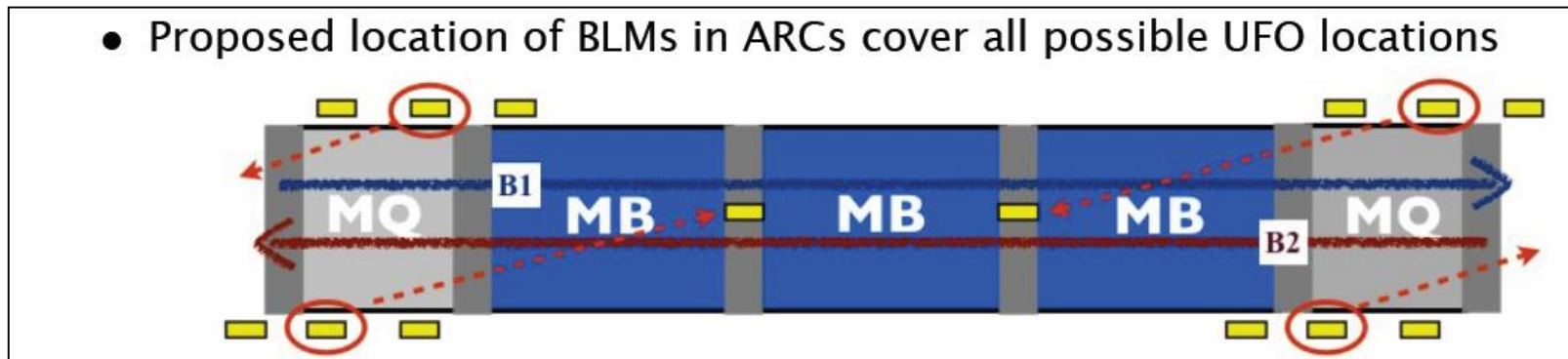

Injection region BLMs – left IP2

Suggestion of changes – version 1

- More details can be found in a word document

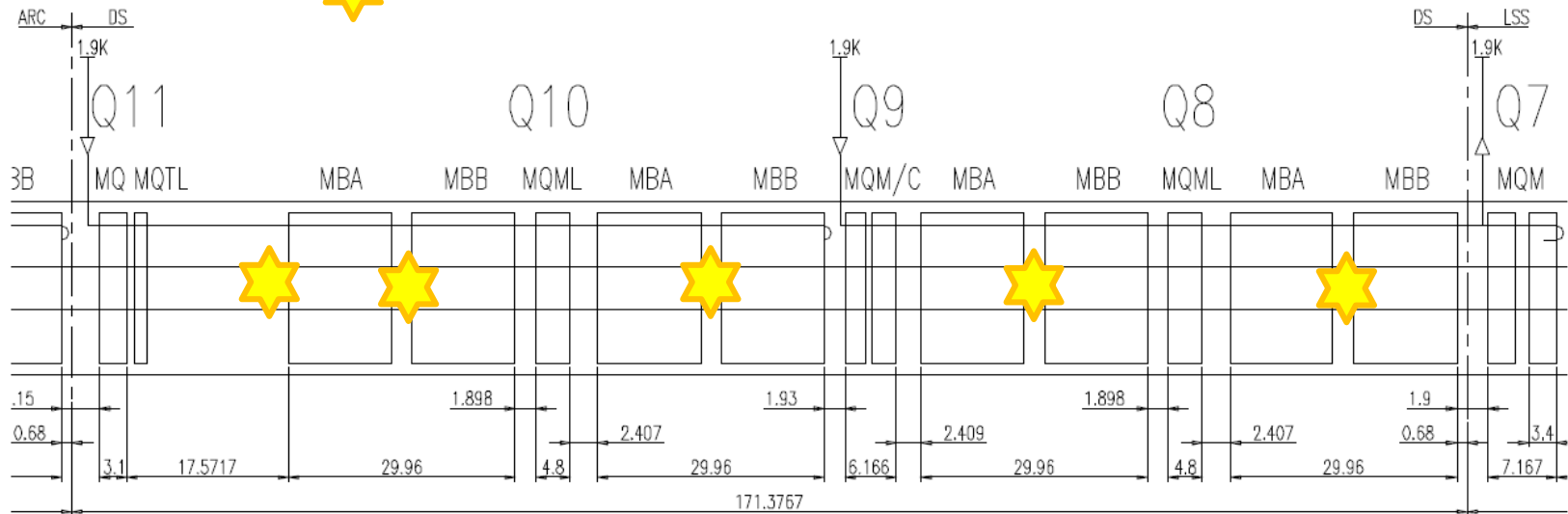
Re-distribution of Arc BLMs

- LS1: 1 out of 3 BLMs per arc quadrupole and beam will be moved to the dipoles magnets
- Aim: protect the dipoles against UFO-loss caused quenches
- The **second BLMQI** monitor per beam will be moved to the interconnect between two dipoles
- New position is **on top of the interconnect**
 - Equal signal from B1 and B2 losses
 - Expect somewhat smaller signal per lost proton
 - Threshold to be determined by new simulations



Re-distribution of Dispersion Suppressor BLMs

 New locations



7 ICs

7 ICs

7 mobile?

6 ICs

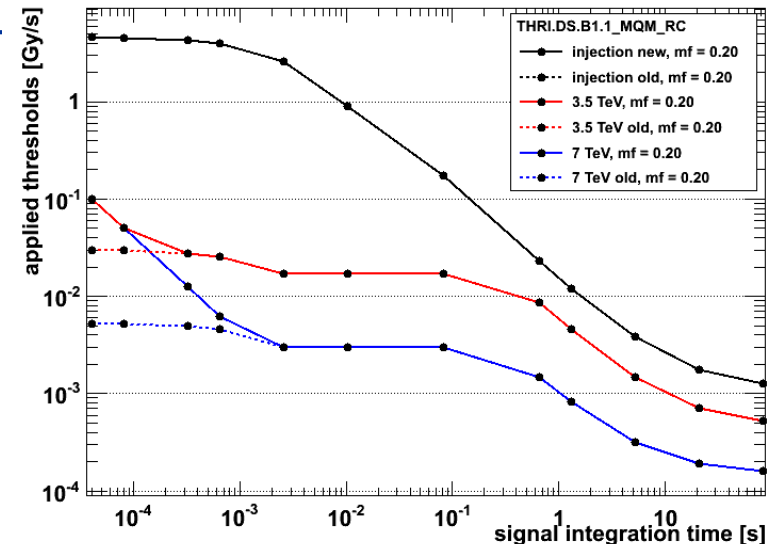
IP2 left currently installed ICs at MBs;
all for B2 - inside

General Remarks

- Request: Allow for 5 times the max. signal from W. Bartmann's 2011 analysis
- Additionally, I made sure that there is at least another factor 2 increase possible by threshold changes.
- Thresholds are shown for 450GeV and 40us running sum.
 - They need to **stay below 23 Gy/s**.
 - All monitors will have to have their thresholds at 450GeV adapted to allow injection losses – this is because we start without bind-out.
- **Factors applied to 40us running sum:**
 - Small filter (2200 pF & 150 kOhm): factor 20
 - Big filter (47000 pF & 150 kOhm): factor 180
 - IC to LIC: factor 14
- **LIC** and **IC+small filter** are basically exchangeable
- **IC+big filter** and **LIC+small filter** are basically exchangeable

Problem at higher energies

- Installing a LIC or an IC with small filter gives the same type of problem with **sensitivity at short running sums at high energy** – but not for all elements – it is only true for sensitive elements with low thresholds
- To overcome this problem is only possible with an IC and blind-out. But as we start without the blind-out, the short running sum thresholds for high energy will be above quench level – possibly even above damage level. To be assessed.
- **Position 1 and position 2 Q6 and Q7 external monitors (filters) have sensitivity problem at 7 TeV as well as 5 out of 6 Q8 monitors**
- Suggestion: use IC+filter on blind-able monitors
 - If we switch on the blinding, we can take away the filter, adapt the thresholds and reduce the problem of sensitivity at high energy.



