



Update on Crab Cavities LHC

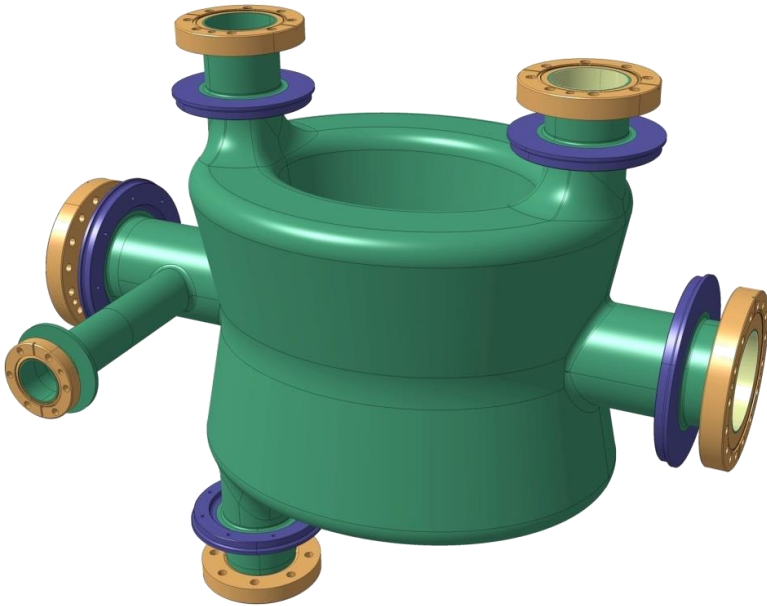
Ofelia Capatina (CERN, EN-MME) on behalf of the
WP4 members



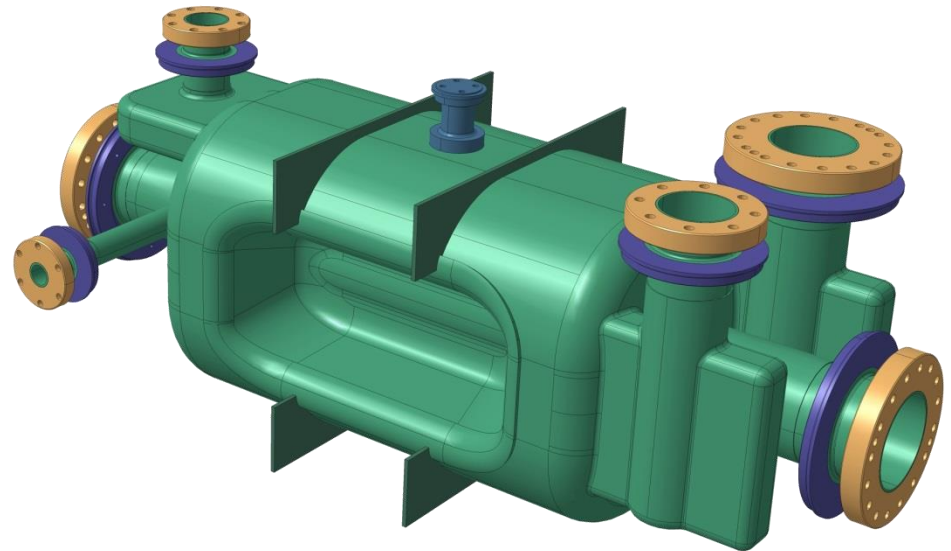
HL-LHC Integration Meeting: n93 , 15 December 2017

Cavity types

- Two types of cavities required (vertical, horizontal)
 - Baseline : adopt both cavity types and exploit their natural RF topology
 - Note: Both cavities could be used in the other plane

