



# AOB - Update of BLM Thresholds at TCTs and IR5 TCL6

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Relevant input from B. Auchmann and G. Papotti

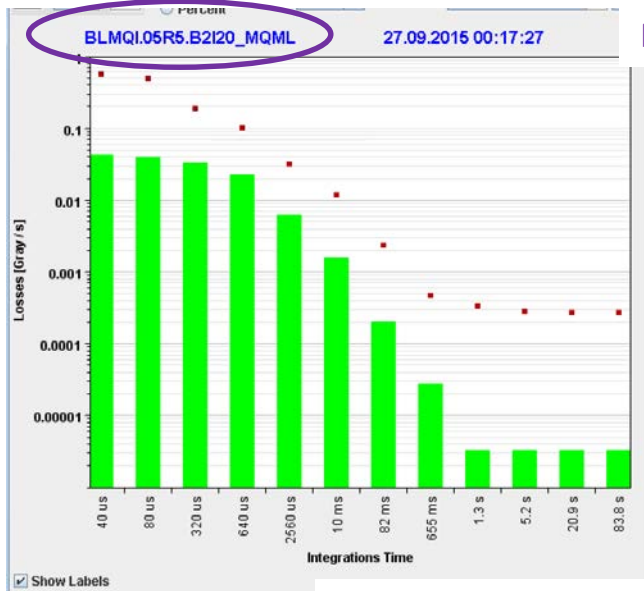
MPP Meeting, CERN, 09<sup>th</sup> Oct 2015

# UFO Dumps Triggered by TCT BLMs

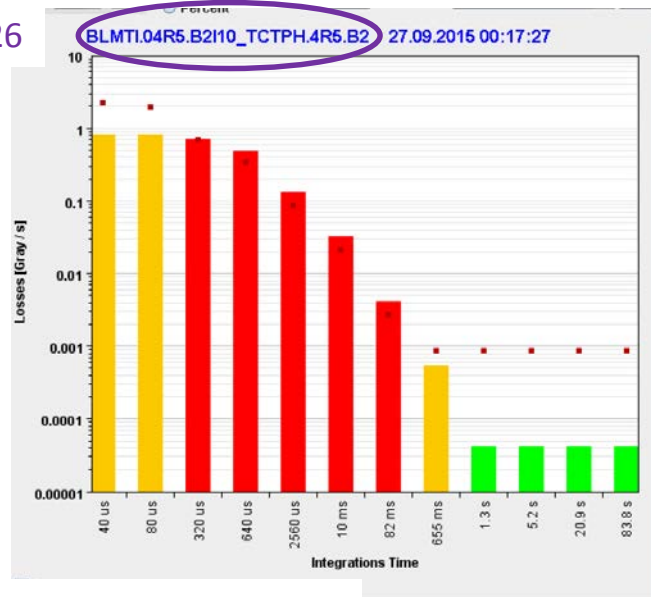
Two recent **UFO** beam **dump**s triggered by BLMs at **TCT**s:

- Fill **4423**, 26<sup>th</sup> Sep 2015, 12:31, **L1**; → RS06/RS07 ~110% of thresholds;
- Fill **4426**, 27<sup>th</sup> Sep 2015, 00:17, **R5**; → actual case for setting new thresholds;

UFO actually happening at the upstream MQM, but no warning levels were reached there;

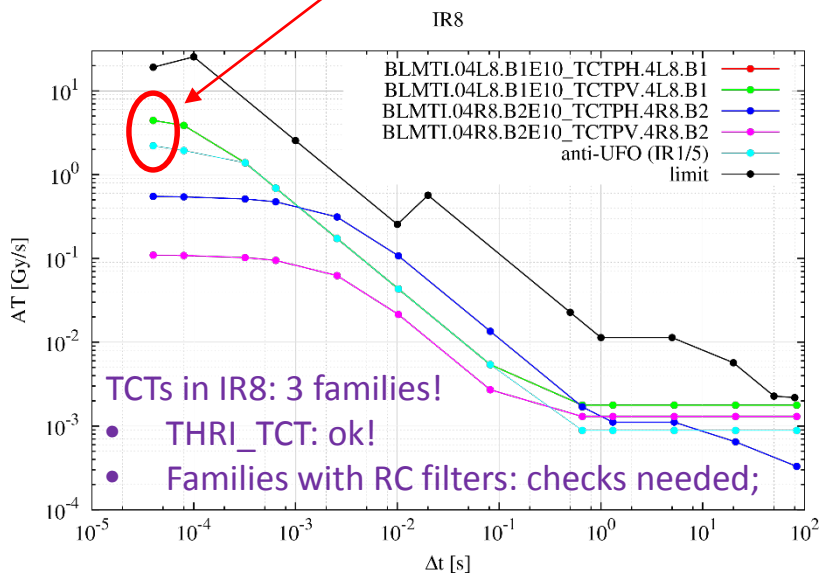
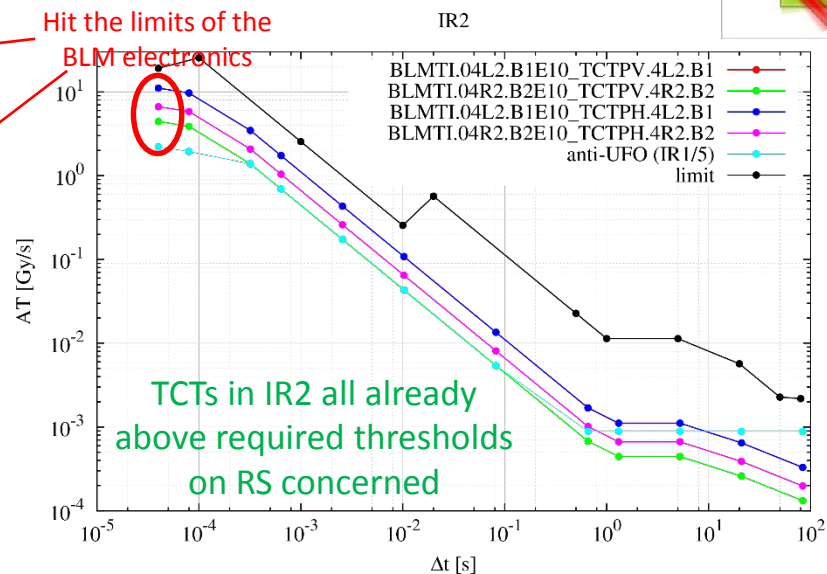
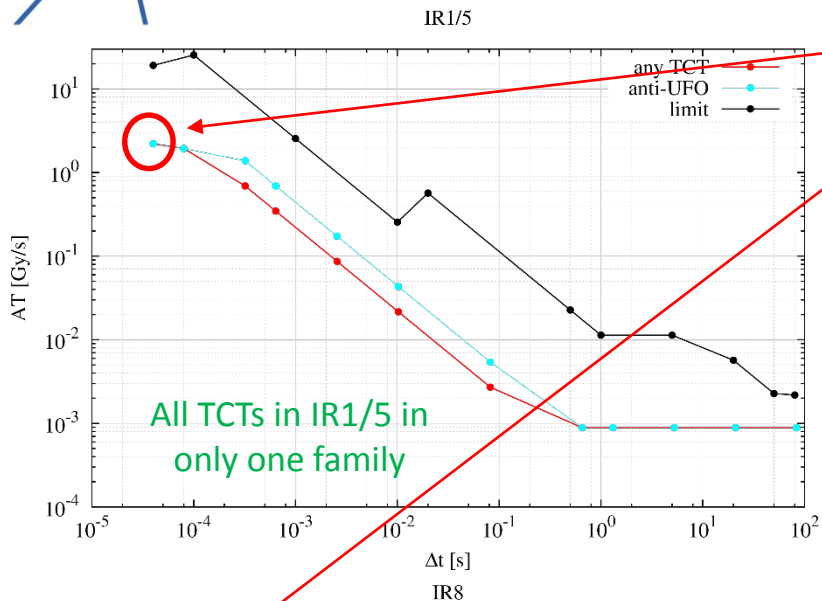


Fill4426



(B. Auchmann)

