BLM SYSTEM:
INTERLOCK REQUEST OF 20/09/2016

Christos Zamantzas on behalf of the BLM team.

04/10/2016

Modifications done in the area during TS2

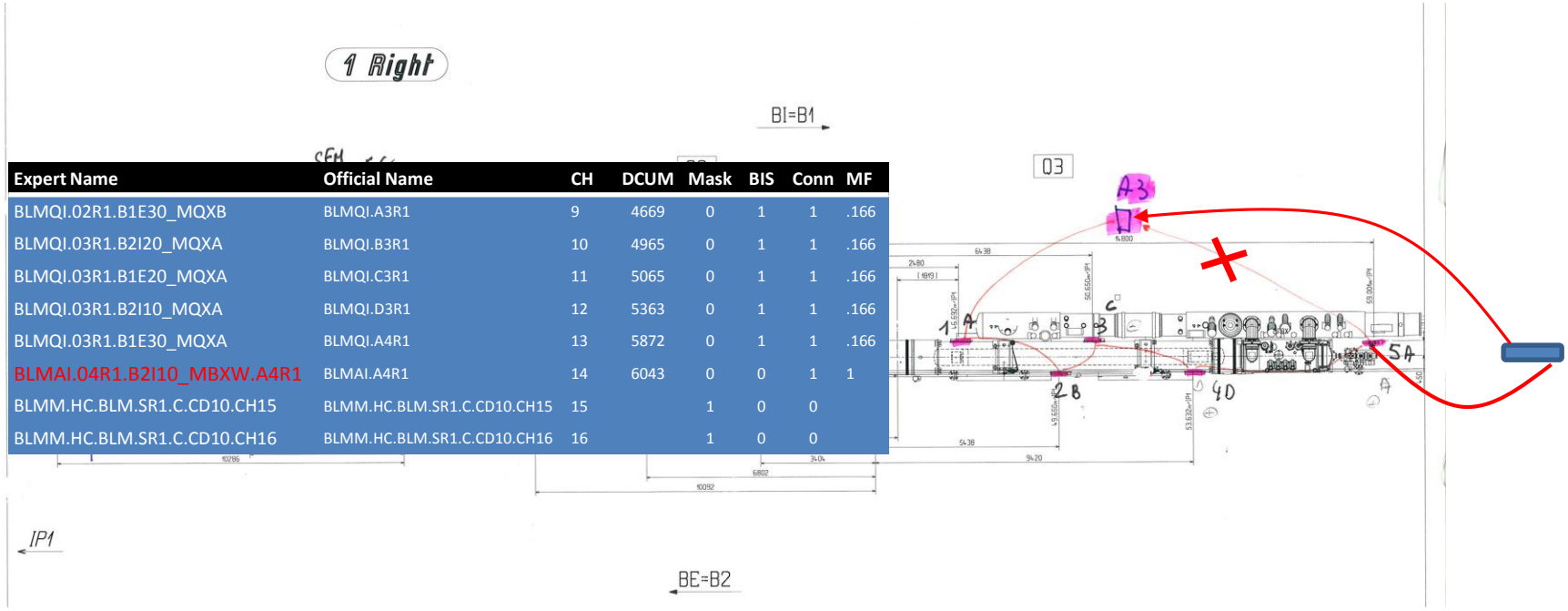
INSTALLATION & VERIFICATION

Addition of new channels

During TS2 two channels added to assist D1 studies

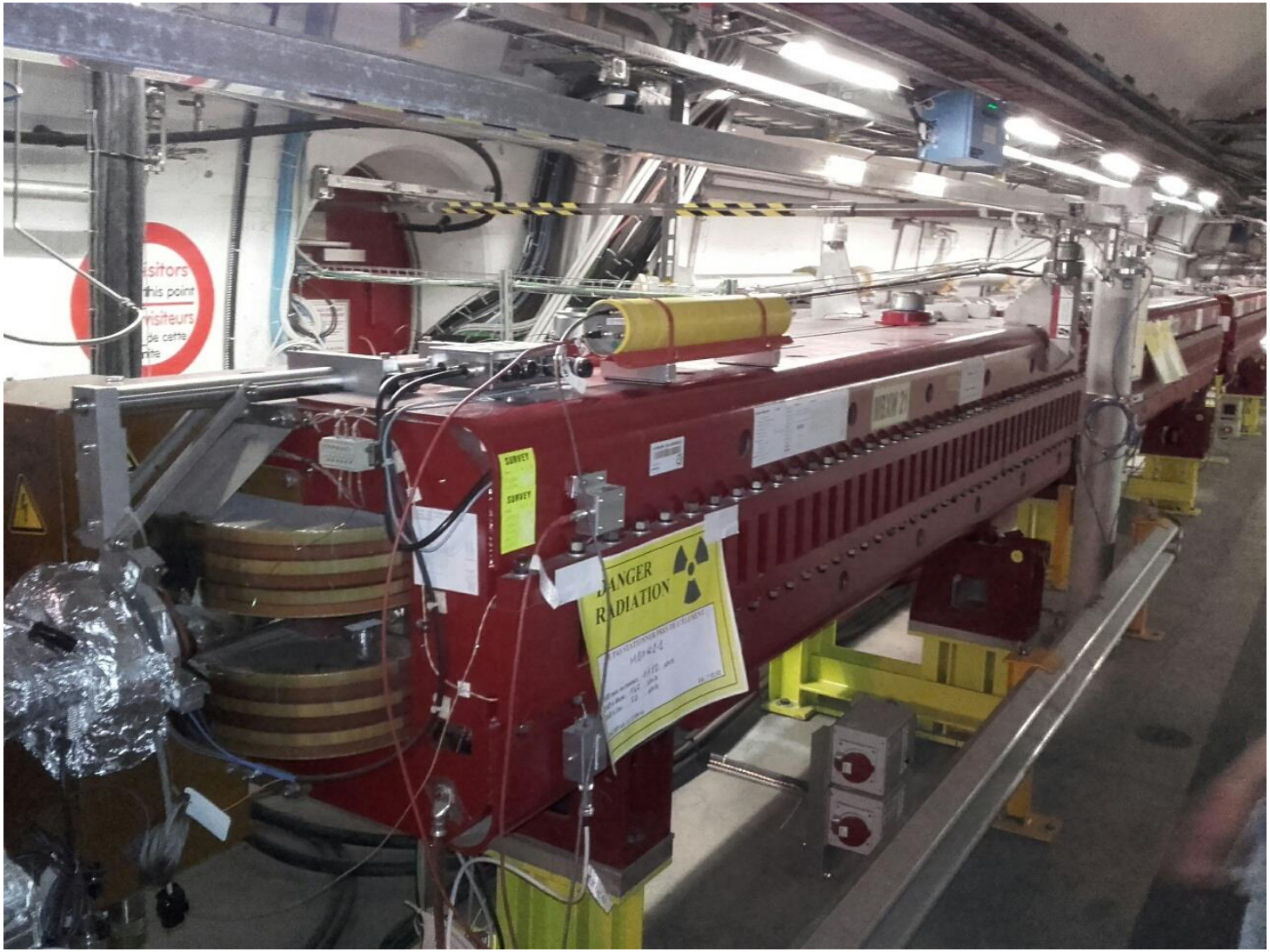
- Installation of channel BLMAI.04R1.B2I10_MBXW.A4R1 & BLMAI.04L1.B1I10_MBXW.A4L1
- Standard addition on the high-voltage network
- Signal in the spare channel of the same acquisition card (BLECF)

