BLM threshold increase for TOTEM roman pots

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Changes requested

- Why:
  - RP BLM thresholds from the beginning of Run 1
  - Higher losses at the new RP design
    - reduced impedance, but higher material budget
- Where:
  - Only the special TOTEM BLMs "_XRP"
    - 8 BLMs
    - No ALFA BLMs
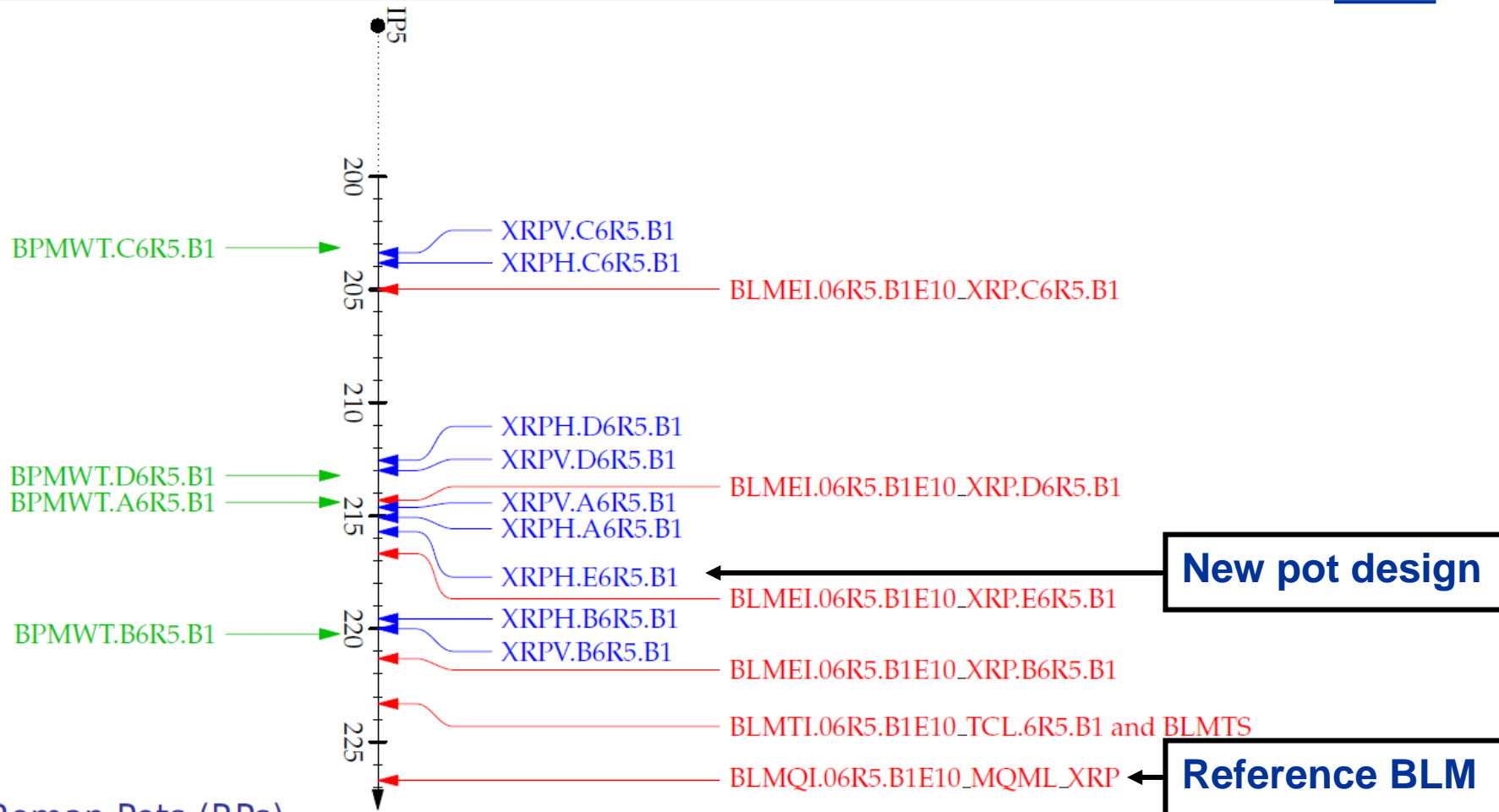   - No BLMs which are used for the protection of machine components (magnets, collimators etc.)
- When:
 - Change done 10.8.2015
- What:
  - Applied thresholds 20 on _XRP monitors 20 time higher than on the MQML monitor (BLMQI.06R5.B1E10_MQML_XRP) for RS9 (1.3 sec) and longer
  - MF unchanged 0.3 (margin for increase)
  - Based on the TOTEM analysis (see spare slides).

