

## AD-HOC WORKING GROUP ON LHC EXPERIMENT-MACHINE

### PARAMETER AND SIGNAL EXCHANGE

Minutes of the 1st meeting held on 15 January 2002

Present: R. Assmann, P. Baudrenghien, G. Beetham, N. Ellis, R. Jones,  
W. Smith, B. Taylor, E. Tsismelis

Apologies: K. Cornelis, D. Evans, A. Smith

#### 1. INTRODUCTION

*(E. Tsismelis)*

The members of the Ad-Hoc Working Group on LHC Experiment-Machine Parameter and Signal Exchange are:

For the LHC Experiments (as appointed by spokesmen):

- ALICE: David Evans
- ATLAS: Nick Ellis
- CMS: Wesley Smith
- LHCb: Alasdair Smith
- RD12: Bruce Taylor
- TOTEM: K. Eggert (*new member confirmed after the meeting*)

For the LHC Machine (appointed by respective machine groups):

- SL/AP: Ralph Assmann
- SL/BI: Rhodri Jones
- SL/CO: Gary Beetham
- SL/OP: Karel Cornelis
- SL/HRF: Philippe Baudrenghien

Convenor: Emmanuel Tsismelis

## 2. LUMINOUS REGION: SIZE AND STABILITY (ANNEX I)

*(P. Baudrenghien )*

At the beginning of a coast, 95% of collisions will occur in an 18 cm region centred on the IP. This value includes the estimate for the RF jitter in the two rings. After 10 hrs. of coast, and assuming that the estimate for the emittance blow-up due to RF noise is correct, 95% of collisions will occur in a 32 cm long region around the IP. This also includes the RF jitter in the two rings.

There was a question to the experiments as to how often the timing would be adjusted to centre the crossing clock on the collisions. This would be done at the start of collisions, but whether an adjustment is required again during the coast is an open question.

There will be satellite bunches from the 400 MHz RF located at 2.5 ns from the nominal bunches. It is believed that the luminosity from these bunches will be small (< 1%), but this is not yet confirmed.

The machine group would like feedback about the beam positions in the detectors during a run. What information they would want exactly will be determined. They will need information about background levels in sensitive components so they can monitor this. There is a request for feedback from the experiments as to what information could be provided.

The conditions for a beam abort from the experiments need to be determined.

The machine group will install RF pickups 70 m from the IP for use also by the experiments. They wish to know what signals the experiments would want. The RF pick-ups are being designed now. The actual pick-ups are read-out in 4 quadrants for measuring the position of the beam. They can sum these signals for the experiments if required. There will be a presentation with more details on these at the next meeting.

## 3. Optimisation of Peak and Integrated Luminosity (Annex II)

*(R.Assmann)*

The beam loses  $10^9$  particles per second with most of this lost in the triplet around the IP. The limit on beam loss will come from this loss in the triplet.

There are nominally  $1.05 \times 10^{11}$  particles per bunch in 2808 bunches. The total stored energy is 331 MJ (beam accidents are very dangerous!)

An informal discussion of the expected running scenario at turn-on as presently planned produced the following:

- Commissioning: 3 months with the first month of running with a single pilot bunch in the period Feb.-Apr. 2006.
- Initial Running: peak luminosity (i.e. max at beginning of coasting beam) of  $1.1 \times 10^{33}$  with 2520 bunches for  $\sim 7$  months with an integrated luminosity of  $\sim 10 \text{ fb}^{-1}$ .

*The peak luminosity was corrected after the meeting to  $2 \times 10^{33}$ , which is in line with what the experiments are basing the design of their Trigger/DAQ.*

- Intermediate Running: peak luminosity of  $3.4 \times 10^{33}$  with 2808 bunches for a period of possibly up to 5 years.
- Nominal Running: peak luminosity of  $10 \times 10^{33}$  with 2808 bunches.

For all of these scenarios, it is expected that the LHC would operate on a cycle of approximately 14 hours of colliding beam with luminosity falling off followed by 10 hours of turn-around until collisions resume.

The peak luminosity figures above are those expected at the beginning of collisions and would fall steadily after coasting beam was established.

#### 4. NEXT MEETING

The next meeting of the working group will be held on Tuesday, 26 March at 16:00 in Bat. 40 5-A01.

**W. Smith / E. Tsismelis**