BLM Thresholds for Ion Quench Tests

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BLMTWG Meeting, CERN, 1st Dec 2015

The 2015 Ion Quench Test

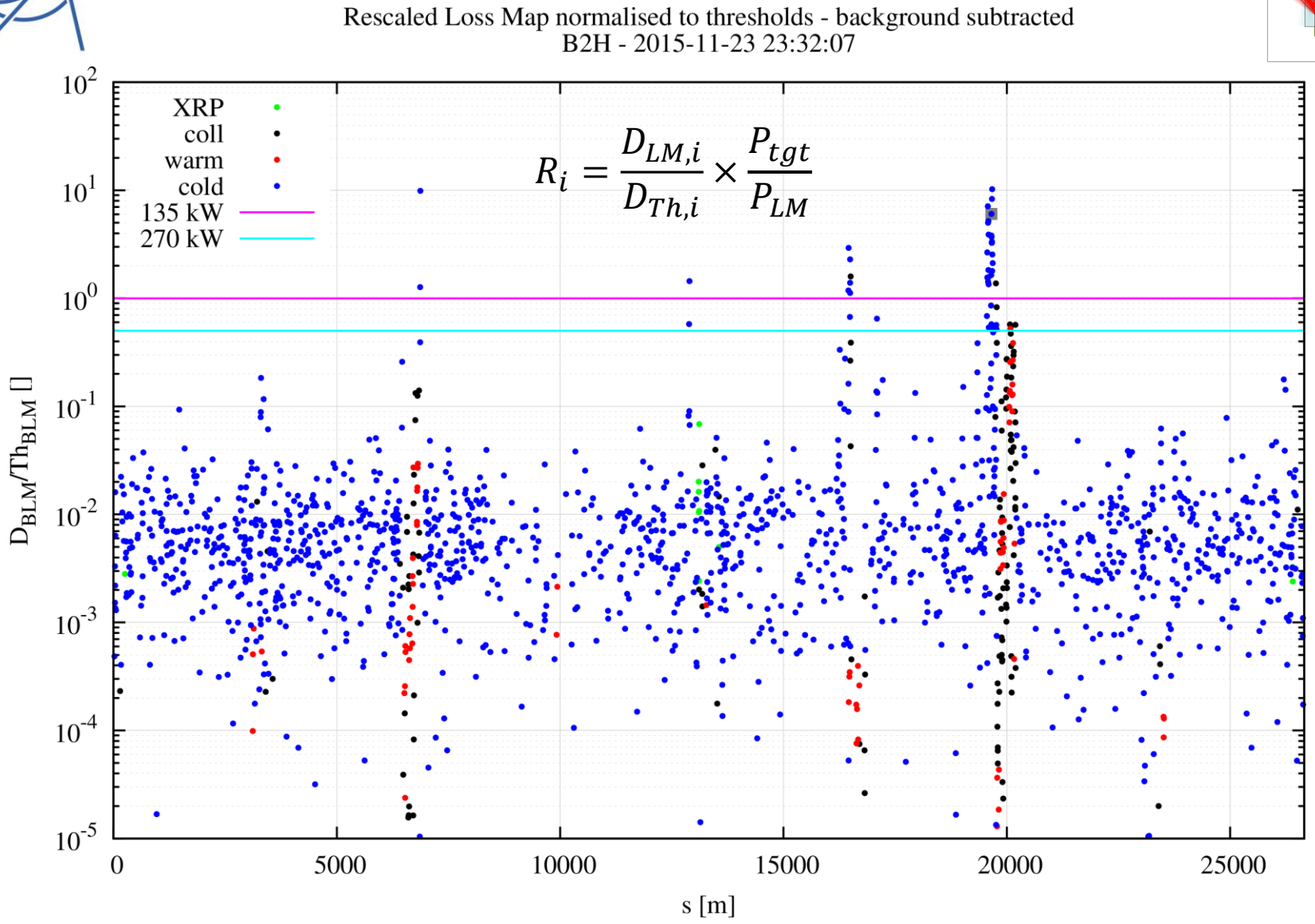
- Aim of the test:

  Induce losses in IR7 DS (B2H) such that the BLM signal is up to 3 times the assumed BLM signal at quench;

  NB: reference scenarios for BLM signals at quench are not betatron collimation, but UFO, dyn. orb. bump…

- Discussions on details of the test started yesterday at CWG meeting – not covered here;
- Strategy BLM thresholds:
  - Get BLM with highest readout from IR7 DS → BLMQI.09L7.B2I10_MQ (η=1.65E-2);
  - Get power loss necessary to induce a signal equal to signal at quench (AT=3.462mGy/s, MF=0.499) → 13.5 kW;
  - Desired power loss during test is x3;
  - Let's allow a further factor 3 of margin, not to run into the same scaling problem found for the proton quench test (see talk at last CWG);
  - Thus, to avoid being prematurely dumped during the test:
    - Get BLMs from LM which may trigger before reaching 135 kW (10x 13.5 kW);
    - Cold BLMs: modify MT such that it is 10x BLM signal@quench;
    - Non cold BLMs: on spot discussions!

RS09 - LM


Rescaled Loss Map normalised to thresholds - background subtracted
B2H - 2015-11-23 23:32:07
$R_i = \frac{D_{LM,i}}{D_{Th,i}} \times \frac{P_{tgt}}{P_{LM}}$
XRP
coll
warm
cold
135 kW
270 kW
D_{BLM}/Th_{BLM} []
s [m]

