Revision of Direct Dump BLM thresholds

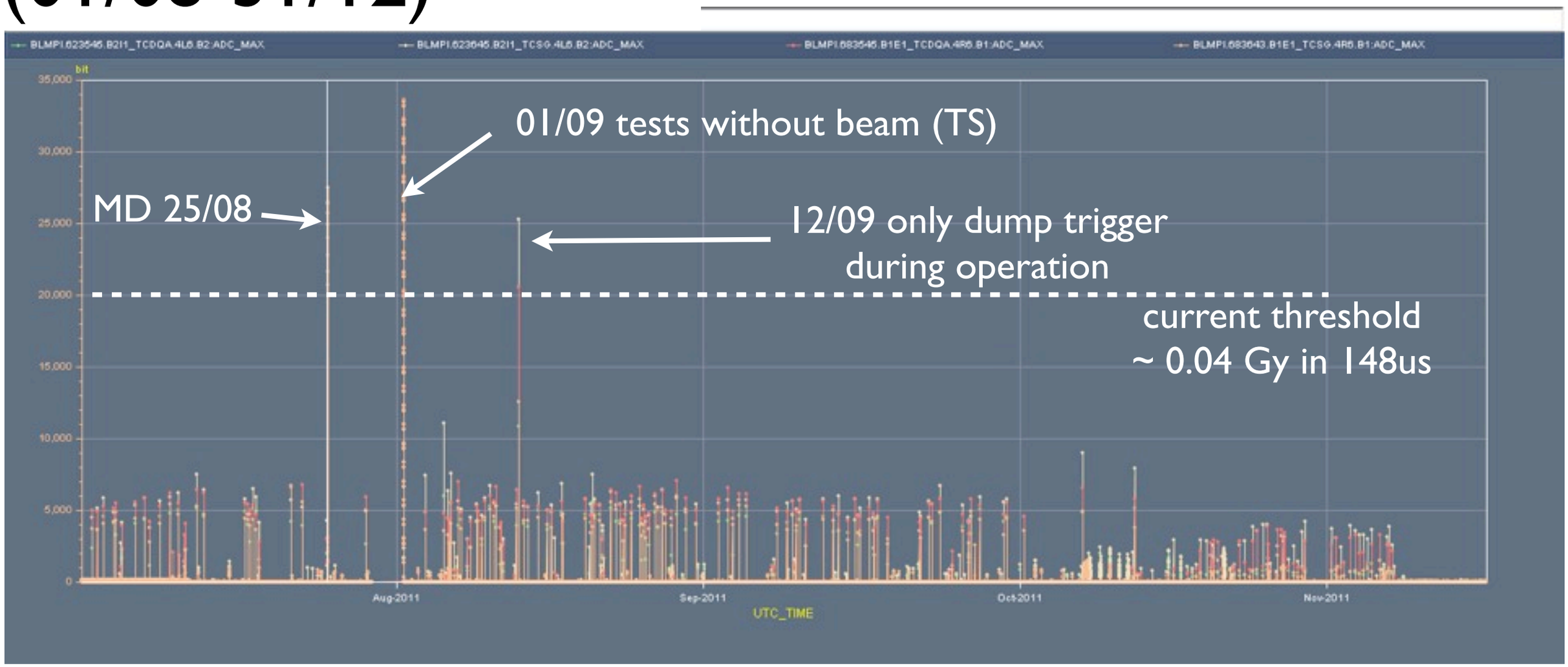
E. Nebot for the BLM team

TWG Meeting 15-02-2012

DIRECT DUMP REMINDER

One single event over dump threshold over 1/2 year during LHC normal operation.

(01/08-31/12)



