LHC RF Meeting
13th May 2005

Present: Luca Arnaudon, Thomas Bohl, Philippe Baudrenghien, Andy Butterworth, Edmond Ciapala, Wolfgang Höfle, Pierre Maesen, Volker Rödel, Joachim Tückmantel, Frode Weierud, Urs Wehrle.

1. Matters arising: meeting 29th April

- **Flexwell cables:** These can be stored outdoors, as long as the drums are not opened. It may be advisable to store air-cored cables indoors, if possible.

2. ACS Modules (Pierre)

- **Module 2:** Low power measurements have now been done. Excellent news is that the tuning ranges of all the cavities are all very good and close to each other. The lowest frequencies are all more than 80 kHz below the LHC RF frequency. This module will therefore need no tuning modifications. Conditioning will start next week. Cavity A should be available for LLRF tests in two weeks.
- **Tuning compensation:** A first prototype of the disc spring assembly has been made and some minor improvements are being done. An initial batch of 8 will be made. The springs we have at the moment are steel but CuBe (longer delivery delays) would be used in view of the low temperature. We should check the temperature range for the stainless steel springs.

  ***(Post meeting:** The steel springs are just within spec for our temperature range)*
- **He domes:** A design has been produced by AT-CR. This is compatible with the present design and can be made using parts of the existing domes. The outlets (He valve, level gauge and bath heater) will be welded at the top. The He valve outlet is double walled to provide an insulating vacuum. A dome has been removed from module 5 to verify that the fitting can be done as planned.

3. ACS Couplers and SA2 conditioning (from Eric).

- **Coupler production:** Preparation of mechanical parts (λ/4 line and body assembly) for the next two couplers has been delayed for two weeks because welding specialists have been assigned to urgent LHC work outside CERN. We may be able to recover one week by doing pre-assembly, rinsing, final assembly and leak-test all in one week. We have been assured that the coupler work will be given highest priority once the welders are back.
- **SA2 Conditioning:** Conditioning of couplers MC120 and 121 is finished; they are now at 300 kW cw. Refinements are being done to the conditioning procedure while we are waiting for the next two couplers.

4. ADT (Wolfgang)

- **Anode Supplies:** Factory acceptance tests were done 10-11 May. Some minor problems in the control logic have already been corrected. Power tests have been done at reduced voltage but with nominal power dissipation in the internal components. Pulsed operation tests will be done here.
- **Dubna:** No news for the moment on kicker production or when the first amplifier will be shipped (presently in customs….)
- **Feedthroughs:** Presently being gold-plated. No feedback yet from supplier on the faulty feedthroughs.
- **Drive amplifiers:** There will be a delay in delivery of the last batch of amplifiers, the supplier has a problem with the ovens used for heat-testing.

5. Coaxial Cables (Wolfgang)

There may be an extra delay for 3/8 inch cable, we will ask for partial delivery of the other cables. Surplus lengths of 3/8 inch unstabilized cable (from our order) have been offered by the supplier at cheaper prices.

6. Access System (Ed)

- **Access modes and safety conditions in IR4:** TS-HDO are presently finalizing the interface specification for the LHC Access Safety System (EDMS document 456769). In this document the modes of access safety system and required states of personnel protection elements are defined for the various RF operating modes. The essential safety elements for the RF zone in RUX45 are the electron stoppers and the 18 kV interlock. A table shows the Access Safety System modes and requirements as described in the document, together with the conditions for the valves on the SC modules. (not themselves part of the access safety system spec.) The safety interlock on the RF systems is the 18 kV. Intrusion into the beam zone will immediately provoke a run-down of all RF power (via the PLCs) and the signal to the 18 kV will follow 2 seconds after. A difference with respect to the previous table (April 2005) is that electron stoppers will go in for any access, not just specifically when RF tests are on. The module valves will cut the RF. This is a direct connection from the vacuum system to the RF, independent of the access system.

7. APW – System and layout (Thomas & Urs)

For each beam there are two wideband longitudinal pick-ups, one vertical wideband pick-up and one horizontal, as shown on the tunnel layout drawing

- **Longitudinal (APWL):** One longitudinal PU is used for the phase loop in the Faraday cage and for SR4 beam control. The other is used for observation and beam diagnostics in SR4 and locally in UX45. In UX45 - see UX45 diagram - signals are taken to three new racks on the cryo side (using the space originally planned for the LLRF systems), rather than the main UX45 ACS rack group. The corresponding reduction in cable lengths from ~200 m to ~30 m considerably improves the quality of the bunch signal. (See bunch profiles 200m cable and 30 m cable)) For all longitudinal signals, in SR4 or UX45, a 20 dB attenuator can be switched in or out, depending on the planned beam intensity, normal or pilot. For UX45 the signal is taken to a splitter, one side going to another splitter for local mountain range and bunch amplitude measurements, the other side taken to a multiplexer/demultiplexer arrangement which allows the remote switching in of up to 8 devices, before connection to a local measurement system or transmission to the CCC over fibre. For the mux/demux we will use a switch based on a AB-BDI design with Ethernet control. One concern is the high voltage produced by the beam and risk of damage to relay contacts if the wrong beam signal attenuator setting is used.

A 7/8 inch phase stabilized cable from the observation longitudinal PU is taken to SR4. Signals are split off for instruments, fibre optic transmission to the CCC equipment room, OASIS acquisition, peak detectors and other specialized measuring devices. see SR4 diagram

- **Transverse - BPWTV and BPTWH:** For these horizontal and vertical PUs, sum and difference signals are taken over 7/8 inch phase stabilized cable to SR4. Again 20 dB attenuators can be switched in. A splitter provides signals for SR4 instrumentation or acquisition systems. There are a total of 4 racks per beam in SR4, for all the PU systems. See below.
- **Rack Layouts:** The rack layout in SR4 and the rack layout in UX45 have been defined and the flexwell cables are in the DiC.
- **Specs and requirements** have been summarized for the UX45 systems and the SR4 systems

There are some **important issues** arising:

1) Fibre optics for RF and Frev signals, beam in timing and analog signal transmission – part of the overall layout for fibre optics which is now needed. **(Action: Philippe)**

2) Positions of our racks in the CCC equipment room. **(Action: Ed)**

3) Supply of beam currents and energy to diagnostic and monitoring equipment. Check with CO group. **(Action: Andy)**

4) Check that OASIS handles the continuous update and auto-refresh modes needed

8. UX45 Installation

- **Electrical layouts: UX45:** A number of modifications and corrections drawings **LHCEB___4041** and **LHCEB___4042** have already been communicated to ST-EL. Now that we are in the installation phase Olivier will take responsibility for electricity layout.
- **ACS HOM cables:** The cable rolls serving as loads will all be put in a separate group of four racks at the back of the UX45 cavern. The signals to the ACS UX45 racks will be split; the previous use of two neighbouring racks has been abandoned as there is not enough surrounding space to route the large number of flexwell cables. The signals for the observation multiplexing system will still be taken there but those for HOM power measurement will be taken to the individual cavity racks.

9. AoB

- **Control area in SR4:** To be discussed in a separate meeting.
- **Faraday Cages:** The tender opening is today.

Next Meeting: Friday 20th May at 08:45 in the JBA Room 864-2-B14.

E. Ciapala, 17th May 2005.