LHC RF Meeting
8th April 2005

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

1. ADT (Wolfgang)

- **Machine protection:** Connections to the BIC - we plan two separate connection points to the BIC in UX45, one for ADT and one for ACS, each in the corresponding rack group. A further connection may be needed in SR4 but so far details of what would be connected have not been elaborated.
- **MPWG external review:** In his presentation Wolfgang will present an overview of the system, then bring up abort gap cleaning, abort gap monitoring, effects of damper mis-phasing and control of the external input.
- **Anode Supplies:** The function of the front panel "OFF" button has to be specified; HV OFF only or HV and 220/380 inside the cabinet both OFF. Normally this would be the former, leaving controls etc. active, the real emergency safety stop being provided by an emergency stop button in the building. Since the 220/380 V will be on UPS the situation for UPS and emergency stop in SR4 should be checked with ST-EL. **(Action: Eric)**
- **Feedthroughs:** Tests on 50 feedthroughs showed 4 to have developed leaks after bakeout. These are being checked by a metallurgist; the results will be discussed with the supplier.
- **Dubna visit:** The scientific secretary of Dubna will visit next week. Progress on kickers and amplifiers will be discussed, together with issues relating to the transfer of and delivery of material.
- **Dividers and signal conditioners (Daniel)**. Resistor divider units and wideband signal conditioners for measuring the kicker voltages are in construction

2. ACS Couplers and SA2 conditioning (Eric).

- **SA2 Conditioning:** Conditioning of couplers MC120 and 121 is progressing well and has reached 300 kW.

3. ACS Modules (Pierre)

- **Module 3:** Has been taken out of the bunker.
- **Module 2:** Following coupler mounting a leaking Pirani gauge was found and changed; the module is now vacuum-tight. Bake-out of the couplers on the module has been delayed due to a power cut. It will continue into next week then a final leak test will be done.
- **Module 5:** Is now in the bunker and a helium leak test will be done. Cool down and tuning measurements (cavity B) will be done next week.

4. ACS Power (Olivier)

- **Klystron 17:** is now being tested. The problem of blocking of the cavity tuning mechanism has not been encountered on klystrons other than klystron 1. We are still waiting on it being repaired and returned by the manufacturer.

5. LLRF (Philippe, John, Thomas, Daniel)

- **Diagnostics:** for LLRF and beam control are being finalized, with the aim of completing the layouts in SR4 and UX45 and defining the equipment and connections. There will be some duplication of signals available inside the equipment and the external monitoring. In general we should avoid continuously accessing the local buffers, e.g. for fixed display applications, by using external and independent monitoring for this. The existing list of signals should be checked to identify which can

be used in single shot (i.e. from the equipment) or which should be continuous and external. We aim to complete the proposal in time for a brief presentation at this meeting on 15th April.

(Actions: Philippe, Thomas Andy et al.)

- **Faraday cages:** One prospective supplier will visit next week.
- **Frequency reference (Philippe):** We have to decide whether to take a rubidium atomic clock reference or use GPS. In LEP the rubidium references were not very reliable. GPS was used without problems in the last three years of operation. The merits of each solution and any potential problems will be checked with Jonathan Sladen. **(Action: Philippe)**
- **Timing interface in VME modules (John):** The GMT timing hardware interface and timing signal standards for the VME backplane have to be defined. Use of hardware or software triggering has to be decided for various operations. Fast trigger standards should also be defined.
- **Procurement of components (John):** A list of LSI and special components for the digital parts of the LLRF designs already tested was presented, with total quantities for 16 cavity systems, plus spares. There are a small number of different types of FPGAs. Certain memories are used in a number of boards and are likely to be used again in ongoing designs. It was agreed that all these components should be purchased as soon as possible, with a reasonable number of spares and extra reserve included for future deigns. The same can be done for components in the RF parts of the designs (Philippe).
- **Directional Couplers (Daniel):** EMC tests were done in an anechoic chamber with a 50 W RF source. Minor modifications (shielding foil) now give < 60 dBm pick up, measured on the coupler ports.

6. Controls (Luca)

- **Klystron controls racks:** The local klystron racks are being assembled and will shortly be tested.
- **B867:** The DIC has to be completed. The two IO systems needed are being built.
- **Procurement for ACS:** A large amount of electronics and equipment, e.g. IO modules, has been received and is being prepared for assembly.

7. SR4

- **Layout and cable lists:** Work is ongoing for ADT low level, ACS (timing fibres and synchro + beam control, long. dampers and instruments) and for diagnostics.

8. RUX45/UX45 Integration

- **Drawing LHCLJ4GA0007** (RF layout and naming in RUX45), now in the CDD approval process. An error has been found and corrected (*ADT; BPMWA is not attached to dampers, right of IP4)*
- **Drawing LHCLJ4GA0008** (RF equipment layout and naming in UX45) is also in the approval process. It has been updated to include the names of all racks, bunkers, bunker equipment, klystrons, klystron local racks, junction boxes etc., as needed for the cabling lists.
- **Cryo WRL, He safety outlets:** These continue to be followed up with L. Serio and AT-CR. For the WRL the use of an unused port on the module has been looked at. A dome identical to that for the helium outlet could be used, with the same type of flexible connection. Dimensioning of safety valves and rupture discs has been studied by S. Claudet. They are slightly smaller than previously estimated. We would still have two rupture discs per module connected to tubes passing through the tunnel wall. This can now be looked at with the integration team.
- **ADT and water:** The layout and all connecting points are now defined, including the overpressure protection (10 bar for ACS, 6 bar for ADT).

9. RUX45/UX45 Installation (Olivier)

- **General planning:** A latest version of LHC installation planning - 7th April 2005 has been made, following the recent TCC presentation by S. Weisz.

- **Present Status RUX45/UX45:** The shielding wall is finished, the tunnel walls are nearly complete and work has started on the ventilation system with the dismantling of part of the existing installation. The tunnel walls are each made as two separate walls of blocks, to be joined later by horizontal bars. This is needed to safely support the monorail.
- **Forthcoming work:** The platforms will start next week, then the HV bunkers for the end of April. The Faraday cages connecting passerelle and the UX45 racks will follow.

10. EVM and Budget Estimates

EVM is up to date for all systems. Controls expenditure estimates for ADT should be increased, but this is minor overall and less that the margin of error in ADT.

Next Meeting: Friday 15th April at 08:45 in the JBA Room 864-2-B14.

E. Ciapala, 12th April 2005.