

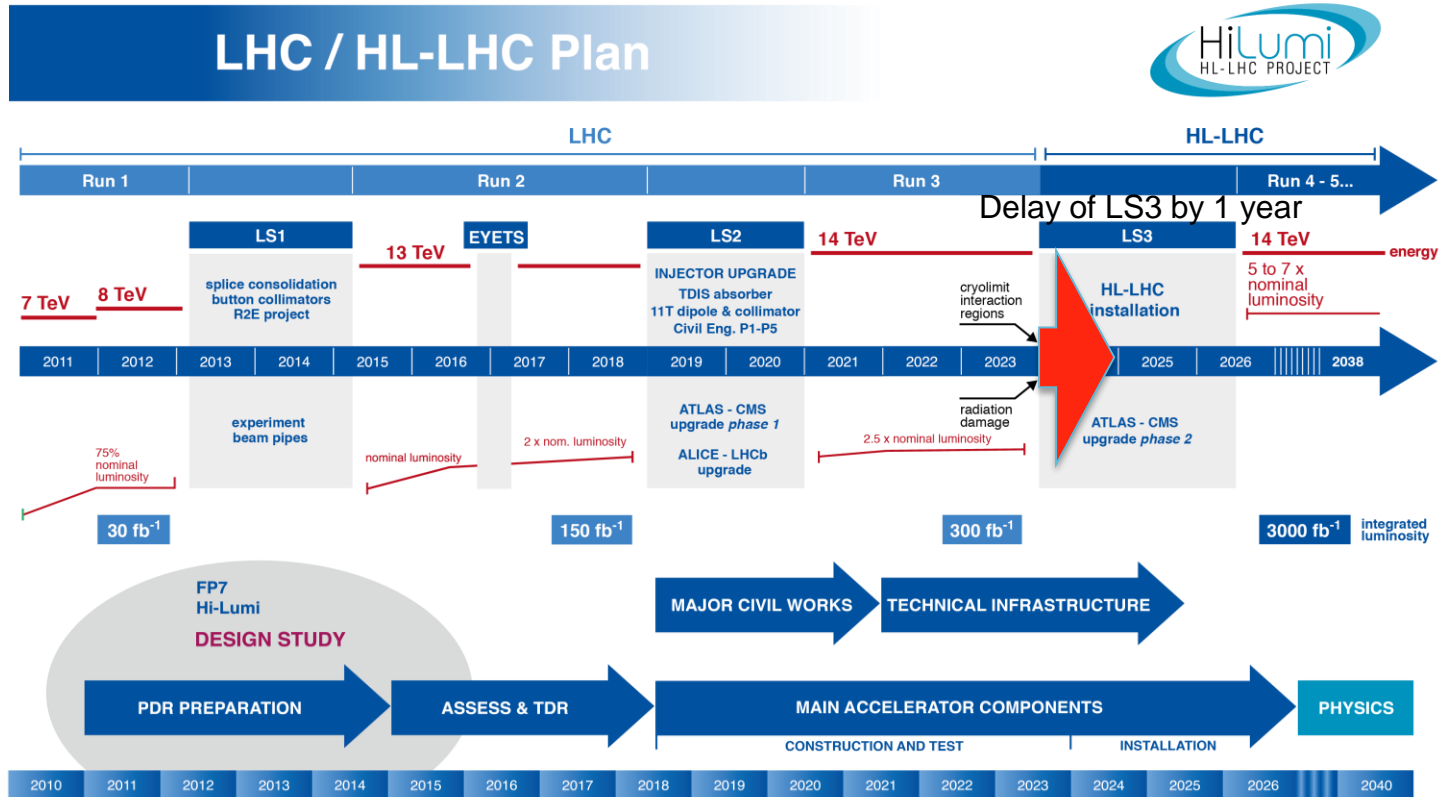


# Status of the HL-LHC Project

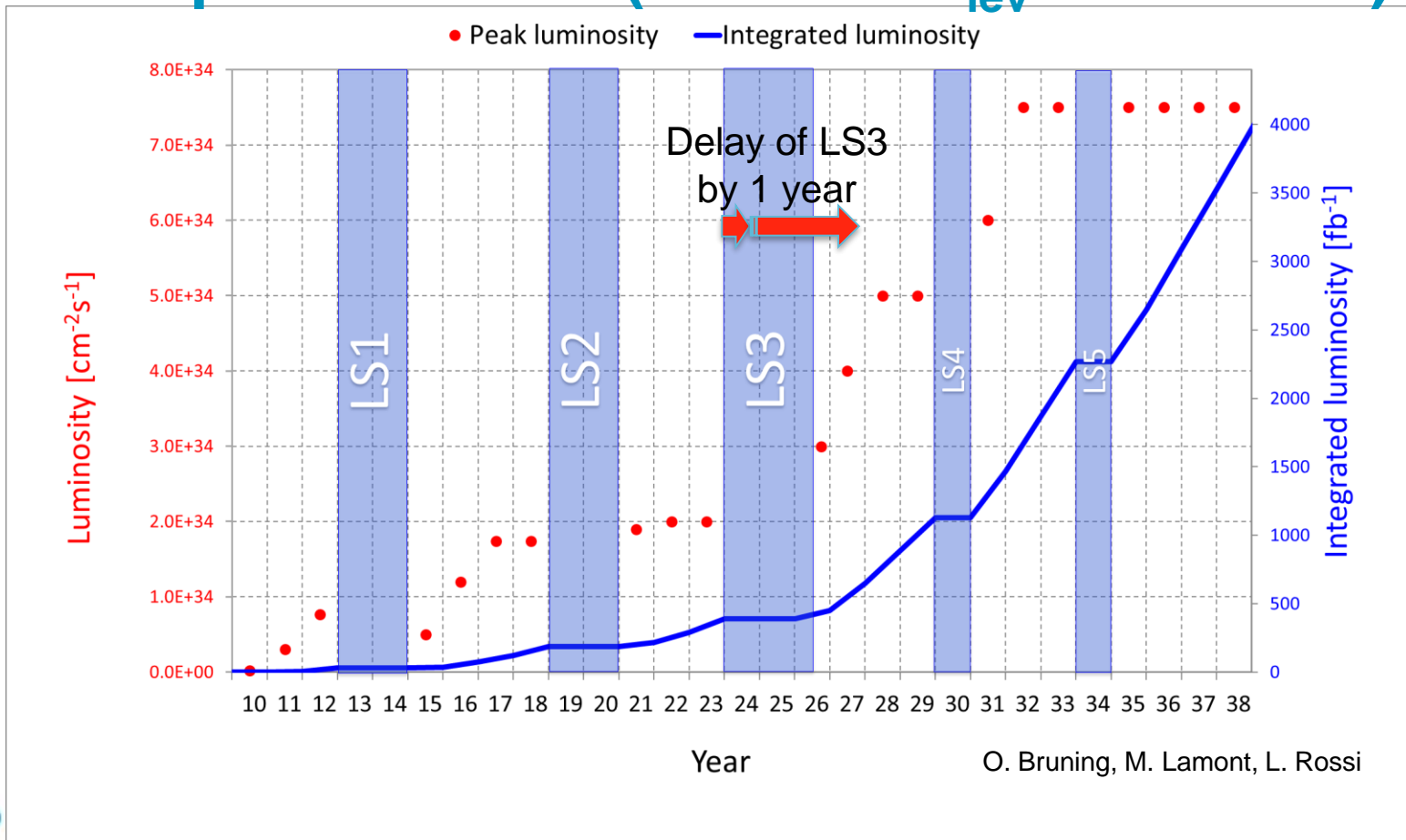
