LHC RF Meeting
19th November 2004

Present: Luca Arnaudon, Olivier Brunner, Andy Butterworth, Philippe Baudrenghien, Edmond Ciapala, Wolfgang Hofle, Trevor Linnecar, Pierre Maesen, Joachim Tückmantel, Daniel Valuch, FrodeWeierud.

1. ADT Progress (Wolfgang)

- **Kicker and Amplifier tests in Dubna:** The kicker used is an early prototype. Tests revealed that the surface metallic coating on the ceramics which hold the electrodes had too low a resistance. The coating will have to be removed and a new coating applied to get the required 20 MOhm resistance. Test of the amplifier was done with non-demineralized water. With 12 kV there was electrolysis of water and production of hydrogen. The tests were done instead at 5 kV, successfully, using longer water hoses. Tests will be done at 12 kV before the end of the year. A second amplifier is to be assembled, we expect to have two amplifiers by mid-April for tests in B867 – see below.
- **Grid supplies:** The first production supplies have been delivered and are being tested. Delivery of the full batch will probably be rapid once they are approved.
- **Voltage divider in amplifier:** Daniel is upgrading the design by Reinier Louwerse to work at the higher voltage needed.
- **Use of US45 for racks and equipment:** This area is not suitable for a number of reasons – poor accessibility, too little free space with presence of cryo and ventilation lines, also the thin wall between the UX and the US may not provide sufficient protection from SEUs with beam. The damper racks will therefore remain in UX45. The problem of routing the coaxial drive cables from the drive amplifiers to the tunnel should be taken to the cabling and integration teams. (Together with the routing of the He vent and safety lines for the SC modules). We should first estimate the maximum length we can tolerate with 3/8 inch flexwell.

(Action: Jean-Claude, Wolfgang, Ed)

2. B867 Test installation (Wolfgang + info from Eric)

- **General Status:** The area will be used for ADT, SPS damper and ACN tests. There are two test stands for dampers and a bunker for an ACN cavity. The whole area has now been cleaned out completely. Two groups of 6 racks are in place. Responsibility for water has been passed from B. Pirollet to another TS-CV expert. We need to have the water installed by the end of January. The present electrical switchboard with 400 A capacity is adequate for the immediate future but an offer has been requested for upgrading to 630 A. Cable trays will soon be installed, in order that cabling can be done by the end of February. For this we need cable lists, in our standard format, as soon as possible, certainly by the end of the year.

(Action: Wolfgang, Frode, Jean-Claude)

- **Priority and planning:** Making the area operational for reception tests of ADT kickers and amplifiers has a high priority, we need to be sure of getting feedback to Dubna as soon as their equipment arrives. The last item to be available to make the test area operational for ADT is the Anode Power Converter, scheduled for delivery in April. The stand must be operational very soon after.

3. Modules and SM18

- **Module 5 (Pierre)** The small helium leak was found to be caused simply by the absence of connection to the recovery line for the gas return on one coupler. Thermal cycling was started at the beginning of the week; two cycles have been done so far.
- **352 MHz: (Olivier/Luca)** 150 kW RF has been applied to a short in the waveguide, with a ½ day of running.

4. ACS Coupler Progress (Ed for Eric)

- **Couplers 114 and 115:** Conditioning in SA2 has reached 200 kW cw and 300 kW with 500us/20ms pulsing. Conditioning should be finished by the end of next week (week 48)
- **Couplers 116 and 117:** These have been successfully assembled. The new batch of sealing rings for the second ceramics is good and a new method of polishing the niobium on the ceramics has been used. Leak tests after assembly were good. The couplers will be baked out next week and fitted to the SA2 test cavity in the following week.

5. LLRF (Philippe)

- **Faraday cage:** Two more firms will be visited.
- **'Synergy' – ADT & 1-T feedback:** Design of the electronics module is progressing well. One obstacle to standard solutions across machines is the number of different function generators, PS GFA, SPS ROCS, LHC PO-FGC etc, as well as different software embedded solutions. The situation will be reviewed to see what might be possible in moving towards a common solution.

(Action: Philippe, Andy)

- **LHC SPS and Synchro:** Discussions are re-starting on filling schemes for LHC. Dumping of the last injected batch is possible; this may be preferable to the originally proposed dumping of the entire beam on one bad injection and starting again. The planned way of transmitting the injection bucket number is via the GMT timing; can a change of bucket number and batch type be sent in time (1 second) to all machines?

6. Klystrons and modulators (Olivier/Daniel)

- **Klystron ripple:** By replacing the tetrode with a resistor and using lower values for the divider, the ripple was reduced from 3 % pp total to 1 % pp, a factor of three (better than the expected two reported last week) The RF power level was 60 kW.
- **Compensation/feedback schemes:** There are two possible approaches: 1) use of the modulator and 2) adding a power supply in series with the power converter to compensate ripple. A variable 600 V 40 A supply would be needed and could be realized with semiconductor devices. Daniel will present proposals for the two options at next week's meeting.
- **Crowbar Detector:** A system to detect which of the four klystrons connected to the power converter has caused a crowbar has been successfully tested in SM18. It is based on fast measurement of the individual klystron currents.

7. Controls and Software (Andy)

- **FESA** (Front End Software Architecture) version 2: has been released by CO group. The PLC software interface will be ready in two weeks. We should first agree on the split of functionality between front end and PLC and then decide on classes and data structures for all systems.

(Action: Andy, Luca, Pierre, Frode, Ed)

- **Interface to the Beam Interlock Controller.** This arises following preparation for the Chamonix presentation on RF system commissioning and the scenarios for different beam intensities. The information presented to the BIC and its conditioning will probably be reviewed if LHC operation over a wide range of intensities is envisaged, to give best efficiency under the various conditions. At present we have interlocks such as He pressure in the ACS cavities which must always dump the beam and klystron trip which may not need to do so - below a certain beam intensity.

8. AoB

- **EMC Workshop:** will be a one day event on the 25th of November. Philippe is making the RF presentation. Everyone should try to attend.

Next Meeting: Friday 26th November at 08:45 in the JBA Room 864-2-B14.

E. Ciapala, 24th November 2004.