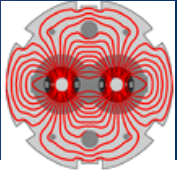


# Current BLM Thresholds in IR7

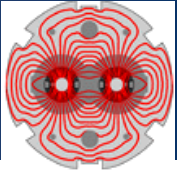
Mariusz Sapinski BI/BL  
for BLM team

CERN, 16 May 2012

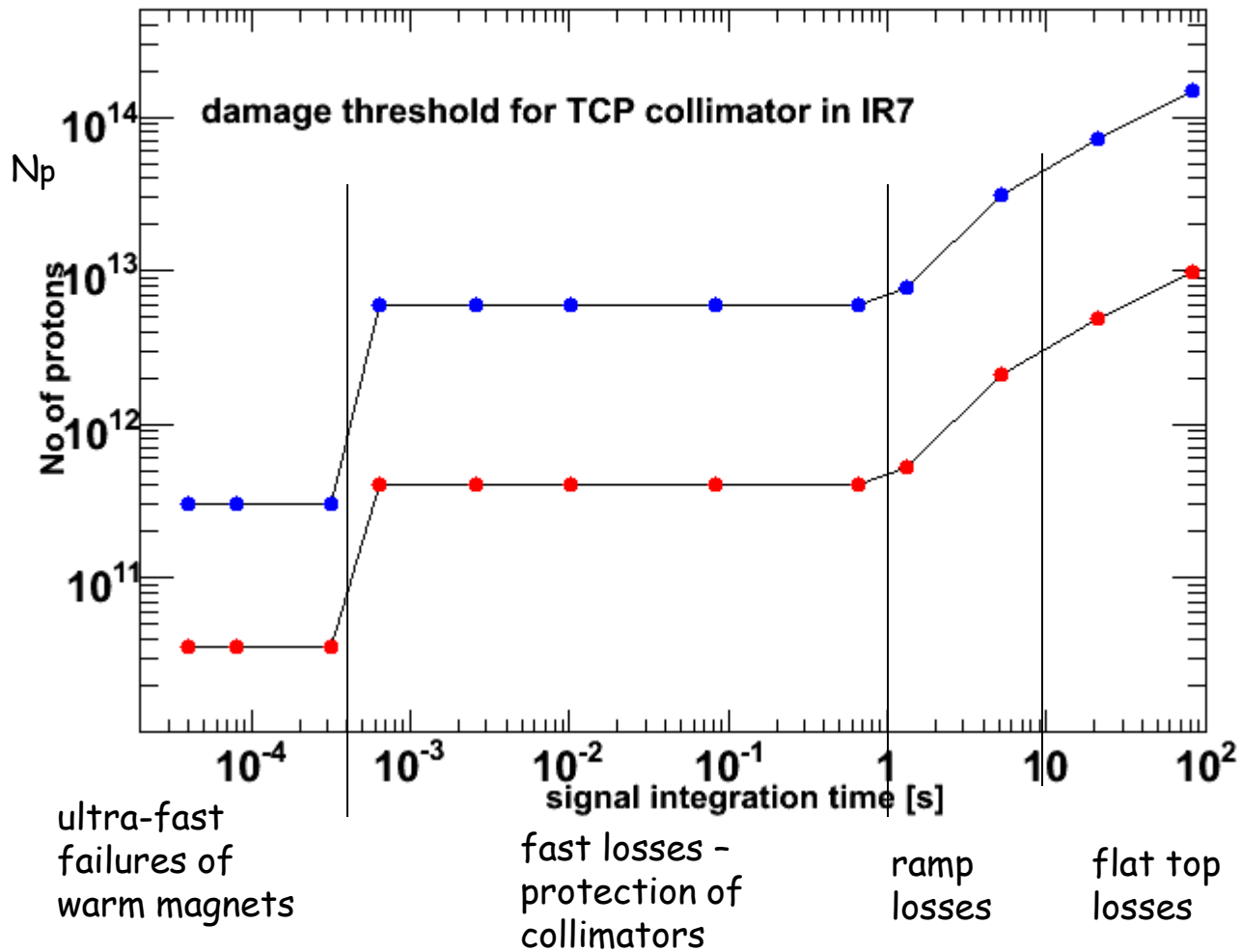


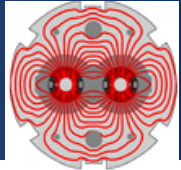
A group of BLM regularly go to warning level and even dump the beams during ramp and squeeze for long running sums:

- **BLMEI.04R7.B2I10\_TCSG.A4R7.B1,B2** RS12 family THRI\_7\_TCSG mf=1
- **BLMEI.06R7.B2I10\_TCSG.A6R7.B1,B2** RS12 family THRI\_7\_TCSF\_F5 mf=1
- **BLMEI.06L7.B2I10\_TCLA.B,C,D6L7.B1,B2** RS12
  - family THRI.06\_7\_A\_TCLA mf=1
  - family THRI.06\_7\_B\_TCLA mf=1
  - family THRI.06\_7\_C\_TCLA mf=0.2
  - family THRI.06\_7\_D\_TCLA mf=0.2
- **BLMQI.05R7.B1E30\_MQWA.E5R7** RS8-11 family THRI\_MQW mf=0.5



$$T = N_p * S_{BLM}$$





Initial setting (EDMS 995569, 2009-08-20):

**Protons to abort (Nprot):**

- 450 GeV:  $(t-10)*1.2E11$  p/s +  $10*6E11$  p/s
- 7 TeV:  $(t-10)*8E9$  p/s +  $10*4E10$  p/s  
at 4 TeV linear interpolation:  $(t-10)*5.6e10+10*2.8e11$  p/s  
for  $t=84s$ :  $N_p=7e12$  protons

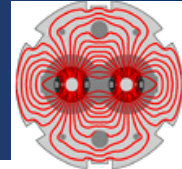
**BLM signal (S):**

$6.22E-13$  Gy/p- TCLA measurements, constant with energy

**Threshold =  $S*N_p/RS12 = 0.052$  Gy/s**

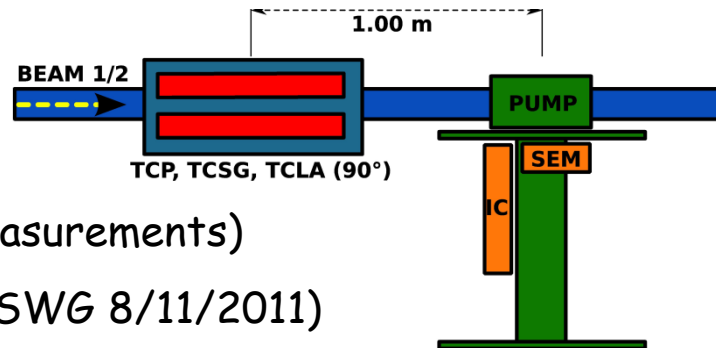
*18:17:57 - Warning on: BLMEI.04R7.B1E10\_TCSG.A4R7.B1, integration time:*