RS09 – LM (II)

name	s [m]	required [Gy/s]	R	Current AT [Gy/s]
BLMQI.06R3.B2E20_MQTL	6865.02	4.28E-04	1.27	3.37E-04
BLMQI.06R3.B2E10_MQTL	6869.04	3.99E-03	9.86	4.05E-04
BLMQI.11L5.B2E10_MQ	12895.7	5.00E-03	1.45	3.46E-03
BLMQI.05L6.B2I20_MQY	16453.1	1.83E-03	1.18	1.55E-03
BLMQI.05L6.B2I10_MQY	16456.13	6.03E-03	2.93	2.06E-03
BLMQI.04L6.B2I20_MQY	16489.02	2.16E-03	1.39	1.55E-03
BLMQI.04L6.B1E20_MQY	16490.63	1.74E-03	1.12	1.55E-03
BLMQI.04L6.B2I10_MQY	16492.39	4.73E-03	2.30	2.06E-03
BLMTI.04L6.B2I10_TCSP.A4L6.B2	**16505.55**	**9.14E-02**	**1.59**	**5.74E-02**
BLMQI.11L7.B2I10_MQ	19560.42	9.21E-03	2.66	3.46E-03
BLMQI.11L7.B1E30_MQ	19562.92	4.36E-03	1.56	2.80E-03
BLMBI.11L7.B0T20_MBA-LEIR	19575.34	6.34E-03	7.11	8.91E-04
BLM2I.11L7.B2I24_MBA_MBA	19578.31	1.13E-02	5.00	2.26E-03
BLMEI.11L7.B2I23_MBA	19580.61	3.22E-03	1.43	2.26E-03
BLM2I.11L7.B2I22_MBA_MBA	19585.58	3.54E-03	1.57	2.26E-03
BLMEI.11L7.B2I21_MBA	19587.78	4.12E-03	1.83	2.26E-03
BLMEI.11L7.B2I30_MBB	19589.74	1.17E-02	5.20	2.26E-03
BLMBI.11L7.B0T10_MBB-MBA	19591	3.47E-03	3.89	8.91E-04
BLMEI.11L7.B2I25_MBB	19592.63	3.04E-03	1.35	2.26E-03
BLMQI.09L7.B2I21_MQ	19651.66	5.68E-03	1.64	3.46E-03
BLMQI.09L7.B2I10_MQ	**19653.66**	**2.09E-02**	**6.05**	**3.46E-03**
BLMEI.09L7.B2I25_MBA	19656.66	8.60E-03	3.81	2.26E-03
BLMEI.09L7.B2I24_MBA	19659.16	8.33E-03	3.69	2.26E-03
BLMEI.09L7.B2I23_MBA	19661.66	7.35E-03	3.26	2.26E-03
BLMEI.09L7.B2I22_MBA	19664.16	7.37E-03	3.27	2.26E-03
BLMEI.09L7.B2I21_MBA	19666.66	7.54E-03	3.34	2.26E-03
BLMEI.09L7.B2I30_MBB	19669.16	1.87E-02	8.30	2.26E-03
BLMBI.09L7.B0T10_MBB-MBA	19670.53	9.12E-03	10.24	8.91E-04
BLMEI.09L7.B2I22_MBB	19671.66	4.04E-03	1.79	2.26E-03
BLMEI.09L7.B2I21_MBB	19674.16	5.74E-03	2.54	2.26E-03
BLMQI.08L7.B2I30_MQ	19684.98	5.92E-03	2.12	2.80E-03
BLMTI.07L7.B2I10_TCLA.A7L7.B2	**19755.46**	**3.23E-03**	**1.38**	**2.34E-03**

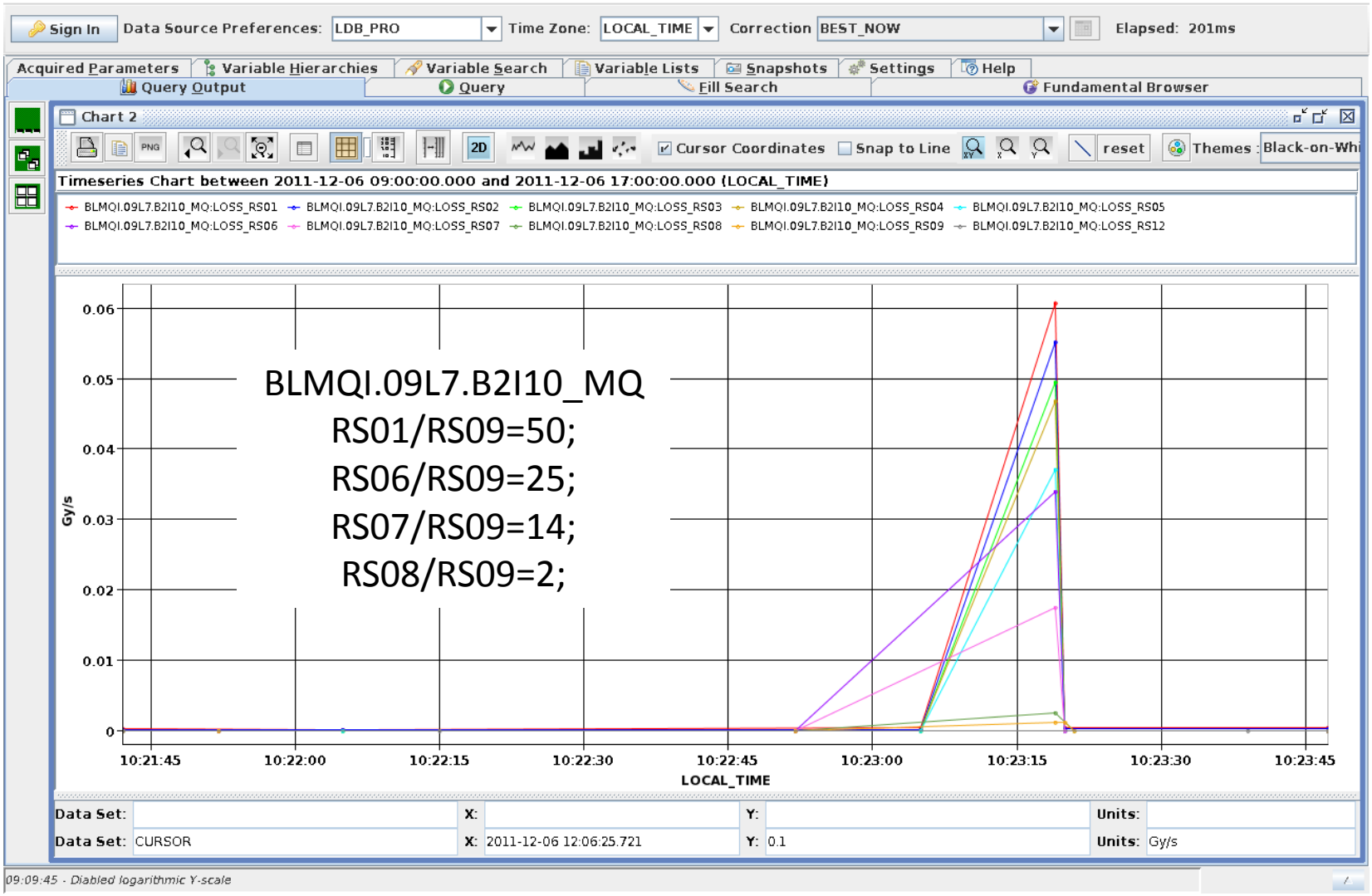
Do we manage to satisfy all the required increase factors setting the MT=quench level x10?

