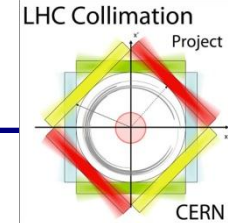




DS Quench TEST 2



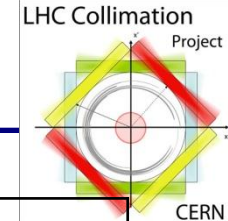
□ MOTIVATION and METHOD:

1. **Achieve 500kW on beam 1 – TCP7 collimators.**(so far 500kW with beam 2 and 235kW over 1s with beam 1 were reached with 16 nominal bunches) crossing the 3rd integer tune resonance with 32 nominal bunches.
2. **Create constant losses over 5-10s with beam 2 – TCP7** by slowly going to the 3rd integer tune resonance with 32 nominal bunches.
3. **Repeat test in 2., achieving 500kW losses over 5-10s** (both in beam 2 and 1), by increasing the number of bunches (80 to 100? In the previous Quench Test MD 500kW over 1s were reached by losing ~10 bunches). **Test still under MPP approval.**
4. **Measure performance limitations with IR3 combined cleaning** starting with 2 or 3 bunches. IR3 combined cleaning could be used if R2E problems arise in IR7.

□ LHC MD Test Program – MD Class C & D (<https://edms.cern.ch/document/1156108/1>)



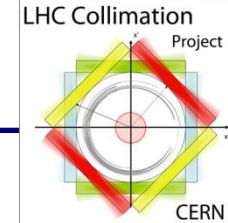
DS Quench TEST 2



Number of MD's	1
Time required per MD [h]	8
Beams required [1, 2, 1&2]	1&2 (one at a time)
Beam energy [GeV]	3.5TeV
Optics (injection, squeezed, special)	Nominal optics, un-squeezed, non-colliding
Bunch intensity [#p, #ions]	Nominal bunch (1.2E11)
Number of bunches	32 bunches for first part in IR7, 80-100 bunches for second part in IR7; 3 bunches for first part in IR3, < 20 bunches for second part in IR3
Transv. emittance [m rad]	Not relevant
Bunch length [ns @ 4s]	Not relevant
Optics change [yes/no]	Reduced crossing/separation (if beam-beam allows) to minimize losses in the IRs.
Orbit change [yes/no]	No
Collimation change [yes/no]	No: nominal settings validated at injection.
RF system change [yes/no]	No
Feedback changes [yes/no]	No
What else will be changed?	No
Are parallel studies possible?	No
Other info/requests	Changes of BLM thresholds, relaxed setup beam flags

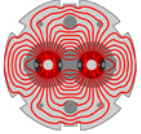


DS Quench TEST 2

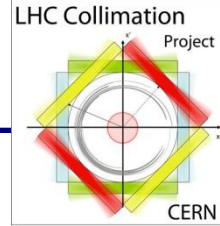


■ PREPARATION OF THE MD

1. Adjust BLM thresholds and monitor factors for the IR7 tests as for the DS-Quench test in May 2011. The details are described in [<https://edms.cern.ch/document/1151015/1>] and [<https://edms.cern.ch/comment/1143931/1>]. **(Responsible: BLM team)**
2. Adjust BLM thresholds and monitor factors for the IR3 tests. This is based on the limiting BLMs found during the IR3 combined cleaning MD in B2 and off-momentum loss maps with both beams. **(Responsible: Coll + BLM team)**
3. Move BLMs quoted in LHC-BLM-ECR-0020 (see <https://edms.cern.ch/comment/1143931/1>) into the three new BLM families. **(Responsible: BLM team)**
4. Drive the new thresholds to hardware. **(Responsible: BLM team)**
5. Perform MCS check. **(Responsible: BLM team)**
6. Perform BLM sanity check. **(Responsible: BLM team / OP)**
7. Extract thresholds from logging database (after the first ramp) for a few short and long running sums, plot threshold ratios (new/old) and re-check the changes (for 3.5 TeV). **(Responsible: COLL + BLM team)**



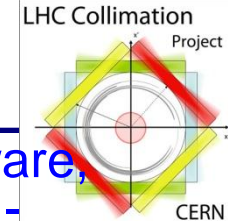
DS Quench TEST 2 : IR7



1. Inject 32 bunches per beam, ramp to 3.5 TeV (flat top).
2. Switch tunes (hor/ver).
3. Perform horizontal loss-map with B1 (repeating the procedure described in [CERN-ATS-Note-2011-042 MD (LHC)] for the third ramp during the last MD) to get a peak loss of ~500kW at the primary collimators.
4. Create constant slow losses in B2 for 5-10s by slowly approaching the 3rd integer horizontal tune resonance. Measure constant loss rate and calculate intensity needed to achieve in the same way constant losses of 500kW over 5-10s.
5. Dump and refill machine with the scaled intensity from step 4 (both beams) and ramp to 3.5 TeV.
6. Repeat the slow losses in B2 and B1 (one beam at a time). If this was done successfully we can switch to IR3 combined cleaning tests.



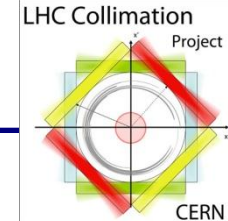
DS Quench TEST 2 : IR3



1. Dump, drive the new BLM thresholds for the IR3 test to hardware, put collimators to IR3 combined cleaning settings (see [CERN-ATS-Note-2011-060 MD (LHC)]), fill both beams with 3 nominal bunches.
2. Force very relaxed SFB true.
3. Mask MASKABLE BLMs:
 1. BLMs in all IPs.
 2. BPM in IP6.
4. Switch tunes (hor/ver).
5. Perform horizontal loss-maps with both beams (one beam at a time) by going onto 3rd integer resonance.
6. During ramp down:
 1. Calculate maximum loss rate (i.e. loss power) achieved with 3 bunches and scale the number of bunches a peak loss power at the TCPs of 500kW.
 2. Extract BLM signals during highest losses and plot ratio of BLM-signal to threshold for the whole ring.
 3. Check if additional bottle necks appeared during the 3 bunch exercise: if yes, it needs to be decided if these could be added to one of the three families created for this MD.
7. Inject the calculated number of bunches to achieve a 500kW loss at the TCPs (multiples of 12 bunches?) and ramp to 3.5TeV.
8. For the losses: repeat exactly the same procedure as done with the 3 bunches before.



DS Quench TEST 2



■ RECOVERY AFTER THE MD

- During the TS set back thresholds to state before the MD
(Responsible: BLM team)
- Plot threshold ratios, to check and document the correct roll back of the thresholds. **(Responsible: COLL + BLM team)**
- Inform rMPP of reversal of changes and document in MPS pages. **(Responsible: BLM team)**