

# LHC RF Meeting

11<sup>th</sup> January 2008

**Participants:** Edmond Ciapala, Philippe Baudrenghien, Pierre Maesen, Thomas Bohl, Luca Arnaudon, John Molendijk, Olivier Brunner, Trevor Linnecar, Joachim Tuckmantel, Eric Montesinos, Andy Butterworth, Wolfgang Hofle.

## 1. Equipment status in UX45:

- ✚ **Modules and cryo:** 2 modules were kept cold until 27th Dec, when communication problems in the cryo control system caused a shutdown resulting in He loss. The modules were recovered at 240K this Monday followed by a cooldown. A strange effect was seen in Module 1 Beam 2 where Cavity C seemed to fill slower than the other cavities. A gas bubble effect resulting from the rapid filling rate is suspected. However both modules are now cold, full, and ready for operation. The sector should be cold until the end of Week 7. During this time there will be quench tests. It would be possible to isolate one module for safety, while leaving the other connected as normal to assess the effects of the cryo perturbations on operation.
- ✚ **Conditioning:** Module 1 Beam 2 has now been conditioning for 3 weeks. Module 2 Beam 1 was conditioned during 1 week before Christmas. Some conditioning time was lost initially due to software problems.
- ✚ **Vacuum gauges:** There are still worries about the calibration of the vacuum gauge analogue output. M. Prax has made a test fixture and performed some tests on 2 vacuum gauge measurement cards under steady state conditions. These confirm that the analogue output is offset by about 1 volt with respect to the front panel reading throughout the whole range, corresponding to about a factor of 10 higher in vacuum (pessimistic). A cross-calibration could be done with real vacuum gauges between the  $10^{-9}$  and  $10^{-11}$  gauges in SM18. Even so, it would still be interesting to have the  $10^{-11}$  gauges in LHC. These will not be available for 4 weeks.
- ✚ **Cavity controller:** The RF feedback modules are installed in cavity 8 Beam 1. If all goes well it should be possible to start Low Level tests on this cavity next Friday. We should aim to have low-level loops commissioned in 1 or 2 cavities by the end of week 7.
- ✚ **Access system:** Access is possible in UX45 from Monday, zone closed + patrol on Tuesday morning. The electron stoppers will be consigned on Monday, and the sector valves will stay closed.
- ✚ **RF leakage & safety:** Olivier is investigating a specific solution for UX45, but SC should define a general strategy. A fixed detector (1 per station?) should generate an alarm but not be connected to the interlock system. 2 portable instruments are permanently available in UX45: one RF radiation monitor and one ionising radiation monitor.
- ✚ **Cabling of analogue switching system:** Jean-Claude will organise getting material (several drums of 3/8 Flexwell) to UX45. Daniel will organise the cabling job. 2 FSU required for 1 week.

## 2. SM18

Will start cooling down in week 7 but could be week 9 (cryo needs 4 weeks shutdown in the year, could be reduced to 2).

## 3. Low-level RF

- ✚ **Synchro and timing:** All LL hardware is ready to be installed, apart from the fibre optic transmitters - the series has been received and needs to be tested. Installation during the second half of February. Fibre VME crates (standard CO) still missing in UX45.
- ✚ **Low-level modules:**
  - **RF Feedback:** 43 boards out of the series of 44 are working correctly, which is more than sufficient for installation + spares.
  - **Setpoint and RF Modulator:** 1 module of each to be tested in UX45 before reception test of the series. The problem with interrupt chaining in the RF Modulator card (in the VME interface from CO) which blocked the conditioning software has been fixed by John. The CO responsible has been informed.

- **Switch/Protection (SWAP):** a modification is necessary to inhibit the gain part of the klystron polar loop when the SWAP is limiting. A backplane line is pulled which freezes the integrator in the gain control. The phase loop is unaffected. The SWAP reacts in 50ns, but the polar loop is much slower, so even though an inhibit will be generated on beam gap transients, this will have no appreciable effect on the polar loop output. 1 module has already been modified for testing in UX45.
- **400MHz filters:** ready for series production. Some quality problems have been seen with PCB production at CERN.
- **Frequency program DDS:** This is the last LL module needed for LHC. Development has been started by Joao.
- **Tuner control/Beam Control loops:** Jorge is ordering more boards.

#### 4. ADT

- ✚ **Amplifiers:** 16 amplifiers + 1 in 867, waiting for HV resistors for 3 amplifiers (12 resistors minimum but ordered 32).
- ✚ **Power Interlock (PIM) modules:** All 8 modules are now working.
- ✚ **Controls:** Luca is preparing new software for amplifier and power supply control, to be tested next week. All power supplies in SR4 will be powered in order to test the electrical supply capacity. 2MW has been requested for SR4.
- ✚ **Maintenance on the 18kV to 400V transformers:** AB/RF needs to request this - apparently it is no longer TS-EL responsibility.

#### 5. ADT Low-level:

- ✚ **Feedback card:** Vittorio has provided 2 prototype cards. He will do the necessary changes to handle digital input. Gerd has started FPGA programming of the damper-specific functionality.
- ✚ **Beam position measurement:** The digital card is in production. Maarten is reviewing the FPGA code made by Iouri. The RF front-end card is undergoing final modifications on the v2 prototype.

**Next meeting:** Thursday 17th January in the JB Adams room.

Until mid-February LHC RF meetings will be held on Thursday mornings in the JB Adams room. After this date they will take place on Friday mornings, also in the JB Adams room.

A. Butterworth, 14<sup>th</sup> January 2008