

(ADDITIONAL) BLMS FOR BUSBAR PROTECTION

Eva Barbara Holzer, CERN

MPP

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FLUKA simulations (see Markus' talk)

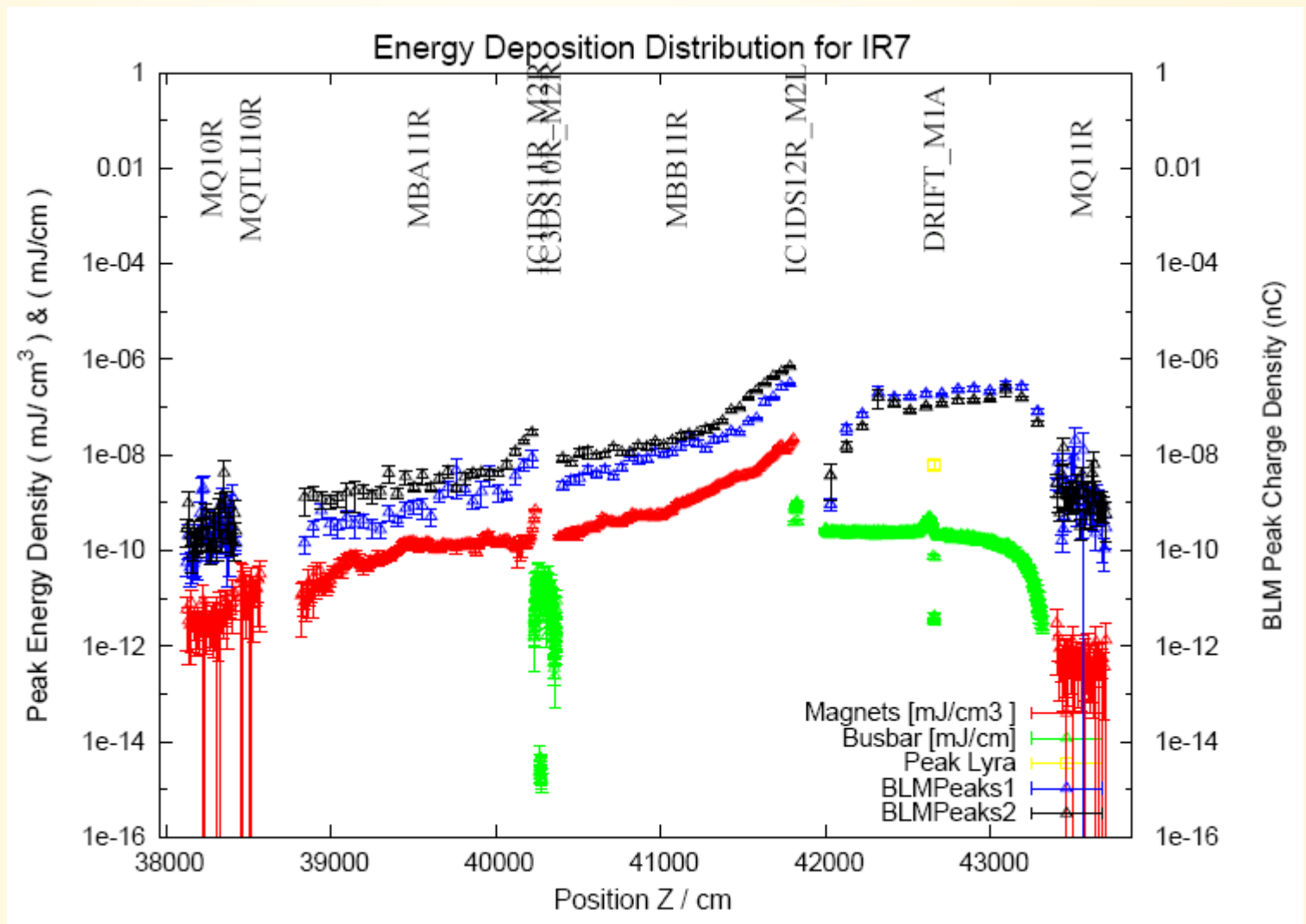
- Simulated beam 2 at right side of IP7 (beam towards the IP) at 5 TeV
- Losses at Q11 and Q12 will quench the quadrupoles long before the busbar. Standard loss scenario for the BLM system -> covered by BLM system.
- Losses at the connection cryostat will quench the MB afterwards (towards the IP) before the busbar (factor 4.8 for point losses and factor 34 for distributed losses). Not a standard loss scenario for the BLM system design -> at the moment only partially covered.
 - 8 new BLM ICs to protect the MB against quenches induced by beam loss in the connection cryostat
 - Automatically protect the busbar as well
 - Factor 4.8 is not very big
 - What are the consequences of a bus bar quench?