Q8

- Q8 stays with 6 monitors

<i>450Gev threshold for IC</i>	<i>450 GeV threshold for LIC</i>	<i>450 GeV threshold for IC with small filter</i>	<i>Old name</i>	<i>SUGGESTION for LS1</i>	<i>Move to blind-able rack</i>	<i>Problem</i>
138.1	9.86		BLMQI.08L2.B1E10_MQML	LIC no filter	Yes BJSAP.B8L2	sensitivity 7 TeV
155.65	11.12	7.78	BLMQI.08L2.B1E20_MQML	stay IC+filter, no th. change (or disconnect from BIS)	no	sensitivity 7 TeV
178.85	12.78		BLMQI.08L2.B1E30_MQML	LIC no filter	Yes BJSAP.B8L2	sensitivity 7 TeV
22.15	1.58		BLMQI.08L2.B2I10_MQML	new 1.1 bar LIC no filter	no	sensitivity 7 TeV
18.15	1.30		BLMQI.08L2.B2I20_MQML	LIC or disconnect!	no	sensitivity 7 TeV
14.15	1.01		BLMQI.08L2.B2I30_MQML	IC no filter (increase 450 GeV threshold)	Yes BJSAP.B8L2	

Septum MSI

- MSIA and MSIB will have each:
 - 3 ICs with small filter, possible to blind-out
 - 3 LIC without filter, not possible to blind out

<i>450Gev threshold for IC</i>	<i>450 GeV threshold for LIC</i>	<i>450 GeV threshold for LIC with small filter</i>	<i>Old name</i>	<i>SUGGESTION for LS1</i>	<i>Move to blind-able rack</i>
163.5	11.68		BLMEI.06L2.B1E10_MSIB	IC small filter	YES; BJBAP.A6L2 (5 more MSI ICs with filter – all blind-able)
27.4	1.96		BLMEI.06L2.B1E20_MSIB	LIC no filter	no
27.4	1.96		BLMEI.06L2.B1E30_MSIB	LIC no filter	no

Q6

<i>450Gev threshold for IC</i>	<i>450 GeV threshold for LIC</i>	<i>450 GeV threshold for LIC with small filter</i>	<i>Old name</i>	<i>SUGGESTION for LS1</i>	<i>Move to blind-able rack</i>
75.25	5.38		BLMQI.06L2.B1E10_MQML	LIC 7TeV sens. problem	No BJBAP.C6L2
165.45	11.82		BLMQI.06L2.B1E20_MQML	IC+filter 7TeV sens. problem	Yes BJBAP.A6L2
			BLMQI.06L2.B1E30_MQML	LIC	no
4.25	0.30		BLMQI.06L2.B2I10_MQML	Thr. change advisable	no
3.9	0.28		BLMQI.06L2.B2I30_MQML	Thr. change advisable	no
5.65	0.40		BLMQI.06L2.B2I20_MQML	Thr. change advisable	no

Install LIC at TCLIB R2 and at one MBXA monitor

<i>450Gev threshold for IC</i>	<i>450 GeV threshold for LIC</i>	<i>450 GeV threshold for LIC with small filter</i>	<i>Old Name</i>	<i>SUGGESTION for LS1</i>	<i>Move to blind-able rack</i>
11.7	0.84		BLMEI.06R2.B1I10_TCLIB.6R2.B1	LIC	no
16.65	1.19		BLMEI.04L2.B1E10_MBXA	LIC	no

TDI

- Changes are in bold
- One LIC and one IC+small filter (blind-able) at the same location

OLD NAME	OLD NAME			Filter	DCUM	
BLMEI.F4L2	BLMEI.04L2.B2I10_TDI.4L2.B2	IC	BJBAP.B4L2	small	3248	blind-able
BLMES.D4L2	BLMES.04L2.B2I10_TDI.4L2.B2	LIC	BJBAP.A4L2		3248	
BLMEL.A4L2	BLMEL.04L2.B1E10_TDI.4L2.B1	LIC	BJBAP.A4L2		3251	
BLMEL.B4L2	BLMEL.04L2.B1E11_TDI.4L2.B1	IC	BJSAP.B4L2	small	3251	blind-able
BLMEF.A4L2	BLMEF.04L2.B1E20_TDI.4L2.B1	LIC	BJBAP.A4L2		3255	
BLMEI.D4L2	BLMEI.04L2.B1E20_TDI.4L2.B1	IC	BJBAP.B4L2	big	3255	blind-able

