
BLM test results at PS and PSB

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In collaboration:

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Motivations

- *Renew old BLM system on PS and PSB:*
 - › *NO spare available for ACEM detectors*
 - › *ACEM has to be recalibrated every year.*
- *Test for future BLM system of LINAC 4*

Tests with different BLMs types

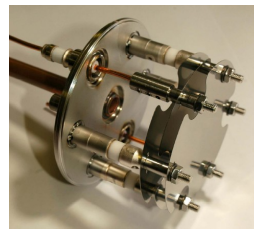


ACEM
(current)



SMALL LHC BLM

LHC BLM



SEM

PEP-II

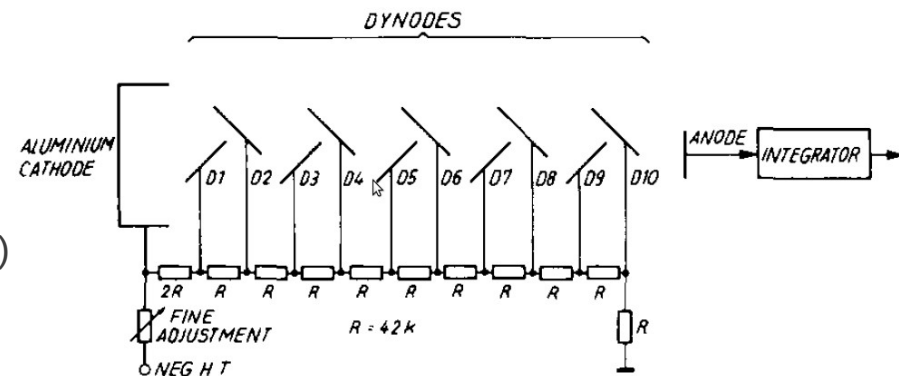
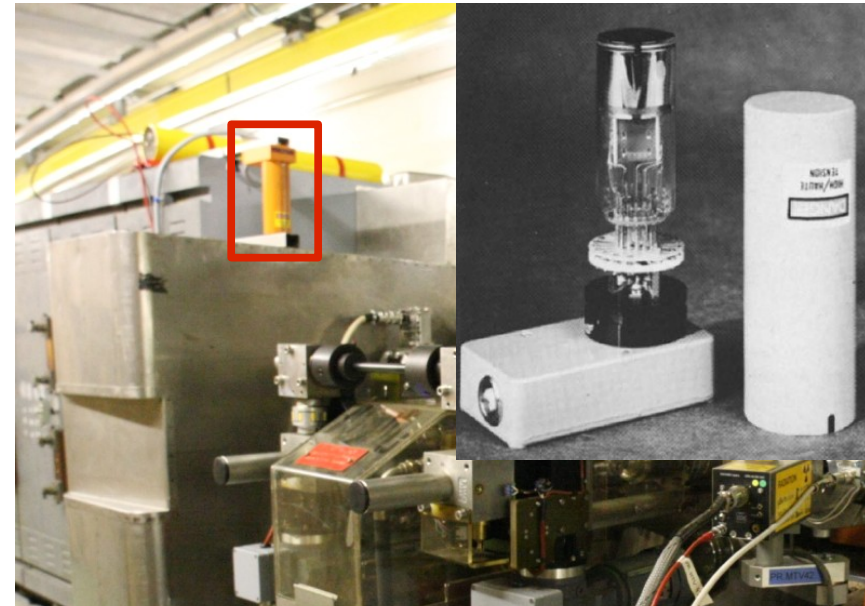


*Courtesy of
U. Wienands*

BLMs types

ACEM:

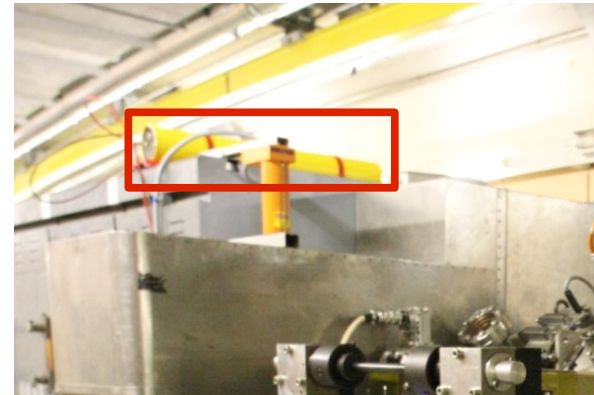
- Glass vacuum tube (40 mm diam. & 90 mm long)
- 10 Stage Electron-Multiplier
- Multiplication factor up to 10^6
- *Pros:*
 - Fast response
- *Cons:*
 - Calibration
 - Aging due to the radiation
 - Reduced size (small solid angle)



BLMs types

LHC BLM:

- Ionization chamber (N_2)
- Parallel Al electrode plates
- 9 cm diam. & 50 cm long
- *Pros:*
 - Large volume (1.5 l)
 - Fully tested in LHC
- *Cons:*
 - Sensitivity to small instantaneous losses
 - Saturated with very large losses
 - Large volume (PSB)



BLMs types

Small LHC BLM:

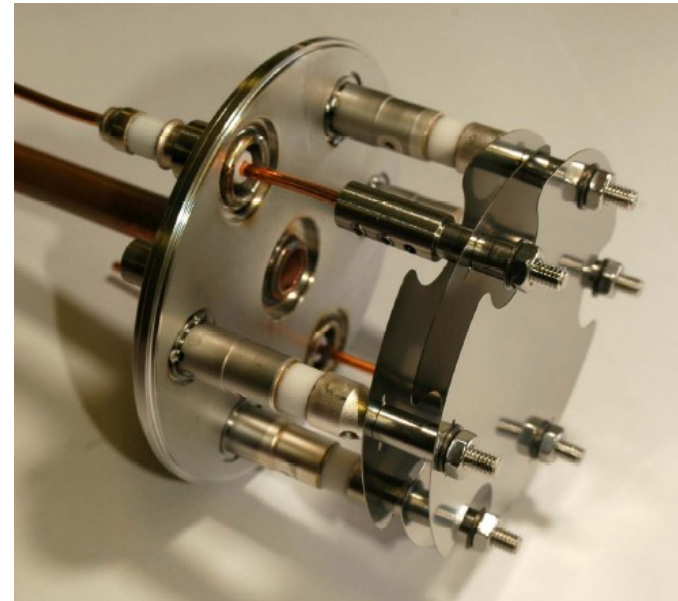
- Same operation as LHC BLM
- Different chamber pressure
- cm diam. & cm long
- *Pros:*
 - Fast response (not tested)
- *Cons:*
 - Sensitivity to small instantaneous losses
 - Reduced size



BLMs types

SEM:

- Based on *secondary electron* emission
- *Pros:*
 - Very high loss rate
 - High linearity
 - Fast response
- *Cons:*
 - Low sensitivity
(10.000 times *less* than LHC BLMs)
 - Reduced size

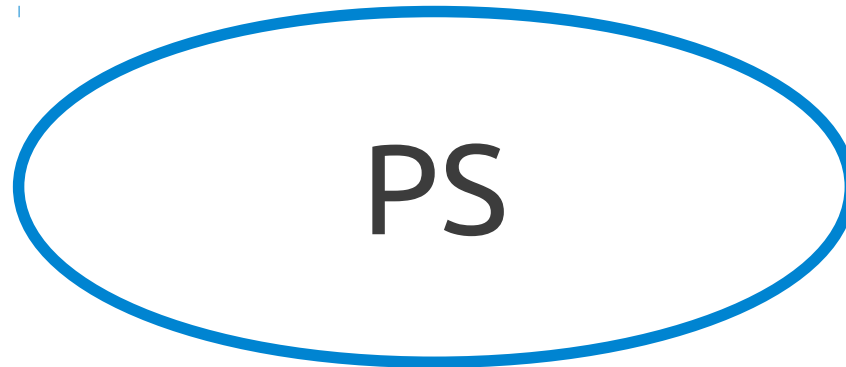


BLMs types

PEP-II detector:

- 1 cm³ *Fluse-silica Cherenkov* counter
- Small (fast) Hamamatsu PMT
- 5 mm lead Shielding (1 kg)
- 40 mm diam. & 150 mm long
- Tested in UA9
- *Pros:*
 - Fast response
- *Cons:*
 - No data available about aging due to radiation from protons
 - linearity of response (*to be tested*)





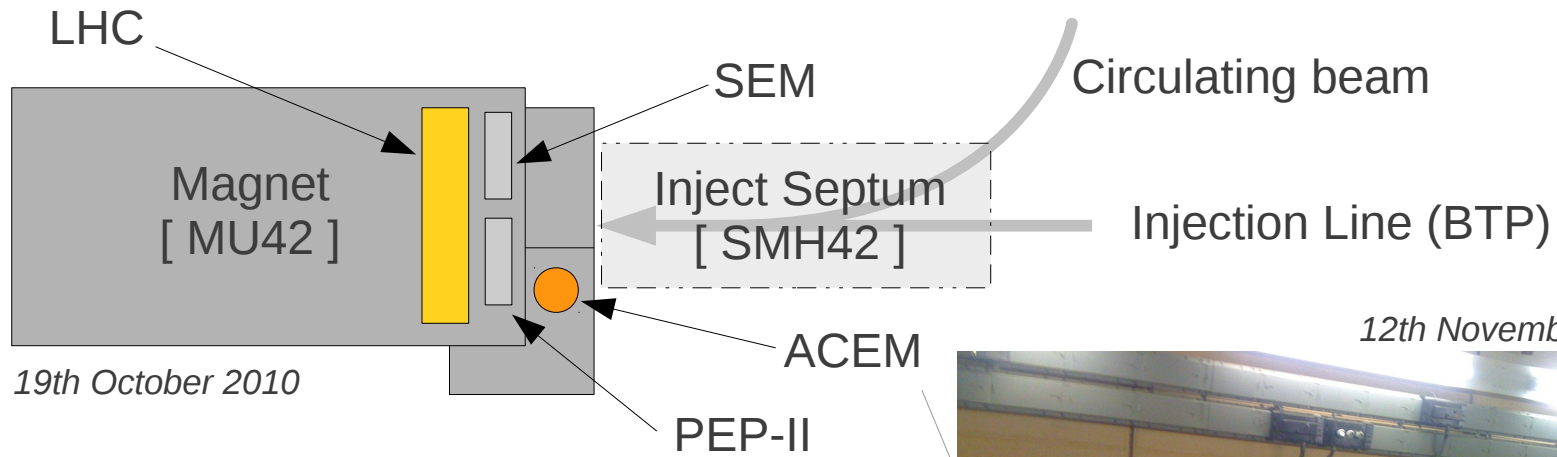
Measurement conditions

- Oscilloscope (1 GHz):
 - › Terminated 50Ω

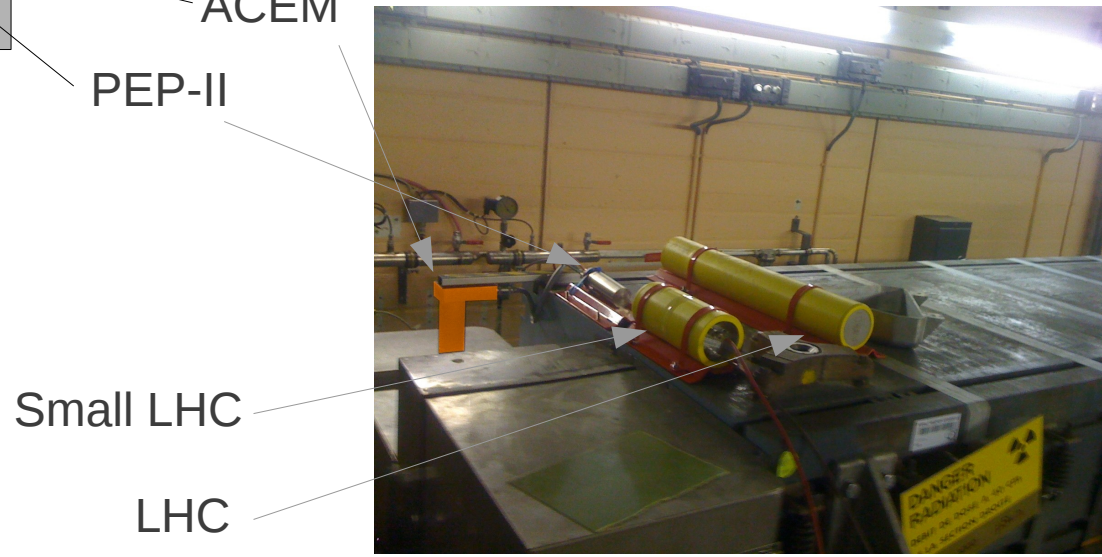


- Direct signal from detectors via spare OASIS able.

