06-2017, D2 Short model Cryogenic test interface meeting #01

Outlines

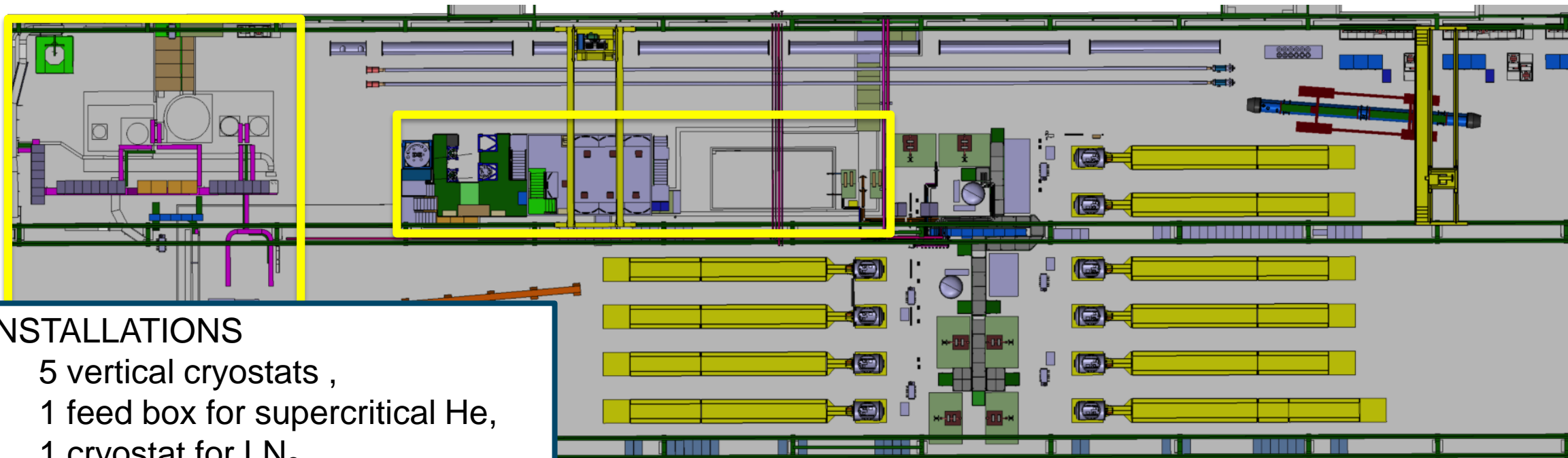
- Vertical test benches at SM18
- Cryostat and Insert
- Mechanical interface: Insert / Magnet
- Power connection: Leads / Magnet
- Electrical interface: Insert / Probes
- Data Acquisition Systems



Vertical test benches at SM18

Cluster G

Cluster D



INSTALLATIONS

- 5 vertical cryostats ,
- 1 feed box for supercritical He,
- 1 cryostat for LN₂,

OPERATION

- $I = 0.12 \text{ kA} - 30 \text{ kA}$
- $T = 1.9 \text{ K} \text{ to } 70 \text{ K He}$
- withstanding $U = \text{up to } 3 \text{ kV}$

Vertical test benches at SM18

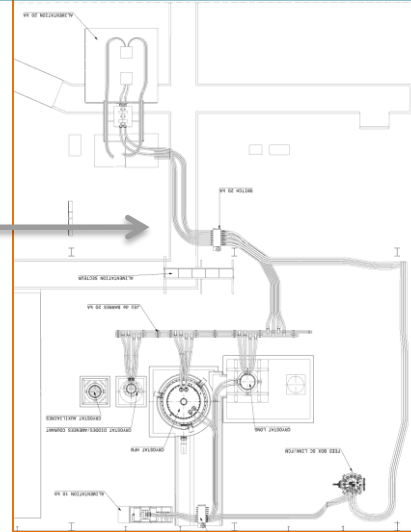
20 kA POWER CONVERTER with EE and DUMP RESISTOR

“DIODE/LEAD” CRYOSTAT :
1.2 m long
400 mm diameter
@ 4.2 K

“SIEGTAL” CRYOSTAT :
1.4 m long
800 mm diameter
@ 1.9 K

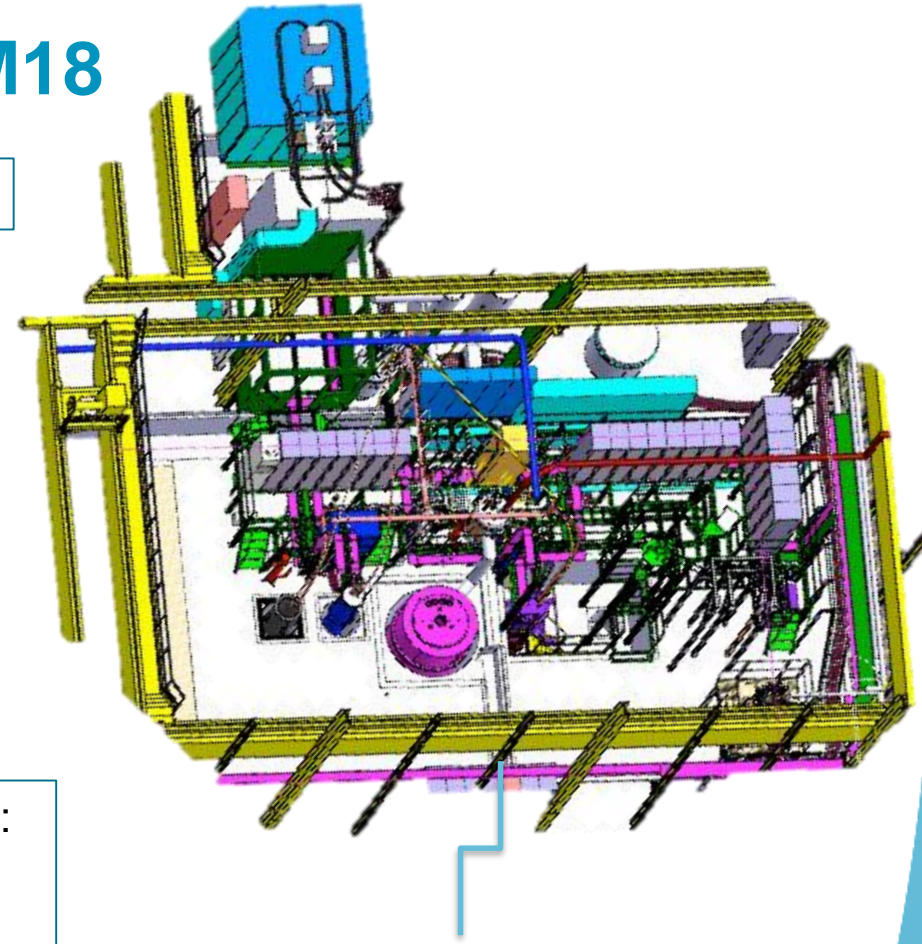
“HFM” CRYOSTAT :
2.5 m long
1500 mm diameter
@ 1.9 K

