January 31, 2005

LHC EXPERIMENT-ACCELERATOR DATA EXCHANGE WORKING GROUP (LEADE)

Minutes of the 21st Meeting held on January 31, 2005

Present: S. Baron, M. Ferro-Luzzi, P. Grafström, Ch. Ilgner, R. Jacobsson, R. Jones, D. Macina, R. Schmidt, J. Serrano, A. Smith, W. Smith, D. Swoboda, E. Tsesmelis, J. Wenninger

1. EXPERIMENTAL EQUIPMENT DIRECTLY INTERFERING WITH THE BEAM (D. MACINA)

In her presentation, Daniela Macina discussed hardware components of the experiments that could possibly touch the beam, such as the TOTEM and ATLAS Roman Pots, the ALICE ZDC and the LHCb VELO detector.

The ZN and ZP making up the ALICE ZDC calorimeters can move independently on separate platforms in the vertical direction, from about 20 cm below the beam (garage position) to the beam height (data taking position). While the ZP will be used in both proton and heavy-ion runs, the ZN will be in data taking position during heavy-ion runs only.

During injection, the machine interlock will prevent the ZDCs from leaving their garage position. For data taking, after a measurement of the crossing angle, the vertical position of the platform needs to be optimized by measuring the vertical coordinate of the centroid of the spectator neutrons. ALICE proposes to operate the ZDCs from the Machine Control Room on ALICE's request. Since the accelerator group will not search the zone after each access, Jörg Wenninger pointed out that the ZDC operation will remain under ALICE's responsibility. Rhodri Jones suggested to protect the ZDC with end caps at the end of an intervention. Moreover, a special meeting was suggested to design the platform.

The LHCb VELO will be blocked in the "open" position (3.5 cm from the beam axis) by the machine interlock during injection. LHCb intends to drive the VELO from the LHCb control room.

Special attention should be given to the ALICE and LHCb-dipole magnets (operated by CCC) since they have to be ramped together with the machine energy and compensator magnets.

TOTEM is planning to operate the RP (nominal distance from beam axis is 10 σ) from the CMS/TOTEM Control Room but the final decision will be made shortly. Some work needs to be done on the signal exchange with the machine, but the RP movement will in any case be prohibited by the machine interlock during injection.

2. SAFE LHC OPERATION PARAMETERS AND THE BEAM INTERLOCK SYSTEM (J. WENNINGER)

The beam-interlock system gives a permit to each of the beams, it also issues a timing signal and inhibits injection/extraction to/from the SPS, but its primary objective is to provide a failsafe & high reliability link between users requesting a beam abort and the beam dumping system. Additional objectives are the protection of the beams and the provision of post-mortem data, including the time sequence of beam-abort requests.

On top of that, there is a software interlock-system, which is of course not fail-safe in the strict sense of the term.

Any system connected to the beam interlock system that decides to abort the beam or is not ready for beam must remove its USER_Permit signal in order to cancel the beam permit, which is carried by the interlock loop. Actually it is foreseen that – in case of necessity for one beam – both beams are dumped at the same time. However, especially for machine testing, it might be useful to keep one beam.

"Safe LHC Parameters" is a standalone distribution system for the machine, reserved for critical parameters. The experiments are not yet on the distribution list.

The difference between a beam abort and a beam inhibit for the experiments was shortly discussed. Wesley Smith mentioned a case at HERA, where a lack in operational procedures defined for "grey" cases became visible. The question of who controls the ramp-up of the magnets was addressed. This needs to be clarified.

In the following discussion, the distinction between "warned" and "unwarned" unscheduled beam-dumps was introduced for dumps that have precursors (in the order of 1 min or longer) or have not; as an example - taking VELO out of its data-taking position takes about 3 min.). Rüdiger Schmidt mentioned that at Fermilab about 30% of the dumps are unscheduled. For LHC, this number is expected to be about the same.

For movable devices (ex. Roman pots, VELO), that are as dangerous in terms of beam scrapping as collimators, the signal is a "hardware" signal (no Ethernet between). It is important to note that "stable beams" does not mean that the machine operators will not continue tuning the beams, collimators etc. Failures leading to a beam dump within 3 turns are always possible.

On a remark by Emmanuel Tsesmelis on the need of engineering specifications for both the electronic signals and the procedures to follow, Rüdiger Schmidt replied that the Machine-Protection Working Group (with the help of Daniela Macina) will first prepare a draft that then will be discussed in LEADE.

As an example on how to avoid common-mode failures, the Beam Condition Monitor (BCM) was mentioned, which will operate completely independently from the beam-loss monitors.

3. FEEDBACK FROM CHAMONIX XIV (E. TSESMELIS)

Emmanuel Tsesmelis summarized the outcome of the XIV. Chamonix workshop, based on Steve Myer's summary, in view of its input to the LEADE working group. He raised the question whether the experiments expect input from the BPMs. There is no request for that so far.

The outline of a typical LHC year comprises 140 days of physics. Every 25 days there will be a technical stop. All the "special runs" might need to be deferred into 2008 or even beyond.

A recent addition to the experiments' wish list is the change of the LHCb dipole-field with every run. The parameters summary-list as requested by the experiments is available.

A short status report on the lead-ion injector was also given. The session was concluded with a discussion on whether beam presence needs to have machine settings included.

Ch. Ilgner

Provisional dates and rooms for the meetings in 2005:

March 21, room 40-R-A10
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