BPM interlock status and plans

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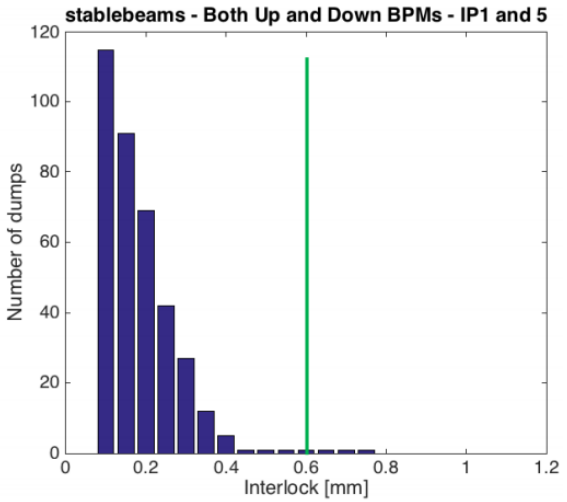
Outline

1. Interlocking concept and motivation
2. Validation status
   - Log file
   - Result
3. Conclusions

Motivation

SIS follows the **collimator beam center** measured from the **embedded BPMs**.



Following the TCT BPM performance analysis *(A.Mereghetti et.al, Evian2016)*

- 600 μm interlock limit was set (from 2016)

In addition to the analysis of orbit quality/stability, this **new analysis of sis logs will also provide an assessment of the overall chain**, addressing the complete implementation (status of acquisitions, etc) and **the reliability**.

Motivation

- The SIS produces the log file for **EVERY** interlocking case.

Current SIS implementation:

- All collimator BPM interlocks are running reliably (at least on the SIS side).
- All interlocks are in the interlock tree, but are currently masked.
- The interlock limits are currently set to 4σ except for:
  - *1σ in IR1 and IR5 at β*= 40 cm,*
  - *1.5σ in IR6 at β*= 40 cm (linked to IR5 β*),*
  - *2.5σ in IR8 at β*= 3 m.*

J.Wenninger, 127th MPP meeting

How many (false?) dumps we would have, if in 2017 we use 2016 analysis result?

Analysing (and understanding) the log file will give the answer!

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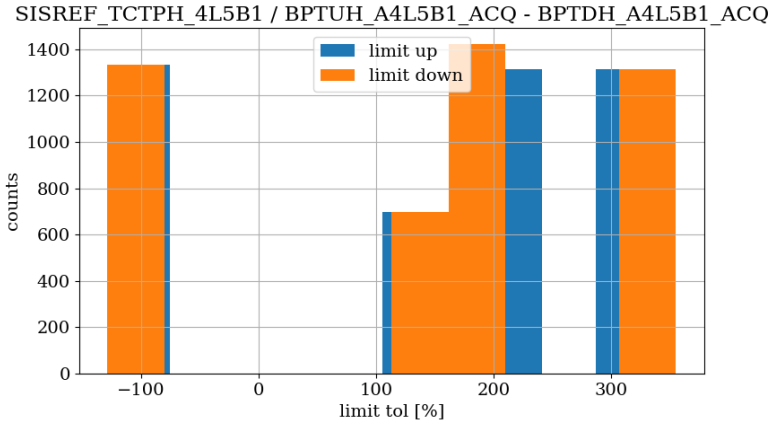
The SIS Log File

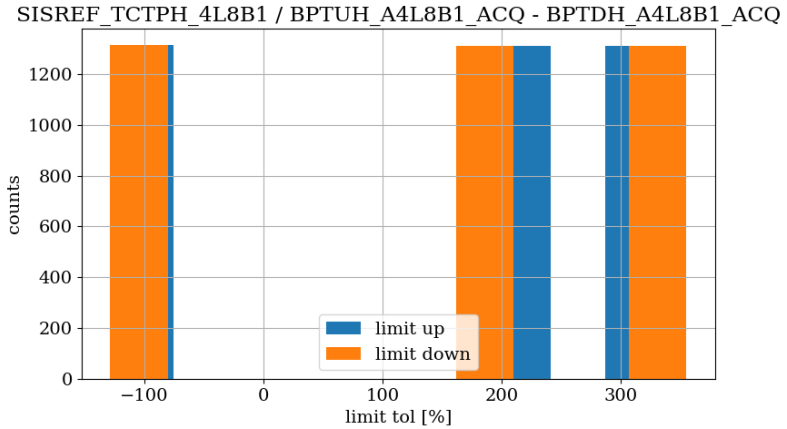
```
2017-05-25 22:49:43,004 [EventUpdaterThread-null-5] ERROR BpmCollimatorCenterValueConditionExtImpl
adc97491-418b-11e7-843f-0f3eb12d931c =>
*** Collimator beam center [SISREF_TCTPV_4R2B2 / BPTUV_A4R2B2_ACQ - BPTDV_A4R2B2_ACQ] :
 Beta @ collimator       =    101.7 [m] for beta* =    10.00 [m] @ IR2
 Beam sigma @ collimator =    0.232 [mm] with tolerance = 4.00 [sigma] @ E =   6499 [GeV] - emit =
3.5 [um]
 Up   BPM position =   -1.123 [mm] -   -121 [tol %] status = true
 Down BPM position =   -1.193 [mm] -   -129 [tol %] status = true
 Dump count =
2017-05-25 22:49:45,003 [EventUpdaterThread-null-5] ERROR
BpmCollimatorCenterValueConditionExtImpl aefaa191-418b-11e7-843f-0f3eb12d931c =>
*** Collimator beam center [SISREF_TCTPH_4R8B2 / BPTUH_A4R8B2_ACQ - BPTDH_A4R8B2_ACQ] :
 Beta @ collimator       =    234.5 [m] for beta* =     3.00 [m] @ IR8
 Beam sigma @ collimator =    0.352 [mm] with tolerance = 2.50 [sigma] @ E =   6499 [GeV] -
emit =   3.5 [um]
 Up   BPM position =    2.899 [mm] -    329 [tol %] status = true
 Down BPM position =    3.101 [mm] -    352 [tol %] status = true
 Dump count =
2017-05-25 22:49:45,003 [EventUpdaterThread-null-5] ERROR BpmCollimatorCenterValueConditionExtImpl aefaa191-
418b-11e7-843f-0f3eb12d931c =>
*** Collimator beam center [SISREF_TCTPV_4R2B2 / BPTUV_A4R2B2_ACQ - BPTDV_A4R2B2_ACQ] :
 Beta @ collimator       =    101.7 [m] for beta* =    10.00 [m] @ IR2
 Beam sigma @ collimator =    0.232 [mm] with tolerance = 4.00 [sigma] @ E =   6499 [GeV] - emit =   3.5 [um]
 Up   BPM position =   -1.123 [mm] -   -121 [tol %] status = true
 Down BPM position =   -1.194 [mm] -   -129 [tol %] status = true
 Dump count =
```