Powering circuit

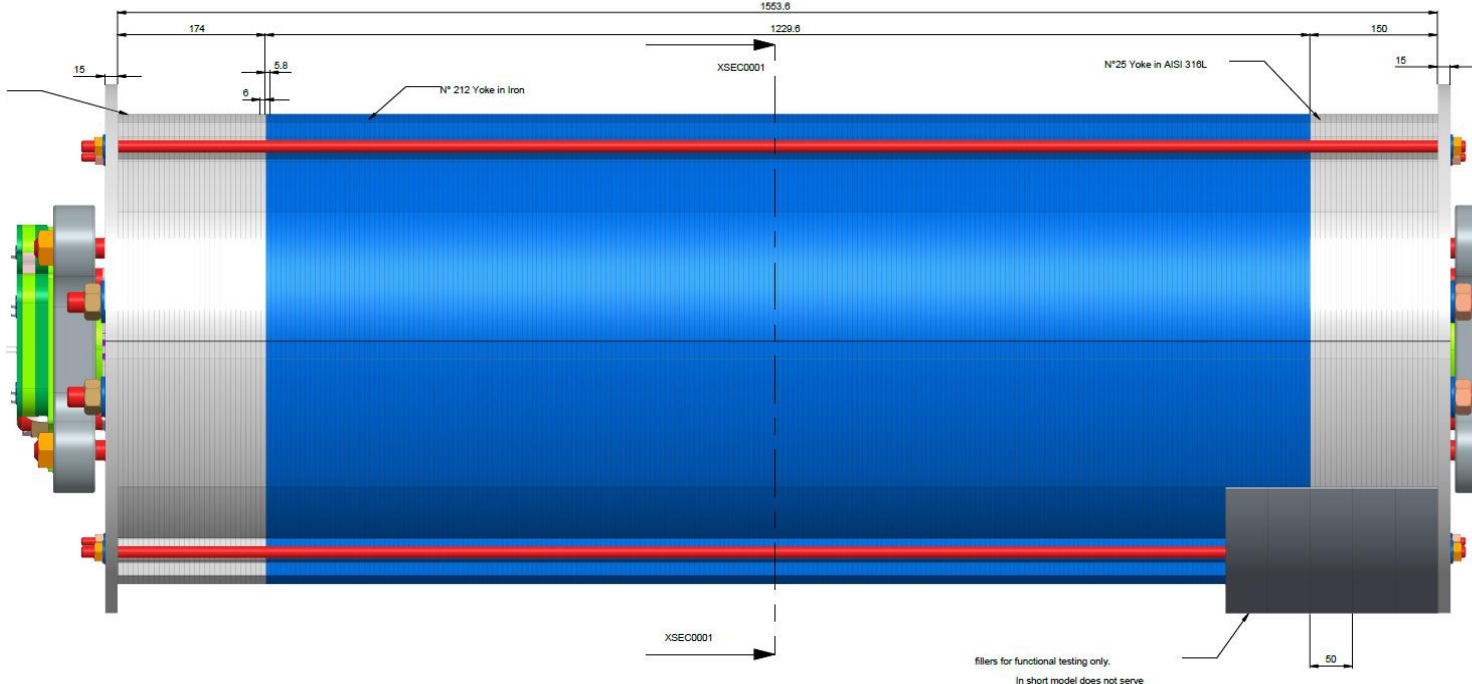
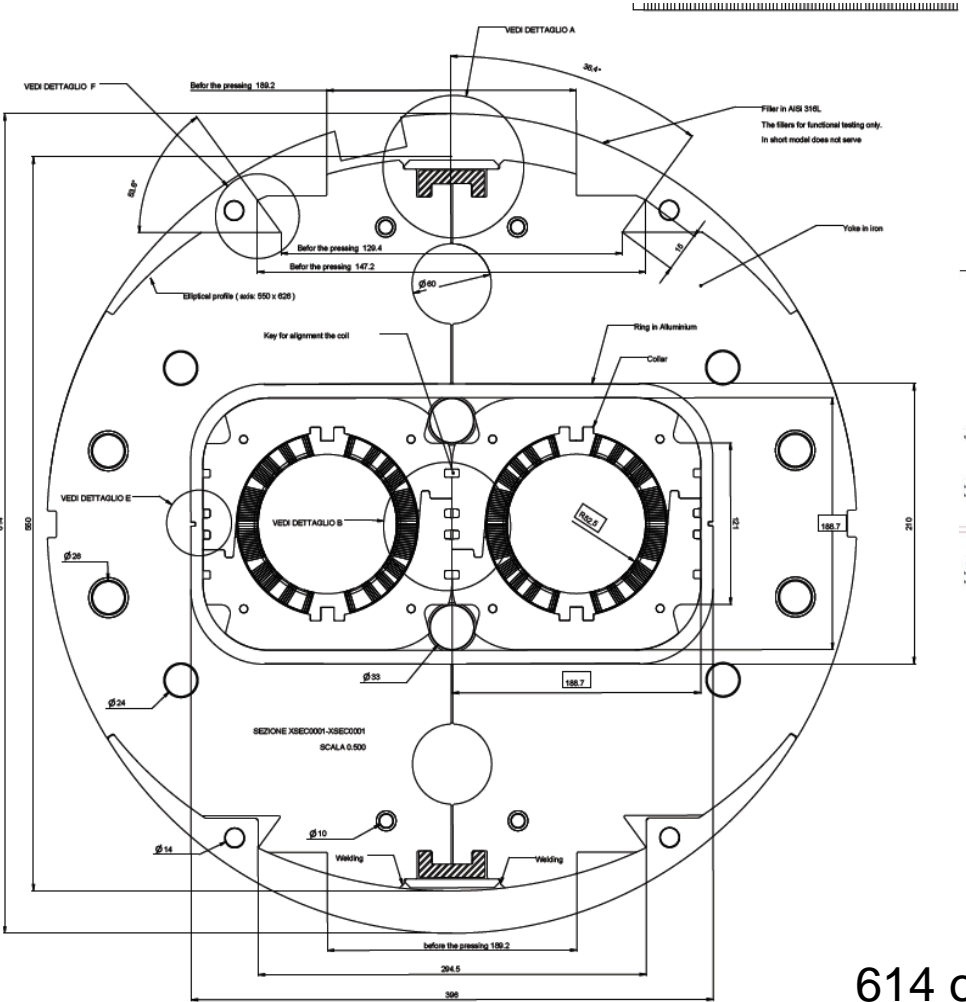


