

## LHC MD72

### Beta\*-reach: IR aperture measurement at small beta requested by rbruce

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**Merit:** This MD aims at checking the IR1/5 triplet aperture at a realistic low-beta\* configuration including the crossing angle, as well as checking the protection during asynchronous dumps. This MD is, together with "beta\*-reach: collimation with tighter TCTs" 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 + aperture team

**OP contact person:** Belen Salvachua

**Description:** The goal of the MD is to check the available triplet aperture at a small beta\*, tentatively beta\*=40cm (<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. The beta\*-reach is limited by the available triplet aperture. This MD therefore aims at verifying the triplet aperture at a realistic low-beta\* configuration, in order to minimize uncertainties in the scaling of measured apertures at higher beta\*. It is assumed that the optics has been corrected down to the chosen beta\* before the MD. The procedure would be (under the assumption of 40cm and 11 sigma BB separation): -- Inject 1 nominal bunch (for having the correct orbit) and max allowed number of pilots per ring, while staying below the setup beam flag limit. The MD could possibly be carried out using only pilots but the accuracy of the results might then be worse -- Ramp, squeeze to 40cm. Stay separated. (if necessary for MP, consider collapsing crossing at 80cm) -- Change half crossing angle to 205 urad -- Align in IR1/5 TCTs around new orbit and retract to 8.8 sigma -- Move out all collimators except TCTs (possibly leave IR6 TCSG 1 sigma outside TCTs for MP) -- Carry out global aperture measurements with ADT method and TCTs retracted in steps. Study B1 and B2, H and V. Possibly follow with TCSG in IR6 (needs ~15 pilots per ring) -- Finish fill with asynchronous dump test: Move in collimators to standard physics settings, then move in secondary collimators in IR7, as well as the dump protection, by 0.5 sigma. Move out TCTs in IR1/5 to 0.1 sigma inside the level of the measured aperture before the test

**Time required (Hours):** 12

**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.

**Are parallel studies possible?:** No

**More information on parallel studies?**

**MD requester is ready?** Yes

### Beam parameters

**Bunch intensity (10<sup>11</sup> 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