Chamonix 2010 - Questions and discussions Session 1

Thursday, January 28, 2010
3:38 PM

Scope and results of hardware commissioning to 3.5 TeV and lessons learnt (M.Solafroli)

L.Rossi: One might not only want to increase efforts to minimize the time spent for electrical testing, but should maybe revisit the idea to have a liquid nitrogen cry-plant on site to speed down as well the cool-down (which is the second big factor in the time spent for HWC)? Although already discussed since some years, maybe worth a new attempt?
S.Claudet replied that it is unlikely that in the future all 8 sectors will be (repetitively) warmed up simultaneously thus the need for this might much decrease in the years to come.

Enhanced QPS – performance, commissioning at 3.5TeV, outlook towards 5 TeV (R.Denz)

P.Collier asked whether it will be possible to extract information about the copper stabilizers from magnet quenches propagating to the busbars?
A.Siemko replied that it would be very difficult to distinguish between the natural resistance growth and the additional resistance from the stabilizer.
S.Myers asked why the threshold set to 300uV(ie a voltage and not rather to a nOhm value). R.Denz replied that the QPS boards do not have any info about the current in the circuits and thus it is much easier to just define a voltage threshold. The integration time of 10 seconds is mainly determined by the filter parameters to reject the noise. 500uV/10s are judged OK for 5TeV, 300uV/10s has been validated with simulations to be OK for the full current range.
L.Rossi wanted to know how many heater firings had to be added to perform the splice mapping for the symmetric quench detector (are we increasing significantly or not)? R.Denz replied that we are doing a factor 2 more heater firings than before (now there are 2 independent systems that can trigger the heaters, such both have to be tested, once the old QPS and once the nQPS).

Do the splices limit us to 5TeV – plans for the 2010 run (M.Koratzinos)

A.Ballarino asked about the temperature which will be applied to the DFBs during the thermal amplifier measurements (if the sector is warmed up to only40-50K)? M.Koratzinos replied that the idea will be to keep the DFB at cold. Amalia insisted that this point is discussed in detail before performing such tests.
B.Goddard commented that applying statistics (ie a 90% confidence level) for calculating the worst splice might be not valid as these splices have been done by human beings and thus the laws of statistic will not apply.

Lessons Learnt from Beam Commissioning and Early Beam Operation of the Beam Loss Monitors (incl. outlook to 5 TeV) (E.B.Holzer)

B.Goddard commented that in 2009 no time was spent to optimize the injection (and related losses) so this is premature and expected to improve for the next run.
R.Assmann mentioned that all collimator limits as shown in the slides are angle dependant, so there is no limitation from the collimator side. B.Holzer replied that this has already been taken into account in the numbers shown.
R.Schmidt commented that it is important to distinguish between fast and continuous losses (for slow losses we have e.g. the temperature measurements in the magnets, tungsten collimators have similar

sensors attached to them). Thus for slow losses one might discuss to relax the BLM thresholds for locations showing problems, without losing the redundancy.
R.Assmann added that one could associate another BLM to the tungsten collimator (e.g. one further downstream), which would be more sensitive to the shower of the primary collimator.

How to safely reach higher energies and intensities? Settings and commissioning of MPS for 5 TeV operation (J.Wenninger)

O.Bruning asked whether it will be a good idea to stick to only a few numbers of β* values for the MPS commissioning? If the intensity is increased the beam effects might increase and one might have to adjust beam sizes?
J.Wenninger replied that this is difficult to estimate right now and that we'll need to learn more. The issue will be similar when going through the squeeze.
M.Lamont asked whether it would be useful (given the criticality) to go through a formal review before stepping over the safe beam limit for the first time?
J.Wenninger and R.Schmidt agreed that it would be very useful to define ahead of this all necessary steps that need to be completed before doing so, still the safe beam limit it is not a sharp line… Jorg added that a long list of individual system tests will need to be done until then, after that the global test will bring it all together and validate e.g. redundancy, correlated failures,etc...
R.Assmann noted that a lot of emphasis is put on collimation, but that it must not be forgotten that there are phases/conditions where collimators must not be considered safety critical, so one should assure that the machine is also safe it some of the collimators are not in place (e.g. for local bumps, setting up of collimators, etc..).
J.Wenninger stressed that having all collimators in place will give an additional level of protection against failures. For powering failures for e.g. looking at the dump statistics will show that the PIC caught most of the failures before any beam losses were seen.
A.Siemko asked whether the ondulators become safety critical even already at low energy levels?
J.Wenninger replied that in some cases (some 10^11 and 3.5TeV) they might be needed following e.g. RF de-synchronization and I order to dump the debunched beams. S.Myers commented that normally the worst case scenario would be an asynchronous beam dump, so the debunched beams could be considered less critical and one should be safe as well for this failure scanrio?
R.Assmann expressed worries as to the protection against wrong settings? He commented that one has been working since years on systems such as the Machine Critical Settings and he had assumed that this would protect us against wrong settings?
J.Wenninger commented that this is true for all interlock settings, machine settings (LSA settings, etc..) are however not covered and one might be a bit stronger in this region.
R.Schmidt added that for him the most critical element is the TCDQ (out of collimation/ondulator/abort gap monitoring,..), so good setting up of this one is vital. R.Assman recalled that at some point the collimators have to be setup, even with UNSAFE beam, thus the redundancy of MPS for such modes is essential.

What else needs to be done, to reach 5 TeV and beyond? Consolidation and commissioning of essential magnet powering systems (W.Venturini)

M.Modena enquired whether the repair of the quench line could wait a future (longer) shut-down?
W.Venturini replied that this is very likely, as the buffers have been designed for 7TeV and as we will probably not experience extended quenches this year.

L.Tavian confirmed that according to calculations, cryogenics can recover the quench of half a sector in Line D and then empty the line D in time. Quench buffers are needed only at higher energies…
L.Rossi enquired about the broken quench heater on the inner triplet in R1. S.Feher confirmed that the real issue is a breakdown of heater circuit above 1kV. The magnet is fully protected with the remaining 1 heater circuit, the main question is how to use the 'sick' heater circuit to re-establish redundancy.

Hardware Commissioning 2010 and beyond (R.Schmidt)
None.

General session summary:

L.Rossi enquired whether it is currently foreseen to measure the RRR everywhere. R.Schmidt and M.Koratzinos replied that for the time being a first type test is preformed, then one will decide whether and how to extend this to the whole machine in case good results are obtained.
L.Rossi emphasized once more that the value for a 'safe splice' at 3.5 TeV has decreased from 90 to 76 uOhm with the RRR set to 100. M.Koratzinos confirmed that it would be interesting to see the 3 TeV numbers as a comparison, this will be discussed in more detail on Monday afternoon (A.Verweij's talk).