*83.8 s, losses =  $1.570069E-02$ , threshold =  $5.170147E-02$ , ratio = 30%*

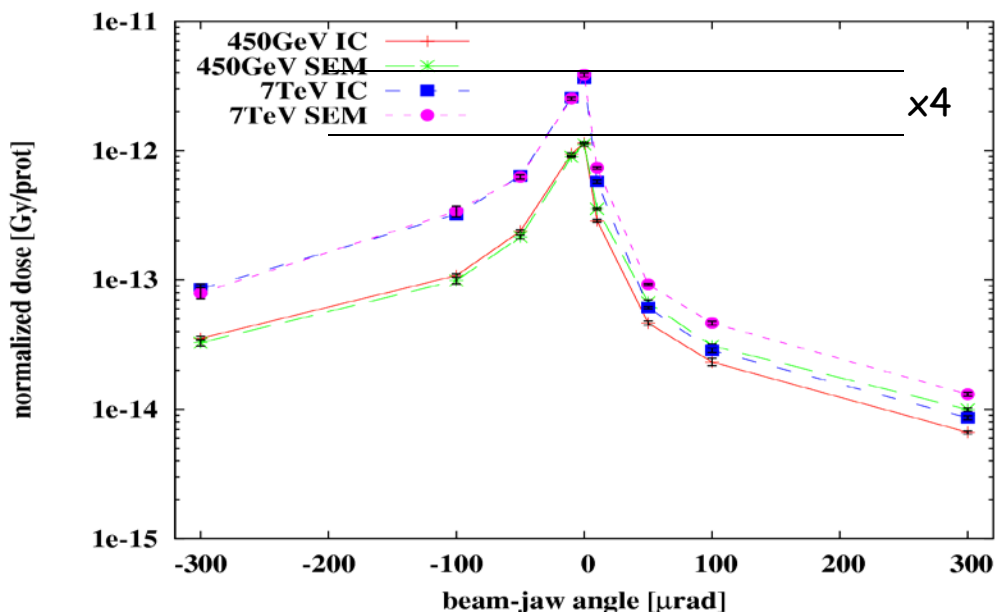


## Do we have BLM signal correct?

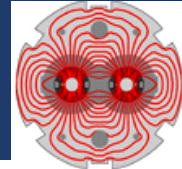
- **6.22E-13 Gy/p** - TCLA measurements 2009
- $1e-12$  Gy/p (T. Boehlen master thesis and measurements)
- $1.2e-11$  Gy/p (TCLIB beam scrapping, Chiara LSWG 8/11/2011)
- $3.6e-12$  Gy/p &  $1.1e-11$  Gy/p (TCDQ BLM exercise, Chiara BCWG 11/05/2010)
- $8.9e-12$  Gy/p - TCSG in IP6, Direct Dump calibration exercise, 03/07/2011



## Shall we change the signal with beam energy?



No data to support this, scrapping at 3.5 TeV of a very small fraction of the beam



Initial setting as before,

modification LHC-BLM-ECR-0023 (August 5, 2011)

*LHC BLM applied thresholds (and master thresholds) for 10 TCSGs in IP7 will be increased for integration times 82 ms and above by a factor of 5 with respect to the original (start-up 2010) thresholds. A new family will be created for these 10 monitors. The monitor factors stay MF=1.*