Expert Name	Official Name	CH	DCUM	Mask	BIS	Conn	MF
BLMQI.02R1.B1E30_MQXB	BLMQI.A3R1	9	4669	0	1	1	.166
BLMQI.03R1.B2I20_MQXA	BLMQI.B3R1	10	4965	0	1	1	.166
BLMQI.03R1.B1E20_MQXA	BLMQI.C3R1	11	5065	0	1	1	.166
BLMQI.03R1.B2I10_MQXA	BLMQI.D3R1	12	5363	0	1	1	.166
BLMQI.03R1.B1E30_MQXA	BLMQI.A4R1	13	5872	0	1	1	.166
BLMAI.04R1.B2I10_MBXW.A4R1	BLMAI.A4R1	14	6043	0	0	1	1
BLMM.HC.BLM.SR1.C.CD10.CH15	BLMM.HC.BLM.SR1.C.CD10.CH15	15		1	0	0	
BLMM.HC.BLM.SR1.C.CD10.CH16	BLMM.HC.BLM.SR1.C.CD10.CH16	16		1	0	0	



Pictures

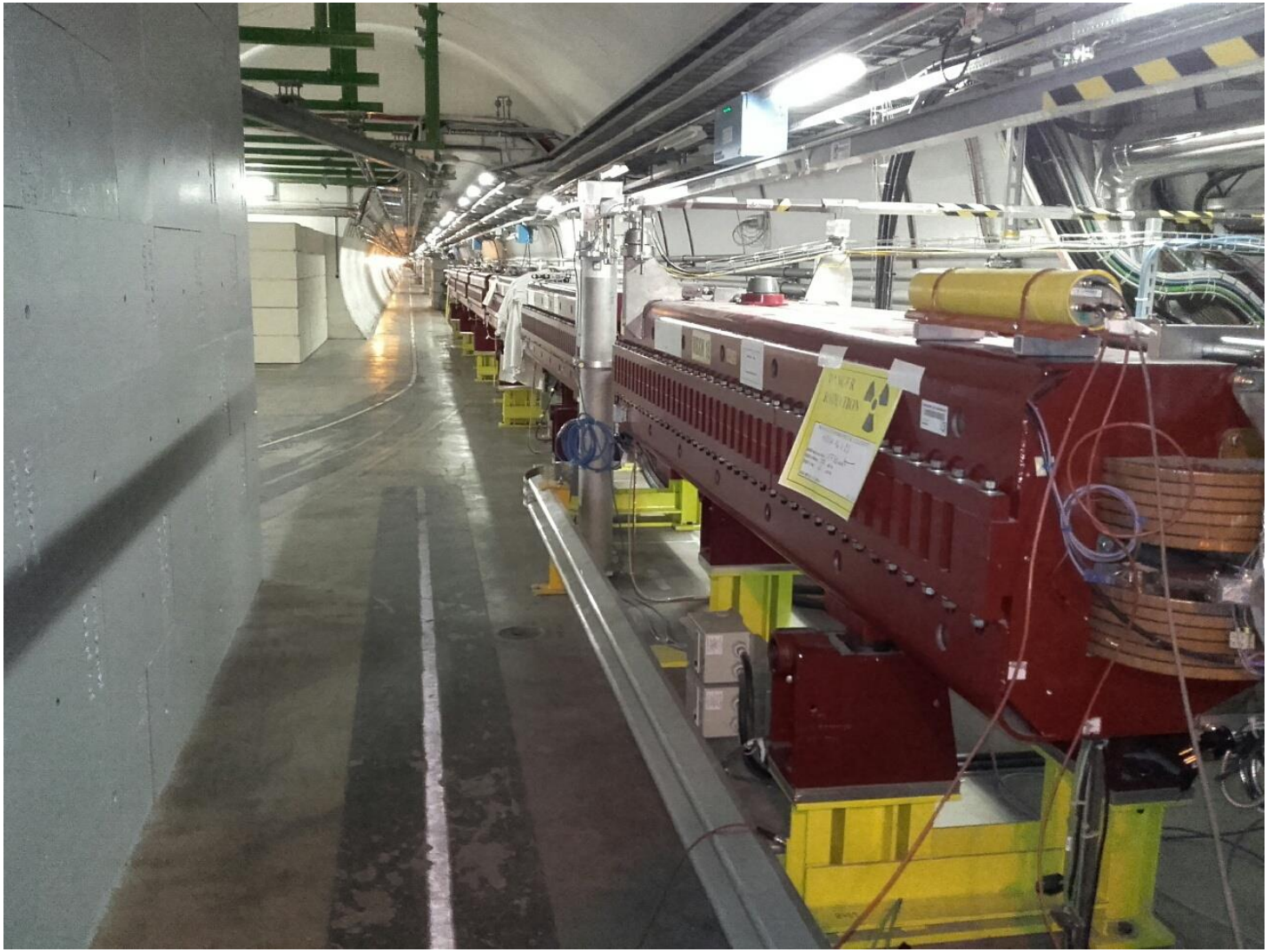
Pictures



Pictures

PRV834
HCMBXW_001-BI000018
MBXW018
GER
IATION
STATIONNER PRES DE L'ELEMENT :
1BXW 14 à 22
contact: 1730 µSv/h
2.00 µSv/h
45 µSv/h
Le 12/09/16
Tél : 7.52.52

