Limiting BLM monitors – what could be gained without sunglasses? -

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Based on the analysis of W. Bartmann presented at last MPP meeting

Effect of filters installed average values

(1-EXP[-RS/T])

RS … running sum integration time length T …time constant (2ms)

Factors for 40us integration time thresholds (RS01)	No-filter (ion drift in IC and cable in LSS)	Small filter	Large filter
resistor	--	150 kOhm	150 kOhm
capacitor	--	2.2nF	47nF
Theoretical time constant	--	0.3ms	7ms
Measured time constant	0.3ms	2ms	11ms
40us reduction factor wrt 'instantaneous loss' threshold	2.5	50	275
40us reduction factor wrt no-filter threshold	--	**20**	**110**

Other effects of filters

- 40 us thresholds above injection energy to be reduced by 20 or 110
- Filters should reduce noise level
  - →probably no problem with threshold/noise ratio
  - →to be investigated
- Delayed response
- Uncertainty in corrected thresholds (about a factor of 3), depending on loss scenario

Effect of LIC

LIC is a factor **60** less sensitive than IC:

- Thresholds above injection energy to be reduced by 60

→Investigate the threshold to noise ratio (threshold to stay a factor 5-10 above noise levels)

Input needed for final set-up

For each monitor:

- 40us applied threshold =

  average (or maximum) of a set of injections times

  Margin factor (for example 5)

- 40us master threshold: What factor should we envisage for tuning freedom with MF? (for example 3)

→LIC, LIC + small filter

→Several location could have LIC OR IC + small filter

B2 (used: average *5*3)

BLMEI.04R8.B2E20_TDI.4R8.B2	LIC + small filter
BLMEI.06L8.B2I11_TCLIB.6L8.B2	LIC
BLMQI.03R8.B1I30_MQXA BLMEI.04R8.B2E10_MBXB BLMQI.07R8.B2E10_MQM BLMEI.06R8.B2E10_MSIB BLMEI.04R8.B2E10_TCTH.4R8.B2 BLMQI.05R8.B2E10_MQY BLMEI.06L8.B2I10_TCLIB.6L8.B2 BLMEI.04R8.B2E10_TDI.4R8.B2	LIC or IC + small filter (2 of these monitors have already a small filter)

~ 17 ICs with small filters installed in IP2 and ~17 in IP8

B1 (used: average *5*3)

BLMEI.04L2.B1E20_TDI.4L2.B1	LIC + small filter
BLMQI.06L2.B1E20_MQML BLMQI.08L2.B1E20_MQML BLMQI.08L2.B1E30_MQML	LIC
BLMEI.04L2.B1E10_MBXA BLMEI.06R2.B1I10_TCLIB.6R2.B1 BLMQI.08L2.B1E10_MQML BLMQI.05L2.B1E10_MQY BLMQI.07L2.B1E30_MQM BLMQI.06L2.B1E10_MQML BLMQI.08L2.B2I30_MQML BLMQI.08L2.B2I20_MQML BLMQI.08L2.B2I10_MQML BLMEI.06L2.B1E10_MSIB BLMEI.06L2.B1E20_MSIB BLMEI.06L2.B1E30_MSIB BLMEI.04L2.B1E10_TDI.4L2.B1	LIC or IC + small filter (6 of these monitors have already a small filter)

Further investigations

- Ratio of threshold to noise at 3.5 TeV for LIC, RC-filter LICs and RC-filter ICs
- New injection energy thresholds for magnets are how much above the ‘standard thresholds’ for these monitors?