Detector installation



12th November 2010



Beam Type

TOF:

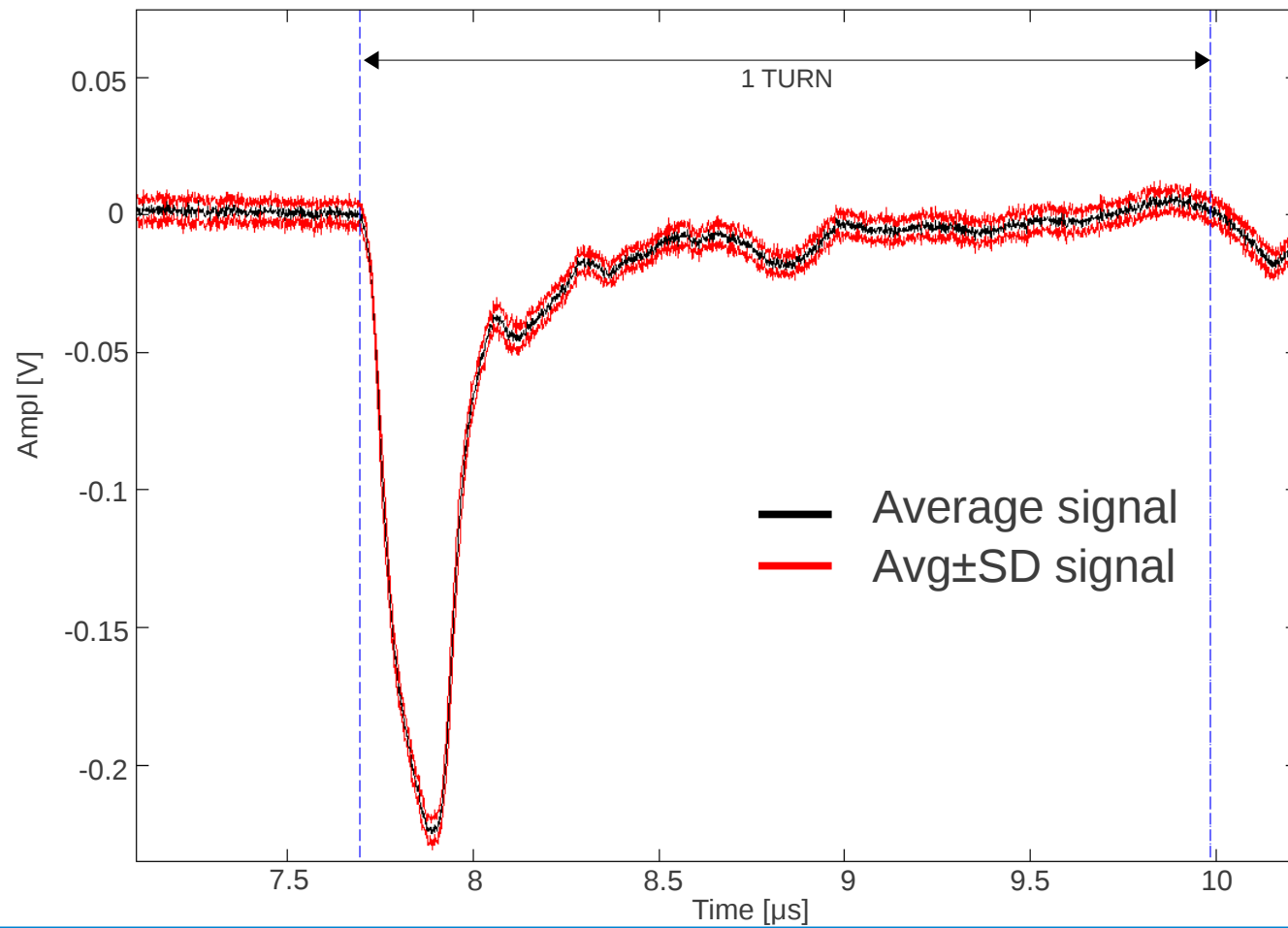
- 1 Bunch
- 200 ns length
- $850e^{10}$ p/bunch
- Toward the *nTOF* facility

CNGS:

- 8 Bunches
- 200 ns length
- $350 e^{10}$ p/bunch
- To *Gran Sasso*

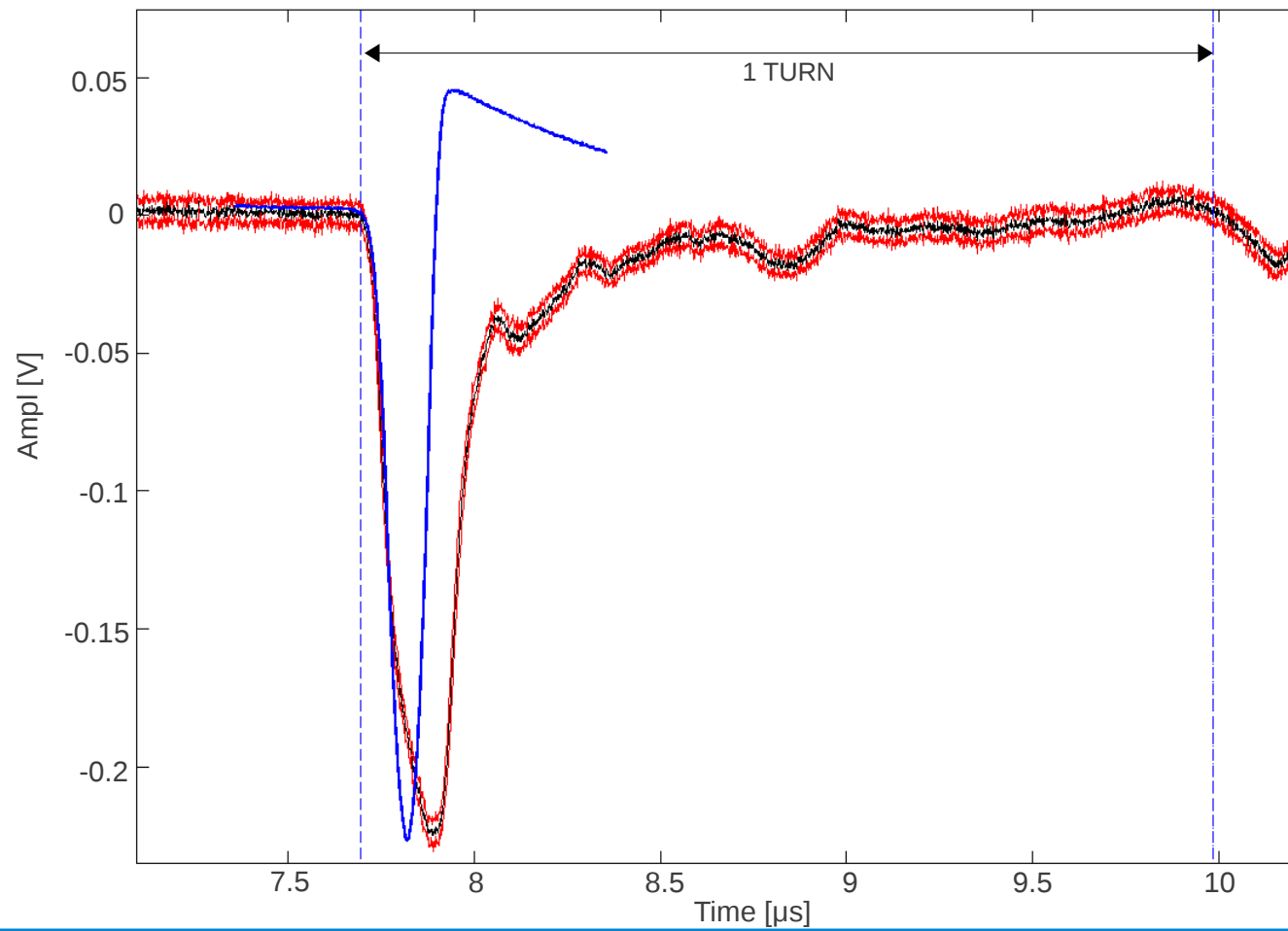
BLMs Results

19th October 2010 [ACEM TOF]



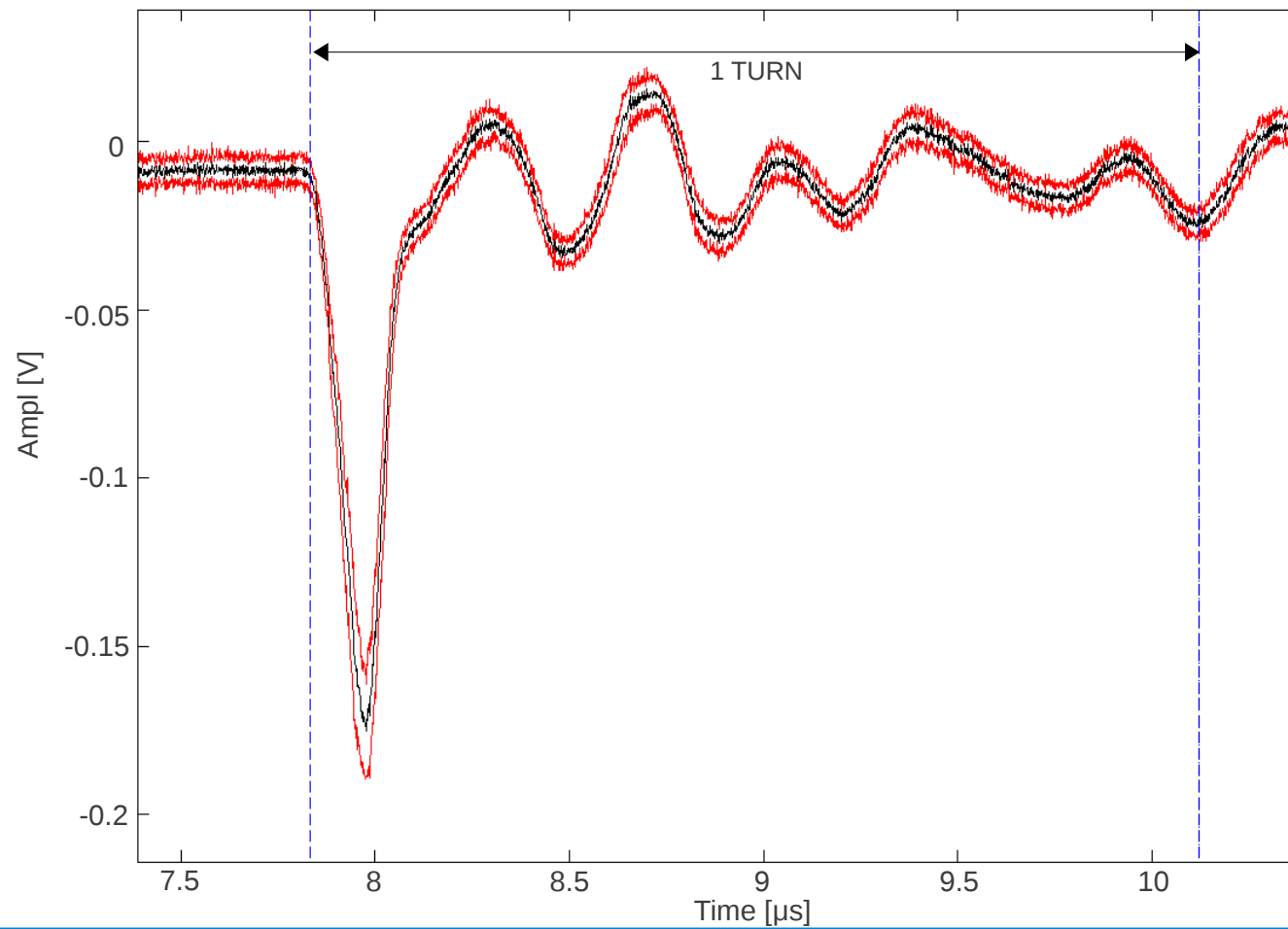
BLMs Results

19th October 2010 [ACEM TOF]