More details

- Remove 6 SEMs at MBA and MBB 11L2 - verify
- Remove 6 SEMs at MBA and MBB in cell 8 - verify
- One of the Q11 position 2 (P2) monitors goes to the interconnect between the empty cryostat and the MBA (cell 11)
- One of the Q10 position 2 monitors goes to the interconnect between MBA and MBB in cell 11
- The other Q10 position 2 monitor goes to the MB interconnect in cell 10
- The outside Q9 P2 monitor goes to the MB interconnect in cell 9
- The outside Q7 P2 monitor goes to the MB interconnect in cell 8. The filter is removed and a LIC installed instead of the IC
- Q7 external monitors P1 will have a LIC without filter (instead of the existing IC+filter), 7TeV sens. problem
- Q7 external monitors P3 stays with IC+filter and moves to blind-able BJBAP.A6L2

Threshold Changes without hardware change

- Threshold changes required on (keep IC without filter):

<i>450Gev threshold for IC</i>	<i>450 GeV threshol d for LIC</i>	<i>450 GeV threshold for LIC with small filter</i>	<i>Name</i>	<i>SUGGESTION for LS1</i>	<i>Move to blind- able rack</i>
2.25	0.16		BLMQI.05L2.B1E20_MQY	Thr. change	no
6.95	0.50		BLMEI.04R2.B2E10_TCTH.4R2.B2	Thr. change	no
7.25	0.52		BLM2I.04R2.B1I10_MBRC_MBRC	Thr. change	no
3.05	0.22		BLMQI.06R2.B2E30_MQML	Thr. change	no

- Threshold changes advisable (IC no filer):

BLMQI.06L2.B2I30_MQML
BLMQI.06L2.B2I10_MQML
BLMQI.06L2.B2I20_MQML
BLMQI.05L2.B2I30_MQY
BLMQI.05L2.B1E10_MQY
BLMQI.05L2.B2I20_MQY
BLMQI.03L2.B1E10_MQXA
BLMQI.06R2.B1I10_MQML

Question

- What do we do with all the SEMs, which are installed at collimators?

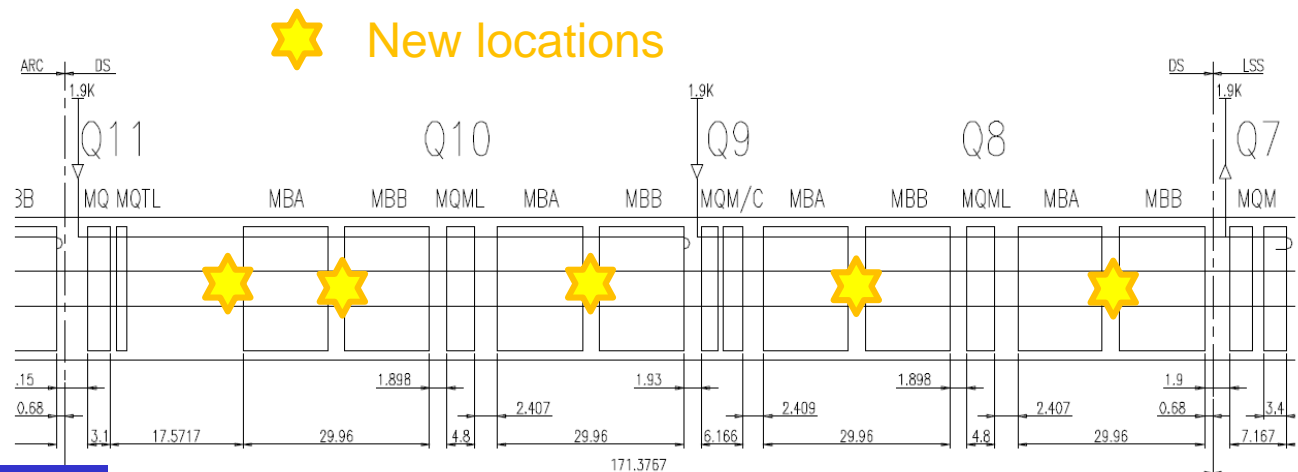
BLMES.04L2.B1E10_TCTH.4L2.B1
BLMES.04L2.B1E10_TCTVA.4L2.B1
BLMES.04L2.B1E10_TCDD.4L2

