



LIC performance in the LHC

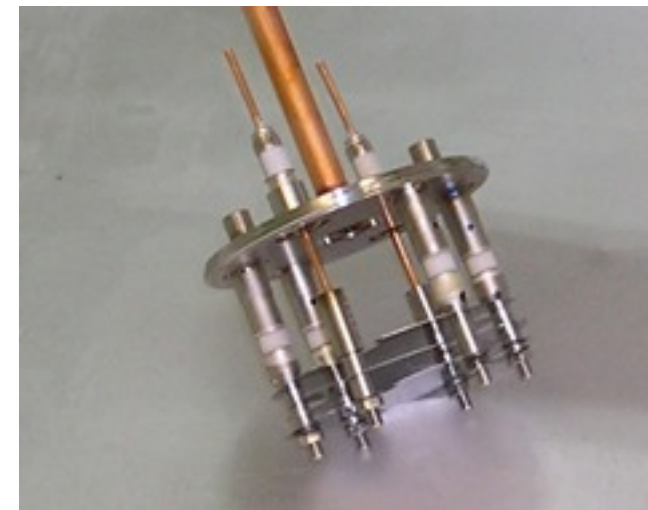
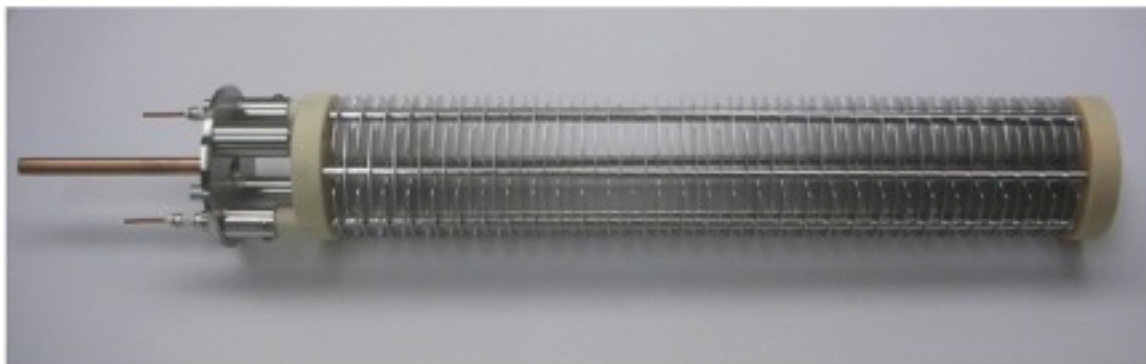
E. Nebot del Busto for the BLM team

Outlook

- Motivation and description
- Noise
- Betatron cleaning. Slow losses
- Injection region
- Installation MSI 06.L2
- Conclusions

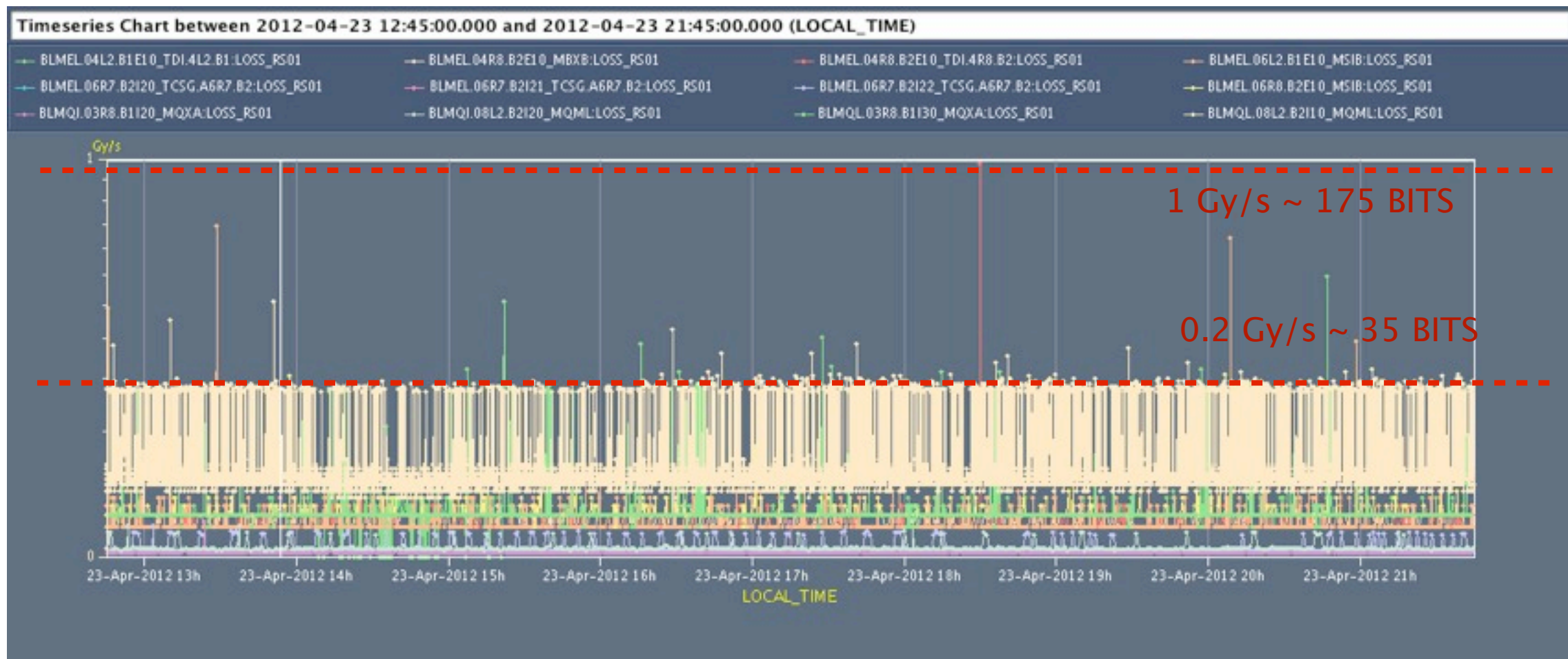
LIC Motivation and description

- Detector with low sensitivity in order to increase the dynamic range of the BLM system (Limited by 23Gy/s in 40 us)
- Possibility of reaching a factor 5 margin between dump threshold and average losses at injection
- Little Ionization Chambers. Reduced Volume (from 60 to 2 active Volumes).
Reduced gas pressure (from 1.1 bar to 0.4 bar)



LIC-LHC. Noise

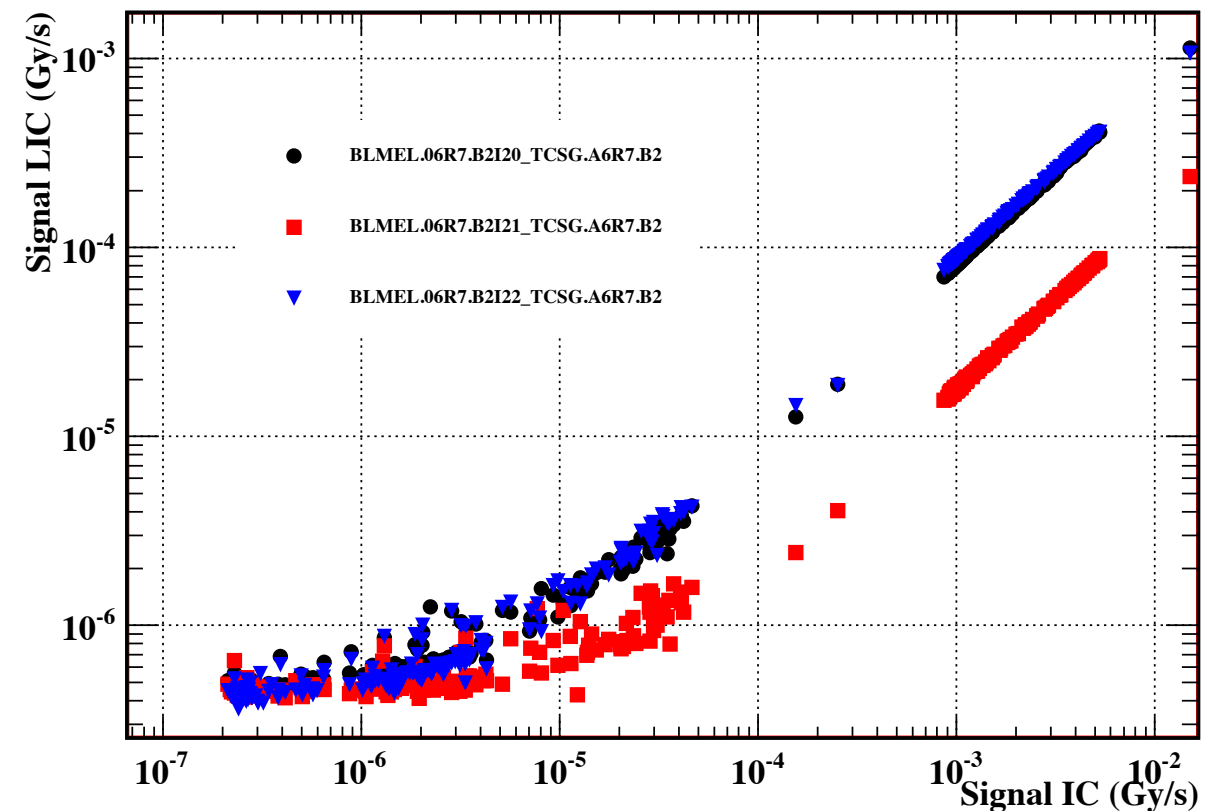
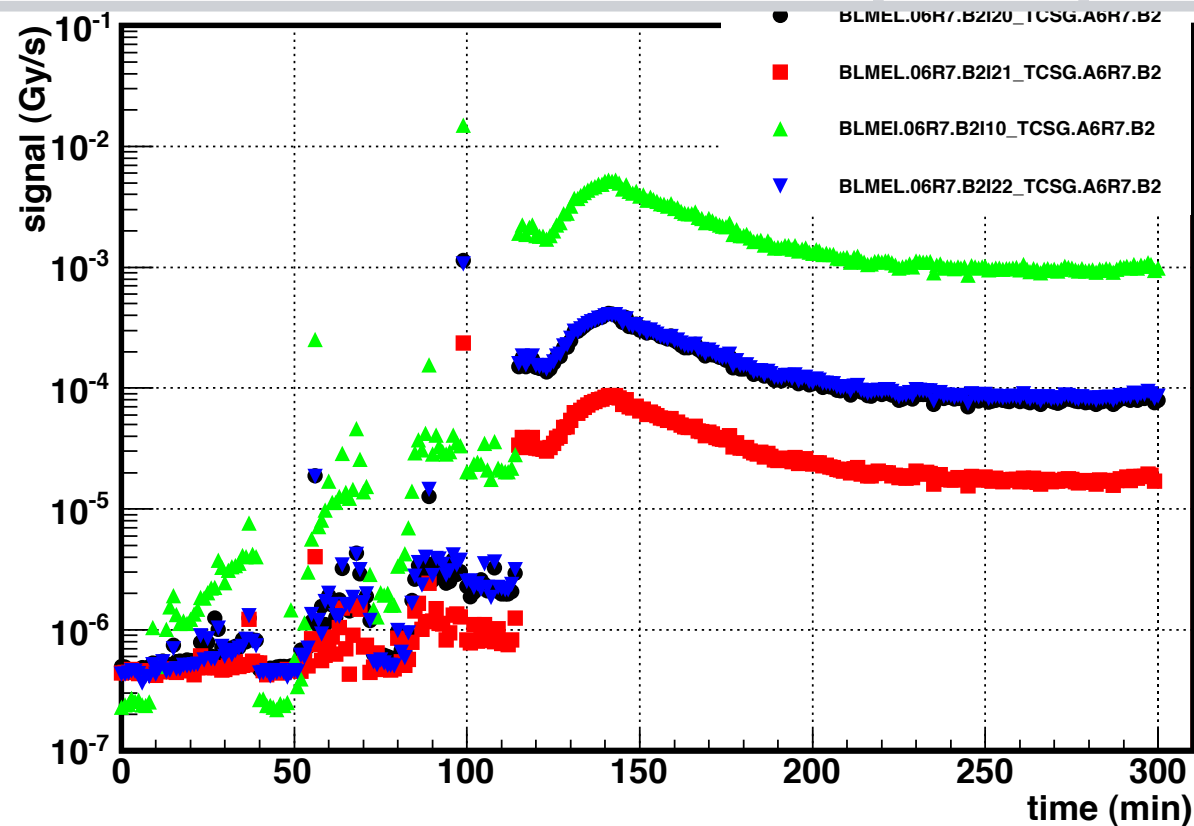
- Several spikes of up to 1Gy/s (~175 BITS)
- BLML at MQML shows high noise.