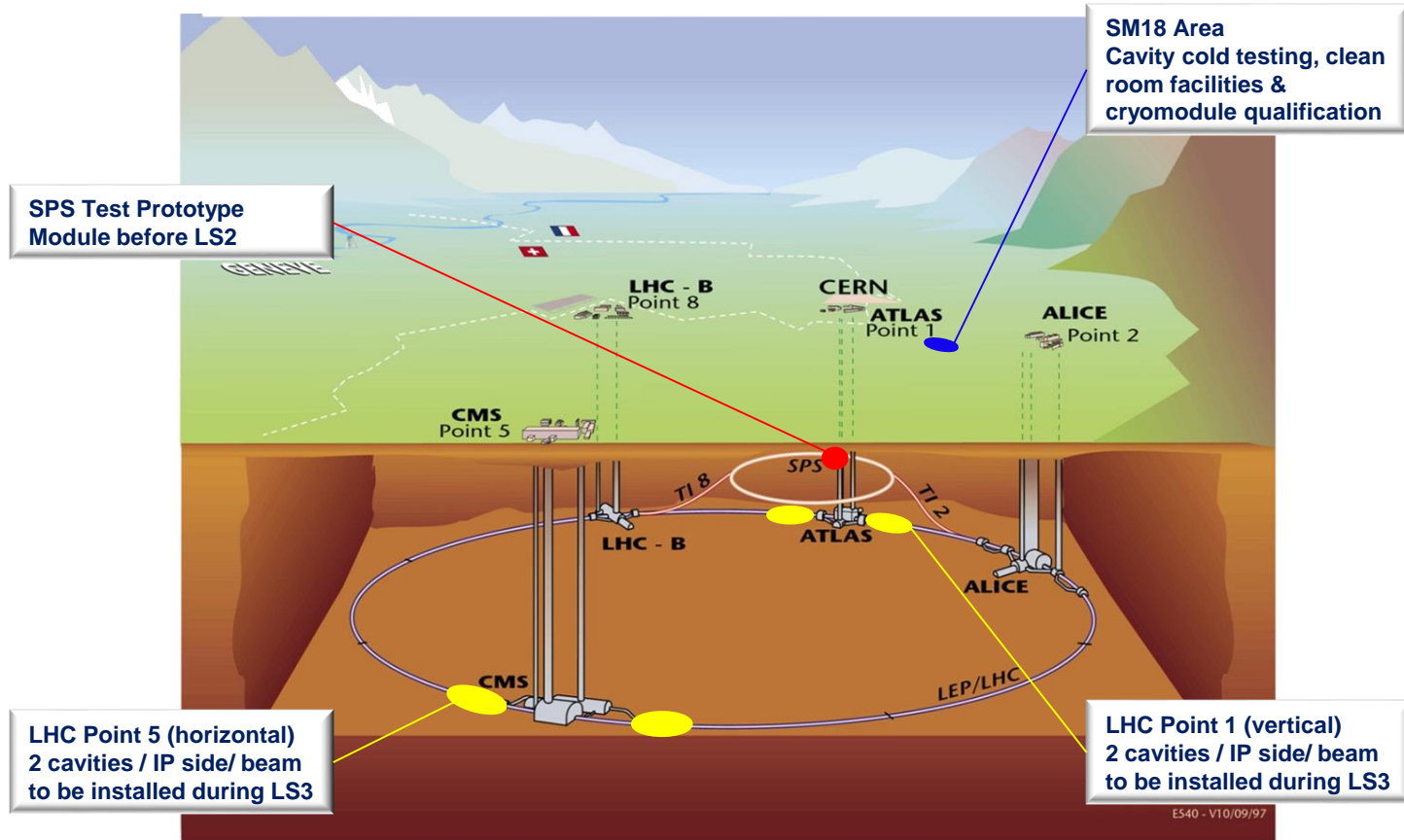


Double Quarter Wave (DQW) cavity –
Vertical – to be used in Point 1 (ATLAS)



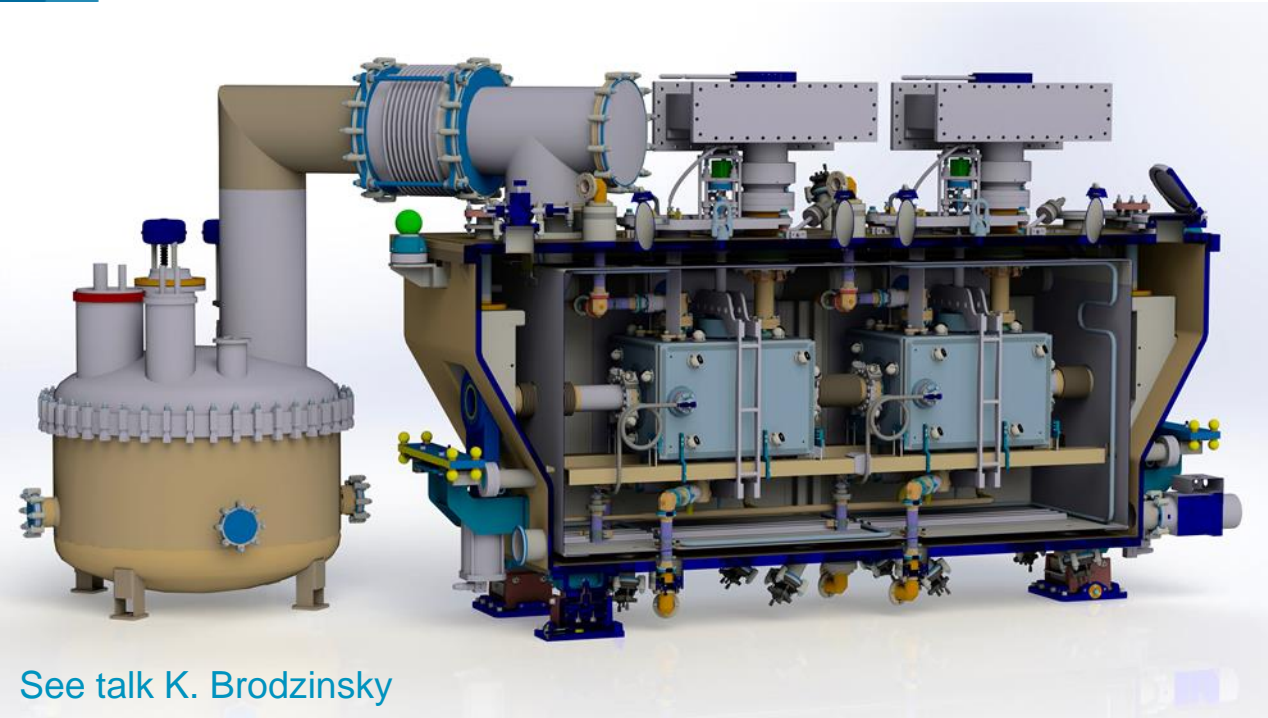
RF Dipole cavity – Horizontal – to be used in
Point 5 (CMS)