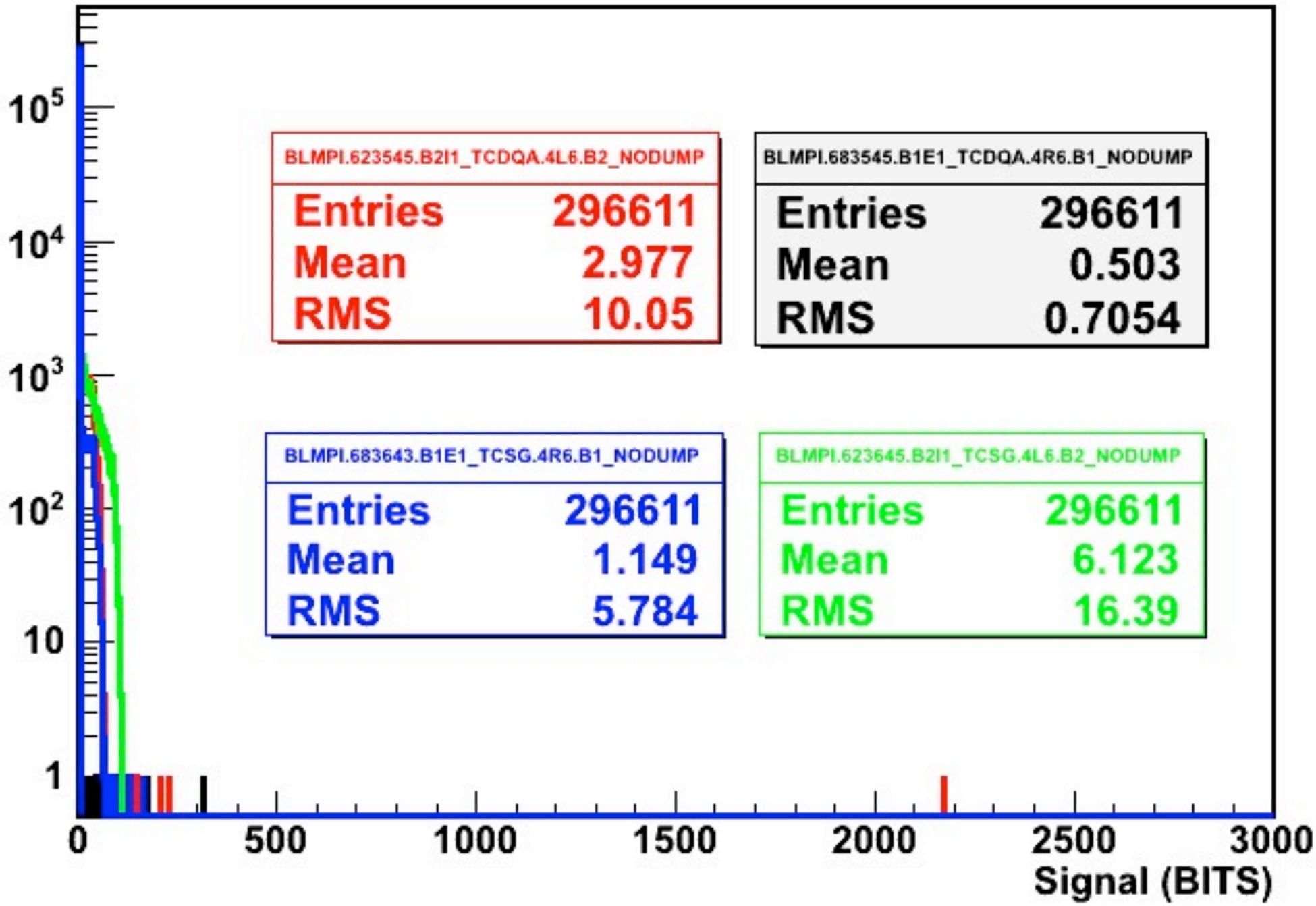
OUTLOOK

- Direct Dump highest signals correspond to beam dumps.