Slow losses. Betatron cleaning.

- Three LIC detectors located in IR7 downstream a secondary collimator.
- 5h in Fill 2208 (2011-10-13 00:54:00)

Monitor Name	Type	P (bar)	ratio
BLMEL.06R7.B2I10_TCSG.A6R7.B2	IC	1.1	---
BLMEL.06R7.B2I20_TCSG.A6R7.B2	pLIC	1.1	12.5
BLMEL.06R7.B2I21_TCSG.A6R7.B2	LIC	0.4	58.8
BLMEL.06R7.B2I22_TCSG.A6R7.B2	pLIC	0.1	12.0

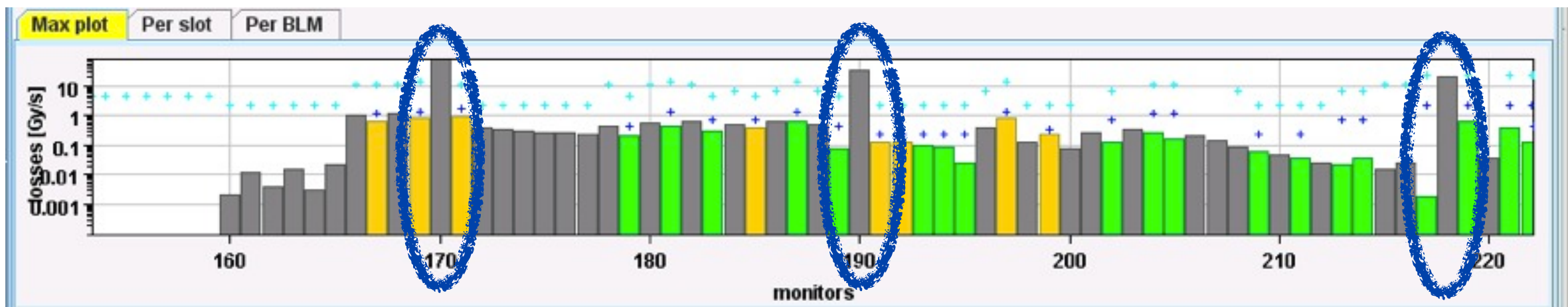


Injection region

- Seven Ionization chambers were replaced by LICs during the shut down.

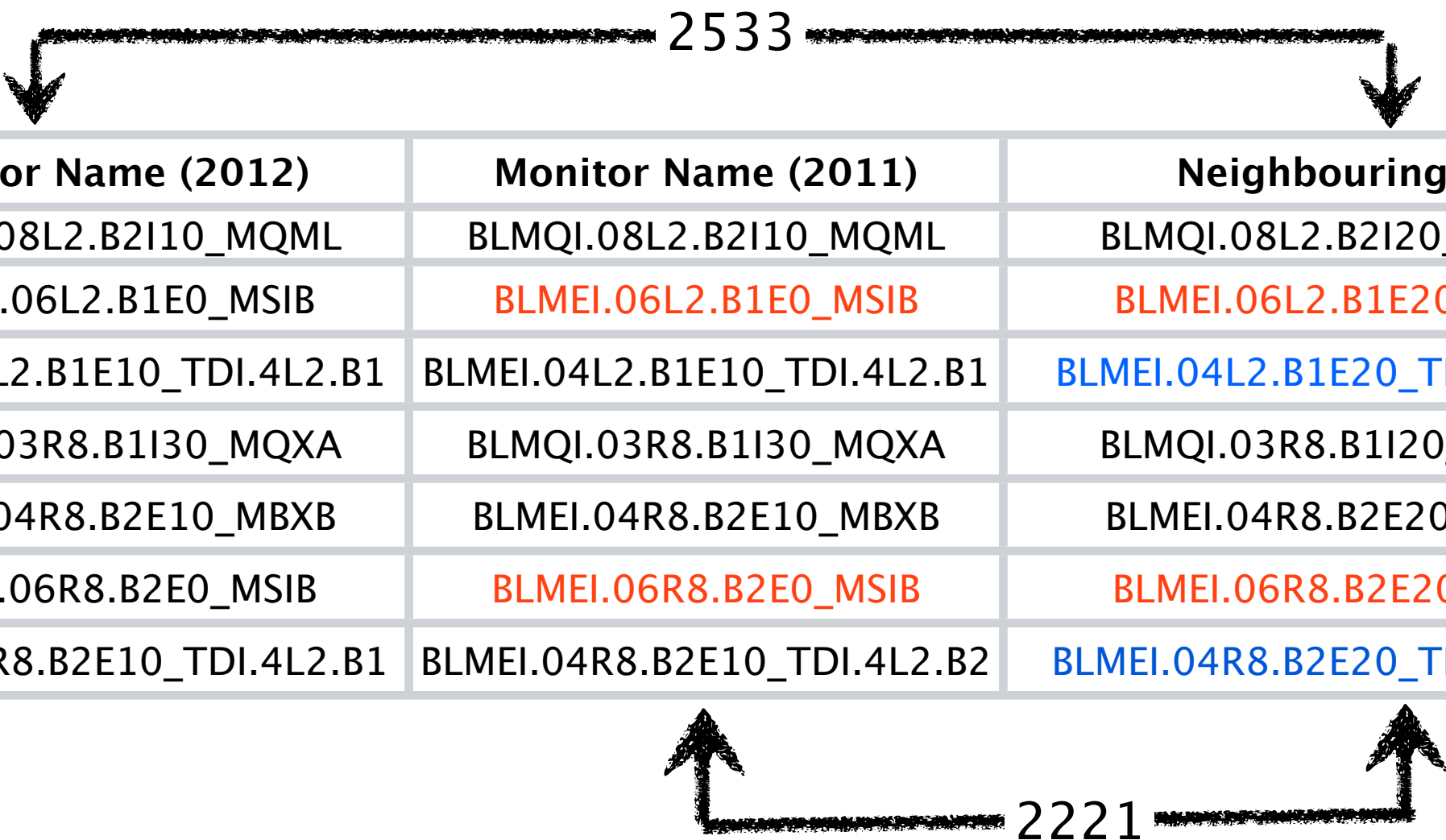
Monitor Name (2012)	Monitor Name (2011)	Neighbouring IC
BLMQL.08L2.B2I10_MQML	BLMQI.08L2.B2I10_MQML	BLMQI.08L2.B2I20_MQML
BLMEL.06L2.B1E0_MSIB	BLMEI.06L2.B1E0_MSIB	BLMEI.06L2.B1E20_MSIB
BLMEL.04L2.B1E10_TDI.4L2.B1	BLMEI.04L2.B1E10_TDI.4L2.B1	BLMEI.04L2.B1E20_TDI.4L2.B1
BLMQL.03R8.B1I30_MQXA	BLMQI.03R8.B1I30_MQXA	BLMQI.03R8.B1I20_MQXA
BLMEL.04R8.B2E10_MBXB	BLMEI.04R8.B2E10_MBXB	BLMEI.04R8.B2E20_MBXB
BLMEL.06R8.B2E0_MSIB	BLMEI.06R8.B2E0_MSIB	BLMEI.06R8.B2E20_MSIB
BLMEL.04R8.B2E10_TDI.4L2.B1	BLMEI.04R8.B2E10_TDI.4L2.B2	BLMEI.04R8.B2E20_TDI.4R8.B2

- Unexpectedly large signals observed during injections.



