

**LHC EXPERIMENT-ACCELERATOR DATA EXCHANGE WORKING GROUP  
(LEADE)**

**Minutes of the 15th Meeting held on 9 February 2004**

Present: N. Ellis, L. Fernandez-Hernando, P. Grafström, Ch. Ilgner, R. Jacobsson,  
R. Jones, J. M. Jowett, E. Mahner, A. Morsch, W. Smith, E. Tsesmelis,  
Th. Wengler

**1. MATTERS ARISING**

Approval of the minutes:

The minutes of the 14<sup>th</sup> LEADE meeting were approved without modification.

**2. TTC COORDINATION ISSUES**

The question of assigning a contactperson from PH Department for matters concerning TTC coordination with the LHC machine was highlighted as being of utmost urgency. A candidate has been identified and it is expected that work can commence in March 2004. As a first task, the candidate shall collect all pertinent information on the TTC system and present a summary to an upcoming meeting of LEADE. The candidate shall be making contact with representatives from each experiment to discuss further details.

Action: Each experiment is asked to name a contactperson for matters concerning TTC coordination with the LHC machine.

R. Jones requested that the experiments provide him with a list of signals to be handled by the Beam Synchronous Timing Receiver Interface for the Beam Observation System (BOBR).

Action: The experiments are asked to send the list of signals to be handled by the BOBR by 13 February 2004 to Rhodri Jones.

R. Jacobsson suggested to send the GPS time over fiber Channel B. This would allow to assign a time stamp of 25ns accuracy to every event in the experiments with a 1 ns time jitter as claimed by the manufacturer.

Finally, the experiments are asked to provide E. Tsesmelis the rack number in their underground counting rooms to where the TTC cables from the LHC machine will arrive.

Action: The experiments are asked to provide rack that will receive TTC cables from the LHC machine.

### 3. RECAPITULATION ON THE RF RANGE (P. Baudrenghien)

On behalf of P. Baudrenghien, E. Tsismelis presented a summary of parameters concerning the range of RF expected at the LHC. The points discussed were the following:

1. During collisions for physics, the difference between proton bunch frequency (40.078966 MHz) and the Pb bunch frequency (40.078964 MHz) is only 2 Hz.
2. At injection into the LHC, the Pb bunch frequency (40.078414 MHz) is 550 Hz below the collision frequency but this should be of no concern to the experiments (see 4).
3. During access, after beam dump, during shut-down and repairs, the supplied RF bunch frequency can be (almost) anything (even missing).
4. It is suggested that a switch be implemented at the TTC input to select either the RF supplied 40 MHz or a local reference. The switch would be driven by a timing that commutes on the RF reference only when the machine is in "colliding" mode. When the machine is in "colliding" mode the RF guarantees a clean, stable, non-interrupted 40 MHz (40.078966 MHz for p and 40.078964 MHz for Pb, see 6) that is well within the range of the QPLLs of the experiments.
5. The LHC RF is not responsible for designing, operating and maintaining this switch.
6. Remark: 1 mm displacement of Closed Orbit changes the 40 MHz frequency by ~10 Hz.

The experiments requested that the RF signals are made available to the underground counting rooms during all periods of machine operation – injection, ramp, and coast. It was agreed that during periods of maintenance, access and machine shutdowns, the experiments will provide their own signals to the TTC. The switch to do so will be provided by the experiments.

### 4. BEAM CONDITION MONITOR (L. Fernandez-Hernando)

L. Fernandez-Hernando gave a presentation on the current status of the Beam Condition Monitor (BCM), which will be a fast system to detect abnormal beam conditions such as those resulting from a D1 failure. The system is also meant to generate a positive signal when beam conditions are normal. The goal is to be able to provide information on individual bunches.

The BCM system will most likely be based on CVD diamond, a technology which is being characterized and tested in the laboratory and in a test beams.

## 5. IONS FOR THE LHC PROJECT (J. M. Jowett)

J. M. Jowett presented a status report on ion operation at the LHC. He presented details from the I-LHC Project, including a review of the new ion parameters, the small-angle separation scheme, quench limits and ECPP, collimation, vacuum and luminosity and beam lifetime.

The conclusions for ion operation at the LHC are given below:

- Operation of LHC with lead ions is limited by diverse effects, often qualitatively different from protons.
- ECPP leads to magnet quench, limiting integrated luminosity.
- Poor collimation efficiency, large particle losses in dispersion compressor, limit on total current.
  - Either keep > 40 min lifetime for nominal ion parameters in Collision or reduce beam current.
- “Early scheme” will allow relatively safe commissioning, and access to good initial physics.
  - Reduced risk of magnet quenches from ECPP.
  - Reduced heat deposition related to collimation.
- But Pb ions require much lower vacuum pressure than protons ions.
  - Independent of beam intensity.
- Ion operation is restricted to a small range of operational parameters below the nominal luminosity.
  - Do everything possible to expand it.

## 6. A. O. B.

Dates for 2004 - The meetings will start @ 16:00 (Bat. 14-4-030)

29 March

10 May

14 June

19 July

6 September

18 October

13 December