# Increasing BLM Thresholds at TCTs



## Proton limits from estimations:

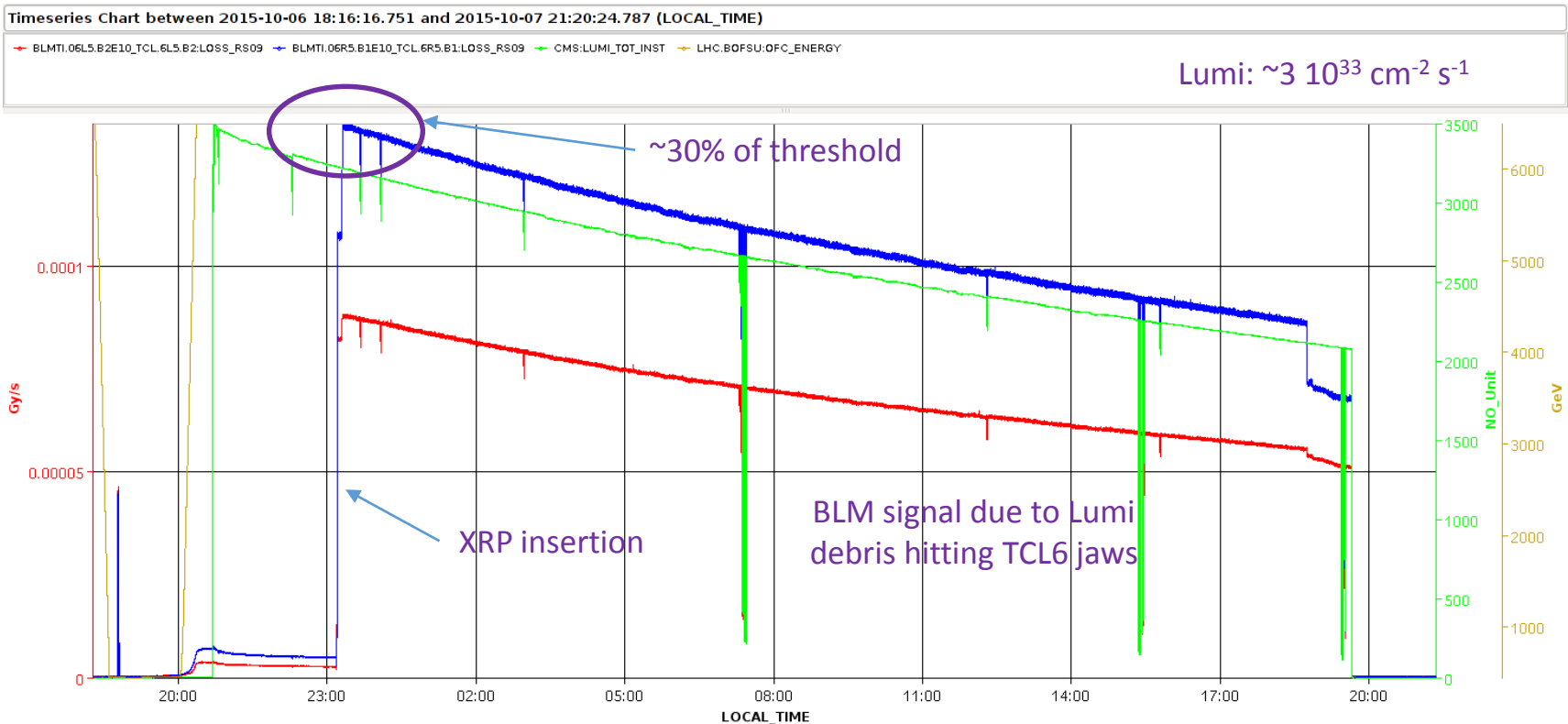
- detailed numerical analyses on TCSGs (Fluka/ANSYS);
- Gy/p from Fluka simulations (Fcerutti, CWG, 2014-08-25): dependence on TCT/BLM geometry, distribution of impacting protons...

Pending green light from EN/MME  
NB: TCTs are the most delicate collimators

# Increase of BLM Thresholds at IR5 TCL.6

Recent changes in IR5 TCL(5/6) settings after TOTEM requests:

- TCL.6 closer to the beam than before;
- Increased BLM signals at TCL6 (downstream of TOTEM XRP);



At Nominal LHC Lumi, we would be at  $\sim 90\%$  of dump threshold

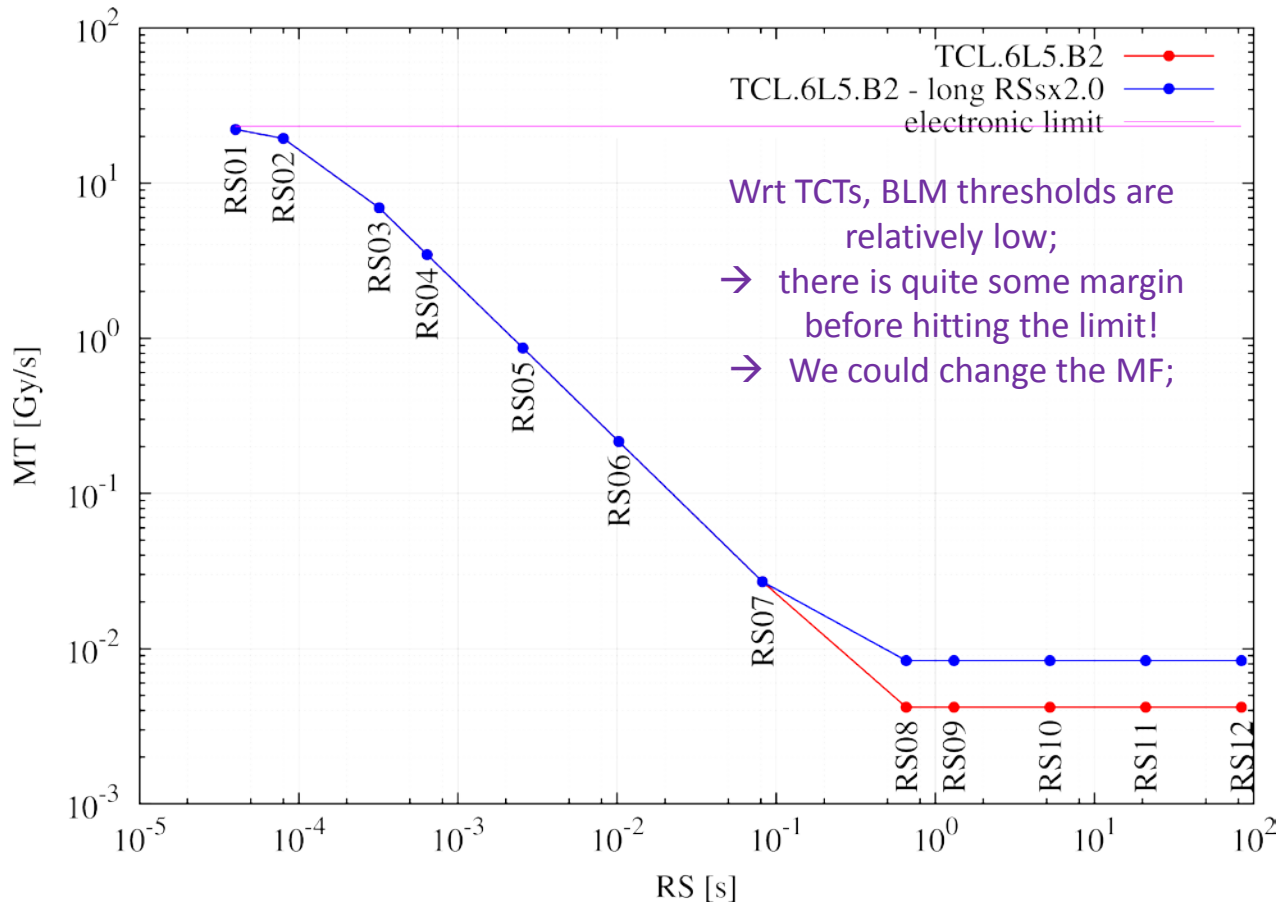
→ Need to update thresholds! (long RSs and at FT)

# Increase of BLM Thresholds at IR5 TCL.6 (II)



Thresholds of these BLMs were already adjusted to target lumi twice the nominal one (before updating their settings because of TOTEM);

→ Same logics leads to increase long RS by a factor 2-3 (but split current TCL family);





# Conclusions



- Recently, isolated events with high **BLM** readouts at **TCTs** due to **UFO** activity in the upstream magnets (cells 4/5/6 of IR1/2/5/8);
  - In particular, in 2 occasions TCT BLMs lead to an actual beam dump (+1, where TCT was spectator; +1, where TCT triggered together with MBXA.4L8);
- Possible **solution**: increase by a factor **>2** BLM thresholds at TCTs:
  - **MT**: RS03 → RS07 (RS08 → RS12 already modified due to debris);
  - Only at **FT**;
  - Pending green light from **EN/MME**;
  - Pending checks on TCT BLMs with **RC filters**;
- Updated **TCL.6** settings for present TOTEM XRP insertion imply higher signals at BLMs at TCL.6;
  - Signal is due to **debris**;
  - BLM thresholds on **long RS** (08-12) at FT can be increased by **~2-3** to avoid limiting nominal luminosities;



