# LHC RF Meeting
17th June 2005

**Present:** Luca Arnaudon, Philippe Baudrenghien, Thomas Bohl, Olivier Brunner, Edmond Ciapala, Wolfgang Höfle, Trevor Linnecar, Eric Montesinos, Pierre Maesen, Volker Rödel, Joachim Tückmantel, Daniel Valuch, Frode Weierud.

## 1. ADT (Wolfgang & Eric)

- **Material from Dubna:** The amplifier and set of electrodes have arrived and all looks good. The final assembly of the amplifiers, including fitting of divider, resistors, tetrodes, water hoses, etc. will be done by the Russian team here. This, together with either of the two original kicker tanks we have here already from Dubna (a vacuum leak in one was repaired at CERN) and other material already received (e.g. feedthroughs) we can assemble a complete amplifier and kicker chain. The overall layout will be as close as possible to that in the machine.
- **B867 status:**
  - ***Anode supply:*** The B867 circuit breaker trips under certain load conditions (e.g. full current, half voltage). The installation will be checked with ST-EL, together with the power supply itself, if necessary. (High reactive input power at low loads or sensitivity to unbalanced 3-phase supply *may* cause problems). We will request the manufacturer to make some minor modifications to the internal cabling for the rest of the series production, the connections to the 400 V also need to be defined with TS-EL (J. Gomez). **(Action: Eric)**
  - ***Water connections:*** "Piquages" in B867 may not be exactly as installed in the machine (Olivier) - to be checked. **(Action: Olivier, Eric)**
  - ***Controls:*** The layout is being finalized; it will also be the basis of the final machine layout.
- **Anode supply lifting:** TS transport section have a suitable lifting frame, we do not need to obtain one from the supplier.
- **Drive Amplifiers:** The CPLD will be modified by Thales to correct the non-fail safe operating polarity.
- **Interlocks:** The overall architecture should be agreed and finalized as soon as possible**;** a proposal will be prepared by Luca and Eric. **(Action: Luca, Eric)**

## 2. ACS Couplers (Eric)

- **Coupler production:** Preparation of couplers MC122 and 123 has been completed and clean room assembly will be done next week. Parts for four more couplers will be received soon from the central workshops.

## 3. ACS Modules (Pierre)

- **Module 2 conditioning:** Cavity C has reached 8.2 MV/m, with the coupler fully retracted. Conditioning of the coupler, at a position of 30 mm, is ongoing.
- **Dome modifications:** Eight domes, removed from two modules, are now in the central workshops for the necessary modifications. All the smaller parts needed to modify the rest of the domes are being made at the same time.
- **Spring compensation:** The prototype set of four springs, made in A5, will be measured and initial tests on module 5 cavity B will be done next week.

## 4. LLRF (Philippe & Daniel)

- **RF Module developments:** The design of the RF trigger unit is almost finished (Greg & John). Vittorio has nearly finished the 1-turn feedback module and will start the setpoint module. The analog part RF of the feedback module has been tested in the lab and the digital feedback loop is currently being tested. (Donat & John).

- **SM18 tests:** Tests on the tuner front end will start next week. The tuner DSP software has to be completed and the hardware taken to SM18 for first tests. The feedback loops should also be given first tests before ACS module 2 is taken out at the end of August. Once the basic functionalities of the RF modules have been tested a number of detailed measurements and performance tests will need to be done. The LLRF beam control team will need some help with this work; it will also be a good opportunity for others to participate and get useful preparation for helping in the installation, commissioning, test and operation of the RF system. Note that a technical student will come to help with Matlab simulations.
- **Crate production:** The series production of the ~40 VME LLRF crates needed for the cavity klystron control loops in the Faraday cages is being prepared. Donat is collecting the material. The back plane designs are finalized. Common material for the ~10 SR4 beam control crates will prepared at the same time.
- **RF Signals Distribution:** Series production is now being prepared for all directional couplers, splitters, patch panels and multiplexers needed for the feedback, control and diagnostic systems. We have some help from BDI for the modification of software to control the diagnostics multiplexers and attenuators.
- **Faraday Cage Filters:** The solution proposed by the manufacturer for filtering of control signal cables in the Faraday Cage patch panels may be replaced by the system used in the SPS Faraday cages (Urs).