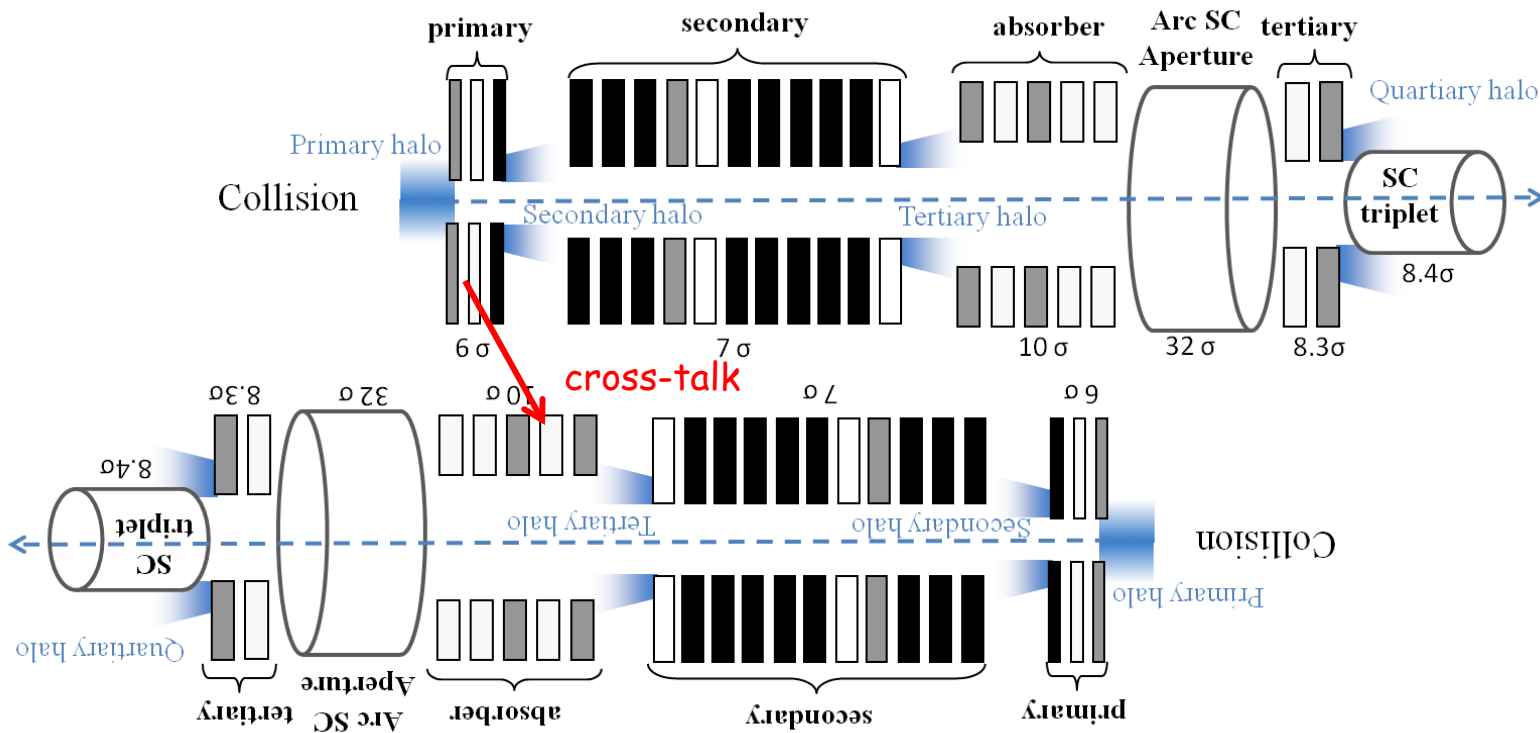
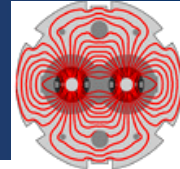
*Justification: based on energy deposit in the collimators*

*(not on BLM signal calibration)*

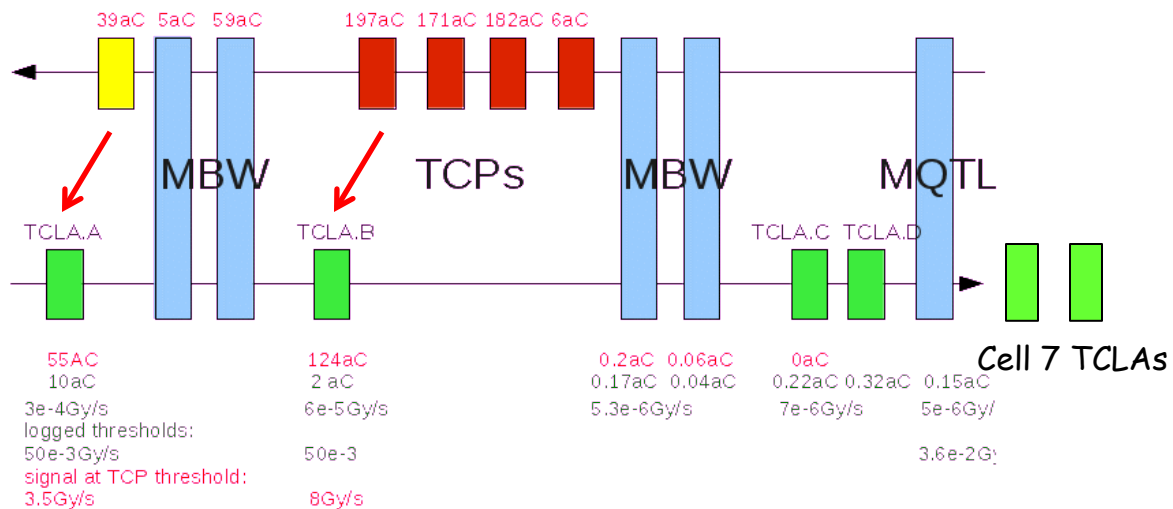
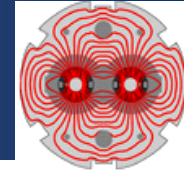
Machine thinks differently?:

*18:18:00 - Warning on: BLMEI.06R7.B2I10\_TCSG.A6R7.B2, integration time:*

*83.8 s, losses = 9.213127E-02, threshold = 2.584808E-01, ratio = 36%*



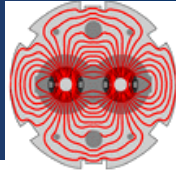
Drawing from Chiara



6 families, 2 monitors each

April 2010





Initial setting (EDMS 995569, 2009-08-20):

**Protons to abort (Nprot):**

- 450 GeV:  $(t-10)*6E8$  p/s +  $10*3E9$  p/s
- 7 TeV:  $(t-10)*4E7$  p/s +  $10*2E8$  p/s  
at 4 TeV and  $t=84s$ :

x 2500 in April 2010  
following extended  
discussions

x 2 some TCLA in  
April 2012

$$N_p = 3.5e10 \text{ protons}$$

**BLM signal (S):**

6.22E-13 Gy/p- TCLA measurements, constant with energy

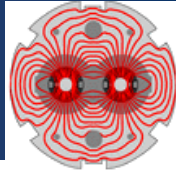
**Thresholds: 0.6 Gy/s: THRI.06\_7\_A\_TCLA, THRI.06\_7\_B\_TCLA**

**~6E-3 Gy/s: THRI.06\_7\_C\_TCLA, THRI.06\_7\_D\_TCLA**

**THRI.07\_7\_A\_TCLA, THRI.07\_7\_B\_TCLA**

*18:17:45 - Warning on: BLMEI.06R7.B1E10\_TCLA.A6R7.B1, integration time:*

*83.8 s, losses = 2.038194E-01, threshold = 6.462072E-01, ratio = 32%*



Initial setting (EDMS 1055377 (still draft), 2009-12-15, G4 MSI)

+ modifications because we were too conservative (BLMTWG 2010/08/27)

+ additional modifications LHC-BLM-ECR-0032 (x2 for long RS)

### Protons to abort (Nprot):

- 450 GeV: 1.E11 p/s in 84 s

- 7 TeV: 1E9 p/s in 84 s

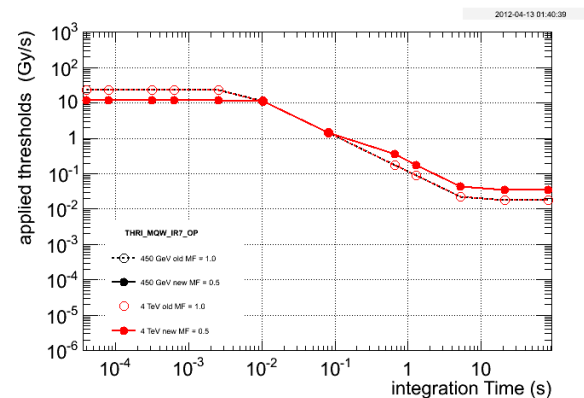
at 4 TeV linear interpolation

for t=84s:  $N_p = 7.2e12$  protons

### BLM signal (S):

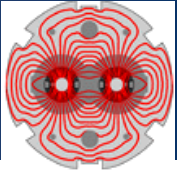
6.3E-12 Gy/p at 4 TeV - Energy dependent, from Geant4 simulations