General plans



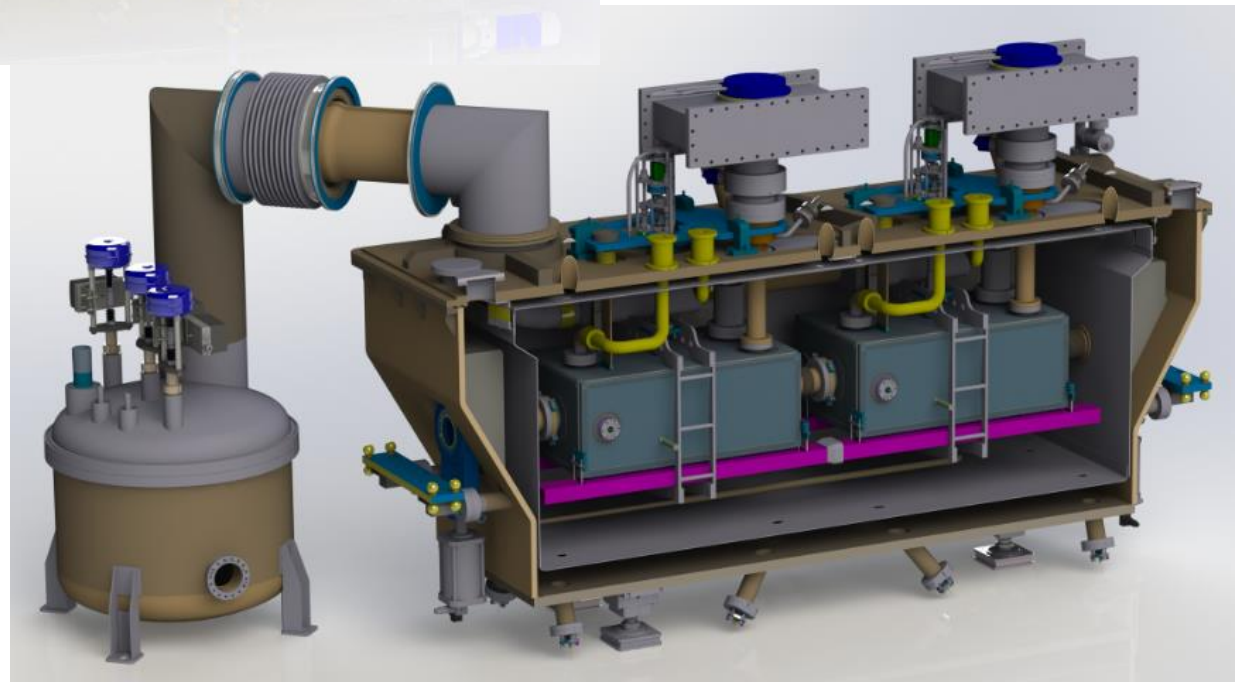
Cryomodules

SPS DQW cryomodule
+ service module



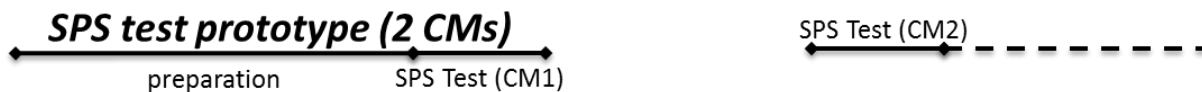
See talk K. Brodzinsky

RFD

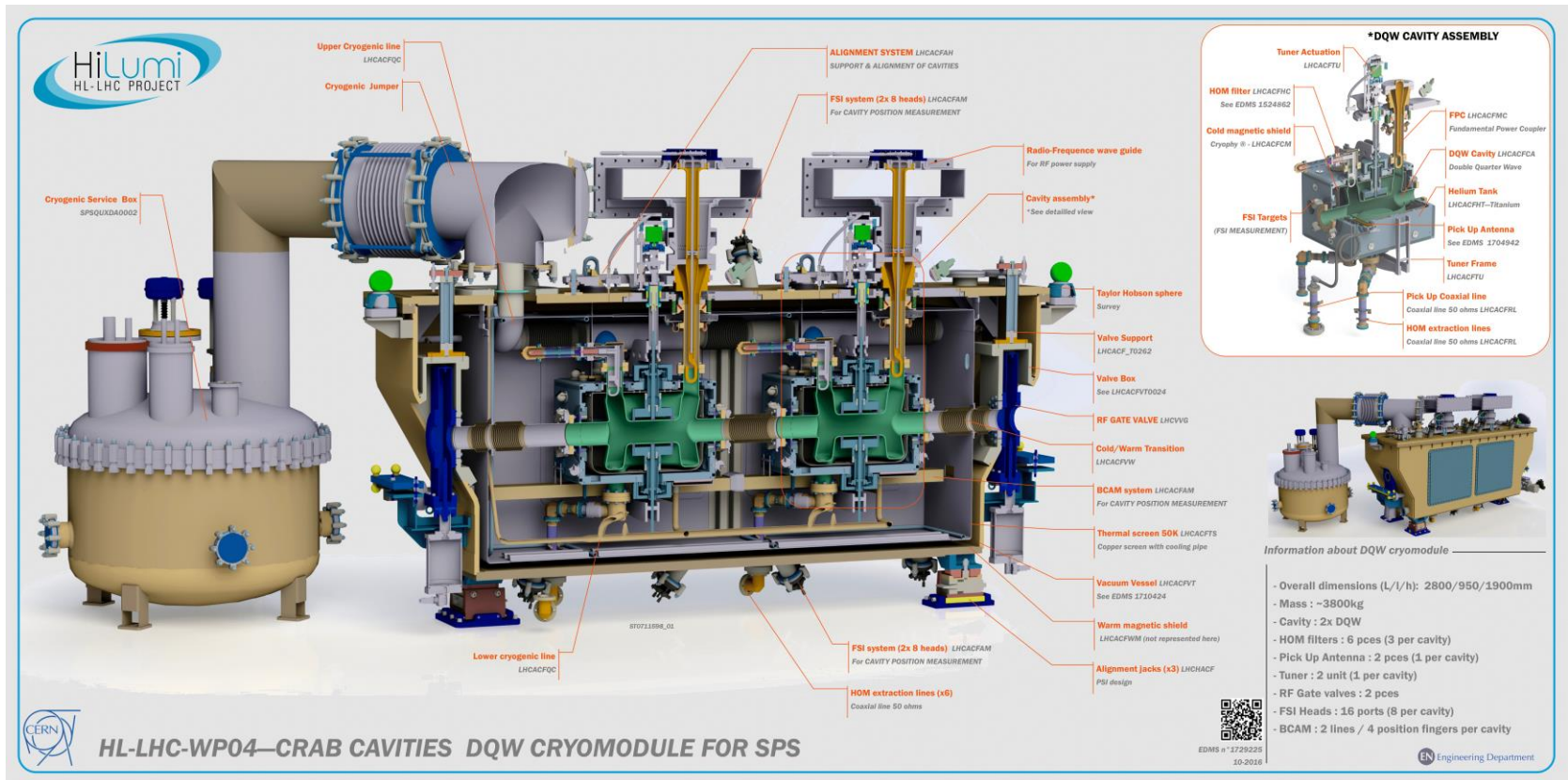


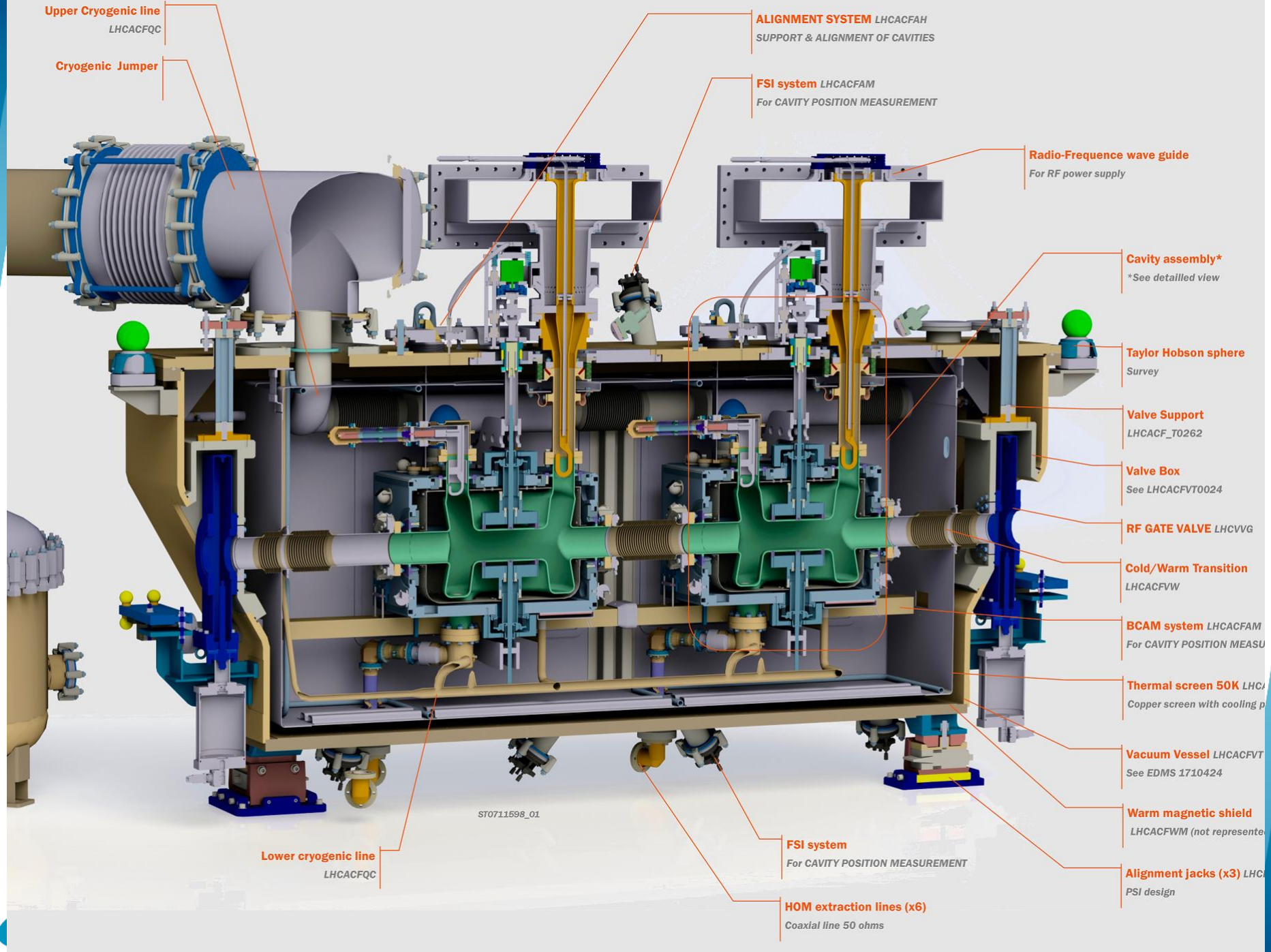
General plans

- 2 cryomodules for SPS tests
 - 1 cryomodule with 2 identical cavities (type «vertical» - DQW)
 - Design as much as possible coherent with LHC
 - To be tested in SPS in 2018
 - 1 cryomodule with 2 identical cavities (type «horizontal» - RFD)
 - Design to be done as LHC prototype
 - To be tested in SPS after LS2, in 2021
- 2 cavities pre-series for LHC (one of each type)
- 8 cryomodules (4 of each type) for installation in LHC during LS3
+ 2 spares (1 of each type)



DQW Cryomodule for SPS





Upper Cryogenic line
LHCACFQC

Cryogenic Jumper

ALIGNMENT SYSTEM LHCACFAH
SUPPORT & ALIGNMENT OF CAVITIES

FSI system LHCACFAM
For CAVITY POSITION MEASUREMENT

Radio-Frequency wave guide
For RF power supply

Cavity assembly*
*See detailed view

Taylor Hobson sphere
Survey

Valve Support
LHCACF_T0262

Valve Box
See LHCACFVT0024

RF GATE VALVE LHCVVG

Cold/Warm Transition
LHCACFWW

BCAM system LHCACFAM
For CAVITY POSITION MEASUREMENT

Thermal screen 50K LHCACFWW
Copper screen with cooling pipes

Vacuum Vessel LHCACFVT
See EDMS 1710424

Warm magnetic shield
LHCACFWM (not represented)