Existing BLMs

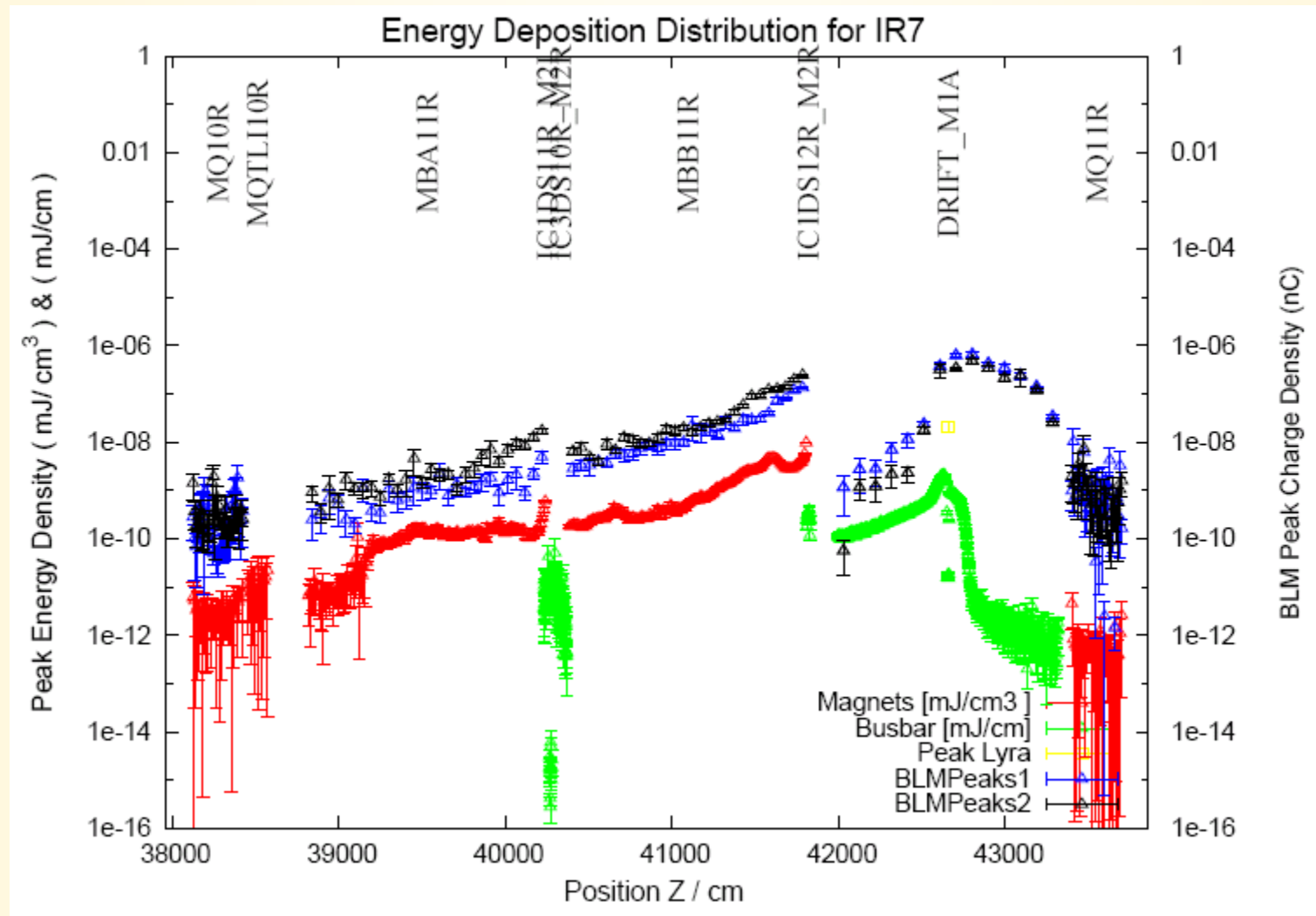
- 1 BLM IC, right after the beginning of the MB (towards the IP) but at beam 1 (on the 'crosstalk' side of the magnet), **nearly ideal location to protect the MB against quenches induced by beam loss in the connection cryostat**: left and right of IP1, IP3, IP5 and IP7
- No BLMs at MB: IP4 and IP6
- BLMs about 4 meter after and about 2 meter before the start of the dipole at the 'crosstalk' location: IP2 and IP8