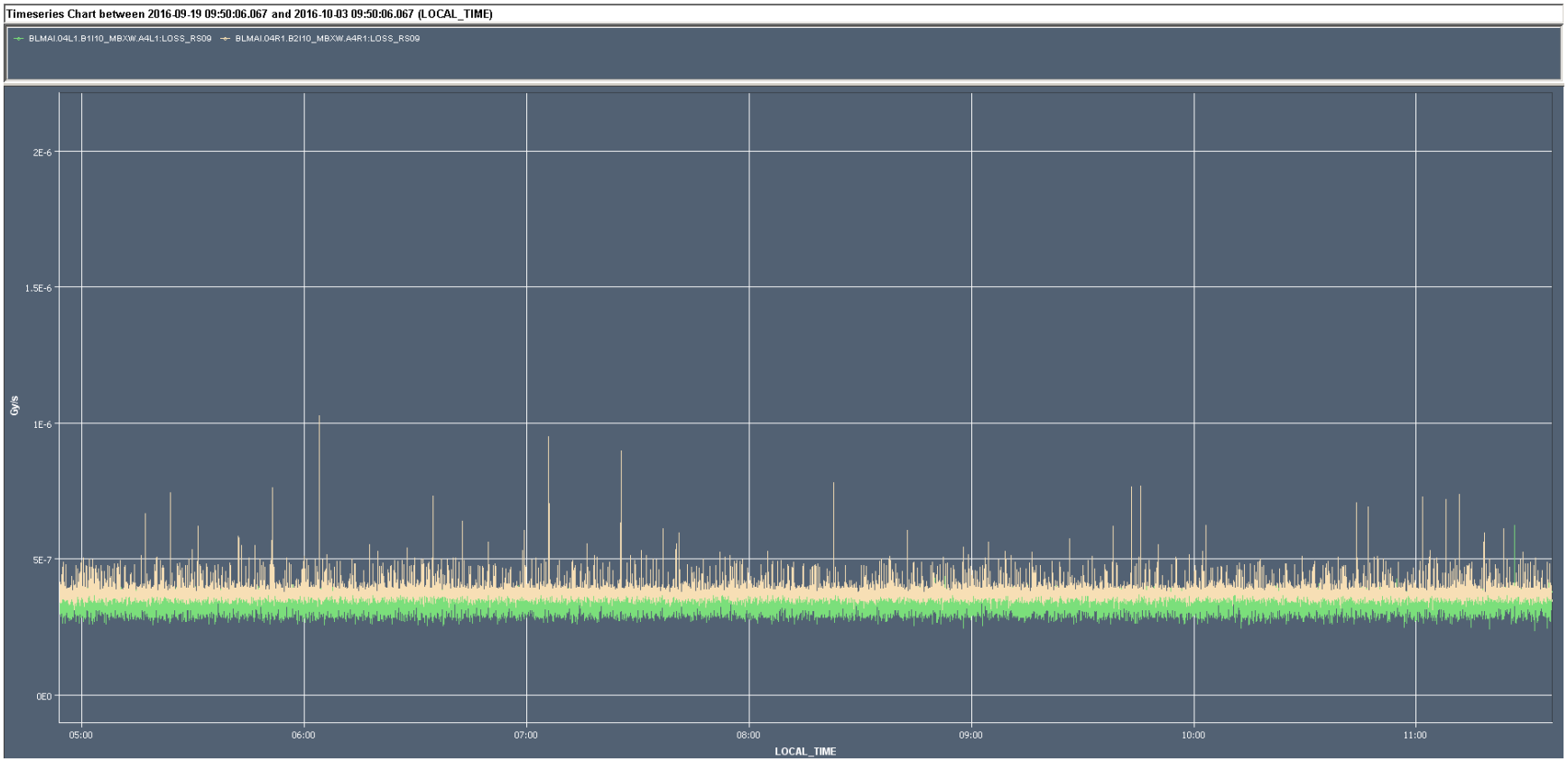
Pictures



Offset

Offset of both new channels is in the expected range

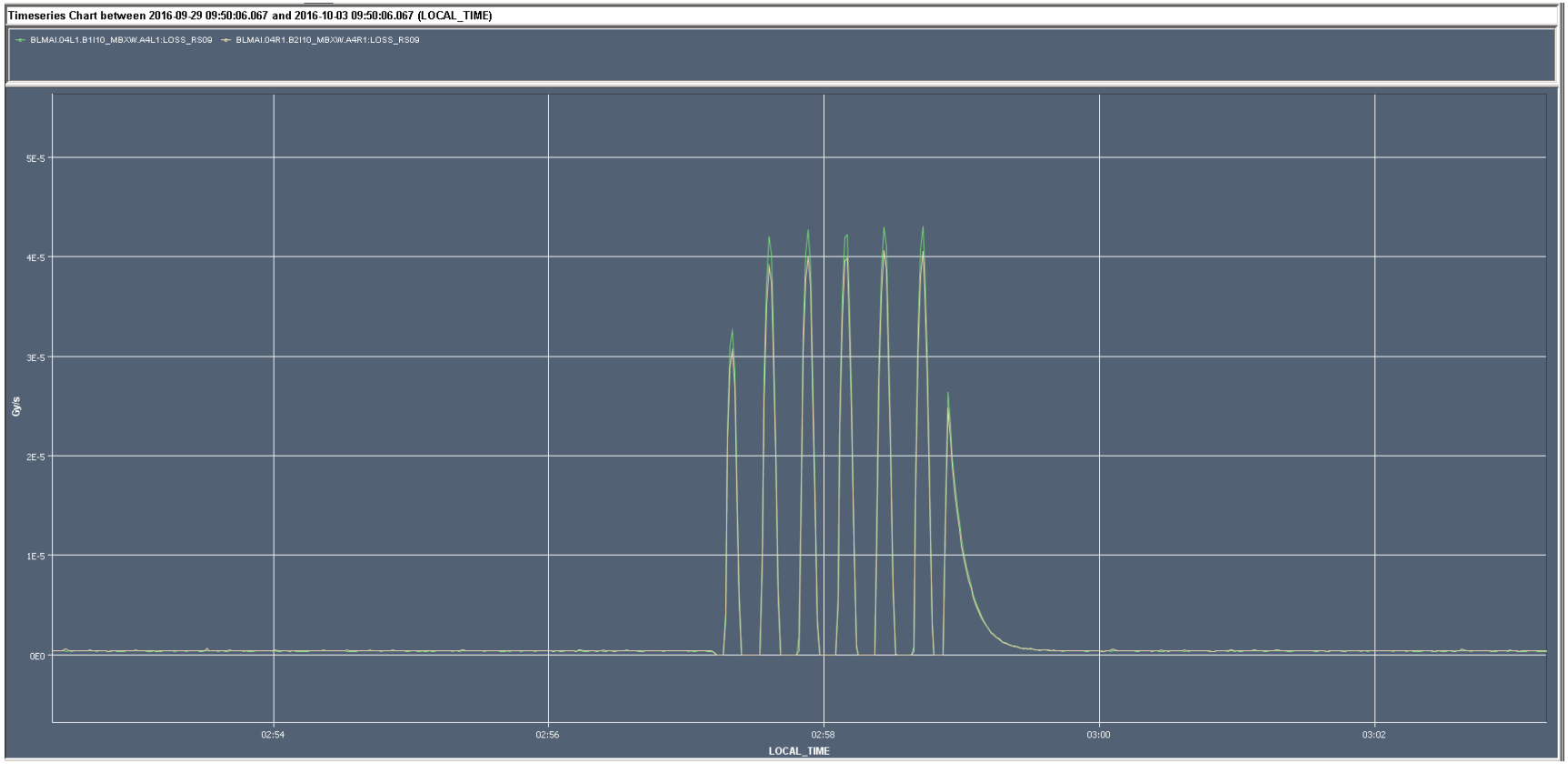
- Cables are not long (~additional 10 m)
- Nevertheless, not in cable trays, but on the floor.