Rhodri Jones

BGC Collaboration Meeting – 16 March 2019

# High Luminosity: a luminous future for LHC!

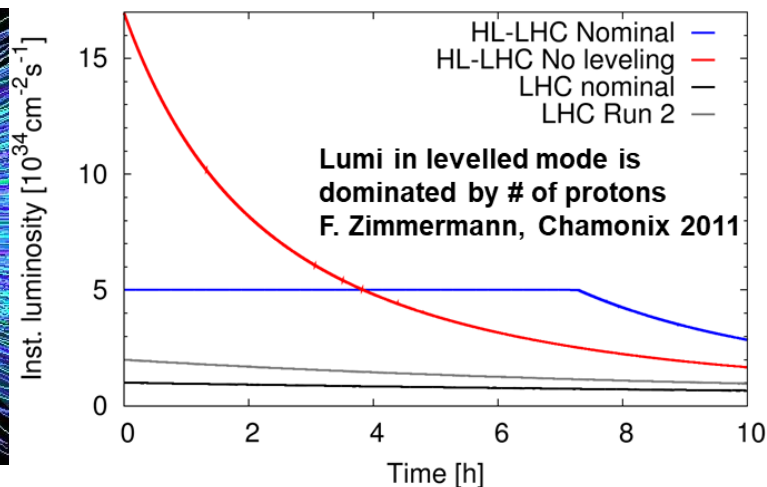
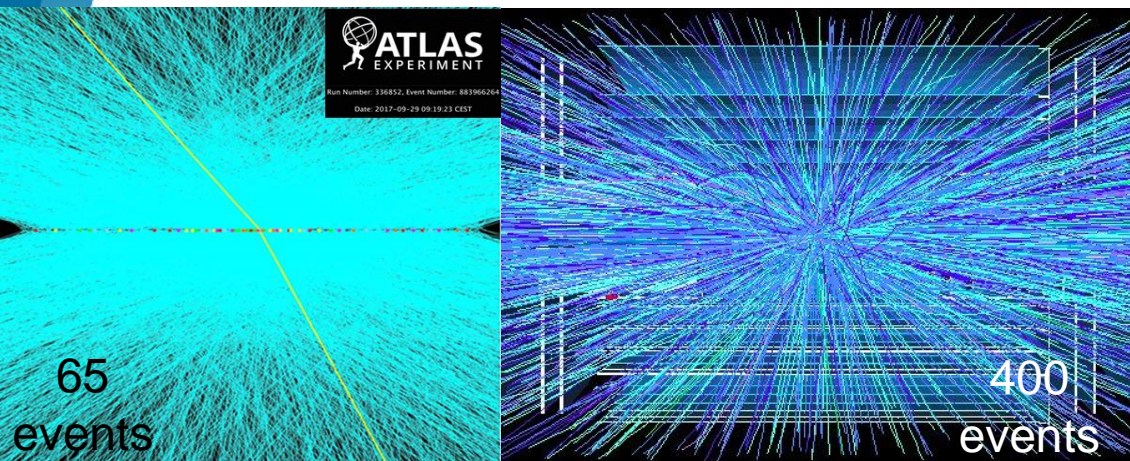