FLUKA: Connection Cryostat Distributed Loss

Min #p to
quench MB:
point:
1.00E+08
dist:
4.70E+07

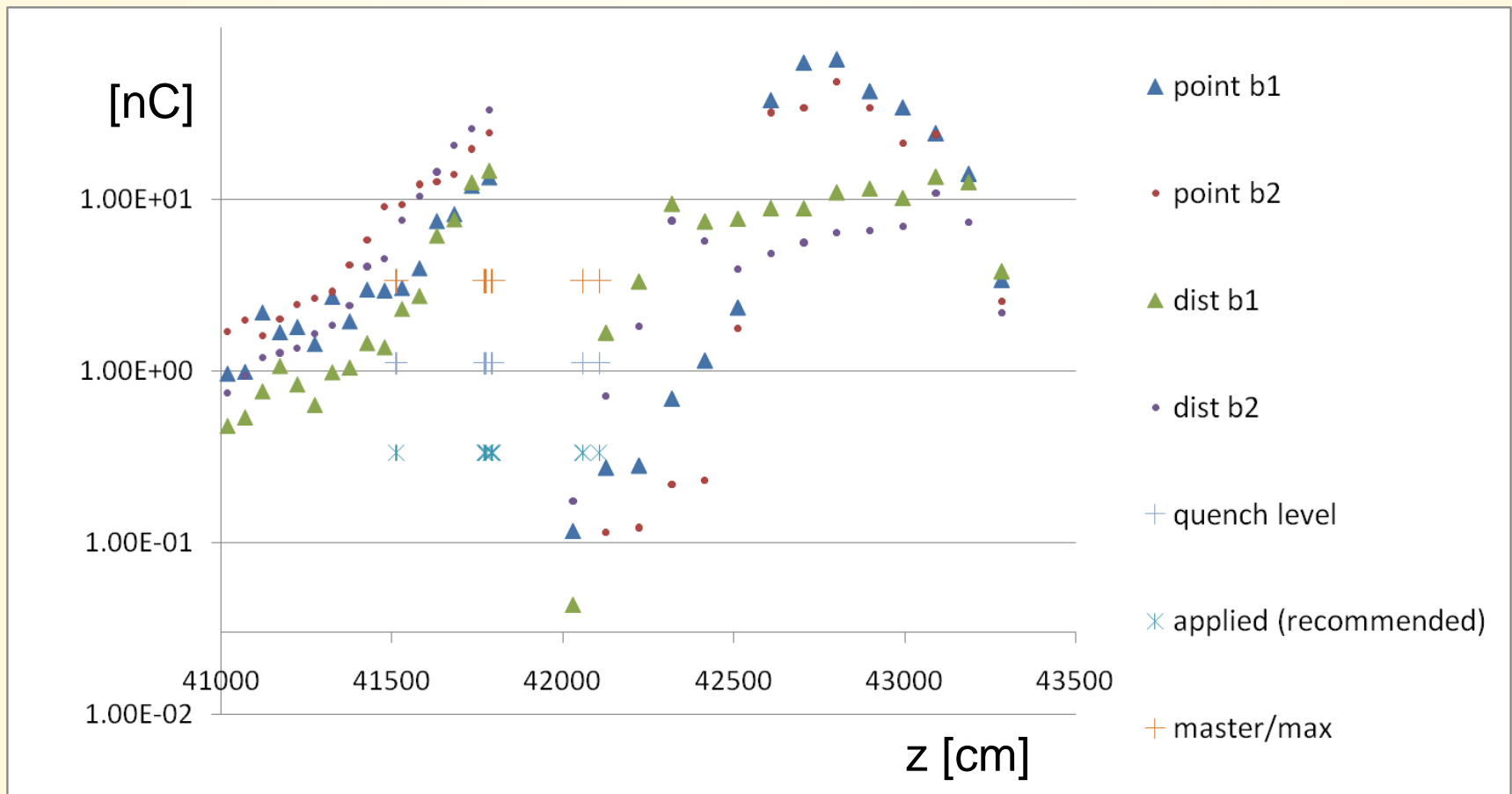


FLUKA: Connection Cryostat Point Loss



BLM Thresholds

BLM signal [nC] at MB quench due to **losses of beam 2** (Fluka) – triangles are on the ‘crosstalk’ side, where the BLMs are installed compared to
Currently set BLM threshold values [nC] (calculated to protect the MB against quenches due to **losses of beam 1**) for instantaneous losses (40 us integration time window) 5TeV.



Conclusions

- BLM location at ~418m, beam 1 is very well placed to protect the MB and the bus bar against quenches. Using the current threshold values gives a safety margin from master threshold (max threshold) to busbar quench:
 - point: factor 19 (is that enough?)
 - dist: factor 150
- Location ~415m can not be used for this purpose
- Location ~421m looks ok to protect the MB against quenches against losses of beam 2. But is there enough margin to reliably protect the bus bar?
- Proposal: install all locations at 418m (8 additional ICs) at beam 1 and use the current threshold values.