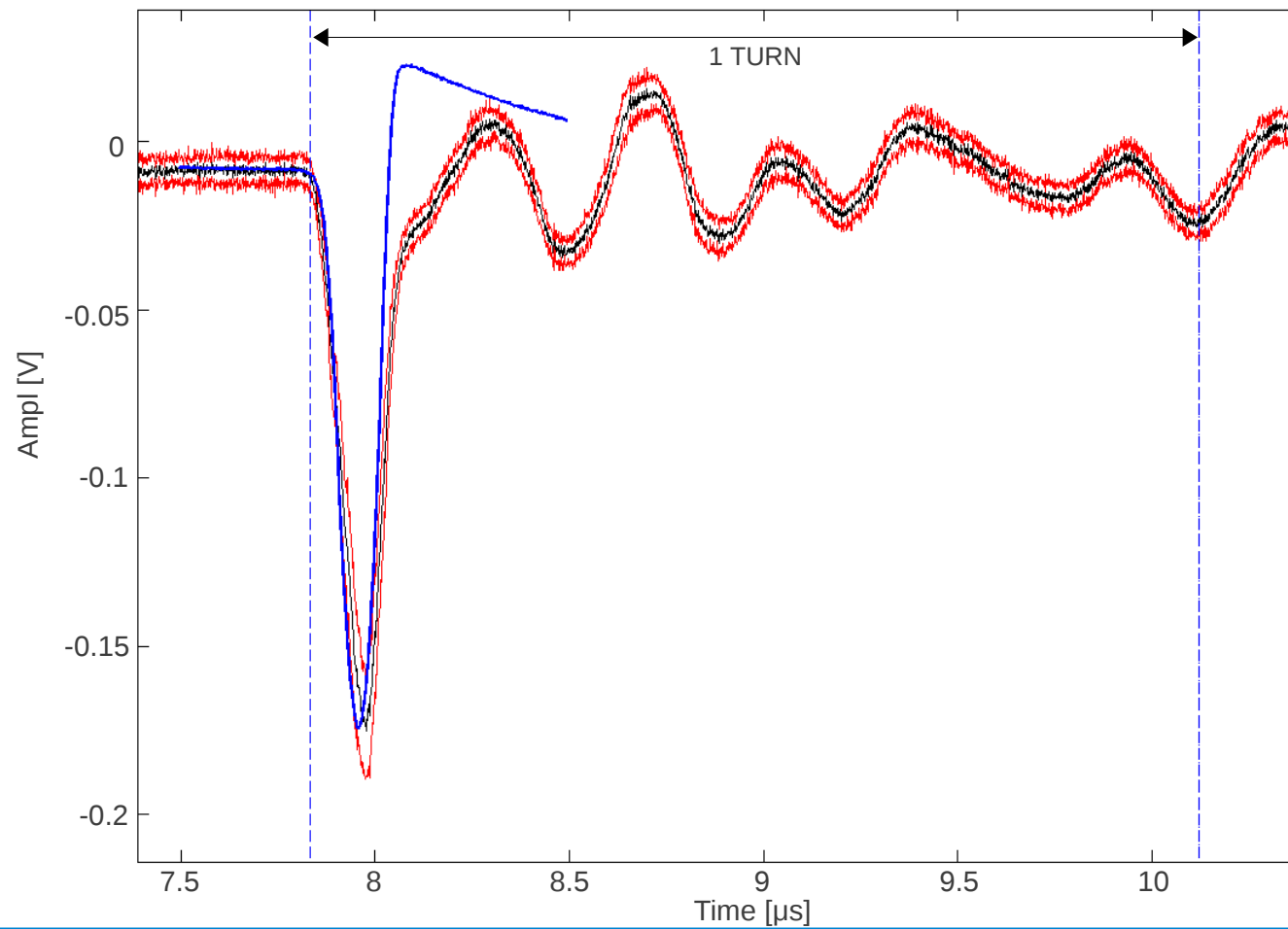
BLMs Results

19th October 2010 [PEP-II TOF]



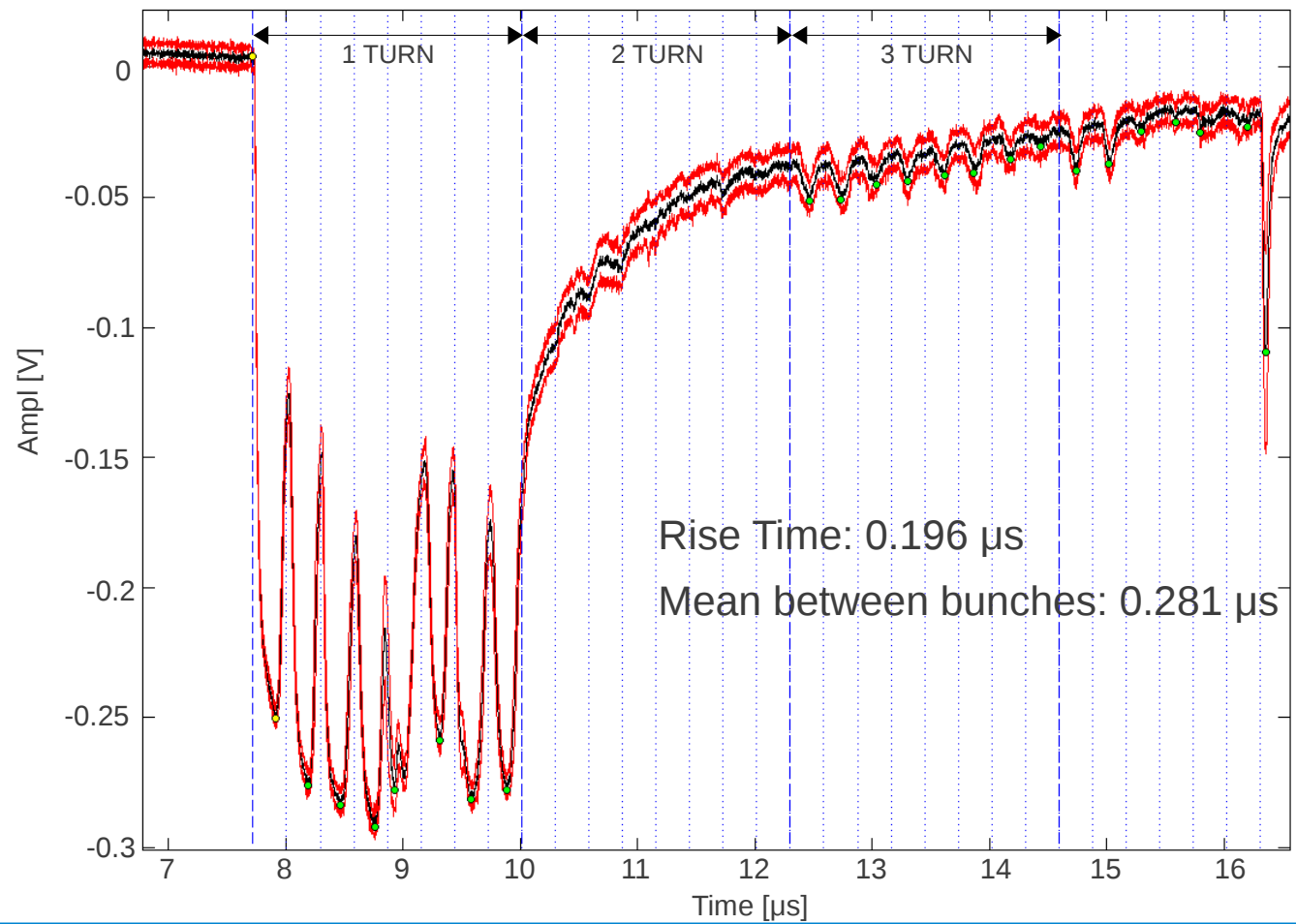
BLMs Results

19th October 2010 [PEP-II TOF]