LHC. Injection region

- Comparison of losses at injection for fills 2533 (18/04/2012) and 2221 (17/10/2011).



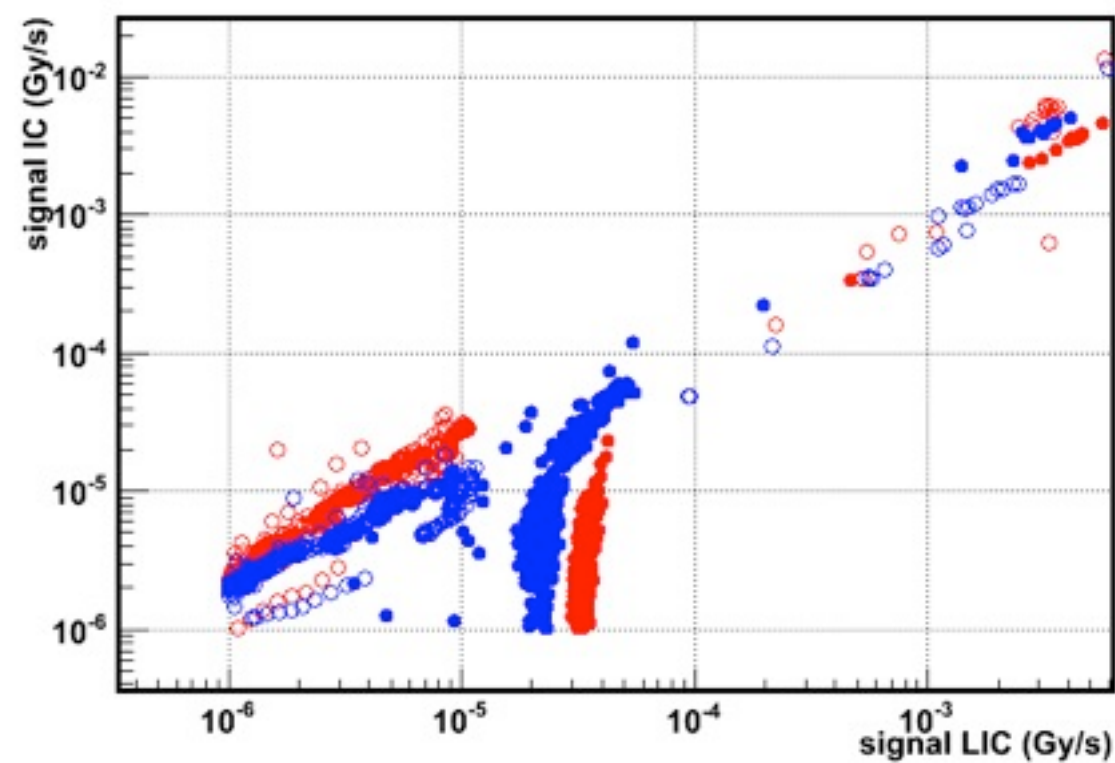
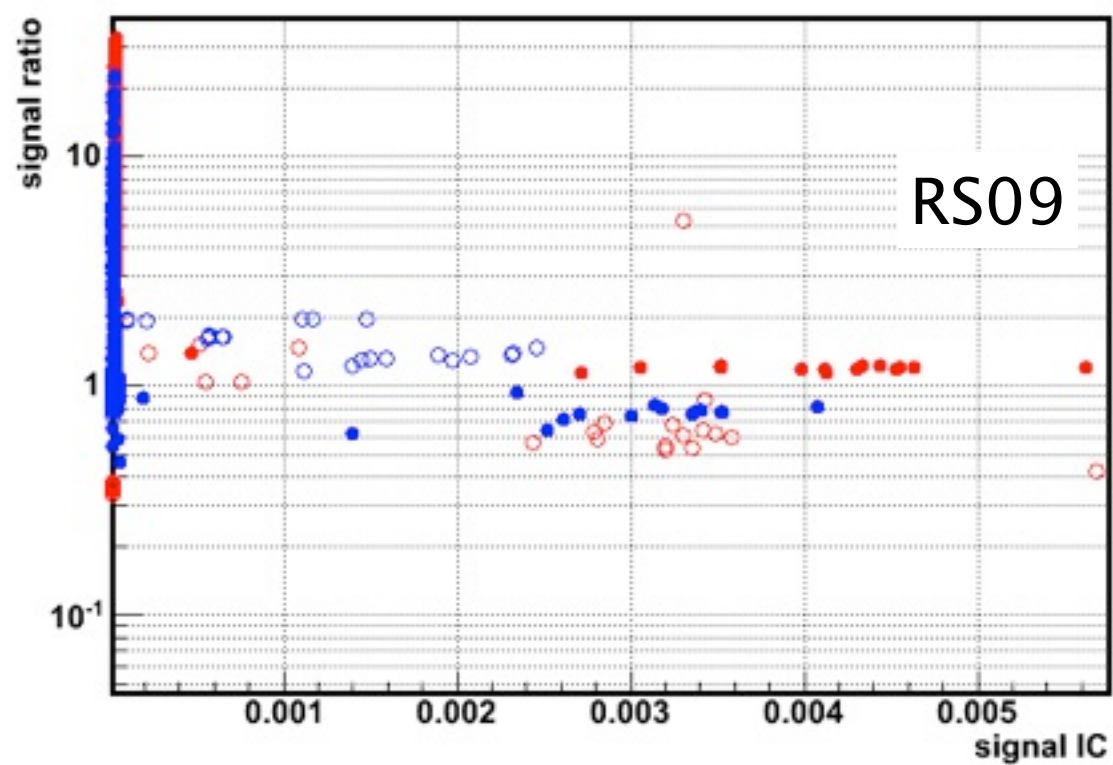
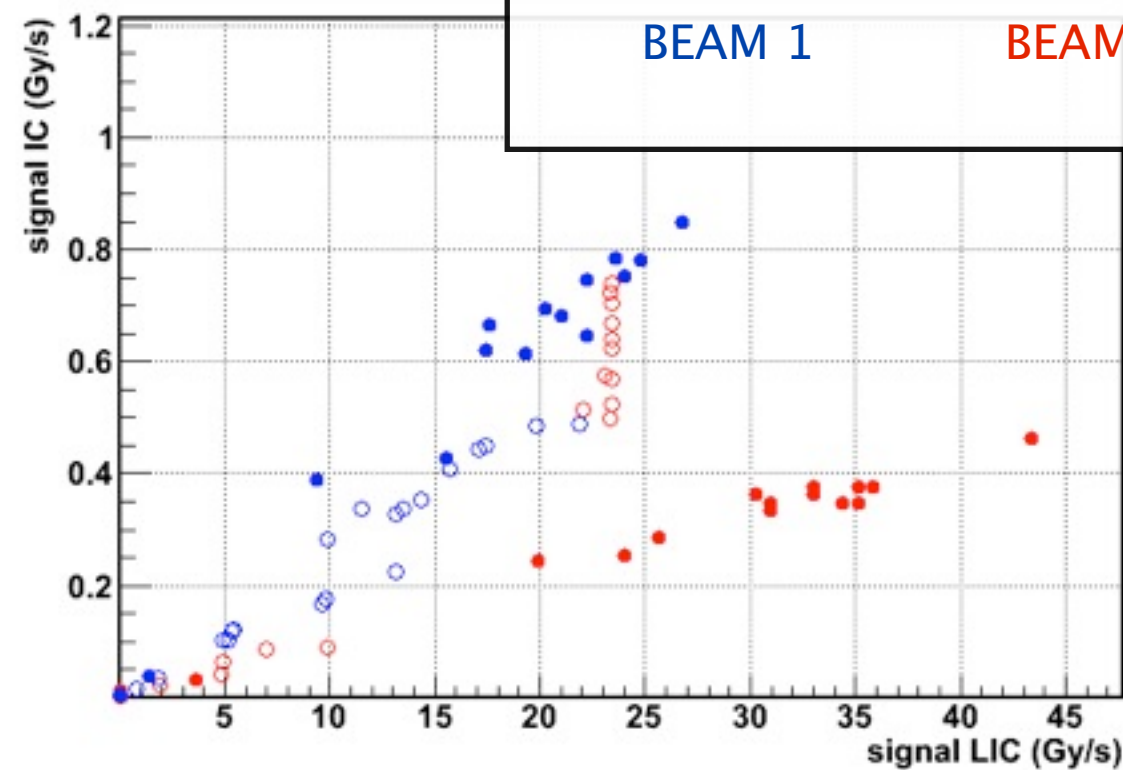
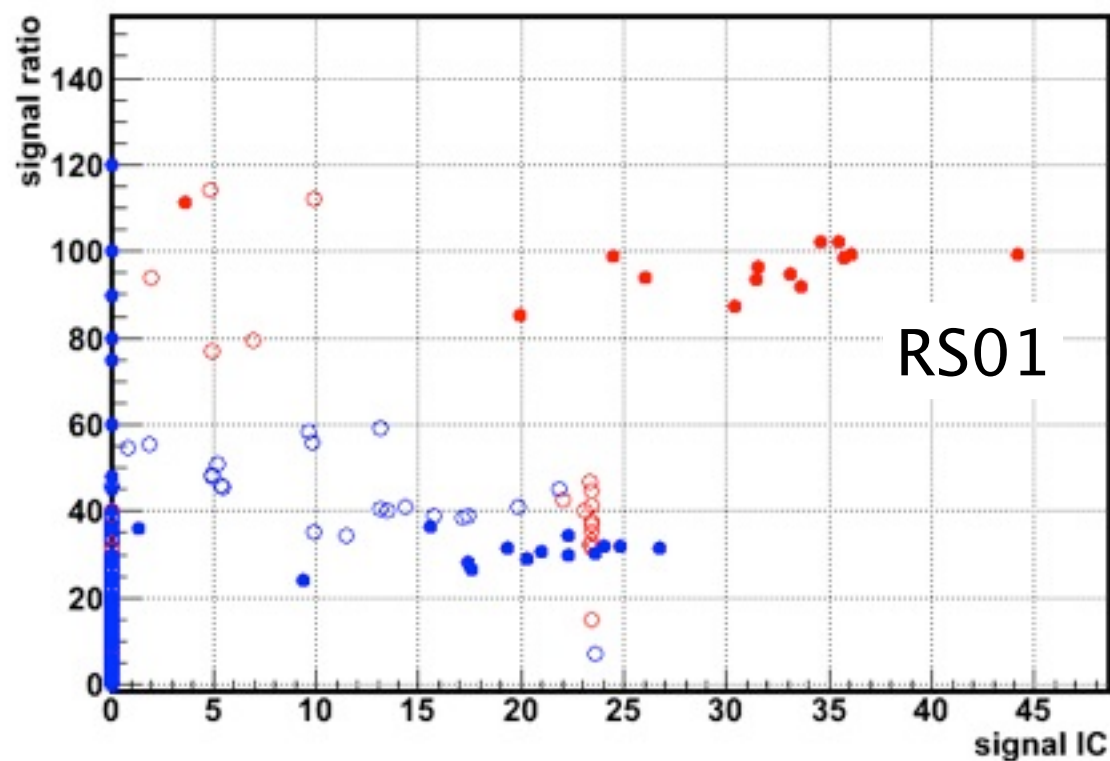
Monitor Name (2012)	Monitor Name (2011)	Neighbouring IC
BLMQL.08L2.B2I10_MQML	BLMQI.08L2.B2I10_MQML	BLMQI.08L2.B2I20_MQML
BLMEL.06L2.B1E0_MSIB	BLMEI.06L2.B1E0_MSIB	BLMEI.06L2.B1E20_MSIB
BLMEL.04L2.B1E10_TDI.4L2.B1	BLMEI.04L2.B1E10_TDI.4L2.B1	BLMEI.04L2.B1E20_TDI.4L2.B1
BLMQL.03R8.B1I30_MQXA	BLMQI.03R8.B1I30_MQXA	BLMQI.03R8.B1I20_MQXA
BLMEL.04R8.B2E10_MBXB	BLMEI.04R8.B2E10_MBXB	BLMEI.04R8.B2E20_MBXB
BLMEL.06R8.B2E0_MSIB	BLMEI.06R8.B2E0_MSIB	BLMEI.06R8.B2E20_MSIB
BLMEL.04R8.B2E10_TDI.4L2.B1	BLMEI.04R8.B2E10_TDI.4L2.B2	BLMEI.04R8.B2E20_TDI.4R8.B2