“LONG” CRYOSTAT :
3.8 m long
600 mm diameter
@ 1.9 K

CRYOGENIC FEED BOX FOR He 4.2-80 K

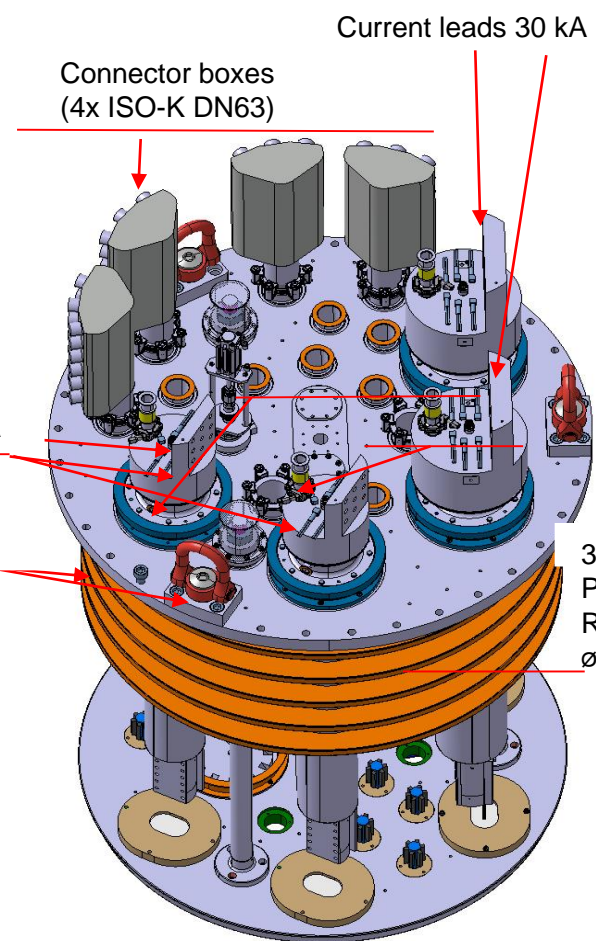
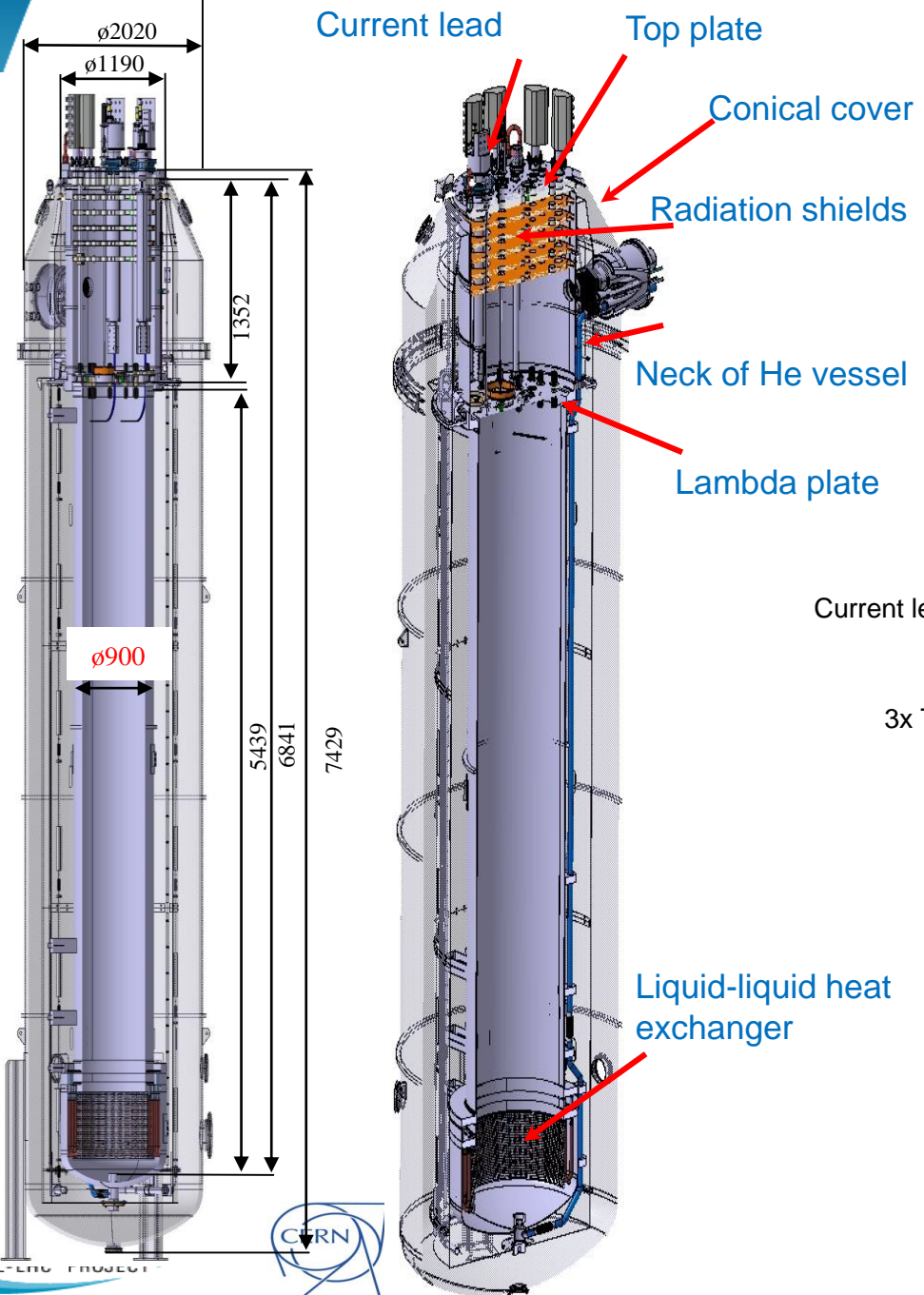


