



CC LLRF

SM18 test plan and BA6 infrastructure

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BE-RF on behalf of WP 4

Crab Cavity Technical Coordination: meeting XXVI, May 8th, 2017



Outline

- SPS CC LLRF electronics
- Lab tests
- SM18 tests
- Calendar
- SPS Infrastructure (Faraday Cage)

SPS CC LLRF electronics (1/2)

- We use the VME platform first introduced in the LHC LLRF (2007), also used in HIE-Isolde (2015), Linac4 (2016) and some SPS upgrades (2014-2017)
- We have adapted electronics designed for Linac4 (352.2 MHz RF) for operation at 400.8 MHz
- The system contains 1 crate with five modules per cavity



SPS CC LLRF electronics (2/2)

- **Hardware** (B. Kremel)
 - Clock Gen module ready (2 PCs)
 - Tuner module ready (1 PC)
 - CavLoop modules (field regulation) being adapted for 400.8 MHz
- **Firmware** (B. Kremel, J. Simonin)
 - Tuner module ready
 - CavLoop under development
- **Software** (N. Stapley)
 - Fesa class for tuner module under development
 - Fesa class for CavLoop not started yet

Lab test

- A test bench is being prepared in the 864 Lab
- The tuner is “modeled” by phase-shifter
- The cavity is modeled in firmware
- First test is to validate the tuner (software/firmware/hardware) before SM18 test. Now-> mid June.

SM18 tests

- Our goal is to **commission the system as it will be in the machine**: FESA, SPS timing, Reference-driven mode, $Q_L=10^6$. Difference is the **reduced power** (no tetrode) and different cryostat.
- We will use the **vertical cryostat** to test the LLRF on the DQW equipped with a mockup tuner.
- Due to power limitations in SM18, $Q_L = 10^6$ (vs. 5×10^5 in the machine), with **reduced field**, using an 100 W amplifier (vs. 50 kW in the machine). Still 10 dBm at Ant. OK
- First **commissioning of the tuning loop, starting mid-June 2017**, when cavity returns from Japan. To be finished in 1-2 months (cryo shutdown)
- Commissioning of the **field regulation** (including RF feedback), starting **Oct after cryo shutdown**. The CavLoop module allows for both Self-Excited Loop (SEL) and Reference-Driven mode as intended in the machine.



