# LHC RF Meeting 4th November 2009

**Participants:** Philippe Baudrenghien, Luca Arnaudon, Vittorio Rossi, Pierre Maesen, Joachim Tuckmantel, Wolfgang Weingarten, Andy Butterworth, Edmond Ciapala, Elena Chapochnikova, Wolfgang Hofle, Daniel Valuch, Eric Montesinos, Maria Elena Angoletta, Frode Weierud, John Molendijk, Frederic Dubouchet

#### 1. UX45 status

- **4** The broken rupture disc has been replaced and the module has been purged and cooled down.
- Sector 4-5 has been conditioned, quite rapid, but one module quenches, M1B2. M2B1 conditioned rapidly. Sector 3-4 has been more difficult especially M1B1 which was just finished last Friday.
- Some field was missing on the signals, this was found to be one antenna signal at -10dB with the loss inside the module, due perhaps to a disturbance of the internal cabling when the module was opened earlier this year, or perhaps a bad screwing in of the antenna. It has been swapped for the second antenna. We should make reflectometry measurements: Gerd has a script which is rapid, Daniel offers help. It could be warmed up over Christmas to investigate.
- **4** The alignment of the ACS modules was checked and very small adjustments made.

## 2. LLRF

- All loops except tuner and kly polar loop were set up with the MATLAB scripts at Q=60k. All settings were found to be very close to the 2008 values.
- The cavity Q needs recalibration. The imperfect circulator match means the loaded Q is lower than in the low power measurements.
- **4** Daniel proposed to re-check the cavity sum.
- ↓ 1-turn feedback has been installed on all cavities.
  - Control OK (David/Luca), a few bugs have been fixed. For the automated setting-up Vittorio spent some time to explain to Claudio how to control the 1-T FB.
- There are problems with the resolution of the MATLAB tools for setting up the 1-T FB the number of excitation points is too limited. John suggests to build in a white noise generator into the modulator, followed by a shaping filter to make it band limited and a phase rotator to move the noise in frequency.
- Coupler movement: For startup, we could very well run with Q=60k all the time. Coupler change with beam should be tested before Christmas.
- The beam signal simulator for the phase and radial loop will be moved to SR4. Some more development is needed for the observation buffers.

## **3.** ADT

The power system fully operational since several weeks. There is still some work to do on controls and software.

## 4. Injection test

SPS operation was smooth except for problem with jitter of bunches from PS. Not the fibre link, but some electronics in PS introducing some phase shift. Heiko is investigating.

#### 5. SPS ions

- 4 The tests this year were successful but there is still some work to do to improve reliability.
- There were many amplifier trips due to the beam control sending the wrong frequency. LHC type switch and limit modules will be installed for monitoring and clamping to protect the amplifiers. A budget for this has been agreed with the DPO.
- **Wheed to look at longitudinal feedback.** This should probably also be upgraded for protons.
- ↓ We will continue to ask for ions MD next year.

#### 6. Plans for beam commissioning

\rm Ed's list:

- o Re-commission beam observation equipment at P4
- APW, mountain range (h/w s/w & OASIS)
- Re-commission B2 capture (check synchro & phase loops)
- Commission B2 radial loop
- Commission B1 capture and radial loop
- Phasing and voltage calibration of all cavities
- Adjust synchro for collisions in IP1 and IP5
- Do accurate bunch lifetime measurements on both beams
- Commission SPS BQM
- Measure transverse injection errors
- Commission transverse damper loops
- Ramp with beam. Initially on synchro loop, then on radial loop if needed (to understand energy discrepancies)
- Verify lifetimes at top energy (transverse or longitudinal losses?)
- o Before physics, switching to reference synthesizer
- o Lifetime measurements ..
- Lifetimes in collision..
- o Closely follow multi-bunch & higher intensity operation..
- **G** Comments/additional items:
  - Cogging and adjustment of collision point:
    - For coarse adjustment: inject and dump: measure and change before injection
    - At IP4 we have a few hundred ps resolution between the two APWs
    - BI have pickups at IP1 and 5
    - We will use the experiments pickups around ATLAS and CMS
    - For fine adjustment: with coasting beam, use the experimental detectors to observe the luminous region (by telephone with the experiments?)
  - The SPS BQM has already been commissioned.
  - Global orbit feedback radial loop: when will it be available? Will we need to commission our own radial loop?
  - Longitudinal blowup: The intrabeam scattering lifetime with 1eVs is a few hours. We should have a solution ready to use if demanded. In Elena's opinion this is a higher priority higher than the Q adjustment. A system for blowup using the LL loops DSP and the noise generation software from Joachim is mostly implemented but will need some time (probably about 2 weeks) to finish and commission.
  - Communication with CCC in SR4: Luca will buy some PCs with screens to display Page 1 and other fixed displays.

#### 7. Consolidation

- Money for klystrons, spare cavities, couplers and APW feedthroughs will come from the consolidation budget (S. Baird). Other items (LL electronics) will be on the operation budgets.
- A. Butterworth, 15th December 2009