IP5

200

BPMWT.C6R5.B1

XRPV.C6R5.B1
XRPH.C6R5.B1

205

BLMEI.06R5.B1E10_XRP.C6R5.B1

210

XRPH.D6R5.B1
XRPV.D6R5.B1

BPMWT.D6R5.B1
BPMWT.A6R5.B1

BLMEI.06R5.B1E10_XRP.D6R5.B1

XRPV.A6R5.B1
XRPH.A6R5.B1

215

XRPH.E6R5.B1

New pot design

BLMEI.06R5.B1E10_XRP.E6R5.B1

XRPH.B6R5.B1
XRPV.B6R5.B1

BPMWT.B6R5.B1

220

BLMEI.06R5.B1E10_XRP.B6R5.B1

BLMTI.06R5.B1E10_TCL.6R5.B1 and BLMTS

225

BLMQI.06R5.B1E10_MQML_XRP

Reference BLM

- Roman Pots (RPs)
  - C, D, A, B: "old" box
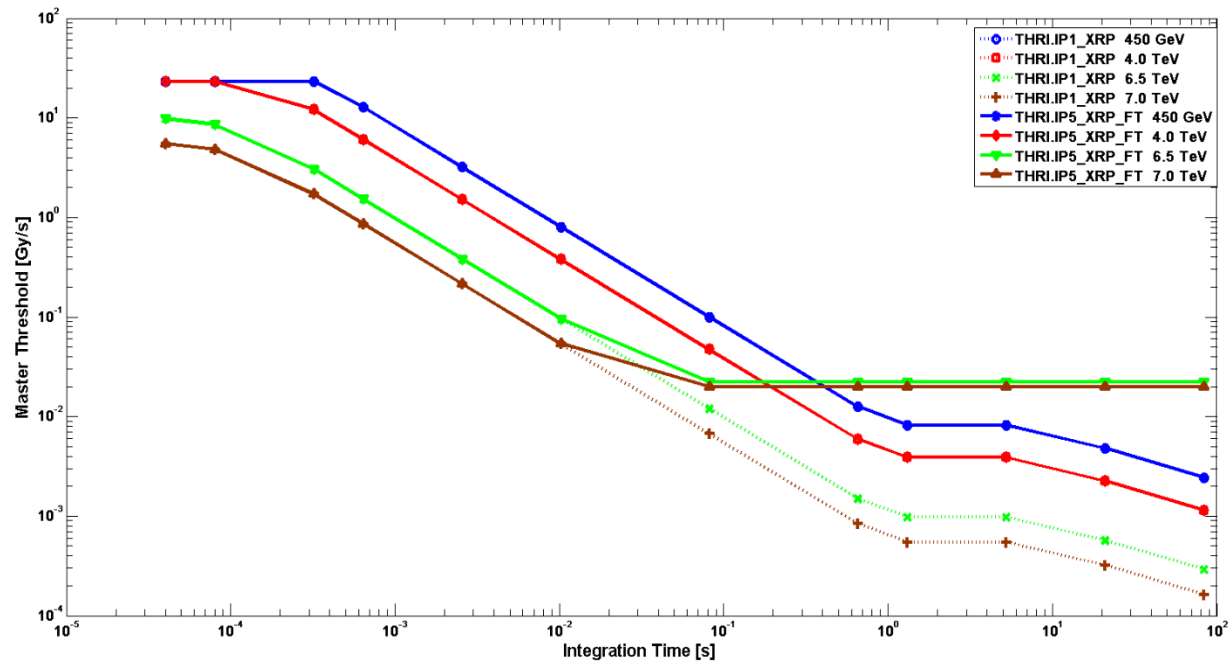 - E: "new" cylindrical – reduced impedance, higher material budget

