# LHC RF Meeting 30<sup>th</sup> September 2005

**Present:** Luca Arnaudon, Philippe Baudrenghien, Thomas Bohl, Andy Butterworth, Edmond Ciapala, Wolfgang Höfle, Trevor Linnecar, Pierre Maesen, Eric Montesinos, Elena Shaposhnikova, Volker Rödel, Daniel Valuch.

# 1. ACS Couplers (Eric)

**Coupler conditioning test stand:** The test stand cavity has been baked out and the assembly leak tested and installed in SA2. Conditioning of couplers 124 and 125 has now just started.

## 2. ACS Modules and SM18 (Pierre)

**4** Module 5: Springs were fitted and the tuning tested with the cavities warm. The new superinsulation sheets were wrongly cut by the supplier (in spite of using their own original plans from previous fabrication) and the old ones will have to be re-used. The module is being closed and will be pumped down this weekend, ready for installation next week in the bunker. Additionally circlips on some of the small cylindrical pegs traversing the tuner flanges to hold the tuner support rods were found to have been broken, due to the flanges being too wide in places – the pegs will be removed and machined to fit.

**Module 4:** A small leak in the helium circuit was detected on checking after fitting of the new safety domes. It was traced to the cooling connection to an HOM coupler and easily corrected.

**HOM tests on module 2:** Some analysis and discussion has followed last week's first series of tests. The additional dipole mode seen between the two expected modes may be due to the dipole couplers themselves. Damping of the dipole modes, with the dipole couplers, is good; this has been verified for all four cavities. However modes between 600 MHz and 700 MHz, normally in the range of the wideband couplers, appear to be damped very little. Note that HOM Q values above a few hundred may be dangerous for above half-nominal beam current – with estimated R/Q 5-10 ohms, 8 cavities and a total impedance limit of 50 kohms at these intensities. BR section has proposed that measurements be done using the dipole couplers as input and output, instead of the wideband couplers. The measurements have just been completed and Pierre will circulate the data as soon as possible.

! It was agreed that tests should be done on the module when it is warm and out of the bunker to cross check original warm HOM measurements.

**Low level RF tests:** These have been very successfully completed. They will be reported later. Some general observations and points needing to be followed up:

1) *Cavity forward and reflected power measurements.* Far higher reflected power was indicated than would be expected, compared to forward power. The measurement system should be tested and calibrations done with a waveguide short, once module 2 has been removed.

2) Saturation of the drive amplifier: This occurs at around 130 W. While this prevents any risk of feedback loop instability by over-drive of the klystron, it does mean reduced gain and hence poorer noise reduction at high power. The pre-driver, driver and klystron complete chain should be measured, in H112 and SM18 and compared with original measurements done by Philippe and Olivier.

3) *Operating klystron current:* The above may mean that during operation, for maximum noise reduction, we will probably always run at maximum klystron current.

4) *Use of polarization:* Occasional trips with the need for subsequent conditioning were seen when coupler polarization was not on. With polarization on running was always stable. Nevertheless periods of conditioning, without polarization, will always be needed and must always be done during operation.

# 3. ADT (Eric / Wolfgang)

**Amplifiers:** Correction to write up of previous meeting: The second amplifier has been successfully assembled – but not yet tested. For power tests we still need loads. Interlocks and controls are to be checked by Luca.

**Water cooled resistors:** Delivery of two modified resistors has been delayed till week 40.

**Cooling tests in 867:** J. Inigo-Golfin (TS-CV) will visit the installation next week.

**4 ADT Layout and Database:** Names and dimensions have now been put in the installation database with S. Chemli. Wolfgang will send a link to the data to help us prepare the necessary information for ACS and APW. Note that the slope of the tunnel (mainly in the radial direction at IR4) has a significant effect and dimensions have to be indicated such that it is clear whether they are with respect to true horizontal or actual floor level.

**Electrodes:** One set has arrived from Dubna

**Drive amplifiers:** The problem with downloading corrected CPLD code into the last batch of amplifiers is still being followed up with the manufacturer.

**Kicker tanks:** News from JINR - Work is advancing well; a number are expected to be delivered shortly.

## 4. UX45 Planning and Installation (Olivier)

**4 ADT Cabling:** (Luca) A meeting was held during the week to prepare the first phase of cabling for ADT. This concerned cabling between racks and equipment. Some issues: Connection to PUs in cryostats, connection of large 7/8 inch cables in trays to tunnel equipment via shorter cables but 3/8 directly to equipment, connector types for grid supply HV cables. Since not all crates are defined cables will be pulled with a given added reserve length – see below, then re-cut when connectors are to be mounted. At this stage it will be necessary to have defined all patch panels and equipment rear panels. Note: we still have to agree on the final interlock configuration.

**4 Cabling with ST-EL: (Luca)** Discussed with S. Pelletier ST-EL, who has extracted (from the DiC) a list of cables according to 'network', i.e. depending on the type or class of equipment connected at each end. This allows them to determine easily the way in which the cable will be cut, e.g. spare length, during the first phase of cabling....

**Test of flexwell cables:** Pre-installation tests are being done on cable rolls at P4 with a network analyser. (J-C Perrier)

**4** Cabling responsibilities:

- Coax cables J-C Perrier, with J-F Malo for APW cables and patch panels
- All controls cables Luca
- Fibres Philippe/Donat
- ACS HV cables Olivier
- ADT HV cables Wolfgang and R. Louwerse

**Note** that pulling of the first 7/8 inch coaxial cables from SR4 to the cavern (APW) will start next week.

**Cabling and QRL installation:** The QRL will now be fully installed between the shielding walls BEFORE cables are installed. Bends between the shielding walls will started on the 17<sup>th</sup> October. Some cable trays already in place will have to be removed beforehand.

**Spare cables:** (Wolfgang) The spare 3/8 and 7/8 inch cables have been ordered, together with some tools for installation and connector mounting.

**Electrical layout in UX45:** There are some errors in TS-EL's electrical layout drawing in UX45 LHCEY\_\_\_\_4011. (e.g. Racks on cryo side) The main interest of the drawing is to show the position of UPS supplies in UX45. The errors should be indicated via the CDD approval process.

**Faraday cages:** The material has been lowered into the cavern; construction will start next week. The VIC, training and Plan de Prevention formalities were all completed during the week. There is no problem with flatness of the floor and the copper sheeting has been laid. Hopefully the work will not conflict with or be hindered by other activities.

**Earthing bars in trenches:** The support bars have been put in place. The bunker earthing connections are next.

**Platforms, cable trays:** nearing completion.

## 5. AoB

None

**Next Meeting:** Friday 7<sup>th</sup> October at 08:45 in the JBA Room 864-2-B14.

E. Ciapala, 5<sup>th</sup> October 2005.