Alignment jacks (x3) LHCACFAM
PSI design

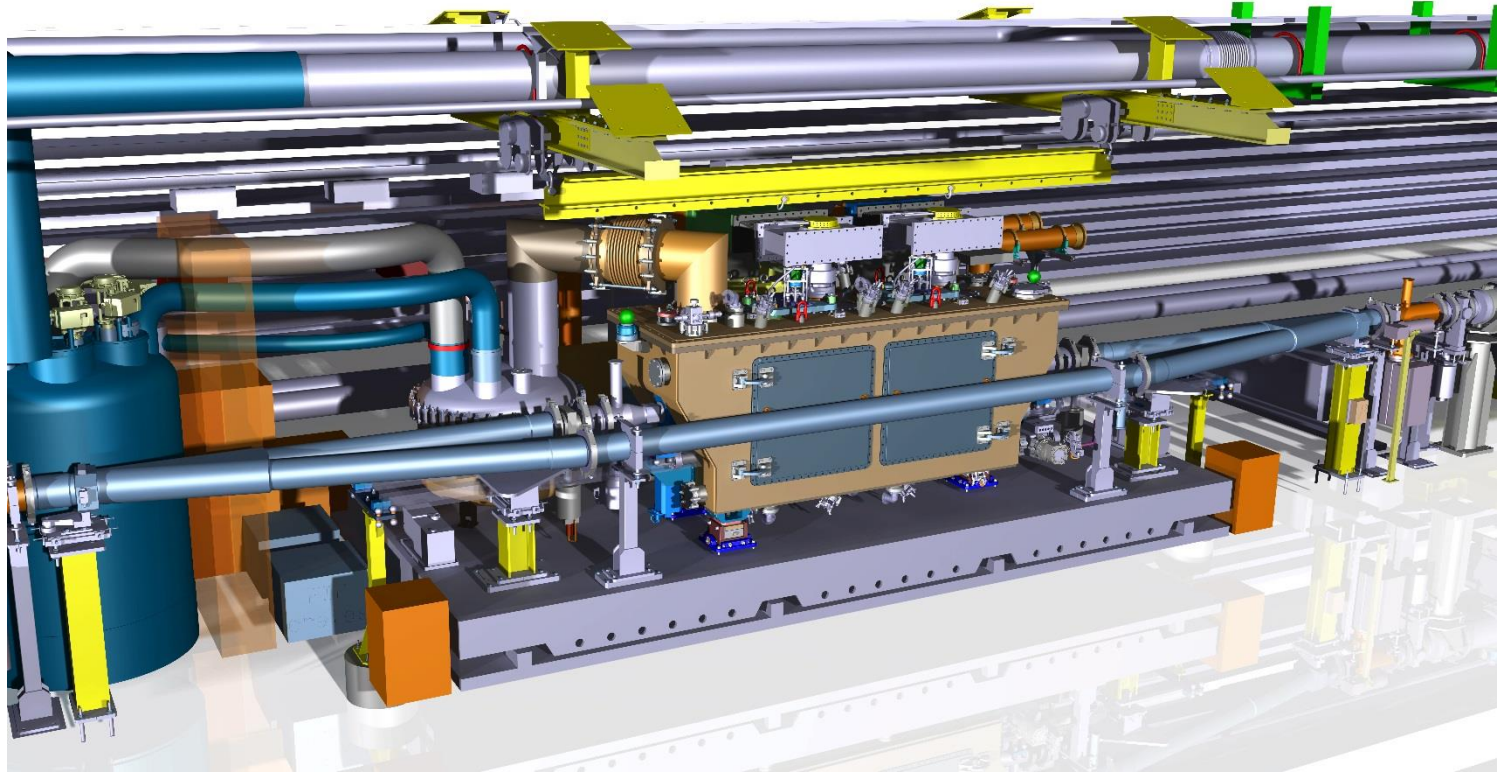
Lower cryogenic line
LHCACFQC

FSI system
For CAVITY POSITION MEASUREMENT

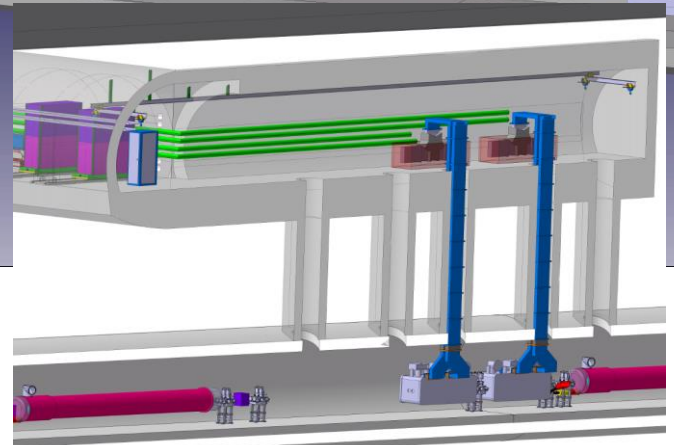
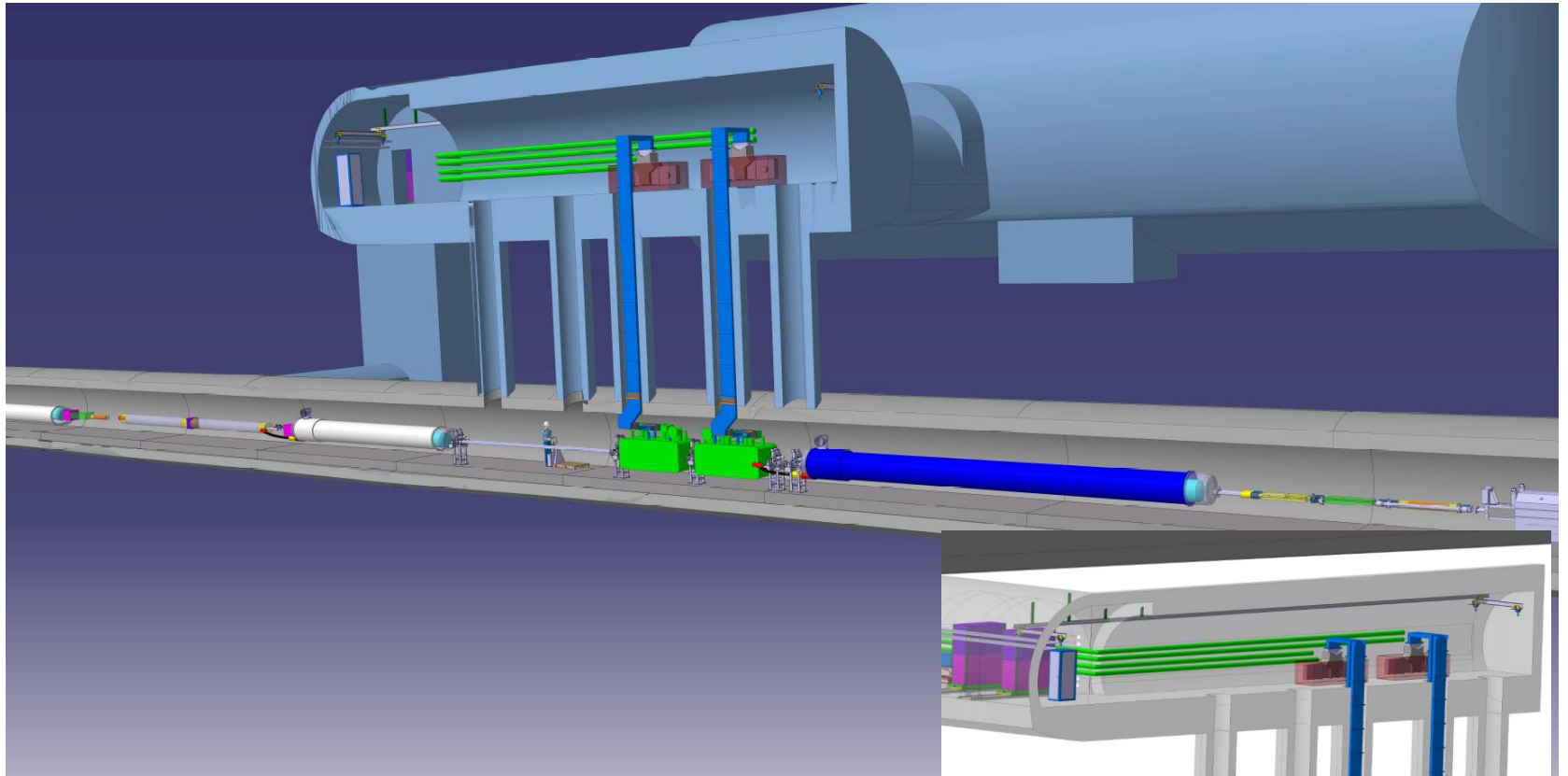
HOM extraction lines (x6)
Coaxial line 50 ohms