Modulation

Modulation output of both new channels is in the expected range

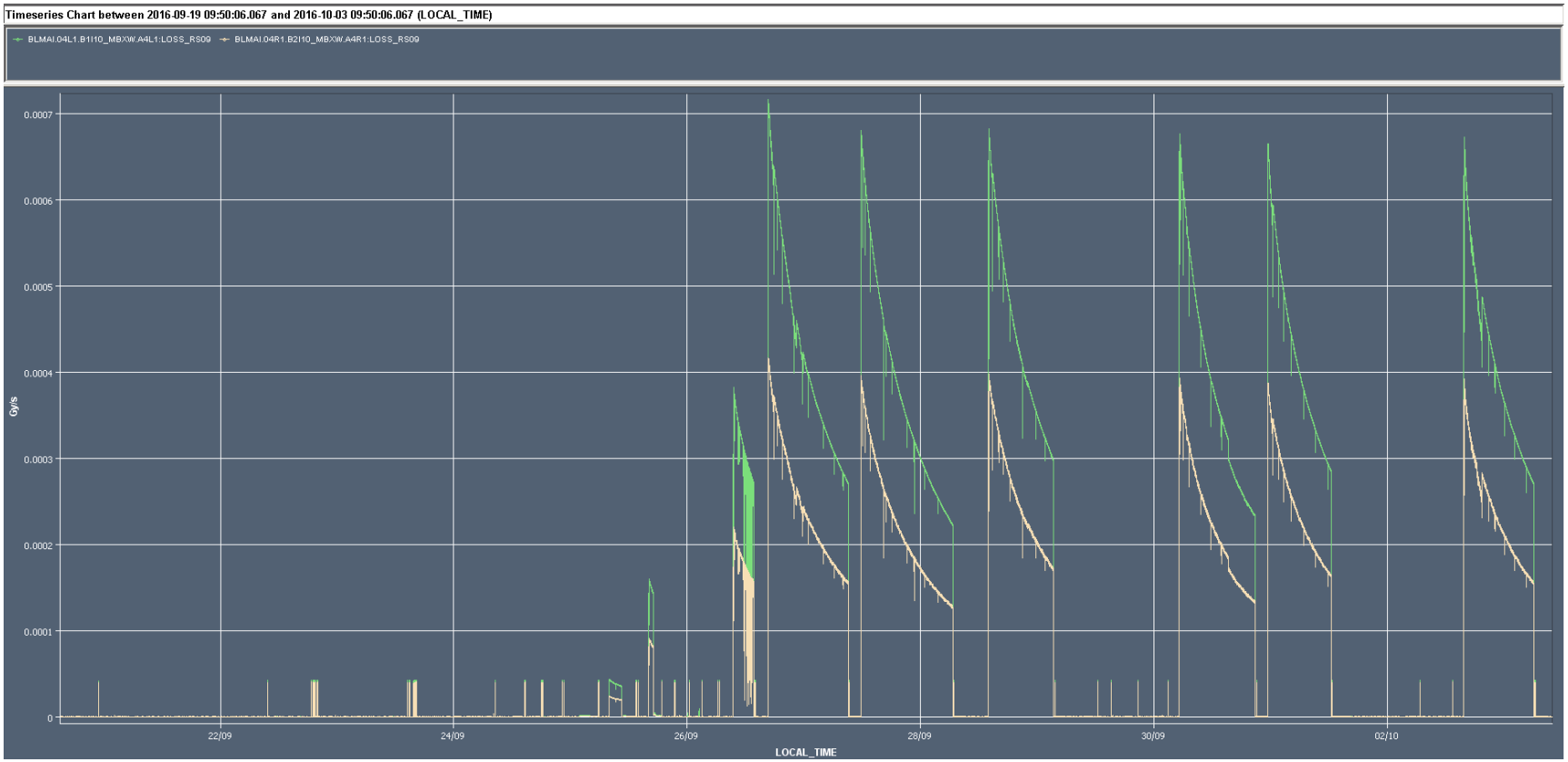
- Cables are not long (~additional 20 m)
- Nevertheless, not in cable trays, but on the floor.



