

MPP meeting 11 March 2011

Original agenda:

- Summary and follow-up of the VELO closing review (J. Malcolm).
- MPP aspects of special physics run in 2011 - Totem/Alpha & 1.38TeV (M. Ferro-Luzzi).
- Estimating UFO speed/size (J. Wenninger).
- MPS checklist for commissioning (all).
- AOB (BIC-LBDS interface...).

Present:

N.Bacchetta (PH/UCM), T.Baer (BE/OP), J.Blanco Sancho (TE/MPE), B.Dehning (BE/BI), M.Deile (PH/TOT), M.Heller (PH/DT), K. Hennessy (PH/ULB), R.Jacobsson (PH/LBC), W.Kozanecki (PH/ADO), A.Lechner (EN/STI), J.Malcolm (PH/ULB), A.Nordt (BE/BI), G.Papotti (BE/OP), M.Sapinski (BE/BI), A.Siemko (TE/MPE), M.Solfaroli (BE/OP), R.Schmidt (TE/MPE), B.Todd (TE/MPE), S.Wagner (TE/MPE), S.Wenig (PH/ADO), C.Zamantzas (BE/BI), M.Zerlauth (TE/MPE).

Excused:

S. Redaelli (), J.Uythoven ().

Minutes:

MPS checklist for commissioning (all)

Markus reminded that the machine protection system task list has been reset for the year 2011. Therefore all the system (BIS, BLM, Collimation, QPS, LBDS, amongst others) should go again through all the tests and check all that have been done. (<https://espace.cern.ch/LHC-Machine-Protection/default.aspx>)

Summary and follow-up of the VELO closing review (John Malcolm)

John presented the main aspects of the review conducted by **Rolf Lindner** (LHCb Technical coordinator) and **Stefano Redaelli** (Machine Protection Group). The review was held on the 16th of November 2010. The main aspects of the review were the VELO motion system hardware, PLC low level control, beam monitoring and PVSS control.

Concerning the interlock of the VELO movement, **John** explained that the MOVABLE DEVICES ALLOWED IN flag (input to the PLC) doesn't prevent the PLC to move the VELO in, but only PVSS does. There is a touchscreen connected to the PLC that eventually will allow moving it in anytime. This touchscreen is however located in a restricted area. Any hardware interlock makes the VELO to retract (taking ~ 3min). **Rudiger** in case the UPS fails the VELO will remain in its current position.

The VELO stays open until a set of requirements are fulfilled (STABLE BEAM flag, BCM monitors below threshold amongst others). The beam position is calculated by the VELO monitoring at every step during the closing procedure. Once closed the VELO doesn't move for small excursions of the beam (~20 μ m). The closing procedure of the VELO has been partially automated but, as it is a complex task, it still requires a manual confirmation on certain steps (distances from the beam). One of the review recommendations was to compare the beam position with previous closing values.

Markus commented that one of the main recommendations was to change the horizontal position limits when moving across zero from 5mm to 1mm and if the currently implemented changes will avoid crossing the beam. **Richard** remarked that there is still a possibility to cross the beams; the primary BCM however will dump the beam well before. There is also experience with asynchronous beam dumps where we were 40 sigmas away from the beam. **Rudiger** pointed out that he is more worried about the transient phases than stable ones (STABLE BEAMS).

Review recommendations are available in the document [EDMS 1111979](#). Main review proposals have been already implemented during the last maintenance stop (2010-2011).

MPP aspects of special physics run in 2011 – Totem/Alpha & 1.38TeV (M. Ferro-Luzzi).

Massimiliano presented the main concerns of the special physics runs of this year. He explained the machine and beam parameters for the luminosity production at top energy (3.5TeV). He said that the TCT settings should be slightly different when Alice switches polarity. For IP8 a different beam emittance will imply small adjustments on LHCb. **Jorg** commented that for the calculation of the Vertical and Horizontal separation at IP2 and IP8 the value of sigma beam must be updated. **Richard** said that LHCb need to have the proper luminosity before STABLE BEAMS FLAG is declared or another option is to have a lower luminosity before the beams collapse. Massimiliano summarized that there are no real machine protection issues in this topic.