# HL-LHC performance (ultimate $L_{lev}$ from 2032)



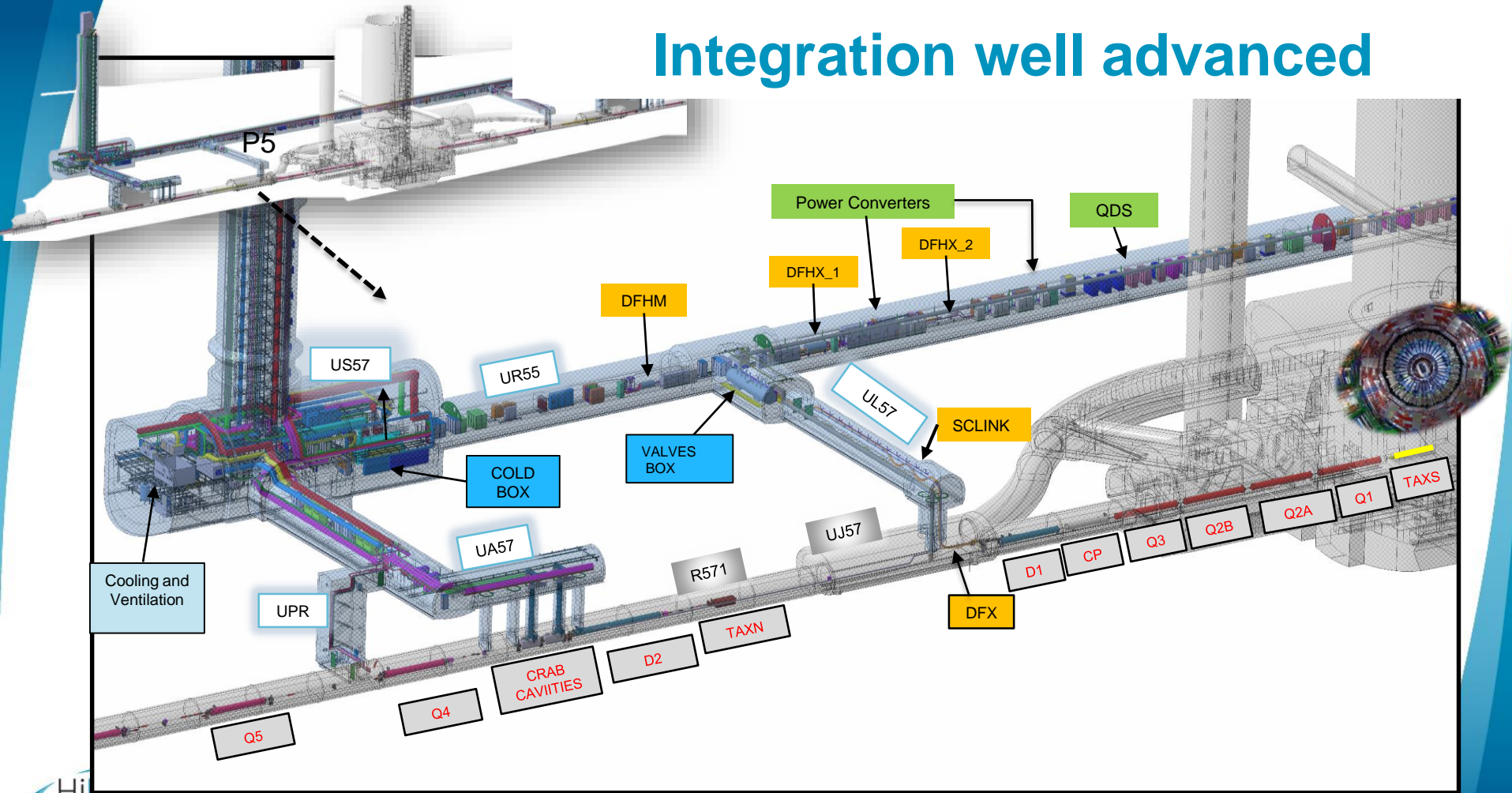
O. Bruning, M. Lamont, L. Rossi

# Goal of High Luminosity LHC (HL-LHC):



- implying an integrated luminosity of  **$250 \text{ fb}^{-1}$  per year**
  - Operation at  $\mu = 140$  for experiments
    - Operation with levelled luminosity at  **$5 \cdot 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$**
- ➔ **10x the luminosity reach of first 10 years of LHC operation!!**