Monitors at TDI

○ Fill 2221 ● Fill 2533

BEAM 1

BEAM 2

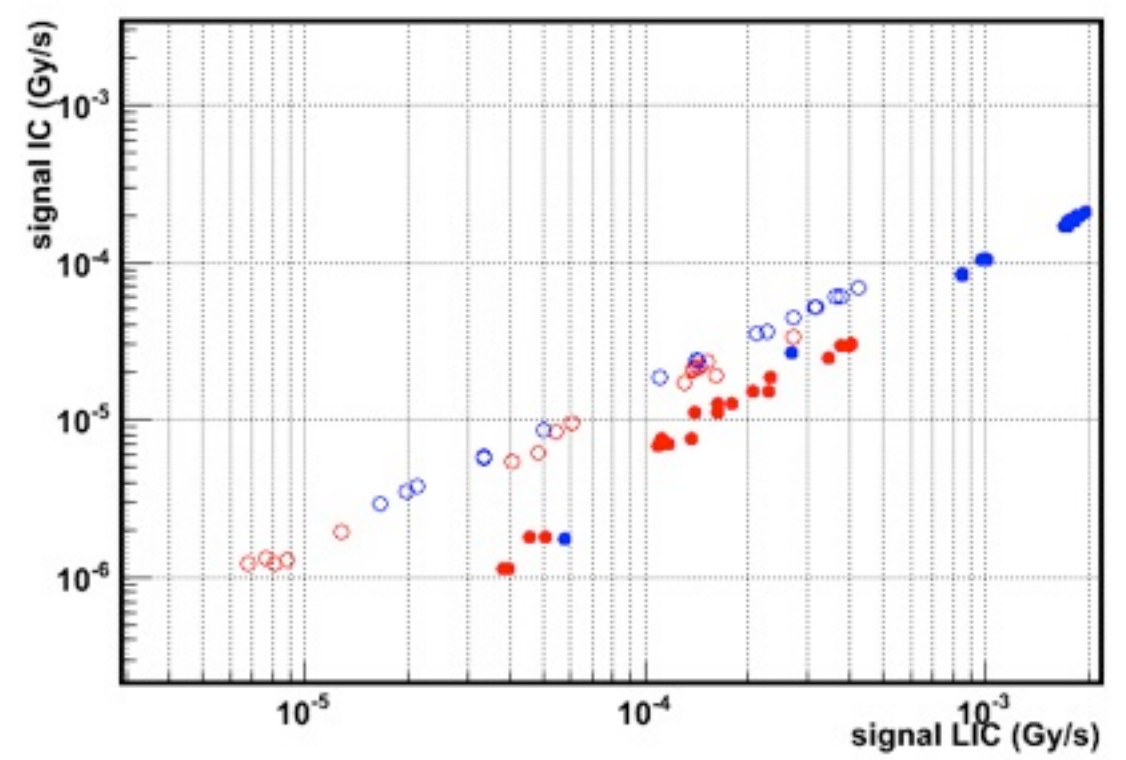
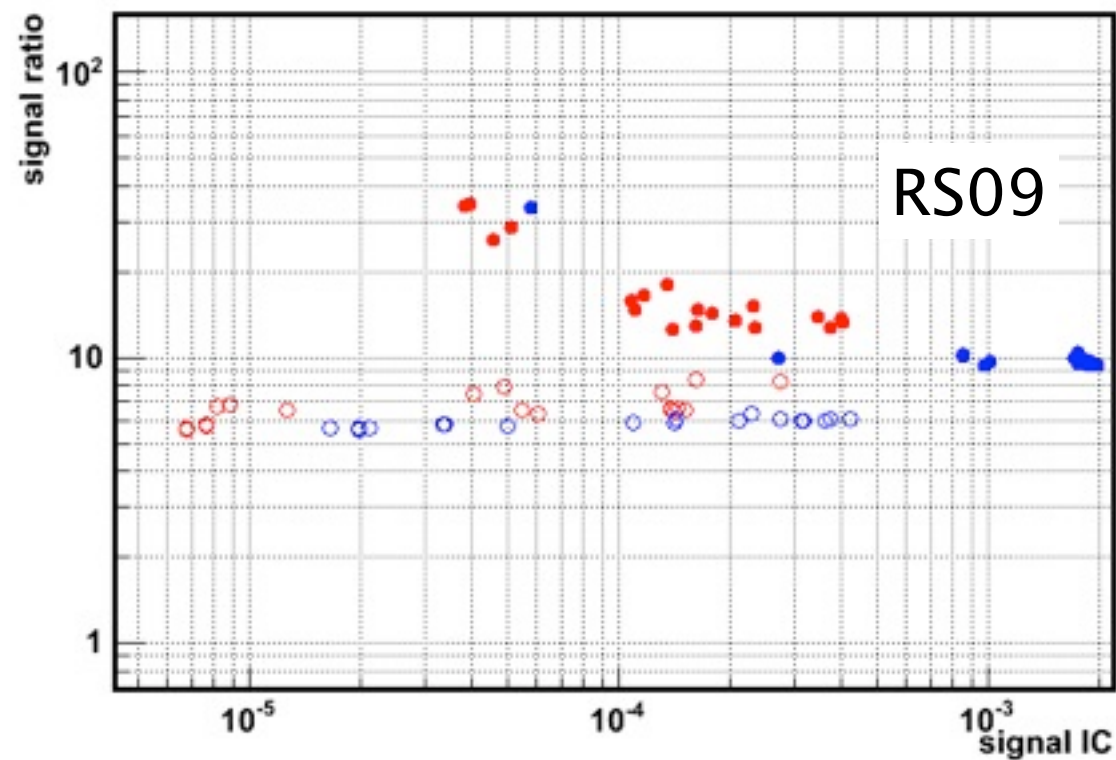
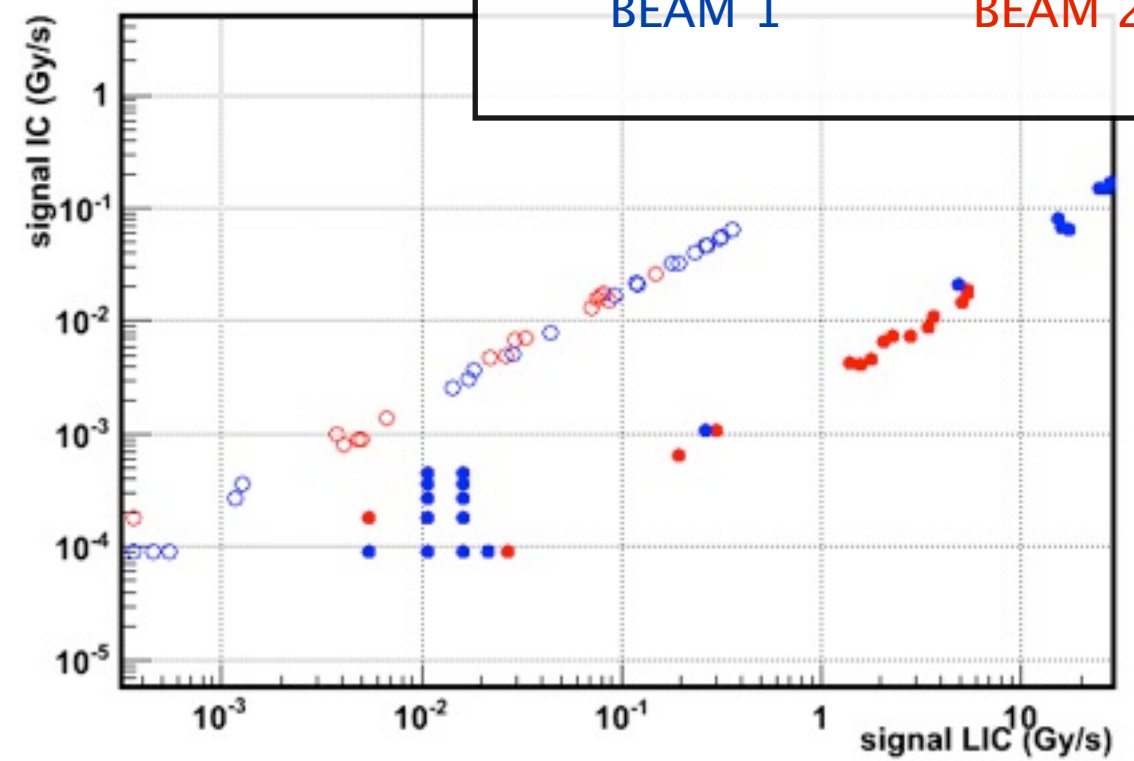
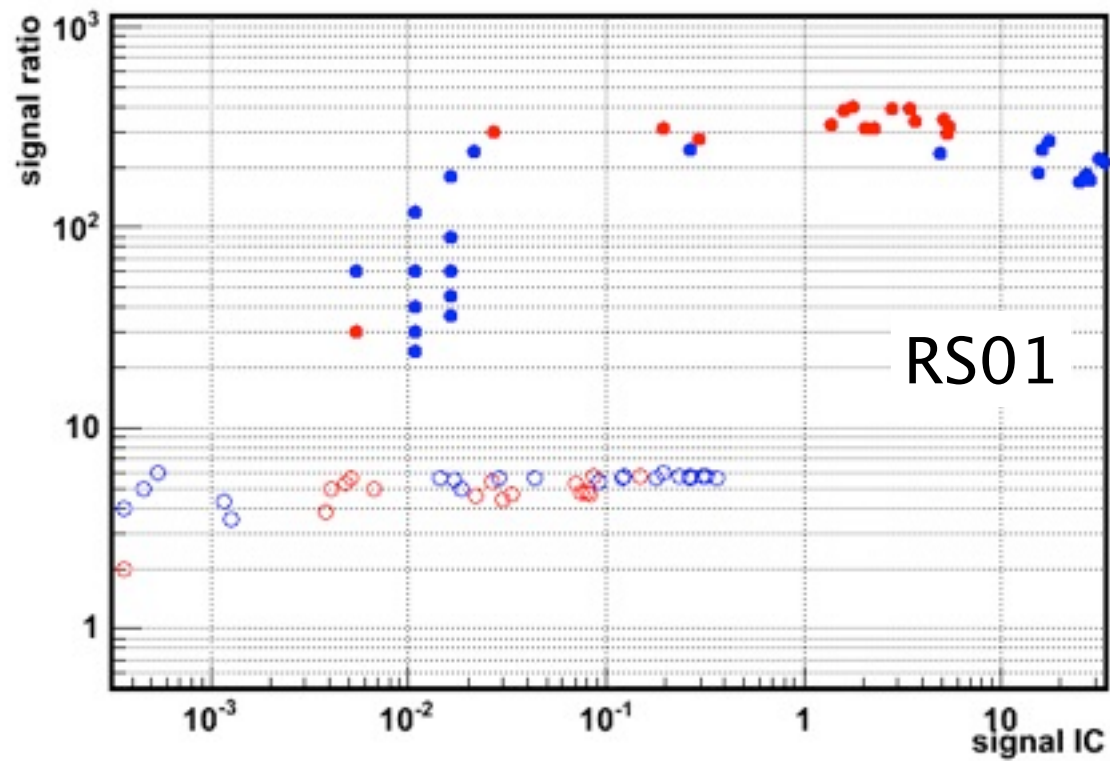


