LHC RF Meeting

13th September 2007

Participants: Maria Elena Angoletta, Luca Arnaudon, Thomas Bohl, Olivier Brunner, Edmond Ciapala, Wolfgang Höfle, Trevor Linnecar, John Molendijk, Eric Montesinos.

1. P4 & RF Planning

General P4 planning: Cool-down of sector 4-5 is stopped for leak detection is Sector E7L5. The magnets are at 80 K and the QRL is warm. Access is completely free in the Sector 4-5 RF area, but the systems are under vacuum and extreme care is required during any intervention. We expect that the inner triplet (waiting at P4 surface) will be installed and cool down will continue. Our latest understanding is that there will be a push to fully cool down Sector 4-5, with power tests and filling of the cavities, before the end of the year.

2. RF Work in RUX 45 (Tunnel)

There are 3 activities to be done in the tunnel area:

Connection of waveguides: Since the QRL is presently at room temperature and we can probably do the low-power measurements on the cavity from the tunnel with the waveguides in place, we will consider removing the measurement transitions and fitting the missing waveguide pieces on the cavities. This will avoid having to do this later when with the QRL cold and will avoid losing time during tests with cavities cold. In order to install the waveguides we need to install the passerelle over the vacuum pipes between the Beam 2 ACS modules **(Action: Olivier)**

Installation and test of ADT amplifiers: All amplifiers have been tested and are ready for final installation. Power tests can also be done and we will arrange to do these with the Russian team.

Fitting of Arc Detectors: A number of these still remain to be fitted on the waveguides near the cavities.

3. UX45 work (Olivier):

False floors in the ACS racks enclosure have been completed, making a big improvement to the area and improving access to equipment in the racks. Work on the ADT area has just started.

RUX45 Roof barriers: Preparation in A5 of the barrier along the cryo side on top of the RUX45 tunnel roof is nearly finished and it will be installed next week. The barrier on the RF side is already in place.

4. Klystrons in UX45

Klystron boiler replacement: The klystrons on the 3-4 side will be put back in place with modified boilers as soon as they are delivered by Thales.

Heater current tests: The measurements to obtain the optimum heater current for each klystron are now in progress.

5. Controls Tests (Luca)

Control Room: We now have an RF 'control room' set up in 864_R_A27, with three PC workstations.

Remote Applications: There are now three types controlling the power equipment and cavities: **1)** Web based surveillance and status displays, **2)** LabView applications allowing access to all parameters and control points for RF equipment experts, and **3)** JAVA base applications for 'operational' use by non-RF specialists. We are already sending alarm messages to the LASER system.

6. LLRF in UX45 Faraday cages (John)

The Faraday cages racks are gradually being filled with equipment:

- **Clock distribution:** Clock generation and distribution modules for B2 have been installed in Faraday Cage FC B. All SMA/SMC patch cables have been put in place for cavity C4 B2 and provisionally labeled. This will be completed for the other cavities of this module, the final labeling done and then all the other cavities completed.

- **Cavity Controllers and modules:** Conditioning and tuning modules are in place in all cavity controllers in the Faraday Cages. The switch and protection module is also in place for C4 B2, this together with the installation of the clocks, means that all the electronics for conditioning of this cavity are in place, connected and the system ready for operation in conditioning mode. The switch & protection modules will be installed for the other three cavities on Module 1 B2 so that power tests on all klystrons of this module can begin towards the end of next week (Week 38). Note that the waveguide shorts are in place. In this situation

- **Function generators:** The FGC crates and power supplies are also now in place in the Faraday cages.

7. SM18: (From SM18 planning)

- **LHC 21**: This 'spare' cavity is in place in the bunker. If all goes well with the maintenance on the cryoplant, conditioning with the leak-repaired coupler will start in week 38. This will be a good opportunity to retest the conditioning hardware and software before starting in UX45. Following this, in week 40, we would like to do LLRF testing, in particular to check combined operation of the klystron polar loops with the RF feedback loops.

- **Module 4 ('Europe'):** is on the platform, waiting to go into the clean-room for fitting of couplers.

8. Hall 112 (Eric)

- **Coupler conditioning:** Conditioning of couplers MC131-134 has successfully resumed and has reached 300 kW. We expect another 2-3 weeks of conditioning will be needed. This will complete the set of four modules needed for 'Europe'.

- **New Couplers**: Preparation of couplers 135 and 136 should start next week.

- **Increased klystron power:** In order to test couplers with power levels above 300 kW another klystron would need to be installed. While the water cooling capacity is not sufficient for two klystrons at full power it would be interesting to know to what power levels two klystrons could be run together.

9. AoB

- **MTF and MTF for Hardware Commissioning**. An open meeting was held on Tuesday 11th September, with a brief review for all LHC equipment with the 'owners'. For RF the test procedure profiles for the equipment classes as recently updated have been loaded. These can be seen via the web interface, all tasks are in RED for the moment and the actual status for each step now has to be uploaded via a special interface. One of our main interests in this system is the attaching of test procedures and results for the various steps, with the necessary update and archival when tests have to be repeated due to hardware or system changes.

- **Spares**: Estimates for all systems have been given to Trevor. For electronics in LLRF and controls, in addition to spare modules, we need to plan a stock of components which may become obsolete within the lifetime of the equipment. The commercial lifetime of complex chips such as FPGAs and DSPs can be six years or less (John).

- **LHC commissioning**: There will be a presentation by Lyn Evans this afternoon.

Next Meeting: Thursday 20th September at 08:45 in the JBA room.

E. Ciapala, 13th September 2007.