2011 Ion Quench Test

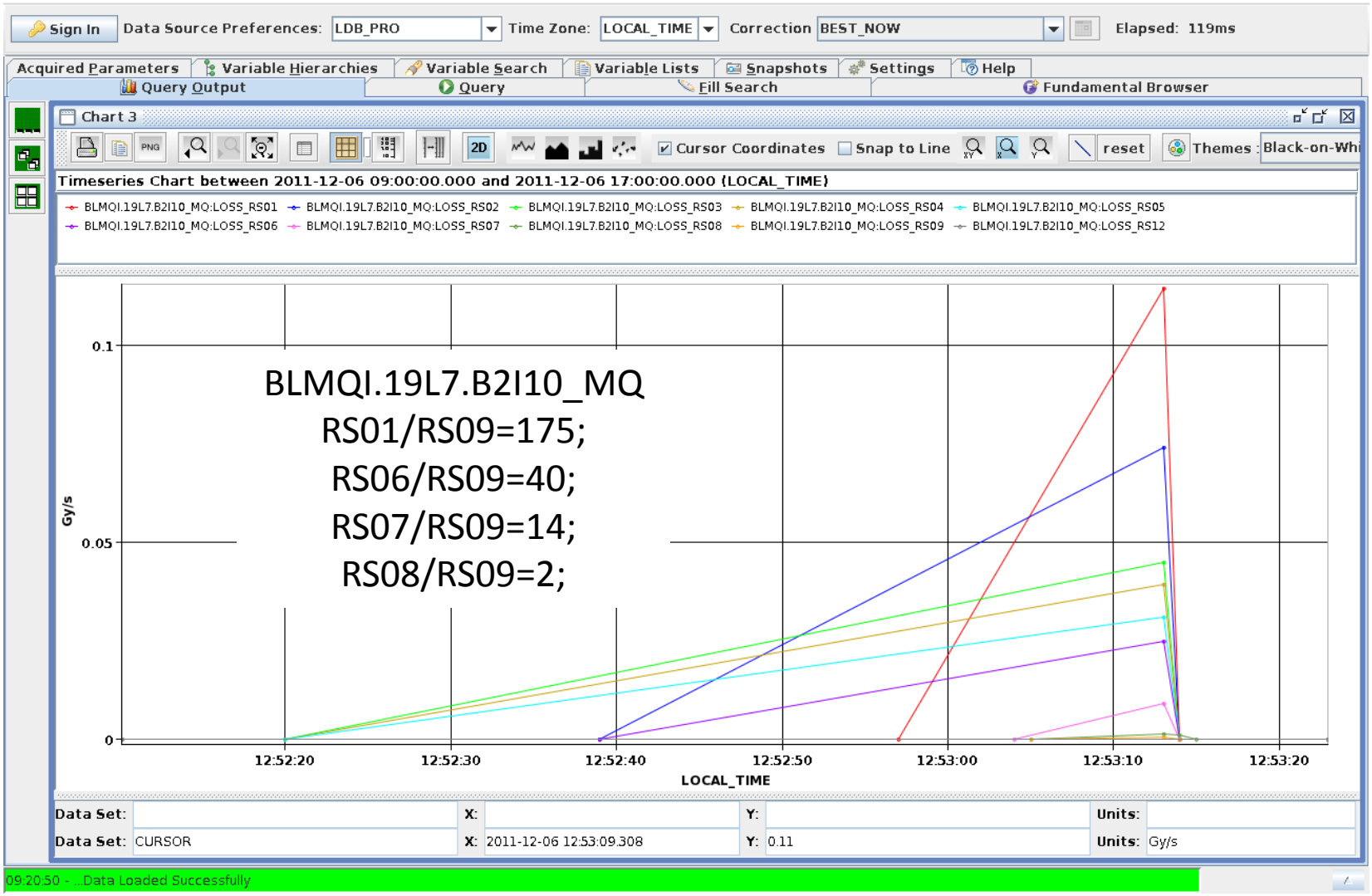
- Performed on Dec 06, 2011;
- Three ramps:
  - 1st : dumped by RS06 of BLMQI.09L7.B2I10_MQ – power loss: 2.7E11 charges/s, i.e. 150kW;
  - 2nd : dumped by RS07 of BLMQI.19L7.B2I10_MQ – power loss: 2.5E11 charges/s, i.e. 140kW;
  - 3rd : dumped by RS07 BLMQI.11R7.B2I30_MQ – power loss: 1.1E11 charges/s, i.e. 65kW;

