LHC RF Meeting

9th February 2007

Participants: Luca Arnaudon, Philippe Baudrenghien, Thomas Bohl, Olivier Brunner, Andy Butterworth, Edmond Ciapala, Pierre Maesen, John Molendijk, Eric Montesinos, Elena Shaposhnikova, Daniel Valuch, Frode Weierud.

1. UX45/RUX45/SR4 installation/commissioning (Olivier et al.)

Olivier gave an update on the status of the various activities:

ACS in UX45/RUX45:

- **Water:** The static pressure tests at 24 bar have been completed successfully. Re-installation of valves and other equipment is now being done, to prepare for week 9 when demineralised water should be available to test the systems.
- **Inter-wall area:** This has been thoroughly cleaned up after all the installation work. Plates have been put on the floor to protect cables and avoid risk of accident.
- **Cryo and WRL:** The WRL lines to the outer modules still have to be put in place. These lines will be straight and there is interference near a waveguide on each side. However modification of nearby waveguide supports should allow the lines to pass.

  Installation of the capillary tubes from the modules to the He pressure measurement equipment on the cryo side will start next week.

  Work is ongoing in preparing and installing the He gas return circuit piping.
- **Coupler mechanics:** These will be installed as soon as the cryo work is completed.
- **Cabling:** Problems relating to flexwell cables: Two out of 16 cables to the multiplexer have been completely pulled away from their connectors on the patch panel, probably while making space in the racks to install equipment. The connectors have clearly not been properly fitted. TS-EL say that these were the first cables installed, by an unskilled person without the correct tools. They maintain that only these 16 cables are affected and all others should have been correctly done. However we have also had bad connecting of cables in SR4 (crossed threads etc.) Bad connector mounting on flexwell cables is a familiar problem (SPS experience) and recurs with every new installation. On our side, the cable testing procedures are based on open circuit at the far end of the cable and will not find such problems (if only done from one end only!). We will now need to pay careful attention during commissioning. We will maintain a list of faulty cables that needed re-done.
- **HV cables for spare power converter:** The connection to the commutator on the surface will be taken away and the cable taken directly to the converter in the Spring, as soon as outside weather conditions allow.
- **Crowbar:** A system is being put in place in each bunker to trigger the crowbar if the voltage exceeds 60 kV.
- **HOM loads on platforms:** The best arrangement for rolling of the cable loads for the wideband HOMs and the easiest means of installing them are still being finalized. The necessary additional cable trays are being installed now.
- **Faraday cages:** The VME crates, ventilation units and pre-driver crates have been installed in the racks. Some fibres need to be moved to a different rack, this will be done by Luit de Jonge. One missing patch panel has now been installed and all flexwell cables are connected. The inside of the cages has now been cleaned out.

- **ADT in RUX45/UX45:**

  - **RF cables:** Testing is in progress.
  - **Interlock and controls tests:** Will start next week.
  - **Layouts and DIC:** Daniel will produce a signal distribution diagram (similar to that for ACS) showing the layout of the diagnostics system, based on tables produced by Wolfgang describing the required multiplexing combinations.

- **SR4:**

  - **ADT electronics and clock signals:** Before the DIC can be completed the final layout of the low level ADT system needs to be defined. This is being worked on by Daniel and Wolfgang and will be finalized on Wolfgang's return. Similarly the layout for the clock distribution is presently being finalised by Jean-Claude and Philippe.
  - **Ventilation System:** This will need to be made fully operational again before we start high power tests. TS-CV should be contacted to check on the status of the system and maintenance plans. (We also need information from them on design of the roof that we may eventually put on top of the new enclosure.) **(Action J-C Perrier)**
  - **Floor panels –** Some sections are covered by using several small pieces and this may not be 100% safe in the long term. We will ask Jean-Claude if some improvements can be done.

2. ACS Modules, Couplers and SM18

- **Couplers 131 and 134:** These were fitted to the test cavity some time ago. VA group have now authorized us to repair the vacuum pumping system. This has been done successfully and the test cavity has now been taken back to SA2 where tests have already started. We can run in SA2 till the end of March, after which there is a 1 month stop.
- **Single cavity module LHC21:** We will decide how long we can keep the cavity in the bunker in order to do maximum LLRF testing. However 2-3 weeks minimum is needed for the LHe level tests on module 4 (Europe). Cryo will not be available from mid-March to the end of April, for the change-over of the 12 kW plant to the 6 kW.

3. LLRF (Philippe)

- **Setpoint module (John):** It will not be possible to change the FPGA on the present prototype (problems with lead free pins during soldering) as the PC would be damaged. However a work-around has allowed us to continue working with this module. A problem of high error rate could be seen with the fast (1GS/s) link used to transfer signals across the backplane from module to module. This was traced to excessive clock jitter – which could be measured very precisely using a special fast oscilloscope. Adjusting the parameters of the clocking system and PLL could not produce sufficient improvement. However, by-passing the PLL and changing the crystal oscillator produced a factor 4-5 improvement in the jitter, bringing it within specs and resulting in error free transmission. This was checked over a period of many hours continuous running.
- **Digital Feedback:** The narrowband digital feedback can be tested once we have a working setpoint module – this is the next LLRF test planned in SM18.
- **Beam Phase module (Daniel):** For the moment, a problem in the VME interface is being looked at.
- **Fibre Optics Tx/Rx:** Version 2 is being prepared and series fibre components are being ordered.
- **Synchro loop module:** Version 1 is now with the design office.

- **1-T feedback/damper:** Some improvements are being made in the design; these will be tested in simulation before the hardware tests are continued.

4. AoB

- **SR4 electricity:** The SR4 electrical installation for the klystron power converters is not rated for running at full power on all four klystrons. The whole installation was re-done after LEP dismantling and the figures used were the kW input ratings for the klystrons at maximum power, instead of the corresponding power converter input kVA. To run at full kVA a number of HV cables need to be changed and current measuring transformers upgraded. Rectifying this, the cost and the consequences on planning will be discussed with TS-EL and AB-PO next week.
- **UPS and Faraday cages:** We clearly need some means of breaking power to the Faraday cages, both for safety reasons and to allow switch off in the event of serious overheating in the cages (as done in SPS) without switching off the UPS. This will be brought up with TS-EL at the coming meeting on the SR4 installation.
- **Schottky pick-ups:** We need to check that 400 MHz reference transmission has been foreseen by BDI, as well as other cabling. To be checked with F. Caspers. **(Action: Elena)**

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Next Meeting: Friday **23rd February** at 08:45 in the JBA room.

E. Ciapala, 13th February 2007.