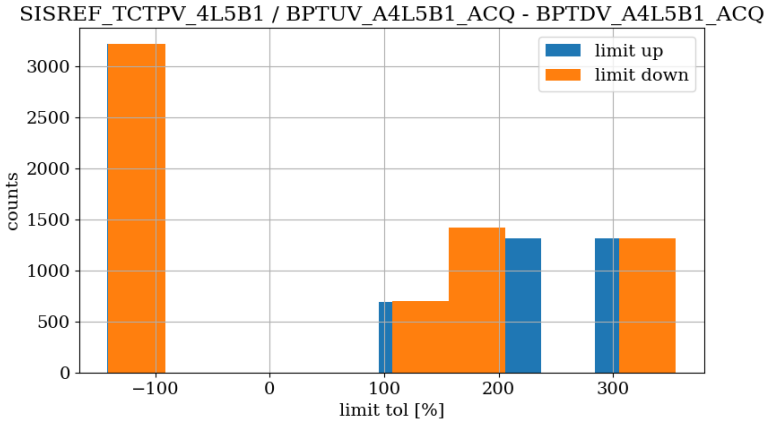
The SIS Log File

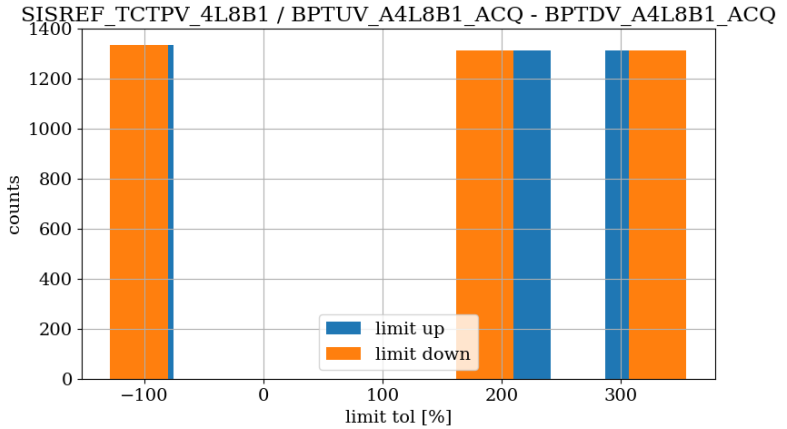
- The first file covered 25 May till 30 May
  - **~6000** interlocking logs, but only the following channels:
    - TCTPH_4L5**B1 &** TCTPV_4L5**B1**
    - TCTPH_4L8**B1 &** TCTPV_4L8**B1**
    - TCTPH_4R8**B2**
    - TCTPV_4R2**B2**
- First days of June (1 - 8)...
  - **... another ~6000** interlocking entries
    - ...TCT

Parsing the file (examples)









Closer look at the interlocks

- Looking at the time binning (one log file)
  - clusters every 2s (?)
- But all of these interlocks were recorded around specific beam commissioning activities:
  - VdM scans in IP8
    - 25 May,
  - 30cm optics validation
    - 25 May, 4 June, etc.

Conclusions

- Ready to perform the continuous monitoring
  - *With limits from the 2016 analysis*
- **So far, no spurious (not identifiable) interlocks were found**, all related to the beam commissioning
  - *Based on the correlation: amount and magnitude of the interlock wrt to the time when it happen*
- The **tool is ready** to monitor the log file
  - Still an interaction with the logbook required to see the reason of interlocking
  - *Possible to add more criterias to check.*

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