Change at 6.5 TeV
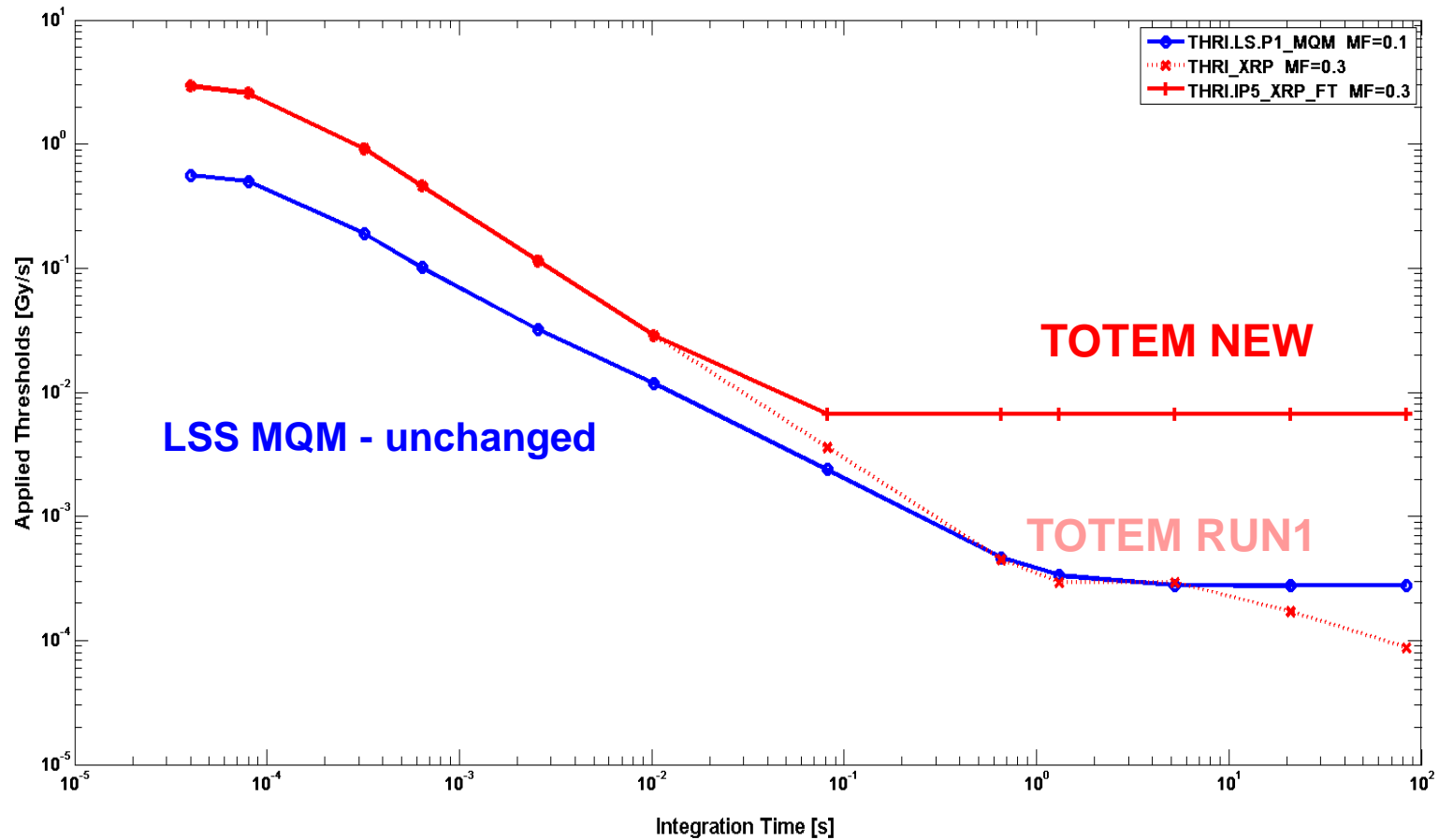
Lower energy thresholds unchanged