# Back-up Slides

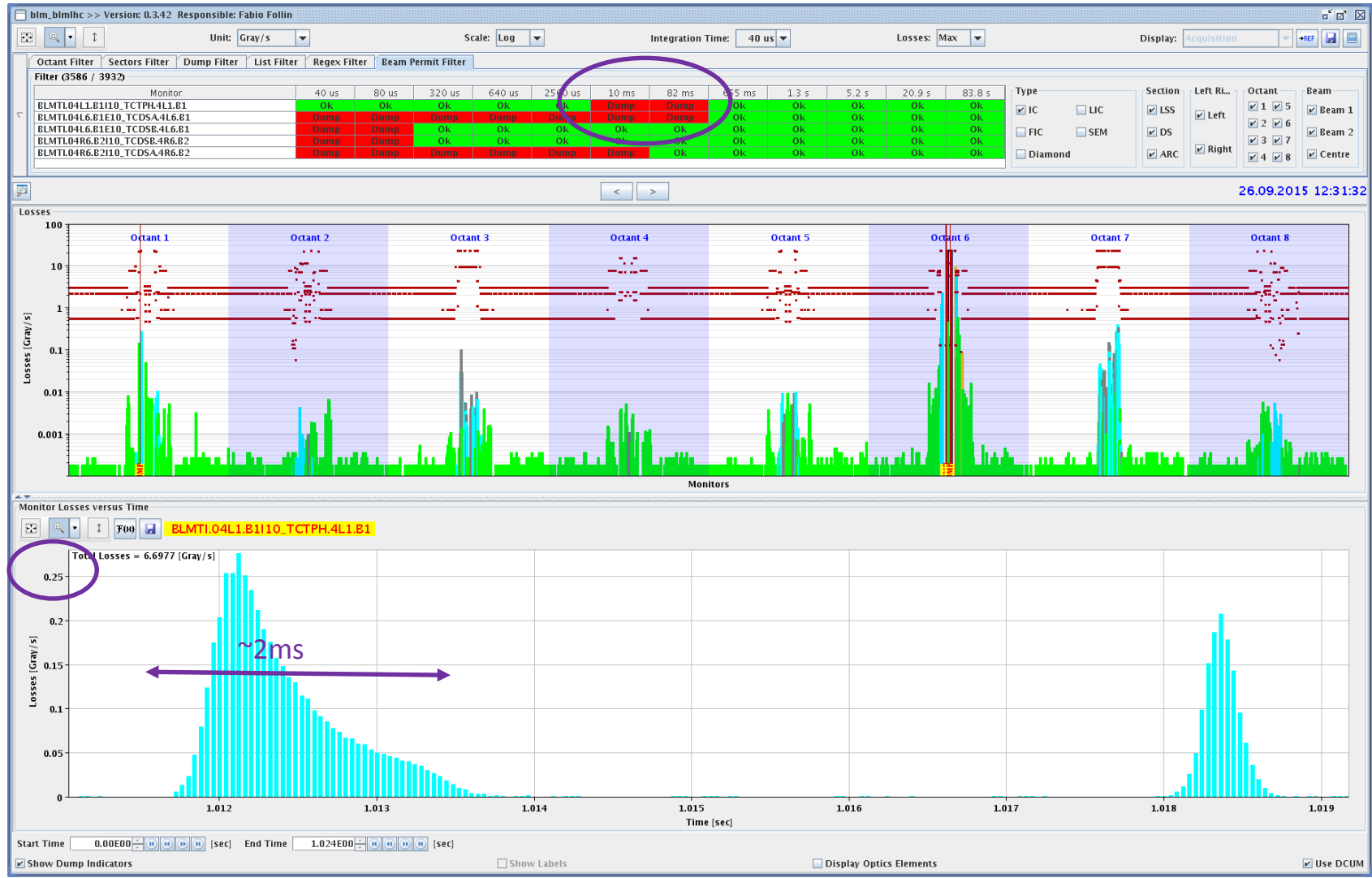


# A Closer Look at Fill 4423



Actual dump due to two consecutive UFOs!

IR1





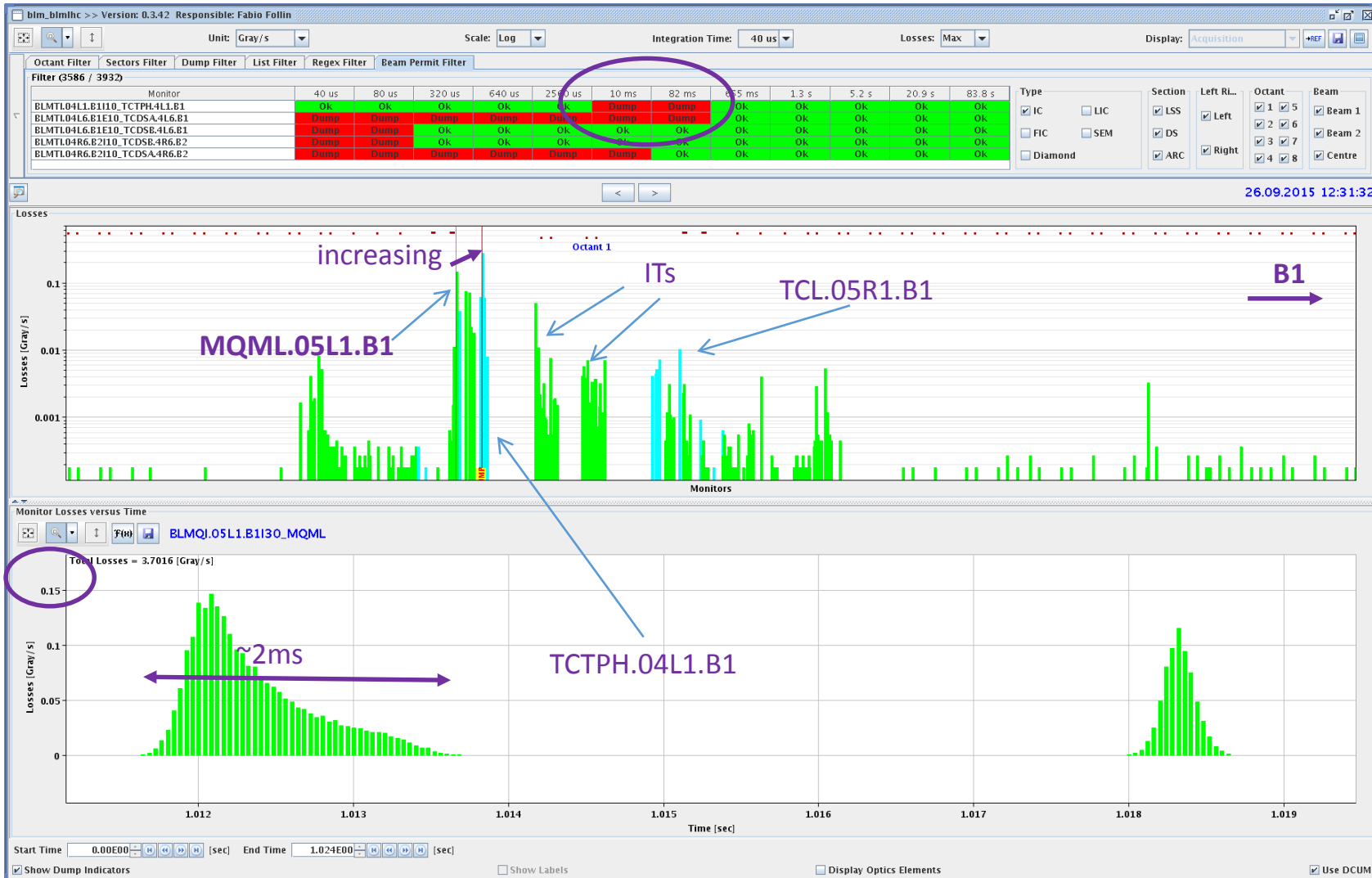


# A Closer Look at Fill 4423 (II)



Actual dump due to two consecutive UFOs!

IR1



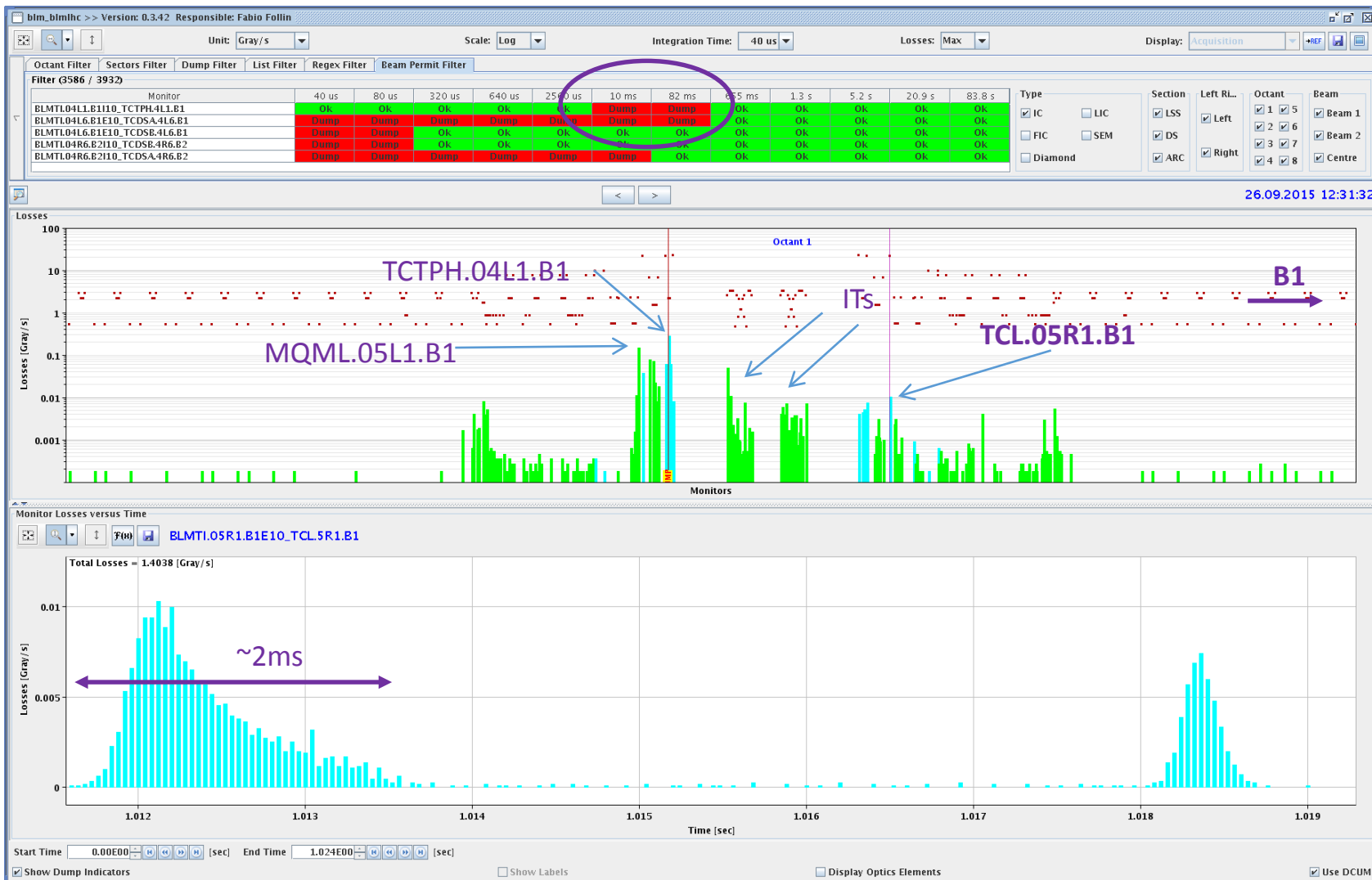


# A Closer Look at Fill 4423 (III)



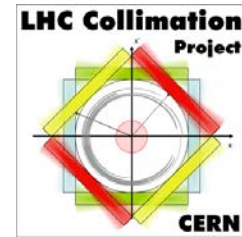
Actual dump due to two consecutive UFOs!