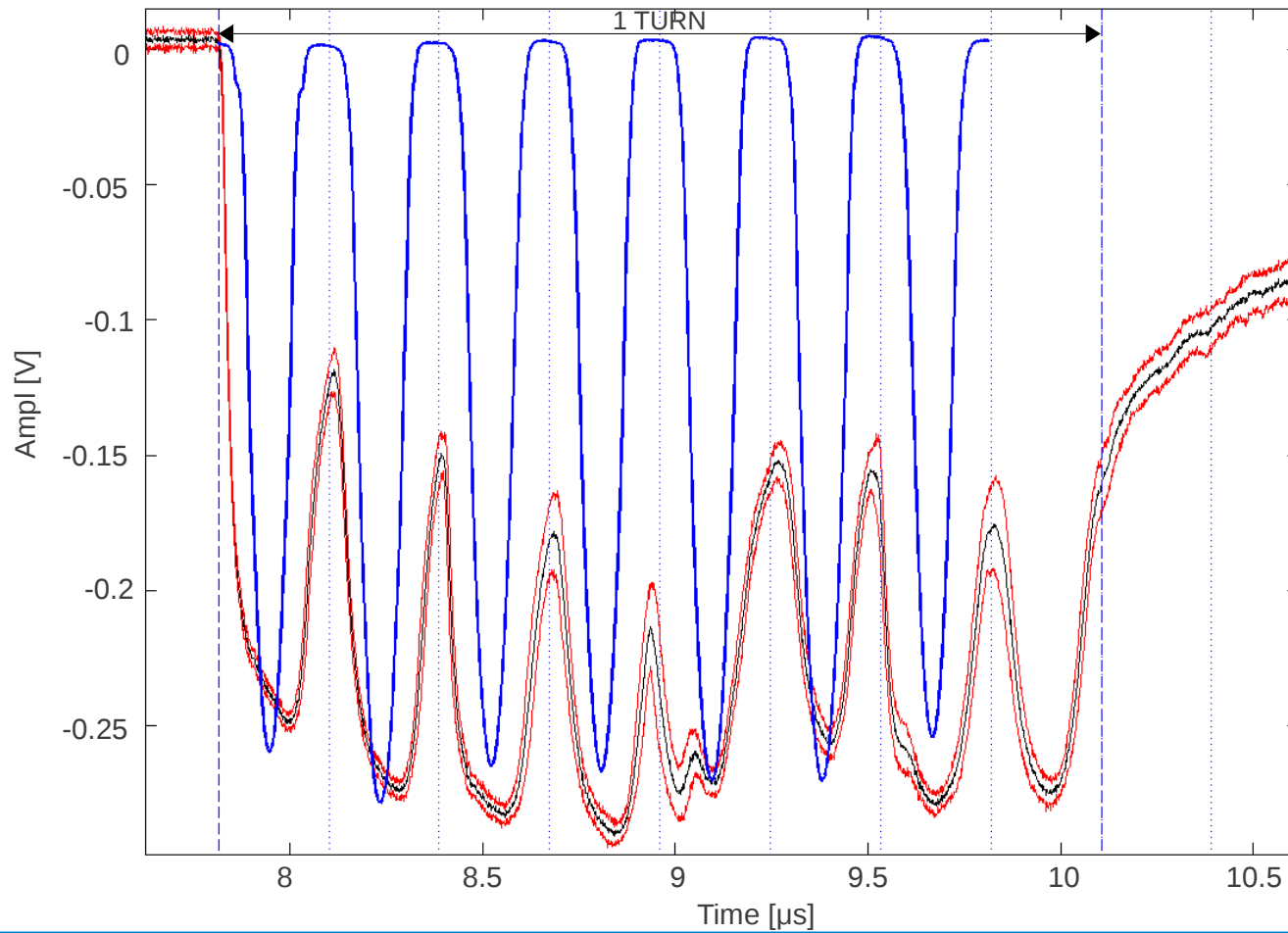
BLMs Results

19th October 2010 [ACEM CNGS]



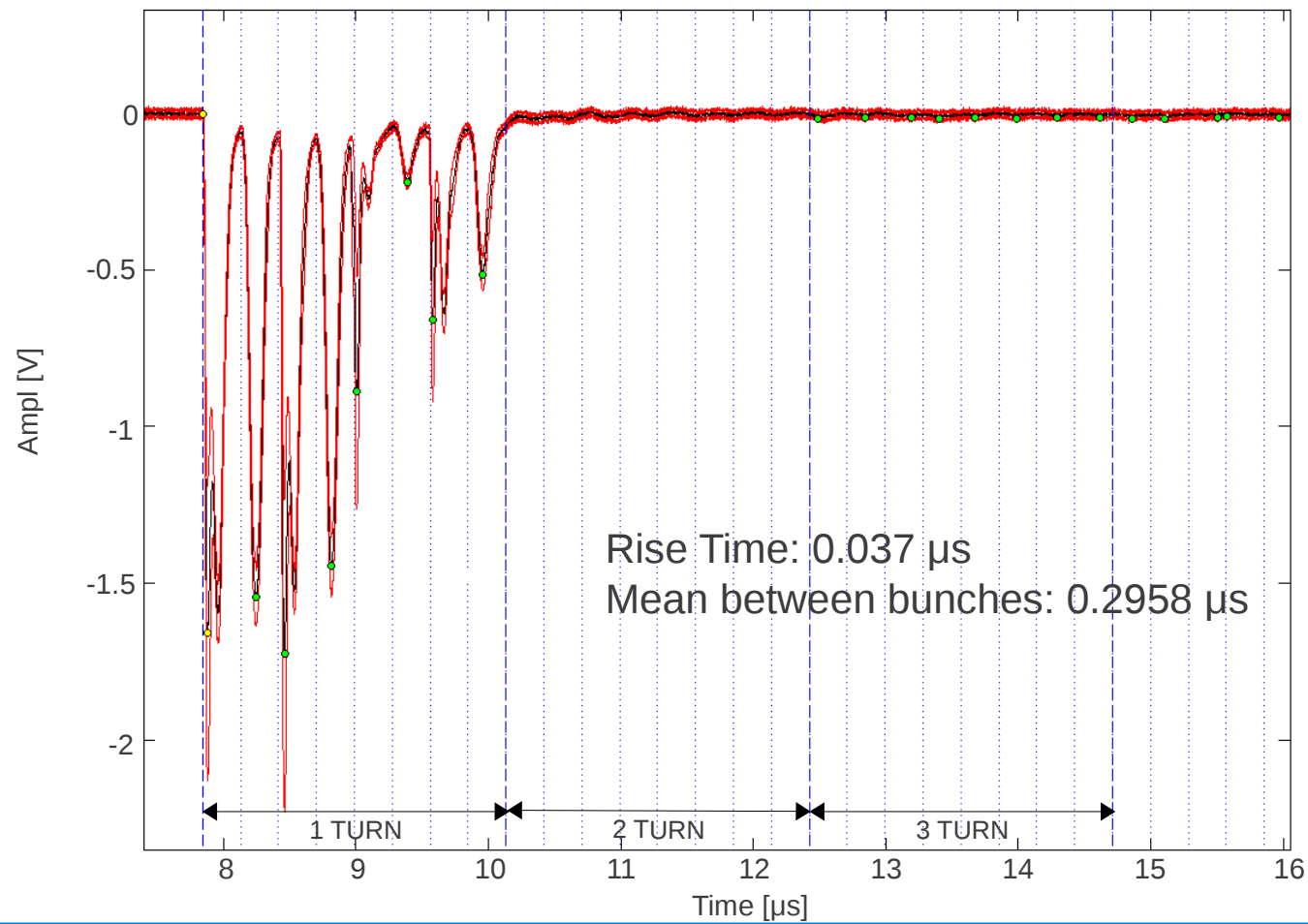
BLMs Results

19th October 2010 [ACEM CNGS]



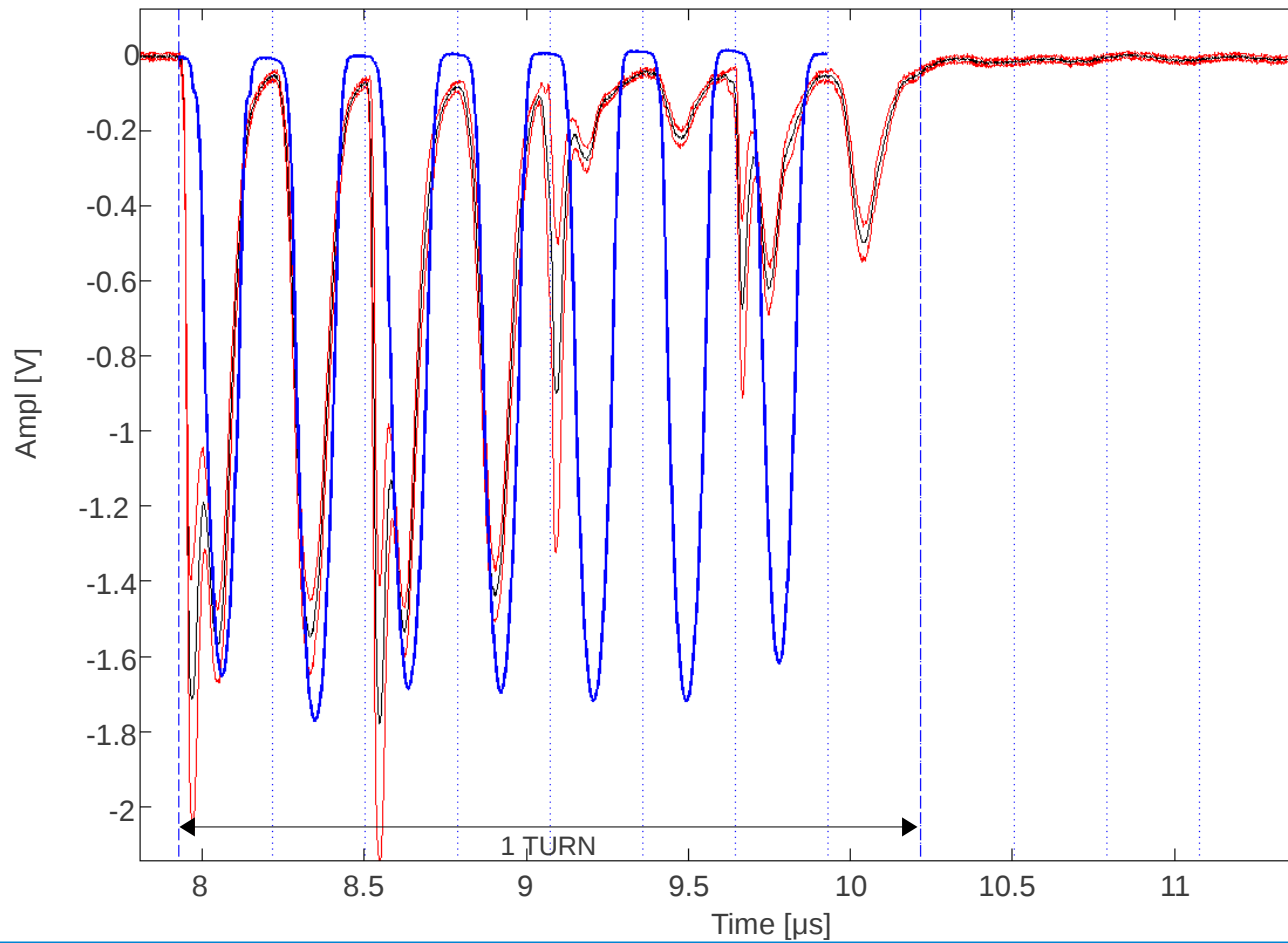
BLMs Results

19th October 2010 [PEP-II CNGS]



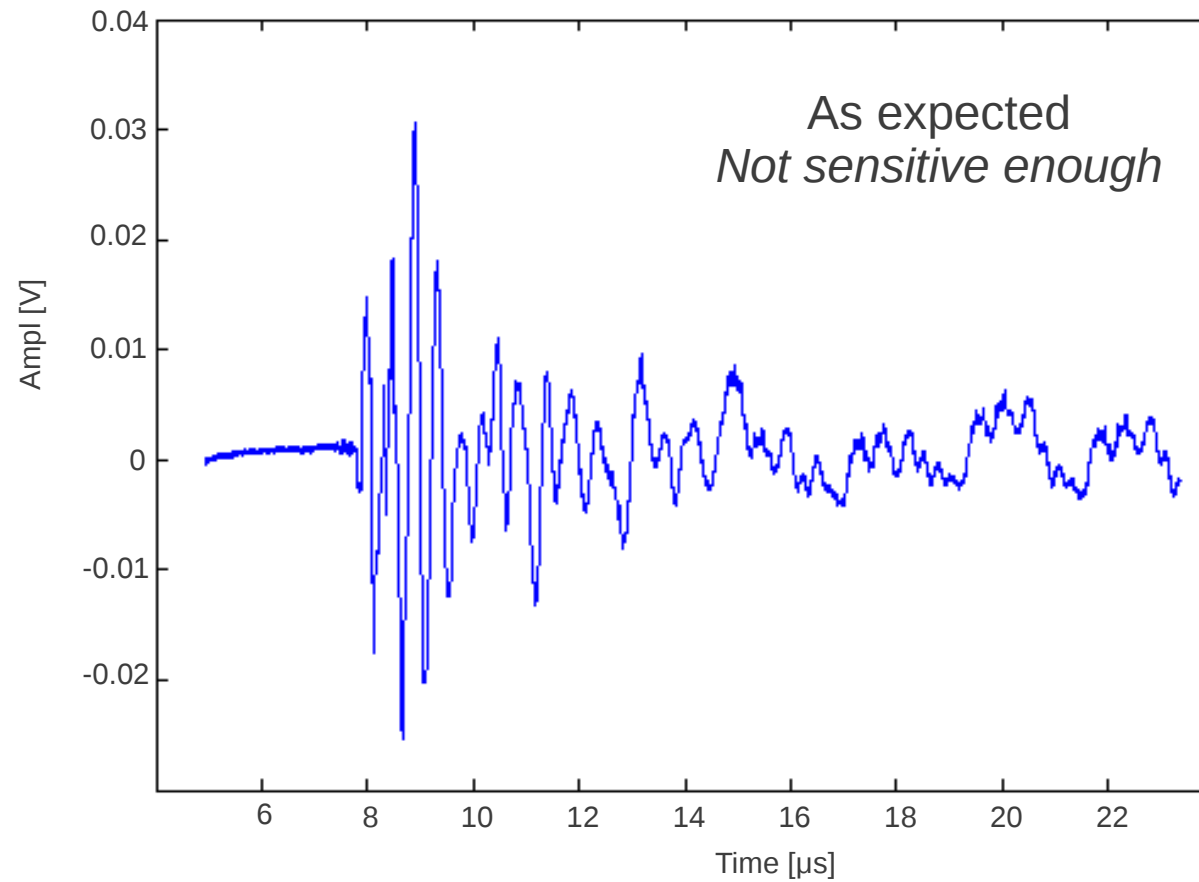
BLMs Results

19th October 2010 [PEP-II CNGS]



