LHC MD73

Beta*-reach: Collimation with tighter TCTs requested by rbruce

Last modified: 2015-02-18 10:50:06, modified: 1 times

Merit: This MD will explore the effect of tighter TCT settings on cleaning and experimental background, as well as investigate the protection during asynchronous dumps at small beta*. This MD is, together with "beta*-reach: IR aperture measurement at small beta" and "beta*-reach: collimation hierarchy and impedance", necessary for understanding the feasibility of reaching a small beta* (tentatively 40cm will be investigated) by pushing the collimation hierarchy.

MD contact person: Roderik Bruce

MD procedure link: ()

Category: Normal MD

Beam: Both

Participants: Collimation team, ATLAS (M. Huhtinen et al.), CMS (A. Dabrowski et al.)

OP contact person: Belen Salvachua

Description: The goal of the MD is to investigate the cleaning and background at a small beta*, tentatively beta*=40cm (reference : talk by R. Bruce at https://indico.cern.ch/event/365220/). Another value of beta* could possibly be established if the long-range beam-beam MD has been carried out and analyzed beforehand. It is assumed that the optics has been corrected down to the chosen beta* before the MD. If the phase advance MKD-TCT is so far from 90 degrees that no MP margin is necessary, the TCT setting is limited inwards by experimental background and hierarchy considerations, and outwards by cleaning losses in the triplet. Therefore, the losses around the ring and on the TCTs in particular, and, if possible, experimental backgrounds in ATLAS and CMS, will be checked through a scan in TCT setting with loss maps at each step. The procedure would be: -- Inject 1 nominal bunch (for having the correct orbit) and at least 10 pilots per ring. The MD could possibly be carried out using only pilots but the accuracy of the results might be worse (potentially worse hierarchy in IR7 due to orbit) -- Ramp, squeeze to 40cm, stay separated (if necessary for MP, consider collapsing crossing at 80cm for increased aperture) -- If MD "Beta*-reach: IR aperture measurement at small beta" has been performed beforehand, introduce the same crossing angle -- Align in IR1/5 TCTs around new orbit using BPM buttons -- Move in secondary collimators in IR7, as well as the dump protection, by 0.5 sigma to establish 2 sigma retraction between TCP and TCS. -- Scan TCT setting between 7.8 sigma and 10.3 sigma, in steps of 0.5 sigma. At each step, check cleaning performance through loss maps with ADT excitation (B1 and B2, H and V), where one pilot is used per case. If possible, ATLAS and CMS could take data to monitor beam-halo induced background from the TCTs under very clean conditions. Need at least 10 pilots per ring. -- Do a final loss map with TCTs at 8 sigma in the horizontal plane, where the nominal bunch is blown up. If the rates during the pilot loss maps are too small for the experiments to make meaningful background observations, a higher loss rate could be achieved with the nominal bunch. -- Move in TCTs to 6.8 sigma -- Finish fill by asynchronous dump test

Time required (Hours): 8

Beam energies:

- Flat top

Optics: tentatively beta*=40cm

Optics change: Yes

Orbit change: Yes

Collimation change: Yes

RF system change: No

Feedback change: No

What else should be changed: Need to use ADT white-noise excitation for loss maps. Turn off RF for asynch dump test. If possible, ATLAS and CMS could take data during loss maps.

Are parallel studies possible?: No

More information on parallel studies?

MD requester is ready? Yes

Beam parameters

Bunch intensity (10^{11} ppb): 1.1
Number of bunches: 1 nominal + several pilots
Transverse emittance (um): 3.75
Bunch length: 1

MD status

Time slot assigned?: No
Assigned duration:
Status: Requested
Coordinator MD readiness:
MP classification: A
MP approval: No
rMPP approval: Yes
Need 2 extra hours for ramp down: No