→ We should have a look also to other RSs, with the same approach as for RS09…

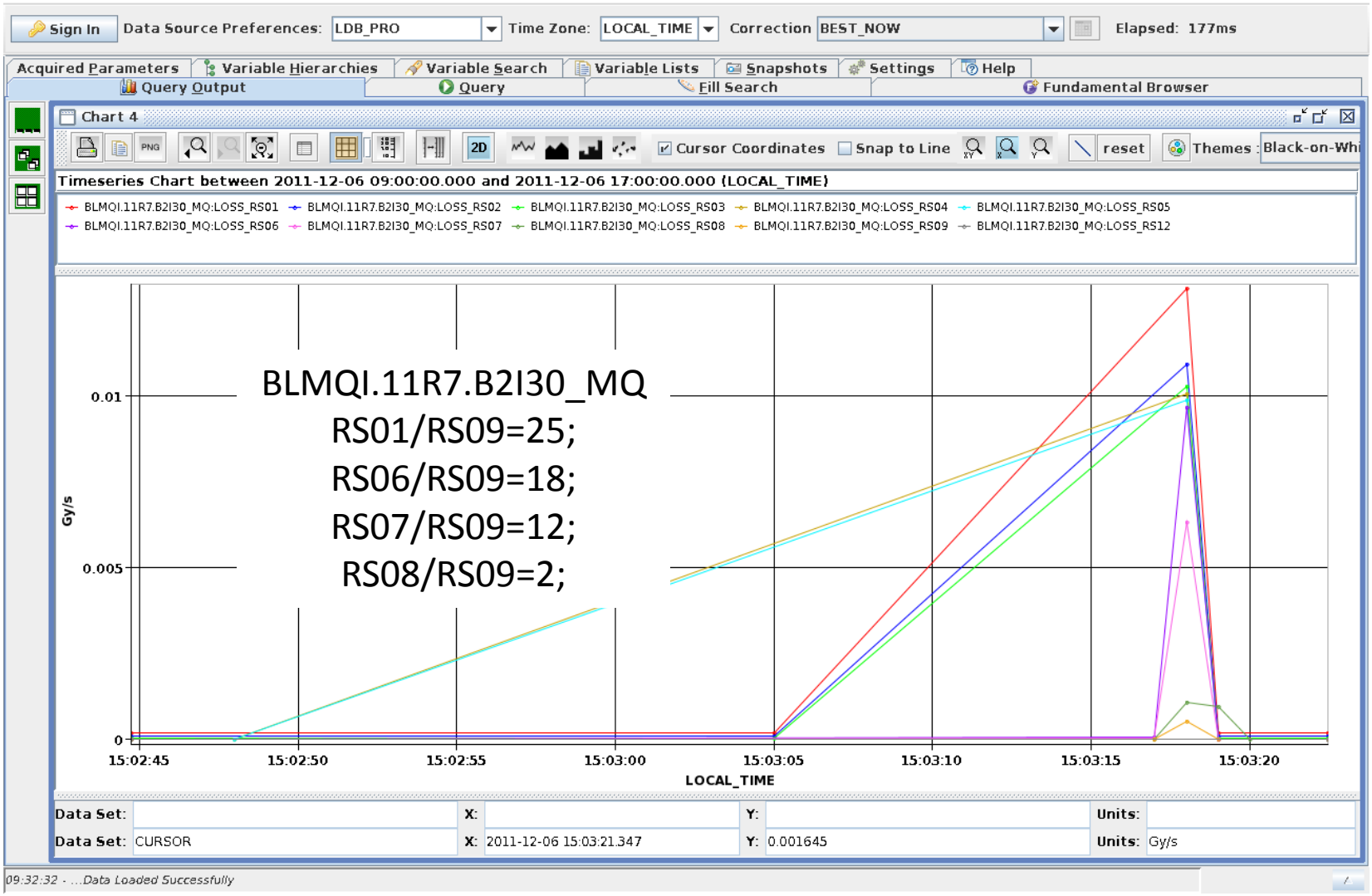
2011 Ion Quench Test – Other RSs – 1st Ramp



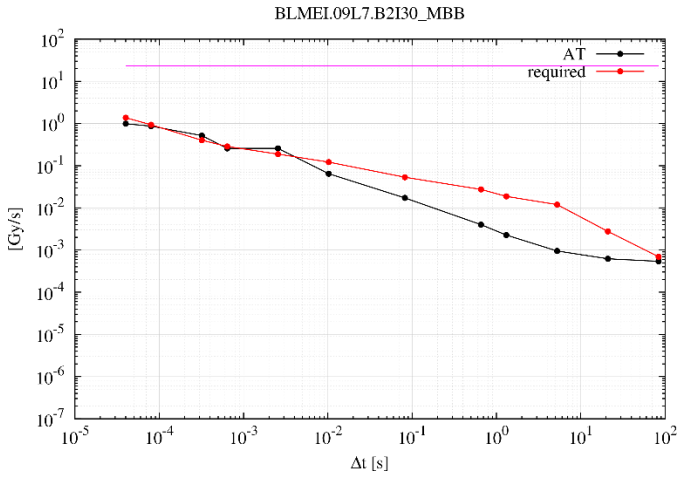
2011 Ion Quench Test – Other RSs – 2nd Ramp