D2 magnet



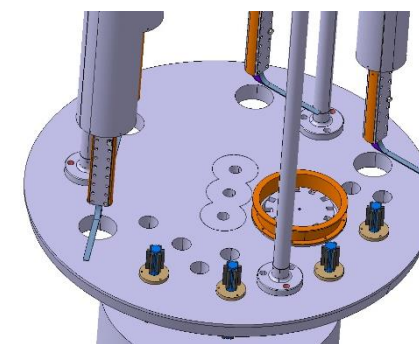
614 outer diameter
1553 length (without support)

Cryostat and Insert Cluster D



- Current leads
- CLIQ lead
- Quench heater
- Instrumentation
 - Connection box
- Magnetic measurement

Magnetic measurement



Mechanical interface: Insert / Magnet



Mechanical interface: Insert / Magnet

- Agreement on:
 - Rods / Intermediate Plate / Magnet
 - Drilled holes on the plate (adaptable)
 - Holes on magnet structure (handling)

λ plate

Holding plate

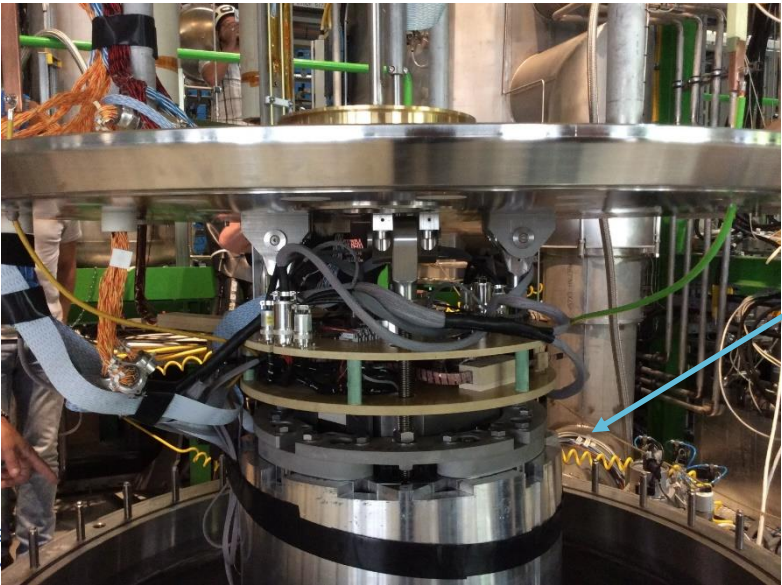
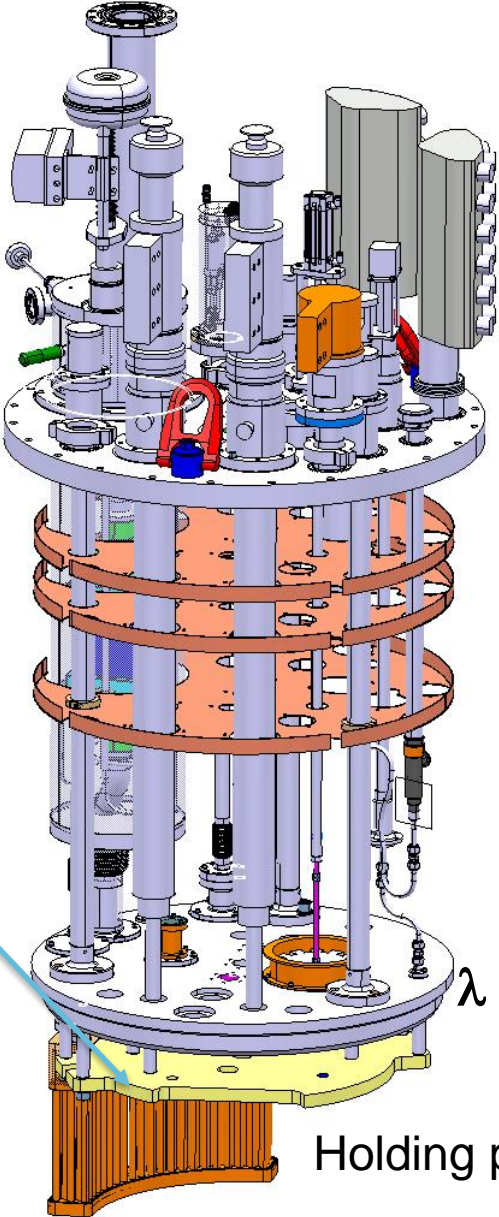


