March 21, 2005

LHC EXPERIMENT-ACCELERATOR DATA EXCHANGE WORKING GROUP (LEADE)

Minutes of the 22nd Meeting held on March 21, 2005

Present: A. Ball, S. Baron, Ph. Baudrenghien, N. Ellis, M. Ferro-Luzzi, P. Grafström, V. Hedberg, Ch. Ilgner, R. Jacobsson, R. Lietava (for D. Evans), D. Macina, T. Pauly, A. Smith, W. Smith, D. Swoboda, J. Troska, E. Tsesmelis, J. Wenninger

1. MAINTENANCE OF TTC UNITS (S. BARON)

In her presentation on TTC maintenance, Sophie Baron mentioned that there is still no sound on-call support assigned to these units by the PH department, apart from herself. It is necessary to define the level of support to cover the link between the experiments. A piquet from PH is not foreseen. The "experiment end" will in any case remain under the responsibility of the experiments. Second-level hardware support (offline) will be assured by Markus Joos (PH-ESS) and Sophie.

TS-EL (Luit de Jonge) will now attribute the already installed fibres to the users. A discussion arose on whether a dedicated monitoring fibre is necessary – for the moment there is one fibre locked to the RF reference and one locked to the RF of the two beams, i.e. three fibres in total.

Sophie will collect information on this for the meeting on April 25. Emmanuel will investigate the manpower question.

2. LHC BEAM ABORT STATUS (W. SMITH)

The signals that will be transmitted from the machine to the experiments will be

1. an injection signal, issued when the machine injects, attempts to inject or is about to inject beam into the LHC,
2. a luminosity signal to flag stable beam conditions,
3. a high-risk procedure signal, issued when a high-risk procedure is about to be initiated, allowing the experiments to take measures they consider appropriate (moving back detectors, reducing HV), which is expected to be acknowledged by the experiments,
4. a beam-dump signal (not assured in all cases) to alert experiments about a controlled beam dump, also to be acknowledged by the experiments.

For the beam abort initiated by an experiment, each experiment will have an input to the machine, transmitting a hard-wired logic signal, basically indicating that backgrounds are above an acceptable level. The system will be fail-safe, i.e. absence of the beam-permit signal from the experiment will cause an abort. The experiments are responsible for setting up and running the logic independently from other signals, as well as recording its state, both regularly and upon transition.

A beam-abort warning signal from the experiments to the machine is also foreseen, being issued upon excess of a pre-set threshold. The inputs to this signal would also be provided to the machine.

The experiments will also provide a "ready-for-injection" signal, which is different from the absence of the beam-abort signal, and will be based on the experiments' detector-safety system.

Finally, everybody is invited to check and eventually comment on whether this conception is correct and the signals are named properly, also in view of the LEP experience. Is anything missing or unnecessary, and what else should be specified. Comments should be addressed to Nick Ellis, Daniela Macina or Wesley Smith.

In the following discussion, several people pointed out that, as a sort of general rule, it would be better to transmit numbers from the experiments to the LHC control room rather than just binary information like the fact that a certain value has exceeded its assigned threshold.

3. THE ATLAS LUMINOSITY MONITOR "LUCID" (V. HEDBERG)

The ATLAS luminosity monitor is designed to be a very radiation hard detector with good time resolution, capable of resolving individual bunch crossings, insensitive to soft background particles. It needs to be able to measure particle tracks, offer a wide dynamic range and must not saturate at peak luminosity. Finally, one of the design goals is that the detector should be simple to construct and cheap.

To achieve this, the design was based on the Cherenkov Luminosity Counter (CLC) of CDF. 200 gas-filled Al-tubes (13.3 to 22.9 mm in diameter) per detector act as Cherenkov counters. With C_4F_{10} as the radiator gas, the Cherenkov threshold for pions is 2.7 GeV and 9 MeV for electrons. The Cherenkov light is being transmitted to multianode photomultipliers via quartz fibres, where background rejection is done by coincidences.

LUCID is designed to be able to run independently from the ATLAS DAQ.

A 6-tube prototype has been tested successfully with cosmics. LUCID will be placed right in front of the TAS, the front face of each detector will be at 17 m from the interaction point. It is expected to be exposed to 60-70 kGy/year (PMTs: 3-5 Gy/year).

4. RADIATION MONITORING FOR CMS (A. BALL)

In his presentation, Austin addressed the variety of systems dedicated to the radiation monitoring in the CMS experiment:

1. The Beam Conditions Monitor (BCM) system.
2. Optically stimulated luminescence sensors (OSL).
3. Passive monitors (thermoluminescence and alanine sensors).

Beside this, there will also be the RAMSES and RADMON systems for the cavern and the beamline around IP5, which are not directly under CMS responsibility.

The BCM can address fast losses of the LHC and is meant to generate a fast beam abort signal. It is based on CVD diamond sensors and will monitor the beam conditions on a bunch- to sub-orbit time scale. It will trigger a beam abort on the onset of adverse conditions. The front-end electronics, mounted outside the CMS sensitive volume, will be commercial 1 GHz rad-hard amplifiers. The CVD diamond sensors have proven in several testbeams to give a linear response over 9 orders of magnitude in particle flux.

Semi-active sensors, here OSL material that is being read out and reset over an optical fibre, passive and active devices and the RAMSES system will benchmark activation studies and identify possible holes in the shielding.

The RAMSES detectors are PMI chambers.

The OSL sensors cover a dose range from 10 mGy to 100 Gy, RPL and alanine together have a dynamic range from about $3 \cdot 10^{-2}$ Gy to 10^{6} Gy.

Ch. Ilgner

<u>Provisional dates and rooms for the meetings in 2005:</u>

April 25, room 4-S-013
June 20, room 4-S-013
July 18, room 40-R-A10
September 5, room 40-R-A10
October 24, room 4-S-013
December 5, room 4-S-013