Measurements

Checking RS09 over the logged period (up to 03/10/2016)

- Losses always x2 at L1
- Note: smaller spikes are modulation checks



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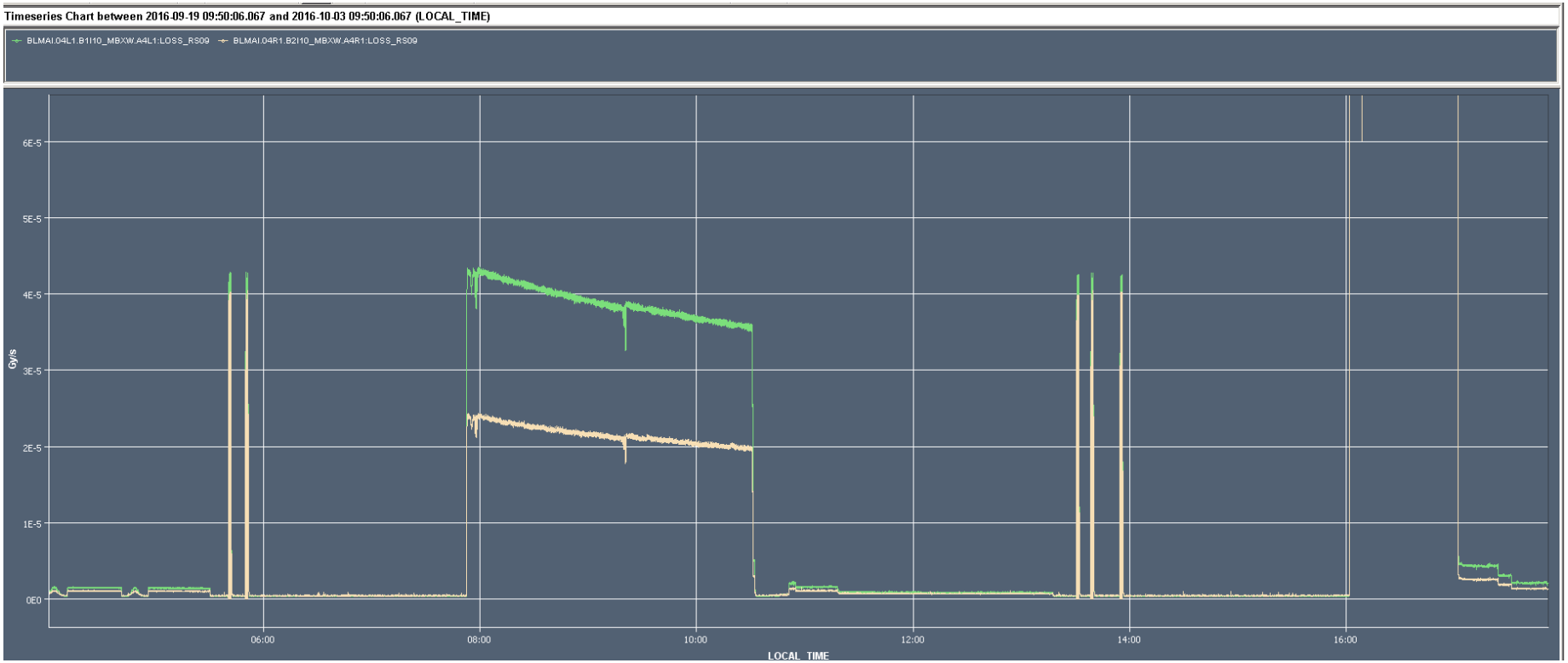

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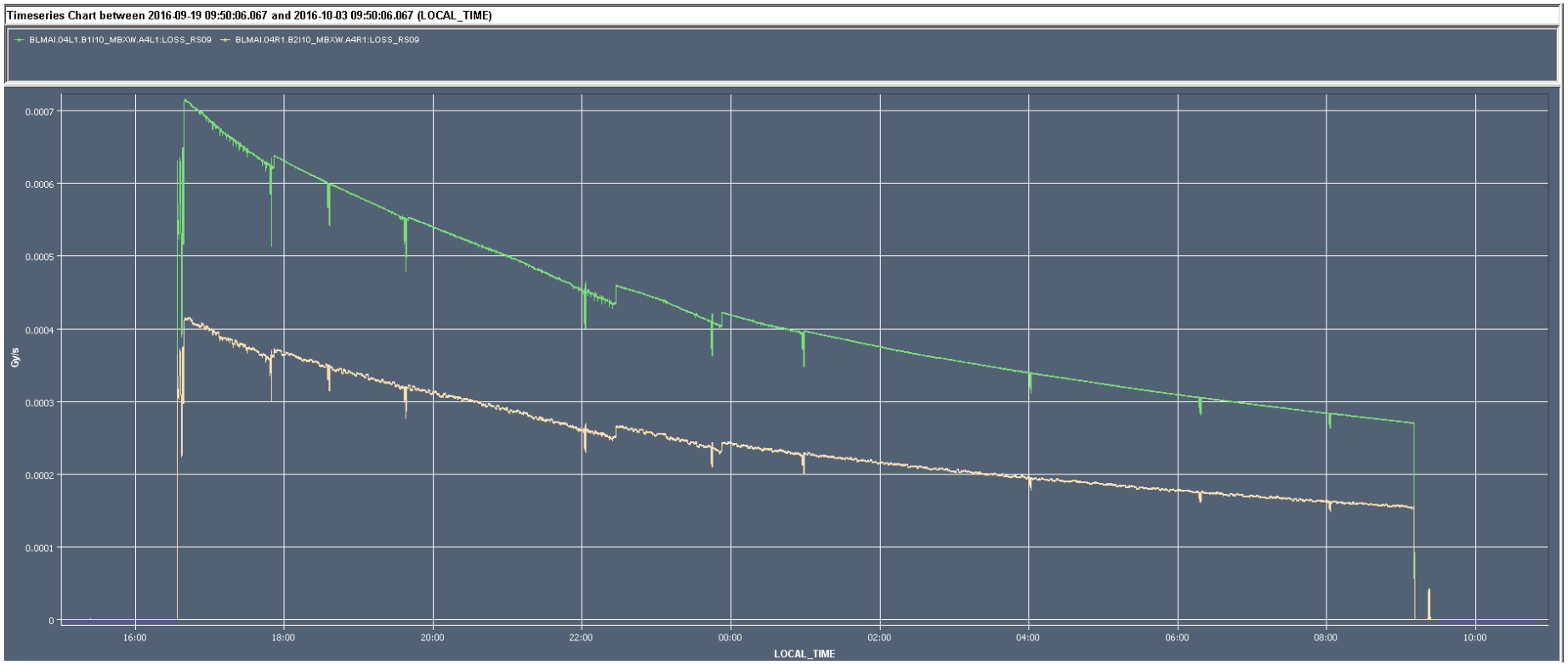
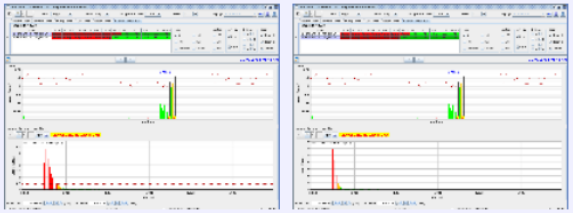


