LHC RF Meeting
29th September 2006

Participants: Luca Arnaudon, Philippe Baudrenghien, Thomas Bohl, Olivier Brunner, Edmond Ciapala, Trevor Linnecar, John Molendijk, Eric Montesinos, Jean-Claude Perrier, Joachim Tückmantel, Daniel Valuch.

1. UX45/RUX45 installation (Olivier et al)

Olivier gave an account of recent events:

- **Alignment:** Main Event of the Week.
  - The apparent error in the longitudinal position for the ACS modules shown on the survey floor markings (individual cavity end points marked) was again indicated by the survey team during the actual alignment, in spite of other doubts having been cleared up. Two modules were nevertheless horizontally and vertically aligned at their existing longitudinal position, since all other measurements indicated correct positioning of the modules, based on the DCUM listings and the vacuum group layouts. The problem was looked at with the database specialist (S. Chemli). The error may come from incorrect (35 mm error) positions of the cavities inside the module having been taken into the database. This will need to be re-checked and corrected in the database.
  - A serious practical difficulty has been the larger than expected variation in floor height along the RUX45 quay. One module cannot be lowered sufficiently and shorter supports or narrower support blocks will need to be fitted.
  - We should ensure that alignment of the installed BI BPMs is done at the same time as the rest of the equipment.
- **ADT kickers:** Protecting cages, similar to those made for the APW, will be put in place as soon as available.
- **UX45 water installation:** The supports for the rows of klystron water cooling pipes are now in place.
- **TS-EL cable testing:** C. Guillaume is making a schedule for the remaining cable testing.
- **Air conditioning:** Was planned to be switched on in week 40 (next week). This is unlikely as chilled water piping is not yet installed.
- **UPS supply in UX45:** This is running and connected to the racks. All racks are equipped with UPS sockets (normal distribution on one side, UPS on the other. UPS installations are marked with a diagonal orange stripe. A triple stripe indicates 3-phase UPS. Once the installations are complete we should verify that equipment intended to be connected to UPS is properly connected, particularly for systems with safety implications.

2. Flexwell cables for LLRF (Jean-Claude)

- **APW patch panels in RUX45**: These are in place and the flexwell cables connected. Note that the two cables which have been tightly bent around the corner or the tunnel are APW cables (not ACS antennas as written last week). One cable may not be bent out of tolerance but the other is clearly damaged. Measurements will be done once connectors are fitted.
- **ADT cables:** Drive cable and HOM cable pairs are being cut to the same length for each kicker.
- **Patch panels on the Faraday cages:** the lower panels at the klystron ends now have all cables connected.
- **Support for ACS HOM cables in waveguide holes**: We will make a simple support system to lift the HOM cables clear of the waveguides. We will install Pt100 temperature probes on certain

cables and monitor the temperatures when beam is present. If temperature rise is found to be excessive we would either find a more sophisticated arrangement or install air cooling.

- **Electricity boxes in Faraday cages**. Cabling is in order, light switches fitted and the lighting inside the cages now working.

3. SR4 status (Jean-Claude):

- **SR4 ADT equipment:** Ug1 and Ug2 supplies have been installed in their SR4 racks, as well as their PLC controllers and interfaces.
- **Control room enclosure:** In view of the low cost of one of the offers received, we can probably purchase without Divisional Request in order to avoid further delay. The enclosure proposed in this offer would allow fitting of a roof, but we would not take this option till later.
- **False floor:** The missing floor panels need to be ordered from outside. This will be done next week.

4. ACS cavities and couplers:

- **Coupler for single cavity module:** Coupler MC125 has also a small leak, we will have to decide whether to put it on the test cavity or use one of the couplers planned for module 4 *(Europe)*

5. ACS HOM cables and power absorption (Daniel)

- **Tests:** A 60 m spiral of RG213 (“brown 3/8 inch cable”) mounted on a simple flat support, has been tested in the lab, with 250 w 650 MHz (“Average” of HOM narrowband and wideband frequencies). The temperature distribution was recorded with an infra-red camera. Maximum temperature was ~50 °C, allowing good margin for operation. (Note also that the HOM powers used in the design correspond to worst case with ultimate beam intensity)

For the wideband HOM couplers this cable will be preceded by a spiral of 3/8 flexwell cable (40-60 m) giving 4-6 dB attenuation. This will be tested next.

Suitable places for mounting these spirals have been found on the platform, they would be mounted vertically, in groups of 16 spirals side-by-side.

6. LLRF (Philippe, John)

- **Dual DDS / Conditioning module:** A number of minor layout faults have been found; all can be corrected on the prototypes allowing them to be used in the forthcoming SM18 tests on the single cavity (planned end October). The RF noise has been reduced and the level is now considered good (better than 60 dB down)
- **Switch and protection module:** Two PCB prototypes have been made. These boards are slightly bent, due to a manufacturing problem, but we can assemble them and use them for our first tests, again on the test cavity in SB18
- **Tuner RF:** V2 is ready for tests, no difficulties expected.
- **Clock distribution:** V3 is ready for testing, again no difficulties expected.
- **VME crate:** We are waiting for delivery of crate mechanics, if there are further delays we will find a way of having one crate at least for the SM18 tests.

7. AoB

- **Hardware Commissioning Schedule:** The Hardware Commissioning team held a meeting this week on the LSS. Olivier has made some slight modifications to the planning in the original RF hardware commissioning EDMS document. (See new version) Co-activity with BDI appears minimal and we believe this can be handled without detailed planning. More serious concerns for us are the commissioning of the cryo system for the ACS modules and the subsequent stability of cryo operation

during cool-down and magnet power testing. To meet the end of year deadline we need to start testing the ACS cavities cold at the end of March. The master planning (See LSS4 planning) shows sector 4-5 becoming cold in mid-May, with the cool down completed by the beginning of June. This already compromises our long term stability test. Furthermore powering tests run concurrently with RF commissioning till the end of August. Progress on cavity conditioning and testing of all the related systems will therefore depend very heavily on stability of the cryo system during magnet powering. First experience of magnet powering will be February, in Arc 7-8. Doing power tests to only 450 GeV in Arcs 3-4 and 4-5 would delay the 2008 start-up and need additional resources.

Clearly we will need to do as much as we can during 'warm' commissioning.

Next Meeting: Friday **6th October** at 08:45 in the JBA room. (Note: TCC same day at 10:00)

E. Ciapala, 3rd October 2006.