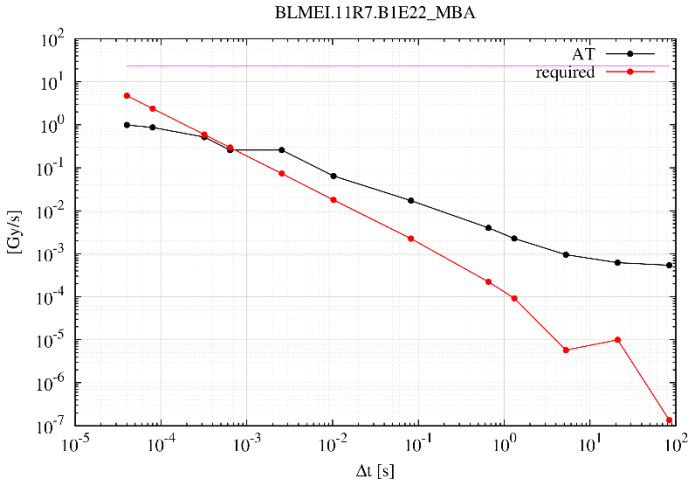


2011 Ion Quench Test – Other RSs – 3rd Ramp



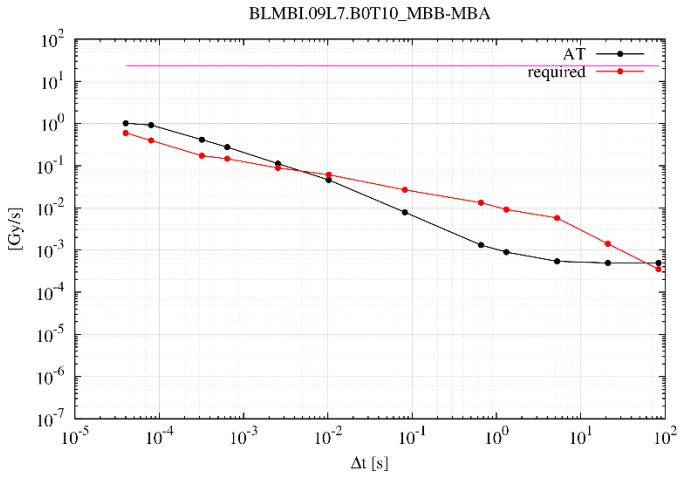
Other RSs

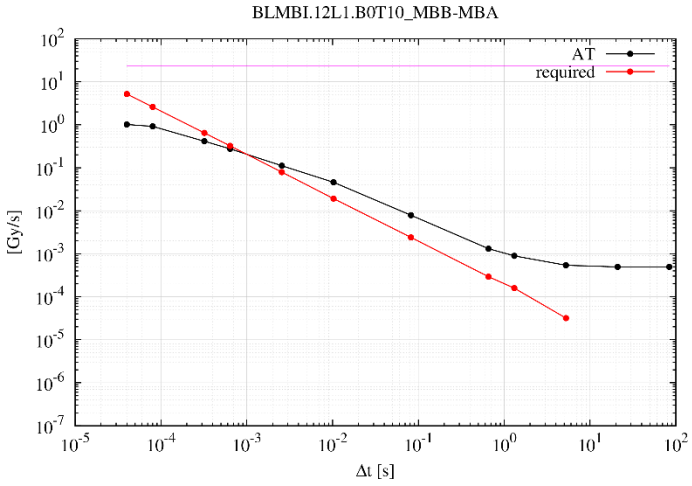




BLM name	Max increase factor		RS01/RS09	RS06/RS09	RS07/RS09	RS08/RS09	RS09 [Gy/s]
BLM2I.11L7.B2I22_MBA_MBA	RS10	2.53	50.84	6.37	2.48	1.47	3.22E-06
BLM2I.11L7.B2I24_MBA_MBA	RS10	7.94	51.19	6.47	2.76	1.48	1.03E-05
BLMEI.09L7.B2I21_MBA	RS10	5.05	48.92	6.33	2.69	1.45	6.87E-06
BLMEI.09L7.B2I21_MBB	RS10	3.80	84.90	6.75	3.00	1.50	5.23E-06
BLMEI.09L7.B2I22_MBA	RS10	4.95	45.56	6.14	2.54	1.43	6.72E-06
BLMEI.09L7.B2I22_MBB	RS10	2.66	70.20	6.99	3.09	1.49	3.68E-06
BLMEI.09L7.B2I23_MBA	RS10	5.07	36.03	6.41	2.52	1.45	6.70E-06
BLMEI.09L7.B2I24_MBA	RS10	5.70	46.57	6.78	2.53	1.44	7.59E-06
BLMEI.09L7.B2I25_MBA	RS10	5.85	56.64	6.09	2.58	1.46	7.84E-06
BLMEI.09L7.B2I30_MBB	**RS10**	**12.61**	**73.24**	**6.48**	**2.84**	**1.46**	**1.71E-05**
BLMEI.11L7.B2I21_MBA	RS10	2.98	59.72	6.03	2.64	1.47	3.75E-06
BLMEI.11L7.B2I23_MBA	RS10	2.25	51.44	6.60	2.76	1.50	2.93E-06
BLMEI.11L7.B2I25_MBB	RS10	2.12	85.48	5.91	2.92	1.50	2.77E-06
BLMEI.11L7.B2I30_MBB	RS10	8.22	40.34	6.42	2.76	1.46	1.07E-05
BLMEI.11R7.B1E22_MBA	**RS01**	**4.81**	**51379.50**	**192.66**	**24.26**	**2.41**	**8.43E-08**

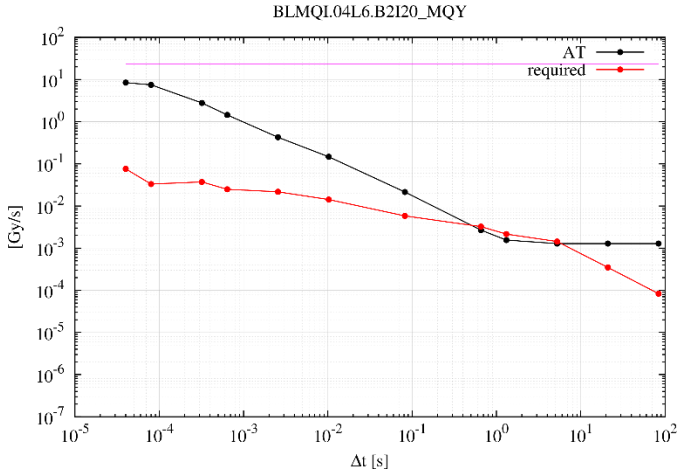
Other RSs (II)

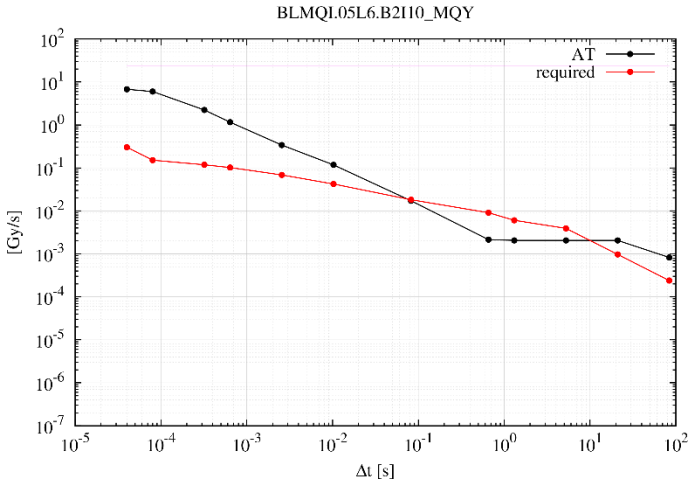




BLM name	Max increase factor		RS01/RS09	RS06/RS09	RS07/RS09	RS08/RS09	RS09 [Gy/s]
BLMBI.09L7.B0T10_MBB-MBA	**RS10**	**10.66**	**65.34**	**6.69**	**2.92**	**1.46**	**8.31E-06**
BLMBI.11L7.B0T10_MBB-MBA	RS10	4.32	20.45	5.59	2.71	1.48	3.16E-06
BLMBI.11L7.B0T20_MBA-LEIR	RS10	7.88	39.57	6.32	2.68	1.48	5.77E-06
BLMBI.12L1.B0T10_MBB-MBA	**RS01**	**5.11**	**32759.50**	**121.23**	**15.10**	**1.85**	**1.44E-07**
BLMBI.34R8.B0T10_MBA-MBB	RS01	3.18	217480.00	854.75	103.56	13.43	1.35E-08

