MPP meeting 15 May 2009

Agenda:

- Follow up on MPP issue: valve closure with beam (J. Wenninger).
- Follow up of MPP issue: beam impact in magnets (J. Wenninger).
- AOB.

Present:

Verena Kain, Nicola Bacchetta (CMS), Walter Venturini, Bernd Dehning, Reyes Alemany, Daniela Macina, Siegfried Wenig (Atlas), Antonio Di Mauro (Alice), Jan Uythoven, Rudiger Schmidt, Jean-Christian Billy, Isabelle Laugier, Markus Zerlauth, Laurette Ponce, Mirko Pojer, Benjamin Todd, Annika Nordt, Christoph Kurfuerst, Juan Blanco, Jorg Wenninger, Mike Koratzinos

Minutes:

Actions from LMC (Jorg)

Jorg first went through the actions assigned to MPP by LMC:

Vacuum valve interlocking failure with circulating beam

To limit the damage of any S34-like incident beam vacuum valves should close as soon as possible. Current logic for closing valves relies on signal BEAM_INFO returned from the CIBU to be set to FALSE following a request by the vacuum PLC to remove the beam permit. Jorg and Ben reminded us that BEAM_INFO is not designed to be a failsafe signal and should not be used in safety-critical situations (for instance, if cables break it will switch to TRUE). Recommendation from this meeting is to take this condition out from current interlock logic. How best to proceed during testing will be discussed amongst a few experts and decision will be reached and communicated.

The interlock signal path includes the vacuum electronics to CIBU and from CIBU to LBDS. Latter has SIL3/4 reliability. The 300 LHC sector valves close in 5 seconds. Jorg reminded us that there was a fast valve interlock failure at the SPS last week (the valve closed on a vacuum spike, but did not trigger an interlock due to a problem with the switch). The LHC valves have two switches that return the state of the valve (open/closed), but only the open switch is used to interlock the valve. There are no fast valves currently at the LHC (closing time ~ 50 ms). Jorg calculated that the worse case speed of the sector valves is 1 sigma per 6ms or 1sigma per 65 turns. This should be caught by the BLMs provided the loss

locations correspond to the BLM positions. For the fast valves the closing speed is close to 1 sigma per turn, which is faster than a D1 failure and the valve would probably need to be replaced. A failure scenario would be that a/ a valve spontaneously 'decides' to close b/ that the switches do not see this state change. In this case we would need to rely on BLMs to dump the beam. A simulation should be performed to confirm that the BLM sensitivity and locations are adequate. This must be done with a program that includes interaction with matter (SIXTRACK for instance). The person to do the studies must still be identified.

Ruediger indicates that during the hardware commissioning all valves will be forced to be closed.

Beam-induced damage to beam pipe and bus bars

This has a very low probability of happening, we should, however, confirm this with simulations and assess what element will fail first. These simulations could be combined with bus bar simulations, as we have also been asked to look into the possibility of a beam-induced quench in the interconnect bus bar region. Juan Blanco is the candidate to drive the work with help from A. Verweij. Ruediger reminded us that the interconnection cryostat is special case and a good candidate for where we might get problems.

Jorg considered a candidate for this beam impact scenario to be a closed bump at 450GeV. This is a likely scenario. A simple corrector bump grows at 2 sigma/sec. First line protection will be local BLMs and second line the SIS system which in worst case will detect it with a latency that allows the bump to grow to 6 sigma.

Alice ghost bunches

In the 50ns bunch spacing scenario, there are plans for special bunches for ALICE. These will be the only bunches Alice will use for physics. These 12 Low intensity bunches will circulate together with the high intensity bunches. The BPM system threshold has two states, low or high. If the normal bunches have more than 5E10 protons, the BPM threshold will be set to high and this will make the Alice bunches invisible to the BPM (but visible on other systems). The question to this meeting is if this is a problem or not. Jorg reminded us that a similar problem might arise during normal operation if some bunches have a poorer lifetime than others. Jorg suggested that we should recommend a limit to the amount of invisible bunches knowingly introduced to the machine, as there are operational issues (for instance it will be more difficult to bring invisible bunches into collision).

LHC upgrade

Jorg reported on a statement made in PAC09 about the LHC upgrade, comprising a new 30cm beta* inner triplet design and monster correctors. Statement was that the upgrade has no machine protection issues, which is not true. Ruediger reminded us that some failure scenarios will become much worse (for instance D1).Jorg has requested for semi-permanent support from ABP to look at these issues and to ensure long-term continuity in the simulations. Not much success so far.

MKI test mode (Verena)

Verena reported on the logic during injection tests. The final system is implemented with the exception of the beam presence flags (BPF1 and BPF2). There is an enable button (asynchronous extraction button) in the control room which could be replaced by a key. There was some discussion about the safety of such a solution (can the key be forgotten in its slot?). There will be discussions offline and a solution needs to be agreed for August.

AOB

Information from Jorg: BLM specification document is nearly complete. Still outstanding is the collimation specification. Jorg has started writing a memo containing all information regarding simulations done in this group regarding protection for the experiments. Thomas Krammer simulations will be updated soon.