IR1



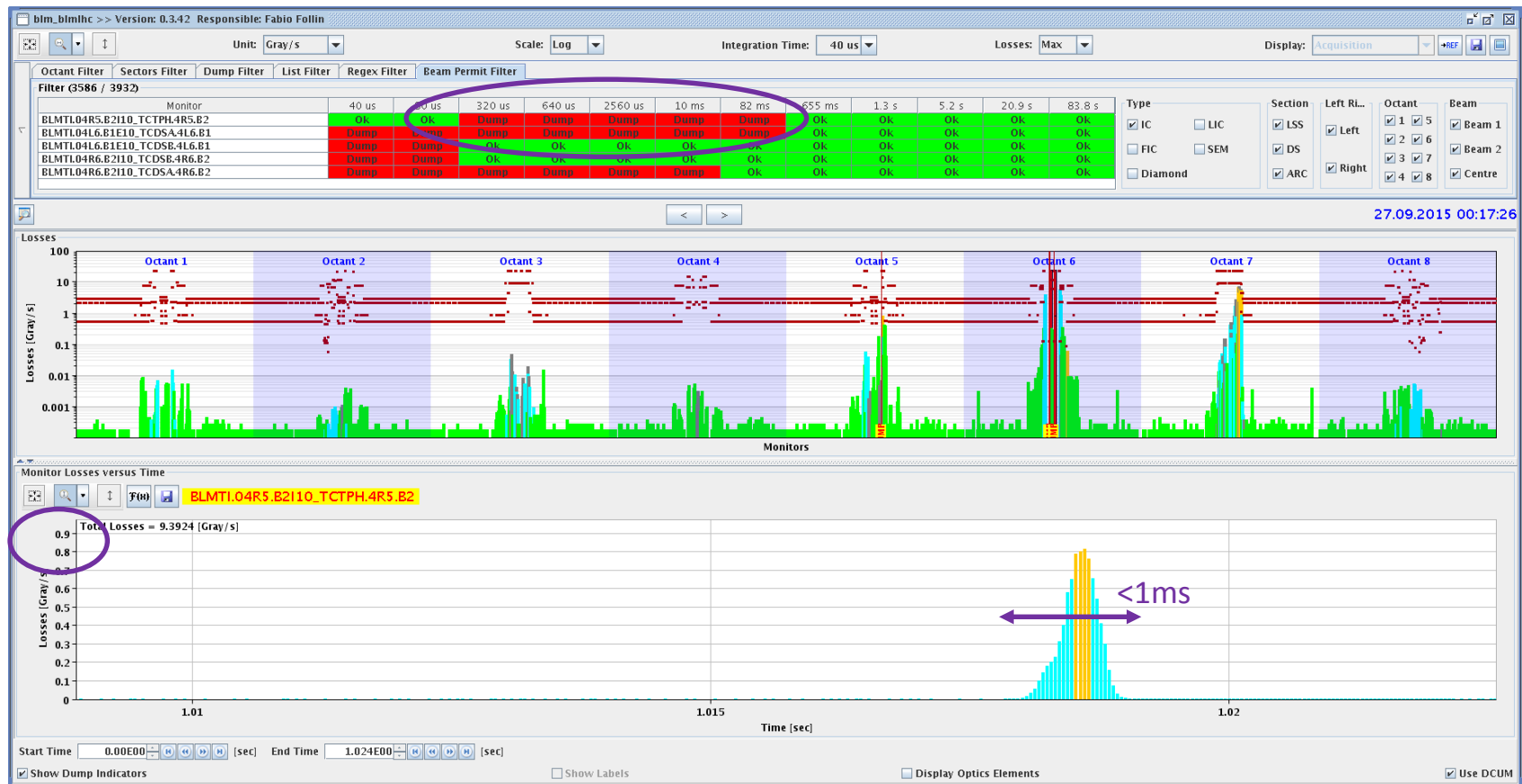


# A Closer Look at Fill 4426



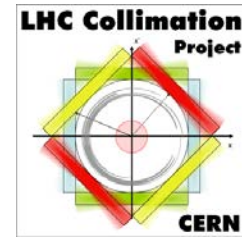
## IR5

### Dumped by TCT BLMs – UFO happening in upstream MQML



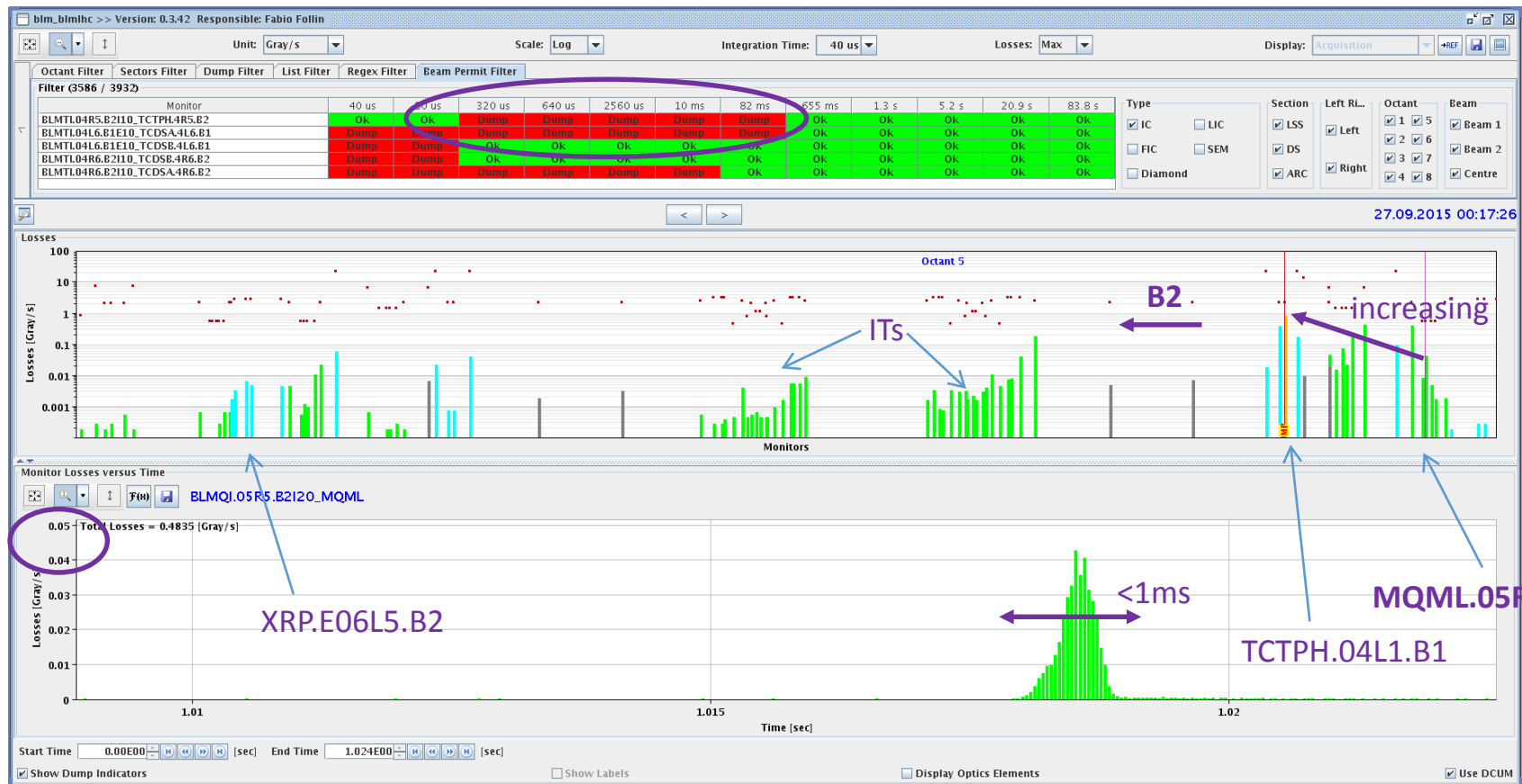


# A Closer Look at Fill 4426 (II)

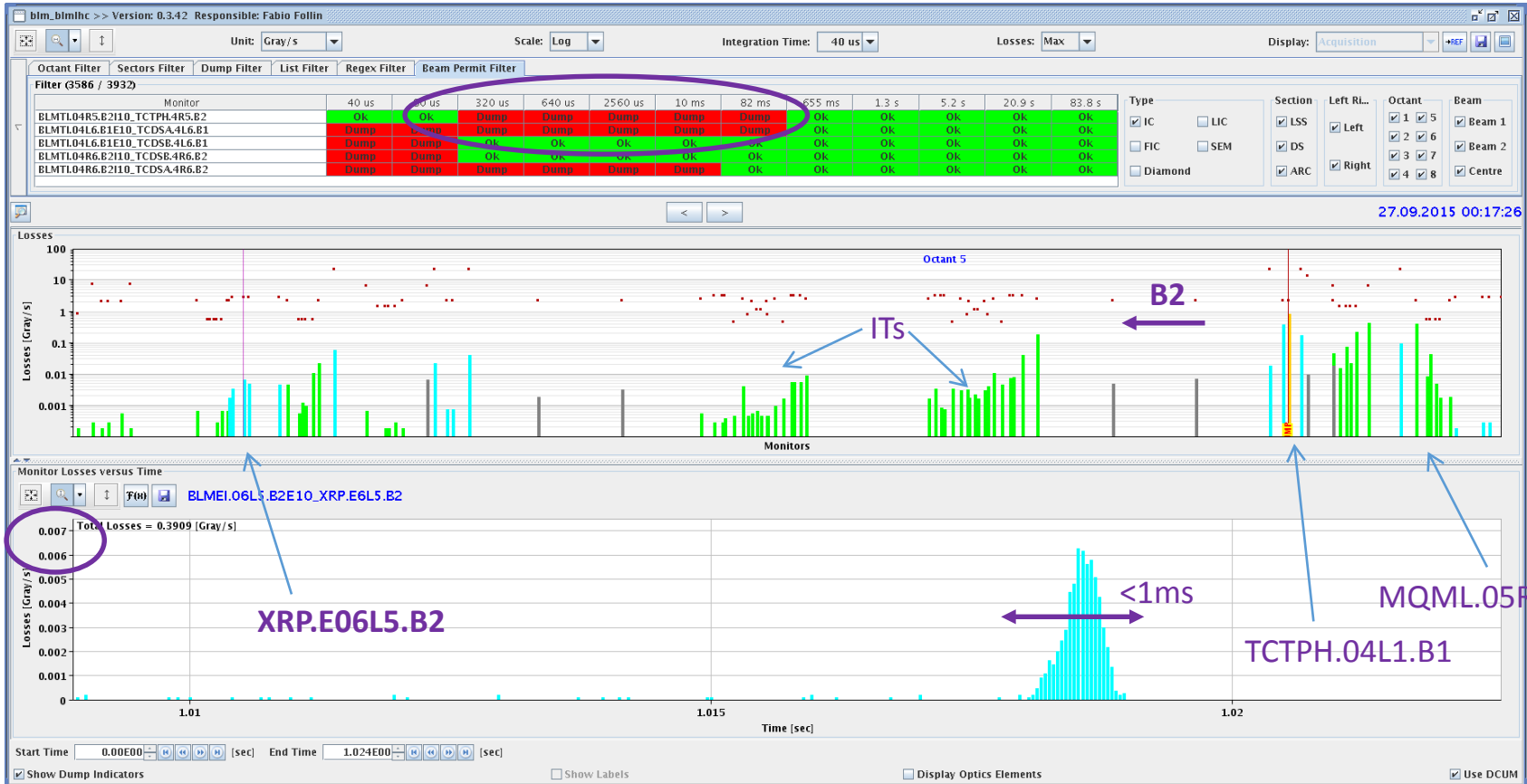


## IR5

### Dumped by TCT BLMs – UFO happening in upstream MQML



Dumped by TCT BLMs – UFO happening in upstream MQML





# Hunting for Similar Cases



Trying to get similar events from UFO Buster (thanks to G. Papotti):

- Look at cells 4/5/6 of IR1/2/5/8 since start of Run II;
- Only with beams going towards the IP:
  - B1 → Left of IP;
  - B2 → Right of IP;
  - no B0;

Result: **543** events;

- **15**: beam was dumped (Dump: True)
  - **4**: flagged with dump\_UFO: fills **3964** (L8, beginning **July 2015**), **4422** (L8), **4423** and **4426** (the last two just presented);
  - The remainder: not\_verified (instabilities, TDI, RF problems...)
- **11**: verified\_UFO (beams not dumped!)
  - **4** noticeable ones: **4420** (L1, 50% RS04), **3992** (L1, 25% RS04), **4332** (R8, 3% RS04), **4381** (R2, 0.2% RS04);
  - The remainder: same IRs / lower BLM signals...

...quite a trend?