ST0711598_01

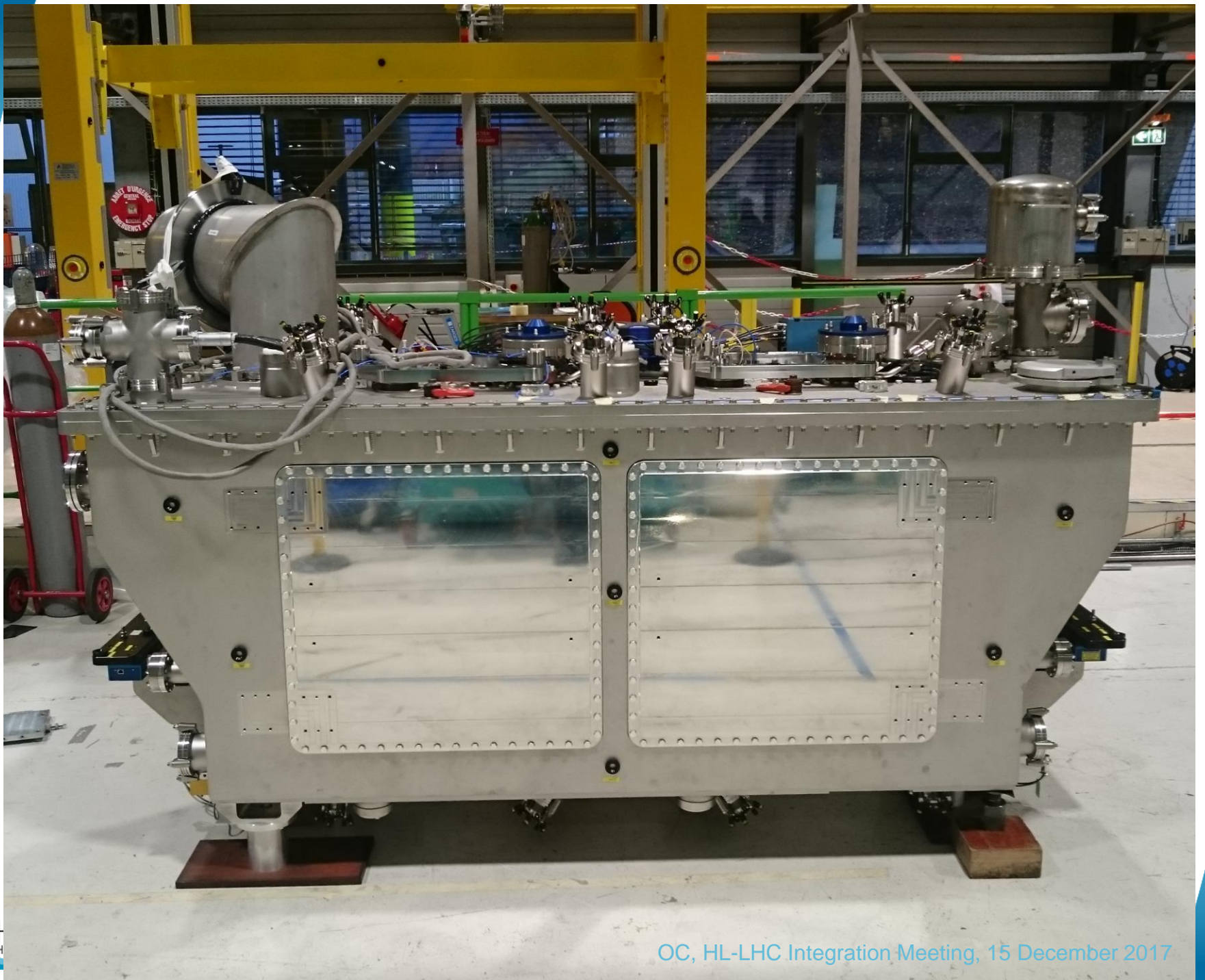
SPS test zone



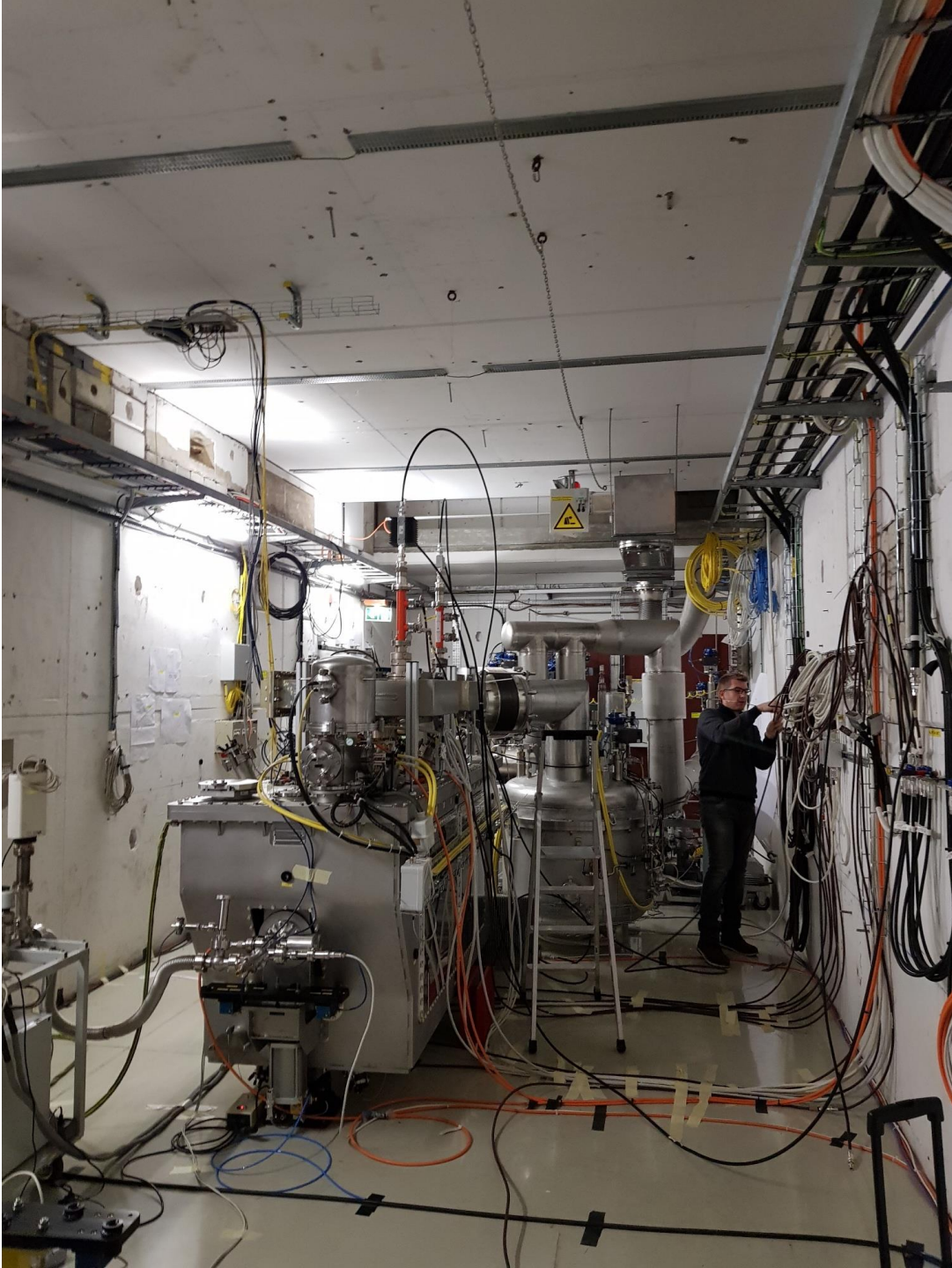
LHC

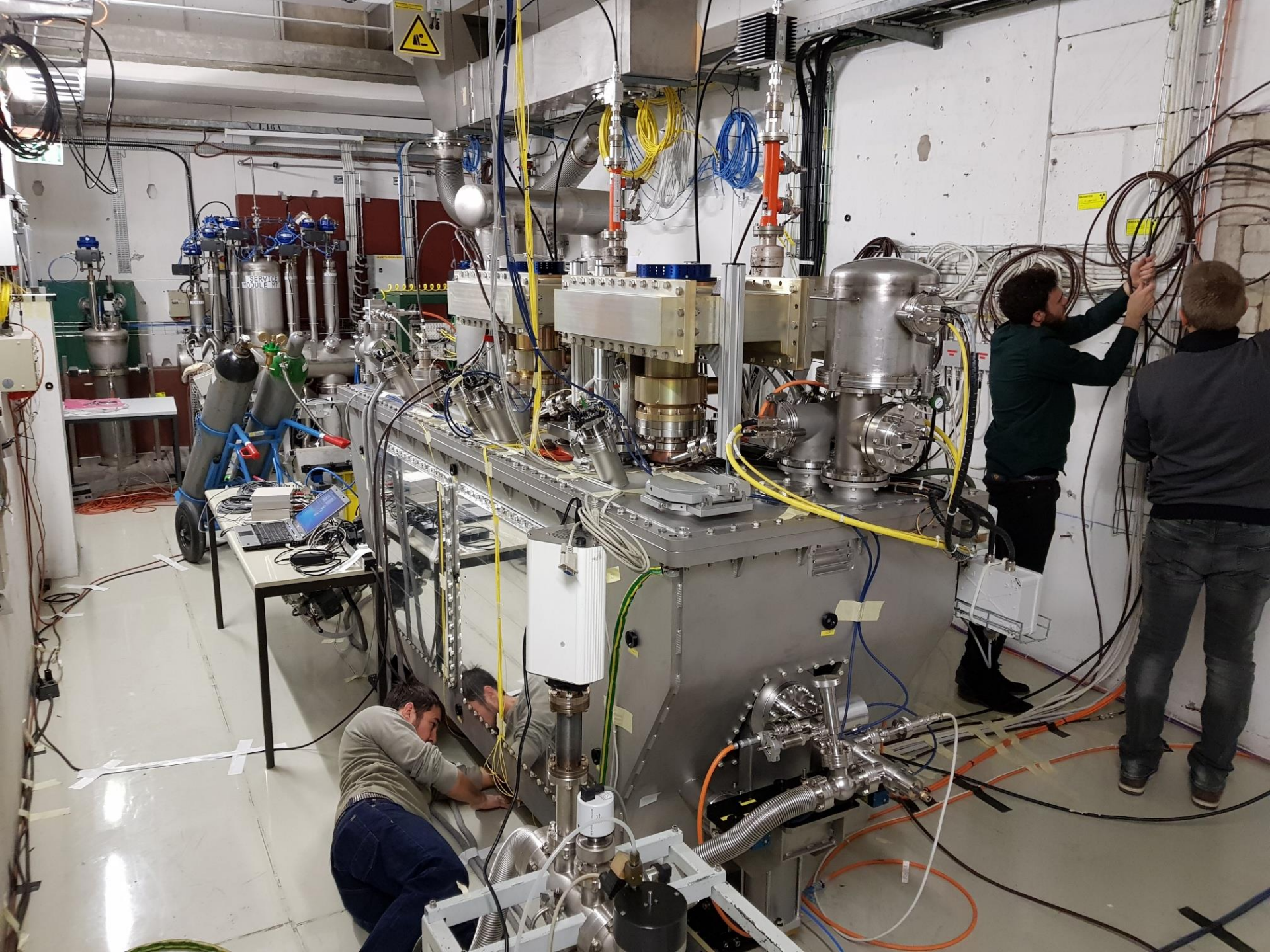


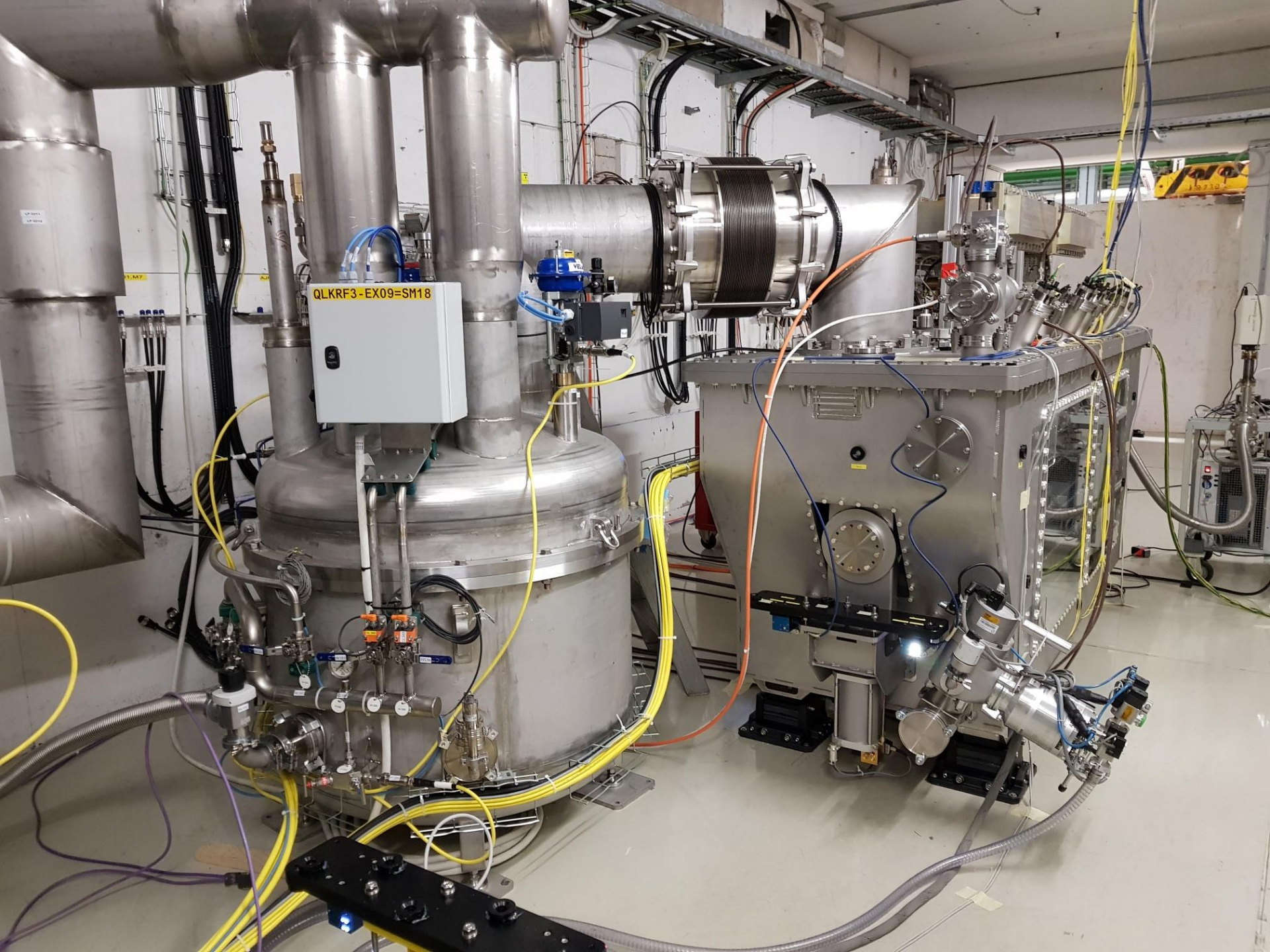












LHC cryomodule

- 2 types of cryomodules
 - DQW in point 1 : One DQW cryomodule already built for tests in SPS; will be tested in SPS next year
 - RFD in point 5 : One RFD will be build next 2.5 years to be tested in SPS but also as LHC prototype
- Similar features for both cryomodule types
 - RFD cryomodule very likely to be longer than DQW cryomodule
 - Longest cryomodule integrated at the moment in the LHC layout
- Additional features for LHC cryomodule with respect to SPS
 - Additional beam pipe with beam screen RF, fingers etc
 - 5K-20K additional cooling circuit
 - Removable cryogenic level probes
 - Vacuum barrier between CM and Service module
 - Safety equipment for cryogenic lines protection on CM
- Important to keep the space on top and under cryomodule available for the developments