LHC. Monitors at MSI

○ Fill 2221 ● Fill 2533

BEAM 1

BEAM 2



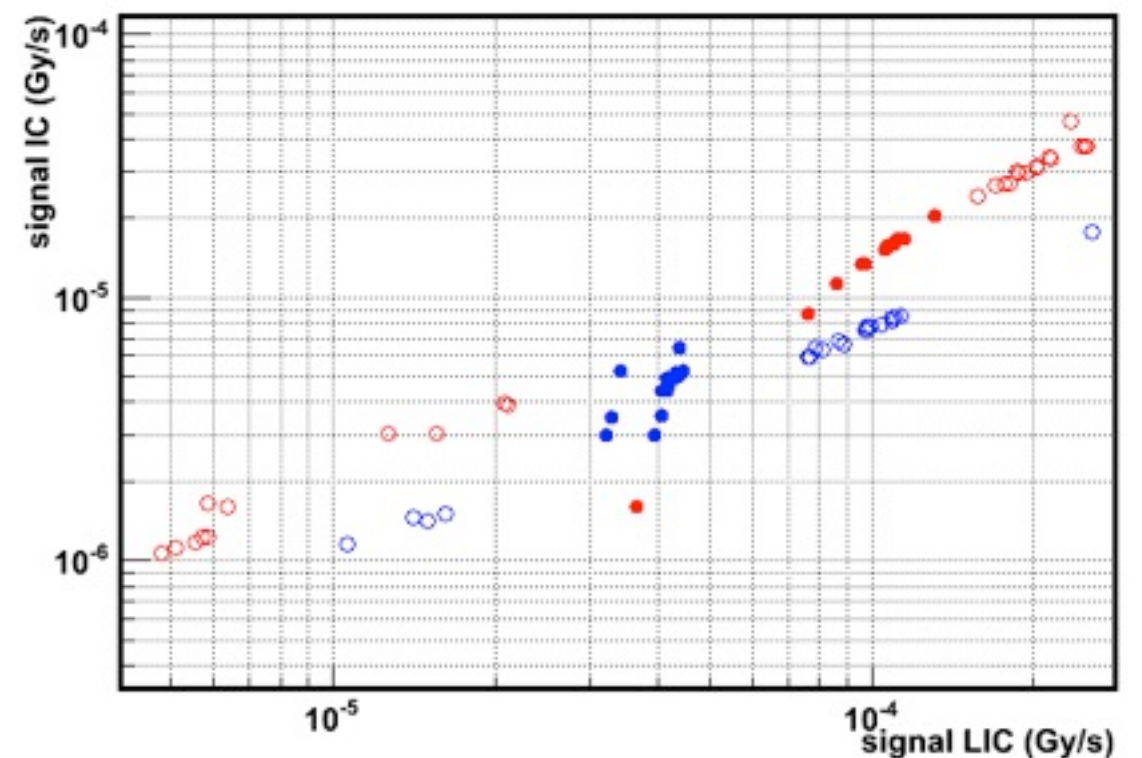
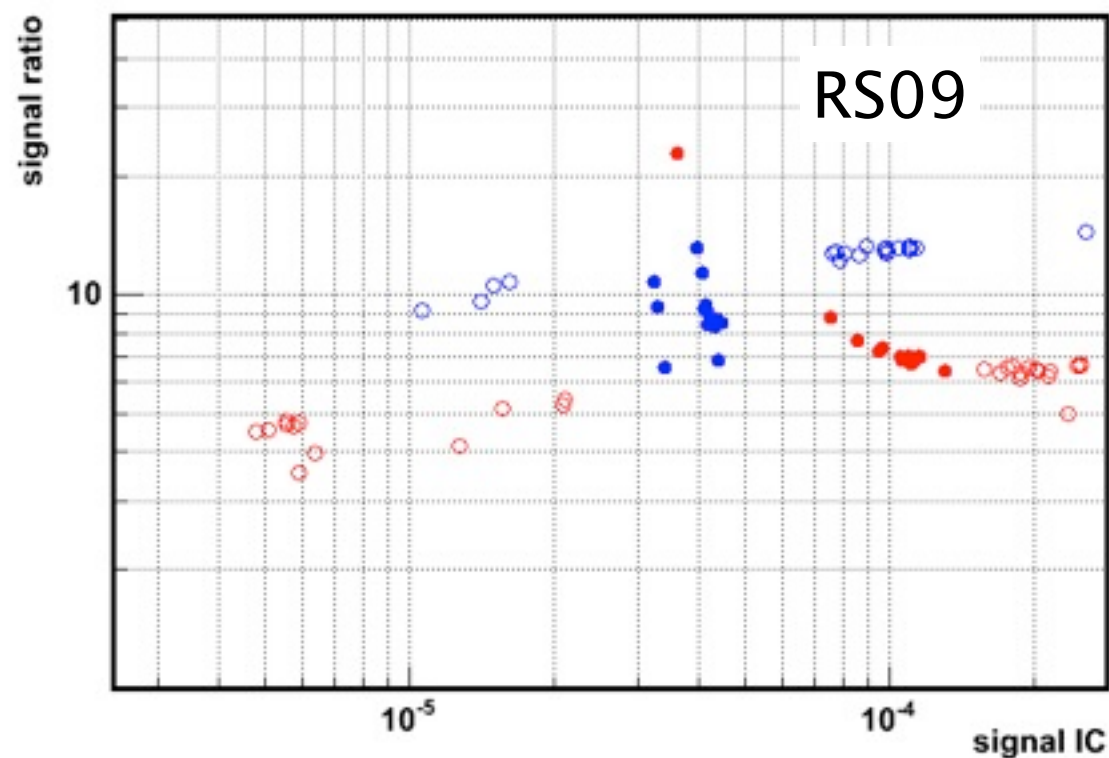
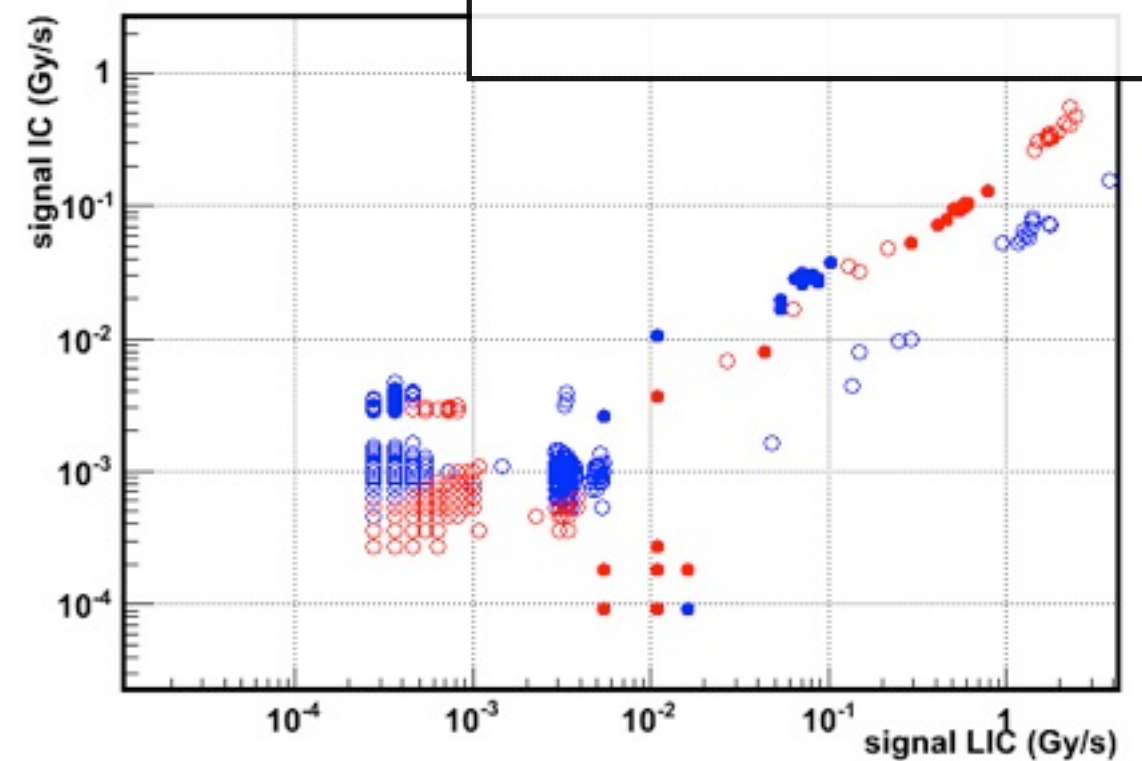
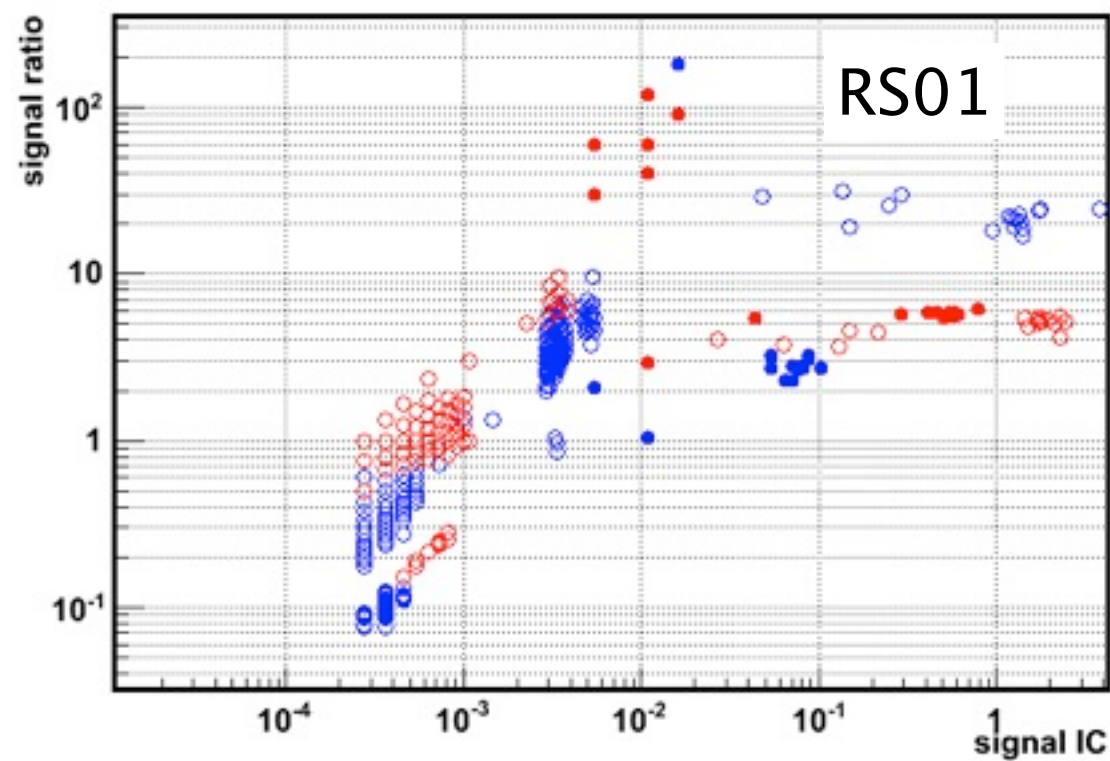
Monitors at MBXB – MQXA