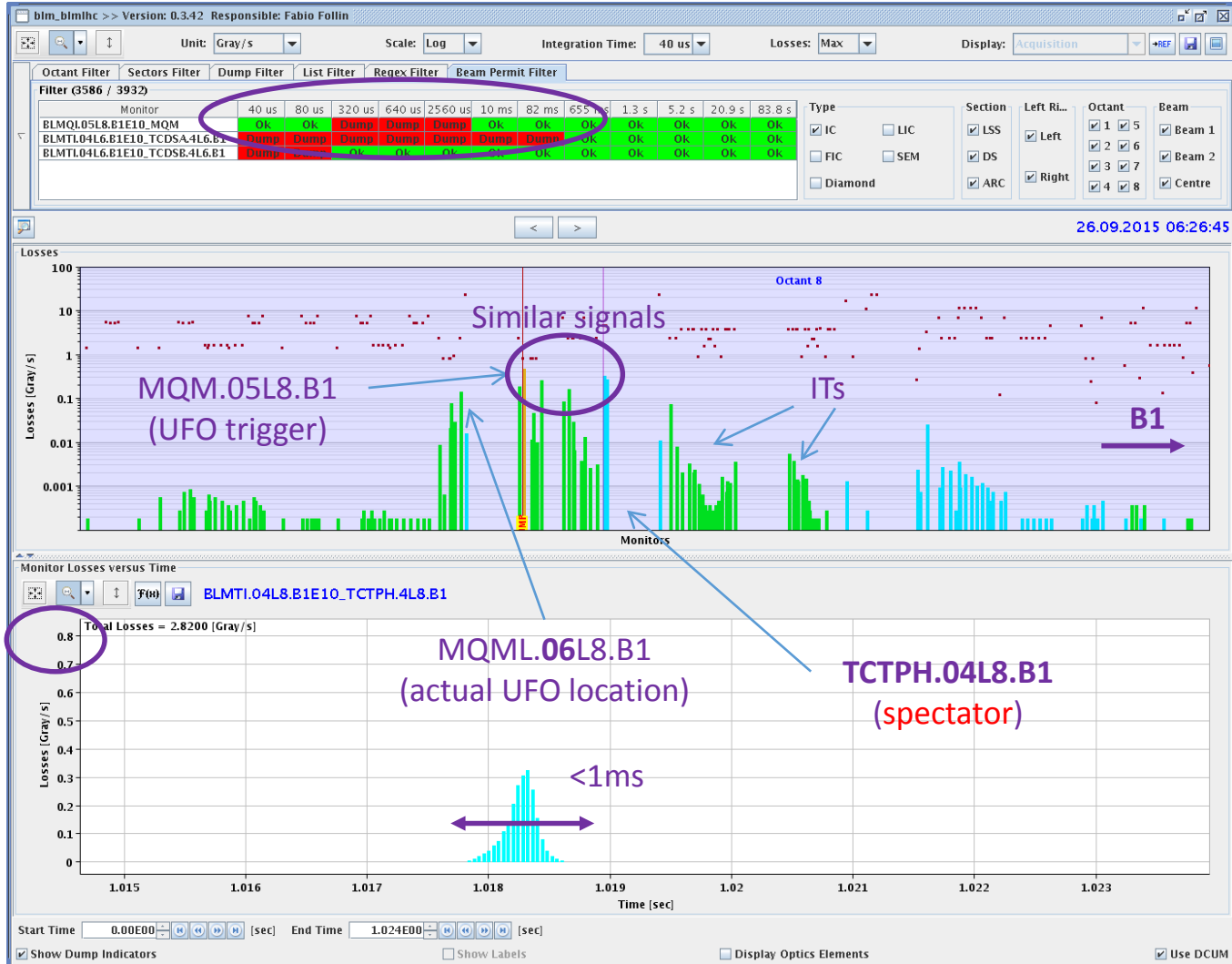


# Fill 4422 (with Dump)

## IR8



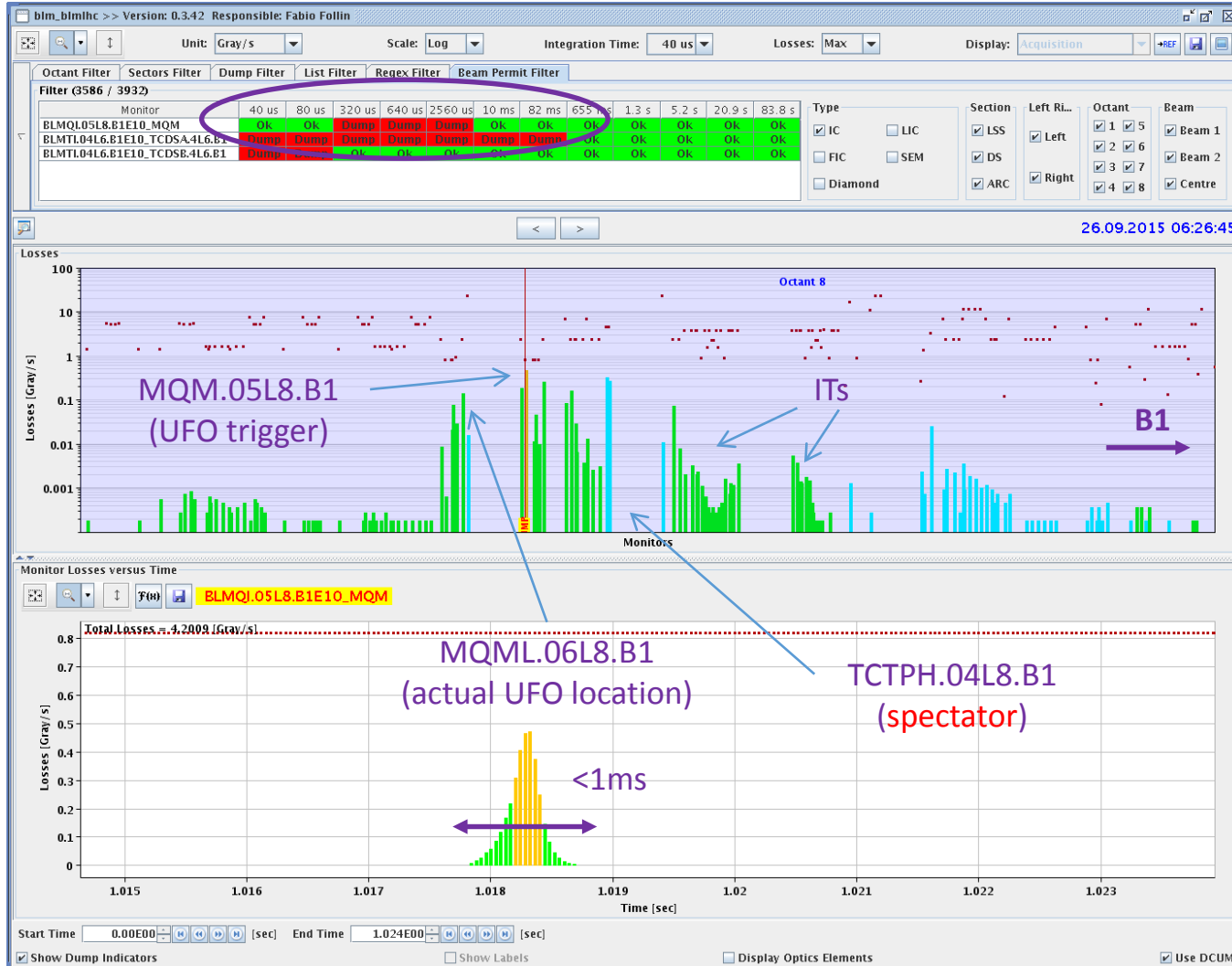
Dumped by MQM.05 – UFO happening in upstream MQML



