

# MPP meeting 2 October 2009

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## Agenda:

- Update on particle tracking studies for asynchronous beam dumps (T. Kramer)
- Collimator settings for 3.5 TeV operation (A. Rossi)
- Collimator commissioning plans (R. Assmann)
- FLUKA simulations of beam impact on vacuum valves (R. Appleby)
- AOB: User configuration for sector/injection test (J. Wenninger)

## Present:

Bernd Dehning, Thomas Krammer, Benjamin Todd, Adriana Rossi, Tobias Baer, Barbara Holzer, Brennan Goddard, Bruno Puccio, Antonio Di Mauro (ALICE), Christoph Kurfuerst, Wolfgang Bartmann, Verena Kain, Mike Lamont, Stefano Redaelli, Mario Deile, Jan Uythoven, Richard Hall-Wilton, Robert Appleby, Daniela Macina, Siegfried Wenig (ATLAS), Ralph Assmann, Massimiliano Ferro-Luzzi, Richard Jacobsson (LHCb), Markus Zerlauth, Jorg Wenninger, Mike Koratzinos

## Minutes:

### Information (Jorg)

Jorg first started with showing the meeting his proposal for the sector test BIC configuration, for discussion. This is the last test before testing with beam. He suggested a different approach from last year (where a minimal configuration was used) where as many as possible interlock settings would be set to nominal (the reasoning being that any large inefficiency is better to be known earlier rather than later).

There followed a discussion about planning, procedures and strategy for the period leading to first beams.

### Collimator commissioning without beam (Ralph)

Ralph started by describing the collimator interlock system: it comprises three independent kinds of interlocks, the MP interlock (energy dependent), the cleaning interlock (time dependent) and the self-

protection interlock (monitoring the jaw temperature). He reminded the meeting that the system is designed as a cleaning system and not a protection system and that it would be wrong to assume that everything beyond 6 sigma ( the setting of the TCP) is safe.

All collimators are fully operational and most of the work needed for remote collimator commissioning aims at initial precision to minimize setup time. The deadline of the 2<sup>nd</sup> week of November has been set for running independent collimator ramp cycles. Ralph presented a detailed plan of tasks that need to be completed till then. There have been found larger than expected offsets in switches (but these are not critical as beam based alignment (BBA) will be used).

A worry mentioned is the recovery time after a power cut, which is one of the planned tests: currently it is 2-3 days.

In conclusion there are no major problems with remote commissioning.

## DCDQ positioning and losses (Thomas)

Thomas updated his results first presented in this meeting in March 2009 treating the worst case of particles continuing in the LHC after an asynchronous dump. All analysis is using beam 1.

A surprising (at first) result was the losses seen on TCTs (although Ralph was quick to remind the meeting that the collimators at IP7 are for cleaning and not for covering a available phase space). Losses in the TCTs were above the damage limit. No losses were seen in IP8 ( the question of if the beta\* of IP8 was set to 10m or not was asked). Thomas then used a semi-analytical approach to verify the MADX results. In conclusion, the effect is real and is due to the angular spread in the beam. The short term solution is to retract the TCTs. Ralph reminded the meeting that installing a more robust collimator is not an option. Everybody agreed that this is an important effect and should be studied further.

Tracking at 3.5TeV has not been completed yet.

## Collimator setting proposal for 3.5TeV (Adriana)

Adriana presented the proposal for the collimator settings at 3.5TeV. Overall ring aperture is given by triplet apertures in LSS1 and LSS5, which defines the collimator settings.

At the TCP, at 450GeV, 1mm is 1 sigma, whereas at 3.5TeV, 1mm is 2.8sigma. Primary collimators will be kept at their nominal setting (at 6sigma), whereas all other families will keep the same absolute distance to the primary collimator (in mm). Tables for collimator settings and operational range of the TCTs were given.

## Impact of vacuum gate valves (Rob)

Rob presented the impact that an undesired closure of a vacuum valve would have on the LHC beam. Rob reminded the meeting that sector valves exist in all LSSs (and not in the arcs or the DS). They take 3 seconds to close, and some more time to seal. These valves are interlocked, so Rob's study would only be relevant in the unlikely case that this interlock does not work (interlocks have been known to have failed in the SPS). The relevant parameter here is the speed with which the flange of the valve (1.8cm thick) presents itself to the beam, which is 2 micros per turn.

Rob in his FLUKA simulators considered the real valve positions, plus a fictitious 'study valve' immediately before Q7 in OR7, to allow comparison to previously published magnet quench studies. Results of the simulations were that in all cases studied, the BLM system will see a signal and detect a quench on time with some margin, both at 3.5 and 7 TeV (the quench level at 7 TeV is  $5E7$  protons and at 3.5 TeV  $3E9$  protons)

The study did not consider the potential damage to the valve itself, nor did it look at the interlocked gate valve either side of the experiments, between the TAS and Q1 but this can be revisited at the experiment's request. Neither did the study consider the case of injecting beam on a closed valve.

Jorg suggested that the BLM team should look at the numbers derived from the simulation, as we do have a margin but it is not an order-of-magnitude margin. Stefano raised the question as to what would be different if for some reason the closing valve is in the shadow of a collimator. Jorg suggested that if a possible case that has not been studied is proposed, we will look at it.