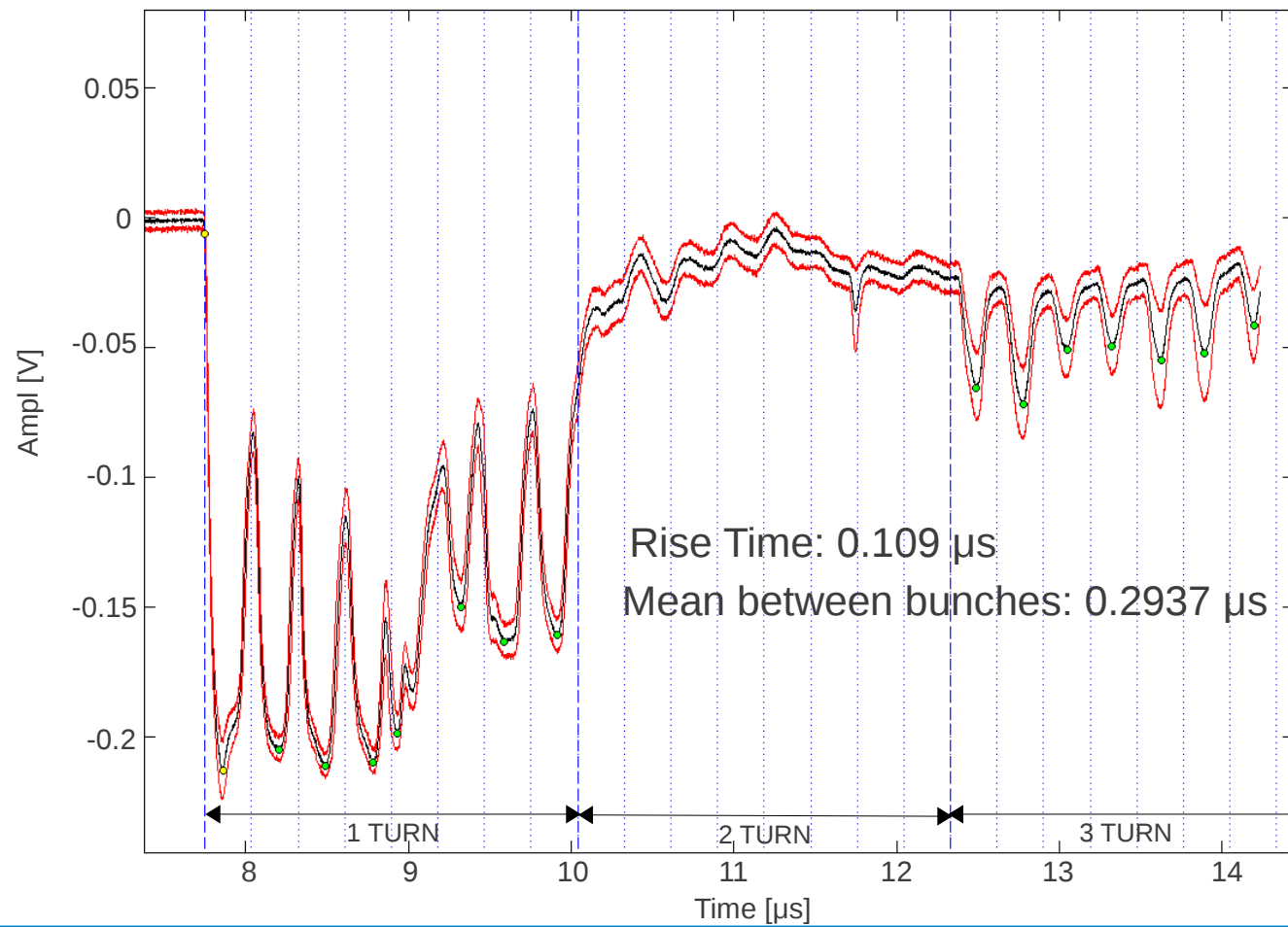
BLMs Results

19th October 2010 [SEM]



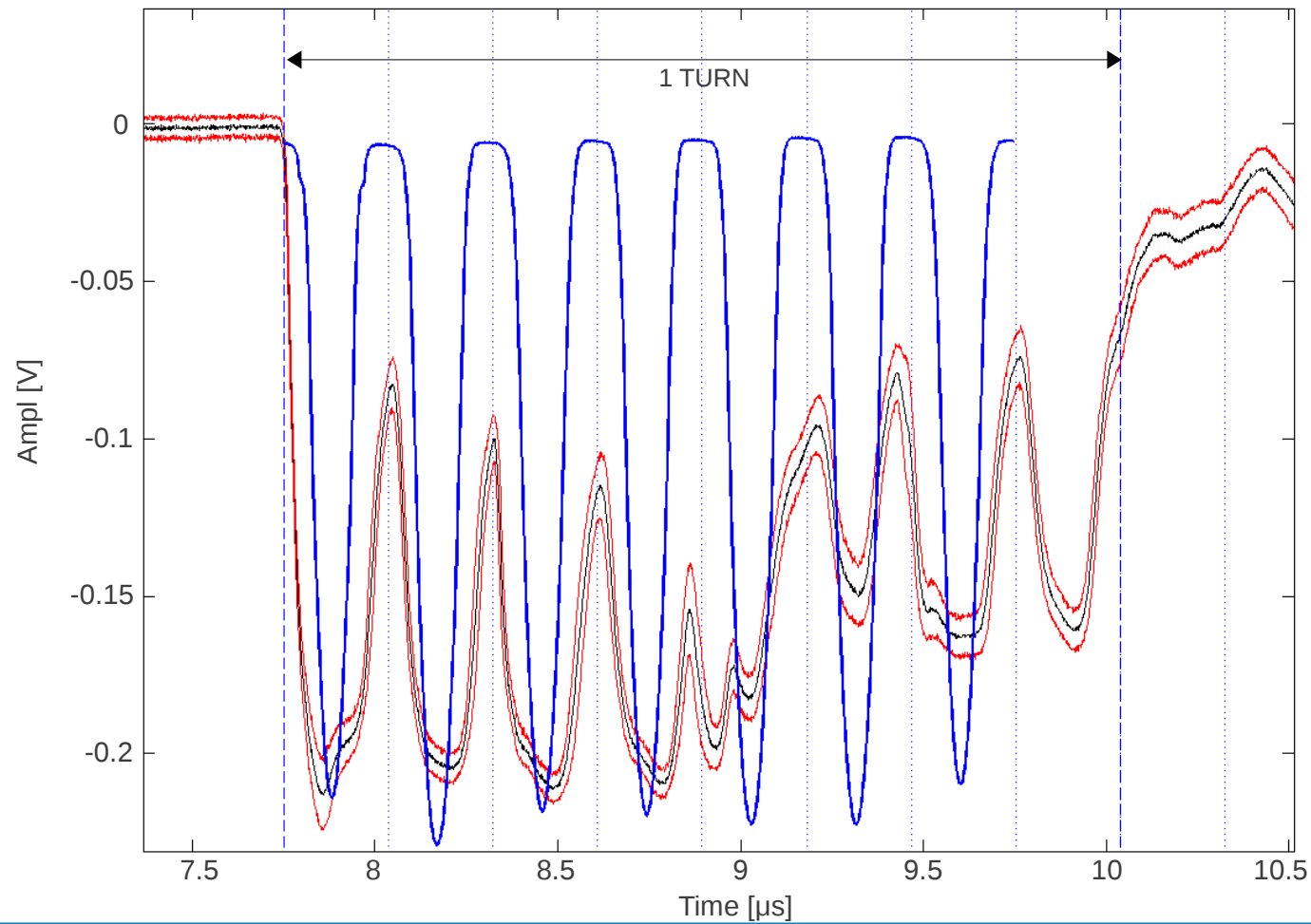
BLMs Results

12th November 2010 [ACEM CNGS]