# Fill 4422 (with dump - II)

IR8

Dumped by MQM.05 – UFO happening in upstream MQML

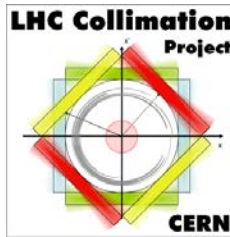




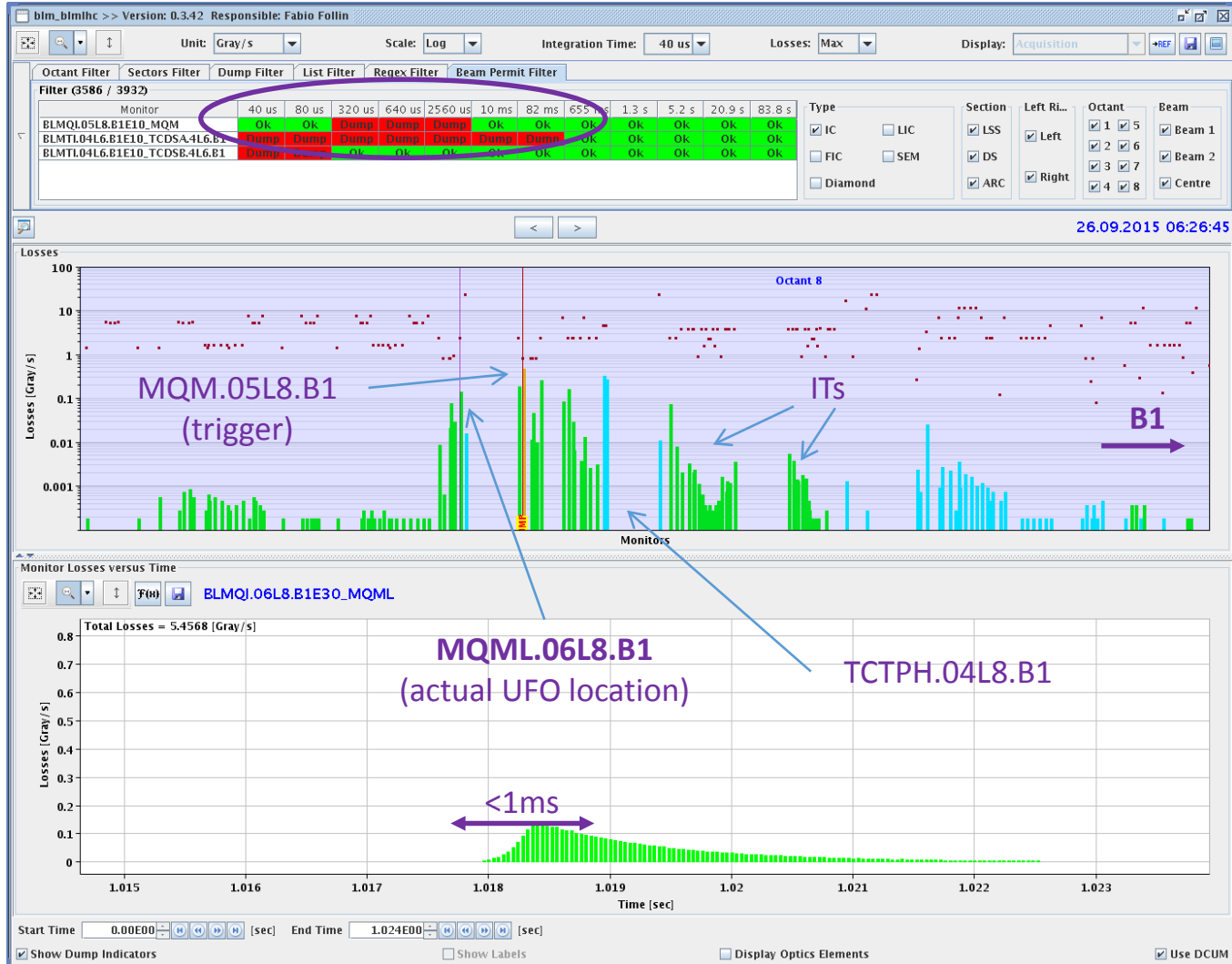


# Fill 4422 (with dump - III)

IR8



Dumped by MQM.05 – UFO happening in upstream MQML

