MPP meeting 31 July 2009

Agenda:

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- LHC BLM software specification (E. B. Holzer)
- ATLAS permits (S. Wenig)
- AOB.

Present:

Jim Strait, Andrzej Siemko, Christos Zamantzas, Annika Nordt, Stephen Jackson, Jan Uythoven, Bruno Puccio, Benjamin Todd, Siegfried Wenig (ATLAS), Bernd Dehning, Jorg Wenninger, Barbara Holzer, Mike Koratzinos

Minutes:

AOB: RF and pre-pulse issues (J. Wenninger)

Jorg reminded the meeting that some RF failure scenarios can be dangerous and need to be look at. The RF system has shown problems during the re-phasing before extraction from the SPS, sometimes the prepulse signal that triggers the kicker was sent out even when re-phasing failed, leading due un-synchronized extractions.

BLM software procedures (B. Holzer)

B. Holzer presented a series of slides concerning procedures for changing BLM settings, software specifications and the database structure. Document on the above will be ready for circulation next week.

Regarding procedures, seven use cases have been identified, with execution times varying between few minutes to one full day (excluding possible access time). A “BLM representative” (a member of the BI BLM section) will be responsible for executing the procedures. The BLM representative will be available all the time during LHC operation. The procedure of how to change BLM system parameters was presented. The validity of any proposed change will be applied directly at the level of the LSA database. No local files will be used. There are strict limits of how many BLMs (ionization chambers, ICs) are

allowed to be disabled or removed: there are 6 ICs per SSS, out of which a maximum of one is allowed to be disabled. The rules are enforced by the BLM expert application. There was some discussion as to what would happen if one monitor is already disabled and a second one fails. In such cases, one of the two failed monitors would need to be repaired.

The most complex procedure is to introduce a new monitor. This is a very complicated procedure, including many DB actions, but cannot be made simpler at the moment. There are clearly identified persons for all steps. There needs to be one person available for all steps at all times.

The expert application to be used to update thresholds in the DB and in the front-ends is under development. Two to three people will be able to perform the update. J. Wenninger mentioned that with only two persons it will be difficult to maintain a good level of service. Currently the procedure is done with scripts. There are 5 tables where info propagated in series. If the applied table and the LSA settings tables are not the same, no beam permit is given. This check is done by the sequencer. The committing of the staging tables will be allowed during beam. All other LSA table changes require no beam. The access to relevant LSA tables is through a dedicated DB account. Only one person can login to this account at any one time and timeouts are imposed.

Another procedure is the trim application for the threshold scale factors: the default threshold factor is 0.1 corresponding to 30% of the quench level. This can be trimmed within a range of 0.001 to 1.

J. Wenninger commented that changing one electronic card takes a full day. Many people are involved, and during weekend it may be impossible to follow the procedure. B. Dehning and B. Holzer replied that the procedure will be re-analyzed to see if certain DB steps can be simplified, or performed without DB expert intervention.

BLM audit follow-up (B. Holzer)

A follow up of the BLM, BIS and LBDS audits was organized in June 2009. The BLM audit itself was organized in June 2008, and the audit scope was to verify the design and implementation of the BLM system.

The audit follow report was released one week before the MPP meeting. The auditors consider that 31 out of 46 recommendations were adequately implemented. Most of the open recommendations will be implemented in 2009. There was particular concern regarding the expert threshold application. The board was also unable to judge whether the locations and distribution of BLMs within the LHC tunnel is the correct one. All pending items are being addressed.

J. Wenninger asked for an easy way to find out from the BLM applications which BLMs are disabled.

A spare BLM system (2 crates), which is an exact copy of the rest of the system, is now available for tests at point 2. This test bench will operate under conditions similar to the conditions of the system in the tunnel and will be more relevant for debugging than an equivalent system set up in a lab.

ATLAS permits (S. Wenig)

S. Wenig presented the use of the ATLAS beam and injection permits. ATLAS has 3 inputs to the BIS (detector, roman pots and magnet) and one input to the injection interlock system for each beam. All these systems fulfill the requirements defined by the LHC.

ATLAS uses a FPGA based system in RIO (NI) technology to generate the USER_PERMIT signals. The master is the ATLAS DCS.

The USER_PERMITs to the BIS include the following signals:

1. Beam condition monitors (BCMs) in the form of diamond detectors installed 55mm from the beam with MIP sensitivity and 1nsec resolution. The beam abort condition is if 3 out f 8 of these monitors are above the high threshold (5 MIPs) and another 4 above the low threshold (0.5 MIPs). In normal operation, 0.38 MIPs are expected on each detector. Time of flight information is not yet taken into account, but could be used in the future. This was the first system to be developed.
2. Beam loss monitors (BLMs) constitute the second system. The detectors consist of 4X3 diamond detectors at z= +-345cm and r=65mm, with an integration time is 45us. The beam abort condition is 2 in a group of 3 detectors above threshold. The electronics is in this case identical to the LHC BLM system.
3. The roman pots are installed at 240m from the IP and use the same interlock logic than TOTEM system. The detectors (ALFA) will be installed next year but the stations will be installed this week. This signal will be disabled for this year.
4. The hardware for the magnet user permit has been installed and is operational. Currently, the USER_PERMIT is permanently TRUE, with the possibility to change this in the future in case the ATLAS detector fields would have a larger effect on the beam than expected.

The USER_PERMIT to the injection interlock system (INJECTION_PERMIT) is generated from the same control hardware, but is independent from the BIS USER_PERMITs. The ATLAS INJECTION_PERMIT is TRUE when the RPs are out, the BCM and BLM are operational and some sub-detectors on standby voltage. The final go ahead for the INJECTION_PERMIT is given by the shift leader at the end of the electronic handshake with the LHC. A screen in the ATLAS control room is dedicated to the INJECTION_PERMIT which can be removed automatically or manually.

Simulations of beam loss on bus bar interconnects (J. Wenninger)

J. Wenninger presented the latest news from the LMC: coming Wednesday the decision about the energy of the LHC during the next run will be taken. A relevant parameter for this decision is if the beam can induce a quench on a bus bar interconnect. A specific area of concern is the interconnection cryostat (or empty cryostat). For this, interconnection as well as empty cryostat FLUKA models have been developed. The geometry is ready and some test simulations have been performed. A more realistic simulation will be performed in August, but for next Wednesday a crash program of relevant simulations will be done over the weekend to 'get a feeling' about the problem. The failure which will be simulated is an impact over 1m at Q11 with beam moving in both directions: towards the empty cryostat and towards the interconnect of the SSS with the adjacent dipole. The main question regarding the decision of the LHC energy has to do with the question if it is possible to quench the bus bar alone or at least quench it at the same time as the adjacent magnet. J. Wenninger cautioned that even if the simulations show that the bus bar is very unlikely to quench before the magnet, in the case of an asynchronous dump it is likely that magnets and bus bars will be quenched at the same time. Results of this crash program are expected on Monday or Tuesday.

Jorg also reviewed the situation of BLMs around the empty cryostat. Some only have one BLM, but more can be added. The status now is that empty cryostats are partly protected already and the situation can improve.