Threshold =  $S * N_p / RS12 = 0.54$  Gy/s

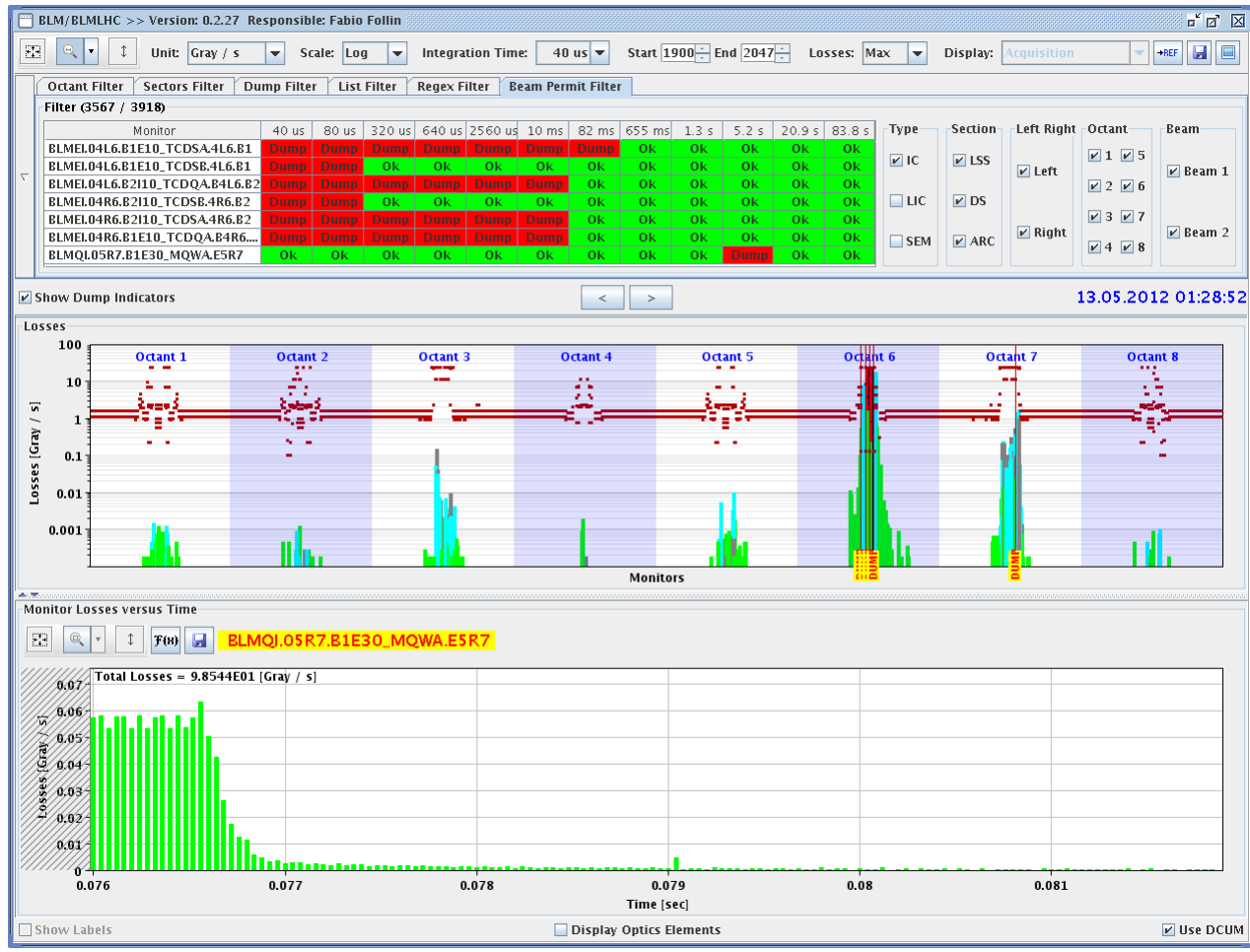


18:16:39 - Warning on: BLMQI.05R7.B1E30\_MQWA.E5R7, integration time:

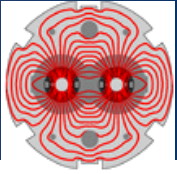
20.9 s, losses = 1.103713E-02, threshold = 3.518546E-02, ratio = 31%



Current BLM thresholds in IR7, LMC, 2012.05.16



# Why Eduardo is not giving this presentation...?



Current BLM thresholds in IR7, LMC, 2012.05.16