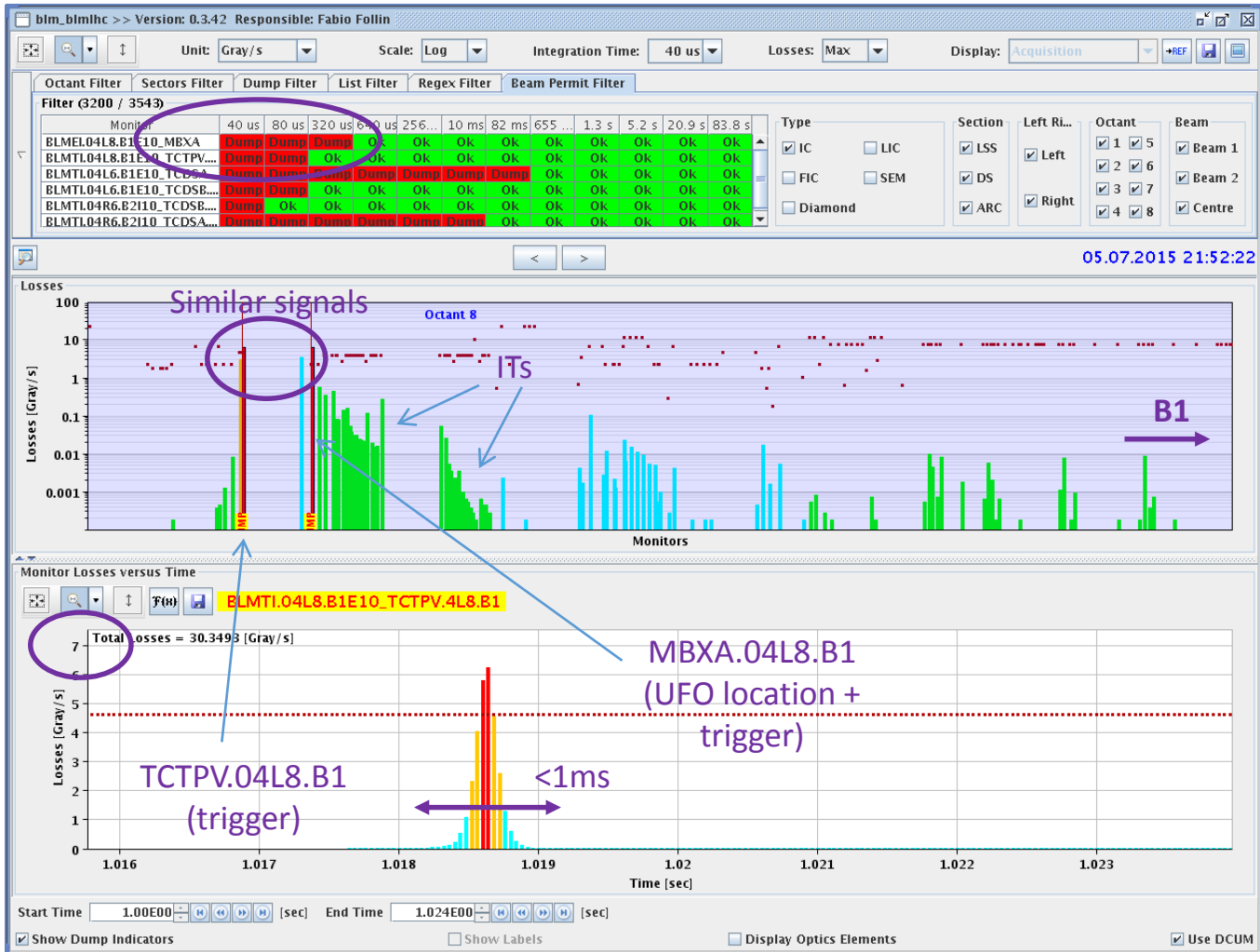




# Fill 3964 (with Dump)

## IR8

Dumped by MBXA and TCT

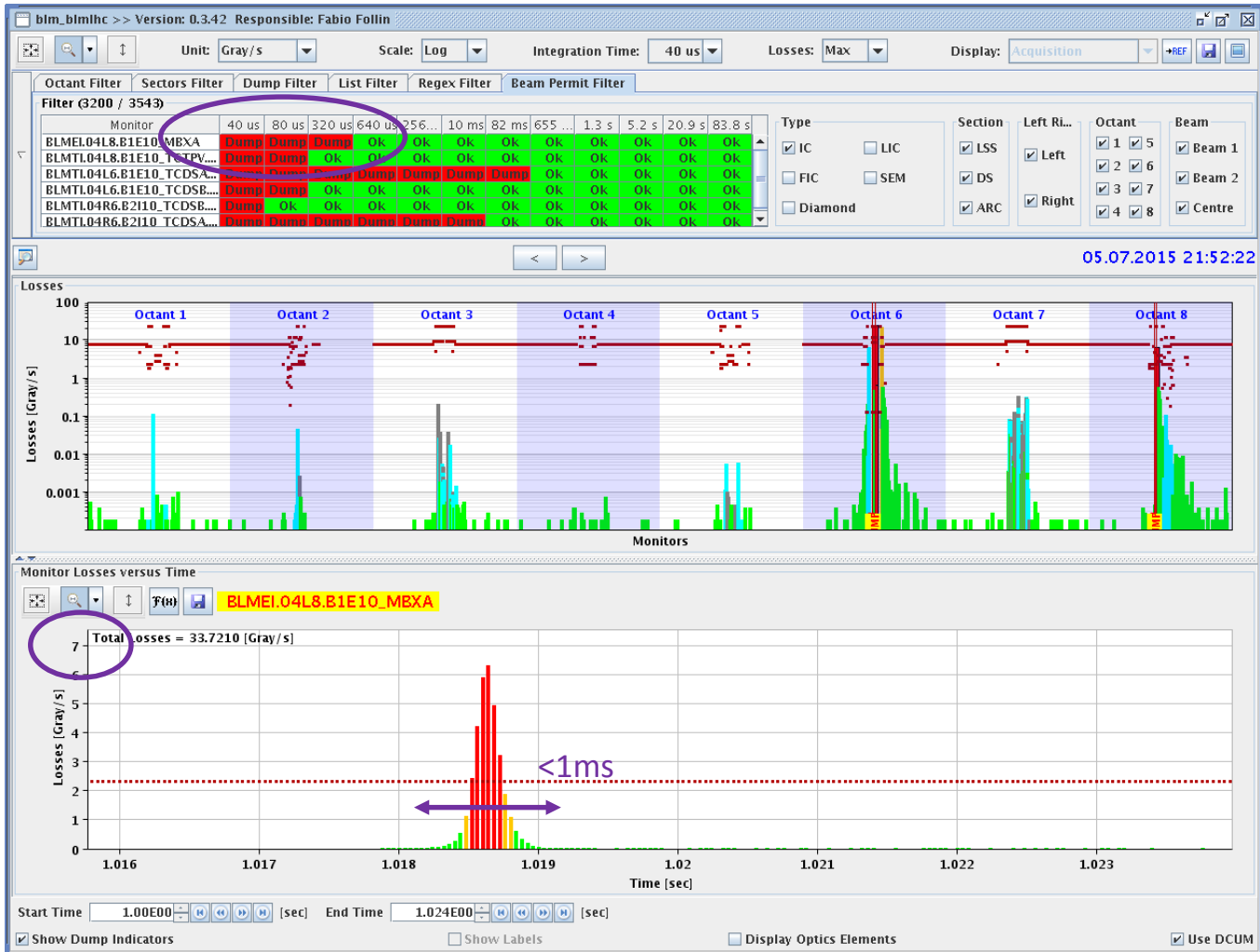




# Fill 3964 (with Dump - II)

Dumped by MBXA and TCT

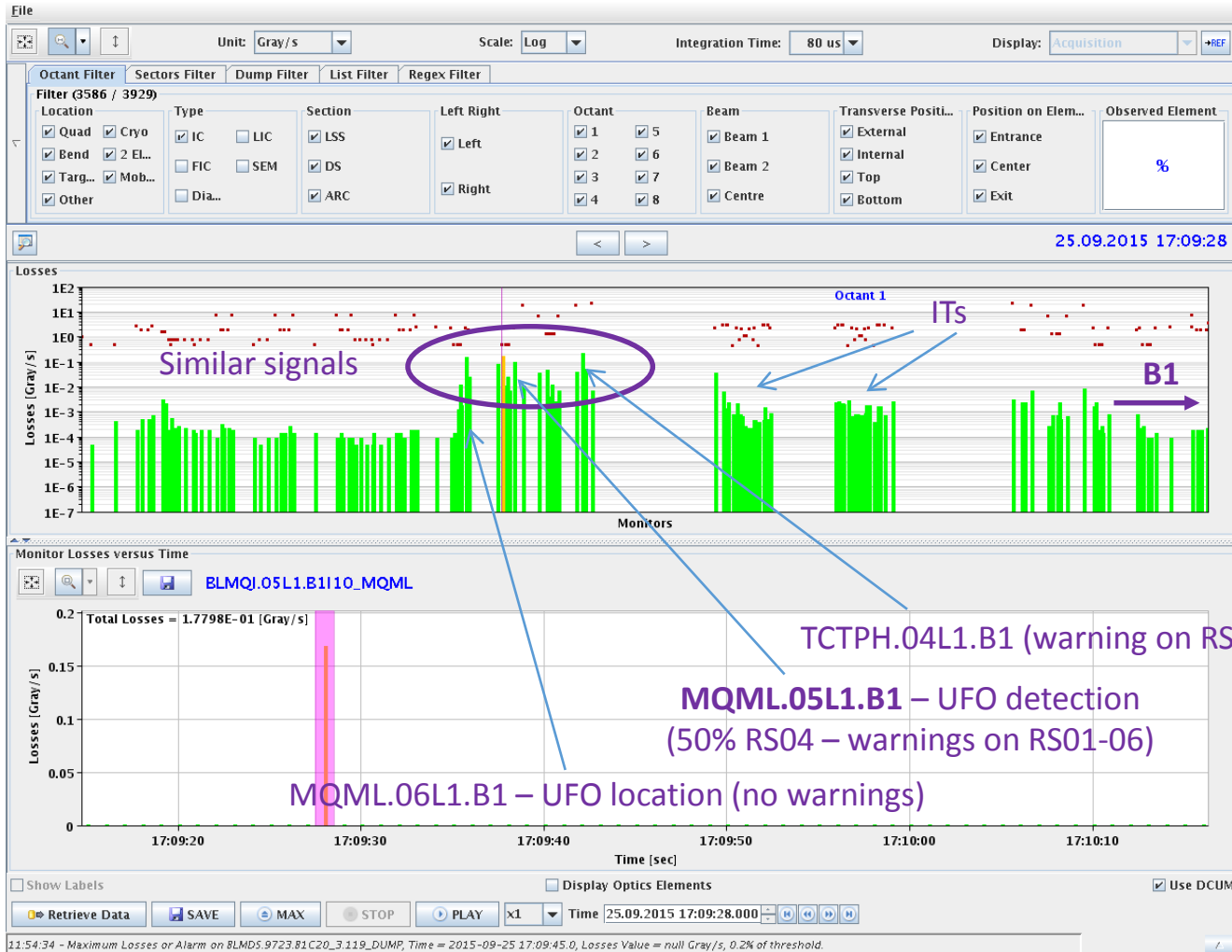
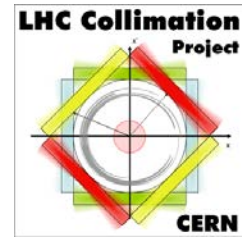
## IR8



