MPP meeting 3 July 2009

Agenda:

- Fast Beam Current Change Monitor 'di/dt' (D. Belohrad)
- LHCb permits (R. Jacobsson)
- ALICE permits (A. Di Mauro)
- AOB

Present:

D. Belohrad, R. Jacobsson, A. Di Mauro, N. Bachetta, A. MacPherson, M. Zerlauth, B. Puccio, B. Todd, S. Redaelli, V. Kain, J. Uythoven, R. Appleby, R. Schmidt, B. Holzer, A. Nordt, M. Sapinski, M. Ferro-Luzzi, J. Wenninger, D. Macina, S. Wenig

Fast Beam Current Change Monitor (D. Belohrad)

D. Belohrad presented the latest concept for the Fast Beam Current Change Monitor ('di/dt'). The measurements that are used to implemented the interlock on the beam current are obtained form the fast BCTs. The same system provides the measurement of the beam population that is used to generate the Beam Present Flag. For the BPF the threshold is presently set to approximately 3E9 protons: below that intensity the measurement is not reliable.

The di/dt interlock logic is implemented in a FPGA, with two interlock settings protected by MCS. Each setting consist of a number of charges and a time interval: whenever the measured change in the number of charges exceeds one of the thresholds over the specified time range, an interlock is generated. The two settings can be used for a fast and a slow(er) interlock. The di/dt monitor requires the … in order to operate correctly. It also needs a good DC restoration which is based on the measurement within the beam abort gap. The DC restoration is therefore biased by the beam population in the abort gap. J. Wenninger commented that since the time constant for abort gap filling is rather long (many seconds) the bias for fast interlocks (time interval around 1 ms) should be negligible. The di/dt system should be ready in October. D. Belohrad requested some initial values for the interlock settings. They will be provided by MPP. R. Schmidt asked what the expected performance could be for a time interval of 1 ms. D. Belohrad said that the noise is at the level of 3E6 charges for an integration of few milliseconds. The issue is however the DC restoration. S. Redaelli asked how calibration factors are handled within the system. D. Belohrad replied that for the moment the calibration factors are Expert Settings protected by RBAC (only D. Belohrad and M. Ludwig have access rights).

LHCb permits (R. Jacobsson)

R. Jacobsson presented briefly the logic that is applied to generate the LHCb user permits (for ring and for injection/extraction). The three 'hard' sources that feed into LHCb permits are the Beam Condition Monitor (BCM), the VELO and the LHCb spectrometer dipole.

The user permit for the ring is based on the signal from the BCMs (8 diamond detectors). The sampling time is 40μs and the interlocks are based on running sums over 2x40μs and 32x40μs. The 8 signals are summed up and only monitors 2 to 6 are used (monitor 1 has the lowest and 8 has the highest signal) to avoid problems with bias currents. The signals will be available in the CCC, normalized to the dump threshold, as BKG1(2). The thresholds are set to 100 MB events (Minimum Bias) for the 2x40μs sum and to 500 MB for the 32x40μs sum (approximately 1 ms). The thresholds are hardcoded in VHDL, but can be easily changed by an expert. The system is on machine power and there is one complete spare for the electronics. On reception of a PM event the system will set the permits to FALSE. Rearming is automatic of the BCM was not the source of the dump, manual if the BCM triggered the dump.

The logic for VELO movement complies with what has been specified quite some time ago for movable devices (RPs and VELO). The garage position is at 30 mm, the data taking position 5 mm. It takes around 2.5 minutes to move VELO in or out. VELO withdraws automatically on power cuts.

The LHCb spectrometer dipole interlock is based on the magnet status (temperature, cooling…), under the responsibility of PH/DT1.

The injection permit is configured to prevent injection when LHCb is not ready, after a dirty transfer and during data taking. Dirty transfers will be measured using scintillators. There was some discussion on whether the dirty transfer diagnostics is really useful, but in any case it should not harm.

R. Jacobsson finally commented that eventually we should think about automatic test procedures that could be run before every fill. He also requested that the Probe Beam Flag threshold be distributed by HW.

ALICE permits (A. Di Mauro)

R. Di Mauro presented briefly the logic that is applied to generate the ALICE user permits (for ring and for injection/extraction).

Before injection the detector must be is safe state in order to set the ALICE injection/extraction permits to TRUE. ALICE foresees to set its injection/extraction permits to FALSE on anomalous losses during injection (for the moment 60% of the dump threshold). The value is chosen arbitrarily, and will be better defined (if it makes sense at all) with some experience. There are plans to also integrated signals from machine BLMs and scintillators. N. Bachetta said that for him this logic was too 'fine tuned' and he

thought that a logic where a dump is triggered in case the losses are too high is simpler. The other experiment representatives (R. Jacobsson and S. Wening) insisted that such a logic did not harm and could turn out to be useful. Experience will tell us.

The ring user permit is based on the BCMs. ALICE uses the electronics developed by LHCb and they also have a fast and a slower abort (same time intervals as LHCb) with similar thresholds. The summing logic of the monitors is however different for the fast interlock: ALICE uses the sum signal from 3 out of 4 adjacent monitors.

AOB

J. Wenninger presented a number of miscellaneous points:

- The TI8 BPMs that gave 'crasy' readings after a first beam pulse of 12 bunches of 5E10 protons/bunch had developed short circuits between electrode and vacuum chamber. The problem could be fixed with a current pulse applied locally to the electrode. Such an effect was already seen on the CNGS transfer line which is also equipped with buttons recuperated from LEP monitors.
- The collimation MPS specification is ready for approval.
- A. MacPherson has uploaded the MPS tests on 'espace' . This will be used to track and document the MPS tests. Access rights will be given to the persons involved in testing.
- An external review of the BIS system will be organized in September 2009. This review will be performed by the company 'Critical Systems Lab' (Vancouver, Canada). This company also reviews airlines, airplane constructors and other important companies. This should provide us with an entirely 'external' view on the BIS system.
- The ALICE injection permit for beam1 was moved to the TI2 downstream BIC. The signal will be retested next week.
- It seems that for the TOTEM and ALFA very high beta* optics (> 1500 m) the closest aperture after the collimators are the vacuum chambers of ATLAS and CMS. Although this is not urgent, this point will have to be analyzed in the coming year.