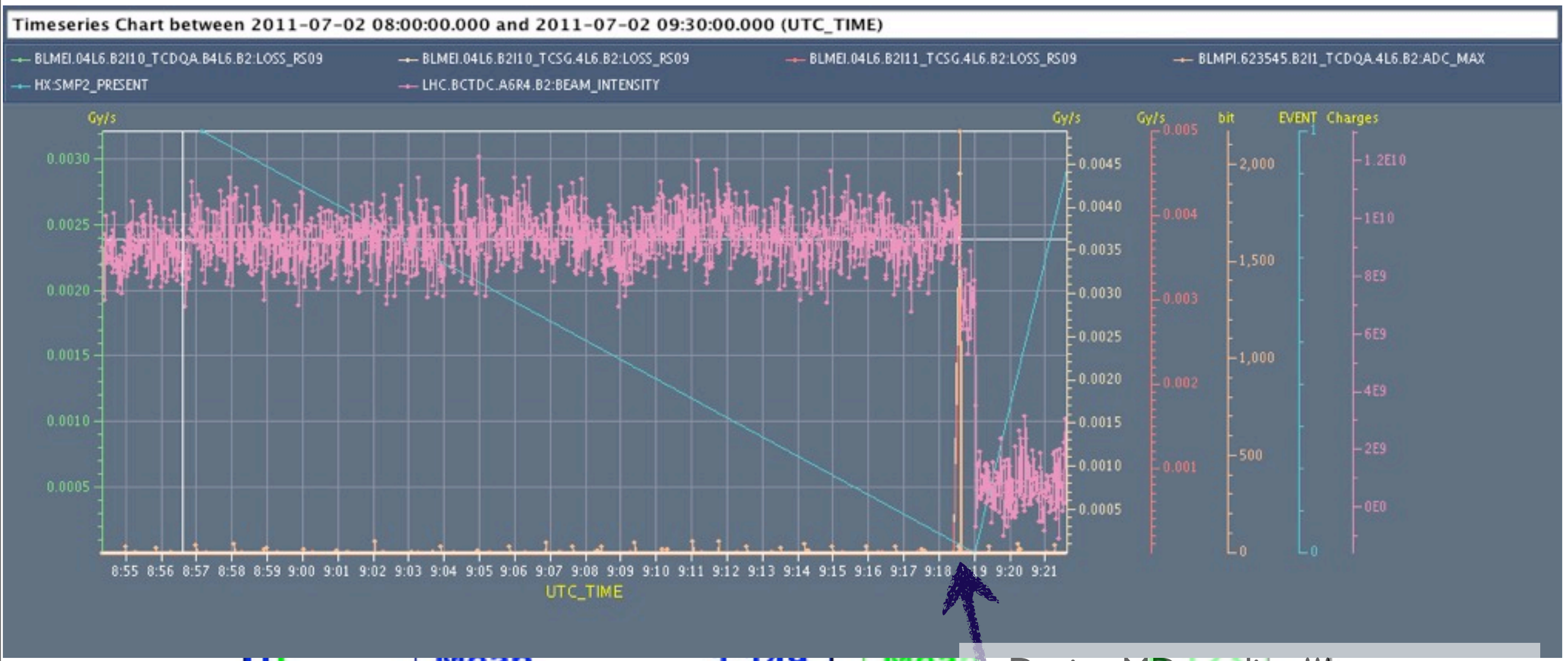
- Study of the signal distribution over the months of July-December:
  * Signals during dumps excluded. TimeStamps +/- 2s around kick of MKD not considered.
  * Beam Present flags.