- Another SEM:
 - BLMES.01L2.B2I10_BPMSW.1L2

SPARE SLIDES

Re-distribution of Dispersion Suppressor BLMs

- Need to re-locate only one BLM per quadrupole
- Injection regions: propose to relocate the **outside** monitor (higher signal from injection line showers)
- Simulation of the signal of the showers from injection line losses on the new location do not exist – and are not planned
 - Rather strong variations longitudinally (see next slides)
 - Top position is not shielded by magnets. Still, for geometric reasons I'd expect a somewhat smaller signal than at the external position



IP2 left currently installed ICs at MBs; all for B2 - inside

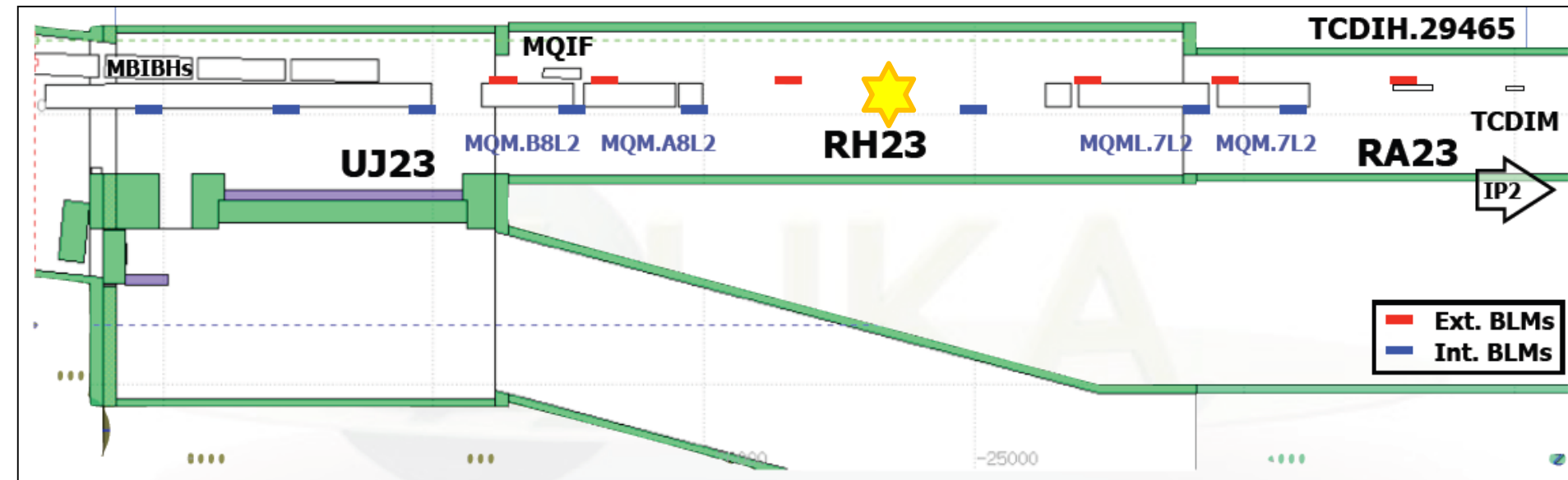
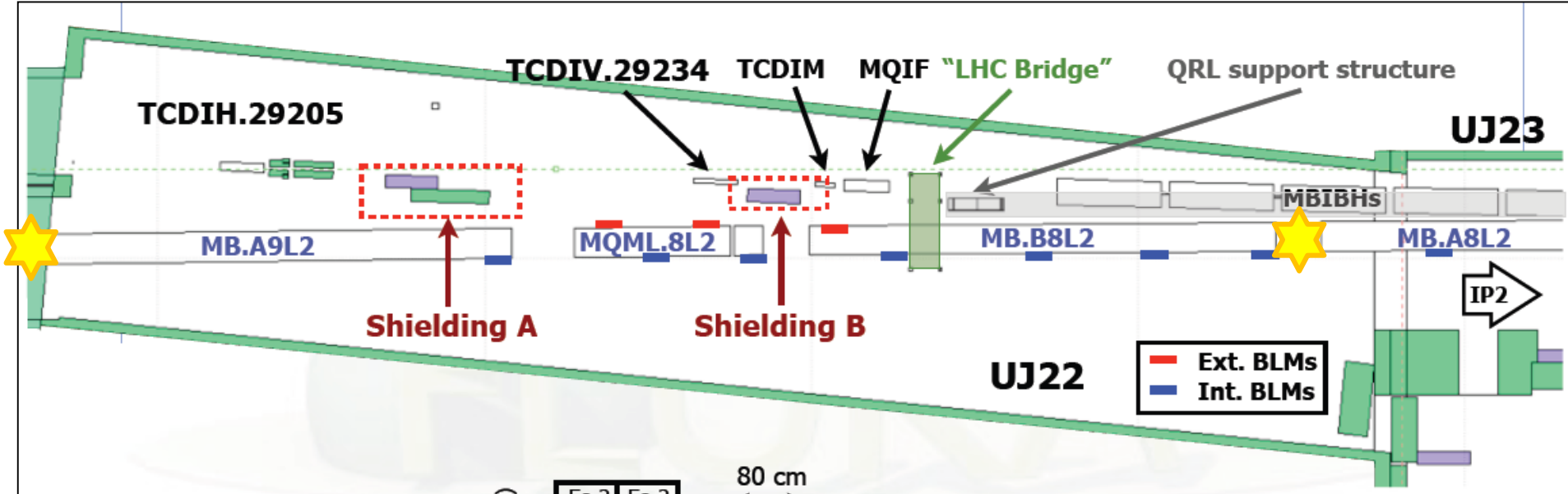
7 ICs