○ Fill 2221

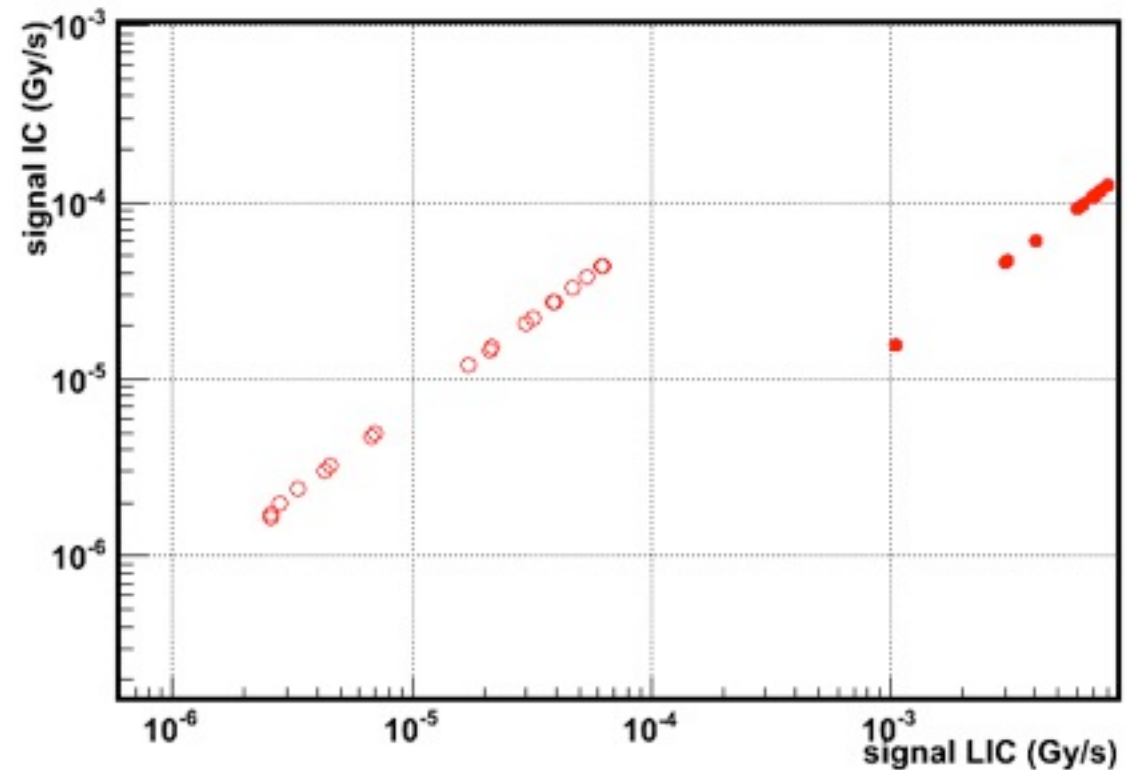
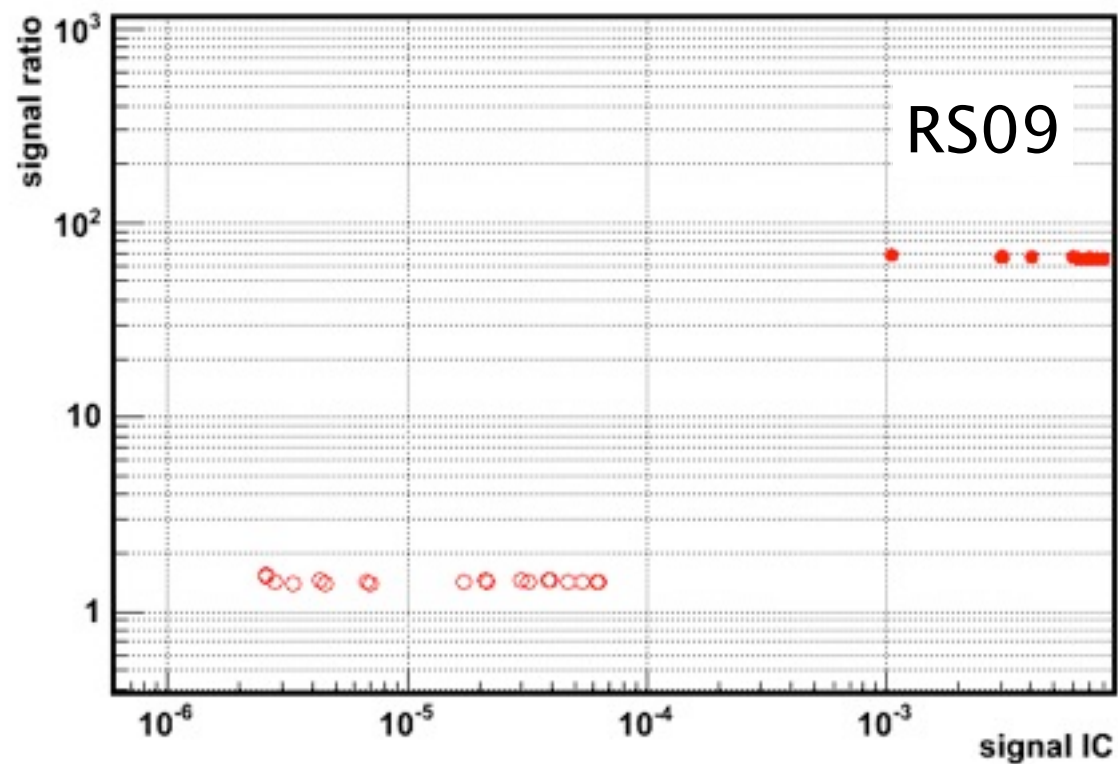
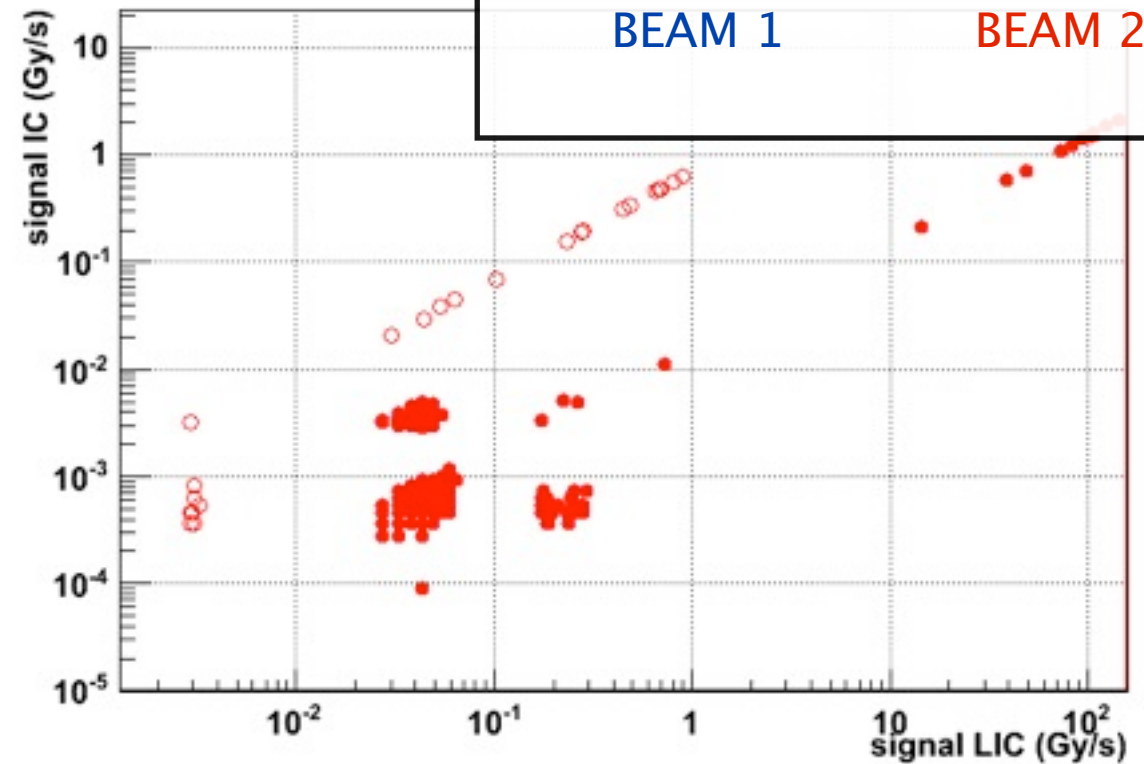
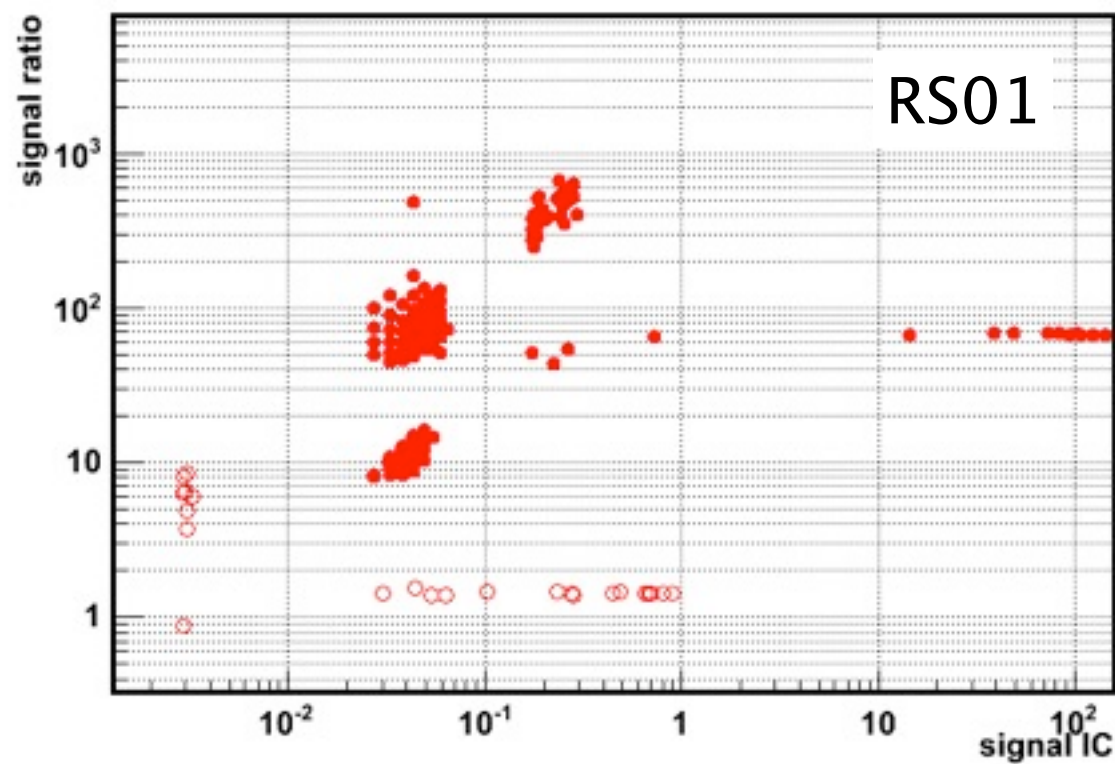
● Fill 2533

BEAM 1

BEAM 2



Monitors at MQML.



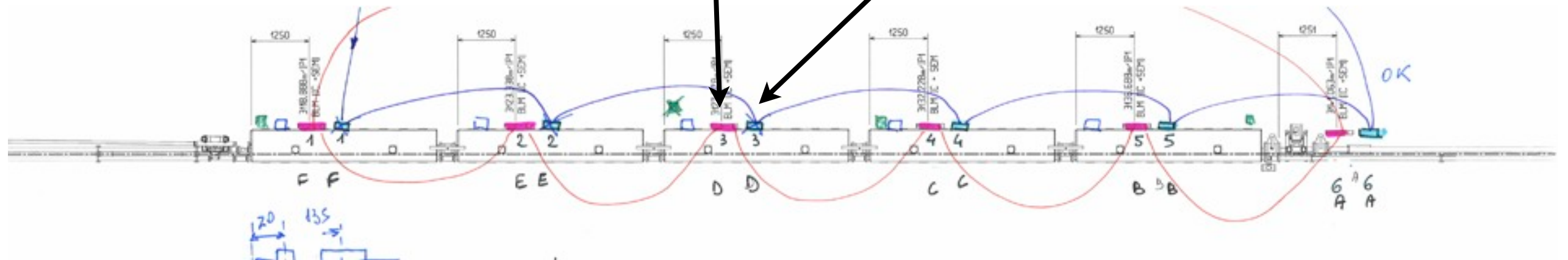
LHC. Installation MSI 06L2

- Original situation: 6 IC + 6 SEM separated by ~60cm (on top of MSI magnets)
- SEM detectors are not connected to BIS
- Replace SEM by LICs to gain more experience with these detectors. LICs not connected to BIS

