

Summary of loss map analysis for pp run at 1380GeV

Injection: 450GeV Injection Protection IN

For beam 1, both horizontal and vertical loss maps look fine and consistent with previous loss maps. See the plots in the Collimation Wweb Page http://lhc-collimation-project.web.cern.ch/lhc-collimation-project/lossmaps.php#20130119_450GeV_InjProtIN.

For beam 2 the losses in IR2 a bit higher and required more investigation, see Figure 1 Figure 2. In these plots the leakage to IR2 is 10^{-4} while in previous loss maps at injection the leakage is at the BLM background level $\sim 10^{-5}$.

We have checked the absolute losses in IR2 during the loss maps and compared to the BLM offset. The absolute value is 4×10^{-6} Gy/s for RS09 (1.3s integration time) which is exactly the value of the BLM offset in IP2, so this apparent increase of the losses is consistent with the noise fluctuation in IP2. The loss maps in absolute value can be found the LHC logbook:

<http://elogbook.cern.ch/eLogbook/eLogbook.jsp?shiftId=1051878>

For the off-momentum the loss maps look ok.

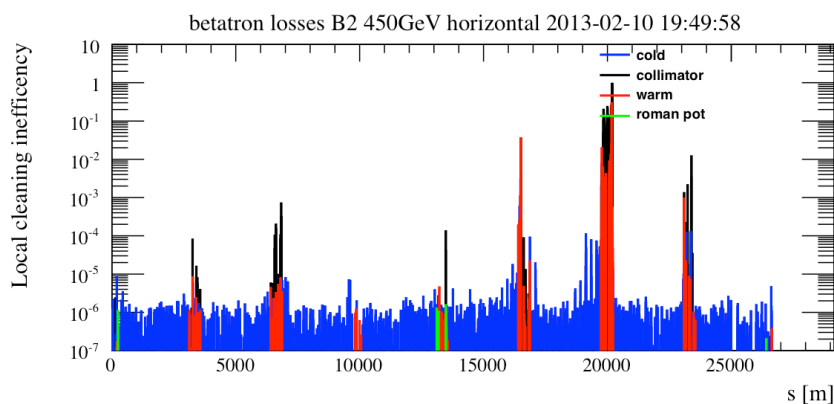


Figure 1: B2 Horizontal losses.

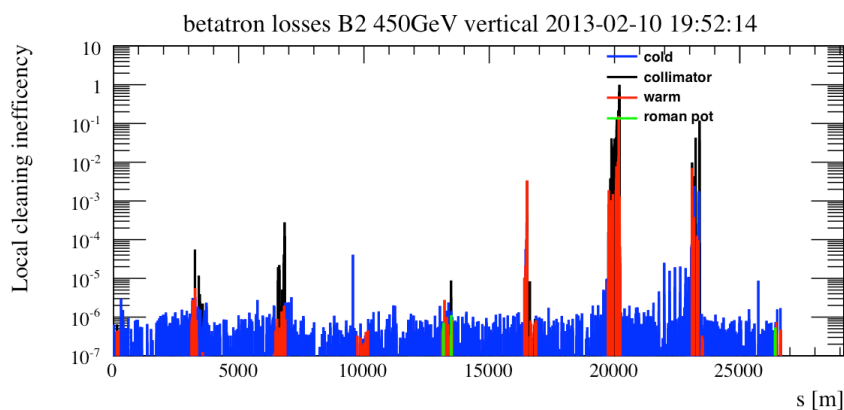


Figure 2: B2 Vertical losses

Flat Top at 1380GeV

For beam 1 the leakage looks ok, however there is a double peak structure in IR3. We investigated if this double peak during beam 1 excitation could come from b2 cross-talk or a problem on the beam 1 hierarchy in IR3. Both options were discarded. For the beam 2 cross-talk, we checked that the losses on left of IR3 come from beam 1. For the hierarchy in beam 1 we checked the off-momentum IR3, as you can see in the case of beam 1 horizontal losses there is a high peak on the right of IR3 (see Figure 3), this corresponds to the TCLA.7R3.B1. However, if we look at the off-momentum loss map in Figure 4, the same peak is lower with respect to the TCP losses in IR3 (highest peak on the left of IR3) showing a good beam 1 cleaning hierarchy in IR3.

Since the losses were not very big in absolute value (about 10^{-5} Gy/s), the cleaning in the cold sector of IR3 is good and the cleaning hierarchy seems to be respected we accepted the loss maps as good qualification of the rest of the pp run at 1380GeV. Keeping in mind that the present settings are 1 year, with the Christmas stop in between and we are stopping at a point during the ramp where:

- the alignments has not been done, we interpolate centers measured at injection and at flat-top for collimators in IR3, IR6 and IR7,
- and the optics were not measured, we interpolate linearly with gamma from the beam-based size calculated at injection to the nominal sized used at top energy.

Ideally we should have made more checked but pragmatically we are operating in a mode when we just exclude major problems. Loss maps are not ideal but in this conditions poses no concerns for the expected run of 1-2 days ahead of us. If there are not other objections we think we can continue like that.

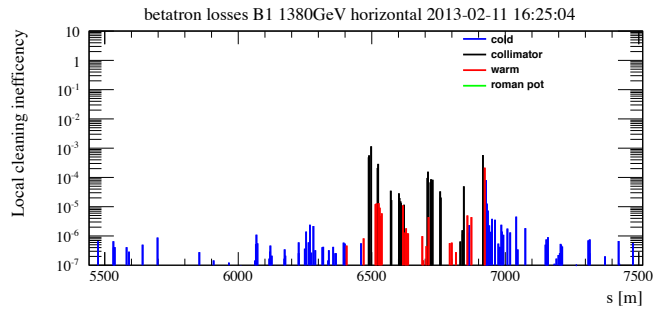


Figure 3: B1 Horizontal loss map.

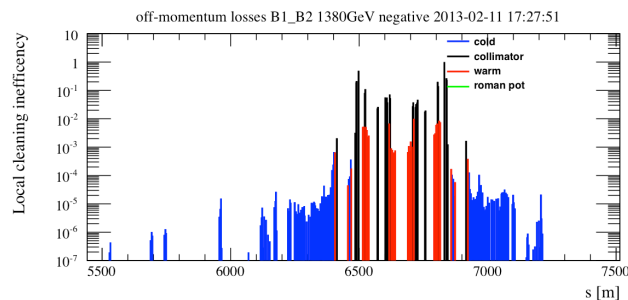


Figure 4: Negative off momentum losses in beam 1 and 2.