

Proposed Collimation MD request for 2015

MD request are listed per category (LHC, HL-LHC), but not ordered by (collimation internal) priority. Listed 1 main contact on behalf of the collimation team (key collaborators listed in the detailed MD request).

LHC performance: 2015 and Run II (some to be pushed as operational developments)

1. Betastar reach from collimation (R. Bruce)

Crucial for performance. Collimation studies for betastar split in 3 categories:

Collimation hierarchy limit and impedance in IR7

Aperture in IR1/5 at smaller betastar

Collimation with tighter TCT settings in IR1/5

Notes: crucial for HL-LHC as well.

2. IR2 aperture measurements in preparation for ion runs (P. Hermes)

Clearly, this should be put as an operational development. Done in MD's in 2012.

One shift to be combined with optics commissioning in IR2.

3. Quench test (protons + ions) (B. Salvachua, P. Hermes)

New set of "collimation quench tests" at 6.5 TeV, for ions and protons

-> crucial impact on the 11 T dipole production until LS2.

Notes: crucial for HL-LHC as well, with important actions for LS2 activities.

4. Improved collimator BLM alignment (G. Valentino)

1 fill, maybe repeated 2 times in 2015

-> Test new hardware (faster BLM and motors) and software (new algorithms, orbit interpolations) to speed up the alignment of "old" collimators without BPMs.

5. Hierarchy limit (A. Mereghetti)

1h shift, ideally repeated several times in the year.

-> Initially, made part of the set of studies on betastar reach. But can be repeated during the year in order to address system stability. Similarly to what was done in 2011/12 to push settings of the IR7 collimators.

Notes: crucial for HL-LHC as well.

6. Off-momentum loss map optimization (B. Salvachua)

Proposal to establish gentle off-momentum loss maps for faster MP validation.

No MD proposal now as presently in the commissioning plan

7. Tail populations (collimator scans) (G. Valentino)

Repetition of 4 TeV measurements: single bunches before and after collision + end-of-fill with several bunches. One dedicated fill + one end-of-fill for protons (+ one for ions).

-> Improved measurements of tail population and diffusion speed + re-establishment of collimator scan methods to probe tails for future support to other teams.

8. Continuous loss maps ramp + squeeze (E. Quaranta, D. Mirarchi)

2 fills, one for measurements during ramp and one for the squeeze

-> Building on the successful MD in 2012, we want to establish methods to validate the system performance (cleaning + MP) during transient machine phases: loss maps through complete blow-up of bunches during ramp and between matched optics in the squeeze.

9. Special IR7 settings for reduced impedance (R. Kwee, A. Rossi, P. Theodoropoulos)

1 fill at flat top

-> Try new sets of settings with more open secondary collimators settings (individual collimators or individual jaws) to reduce the impedance while keeping acceptable cleaning and MP functionalities.

10. Characterization of BPM collimators (G. Valentino, M. Gasior for BI)

2 x 4h for dedicated BI tests through orbit changes at the BPM-collimators

-> Essential to characterize well the new hardware: pre-requisite for orbit interlocking and feedback with new BPMs. Ultimately, impact on betastar reach. Couple it with advanced features (like inferring beam size from non-linear BPM signals).

11. Asynchronous dump studies and TCT beam loads (R. Bruce + dump team)

Several end-of-fill (actually, end-of-MD).

-> Understand better predictions on TCT loads

12. TCL scans (S. Redaelli)

Several end-of-fill, preferably during intensity ramp-up. Actually, scans can be done during stable beams parasitically according to the 2012 experience.

-> Important to optimize the setting of the new physics debris collimation in IR1/5, than now involves 12 TCL's in total.

13. Off-momentum tail population (D. Mirarchi)

1 or more end-of-fills

-> being proposed as passive cleaning of the abort gap

HL-LHC studies

14. Crystal collimation tests (S. Redaelli, W. Scandale)

2 x 8h shifts to demonstrate crystal channelling at 450 GeV and 6.5 TeV with safe beams

-> Important to have first tests on hardware installed in LS1 before end of 2015.

15. Active halo control (R. Bruce)

2-3 shift at injection to demonstrated the principle feasibility of active halo control with tune ripple and ADT narrow band excitation.

-> Important in case of problems with beam losses on the collimators exceeding the 500 kW design values and spurious beam dumps (potential issue already in 2015!).

Note: might be pushed up to much higher priority in case of loss issues in 2015!

Note: Clearly, studies on hierarchy, beta* and impedance are important for HL but our effort in 2015 is focused on the Run II performance.