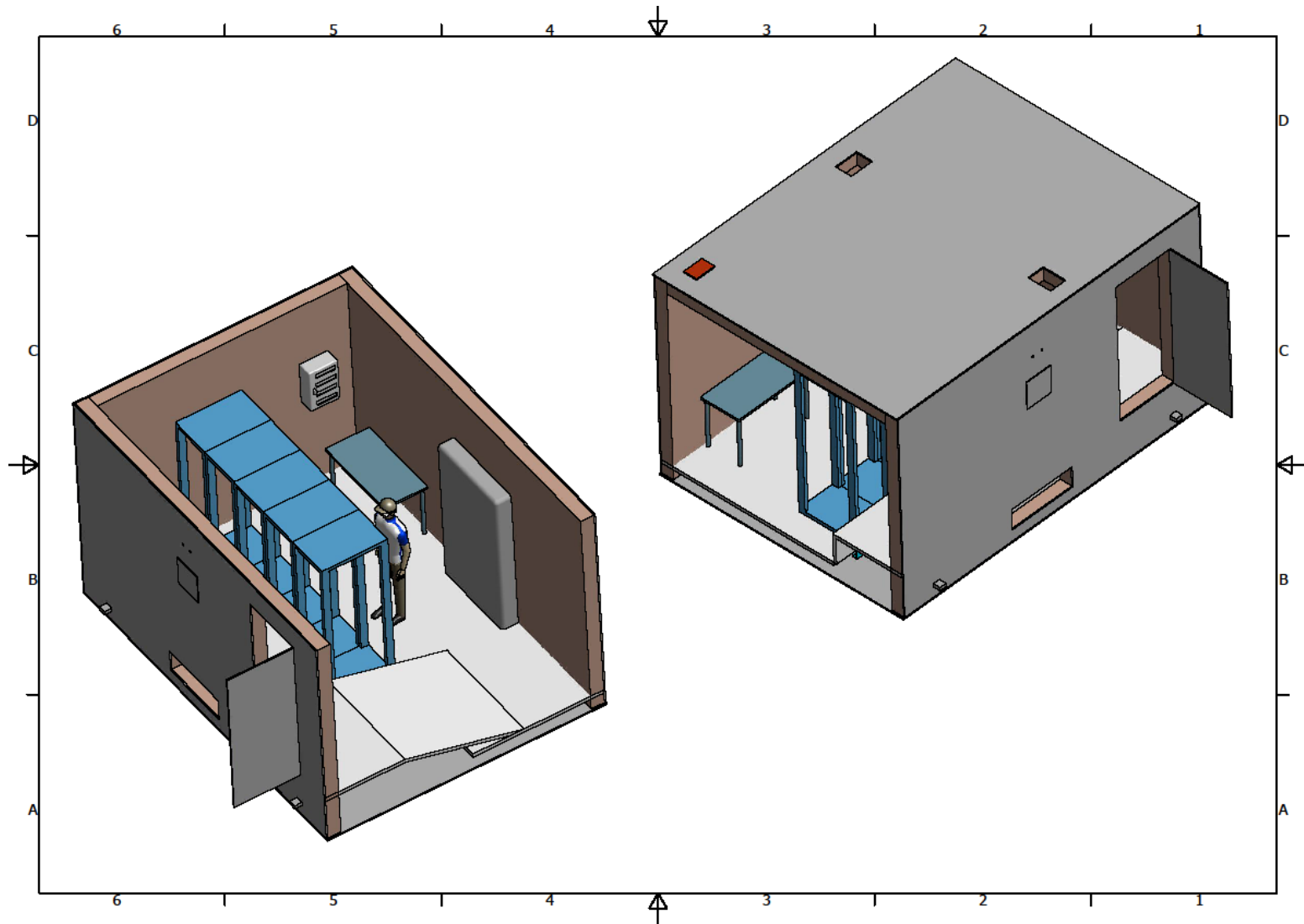


Calendar to-day – Dec 2017

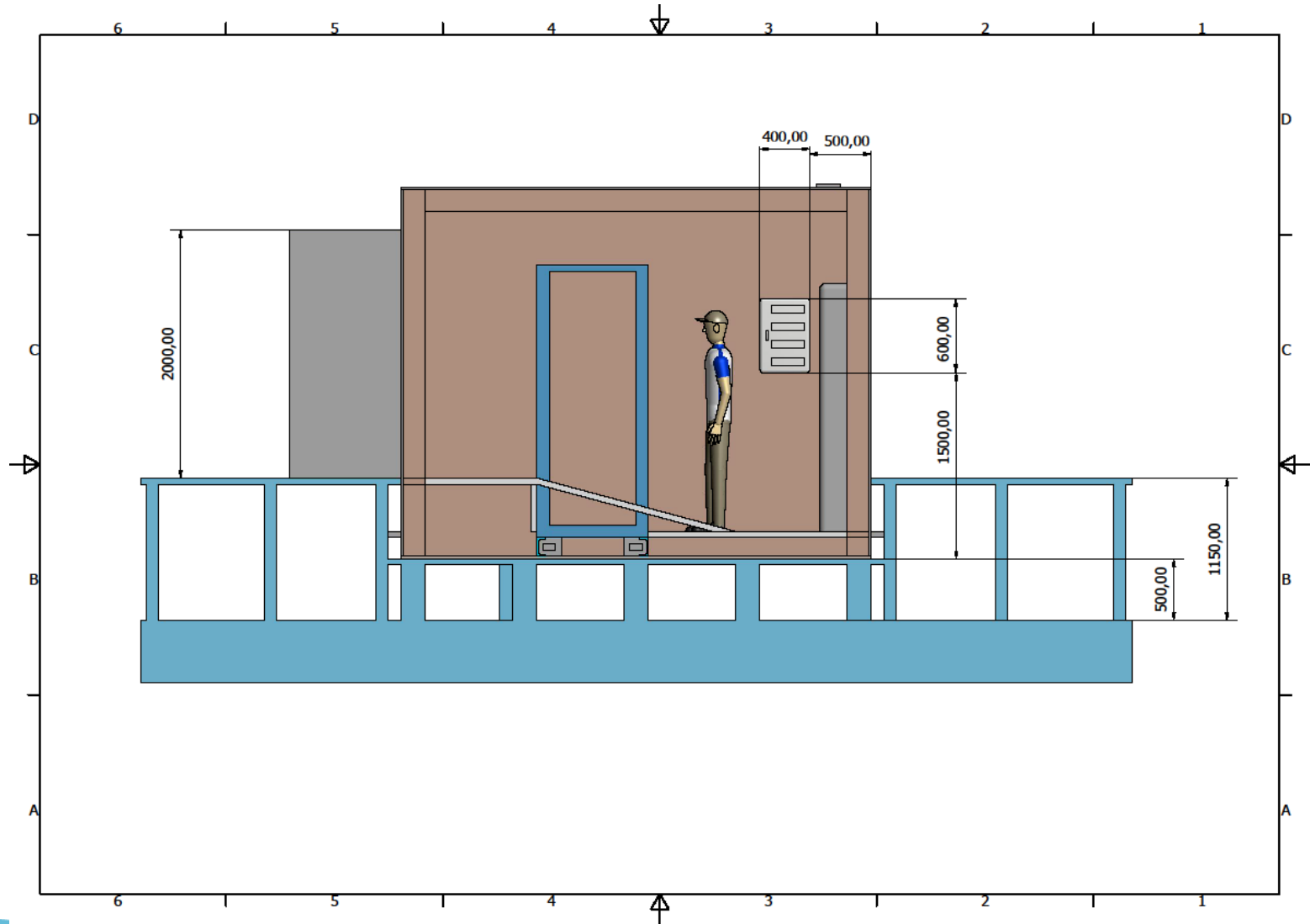
- Tuner test in the lab. Now->Mid June
- SM18 tests (vertical cryostat) Mid June-
Mid Aug
 - Setting-up the Tuner Loop
 - Start setting-up the RF feedback
- SM18 cryo shutdown Mid Aug- End Sept
- Resume SM18 tests (vertical cryostat) Oct-
Dec
 - Complete the setting-up of the RF feedback