Plate
for magnet weight support

OR

Top plate

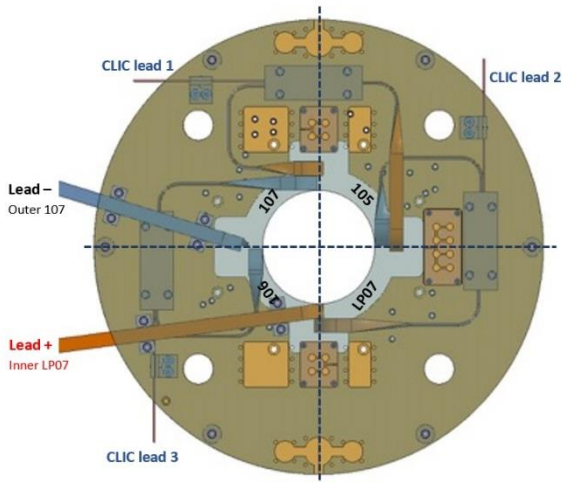


λ plate

Holding plate

Power connection: Leads / Magnet

- Agreement on:
 - Magnet NbTi leads path
 - Copper stabilization
 - Cable dimension for clamp



Electrical interface: Insert / Probes

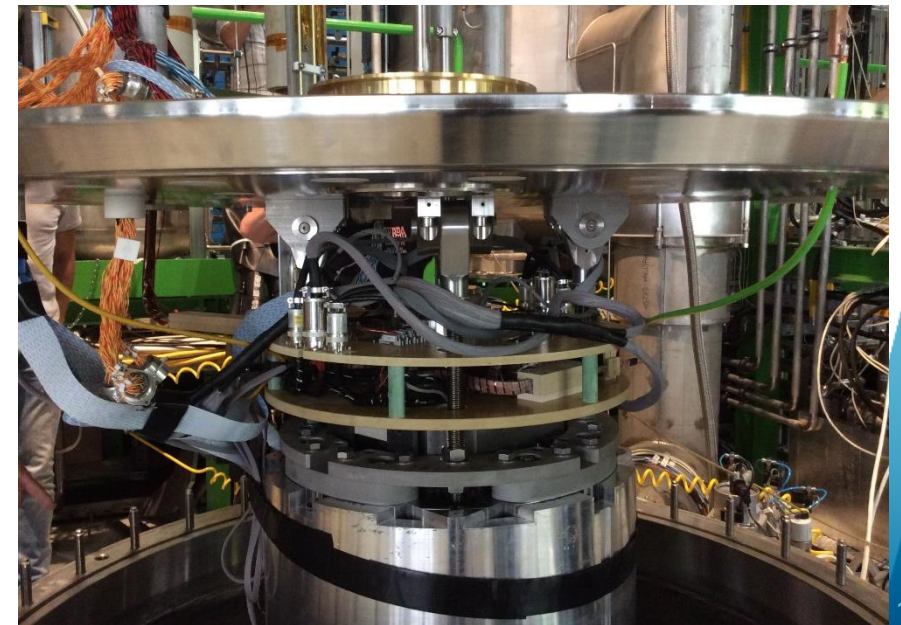
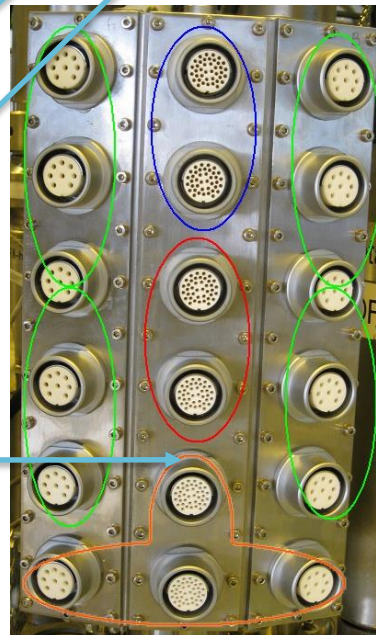
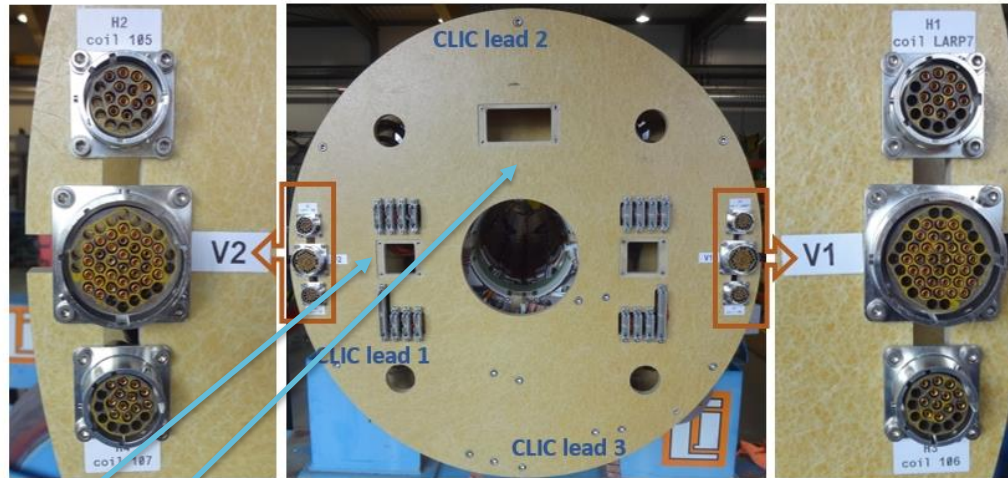
- Types of sensor
 - Vtaps
 - Strain gauges
 - Fiber Optic Sensor
 - CERNOX

- Types of connector

- λ -plate / Magnet
 - Burndy (Vtaps, QH)
 - M3 flat connector (SG)
 - Optic interconnect