20/09/2016 EVENT

GPM Event

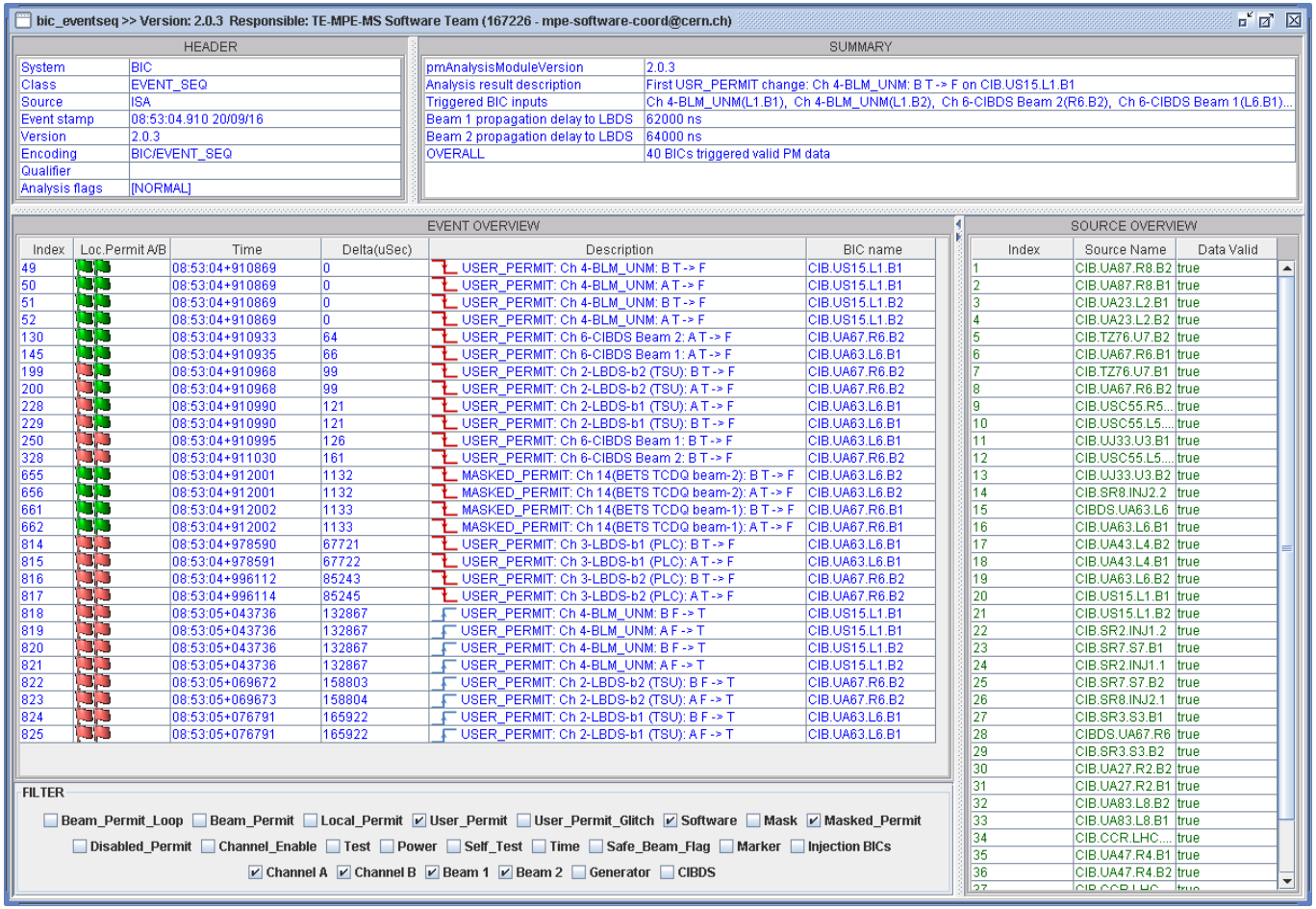
Event Timestamp: 20/09/16 08:53:04.910

7	08:53	1	Global Post Mortem Event Event Timestamp: 20/09/16 08:53:04.910 Fill Number: 5313 Accelerator / beam mode: PROTON PHYSICS / ADJUST Energy: 6499320 [MeV] Intensity B1/B2: 17 / 21 [e^10 charges] Event Category / Classification: PROTECTION_DUMP / MULTIPLE_SYSTEM_DUMP First BIC input Triggered: First USR_PERMIT change: Ch 4-BLM_UNM: B T -> F on CIB.US15.L1.B1  20160920091755.png 20160920091805.png *created by lhcop on CWO-CCC-D4LC*
8	08:53	1	Global Post Mortem Event Confirmation Dump Classification: Beam Loss Operator / Comment: msolfaro / Fast losses at the IT.R1 during 2.5 km run (5 low nominal bunches) *created by lhcop on CWO-CCC-D4LC*

- All channels of the BLMAI type were missing from the BLM applications.
- Logging was not correctly configured for the new channels.

