Planning of the quench test with Wire Scanner

M. Sapinski

BLM threshold WG 2010.10.29

Considerations

- This might be a crucial test to understand UFOs – one of the main issues for 2011 run.
- The best would be to perform quench test with an orbital bump on the same magnet afterwards.
- Wire will break when scanning:
  - 1E14 protons with 1 m/s
  - 5E13 protons with 0.5 m/s
  - 2E13 protons with 0.2 m/s (200 bunches)
  - 1E13 protons with 0.15 m/s (150 bunches)
- We know: 1E13 protons with 1 m/s – no quench, no breakage – we can go up by factor 10, hopefully we will quench before breakage
- The last test has been performed with 200 bunches,

  date: 2010-10-07 08:59:42 (UTC), dumped in the middle by BLMs in IP4.
- If the wire breaks it will be exchanged during winter technical stop and there is a spare wire scanner for ion run.
- BTW if wire break it is also an interesting experiment
- We can train LSA roll-back mechanism (Chris Roderick)

Can we exploit factor 10 without dumping the beam by the BLMs?

- Let's look at all BLMs which had S/T>0.1 during the last test.
- IR4:

Need to change master for 9 monitors and monitor factor of all these monitors to 1

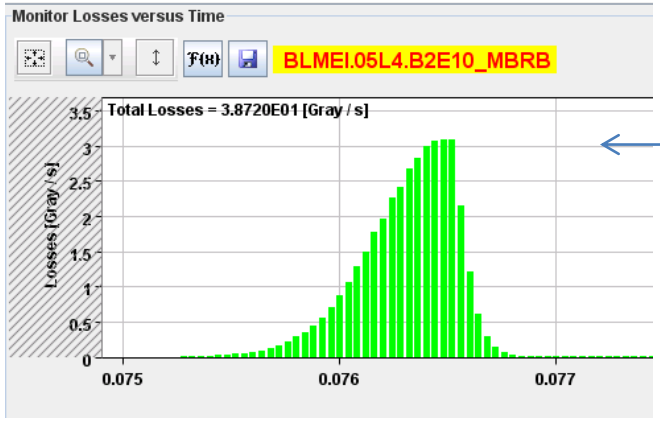
BLM name	RS01 S/T	RS02 S/T	RS03 S/T	RS04 S/T	RS05 S/T	RS06 S/T	family	mf	max(S/T)*10*mf
BLMQI.07L4.B2E30_MQM			0.174784	0.261526	0.288982		THRI.DS.B2.3_MQM	0.3	0.866946
BLMQI.07L4.B2E20_MQM			0.157643	0.236375	0.265368		THRI.DS.B2.2_MQM	0.3	0.796104
BLMQI.07L4.B2E10_MQM	0.172322	0.193353	0.491253	0.733109	0.810665	0.202684	THRI.DS.B2.1_MQM	0.3	2.431995
BLMQI.07L4.B1I30_MQM			0.236494	0.354327	0.392038		THRI.DS.B1.3_MQM	0.3	1.176114
BLMQI.06L4.B1I10_MQY				0.112205	0.123108			0.3	0.369324
BLMQI.06L4.B2E20_MQY	0.324003	0.364675	0.930262	1.39879	1.56542	0.391355	THRI.SS.B2.2_MQY	1	15.6542
BLMQI.06L4.B1I20_MQY	0.117265	0.128813	0.326016	0.492282	0.538228	0.134557	THRI.SS.B1.2_MQY	1	5.38228
BLMQI.06L4.B2E10_MQY	0.285315	0.321489	0.821507	1.24151	1.39325	0.348312	THRI.SS.B2.1_MQY	0.5	6.96625
BLMQI.05L4.B2E30_MQY	0.417135	0.417064	0.382254	0.289709			THRI.SS.B2.3_MQY	0.3	1.146762
BLMQI.05L4.B1I10_MQY				0.137493	0.149314		THRI.SS.B1.1_MQY	0.3	0.447942
BLMQI.05L4.B2E20_MQY	0.393382	0.448646	1.14759	1.72973	1.94982	0.489253	THRI.SS.B2.2_MQY	0.3	5.84946
BLMQI.05L4.B1I20_MQY	0.128961	0.144465	0.371961	0.558421	0.607206	0.15532	THRI.SS.B1.2_MQY	1	6.07206
BLMQI.05L4.B2E10_MQY	0.130437	0.14883	0.379569	0.576756	0.648234	0.162236	THRI.SS.B2.1_MQY	1	6.48234
BLMEI.05L4.B2E20_MBRB	0.192247	0.219667	0.565325	0.850235	0.951263	0.239736	THRI_MBRC	0.3	2.853789
BLMEI.05L4.B2E10_MBRB	0.359019	0.410251	1.04354	1.59502	1.8008	0.450738	THRI_MBRC	1	18.008