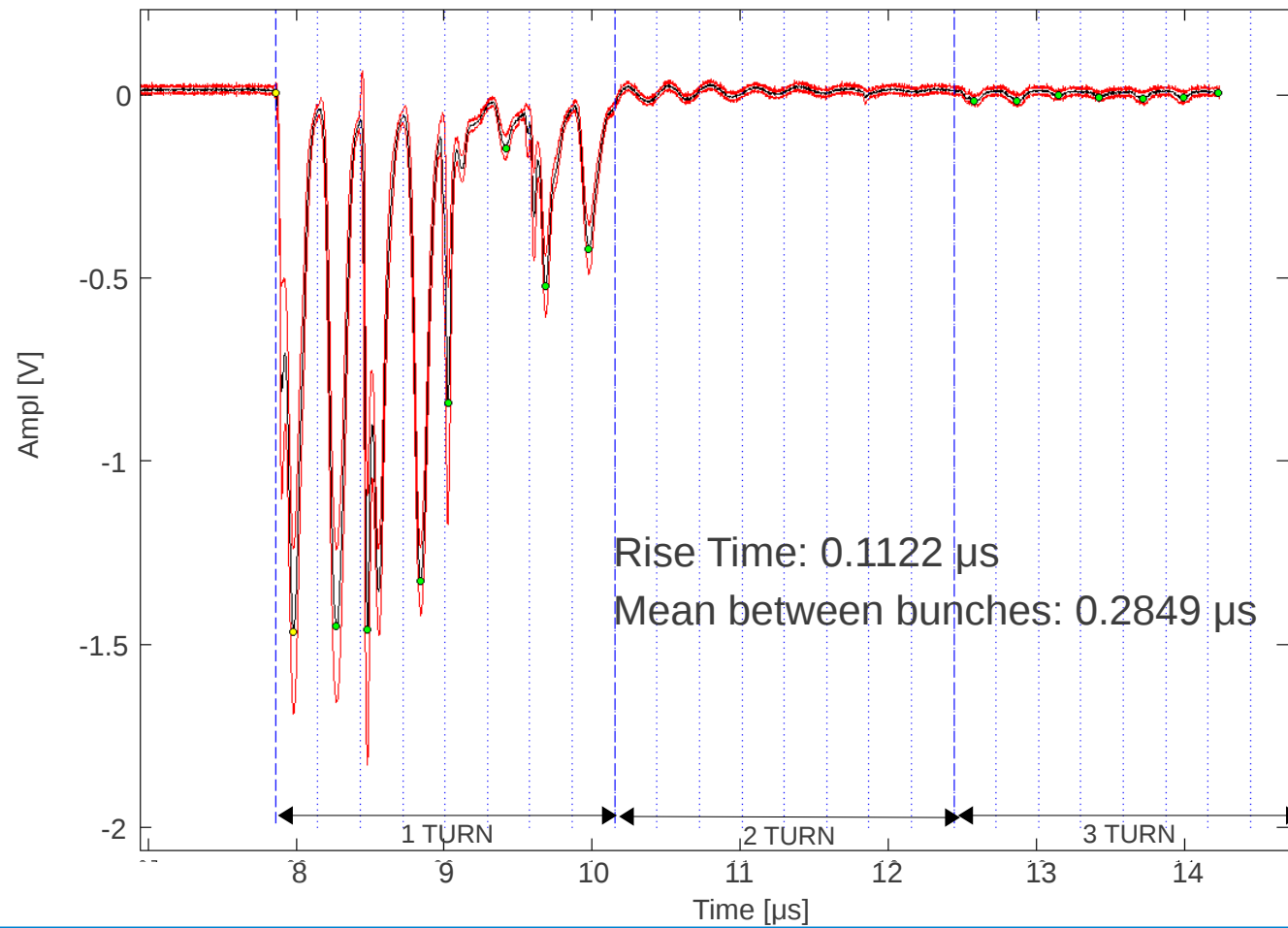
BLMs Results

12th November 2010 [ACEM CNGS]



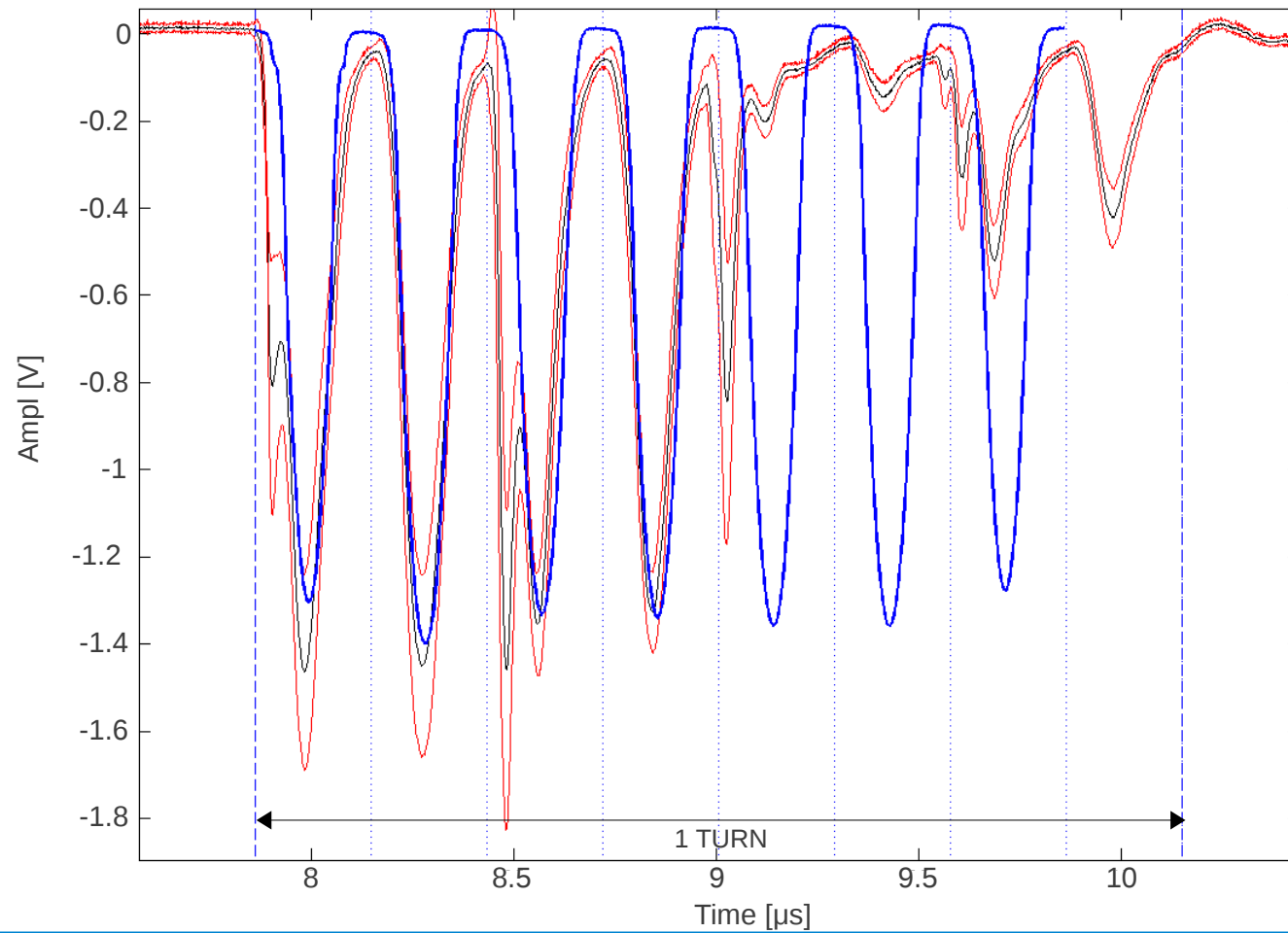
BLMs Results

12th November 2010 [PEP-II CNGS]



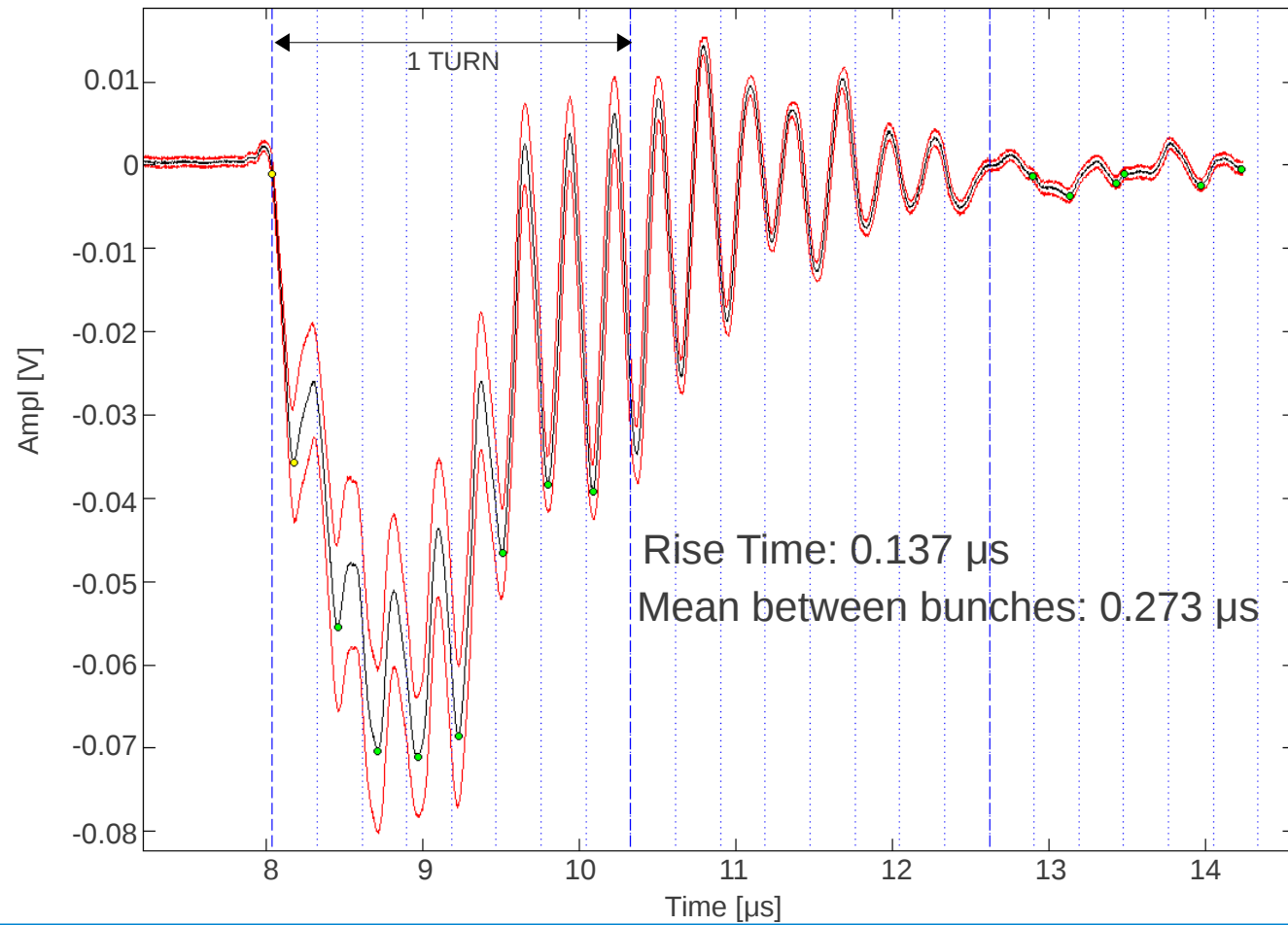
BLMs Results

12th November 2010 [PEP-II CNGS]



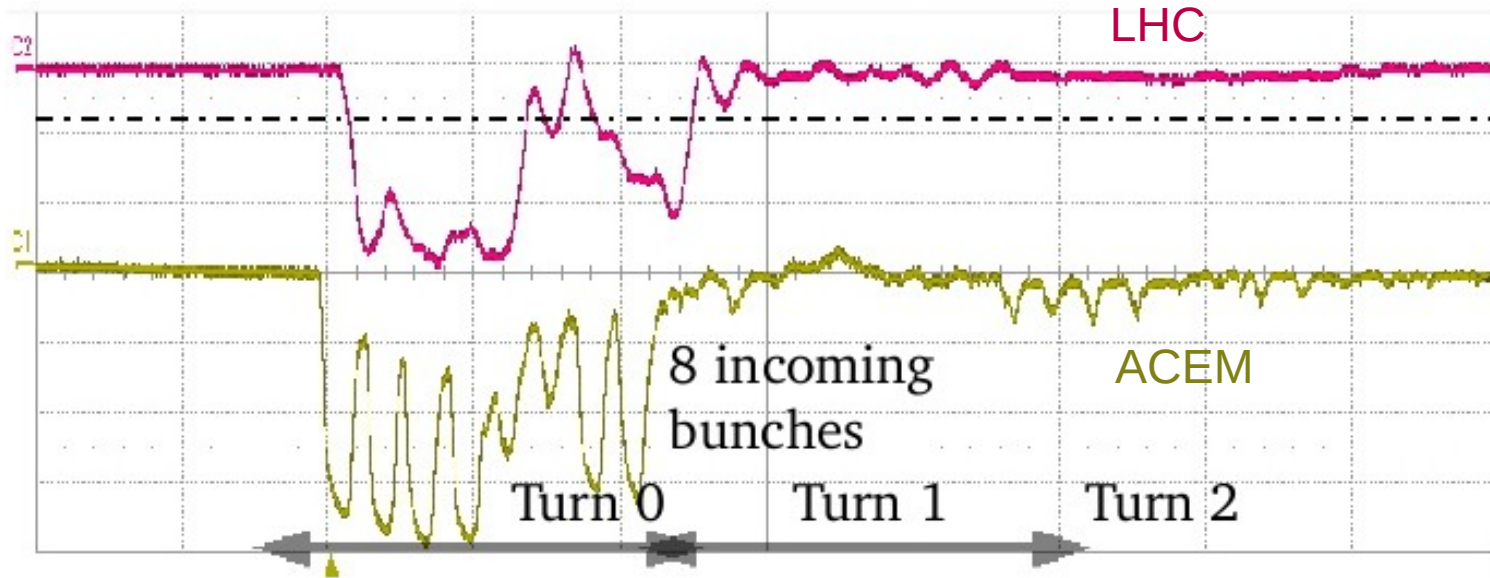
BLMs Results

12th November 2010 [Small LHC BLM CNGS]