Massimiliano explained that 4 probe beam bunches at the beginning of the pattern would be sufficient to provide enough data without any extra time to TOTEM (~10-nb). It would take 125h with 4 bunches or 500 with a single one.

Massimiliano commented roughly a new levelling procedure. **Reyes Alemany** is working on the specification. **Massimiliano** raised the question: what would happen if by mistake we get maximum

luminosity? ALICE and LHCb expressed that this would not be any potential issues and that if it ever occurs the BCMs will dump the beam.

Mario commented that all the tests done with the roman pots are logged in either the collimation or the machine logbook. All the machine protection procedures will be published in a dedicated EDMS note.

Massimiliano asked what would be the operational envelope for the roman pots in 2011, 12 sigma? Jorg answered that it needs to be defined how far the roman pots can go but it doesn't tell you where the beam actually is. **Jorg** proposed 17 sigma H and 14 sigma V, **Mario** agreed with the values.

Jorg pointed out that some of the roman pots are at precisely 90° phase advance from the dump kickers, so in case of wrong kick angle they have no protection from the phase space, ie will see the full kick. **Rudiger** added that it is needed to know the consequences to magnets and window in case of beam impact into the roman pot. **Massimiliano** asked how many protons are needed, in one go, to melt the window. -> Studies are currently ongoing to evaluate the possible consequences of such a worst case failure and will be presented in a future MPP.

Concerning the polarity switch, specifically IP2 (ALICE) features a huge coupling, there is only 1 setting for the tertiary collimators TCTs. Other polarity switches, LHCb/ATLAS/CMS, have no impact on the orbit.

Massimiliano explained the simulations of the VELO aperture @1.38TeV concluding that at low energy the VELO (closed) is the aperture restriction for the LSS. Hence it is wise to keep it open at 5mm w.r.t the fully close position.

A new protocol for length scale calibration scans was introduced. The actual code doesn't allow switching from active beams without returning to the reference. The new scan protocol will automatize the process, actually is manually done. **Simon**, **Reyes** and **Fabio** are working on the lumi scan application. **Massimiliano** asked for dry runs to check the lumi scan application. He commented that **Simon White** has foreseen a simulation mode that will allow to check it, even with beam in the machine. **Jorg** said that the first test must be done without beam in the machine. **Markus** proposed doing them after a beam loss and before the pre-ramp.

AOB: BIC-LBDS interface (Benjamin Todd)

The LBDS-BIS systems have been investigating problems during the past weeks when trying to re-arm the LBDS B2. It is unclear, due to the lack of monitoring/diagnostics, whether this is coming from the BIS or LBDS. Last year the LBDS system was reviewed by and external company (see MPP meeting 11th February 2011). Following the technical review, a number of actions have already been taken for 2011.

Ben made a small presentation about the optical error rates as seen by the BIS. Ben explained that from the BIS point of view the Bit Error Rate values of all the optical boards installed in the 17 BICs in all the 4

channels are below $5 \cdot 10^{-12}$ Hz which is a value far below the assumed threshold for repair ($\sim 10^{-8}$ Hz). **Ben** remarked that the optical emitters used in the CIBO are ELEDs and not VCSELs.

Ben explained that optical boards (CIBO) for the LBDS-BIS connection were all preventively replaced by a newer version with an improved noise filter. He suspects that the problem be a noise problem. **Markus** pointed out that the replaced boards could not be tested on the lab because they have different parameters, that are not longer used, and so they will fail actual tests. Still, the current test procedure will be changed to assess the boards taken out of the machine and eventually reproduce the failure in the lab.

Jorg said that since the replacement of the optical boards the problem has not been observed anymore (there have been one problem that is thought to be due to the data transmission).

Markus and **Ben** agreed that the BIS need more diagnostics.