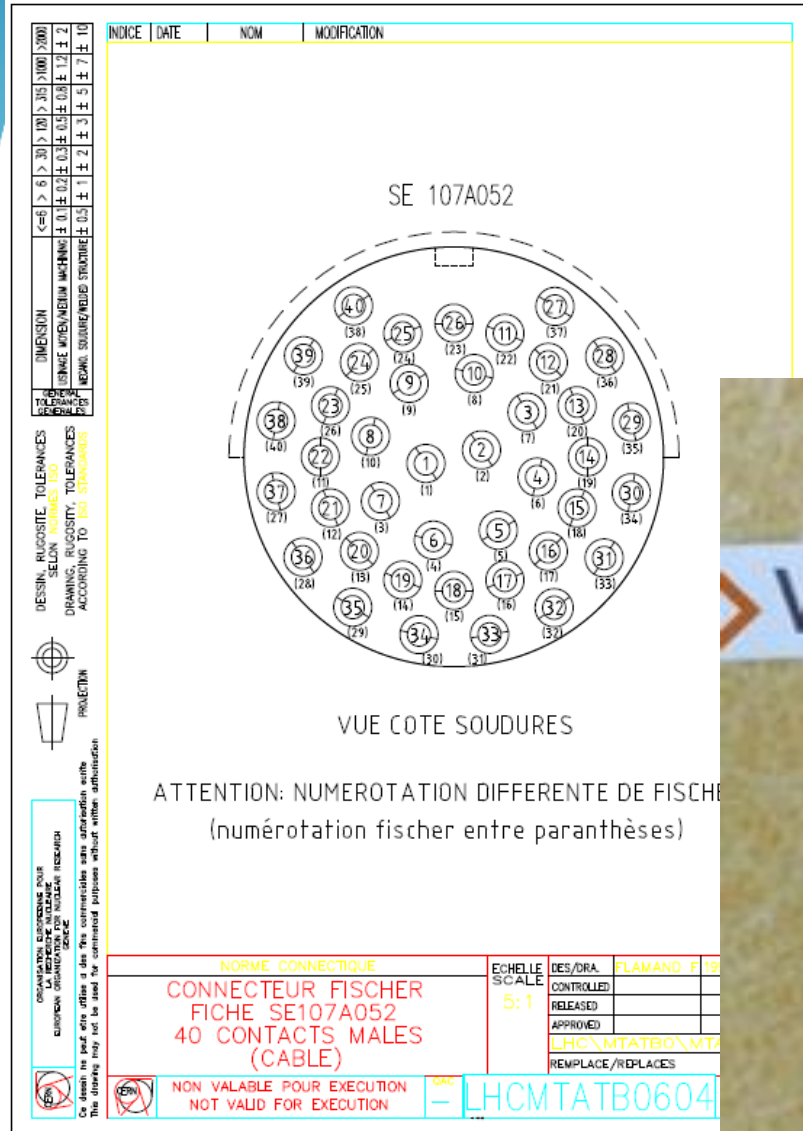
- Connection box
 - Fisher (40 ou 8 pins)

Burndy Connector Labelling

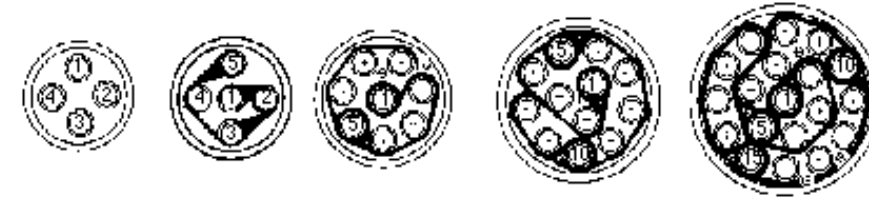


Electrical interface: Insert / Probes

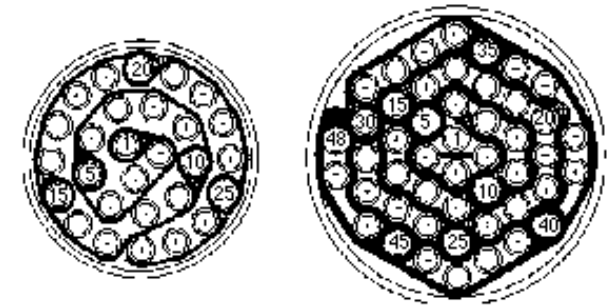
- Agreement on cabling and number of instrumentation



FICHES MALES (vue côté accouplement)



COULEUR : Blanc



PRISES FEMELLES (vue côté accouplement)



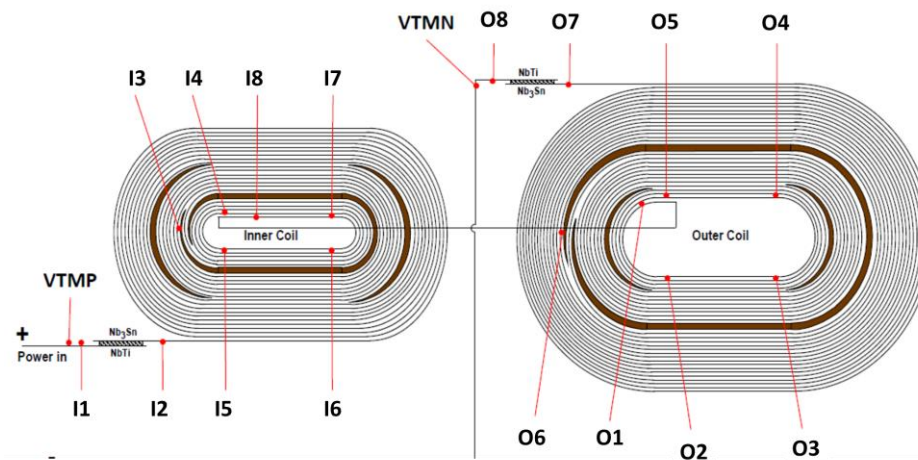
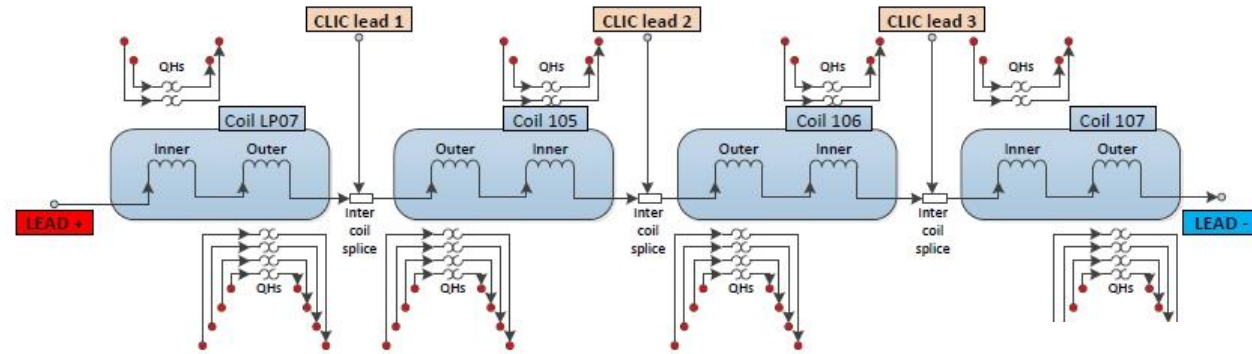
COULEUR : Jaune



