

LHC RF Meeting

7th June 2007

Participants: Philippe Baudrenghien, Andy Butterworth, Olivier Brunner, Edmond Ciapala, Trevor Linnekar, John Molendijk, Eric Montesinos, Joachim Tückmantel, Daniel Valuch.

1. P4 RF Installation/Commissioning

✚ **Safety – reminder:** Note that for safety reasons FSU staff must not be left to work alone in the tunnel, UX45 or in SR4. The work has to be organized such that two FSU staff are working in the close vicinity of each other or are working with or are directly supervised by a staff member.

✚ **General P4 planning:** As last week, cool-down of sector 4-5 remaining as planned.

✚ **Commissioning planning:** Eric has supplied the excel sheet for the ADT commissioning. This and the ACS commissioning planning can now be found at the following location:

<http://dfs.cern.ch/dfs/Departments/AB/Groups/RF/Machines/LHC/HWCommissioning>

✚ **Electrical system:** The current measurement transformers for the up-rated electrical installation have now been installed. We can now draw full power.

✚ **Tunnel access during cool-downs:** Temporary doors will be put on the RB44 side of our equipment during cool-down of sector 4-5. Hence we will not be able to access any equipment in the tunnel during the cool-down of 4-5. For the 3-4 cool-down the door will be on the RB46 side, again preventing access to all RF equipment. Note that any chicanes needed in the RBs will only be put in place after initial RF measurements at the start of cavity powering.

✚ **Safety issues:** The UX45 installations were visited with G. Roy, AB Safety Unit, on Friday 1st June. The layout for the grill preventing access from the cryo side onto the tunnel roof was agreed. Some other points needing action were raised:

- Barriers also needed along top of roof on RF side
- Block some gaps in barriers near the platform.
- Block ladders allowing access from floor to cable tray platforms, both sides of cavern, by putting grills on them.
- Move fire extinguishers on walls (now behind ACS and ACS racks) to more prominent positions.
- Emergency stops similarly hidden to move.

Ghislain will send us the list. We will have to organize this work ourselves. We have agreed to another visit before powering the modules.

✚ **ACS in UX45/RUX 45:**

• **Klystron powering in UX45:** Eight klystrons have been powered together. Checks and power calibrations are ongoing.

• **HOM cable trays:** The laying of the cable rolls has started on the UX45 platform. There are The work will take a couple of weeks.

• **Waveguide holes:** We have been asked to fill the gaps around the waveguides, in order to prevent air from the tunnel passing into UX45. Sandbags could be used, as in LEP. The outer holes with three waveguides passing through are the most difficult.

• **Access during cool-downs:**

• **Cryo commissioning:** The first tests on instrumentation were started last week. Polarities needed to be inverted for the interlock and enable signals. A basic list of checks has been made, to be discussed with A. Suraci (AT-ACR) as soon as he is available.

2. ACS Klystrons

✚ **Klystron collector cooling modification:** The modified parts from Thales will be tested here in two weeks. We are reasonably confident that the test will be successful. First priority upgrade will be the

klystron in H112, to continue with coupler power processing. The SM18 klystron would be done later, to allow complete testing of the modulator and polar loops module.

3. SR4

✚ **Cabling lists:** for the fast timing and clock distributions have been put in DIC form and can be given to TS-EL. The cabling for ADT and diagnostics will be compiled by Luca and Daniel. The timing and clock cabling is needed for the sector test, but could wait till the ADT lists are complete, allowing the work to be done at the same time in September, as planned.

✚ **GPS Antenna and installation:** This has been completed.

✚ **Responsibilities:** Olivier has agreed to take responsibility for organizing the remaining cabling and infrastructure work in SR4.

✚ **ADT**

- **Power test and commissioning:** The first stages of the power checking have been done, not fully completed as stated in last week's write-up. A number of tests and calibrations are needed, and the work will only be completed once all amplifiers are finally in place.

- **Layout and cabling:** The new [rack layouts and numbering for SR4 and UX45](#) are now clearly defined. The arrangement is the best that can be done with minimal cabling changes. These concern the HV cables for the anode supplies in SR4 and a small number of control cables in UX45.

4. ACS Modules, Couplers and SM18:

✚ **Module 4 (Europa):** The Cryo system in SM18 is still not available, due to transfer line problems.

✚ **Polar loop tests:** Successful tests have been done on the amplitude loop amplitude loop. See LLRF below.

✚ **Cavity 21:** Now planned go into the bunker early July. The module 4 tests however remain the priority.

5. LLRF:


✚ **Klystron Polar Loop & modulator: SM18 tests** – The amplitude loop has now been set up and tested. Amplitude and phase loops have been closed together. For the amplitude loop, ripple suppression is at the 30 - 40 dB expected. Some spurious 40 MHz is introduced; while this is well outside the cavity bandwidth attempts will be made to reduce it. A problem was found with the DAC, use of low gain setting was found to introduce 4 MHz sidebands at -30 dB. This is not mentioned in the data sheet for the DAC. However, the system can be set to work at the high gain setting, avoiding any problem. There are some minor modifications and a filter needs to be added, but we will nevertheless go directly for series production, without doing another prototype.

✚ **Series production and testing for ACS in UX45:**

- **Clock distribution:** 40 of the 70 modules have now been modified and tested.
- **Tuner RF front end:** Philippe will test the first module of the 25 received.
- **Dual DDS conditioning:** John has flashed the first of the series of 25. Tests are going well so far.

- **Polar Loop and Modulator** – See SM18 tests above
- **Switch and protection module:** 10 have been ordered, expected before the end of July.
- **VME crates:** These are all installed in the Faraday cages, with CPU modules and the systems can be configured and tested when power is available in the cages. The ADT crates can also be put in place in SR4

- **VME crates:** We should also install and configure the ADT crates needed in the SR4 racks.

 **Beam commissioning** – Philippe has made a [presentation](#) to the LHC Commissioning WG (LHCCWG) on the 5th June outlining the bunch numbering scheme, and the RF tests and setting up needed with pilot beam and multi bunch injection, corresponding to the various defined beam operation stages (A-D). Also the work for ramping and re-phasing at flat top.

Next Meeting: Thursday 14th June at 08:45 in the JBA room.

E. Ciapala, 13th June 2007.