BLMs Results

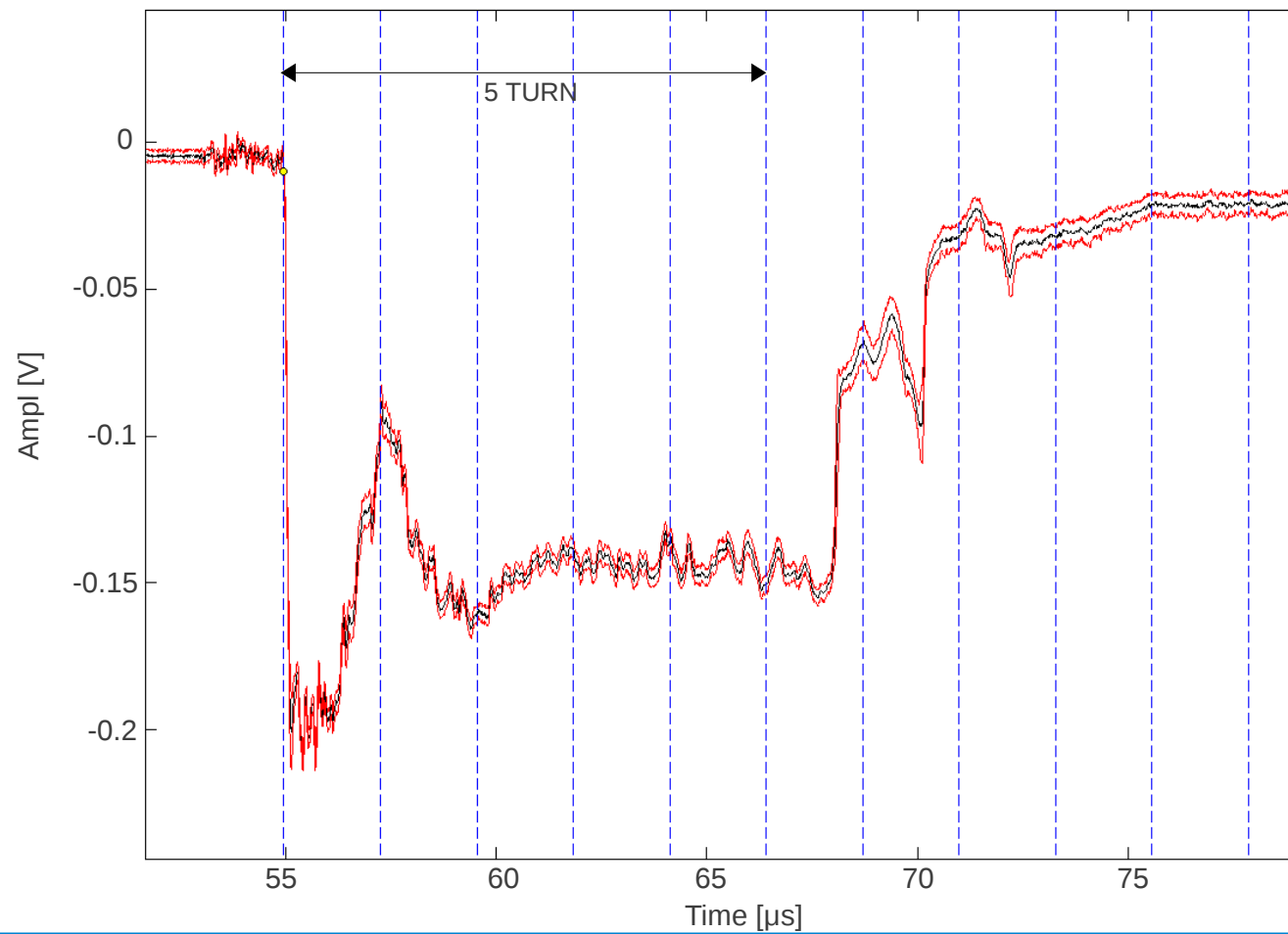
LHC / ACEM CNGS



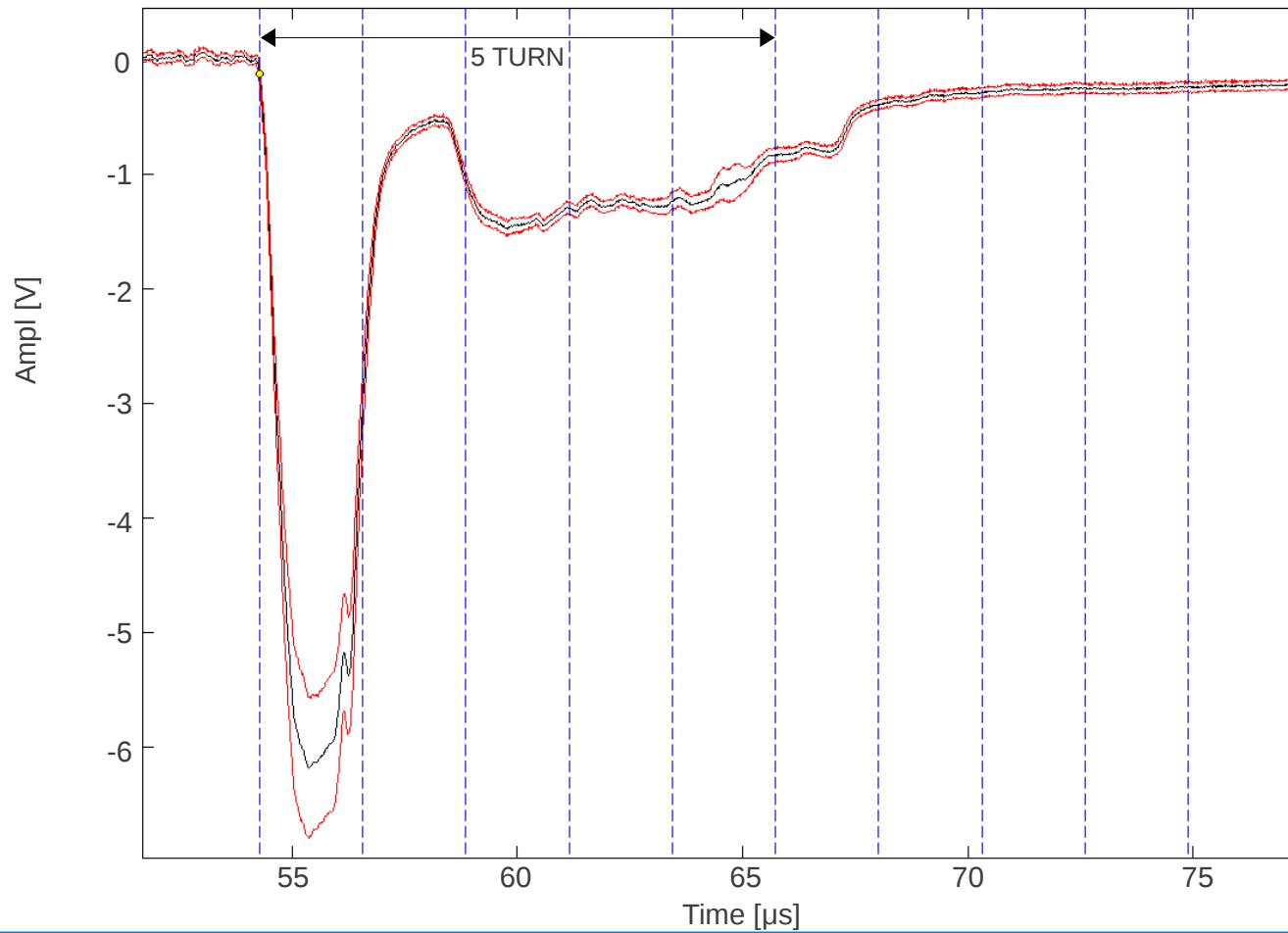
S. Aumon
MSWG Meeting 13/08/2010

BLMs Results

12th November 2010 [ACEM CNGS extraction]



BLMs Results 12th November 2010 [LHC BLM CNGS extraction]



