LHC RF Meeting

28th June 2007

Participants: Luca Arnaudon, Philippe Baudrenghien, Thomas Bohl, Olivier Brunner, Andy Butterworth, Edmond Ciapala, Trevor Linnecar, Pierre Maesen, John Molendijk, Joachim Tückmantel, Daniel Valuch, Frode Weierud.

1. P4 RF Installation/Commissioning

General P4 planning: The latest general planning can be found in EDMS under **LHC-PM-MS-0005, document 102509. See current V.4 here.** Cool-down of sector 4-5 is delayed till week 27. It has now been decided to organize the QUI intervention such that the warm-up of Sector 4-5 will not be needed. We will therefore not do low power tests as in Sector 4-5 separately; instead they will be done as soon as there is liquid helium at 4.5 K. From discussions with Cryo specialists, the earliest we can probably expect liquid is mid-September in 4-5 and mid-November (!) in 3-4.

Cryo status: Discussed with U. Wagner (AT-ACR). Connection and test of instrumentation is still ongoing. Deployment of control logic and software is unlikely to be done before start of sector 4-5 cool-down. Tests will therefore be done at 20 K, before filling. The inlet and outlet lines will be clamped shut at the start of cool-down, with the warm recovery line open to release any helium leaking through the valves. The valves and numbering will be checked against diagram LHCLSQR 0104 and the basic software for remote opening and closing from the Cryo control room will be implemented and checked before start of cool-down. (We should also find out if the valves supplying the cavities are among a certain number that need to be changed for different size).

Vacuum work: The final vacuum interconnections have all now been installed. The delay in cool-down allows the vacuum work and bakeout to be completed this week. The second beam tube bakeout and NEG activation in the remaining three modules is ongoing. All sector valves remain closed and electron stoppers open. The drive mechanisms on the module sector valves will be changed in July. ADT bakeout is also ongoing in sector 3-4. There was concern over a possible vacuum leak on an APWL flange. This was due to the bolts used to tighten the connection, after repair the flange was leak checked successfully by the vacuum group and the pick-up did not need to be removed. Note that four temperature sensors have been installed for each pick-up; they will probably be used to measure load temperatures with beam.

2. Klystrons:

The modified collector cooling manifold ('boiler') from Thales has been tested on the H112 klystron. The klystron was powered for 24 hours at 500 kW. On dismantling no discolouring was seen on the cover nor on the collector, indicating that with the new cooling arrangement the water circulates correctly. Four klystrons in UX45 have had the boilers removed and modified ones will be fitted. All show discolouration and one collector is particularly bad. One other klystron in UX45 has a short in the filament and will need to be repaired (under guarantee).

3. SR4

Cabling DIC: This has now been given to TS-EL. Some minor details of cabling (Longitudinal feedback?) remain to be settled.

Network: The recent access problem has been solved (missing switch)

4. SM18:

Cryo Plant: The supply of helium with the re-installed old 6 kW plant is still only 15 g/s, compared to the nominal 30-35 g/s. The available cooling is used for priority magnet tests. The performance of the plant is still being looked at. Pierre has contacted S. Claudet on obtaining two weeks to do our tests.

RF Tests: In addition to the work of completing couplers and finishing Module 4 (Europe) there are two important test to be done:

- **Filling and level measurements** on Module 4 with Cryo

- **Testing of a full RF cavity controller** with all tuning, RF feedbacks, polar loops and conditioning hardware, together with the software - finding any problems and identifying any operational improvements that might be done. This could well save us valuable time in the tunnel.

5. LLRF:

Testing of ACS 7/8 inch cables: Drive and antenna cables will be measured. The work can be done conveniently when the klystrons are out for changing of the boilers, in groups of four**.**

Series testing for ACS conditioning (Phase 1):

- ***Clock Distribution:*** The full series has now been tested.
- ***Tuner Control:*** We have 25 modules. They have all been configured and tested in the Lab. First tests in UX45 will start soon.
- ***Tuner RF Front End:*** We have 25 modules. The first has been tested without any problem, the remainder can now be tested by the FSU team.
- ***Quad DDS – Conditioning module:*** There are some minor modifications to be done on the series, (changing of some resistors) but this can be done during the testing, by the FSU. A full test procedure has been prepared by John
- ***Switch and protection:*** Ten are in production; we expect to have them by the beginning of August.

Series testing for ACS feedbacks and operation (Phase 2):

- ***Modulator & Polar loops:*** Preparing for series production, collecting components and discussing with design office.
- ***Feedback modules:*** Series of 44 ordered, Expecting PCBs by end of next week, collecting components.
- ***Set point:*** Again collecting components for series of 25
- ***Analog demodulator:*** Waiting for availability of design office effort.

Closure of PCB manufacturing firms in August may be a source of delay.

ACS Patch cables: (From two weeks ago) We still need to order around 20 SMA/SMC cables per cavity in the Faraday cages to connect the VME modules to the patch panels. This is stores material and will be ordered straight away. We can use the installation budget code for this.

Next Meeting: Thursday 5th July at 08:45 in the JBA room.

There will be a presentation on the results obtained during the tests on the Klystron Polar Loops in SM18.

E. Ciapala, 29th June 2007.