LHC RF Meeting
7th January 2005

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

1. ACS Couplers (News from Eric)

- **SA2 Conditioning:** Conditioning of couplers MC116 and 117 continued over the end of year break; they have now reached 200 kW cw and 300 kW pulsed.
- **Couplers MC118 and 119:** have been successfully assembled and are leak-tight

2. ACS Modules and SM18 (Pierre)

- **Module 5:** Cycling has finished, measurements will be done in January, after Cryo start-up in SM18.
- **Module 3:** Removal of the coupler from cavity C (coupler MC104) had revealed some small spots on the antenna, probably due to small arcs. Conditioning of Cavity C has been checked. He processing had been done on this module. There is no reason to believe that this is related or that the cavity or the coupler would have given problems during operation. There has however been saturation of the ion pumps with helium and the residual He levels have made leak testing difficult. The ion pumps are being baked out at the same time as the couplers. The vacuum work and bake-out started promptly as planned at the beginning of the year. The dedicated support of the vacuum group is highly appreciated. (G. Mathis, F. Billard and S. Blanchard)

3. ACS Power (Olivier)

- **Klystrons:** Klystrons 13 and 14 will be tested by mid-January. Adjustment of the tuning on the cavities is made difficult by blocking of the tuning mechanism, due to the eccentric positioning of holding screws. This has been taken up with the manufacturer.

4. ADT (Wolfgang)

- **Drive Amplifiers:** Eight Thales 200 W amplifiers have been received and are being tested. Office 864-R-C27 has been converted into storage space with racks. Four amplifiers (prototype + pre-series) have been shipped back to Thales for retro-fitting. Amplifiers arriving during next two months will be stored in office 864-R C27
- **Grid Supplies:** All Ug1/Ug2 supplies have been received; they are being tested and stored in the same place.
- **HV feedthroughs:** 45 pc have been received from SCT. H. Preis and J.-F. Malo are organizing their vacuum testing and gold plating.
- **Ceramic supporting rings**: The Dubna team will need to remove the coating (by chemical means) because the conductivity is too high and the coating is not uniform. We are ordering some spare rings from SCT separately as a back-up.
- **Power Amplifiers in Dubna:** Wolfgang was in Dubna in week 51/2004 for the tests of the power amplifier. It worked up to nominal voltage (7.5 kV RF) and can be shipped to CERN. It is roughly 70% complete. The Dubna team will start the next amplifier(s). Retro-fitting will be done with help of Eric on arrival at CERN.

Water cooling at Dubna: This is a closed circuit, with no heat exchanger. The system is filled with demineralized water but since the equipment to keep water in good quality is not operational, the tests were done in a one-off 10 minute period.

- **Kicker tanks and electrodes**: are being produced at Dubna and in Russian industry. We have not seen the results yet. One electrode structure and a mechanical support will be shipped to CERN as early as possible, together with the power amplifier.

- **HV power converter** Imtech have practically completed the design. The main components have been ordered and the delivery date confirmed as 29th April for first unit, 29th July for 3 units and 16th December for 5 units. The units delivered in July must go straight to SR4. The floor structure must be studied with TS and modified as needed **beforehand**. **(Action: J-C Perrier)**
- **HV Divider for amplifiers:** Daniel is testing a prototype
- **Power interlocks:** This is being done by Reinier.

5. Test area 867 (from Eric)

- **Water installation:** has started, with R. Mollay (TS-CV). The layout is similar to that for ADT in LHC, following the layout for a group of four amplifiers. Some LEP equipment (e.g. on-off valves) has been recuperated, also Elettra flow meters which may be replaced later by those to be used for ACS.
- **Cabling and installation:** Cable trays are being put in place. List have been done for essential cabling, which will be done in early February. The system will be ready by the end of March. Controls cables and equipment need to be finalized.