# Integration well advanced

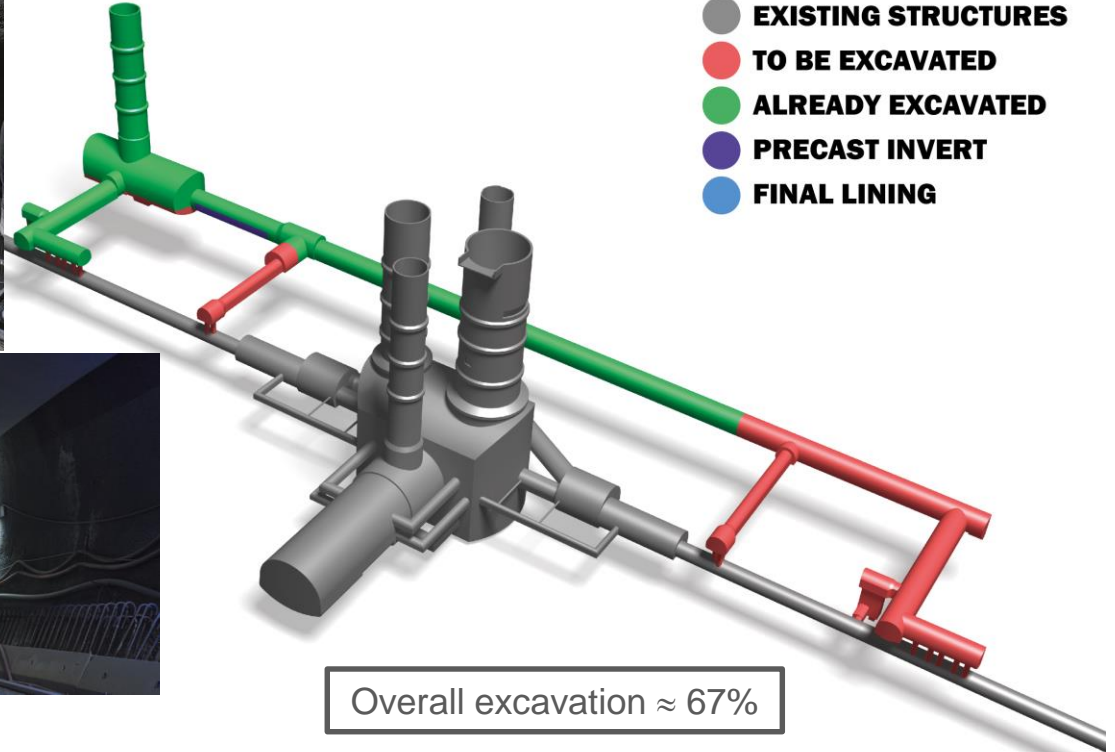


# Excavation progress at Point 1



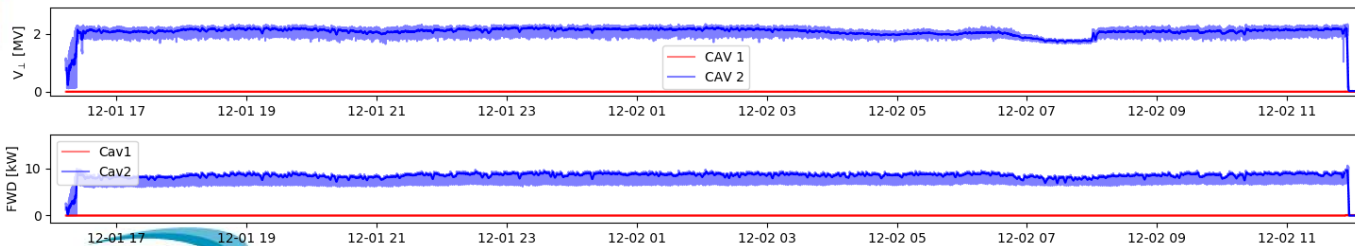
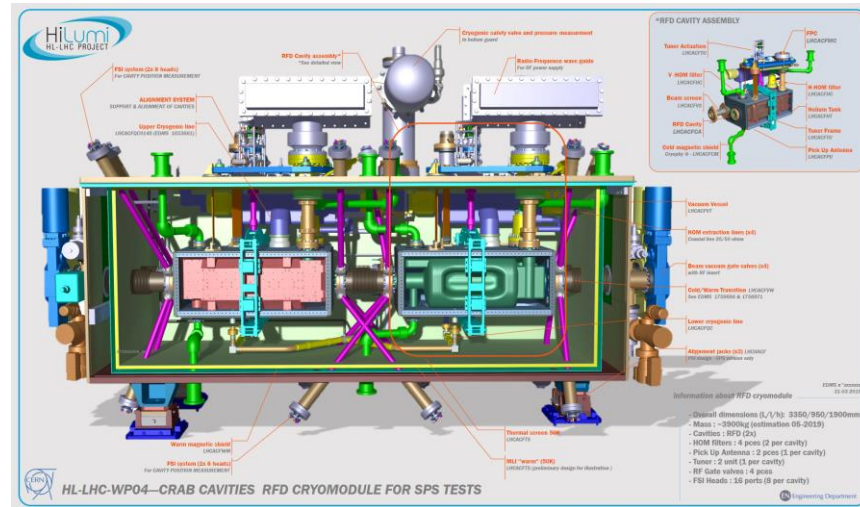
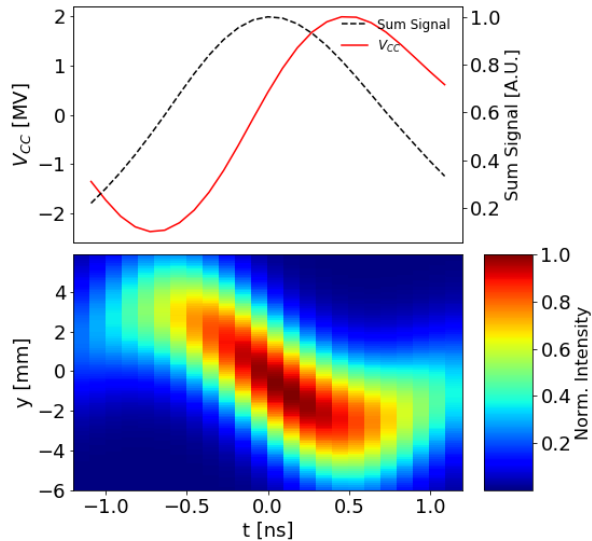
**STATUS: 2019.10.11**