But max signal S=3.1 Gy/s so we can go only factor 7.5 up (23.6/3.1)

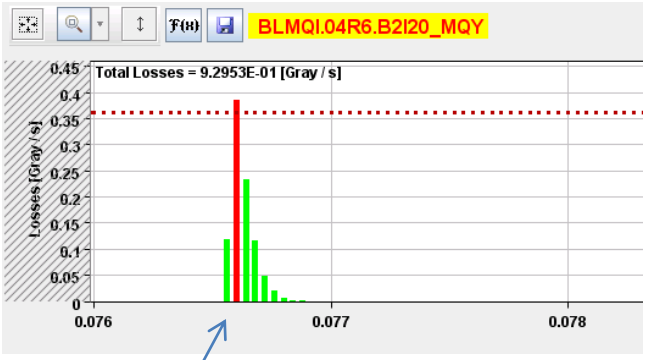
IR6

25(+) monitors with S/T>0.1

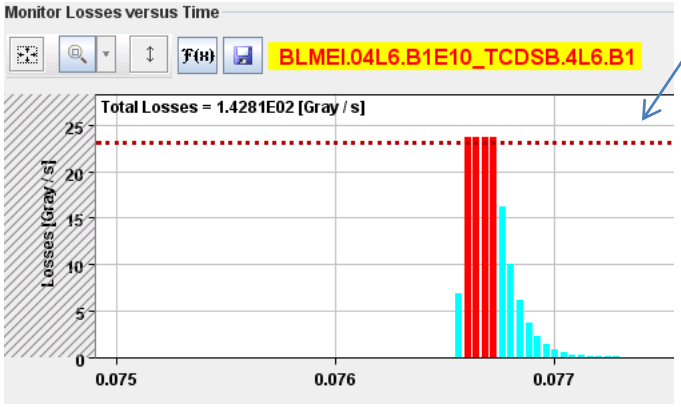
But let's look at the signals – are they coming from wire scan or from dump?

