8 July 2003

LHC EXPERIMENT-ACCELERATOR DATA EXCHANGE WORKING GROUP (LEADE)

Minutes of the 11th Meeting held on 7 July 2003

Present: R. Bailey, N. Ellis, K. Gill, P. Graftstrom, Ch. Ilgner, R. Jacobsson, R. Jones, A. Morsch, A. Smith, E. Tsesmelis, Th. Wengler, J. Wenninger

1. MATTERS ARISING

The minutes of the 10th LEADE meeting were approved without modification.

The draft engineering specification for the `Beam Synchronous Timing Receiver Interface for the Beam Observation System' has been put on the LEADE working group's Web pages and the representatives from the experiments are invited to review the specification prior to the next meeting of LEADE.

Action: LHC experiment representatives

G. Beetham reported on the lay-out of the racks requested for experiment-machine interface systems in the experimental areas. Space has been reserved in the SR buildings and in the LHC alcoves and the experiments are requested to allocate space for two racks in their respective underground service caverns/counting rooms. The contents of these two racks will be presented at the next meeting of LEADE.

Action: LHC experiment representatives, G. Beetham

The coaxial cables for the BPTX monitors will be of the CMC50 type and the costs are being estimated.

Action: C. Ilgner, J.-C. Guillaume

2. LHC COMMISSIONING AND FIRST YEAR OF OPERATION *(R. Bailey)*

R. Bailey reported on the following schemes of operation:

Phase 1 – Establish Colliding Beam Operation:
25ns bunches with 30-35% of nominal bunch intensity
43 bunches/beam, ≈ equally spaced with large gaps
Crossing angle: 0°
Bunch current: 0.9×10^{11} protons
Luminosity: 6×10^{13} cm^{-2} s^{-1}

All bunches will collide in each of the experiments except LHCb.

Phase 2 – Establish Multi-bunch Operation:
More suitable for physics; switchover time ≈ 1 week
75 ns bunches
7 TeV (maybe initially 6.5 TeV), more suited for physics
936 bunches/beam
Beam crossing angle: 250 μrad
Bunch current: $0.5 \cdot 10^{11}$ protons
$\beta^* = 0.55$ m
Luminosity: $5 \cdot 10^{32}$ cm^{-2} s^{-1}
Event pileup: ≈ 2

Phase 3 – Nominal Physics Run:
After electron cloud problem solved
936 bunches/beam at 7 TeV
Beam crossing angle: 285 μrad
Bunch current: $1.1 \cdot 10^{11}$ protons
$\beta^* = 0.55$ m
Luminosity: $5 \cdot 10^{34}$ cm^{-2} s^{-1}
Event pileup: ≈ 20)

3. SATELLITE BUNCHES

(J. Wenninger)

While transferring the beam from one machine to another (PS -> SPS and SPS -> LHC), two phenomena are to be considered:

- the uncaptured beam which is lost at the beginning of acceleration, and
- the beam captured in unwanted locations giving rise to satellite bunches.

At IP1, IP2, IP5 and at IP8, collisions between satellites may occur every 2.5 ns at the same vertex as nominal bunches and in the worst case may occur 9 times more frequently than normal collisions. At IP8, there is an additional possibility of collisions between satellites and normal bunches at the beginning and end of each 72-bunch train. For TOTEM running, since there is no crossing angle, there is the possibility of additional collisions between satellite and normal bunches every 37.5 cm on either side of the IP.

A high-sensitivity longitudinal profile monitor should detect satellites at the per-mille level within minutes in the LHC. However, satellite bunches in SPS are likely to create satellites in LHC but measurements in the SPS are difficult and limited only to the percent level. Detection of satellites in the SPS may be used to prevent injection into the LHC, but this would require new instrumentation that is currently not foreseen. The experiments are therefore invited to communicate whether or not a satellite frequency at the percent level is acceptable or whether reducing the satellite rate in the SPS is required in order to bring down the frequency to the per-mille level.

Action: LHC experiment representatives

4. STATUS OF LHC LUMINOSITY MONITOR (LUMINOMETER), FUNCTIONAL SPECIFICATION
(R. Assmann)

R. Assmann reported on the status of the luminosity monitor functional specification. All 4 LHC experiment IRs will be equipped with such devices in order to measure the relative luminosity and the collision rate. The technology for the luminometer will be decided at the end of 2003 and the choice is between ionization chambers and CdTe-based detectors. Following a presentation to the AB-BI Technical Board and the LTC (LHC Technical Board) the specification has been released for approval to the relevant LHC machine groups and to the experiment

Action: LHC experiment representatives

5. A.O.B.

R. Jacobsson reported that the RF clock is expected to come back into phase following a clock reset but that some perturbations should be expected. Prior to each injection into the LHC, a general system reset will be performed. Further details will be provided at a future LEADE meeting.

Action: R. Jacobsson

Remaining Provisional Dates for 2003 Meetings:

18 August
13 October
10 November
15 December

Ch. Ilgner