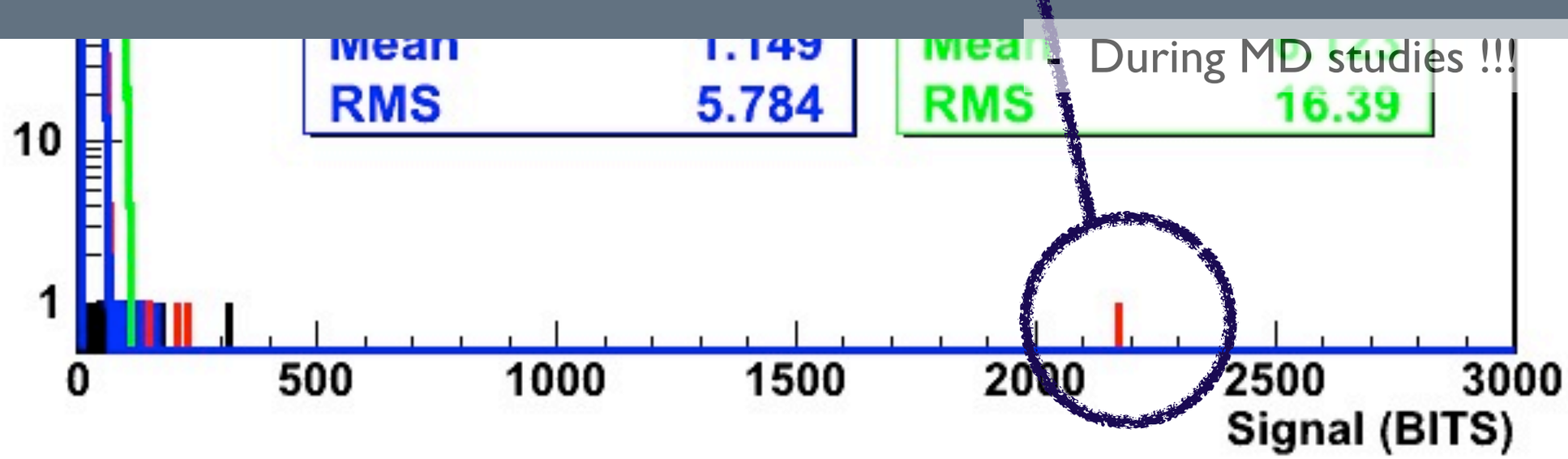
SIGNAL (NO DUMP) DISTRIBUTION

01-07-2011 => 31-12-2011



HIGHEST (NO DUMP) SIGNALS I

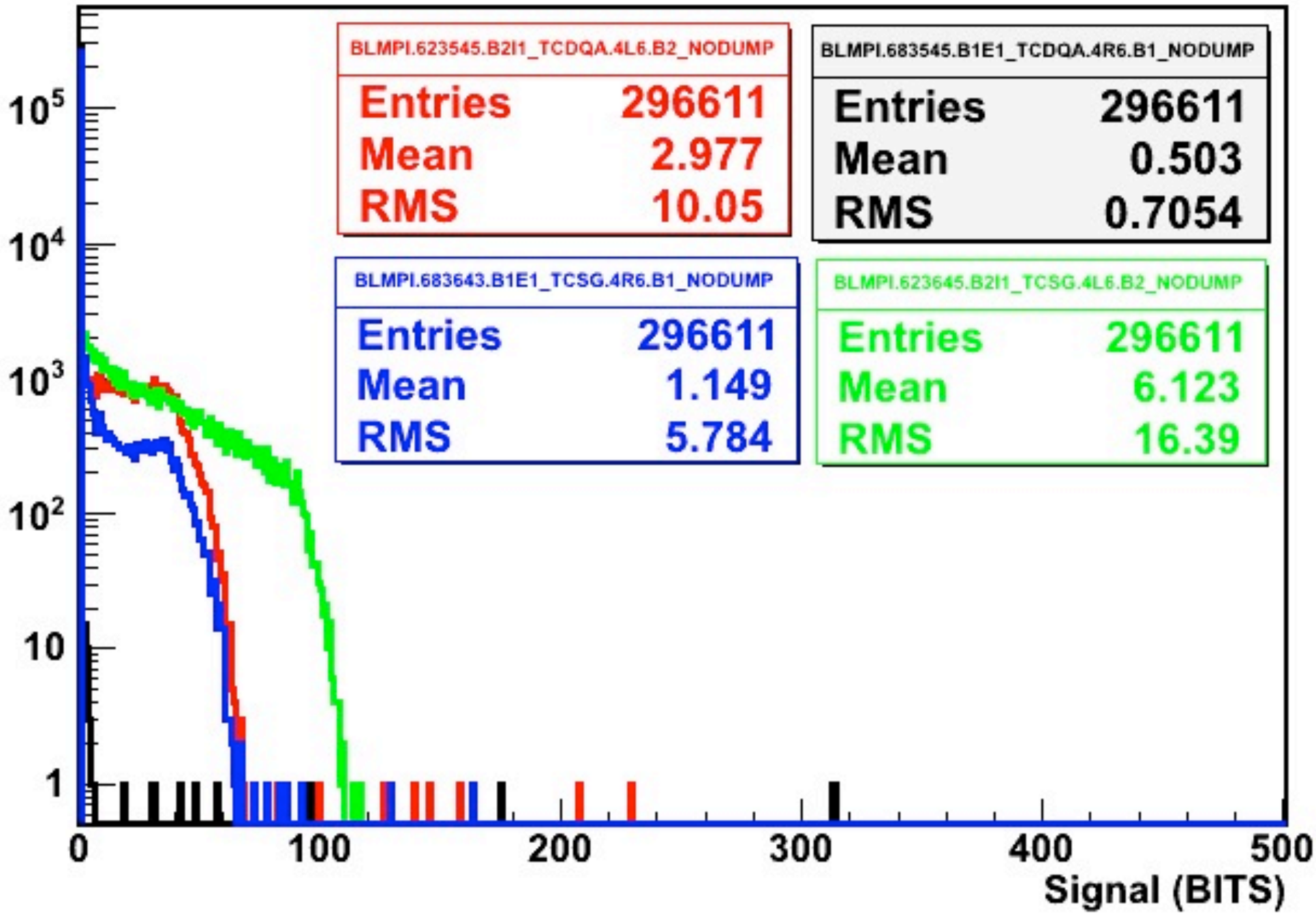




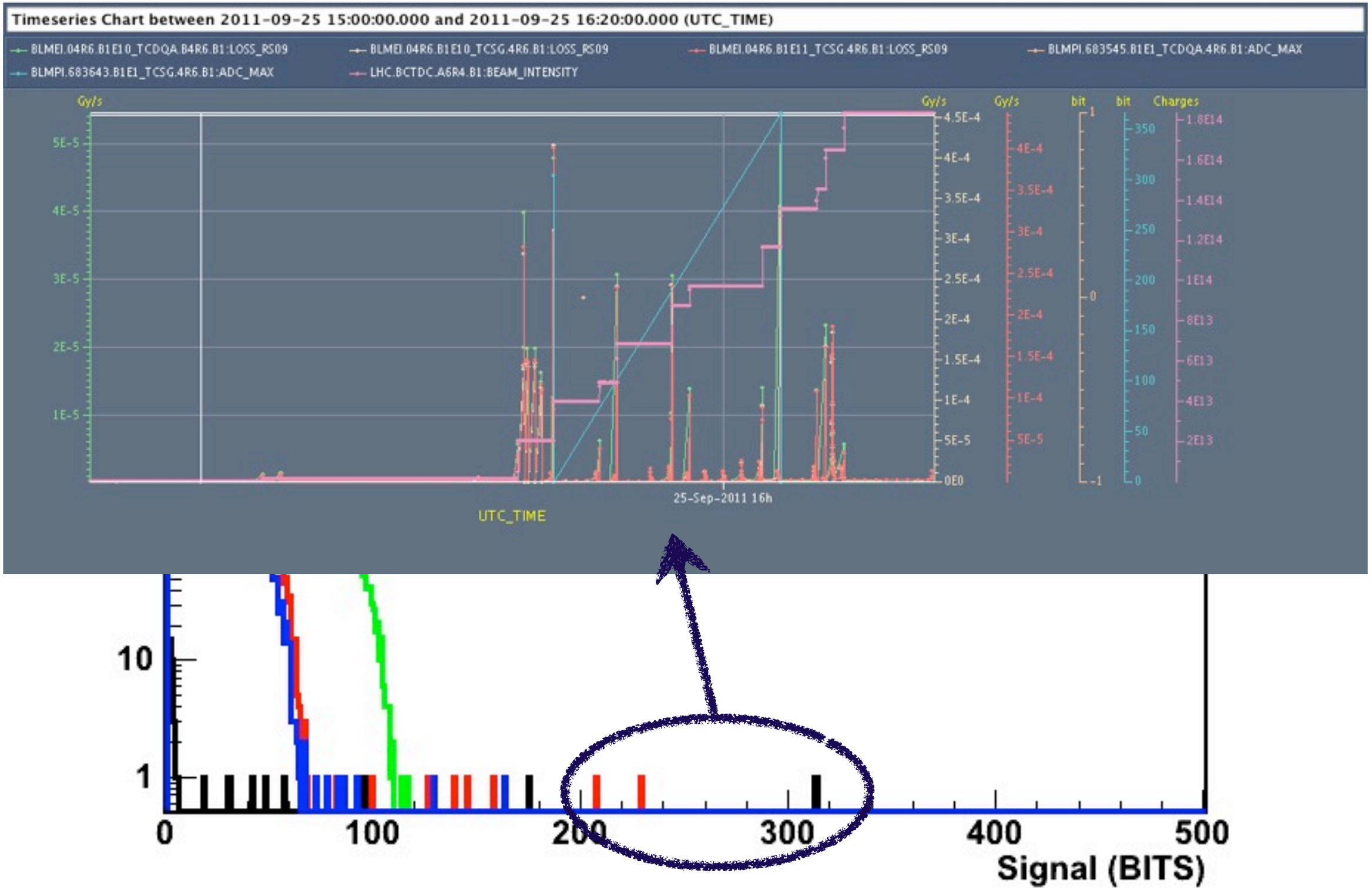
During MD studies !!!

SIGNAL (NO DUMP) DISTRIBUTION ZOOM

01-07-2011 => 31-12-2011



HIGHEST (NO DUMP) SIGNALS 2



CONCLUSION

- Direct Dump BLMs show significant signals almost exclusively during dumps.

- A few exclusions:

* Losses on 2011- 07-02 at TCDQA. 4L6.B2 during MD
* Some low signals (below 400 BITs) observed during injections in a few cases

Backup

CONVERSION FACTOR

Hi Jan:

Let me explain how I computed the conversion factor for the Direct Dump BLM. From the Dynamic range (50mA/65536 ADC counts) we have that each bit corresponds to 0.763E-6 A.

As mentioned in our discussion the Ionization Chambers have a low pass filter with time constant 138us. Since from the read out we get the peak signal I assume that the signals smoothes out in this 138us so one ADC count corresponds to a charge collection of 0.763E-6 A x 138us = 1.05E-11 C.