- EXISTING STRUCTURES
- TO BE EXCAVATED
- ALREADY EXCAVATED
- PRECAST INVERT
- FINAL LINING



Overall excavation  $\approx$  67%

# Crab Cavity and RF: SPS test excellent!



# Real Nb<sub>3</sub>Sn magnets are coming... for first time in an accelerator!

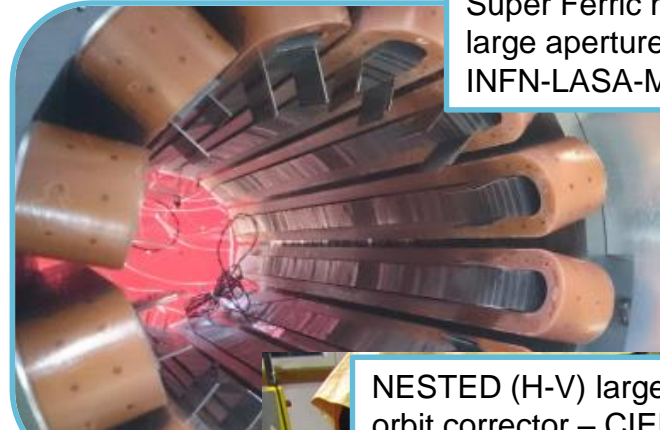




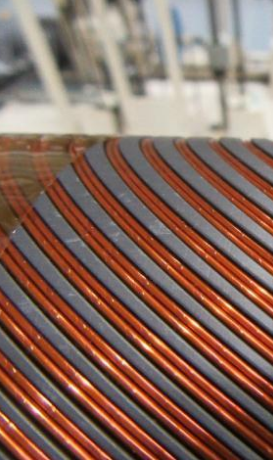
# And more technology novelties...



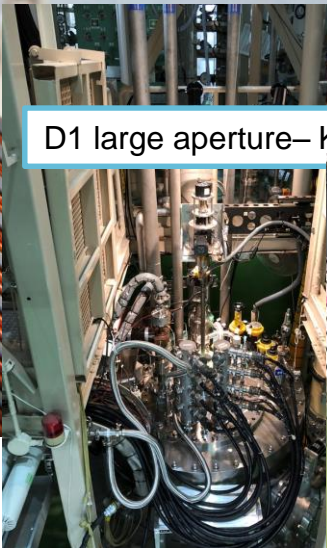
Canted Cosine Theta – CCT  
For D2 (Dual) orbit correctors  
CERN-IHEP Beijing



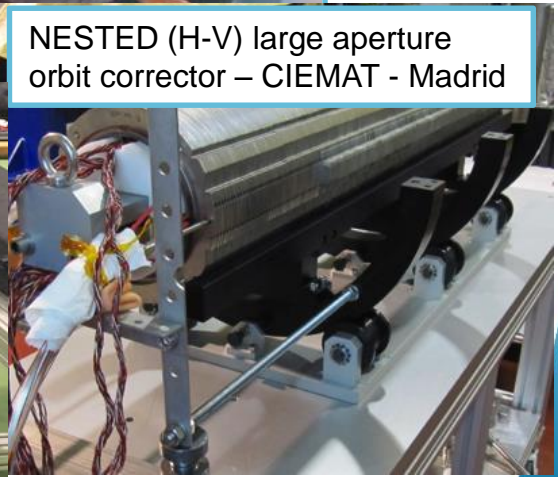
Super Ferric magnets for single  
large aperture HO Correctors  
INFN-LASA-Milan