Faraday Cage (1/2)



Faraday Cage (2/2)



- Technical spec completed (EDMS 00001750664). Waiting for OK from Safety (promised for...today)
- Commercial documents under preparation. Should be sent by end May
- 5 bidders selected. We know them...

Firm	Address	Country	web site	Contact name	Contact phone	ACTION SPS MS
Albatross Projects	Daimlerstr. 17, D-89564, Nattheim	Germany	http://www.albatross-projects.de/emc/products/shielding/shielding-structure.html	Mr. Brinker, Mr Fores	49 7321 730 526 / 49 7321 730 525	Contact
Holland Shielding	PO Box 730, NL-3300, AS Dordrecht	Netherlands	http://www.hollandshielding.be/	Jan van Tienhoven	31 78 6 13 13 66	Contact
European EMC Products	Units 7-9, Saffron Business Centre, Elisabeth Close, Saffron Walden, Essex	UK	http://www.euro-emc.co.uk/	Ian King	44 1799 533073	Contact
ETS. Lindgren	Mekaanikontie 1 FI - 27510 Eura FINLAND	Finland	http://www.ets-lindgren.com/europeanheadquarters		+358-2-8383 300	Contact (EU headquarter. Replied to both LHC and L4 tender calls. Good)
Rainford EMC	Rainford House, 2 Kellett Close, Martland Park, GB-WN5 0LP WIGAN	UK	http://www.rainfordemc.com			Contact (now part of MVG)

- Calendar for the cage contractor:

Task	Duration	Start	Finish
Invitation to tender	4 working weeks	May 22, 2017	June 16
Selection of contractor	3 weeks	June 19	July 07
Contract awarded		July 10, 2017	
Detailed design submitted	3 weeks		July 28
Detailed design approved	2 weeks	July 31	August 11
Manufacturing	8 weeks	August 14	October 06
Delivery to CERN		Oct 06	
Installation by contractor	2 weeks	Oct 09	Oct 20
Test/Commissioning	3 days	Oct 23	Oct 25
Cages ready for use		Oct 26, 2017	

- The “bare” cage should be finished end Oct. 2017
- Then rest of installation is done by CERN services
 - Connect cables to patch panel, cabling inside cage
 - Electrical distribution to racks inside
 - Cooling-Ventilation (AC)
 - False floor, installation of racks
 - Networks and Wifi
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- Then we install the LLRF VME crates (same as tested in SM18), deploy the software and...test for real....(SPS restart 2018).