7 ICs

7 mobile?

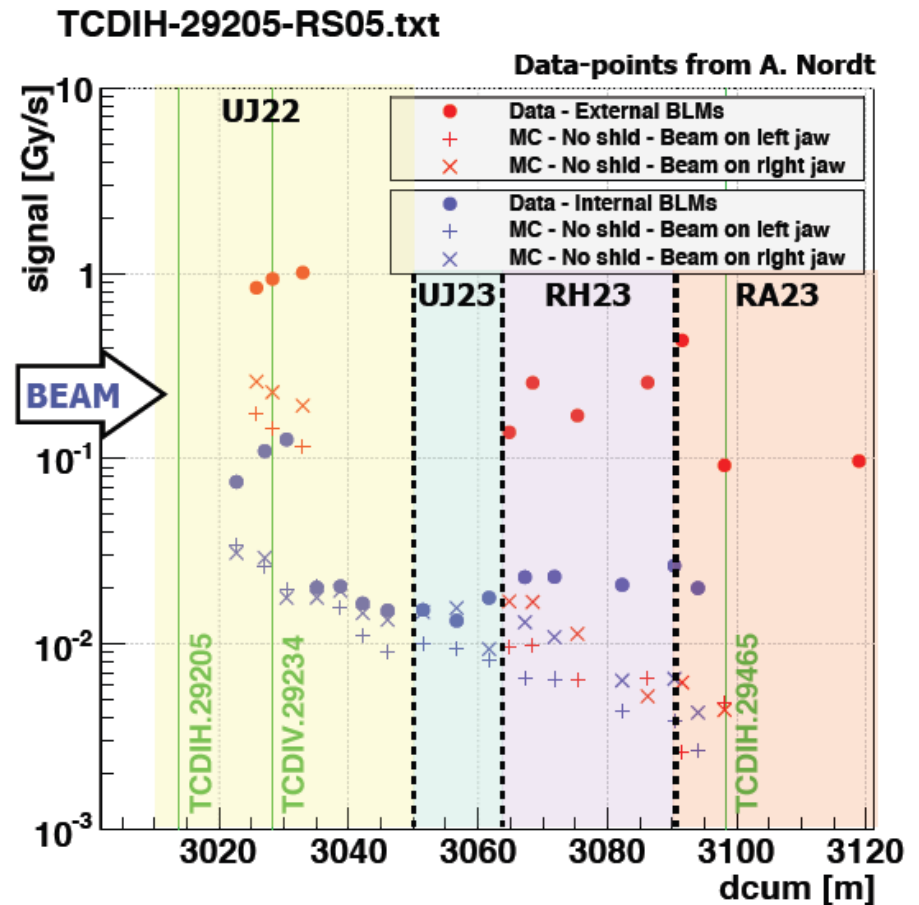
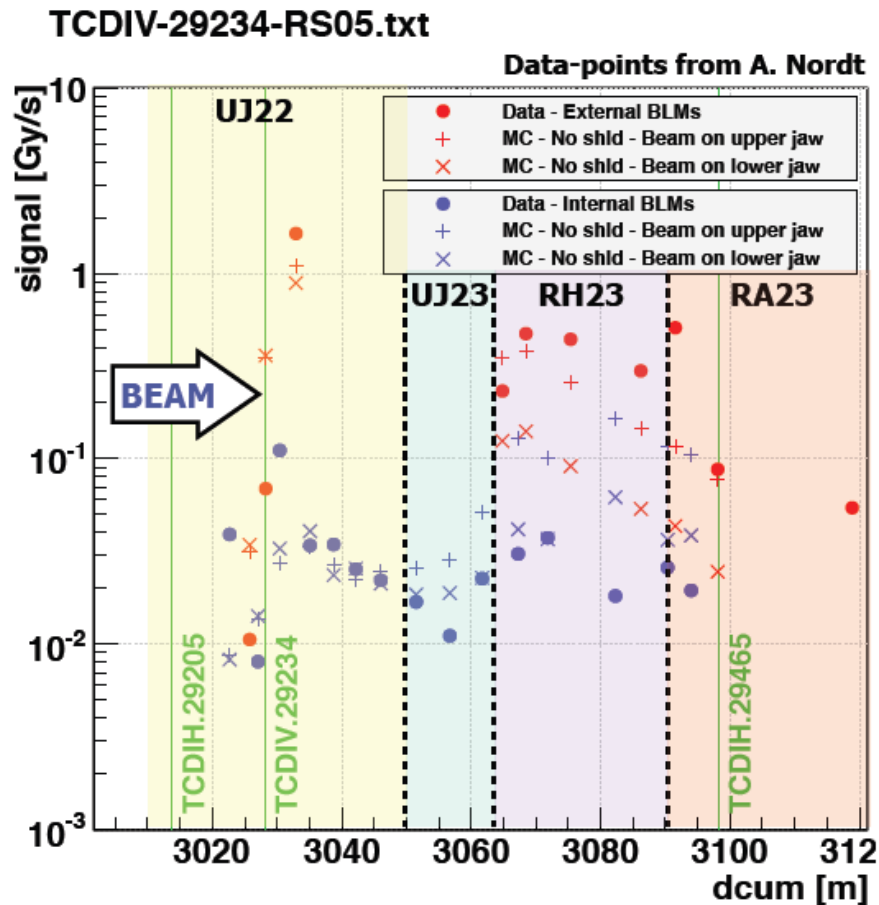
6 ICs

FLUKA simulations from V. Boccone (LIBD meeting 23.10.2013)