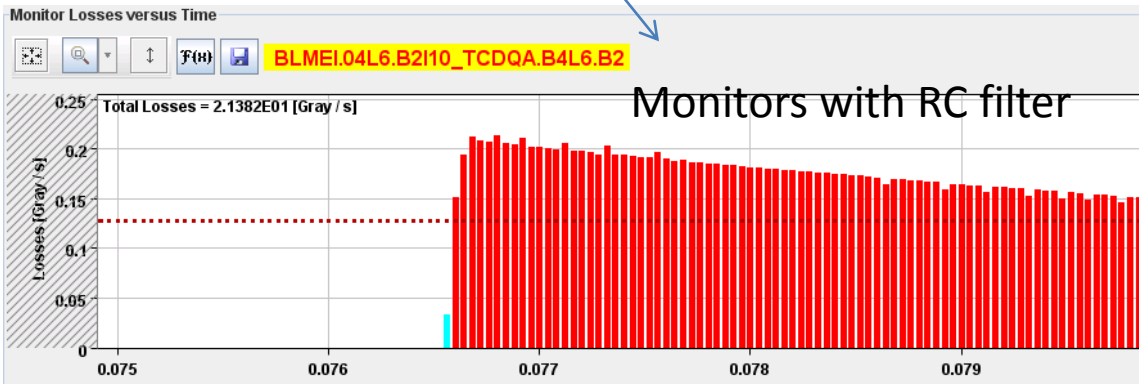


Scan-type
– all monitors in IR4



Dump-type: all monitors in IP6

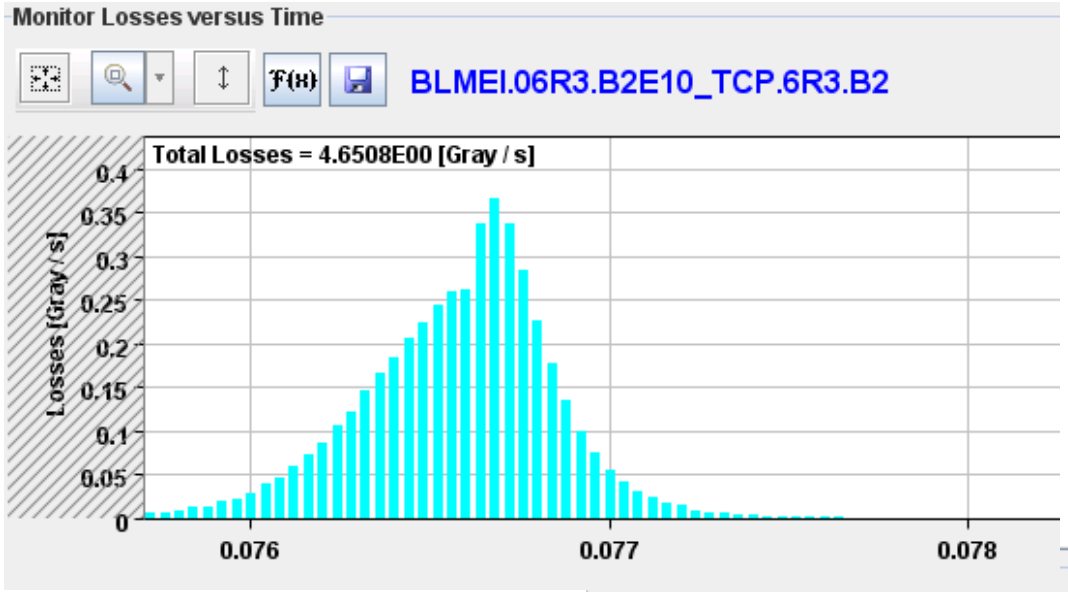


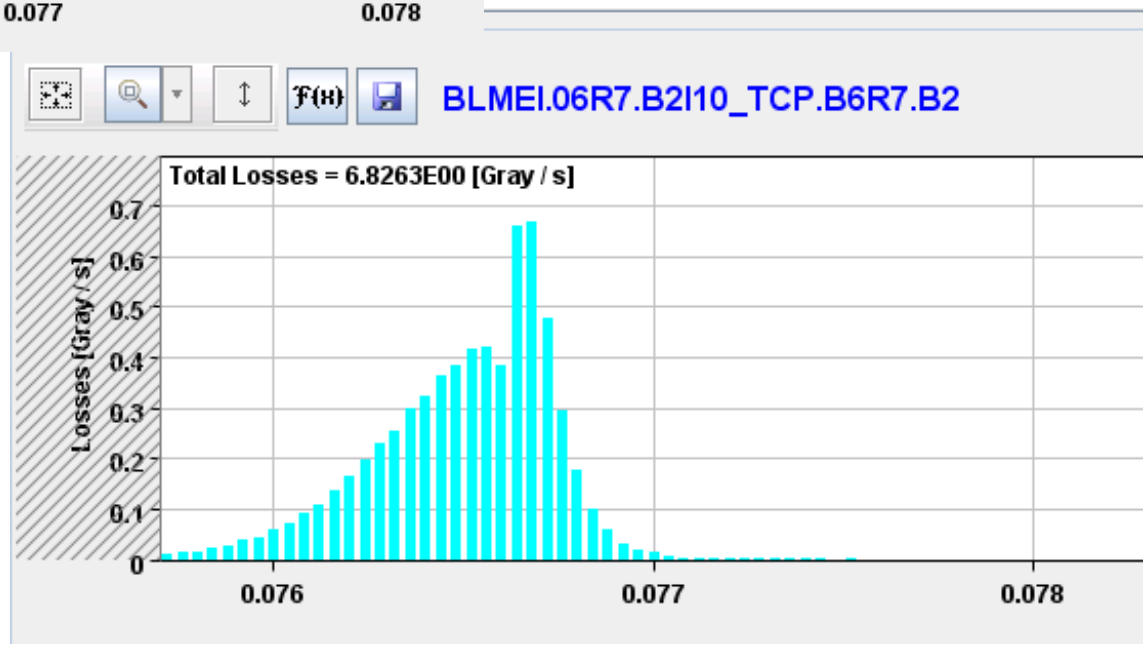


Monitors with RC filter

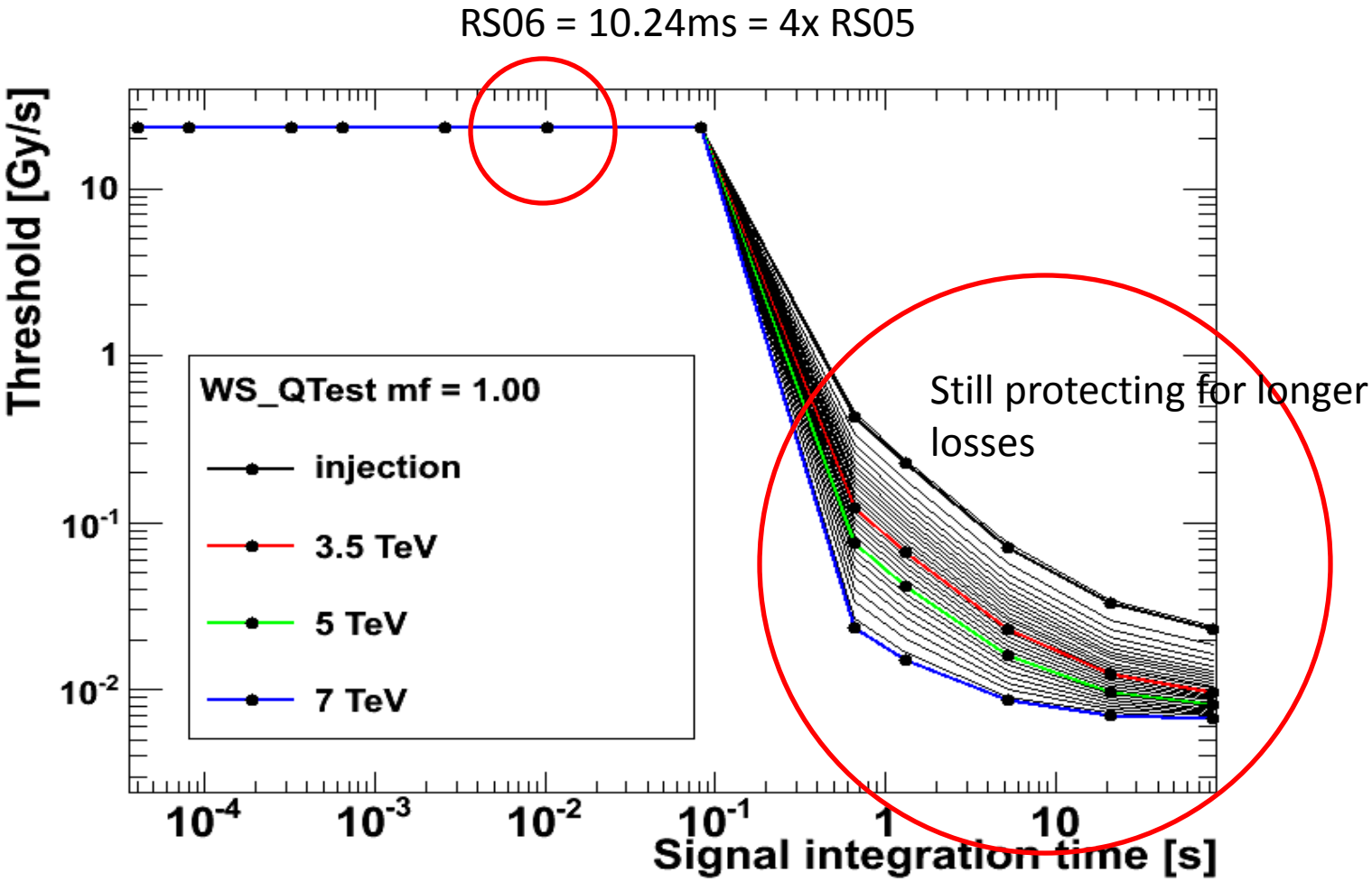
As we have only one try, we could push all mf in LSS of IR6 to 1.

IR3 and IR7


Monitor Losses versus Time
BLMEI.06R3.B2E10_TCP.6R3.B2
Total Losses = 4.6508E00 [Gray / s]
Losses [Gray / s]
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0.076
0.077
0.078


BLMEI.06R7.B2I10_TCP.B6R7.B2
Total Losses = 6.8263E00 [Gray / s]
Losses [Gray / s]
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0.076
0.077
0.078

Special temporary threshold



Planning

last = test with 200 bunches dumped in the middle

- Move 9 monitors to special family with new master
- Set mf of all 15 monitors in IP4 to 1.
- Inject 150 bunches, scan with 1 m/s (1.5x *last*)
- If not quenched scan with 0.75 m/s (2x *last*)
- If not quenched scan with 0.5 m/s (3x *last*)
- If not quenched scan with 0.37 m/s (4x *last*)
- If not quenched scan with 0.3 m/s (5x *last*)
- If not quenched scan with 0.25 m/s (6x *last*)
- If not quenched scan with 0.2 m/s (7.5x *last*) – here we should dump anyway because signals reach 23.6 Gy/s
- If not quenched scan with 0.15 m/s (10x *last*) – here wire should break
- Move back 9 monitors to their families and set back the mf.

Remarks

- Ana introduced a possibility to have different speeds for scan IN and OUT – we could make fast scan first and slow second to be sure that the IN scan disturbs magnet the least (time between scans is about 1 s – can also be regulated).
- Ion run starts on Wednesday!
- Ana in not here during the weekend, and she is on holidays Monday-Tuesday – she declared that she can come for the test
- FLUKA team and BLM team (Geant 4) will both simulate this experiment – simulation will be crucial for understanding