Data Acquisition Systems

- Agreement:
 - On electrical scheme
 - On magnet protection strategy

MQXS
HCMQXFS001-CR000003



Data Acquisition Systems



LHC Project Doc
CERN Div./Group or Supplier
TE/MS
EDMS Docu
1518

DAQ SPECIFIED PARAMETERS

Input channels:	+/- 10 V and
Nr of HF channels:	200 differential
HF frequency:	200 kHz
HF,MF,LF resolution:	16 bit resolution
HF,MF,LF accuracy:	1mV
MF frequency:	50 kHz
Nr of LF channels:	144
LF frequency:	1kHz
Timing:	GMT synchronization

NI PXIe-6358

Simultaneous X Series Data Acquisition



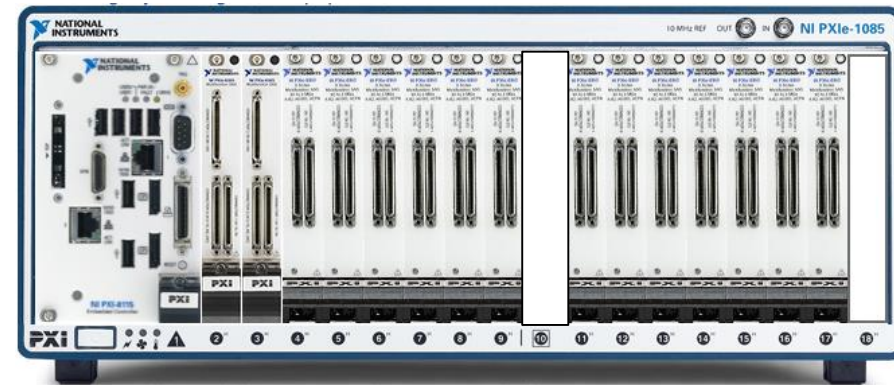
[Zoom/Alternate Images](#)

Example of HF system

Starting at ~~\$ 6,086~~ **\$ 5,355.68** (view pricing options)

[View Data Sheet](#)

- 16 simultaneous analog inputs at 1.25 MS/s/ch with 16-bit resolution; 20 MS/s total AI throughput
- Four analog outputs, 3.33 MS/s, 16-bit resolution, ± 10 V
- 48 digital I/O lines (32 hardware-timed up to 10 MHz)
- Four 32-bit counter/timers for PWM, encoder, frequency, event counting, and more
- Analog and digital triggering and advanced timing with NI-STC3 technology
- Support for Windows 7/Vista/XP/2000



Data Analysis with DIADEM

Discussion

- Need to agree on:
 - Cryostats: HFM or Cluster D would host D2.
 - Technical drawings for CAD integration (Insert / magnet / magnetic shaft)
 - Instrumentation number and connector cabling
 - Magnet integrity checks (High Voltage test requirement, quench protection strategy)
 - Test plan details (standard procedure to be adapted to D2)
 - Planning for 2018 (delivery at SM18, test due date)