## 5. ACS Power (Olivier)

- **Klystrons:** Klystron 19, the second last, is under test in H112. For loads and circulators we have one set still to be delivered and one load sent for back repair still to be returned.
- **HV Equipment:** Assembly is on schedule, details will be presented at a future meeting.

## 6. APW (Thomas)

- **Ferrites:** The next step is to have ferrites cut and fitted.
- **Cabling:** The cables from the APWs to the Faraday cages are included in the DiC cabling lists, but not in the drawings of the cable tray sections. They will be added together with temperature sensor cables which were also not included on the tray sections **(Action: Olivier)**

## 7. UX45 Installation (Olivier)

- **Progress:** Recent pictures of UX 45 show the present state of platform and shielding walls and the bunkers and racks. Work on the platform is still going on; the waveguide holes have been drilled in the shielding wall and remain to be finished off. The walls of all four bunkers have been completed. The copper sheeting has been put on the floor in the ADT racks area and the ADT racks are in place. A safety incident has temporarily delayed the lowering down of the ACS racks but this should nevertheless be done early next week. The space for the Faraday cage and its passerelle can also be seen.
- **Cable trays:** Following a recent integration exercise, a special vertical cable tray can be taken along RUX45 to route the 3/8 inch flexwell cables along RUX45 for the dampers. The latest TS-EL planning is for the cable trays to be installed in the coming two months, general services and other cabling to follow immediately afterwards.
- **CV installation work:** Just starting, this will go on through the same period as the cable trays installation. The work will be organized such that the two activities go on separately on the two sides of UX45.
- **Cables:** Cables from SR4 to UX45 and the RBs going down the PM shaft will be pulled first. Complete separation of HV cables and Flexwell cables carrying sensitive RF signals is impossible. We can only ensure that the best arrangement is made, done to the best of their efforts already by Olivier and Luca. One worry is HV transients perturbing the LLRF. Problems like this are probably caused more by earth currents that by pick-up. (See below). A test will be done for the damper in B867, where

cable rejection is also being measured. The biggest cause of pick-up from comes from bad RF connector mounting.

- **Earthing:** We have separate earth lines for the HV bunkers, the klystrons and the electronics and Faraday cages. HV bunkers are taken via the bars in the trenches directly to the earthing system in RUX45. A simple diagram showing the connection of the earthing lines to the main earthing system is needed. **(Action Ed, Olivier with ST-EL)**

- **Faraday cages:** The contact is signed. A representative of the actual manufacturing company (rather than the local distributor) will visit next week. Issues are the reduction of size by 10 cm and raising the height of the bottom of the door, patch panels and filters. A simple method of checking floor flatness would be to use a straight rigid bar.

- **HV cables:** Space for the boxes to extend the HV cables has been found in the integration, the box design has to be checked with SG-SC.

- **General concern:** The many concurrent installation activities in UX45 and RUX45 in the coming months, including the QRL, will be very difficult to organize.

- **Drawings:** As stated last week our layout drawings:
  LHCLJ4GA0001, Point 4 Ver 6.4 - Cooling , Ventilation, Powering
  LHCLJ4GA0002, UX45 RF Layout
  LHCLJ4GA0007, RF Layout - Point 4 - V6.501
  LHCLJ4GA0008, RF Layout Names - UX45
  are up to date and should be kept up to date.

## 8. SR4

- **ADT supply floor support:** Material for construction will be ready next week. There will be a meeting of everyone concerned next week ‘sur place’.

**Next Meeting:** Friday 24th June at 08:45 in the JBA Room 864-2-B14.

E. Ciapala, 20th June 2005.