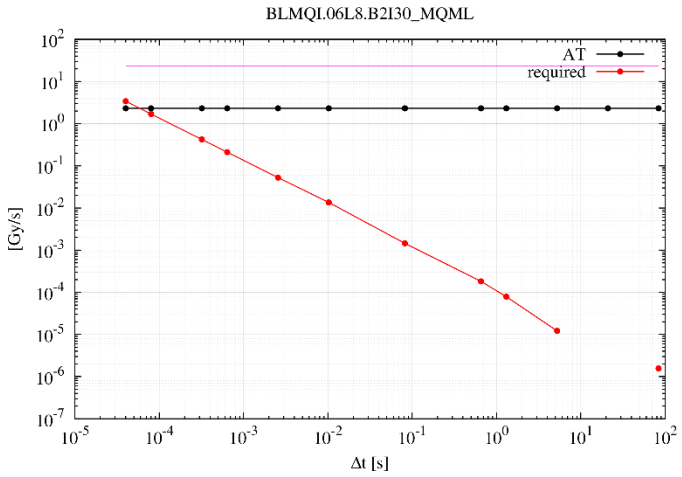
Other RSs (III)



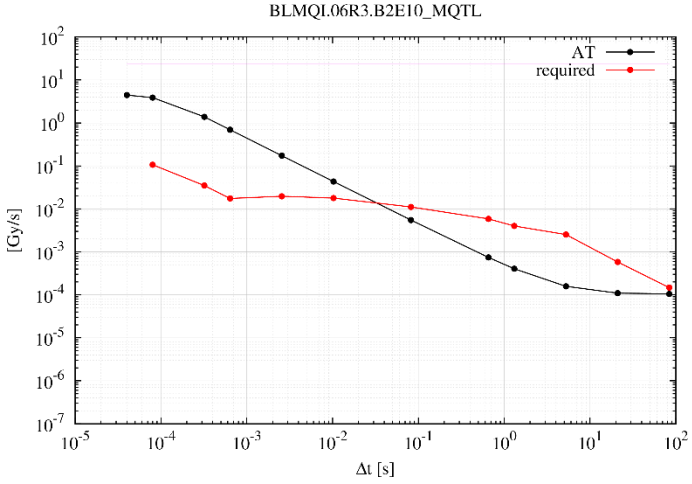


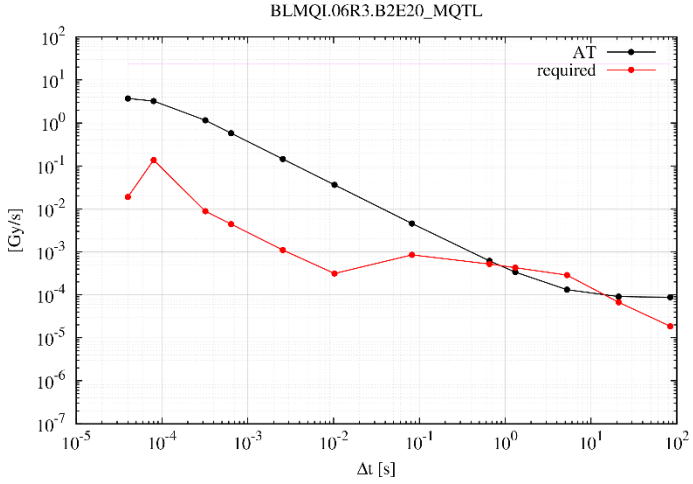
BLM name	Max increase factor		RS01/RS09	RS06/RS09	RS07/RS09	RS08/RS09	RS09 [Gy/s]
BLMQI.04L6.B1E20_MQY	RS09	1.12	195.89	7.65	2.83	1.51	1.58E-06
BLMQI.04L6.B2I10_MQY	RS08	3.29	54.97	6.75	2.76	1.49	4.31E-06
BLMQI.04L6.B2I20_MQY	**RS09**	**1.39**	**35.04**	**6.59**	**2.70**	**1.50**	**1.97E-06**
BLMQI.05L6.B2I10_MQY	**RS08**	**4.24**	**50.23**	**6.99**	**3.03**	**1.51**	**5.49E-06**
BLMQI.05L6.B2I20_MQY	RS09	1.18	54.16	7.17	3.07	1.53	1.67E-06

Other RSs (IV)

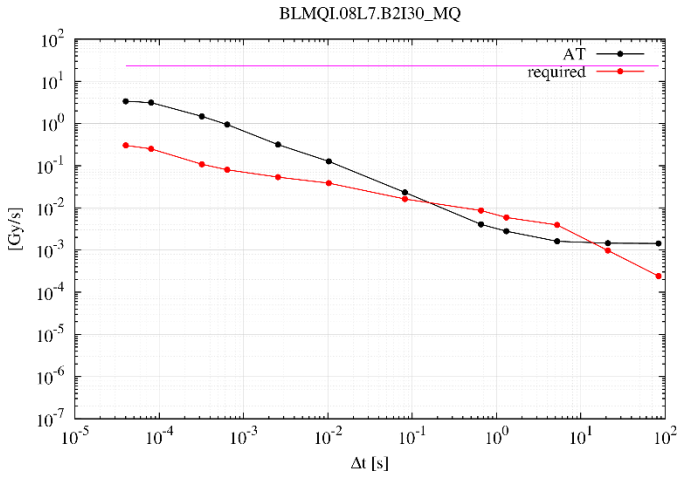


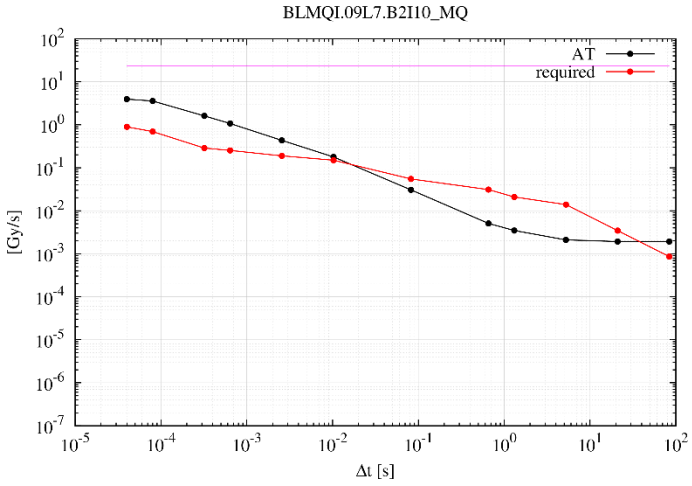
BLM name	Max increase factor		RS01/RS09	RS06/RS09	RS07/RS09	RS08/RS09	RS09 [Gy/s]
BLMQI.06L8.B2I30_MQML	RS01	1.47	43436.20	173.03	18.56	2.32	7.14E-08
BLMQI.06R3.B2E10_MQTL	RS10	15.96	-19.01	4.46	2.78	1.47	3.64E-06
BLMQI.06R3.B2E20_MQTL	RS10	2.19	44.06	0.73	1.98	1.21	3.90E-07





