

# Minutes from the 44<sup>th</sup> BLM Threshold Working Group meeting – 20.09.16

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Present: C. Bahamonde, M. A. Jebramcik, J. M. Jowett, M. Kalliokoski, A. Lechner, A. Mereghetti, R. Schmidt, D. Wollmann, C. Xu.

*The overall goal of the meeting (apart from what concerns the first presentation) was to have a first idea of how to tackle the collimation region during the p-Pb run in 2016: if flat top corrections are needed at TCTs, TCLs and triplets, for example.*

## Summary of BLM hardware, naming and threshold changes in TS2 (M. Kalliokoski)

Slide 3

*Matti* says the reason for these new monitors is that the collimation team wanted them there because of some inside losses from the beam. *Alessio* adds that this related to some aperture measurements that they will perform. In any case *Matti* states they are permanent BLMs, not mobile.

## First analysis of IR7 threshold changes required for the 2016 p-Pb run (A. Mereghetti)

Slides to be found in <https://indico.cern.ch/event/522181/> starting in Slide 7

Slide 7

The shown loss map corresponds to the moment right before quenching and it is worth pointing out that it is not on Gy/s but rather on a ratio of BLM measured dose to threshold. *Anton* points out in at this moment the 2015 proton thresholds were still been applied.

Slide 8

There's a ratio of 4.4 in the BLM signal to threshold plot at quench level which could represent a risk of unnecessary dump if high losses were to occur in IR7. The only changes done at this point involved a Monitor Factor change in RS01. *Anton* points out that keeping the proton thresholds, the signal to threshold ratio in the primary and secondary collimators is much lower than in the DS.

*Alessio* proposes that for this year's run, the threshold could be reset both at 4 and 6.5 TeV based on loss maps. Plus, for 6.5 TeV the same power loss that during the 2015 quench can be assumed, if this power loss is reached at a slow rate. For 4 TeV, there was an ion quench in 2009 done by inducing the losses at resonance, but these were very fast losses, not representative of steady state and therefore the power loss then cannot be assumed to be the same as in this year's run.

*Anton* concludes that the best would be to do a loss map and then change the thresholds at both energies, although this takes time and there's a risk of creating bottlenecks. *Alessio* and *Anton* agree that since there are loss maps from past year at 6.37 TeV, they could be reused for this year's 6.5 TeV run. *Anton* says for 4 TeV we could take the loss maps from 2013, but then we'll have to scale them in terms of power loss, and he offers to provide this factor to *Alessio* for the scale up. Regarding

bottlenecks, *Alessio* adds that in principle the collimator setting will remain the same but he's not fully certain about this.

*John* points out that running p-Pb there are different loss mechanisms involved than with just Pb, for example, at the end of the ramp there will be higher losses and in the past had the thresholds had to be risen. He also says the bunch intensity will be  $3 \times 10^{10}$  protons per bunch and around 500 bunches would be injected.

Machine Protection thinks that it would be better to dump at primary or secondary collimators rather than at the DS and *Daniel* says there's no way that with these thresholds a dump would occur in the collimation areas.

*John* and *Alessio* agree that it would be better to scale only the thresholds in the primary collimators (and not also the secondary ones) since primaries are the ones used to reconstruct the actual power loss. *Anton* agrees and proposes to keep the thresholds only for ions and not change them even if beam 1 and 2 change from proton to Pb and vice versa. *Daniel* agrees.

*Rudiger* wonders if for the protons these thresholds would be too pessimistic in the collimation region, so it is advised to not change the thresholds all the time but rather see if there's a problem somewhere and fix it with the MF.

Threshold changes could occur during TS3, since recommissioning starts on November 5<sup>th</sup>. *Alessio* says by the beginning of October he could have a threshold proposal to then handle to *Chen* so he can cross check with the loss maps of past runs, and see with the BLM team the families that need a change (which in principle should be only the primary collimator and DS ones). Once this is done, changes would be presented at MPP and LMC.

## Recap of FT corrections applied in the 2013 p-Pb run at 4 Z TeV (M. Kalliokoski)

No Flat Top corrections were applied during 2013 p-Pb run, only Monitor Factors were changed when there were high losses in Q9 (a couple of monitors had the MF increased). *John* says there were losses at the end of the ramp which were the reason behind those changes. In any case, since master tables have changed from then, a direct comparison is not possible.

During stable beams, only IR 3 and 7 saw high losses. *John* is mostly worried about the cogging process. In 2013 cogging was way less, but for this year's run it could take up to half an hour. No FT corrections should be needed in insertion regions at 4 TeV since injection and ramp are normal, it's after this when cogging is done, that we could need a flat top correction. *Anton* says this means that no changes are needed from 4 to 6.5 TeV which is a good thing.

*John* says luminosities in 2013 were roughly a factor 5 below the ones expected in 2016. ATLAS and CMS will have the higher luminosities and LHCb will also have a quite high luminosity. *Anton* says since normally there's no FT correction in LHCb monitors but there is in ATLAS, so this is something to be looked at.

## BFPP losses during the p-Pb run vs S12 thresholds (A. Lechner)

*Anton* says it's not worth to apply orbit bumps in this year's run, since the affected monitor is already in an ion family, instead the thresholds could be just set higher. This is a consideration only to be taken into account in ATLAS (S12) since in LHCb monitors are not that low. The only other area to keep an eye on would be the triplet area when operating at 6.5 TeV.

*Daniel* votes to not increase it quite yet but keep it in mind because it would require a discussion with MP3. Since this monitor protects for both beams, not only the case when Pb is in beam 1 is worrying but also when Pb is in beam 2.

*Chen* proposes to introduce a FT correction in this monitor, that way it would still protect against UFOs and also get the rise in threshold needed for ions.