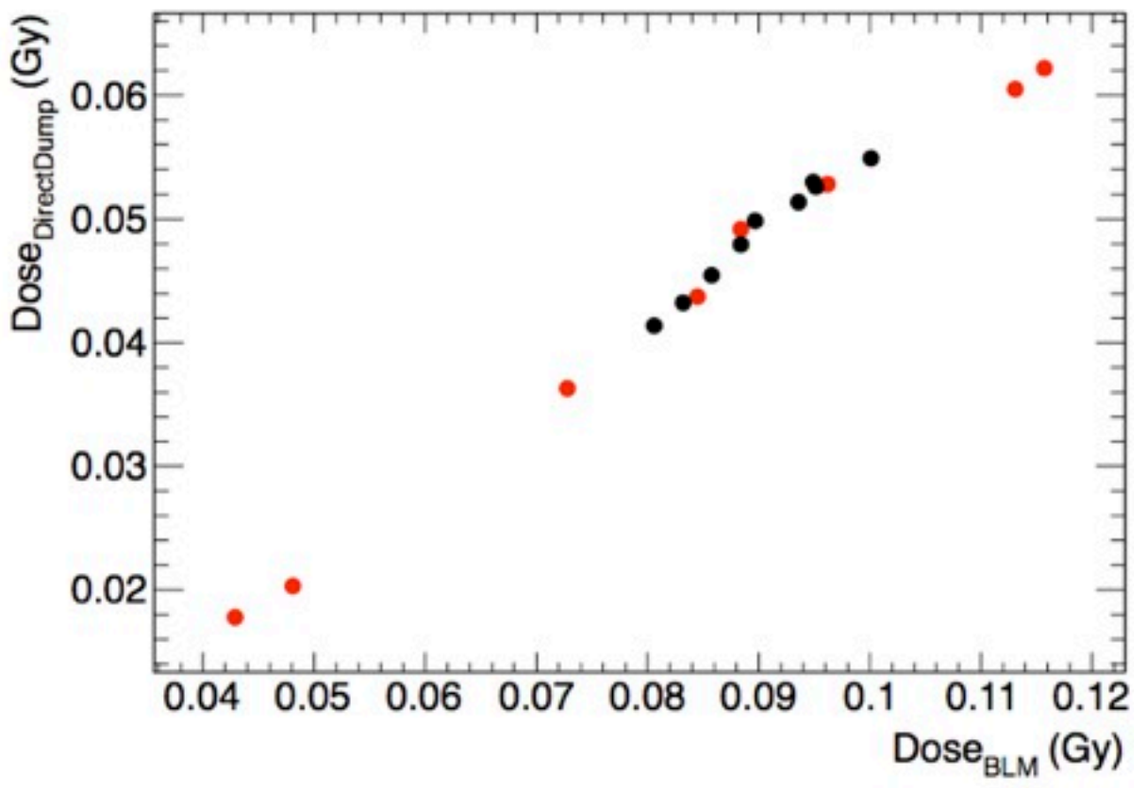
Now assuming an average energy of 34.8 MeV to produce an electron-ion pair in N2 we have that 1Gy(N2) = 5.26 E-5 C. Combining the results above we have a conversion factors between adc counts and Gy (collected in 138us) of

2.0E-6 Gy/adc count.

