

Status of BCM1F4LHC

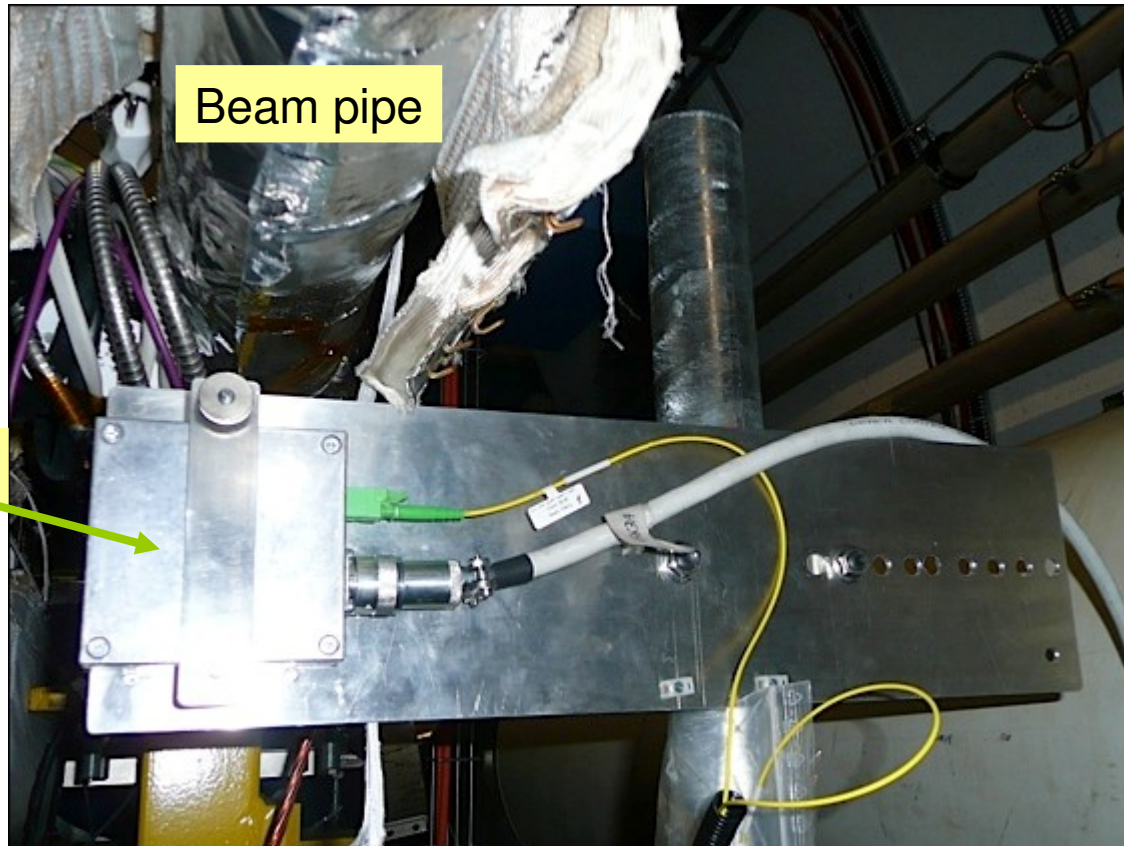
E. Castro

FCAL-CMS meeting

17th Oct 2011

Installation of the diamond

- The diamond is installed in the IP#8 of the LHC ring, cell 4 R8, close to the TCTVB (collimator) and at 70.501 m from the LHCb IP on the side closest to IP#1.
It is located below the vacuum chamber and it is about 20 cm away from the center of the beam pipe.
- Losses are created by the impact of protons on the collimator TCTVB (vertical collimator). LHCb lumi and losses due to vacuum degradation can also be observed????



Beam pipe

Diamond + FEE

DAQ chain

- The signal from the diamond is carried out from P2 to Preveessin site via optical fiber.
- An optical receiver converts back the sensor's optical signal into an electrical signal.
- With a Fan In-Fan Out several copies of the signal are provided to the data acquisition devices.
- The data acquisition is done using CAEN VME boards:

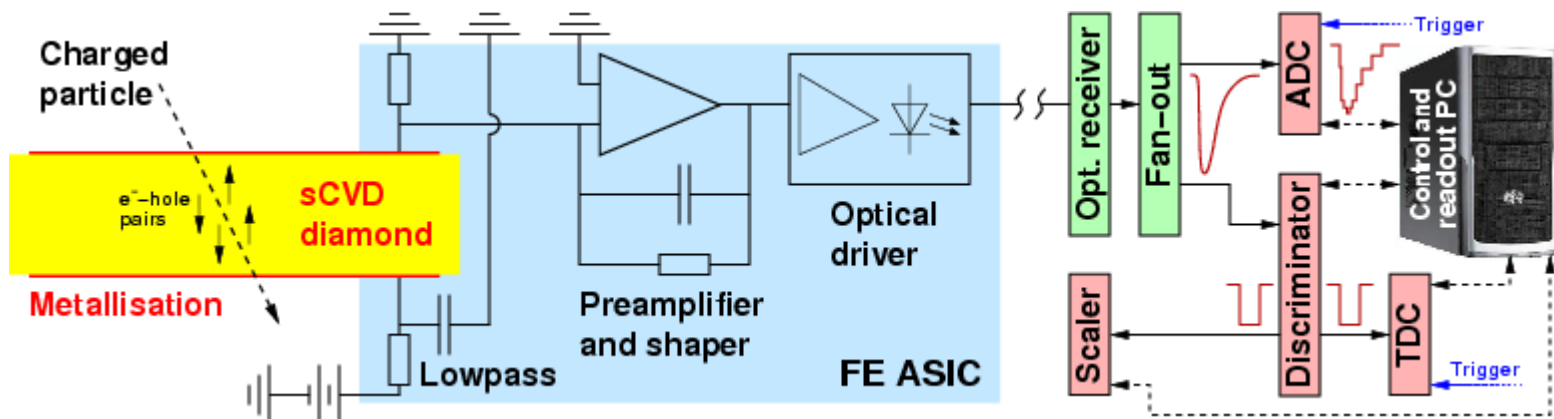
An **ADC** digitizes the signal that comes out from a DC output of the Fan In-Fan Out.

A **discriminator** discriminates the signal that comes out from the AC output of the Fan In-Fan Out (baseline set to 0mV).

From the discriminator the signal is distributed to:

A **scaler** that counts the rates (hits/sec)

A **Time to Digital converter (TDC)** that obtains time information of the hits with respect to the Orbit trigger.



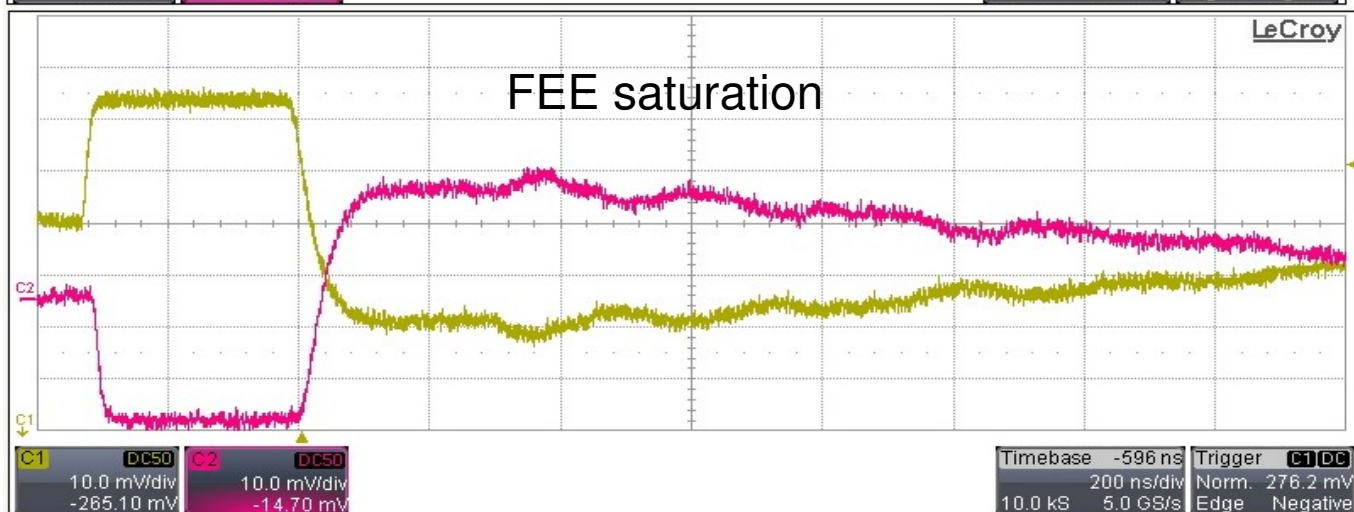
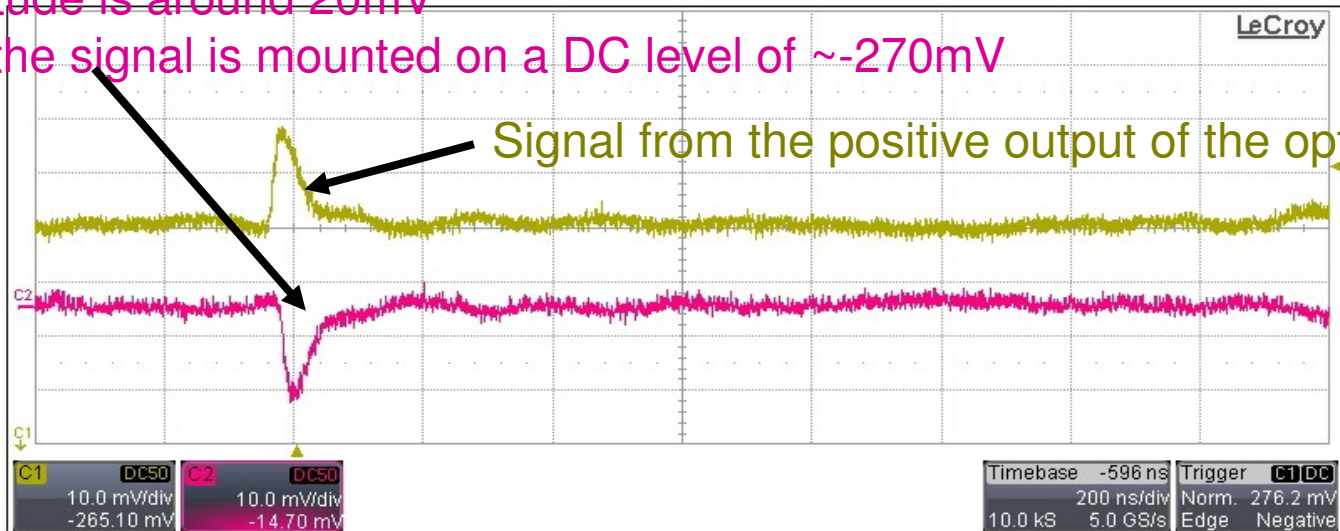
First results: scope screenshots