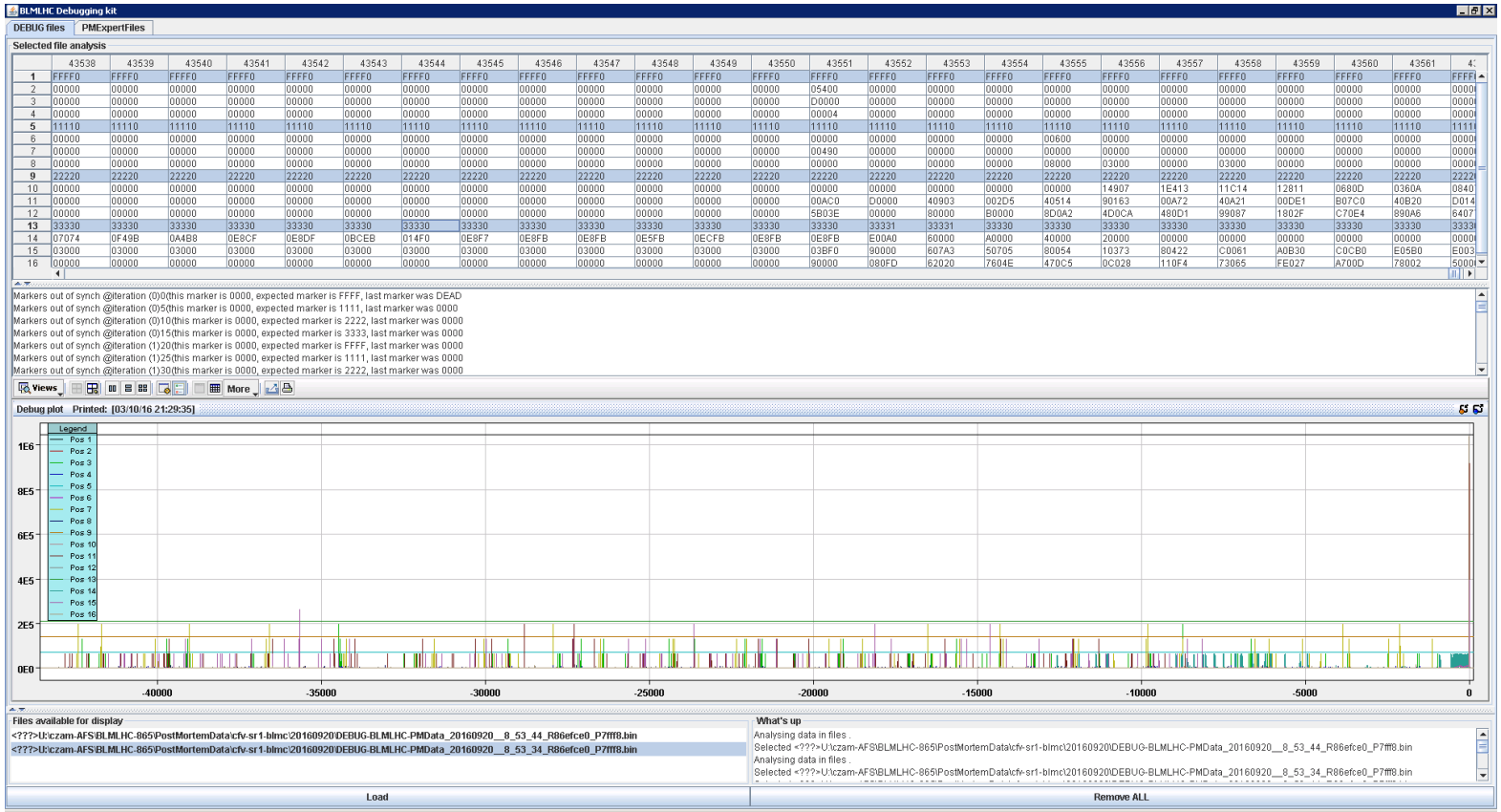
Interlock Sequence

- Only the UNMASKABLE output triggered
- Note: If error was from error or statuses would trigger both outputs