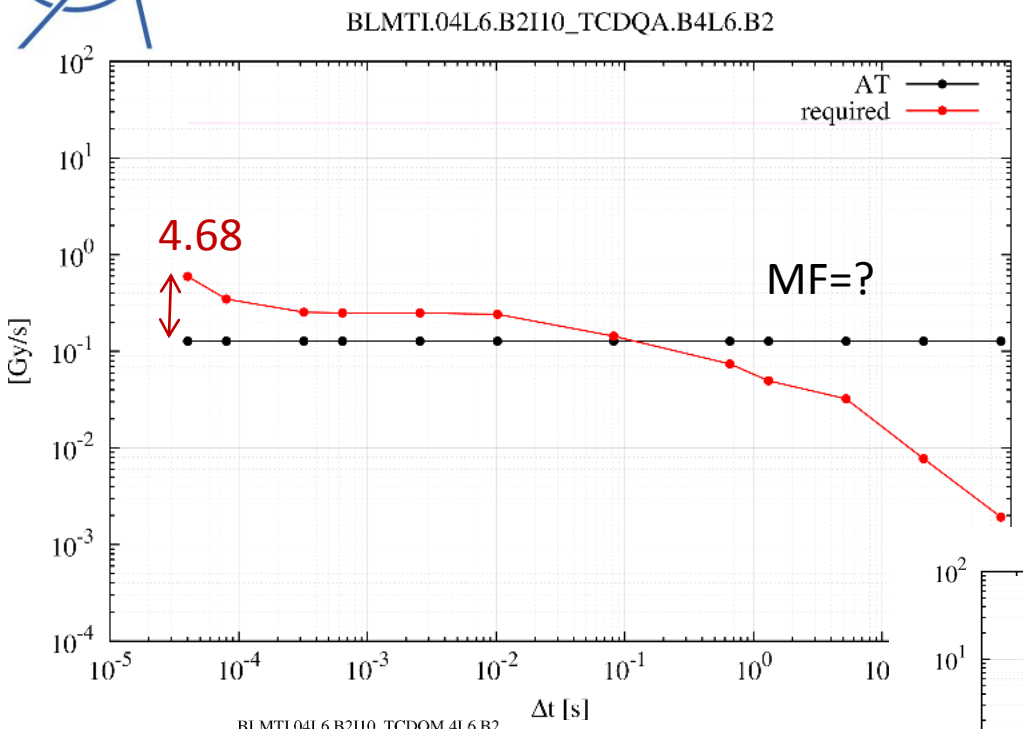
Other RSs (V)

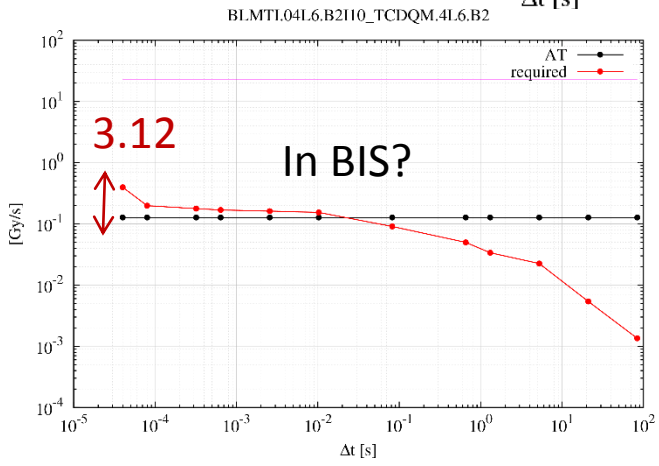




BLM name	Max increase factor		RS01/RS 09	RS06/RS 09	RS07/RS 09	RS08/RS 09	RS09 [Gy/s]
BLMQI.08L7.B2I30_MQ	**RS10**	**2.44**	**51.14**	**6.50**	**2.75**	**1.46**	**5.39E-06**
BLMQI.09L7.B2I10_MQ	**RS10**	**6.63**	**42.71**	**7.15**	**2.62**	**1.48**	**1.91E-05**
BLMQI.09L7.B2I21_MQ	RS10	1.79	26.64	6.48	2.76	1.48	5.18E-06
BLMQI.11L5.B2E10_MQ	RS10	1.54	63.31	5.91	2.86	1.48	4.56E-06
BLMQI.11L7.B1E30_MQ	RS10	1.85	65.16	6.55	2.53	1.46	3.97E-06
BLMQI.11L7.B2I10_MQ	RS10	2.98	29.26	6.28	2.44	1.43	8.40E-06

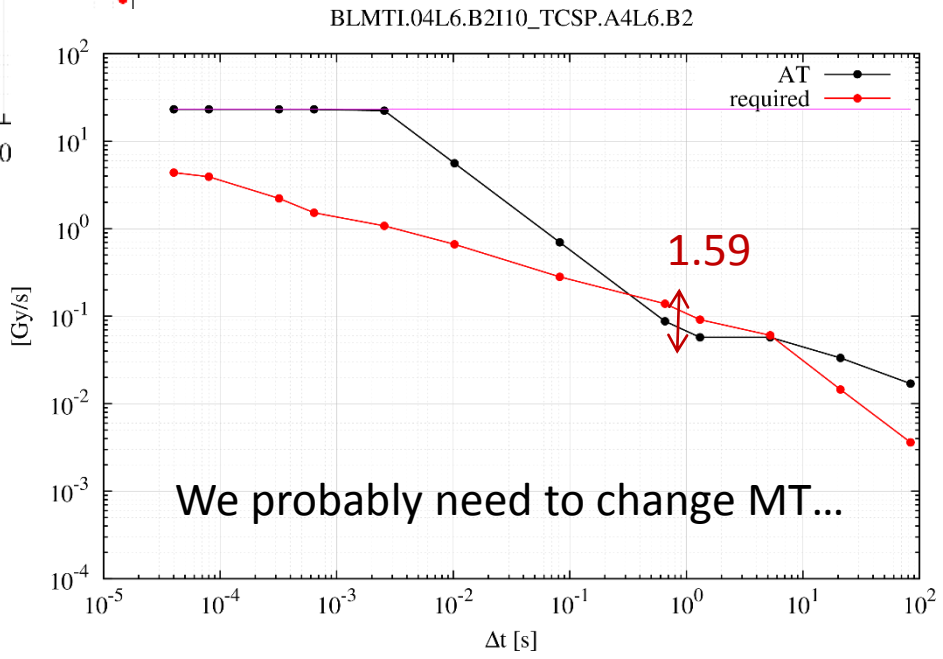
Other RSs (VI)



