

# 124<sup>th</sup> meeting of the LHC Collimation Study group

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2011.04.11

Present: O. Aberle (OA), R. Assmann (RA), G. Bellodi (GB), V. Boccone (VB), R. Bruce (RB) (scientific secretary), F. Bukrart (FB), F. Caspers (FC), M. Cauchi (MC), H. Day (HD), D. Deboy (DD), J. Jowett (JJ), L. Lari (LL), T. Markiewicz (TM), A. Rossi (AR) (chairman), G. Smirnov (GS), G. Valentino (GV)

## 1 List of actions from this meeting

- Clarify which horizontal loss maps showing a hierarchy breakdown were done after having done a vertical loss map first (collimation team) . For future loss maps, keep the same sequence: first horizontal than vertical loss maps.
- Calculate margins for van der Meer scans at 7 TeV, nominal optics

## 2 Topics presented

### 2.1 R. Bruce: Limits for van der Meer scans

- RB presented calculations on how far van der Meer scans can go before the protection margins are violated, either between TCTs and triplets or between TCTs and IR6 collimators.
- During normal running conditions (3.5 TeV,  $\beta^*=1.5\text{m}$ ) up to 1 sigma orbit movement is allowed at IP1 and IP5.
- At 1.38 TeV, scans ranging to 3 sigma at all IPs are allowed.
- RA commented that similar calculations should be done for 7 TeV.

### 2.2 R. Bruce: SixTrack simulations with reduced pipe radius in ATLAS

- RB presented results from SixTrack simulations with a reduced pipe radius in ATLAS, motivated by the request to install a smaller beam pipe in the next long shutdown.
- No beam losses were seen in the detector until the pipe was made significantly smaller than the worst-case aperture.
- The studied optics scenarios (injection 0.45 TeV, 3.5 TeV and 7 TeV, collision 3.5 TeV and 7 TeV) are thus judged as safe for collimation. High-beta optics has not been studied with SixTrack but is considered as unsafe based on n1-calculations by M. Giovannozzi.

### 2.3 D. Wollmann and F. Burkart: Loss maps

- DW reported on measured performance of the collimation system in 2011.
- The cleaning inefficiency in the cold bottleneck stays between  $1\text{e-}5$  and  $1\text{e-}3$ , as in 2010, at injection and collision. An increase can be suspected in B1 horizontal.
- Hierarchy problems observed after technical stop were cured by re-setup of skew collimators.
- Abnormal loss maps were observed but when they were repeated after orbit correction and re-driving the collimators and they were normal again. The source of the problem is not well

understood but it seems to be fixed. The most likely cause is orbit distortions – loss maps with orbit offsets show that a 500 um deviation can reproduce the faulty loss maps.

- After power cut, changes of up to 150 um were observed in the offset between motor settings and LVDT readings.
- RA points out that the order in between horizontal and vertical loss maps might be important. If a vertical loss map has been performed first, blowing the beam up in the vertical plane, the load on the skew collimators is higher.

## 2.4 G. Valentino: Improved setup system

- GV presented the improved control application for collimation setup.
- The new program introduces three new main features
  - Automatic collimator movements that stop once the beam is touched and a certain loss level is reached.
  - Setup initialization with a simultaneous movement of multiple collimators.
  - Automatic logging of the found settings.
- The application reduces the risk of human error, the stress on the user and the setup time per collimator (a factor 1.5-5 improvement at top energy)
- Work on the application is still ongoing and several further improvements were mentioned.
- GV also showed a new Vistar display for collimation settings.
- Results for measured beam sizes were shown. With some exceptions, the measured beam size is similar or closer to nominal than in 2010.

## 3 AOB

- AR reported on progress on the Chamonix activities. Meetings with the beam dump team are ongoing to define possible accident scenarios and results could hopefully be reported in the next meeting.