6. Coaxial Cables (Wolfgang & Jean-Claude)

- **Ordering:** The DAI has been made and is out for signatures. A justification has been made concerning non-member state origin of compensated cables. Discussion with prospective suppliers on 17th December revealed no special problems with our requirements and delivery is expected to be rapid once the order is placed.
- **Cable laying:** We have been contacted by a company interested in cable laying. We should have initial discussions with this and other companies in order to help decide the best approach to adopt. This will come under installation, under one of the cabling 'phases' of the installation, soon to be defined – see below

7. Cryo in UX 45

Further discussion on the cryo layout has followed prior to a special session on IR4 cryo system at the coming LHC Performance Workshop. We have re-described our requirements to S. Claudet and U. Wagner AT-CR. A main concern is our susceptibility to pressure rises in the QRL D-Line. A proposed improvement would be to connect the RF modules directly to the refrigerator, using the other end of the rigid supply lines in the tunnel, normally connecting to the QRL. A detailed resume of the discussion will be compiled. In the meantime our basic requirements remain:

- **Safety** :Decoupling from D-Line pressure rises
- **Redundancy** (possibility to run all modules if one adjacent sector is unavailable due to magnet quench)
- **Stability** (< 5 mbar)

8. UX45 Installation and planning (Olivier)

- **Responsibility:** The installation in UX45 is now getting under way. Olivier has agreed to take the responsibility for this. Information such as lists of immediate tasks and pending activities will be kept up to date on the Web, together with the latest version of the installation planning. (See LHC Installation on the new LHC RF Web pages). Progress will be followed up regularly in the LHC RF meetings. Issues to be resolved will be brought up at these meetings and the necessary decisions agreed on.
- **Some important items** concerning UX45 at the present time:
  - → ADT power cables - new cable tray defined Jan'05 to be integrated
  - → ADT water cooling – Eric's layout of Jan'05 to be approved
  - → He discharge lines (modules) - 70mm to vent line - 200mm safety to UX45 cavern
  - → Paint shielding wall
  - → Faraday cages – Fire regulation conformity – then call for tender
  - → Grounding (floor mesh, connection machine, copper bars) with TS/EL
  - → Vacuum Layout
  - → Safety valves on modules - to be selected and integrated

- **RF zone – radiation and shielding:** This will be followed up with TS-RP early in 2005, with input from the responsibles in LEP. Meanwhile there will be a meeting with the Access system specialists again, next week. **(Action: Olivier/Ed et al.)**

9. Faraday Cages (Philippe)

- **Procurement:** Another supplier will be visited soon. One firm visited recently (used a construction based on panels covered on both sides with metal foil rather than the more usual grid solution. One problem is to find feedthrough filters for Burndy connectors, (sub-D connectors are more common in industry) we have 20 12 pin burndy connectors per cage.
- **Invitation to Tender:** This will be available, for information and any comments, on the LHC RF web LHC LowLevel RF page, in the 'Infrastructure' column

10. LLRF (Philippe)

- **Injection:** A short meeting was held with J. Lewis (AB-CO) (Philippe, Andy, Ed) to discuss injection and the implications of 'on-line' changes in the filling sequence in the event of rejected batches. There is roughly one second for the beam quality system to react to unsuitable beam. In this event the next beam is simply injected on top, the old beam is lost on the TDI. This operating mode should not present any particular problems for RF controls or synchro.
- **Fibre links:** A sample of the 3 GHz module we intend to put on a special VME transmission module has been delivered and will be tested soon. The dynamic range is reduced due to our operating levels but this might finally be re-obtained in a modified design by the manufacturer.

11. Controls and Software

- **ACS Controls (Luca):** The series of 16 PLC line controllers (for the UX45 racks) has been completed and tested. The series of 16 KCI klystron remote IO units for mounting in the racks next to the klystrons has been delivered and tests have started.
- **Software and interfaces (Andy)**: Some time will be devoted to LEIR activities in the early part of the year. This will be a test bed for LHC software for OASIS (signal monitoring & data display), parameter control and generally doing FESA2 applications with CO group.

Next Meeting: Friday 14th January at 08:45 in the JBA Room 864-2-B14.

E. Ciapala, 12th January 2005.