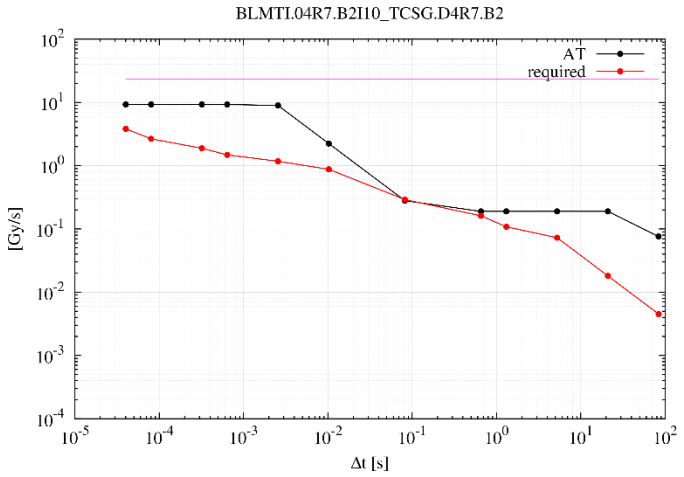


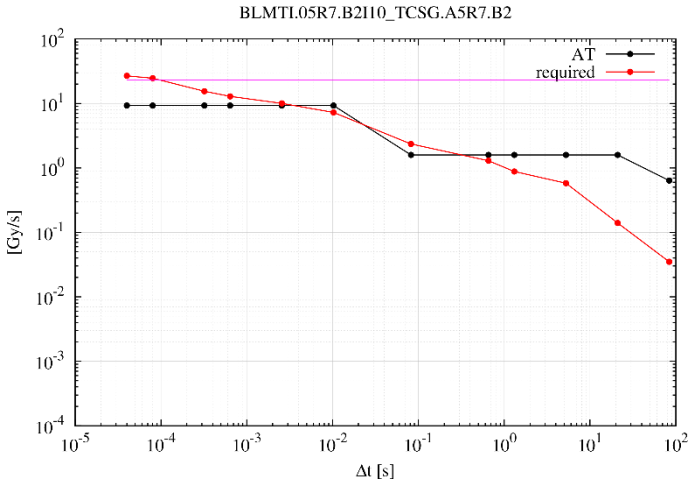
In BIS?

BLMEI.05R7.B1E10_TCSM.B5R7.B1
BLMEI.05R7.B2I10_TCSM.A5R7.B2
BLMEI.05R7.B2I10_TCSM.B5R7.B2
BLMEI.06R7.B2I10_TCSM.A6R7.B2



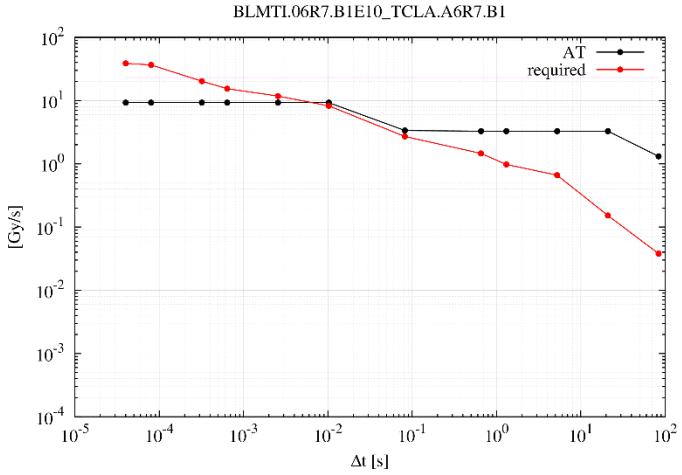
Other RSs (VII)





BLM name	Max increase factor		RS01/RS09	RS06/RS09	RS07/RS09	RS08/RS09	RS09 [Gy/s]
BLMTI.04R7.B2I10_TCSG.D4R7.B2	**RS07**	**1.04**	**35.24**	**8.08**	**2.68**	**1.49**	**9.88E-05**
BLMTI.05R7.B1E10_TCSG.B5R7.B1	RS01	2.73	33.84	8.23	2.67	1.47	6.82E-04
BLMTI.05R7.B2I10_TCSG.A5R7.B2	**RS01**	**2.89**	**30.47**	**8.25**	**2.67**	**1.47**	**8.02E-04**
BLMTI.05R7.B2I10_TCSG.B5R7.B2	RS01	1.57	25.26	8.33	2.69	1.48	5.24E-04
BLMTI.06R7.B1E10_TCSG.6R7.B1	RS01	1.66	41.21	8.35	2.76	1.49	3.40E-04
BLMTI.06R7.B2I10_TCSG.A6R7.B2	RS01	2.35	42.69	8.41	2.71	1.47	4.65E-04

Other RSs (VIII)



BLM name	Max increase factor		RS01/RS09	RS06/RS09	RS07/RS09	RS08/RS09	RS09 [Gy/s]
BLMTI.06L7.B2I10_TCLA.D6L7.B2	RS07	1.29	37.00	6.72	2.83	1.48	5.82E-06
BLMTI.06R7.B1E10_TCLA.A6R7.B1	**RS01**	**4.19**	**39.69**	**8.45**	**2.76**	**1.49**	**8.91E-04**
BLMTI.06R7.B1E10_TCLA.B6R7.B1	RS01	1.62	50.84	8.74	2.82	1.49	2.69E-04
BLMTI.07L7.B2I10_TCLA.A7L7.B2	RS08	2.01	99.60	5.70	2.92	1.46	2.94E-06