Example from 2010 FLUKA Simulations

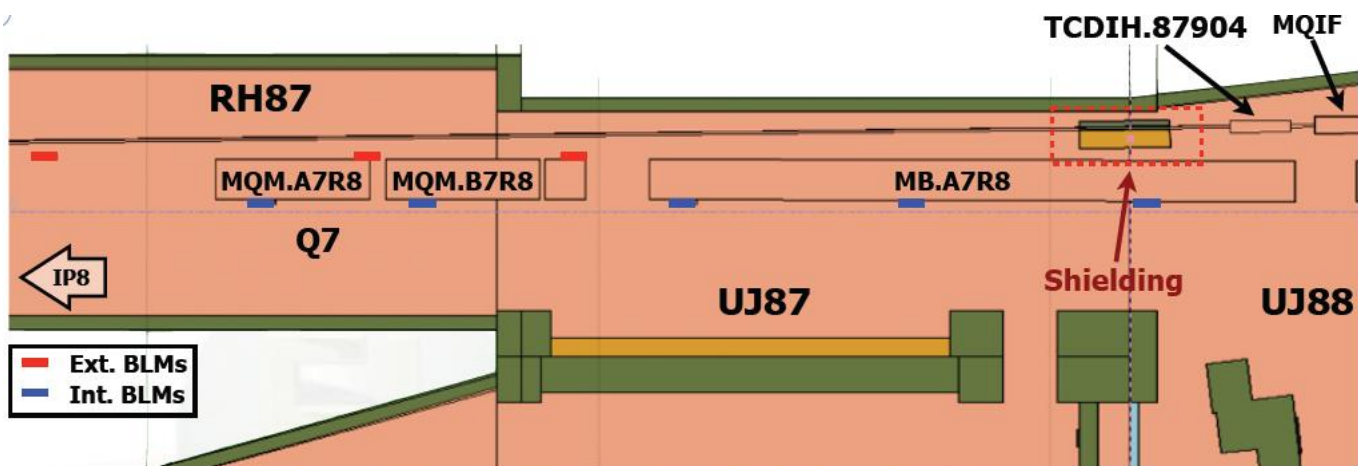
MC simulation for the controlled losses (2)



No Shielding included

Summary

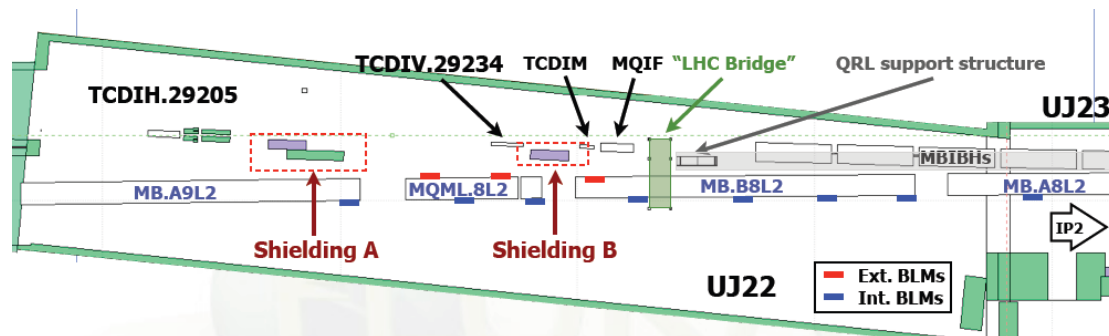
- Signals from injection line losses on ring BLMs in the new location
 - Assume that the signal is similar to the signal at the external BLMs (probably it is actually somewhat lower)
- Assume BLM thresholds similar to existing ones (probably actually somewhat higher) → wait for the simulations
- Longitudinal variation of signal from injection line losses
 - → analyze the data from the existing MB monitors (inside locations only)
 - Info from 2010 FLUKA simulations (partly)?



TCDI shielding

- Shielding the LHC BLMs from the TCDI showers.
- Shielding investigated for TCDIs directly next to SC magnets
 - TI 2: TCDIH.29205, TCDIV.29234
 - TI8: TCDIH.87904
- Expected loss reduction with shielding:
 - TCDIV.29234 – factor 8
 - TCDIH.29205 – factor 5
 - TCDIH.87904 – factor 4
- Shielding for TI 8 tricky due to lack of space
- Shielding installed for TI 2

Not critical
from MP point
of view!



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- Wolfgang analysis: MPP 30.9.2011 and Evian 2011