Threshold increase factors:

|		RS7	RS8	RS9	RS10	RS11	RS12
6.5 TeV	Elevel 27	1.86	14.9	22.7	22.7	39.0	76.8
	Elevel 28	2.45	19.6	29.9	29.9	51.5	101.3
7 TeV	Elevel 29	2.96	23.7	36.1	36.1	62.2	122.4

Old / new for 4 energy levels:

Back-up slides

- RPs inserted routinely by sequence
  - safety margin of 1 mm: verticals at 21 σ, horizontals at 31 σ
  - TCL5 in

- study by M. Deile: correlation between beam intensity and BLM signal
  - evaluated right after RPs inserted
  - BLM: running sum 9 (1.3 s)
  - dashed = quadratic fit
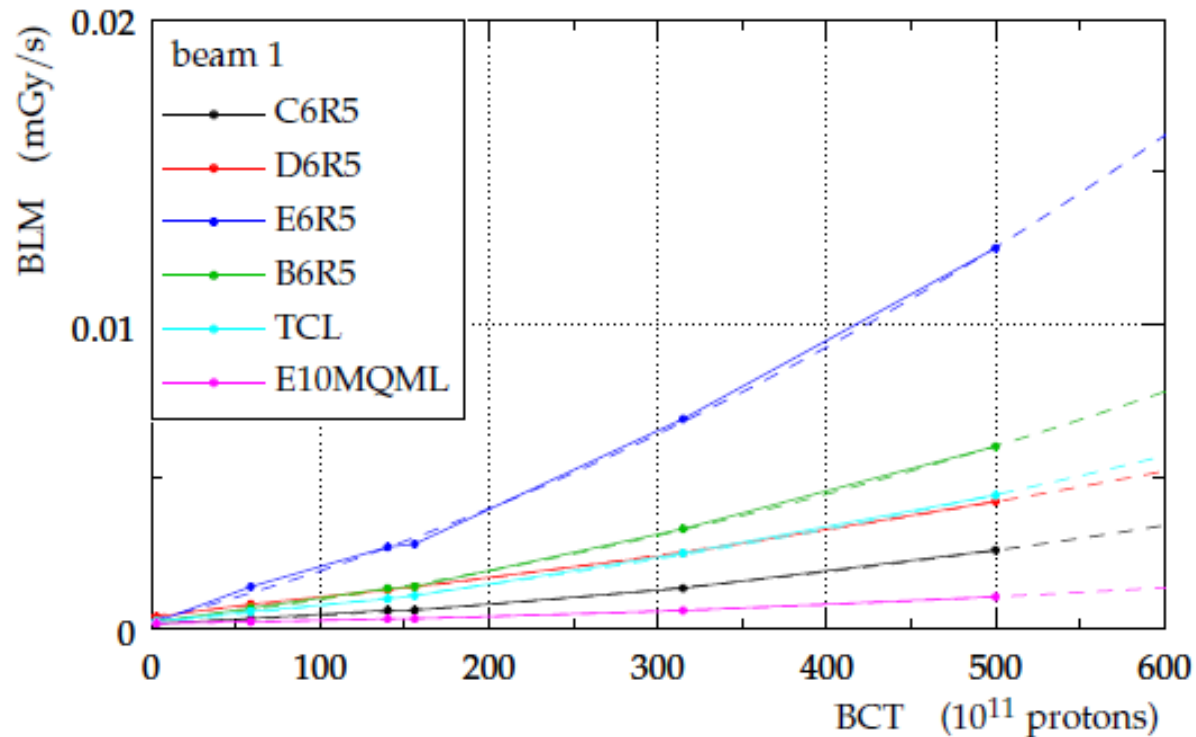
- BLM signal extrapolation to full intensity:
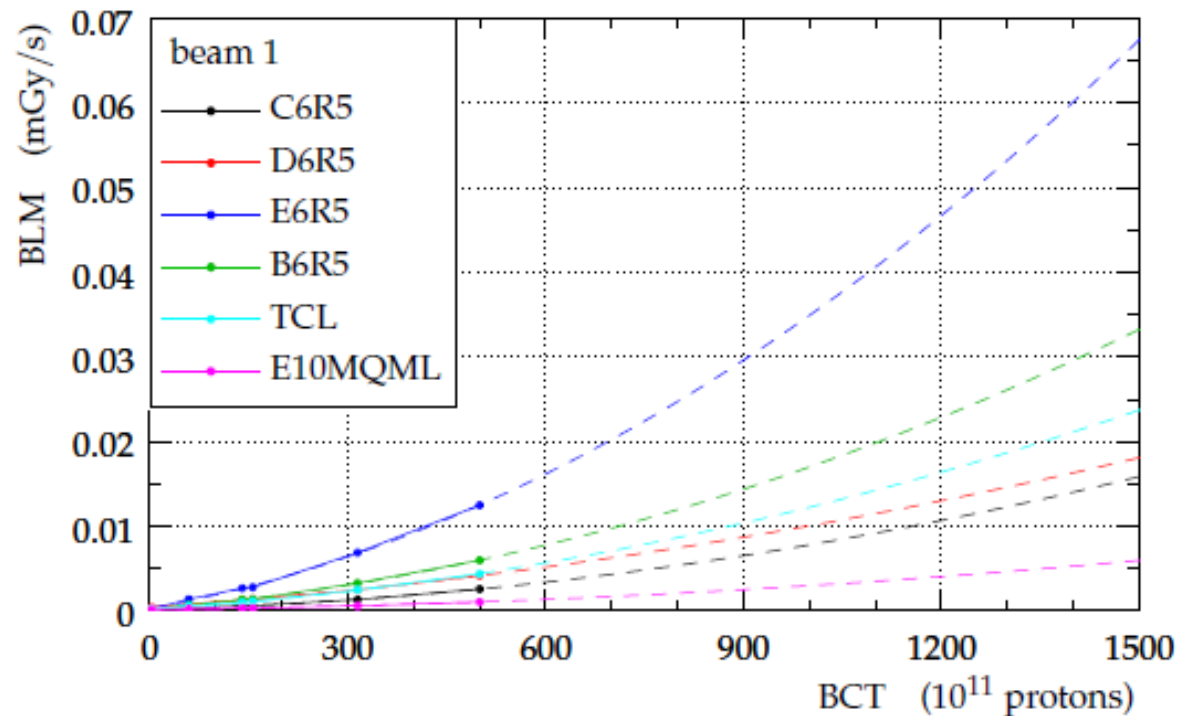
- BLM threshold: 0.3 mGy/s flat for all RP BLMs
- "E" BLM: extrapolated signal $\approx \frac{1}{4}$ of threshold

- changes to fulfil *physics requirements*
  - TCL5 out to 35 σ, TCL6 in
  - RP position without the safety margin of 1 mm: verticals at 18 σ, horizontals at 21 σ

$$\Downarrow$$

BLM signal expected to increase

- threshold guidelines
  - radiation not issue for RPs
  - thresholds should not be show-stopper for RP operation

- guideline for threshold value: if beam dumped then not by RP BLMs
  - slide 3: ratio of BLM signals between MQML and "E" BLM ≈ 10
  - margin: increase the ratio to ≈ 20
  - threshold for E10MQML (Q6) = 0.3 mGy/s
  - thus: increase threshold of RP BLMs to 20×0.3 mGy/s = 6 mGy/s

- increase base thresholds (keep monitor factors for further increase if needed)

- increase threshold of all RP BLMs

- review the situation in the beginning of 25ns rampup