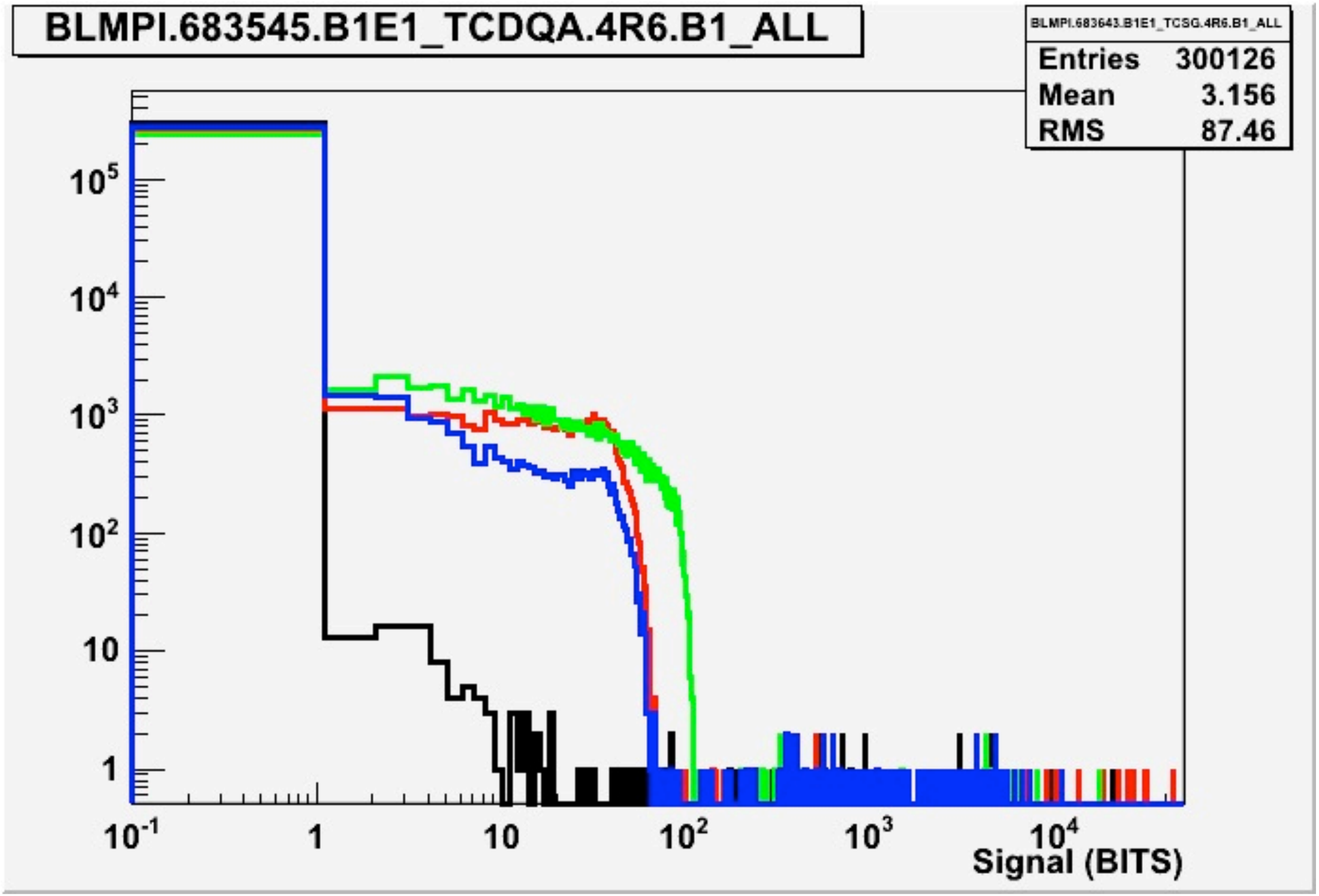
I apply this factor to the Direct dump for the signals collected during the MD and compare them with the IC with filter located at the same location and I get that the signals in the DD monitor are roughly 1/2 the signals in the IC with filter. See plot below.