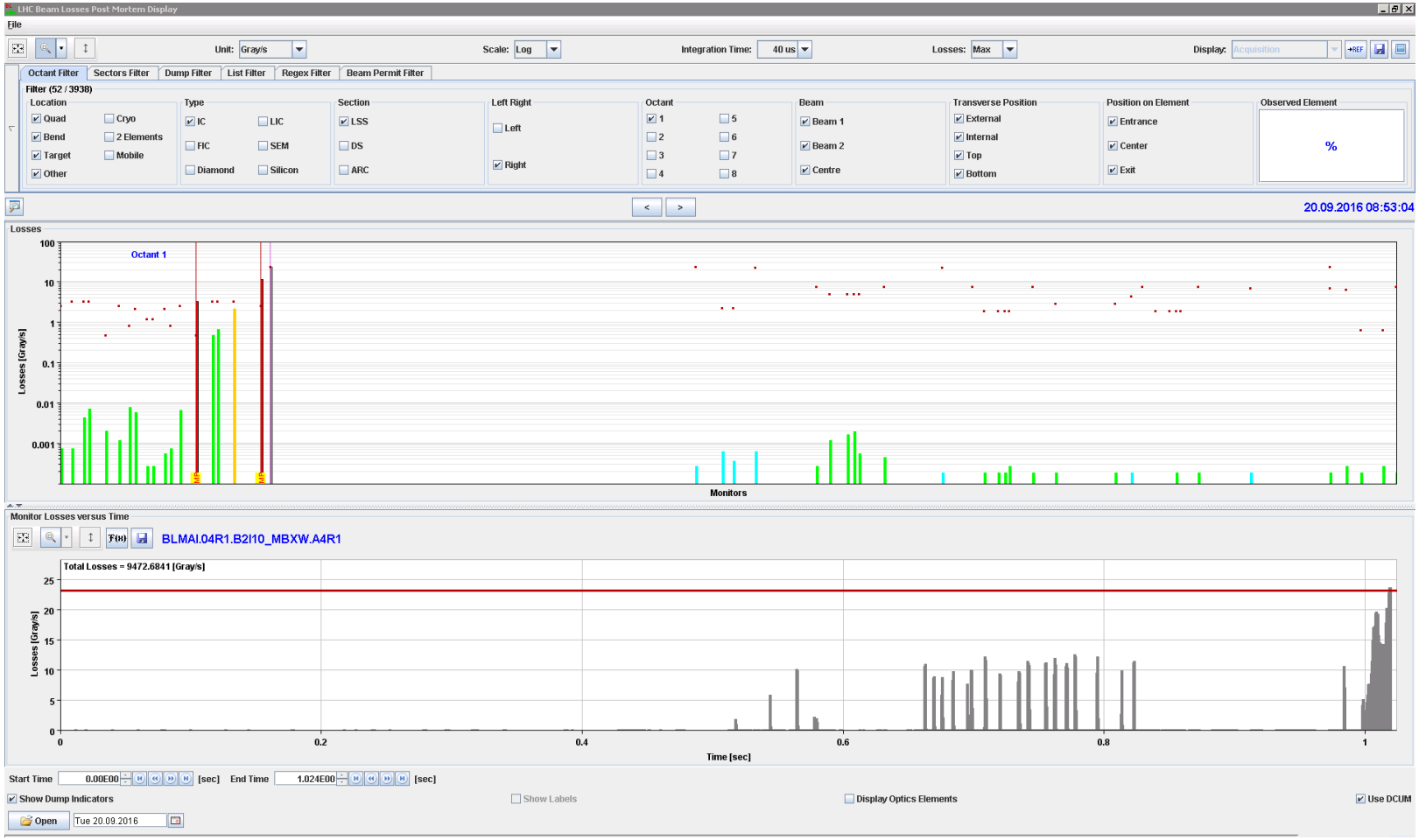
PM Buffer Verification

- No communication errors
- Markers in expert data show that data is correct



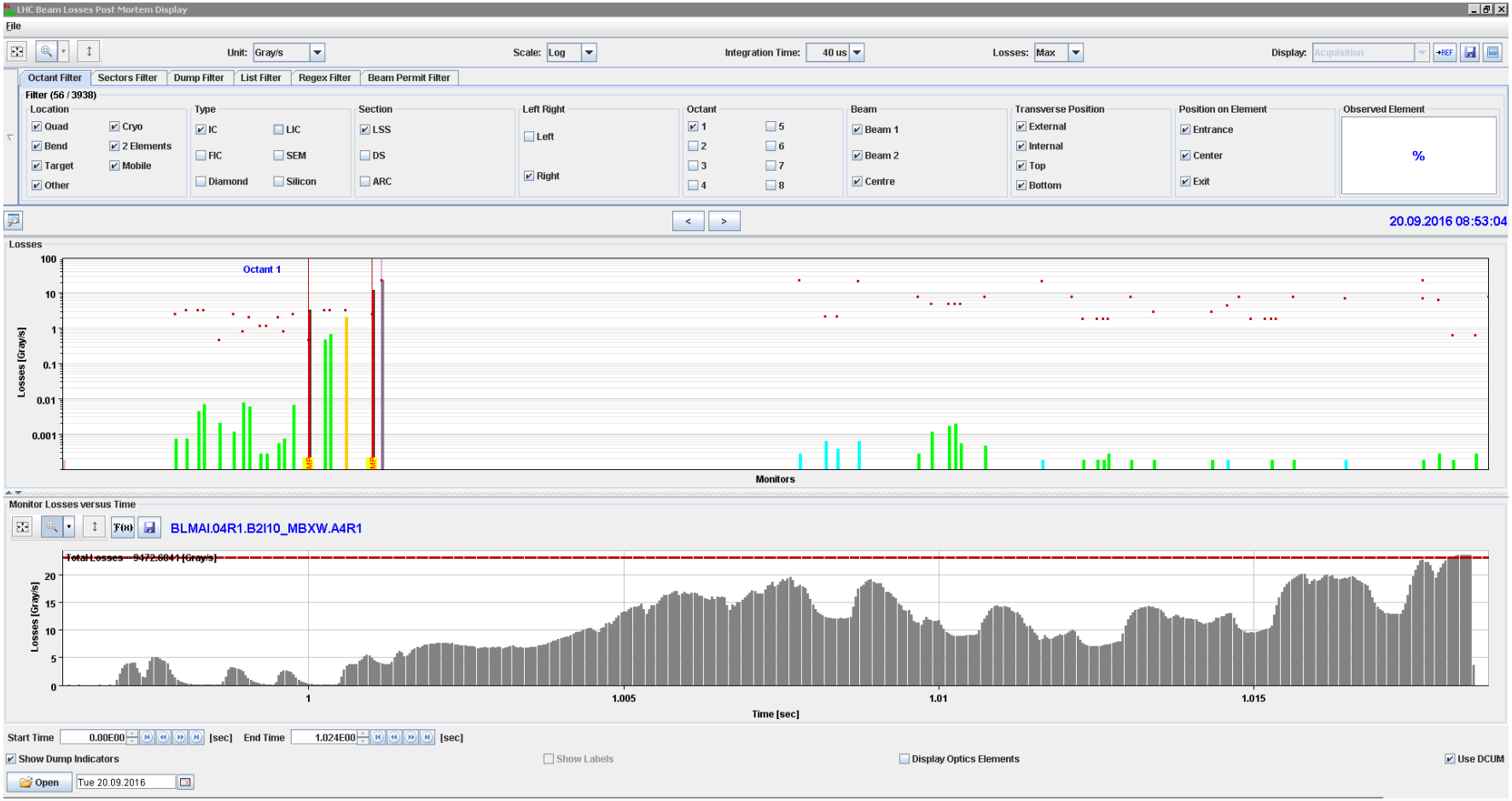
BLMAI.04R1.B2I10_MBXW.A4R1

Complete PM buffer:



BLMAI.04R1.B2I10_MBXW.A4R1

Zoom in the PM buffer just before the interlock request:



SR1.C, Card 10, Channels 09-14

Zoom in the PM buffer 1 ms around the interlock request;

All channels on the same acq. card and HV Box:

CONCLUSIONS

Summary

- None of the channels involved has shown any abnormal behaviour since the event.
- Issue cannot be attributed to SEU, broken card or wrong decoding of data
  - each channel is independent and
  - excessive check in the data correctness is done.
- Issue is localised
  - Some channels in other locations have minor losses at the same time, but most probably coincidence (noise) or crosstalk.
- Loss mechanisms cannot explain it (at least this is what experts claim)
- One probability (very low) is external coupling, but
  - cable adaptors for the extensions and detector are isolated
  - difficult to think how this would work to create such signals

THANK YOU