Signal coming out from the Fan in –Fan out through the AC output and that is used by the discriminator.

Before 12th Oct 2011 @ 11am

Hits amplitude is around 20mV

In reality, the signal is mounted on a DC level of $\sim -270\text{mV}$



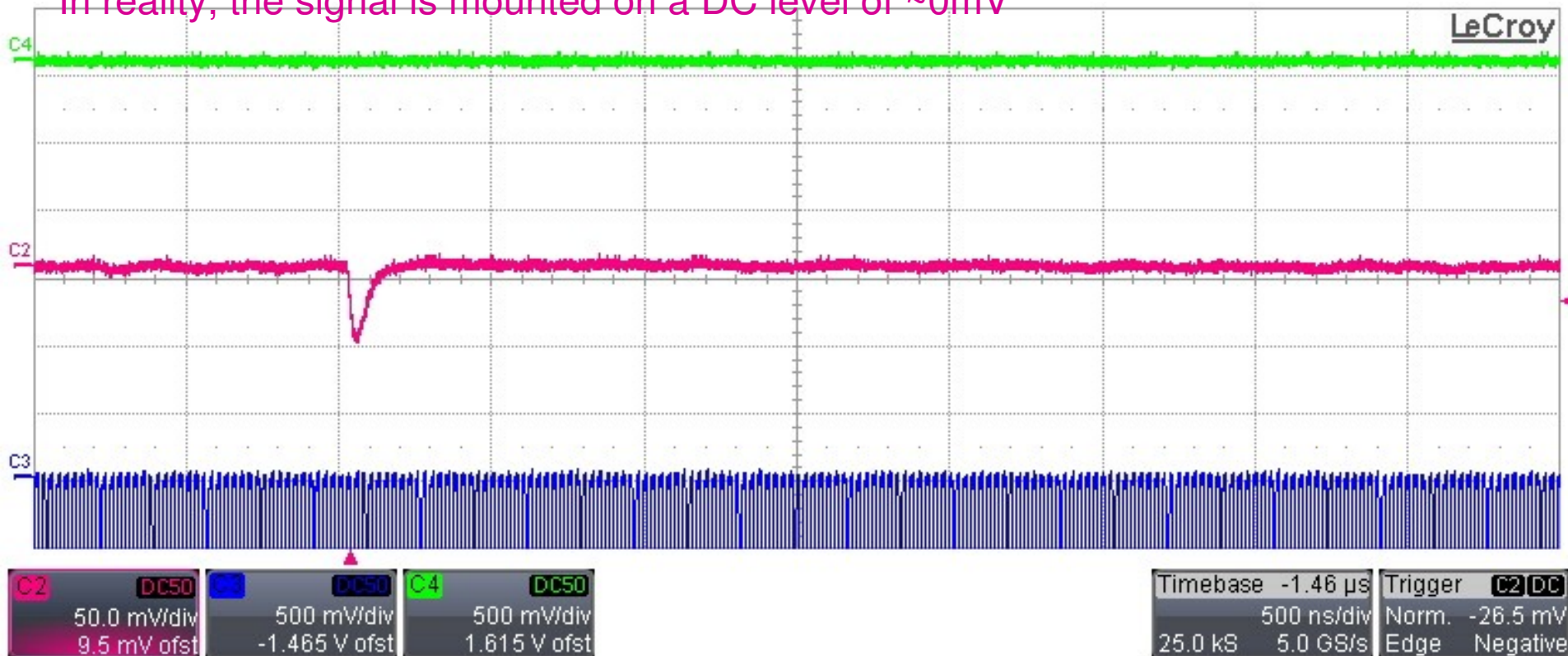
Scope screenshot

After 12th Oct 2011 @ 11am

Signal coming out from the Fan in –Fan out through the AC output and that is used by the discriminator.