D1 large aperture – KEK



D2 INFN-Genova  
Asymmetric coils



NESTED (H-V) large aperture  
orbit corrector – CIEMAT - Madrid

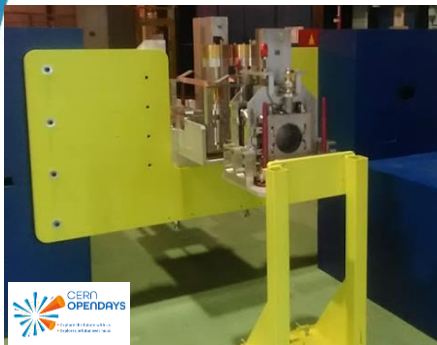
# WP6A-Cold Powering: $\text{MgB}_2$ SC links in flexible cryostat/HTS/Cu CLs: **new tech, novel concept**

First system test  
in March 2019

$\text{MgB}_2$  60m-2x18kA @ 25 K  
2x18kA REBCO Cable @ 50 K

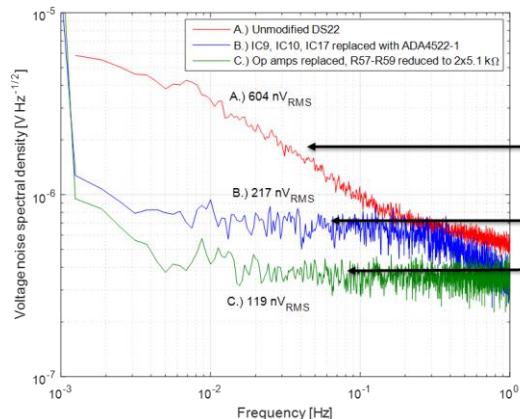


# Progress and new achievements in the project



WP8/12: Vax region at Coll-Exp. interface

Final weapon for fighting e-cloud: LESS!  
(in collaboration with UK – Univ. Dundee)

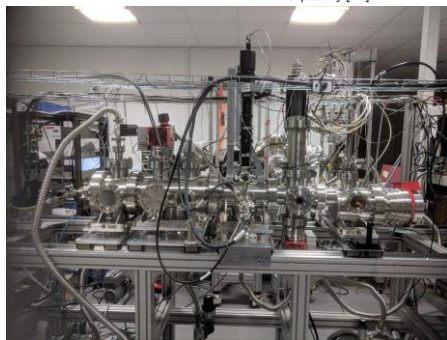


WP6B: Power Converters  
HL-LHC Class 0  
short-term stability  
requirement BW

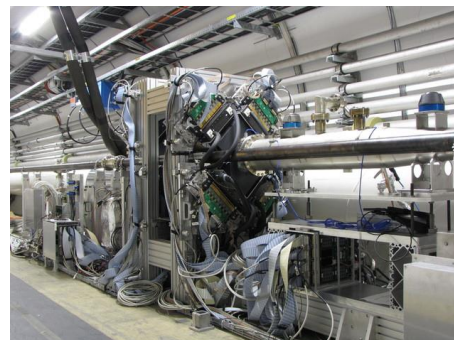
DS22

First improvement

Further improvement -> DS24  
**5x lower noise  
(2.3 effective bits)**



WP13: Gas curtain monitor  
@ Cockcroft I. Daresbury



Beam Gas Vertex proto  
working in LHC

# Decision by CERN to approve the following options Subject to ratification of Russian & UK in-kind contributions Will be introduced in Baseline 3.0

- Hollow Electron Lens **including Gas Curtain Monitor**
  - Cost: **11,200 kCHF**
  - Funding:
    - **4,500** kCHF CERN + **6,000** kCHF Russia (BINP)
    - **700** kCHF HL-UK2
      - Approved by UK
      - Deliverables & acceptance criteria being finalised
- Beam Dump upgrade
  - To mitigate new failure mode discovered in 2018
  - Collaboration with BINP Russia
- Crystal collimation
  - Part of Russian Collaboration



***Welcome to the 2020  
Beam Gas Curtain Collaboration Meeting!***