Thank you for your attention



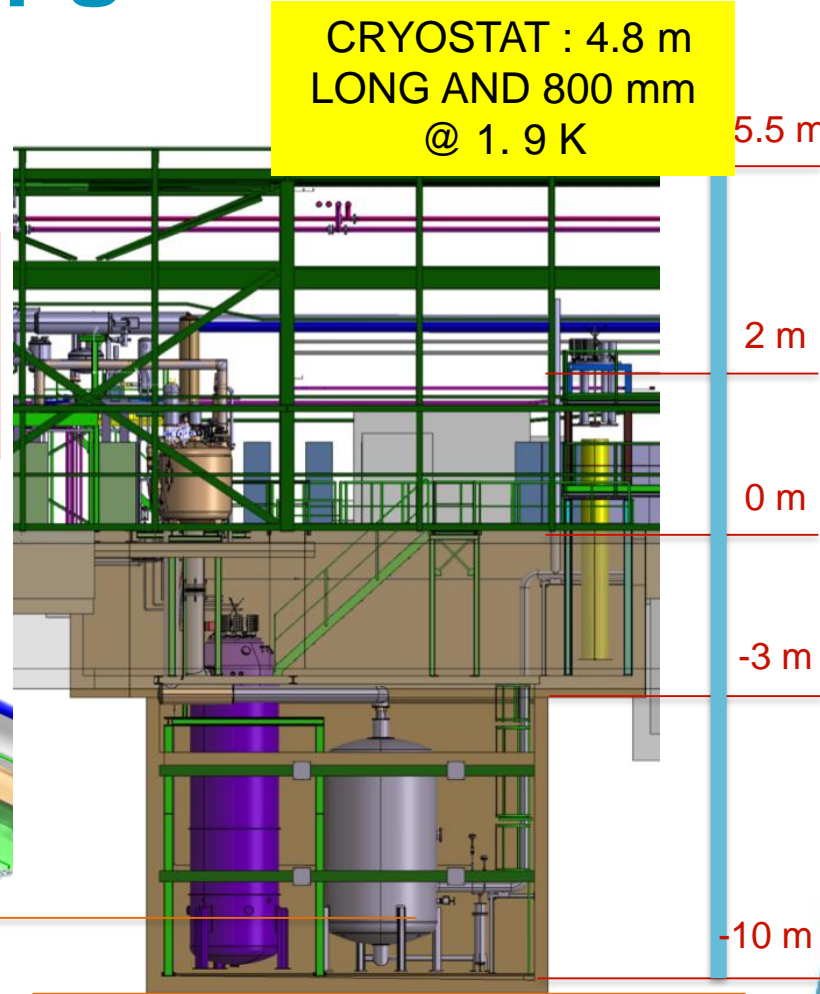
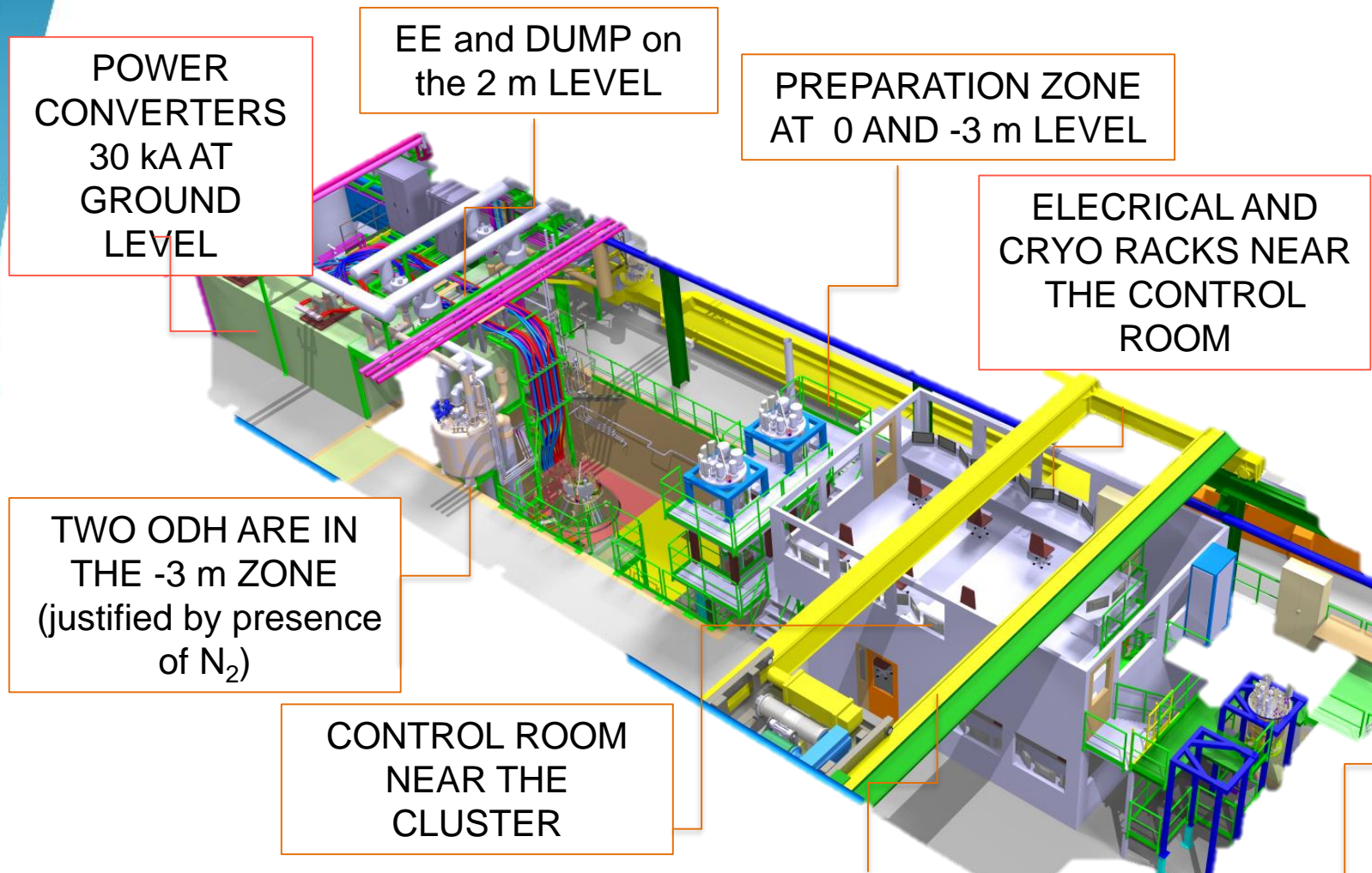
The image shows a browser window with the URL `indico.cern.ch/event/645011`. The page displays a meeting agenda with the following items:

- 09:30 → 09:50 **Magnetic measurement requirements, (INFN) discussion on hardware adaptation, actions (CERN)** 20m
- 09:50 → 10:05 **Presentation of vertical test cryostat, main interfaces, common mechanical adaptation, (CERN TF)** 15m
- 10:05 → 10:20 **Instrumentation table by INFN, discussions (all)** 15m
- 10:20 → 10:40 **Discussion on DAQ instrumentation interface : connectors types (QHs, VTs, SG, TS) , leads lengths, number of channels (CERN TF, EN-MME M Guinchard)** 20m
 - INFN_D2_short Mod...
 - INFN_D2_short Mod...
- 10:40 → 10:50 **Optical strain fiber experience on MQX, discussion coil OF sensing proposal (A. Chiuchiolo)** 10m
- 10:50 → 11:10 **Discussion on interface preparation of coils, cryostat (structure preload, splices on leads, Cryostat interface flange, ...) (INFN, CERN)** 20m
- 11:10 → 11:25 **QA Hi-Voltage test before transport (INFN) , at reception and after CD test (CERN)** 15m
- 11:25 → 11:40 **Quench protection test interface, Common Test scenario plan proposal (CERN, MSC TF,LMF), discussion all.** 15m
- 11:40 → 11:50 **Overall updated SM coil Schedule (INFN)** 10m

The Windows taskbar at the bottom shows the date and time as 6:27 PM on 6/6/2017, along with icons for various applications like File Explorer, Word, and Mail.



Cluster D : on going upgrade



COLD He RECOVERY BUFFER - 10 m³ à 5 bar, UNDER THE WORKING AREA IN CONFINED SPACE

Integration by A.Kosmicki