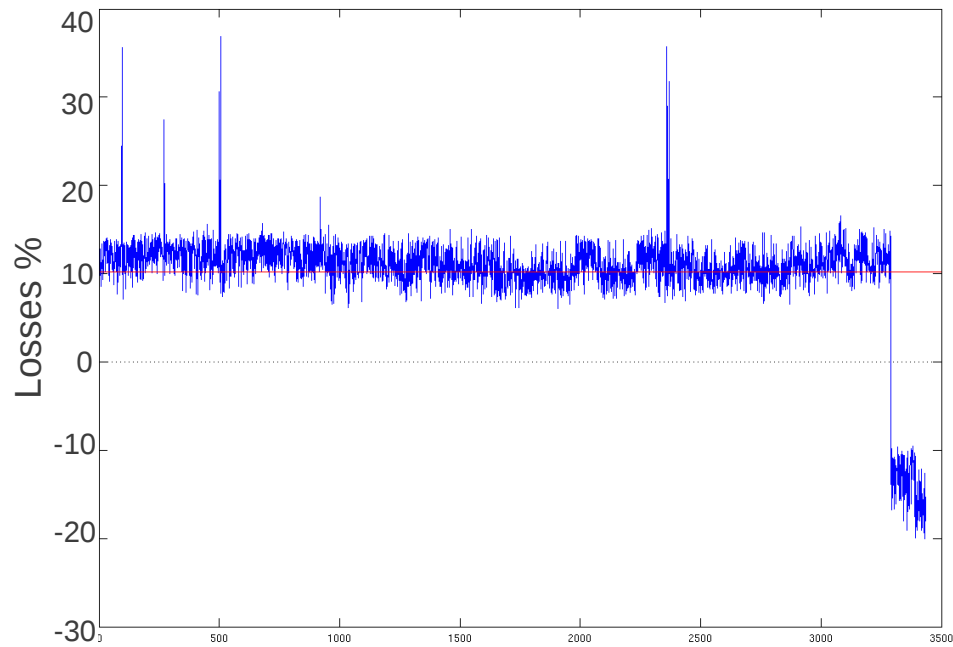
Transformers

Losses between BT.BCT & PR.DCAFTINJ_1 transformers

19/10/10

Relative losses [mean]: 10.17%

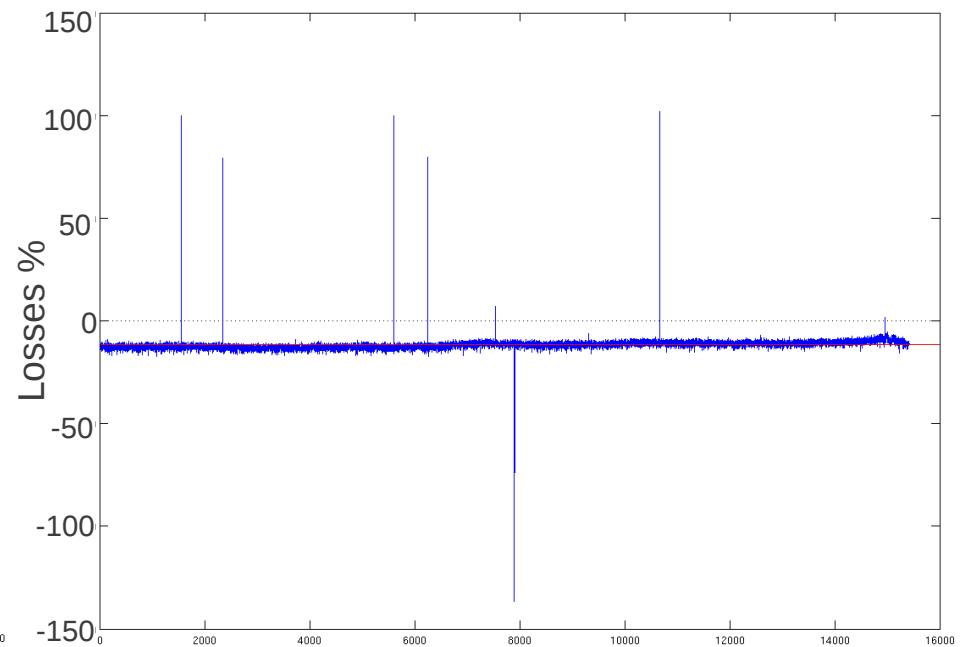
Relative losses [sd]: 5.45%



12/11/10

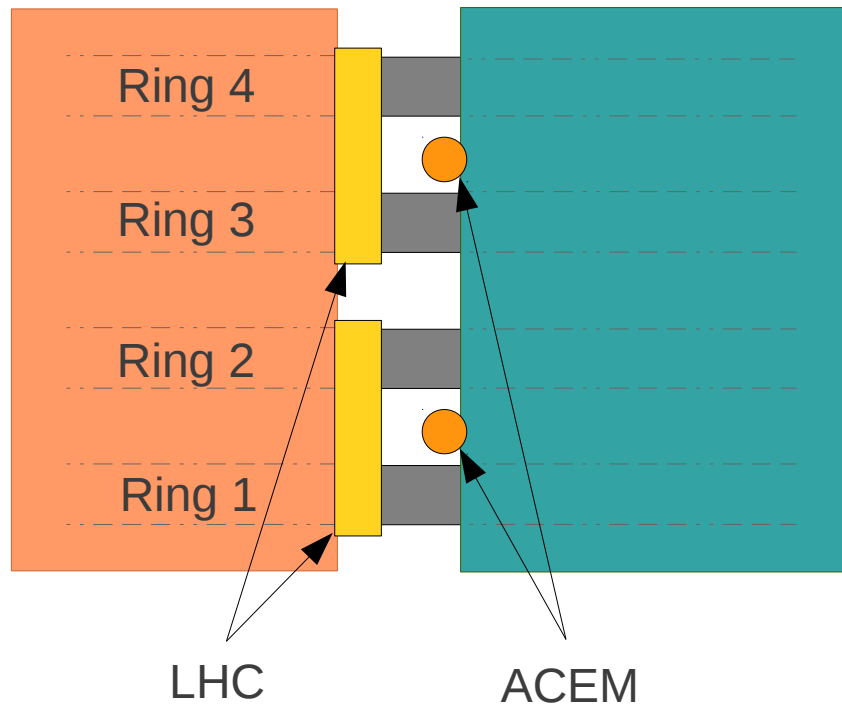
Relative losses [mean]: -11.67%

Relative losses [sd]: 3.06%

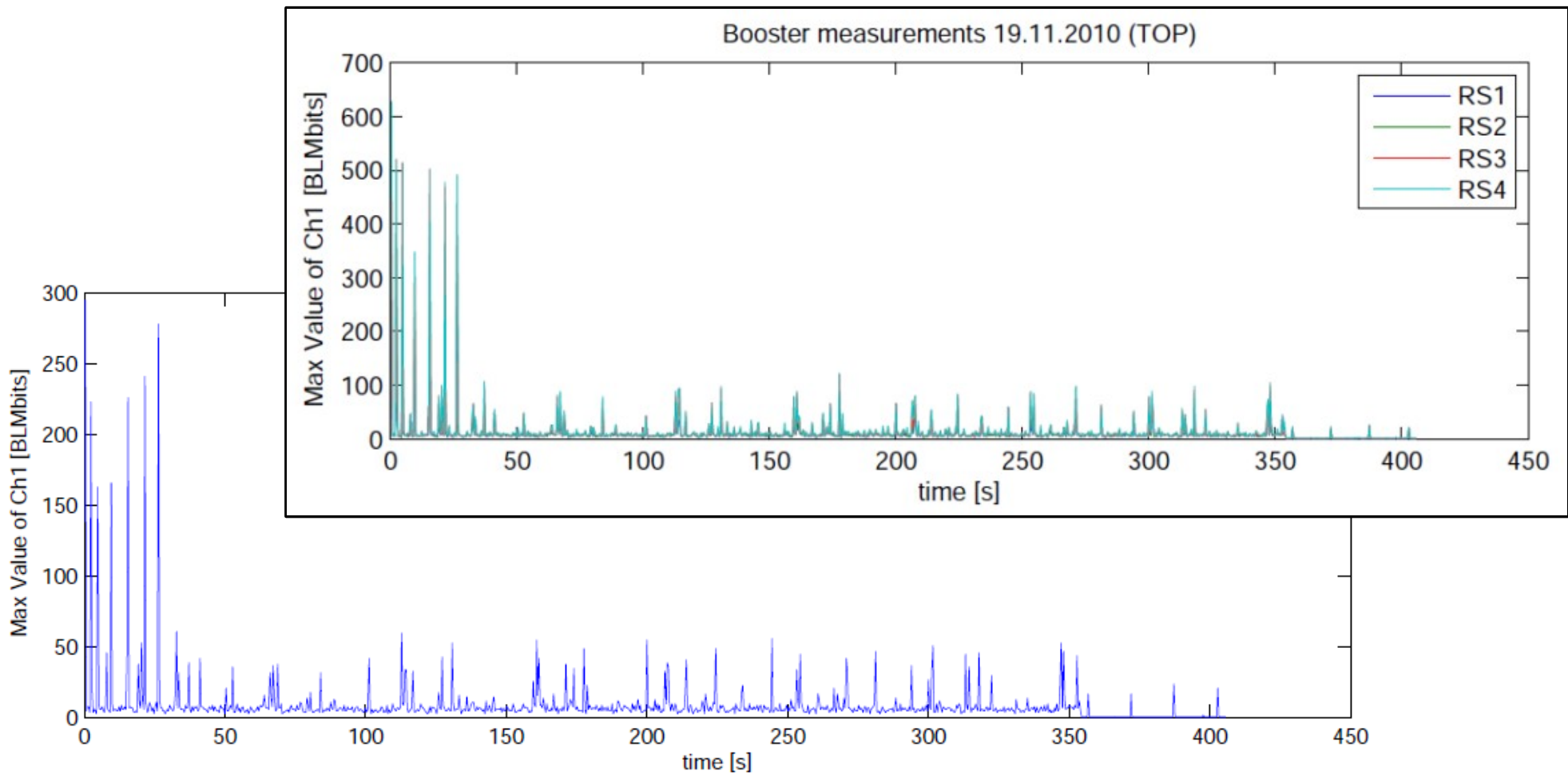




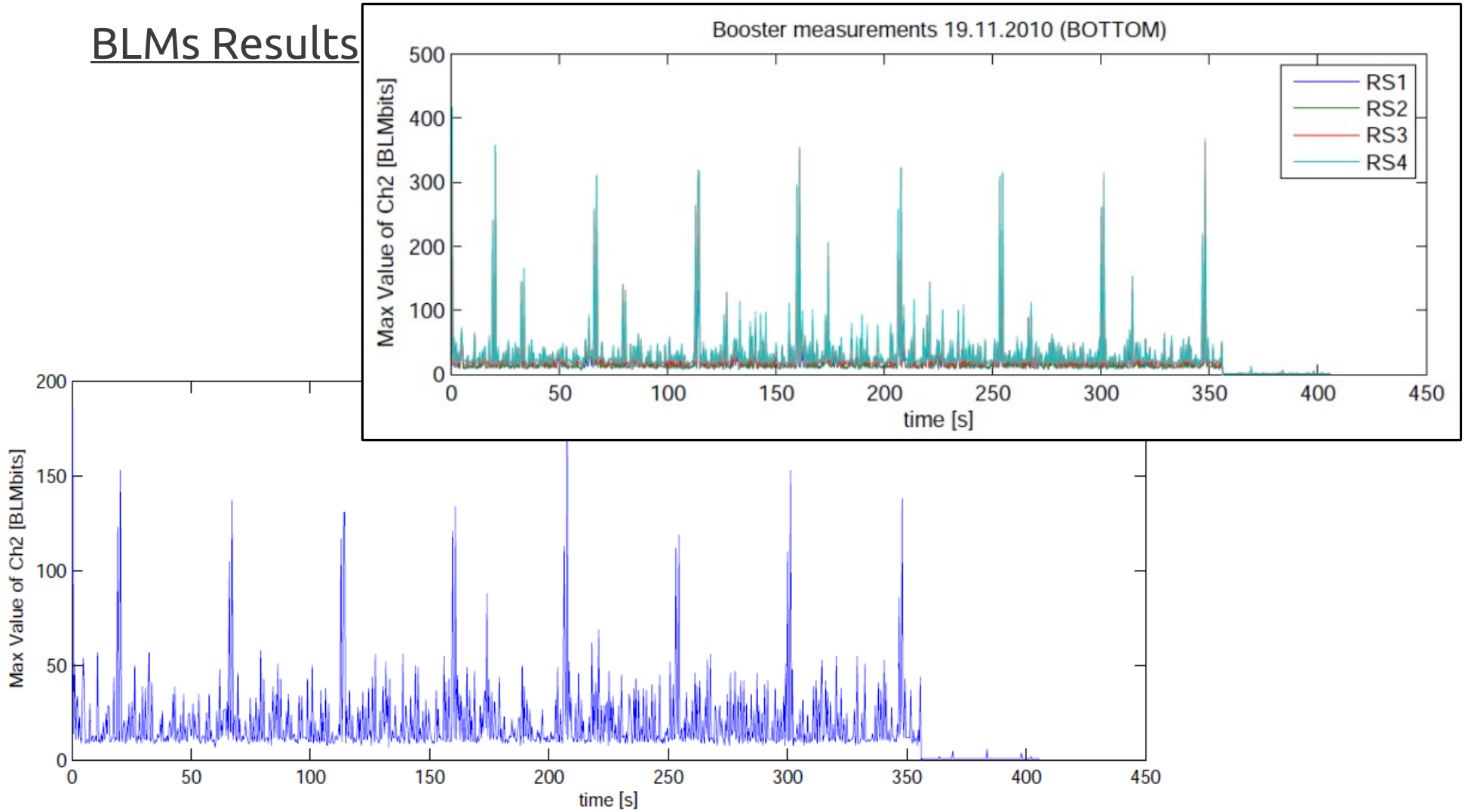
Detector Installation



BLMs Results



BLMs Results



Conclusions

See Simone's slides