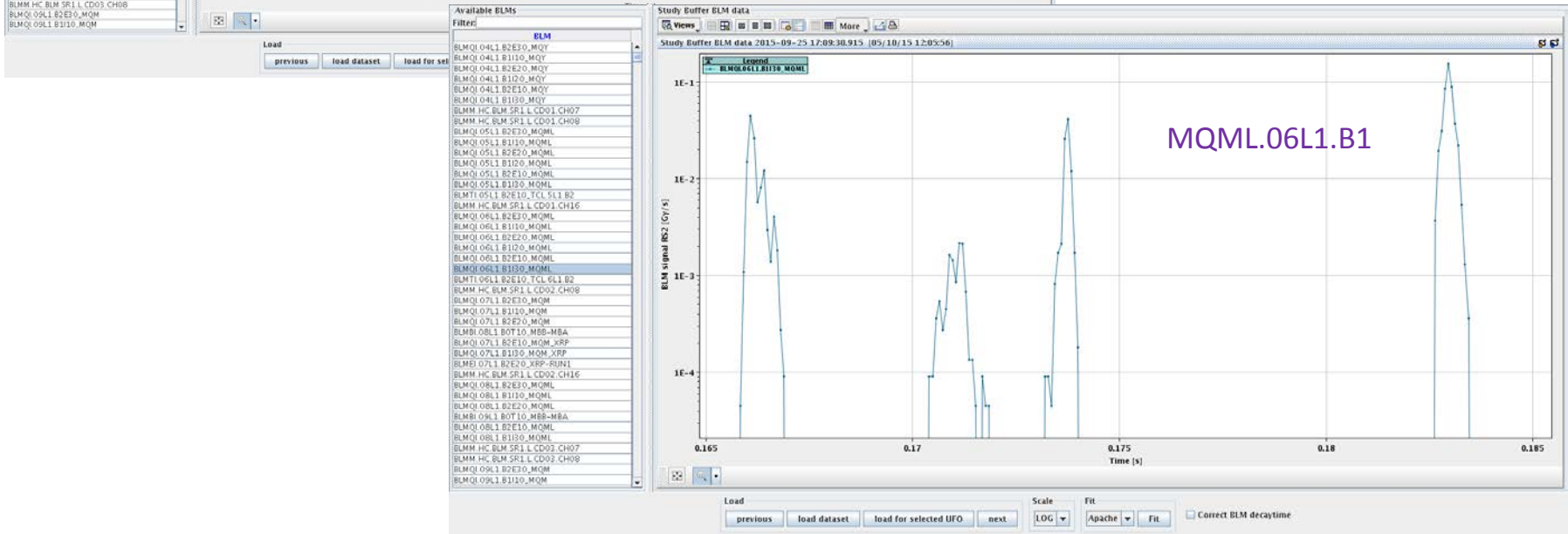
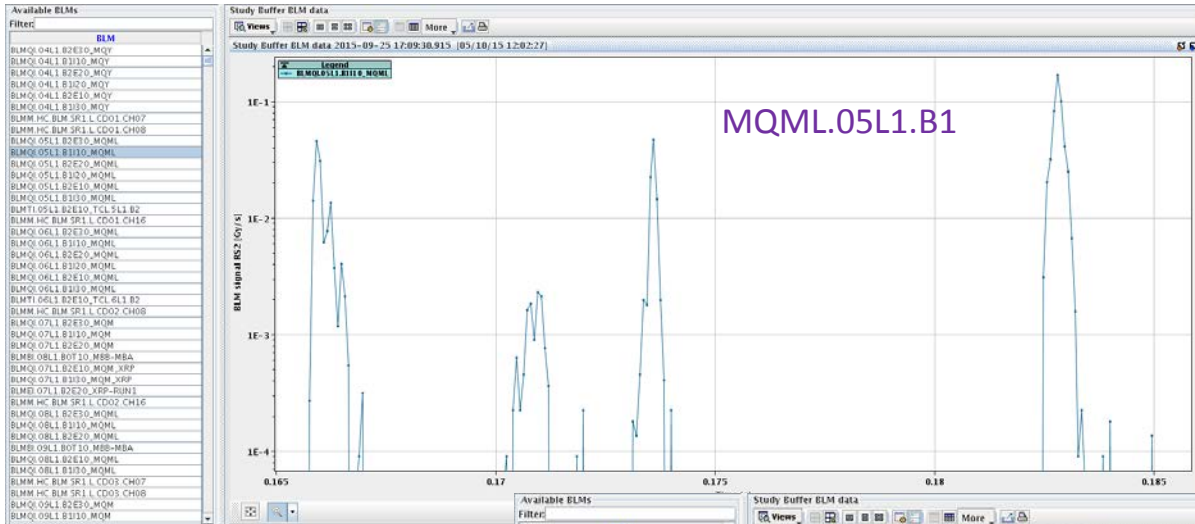


# Fill 4420 (50% RS04 at UFO Location)

## IR1



# Fill 4420 (50% RS04 at UFO Location - II)





# Fill 4420 (50% RS04 at UFO Location - III)

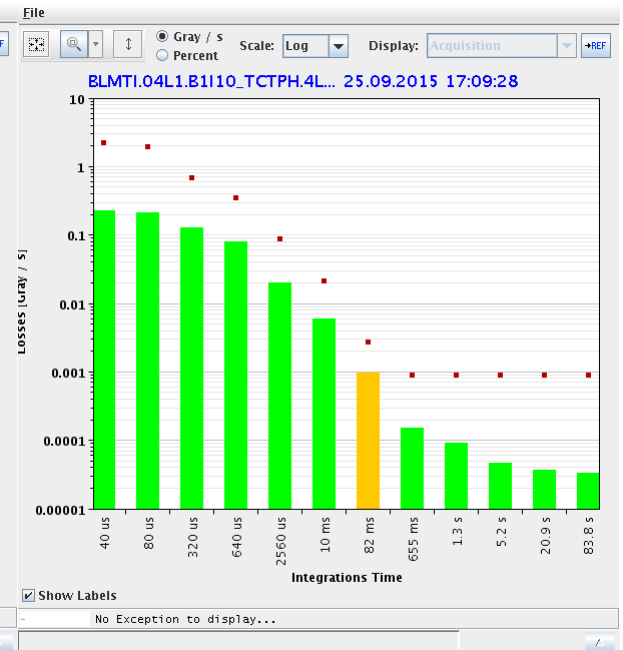
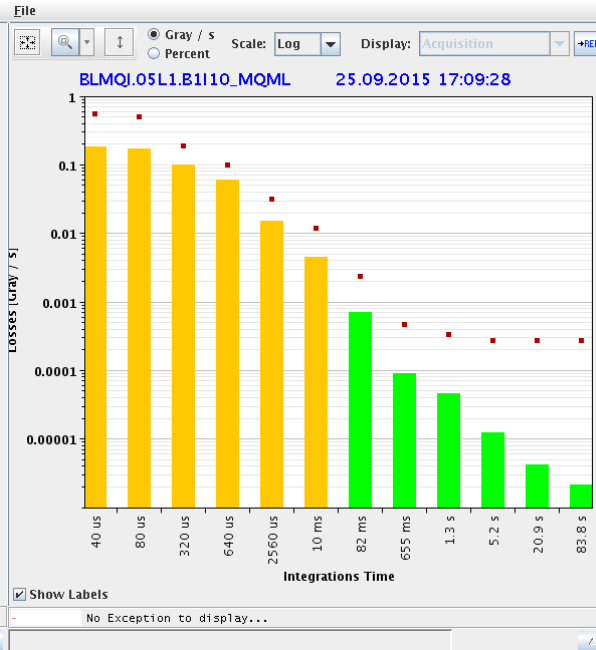
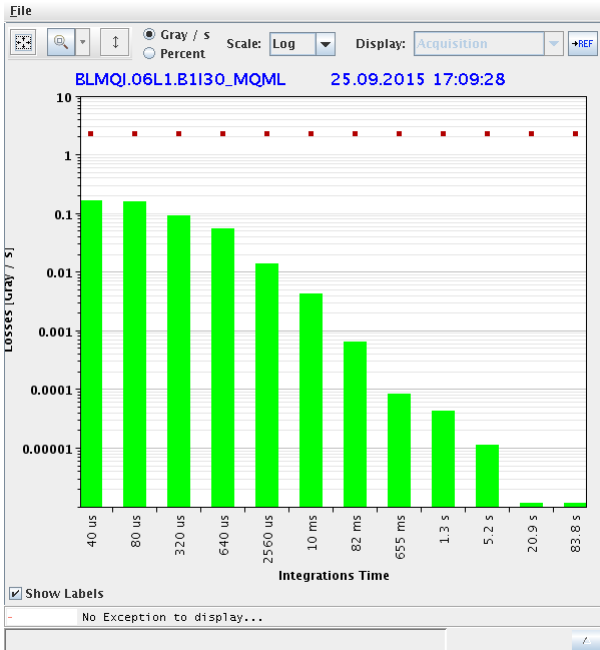


B1 →

MQML.06L1.B1

MQML.05L1.B1

TCTPH.04L1.B1



# Increase of BLM Thresholds at IR5 TCL.6 (III)



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