Beam I

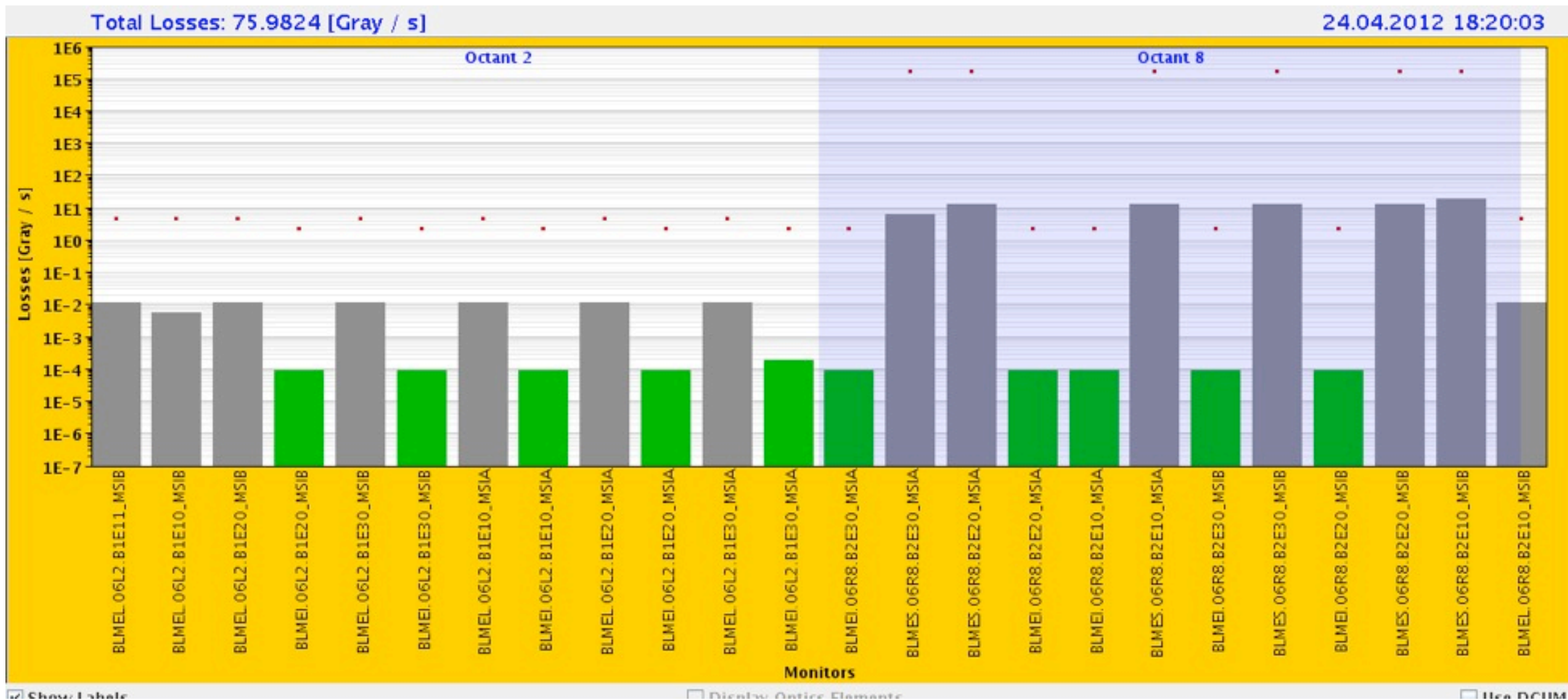


IC SEM -> LIC



LHC. Installation MSI 06L2

- SITUATION after installation. IP2 vs IP8



LHC. Installation MSI 06L2

- SITUATION after installation. IP2 vs IP8

Six SEM monitor located in the septa magnets in 06L2 were replaced by LIC to gain experience on the performance of these detectors with LHC losses. The old (SEM) and new (LIC) monitor expert names are listed below.

Old Expert Name	New Expert Name
BLMES.06L2.B1E10_MSIB	BLMEL.06L2.B1E11_MSIB
BLMES.06L2.B1E20_MSIB	BLMEL.06L2.B1E20_MSIB
BLMES.06L2.B1E30_MSIB	BLMEL.06L2.B1E30_MSIB
BLMES.06L2.B1E10_MSIA	BLMEL.06L2.B1E10_MSIA
BLMES.06L2.B1E20_MSIA	BLMEL.06L2.B1E20_MSIA
BLMES.06L2.B1E30_MSIA	BLMEL.06L2.B1E30_MSIA

For simplicity, the six new LIC monitors are moved to family THRL_MSI. This family contains dedicated threshold for the two LIC monitors (BLMEL.06L2.B1E10_MSIB and BLMEL.06R8.B1E10_MSIB) that were installed during the shut down. However, the 6 monitors are exclusively installed for measurements and they are disconnected from BIS.

The two attached plots show the situation in cells 06R8 and 06L2 before (note that when this plot was produced the SEM monitors in 06L2 were already removed from LSA. therefore they do not show up in the graphic) and after the modification. In the after plot, there are 7 LIC monitors in 06L2 whereas in 06R8 1 LIC and 5SEM detectors are observed.

IMPORTANT! Changes implemented on 24/04/2012 at 17:52. Entry posted by mistake on LHC COLL logbook

BLMEL.06L2.B
BLMEL.06L2.B
BLMEL.06L2.B
BLMEL.06L2.B
BLMEL.06L2.B
BLMEL.06L2.B
BLMEL.06L2.B
BLMEL.06L2.B
BLMEL.06L2.B
BLMEL.06L2.B
BLMEL.06L2.B
BLMEL.06L2.B
BLMEL.06L2.B
BLMEL.06R8.B
BLMES.06R8.B
BLMES.06R8.B
BLMEI.06R8.B
BLMEI.06R8.B
BLMES.06R8.B
BLMEI.06R8.B
BLMES.06R8.B
BLMEI.06R8.B
BLMES.06R8.B
BLMES.06R8.B
BLMEI.06R8.B
BLMES.06R8.B
BLMES.06R8.B
BLMEI.06R8.B
BLMES.06R8.B
BLMES.06R8.B
BLMEL.06R8.B2E10.B

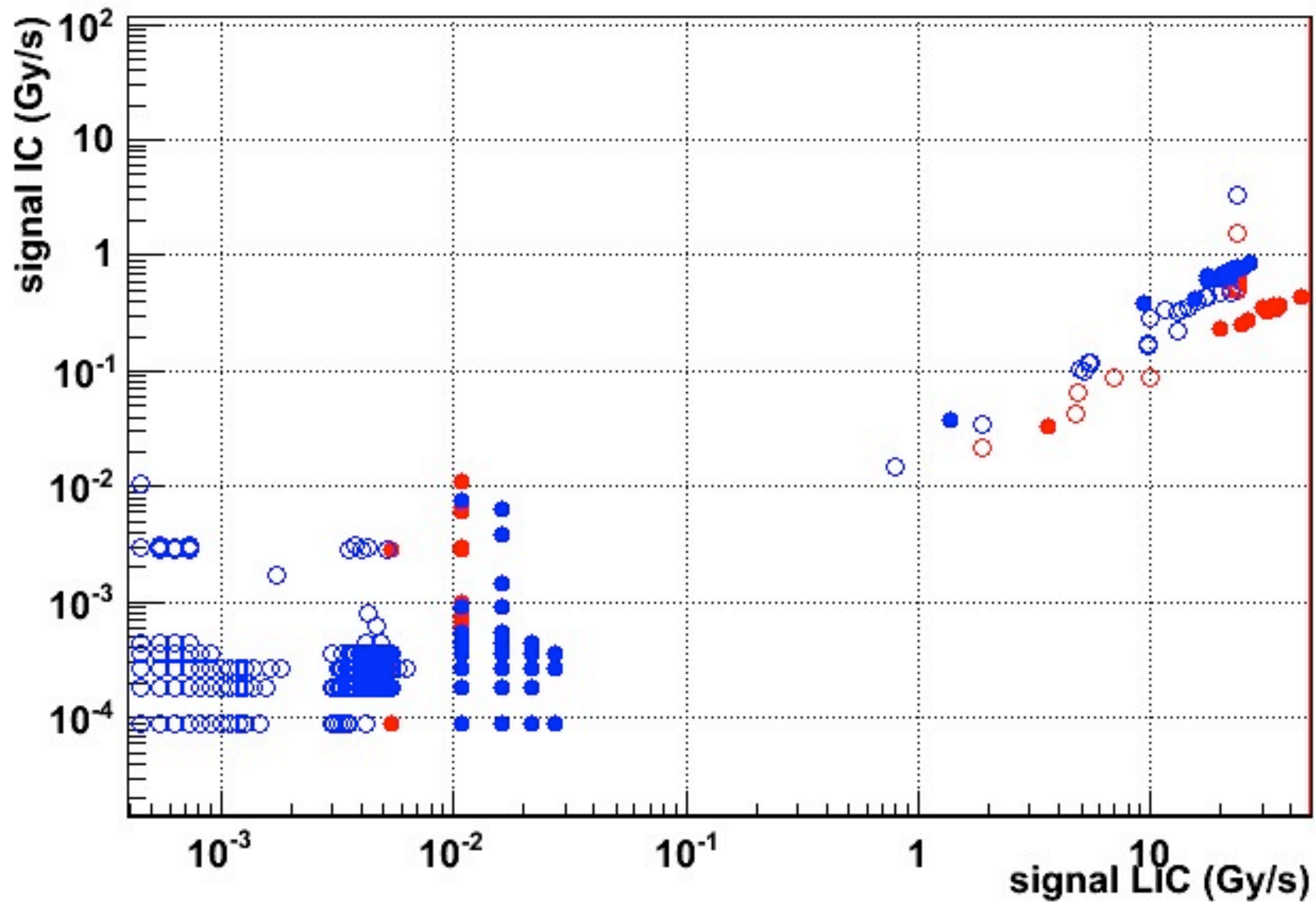
Monitors

Conclusions

- Several Noise spikes observed within 9 hours.
- LICs have performed well under slow loss conditions collecting significantly less charge (up to a factor 58)
- Losses observed by LIC during injections of up to 144 bunches (fill 2533) compared with losses observed during injections last year (fill 2221). Agreement within a factor 2 for monitors at TDIs, MSIs and MBXB.
- LIC monitor at MQML systematically records large signals. This monitor was previously exchanged for giving spurious signals. The monitors are under investigation of gas purity and filling pressure.
- Replacement of 6 SEM by LICs to gain experience.

Back up slides

LHC. Monitors at TDI. RS01



LHC. Monitor at MQML. RS01