Cheers

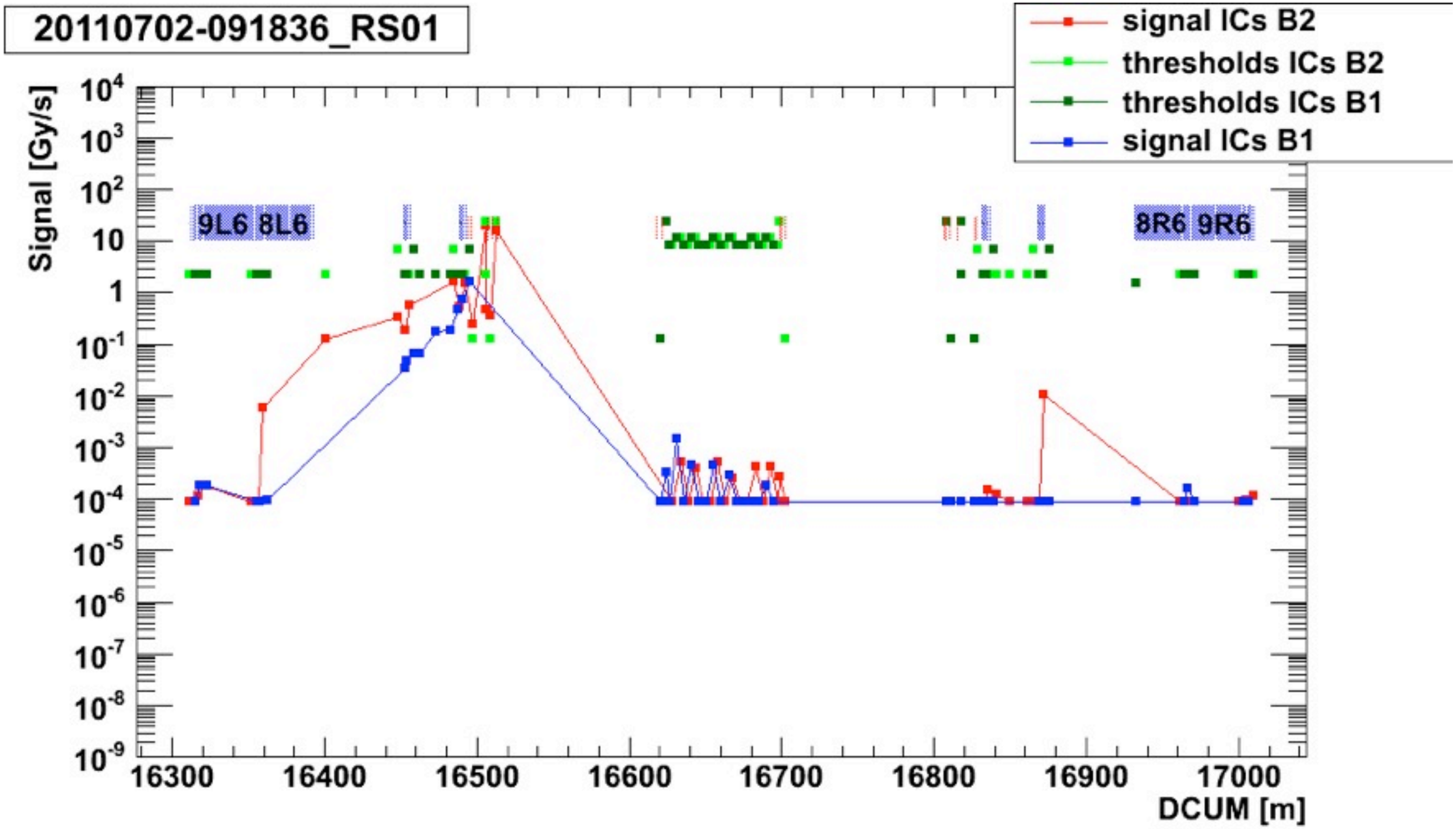
Eduardo



DIRECT DUMP SIGNAL DISTRIBUTION



July 2nd.


20110702-091836_RS01
signal ICs B2
thresholds ICs B2
thresholds ICs B1
signal ICs B1
Signal [Gy/s]
9L6 8L6
8R6 9R6
DCUM [m]

July 2nd. Comments from logbook

Short summary of the DA measurement part of the non-linear MD
We started correcting/checking tunes, coupling and chromaticity.
The aperture kicker was used to heat the beam and induce losses related to non-linear dynamics.

Intensity vs. time was recorded for:

- nominal conditions (but with MOs set to zero)
- scan on the MCOs strength

Originally it was also planned to scan over the MCDs strenght, but in the end it was not possible due to lack of time (mainly BETs issue at the SPS, which prevented to inject Beam 1 for a long time).

The data collected will need to be analysed off-line.
We will clearly need some additional time to complete the original programme.

Addendum: during the MD the linear chromaticity was regularly performe din order to have data to qualify the decay over long period of time at injection energy.
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NL part of the DA experiment

Participants: Ewen Maclean, Frank Schmidt, Glenn Vanbavinckhove, Ryoichi Miyamoto, Rogelio Tomas
EIC: Laurette Ponze & Markus Albert, Alick Macpherson & Guy Crockford, Ralph Steinhagen

- Systematic measurement of detuning with amplitude with aperture kicker and AC-dipole with and without spool piece knobs:
- NL chromaticity measuremenment and correction of Q" and Q"' with newly defined MCO & MCD spool piece:
In System/BETA-BEATING:
LHCBEAM/non_lin_chroma_dqq_b2 (b4) 1200.0
LHCBEAM/non_lin_chroma_dqqq_b2 (b5) 160.0

NL chromaticity B2 before correction:

H V
Q" = -1800 570
Q"' = -1.900E6 0.78E6

NL chromaticity B2 after correction:

H V
Q" = -670 -170
Q"' = -0.37E6 -0.15E6

- Comments:

+ Collimation settings in IP6 limited the maximum kick strengths of both kicker types. Therefore no true DA measurement possible with kickers.
+ Spool piece correction very effective also to reduce detuning.
with amplitude.