LHC RF Meeting
17th September 2004

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

1. ACS Couplers (Eric)

- **Conditioning in SA2:** Couplers MC111 and 112 has now passed 300 kW continuous, they will be removed next week.
- **Couplers 113 and 114:** These are presently being assembled; bake out will then be done individually.
- **Polarization Ceramics:** Eight more will arrive soon, to be delivered in batches of four.

2. ACS Modules (Pierre)

- **Module 1:** has been cooled down and low-power tests done on all four cavities. Q measurements are correct and all cavities are within the specified tuning frequency limits. There have been some problems with the CERNOX temperature probes; these are thought to be related to cabling or conditioners. Waveguides will be connected today. Power tests and conditioning will start next week.
- **Arc detectors for windows:** One arc detector will be fitted to the coupler under test and rotated between the cavities
- **Module 5:** The second beam tube has been mounted and checked. CERNOX temperature probes will also be checked before closing the module.
- **Planning:** Our planning up till the end of the year included first RF tests and conditioning of module 5. It will probably not now be possible to achieve this, due to the difficulty in scheduling the overall large number of activities involved, especially in view of the Soleil tests which we would nevertheless like to complete as quickly as possible. This may push the last module (Module 3 with its re-mounted couplers) till early 2006. Installation of the four modules in the machine would remain on schedule. A new planning will be done and presented next week, highlighting the critical activities and any possible resource limitations. Ample for LLRF tests will remain. . **(Action: Pierre)**
- **Second Bunker:** In view of the above it has been decided to install the second bunker. This is now being prepared by Luca. Linac 4 work can also be done in this bunker as well as waveguide phaseshifter tests by Daniel. We do not anticipate problems with cryo, if for example we do conditioning and cycling in parallel; most power is actually used only during the three hours filling. We will not do any tests without super-insulation in the modules.

3. ADT Status (Wolfgang)

.

- **Anode power converters:** A technical discussion was held with AB-PO and TS-EL. Harmonic level calculations done by the supplier have been repeated by K Kahle (TS-EL). A significant amount is in fact due to the long cable between the LV distribution units and the supplies (40 m). We will reduce this (to 15 m) by moving the power converters. (See SR4 layout below). This, together with the possible future upgrade of the transformers to reduce impedance, is expected make the 6-pulse solution acceptable. This will be discussed with the supplier.
- **Kickers:** Tests on the Russian 304L steel test chamber by AT-VA (M. Jimenez) are to be competed by the end of the week. They have been successful and we now need and expect to receive soon an official acceptance from M. Jimenez. Production will start in the factory in the Urals. A slight reduction in tank outer diameter which may be necessary due to the existing material has no negative consequences.
- **Supports:** The supports planned for the kickers do not allow sufficient height adjustment range (only +/- 20 mm) and a re-design is needed. (ACS supports should also be verified ! **Action: Ed**) Space for the amplifier units is very tight and the design must take this into account..

- **HV capacitors in tunnel:** These only need to be 2uF, according to calculations by Dubna, rather than 20 uF as previously estimated by R. Louwerse. They can probably be put inside the amplifier units. Similar capacitors (15 kV) are used in the PS by SR section. (Pierre)
- **B867 Test area:** Electricity and water modifications are minimal. There should sufficient time to complete the installation of the infrastructure before the ADT equipment will be available for test. A layout has been done. Eric is now preparing a basic planning.

4. ACS Power (Olivier)

- **Klystrons, loads & circulators:** Klystron 10 is under test. The posts in the waveguide of all klystrons are being modified to gain efficiency through better matching. Klystron 11 arrives next week
- **Klystron ripple:** The klystron modulator in SM18 is now installed close to the klystron. The short unshielded cable and hence reduced capacitance means that 100 Hz power converter ripple appears equally on the klystron cathode and mod anode, with resulting lower ripple on the cathode current. Measurements are however difficult due to electrical noise. 50 Hz noise from the modulator remains. It can be reduced but the adjustment depends on the klystron working point. The present arrangement is not very convenient and the next step is to make a new HV box for the klystron, to house a divider for the mod anode. This needs approval from Thales and we may have problems with the overall height. The divider setting will depend on individual klystron characteristics.
- **Need for the tetrode:** The main advantage of variable mod anode voltage is that klystron current can be reduced during coast where a maximum of only 200 kW is needed. (Joachim). The reduction in cathode current can give a significant improvement in klystron lifetime (Olivier). Additionally there is reduction in overall power consumption. The reliability of the tetrode and its electronics in the oil tank is however an important issue. Failures in LEP were around one to two per month. A decision on this and the ongoing series production of the modulators needs to be made soon. The present tests will be completed to help with this decision.
- **Waveguides in ISR:** Half-height waveguides for LHC have been separated out. The temporary destination storage tent itself needs to be cleared out. Official instructions regarding the GSI agreement are needed soon or the work will have to be temporarily postponed.

5. SR4 (Volker)

- **Layout:** A new layout showing the positions of the racks has been prepared. Agreement was been reached with TS-EL on racks to be removed or left in place. However the layout now has to change again with the need to install the ADT anode supplies close to the switchboard and transformers (See ADT above). One row of racks, originally marked as 19 racks for ACN will be taken out to make room for these. The existing parallel rows of 12 and 9 will be for ADT and ACN respectively. (3 racks will be added to the latter to make 12). A new layout will be produced.
- **UPS supplies:** All rack equipment in SR4 is to be on UPS.

6. Pick-ups and LLRF (Philippe)

- **Longitudinal Pick Ups:** Two will definitely be installed per beam, allowing complete separation of observation and feedback systems.
- **LLRF module progress:** The tuner control module is now being tested. Two cards have been made. This is the most complicated module so far having the on-board DSP and Xilinx XC2V2000 2M gate equivalent FPGA. Testing is still in the early stages, so far only minor faults have been found. The VME interface was quickly tested and works; this together with a basic software application (via FESA) is proving very useful in the debugging process.

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

E. Ciapala, 23rd September 2004