June 20, 2005

LHC EXPERIMENT-ACCELERATOR DATA EXCHANGE WORKING GROUP (LEADE)

Minutes of the 24th Meeting held on June 20, 2005

Present: S. Baron, N. Ellis, D. Evans, Ph. Farthouat, Ch. Ilgner, R. Jacobsson, R. Jones, D. Macina, Th. Pauly, R. Schmidt, A. Smith, W. Smith, D. Swoboda, E. Tsesmelis, J. Wenninger

1. MATTERS ARISING

Approval of the Minutes
The minutes of the 22nd LEADE meeting were approved without modification.

Racks for LHC Timing (Ch. Ilgner)
There was a request by J.-P. Vanuxem (PH-AIS) on the allocation of the two racks reserved for LHC timing in the ALICE cavern. He needs the exact type of equipment (SCEM no., if possible), the magnetic field tolerance, the heat dissipation and the total power consumption of any equipment to be installed there. The goal is to have an inventory of the timing equipment ready for the next LEADE meeting (on July 18, 2005), covering not only ALICE, but all LHC experiments and including TTC (S. Baron will provide information on this) and BPTX. In order to fulfill this request, E. Tsesmelis and Ch. Ilgner will collect information.

Action: each experiment is asked to provide the information mentioned above.

2. STATUS OF FUNCTIONAL SPECIFICATION ON LHC EXPERIMENT BEAM INTERLOCKS (J. WENNINGER)

J. Wenninger reported on the possibility to mask interlock signals, which is only permitted if the beam intensity is safe and should not lead to damage. The property “maskable” of a signal can be turned into “unmaskable”, but not vice versa. Changing the mode of operation requires real hardware intervention. Masking alarms is not considered the normal way of operation. Typically, everything related to beam instrumentation is maskable. If interlocks cannot be masked, they must be operational from the very beginning of LHC running.

The beam-dump and injection-inhibit systems can be realized separately according to various requests. The injection-permit signal can either be an interlock similar to that for the beam permit (one loop for both beams), or direct connections to IR2 and IR8. Since the injection inhibit can act slower than the beam dump, a cheaper PLC solution (as compared to the standard beam-interlock solution) might still be appropriate.

While the collimators need to be constantly positioned within a pre-defined tolerance window around their reference settings (to be adjusted experimentally), the Roman Pots

(RP) must always be in garage position, except in “stable beam” mode. The RP control is proposed to be integrated into the collimator control system.

For the LHC operation at 7 TeV, several modes are defined: for example “adjust”, ”stable beams” and ”unstable beams”, with the first two taken over from LEP operation. The latter mode is newly defined. Jörg discussed several transitions between the modes. One problem appears to be the fact that VELO and the RPs force a beam dump when a mode transition occurs and they are not completely out.

The new working group COCOSTE coordinates the design of the collimator control systems.

3. COLLISION RATE MONITORS (E. TSESMELIS)

E. Tsesmelis summarized the different concepts of bunch-by-bunch collision rate monitoring. ATLAS and CMS will be using fast ionization chambers, due to the need for high radiation hardness at IP1 and IP5, although special developments like LUCID (for ATLAS) are being followed up. The ionization chambers will be installed in slots inside the TAN absorbers. ALICE and LHCb will be using CdTe detectors instead.

The collision rate monitors will help with the initial beam finding and overlap maximization as well as with the manual maximization of the collision rate for physics runs. As a by product, the crossing angle can be measured.

4. READ-OUT OF BPTX (TH. PAULY)

In his presentation, Th. Pauly discussed a possible read-out system for the ATLAS BPTX based on test measurements with a Tektronix TDS 3054B digital oscilloscope. This device offers 5 GS/s real-time sampling rate and a memory depth of 10 kB, thus making it possible to take one measurement every 200 ps.

The BPTX system consists of four electrostatic button electrodes per interaction point and beam, located 175m away from the IP, read out by one single coaxial cable.

Simulation results show the response upon the passage of a Gaussian bunch of a length of 252 ps, corresponding to the nominal LHC operation parameters.

The system is supposed to see the incoming bunches, enabling ATLAS to find the optimal phase between the bunches and the clock, to check the phase of individual bunches according to the clock and to detect gaps in the bunch train. It also appears to be feasible to detect a possible clock drift due to problems in the signal chain or temperature drifts in the optical fibres.

The tests also included the response to satellite bunches at an (exaggerated) 10% level, simulated by a function generator, which could be distinguished in the response.

Once the cables are installed in the tunnel, the signal propagation time will be measured together with the effects of the RF combiners and splitters.

A writeup of the results will soon be available. It is recommended that all LHC experiments consider this read-out scheme for their BPTX.

Ch. Ilgner

Provisional dates and rooms for the meetings in 2005 (16:00 hrs):

July 18, room 40-R-A10
September 5, room 40-R-A10
October 24, room 4-S-013
December 5, room 4-S-013