Hits amplitude is around 50mV

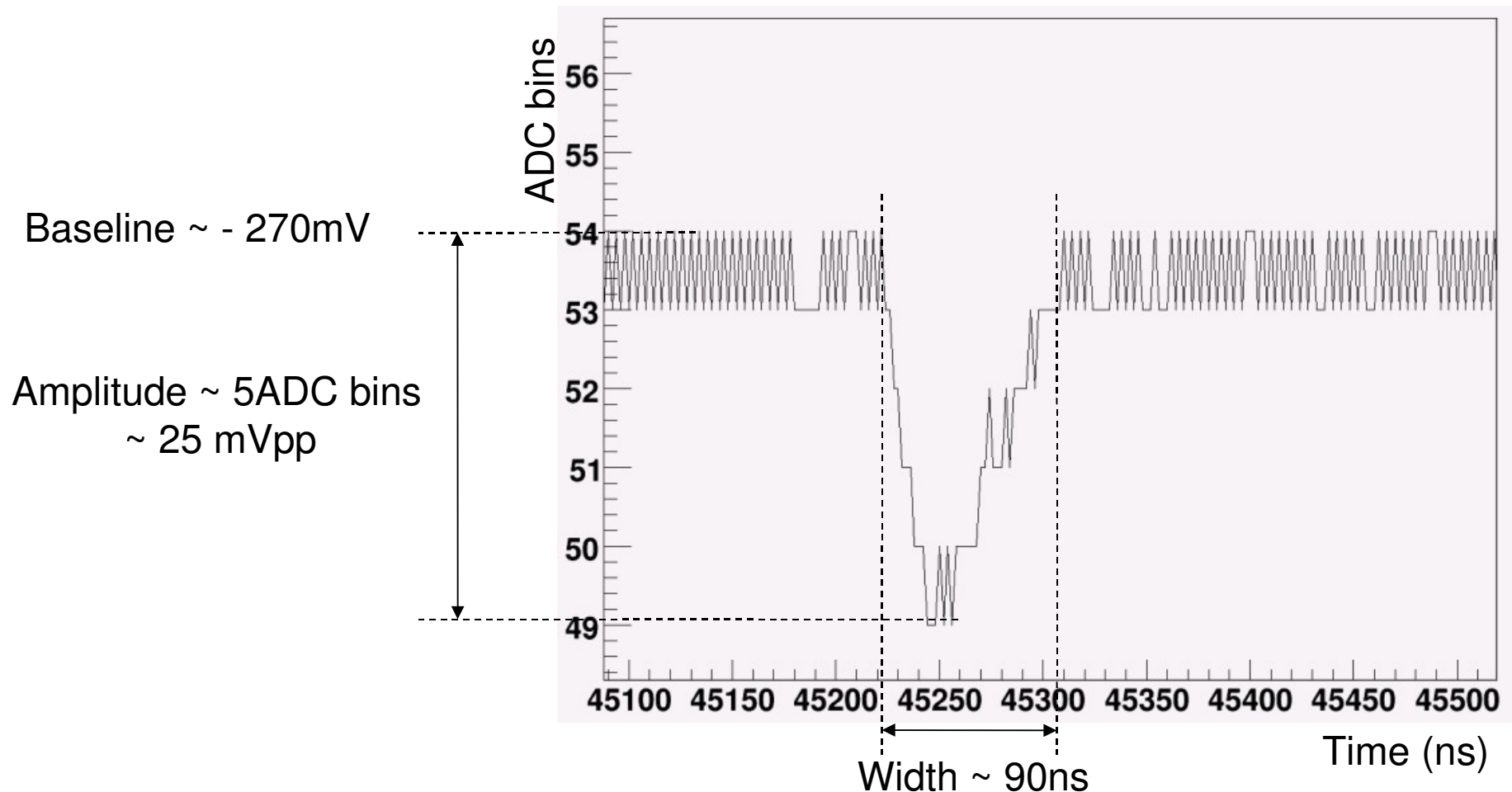
In reality, the signal is mounted on a DC level of ~0mV



First results: ADC sampling

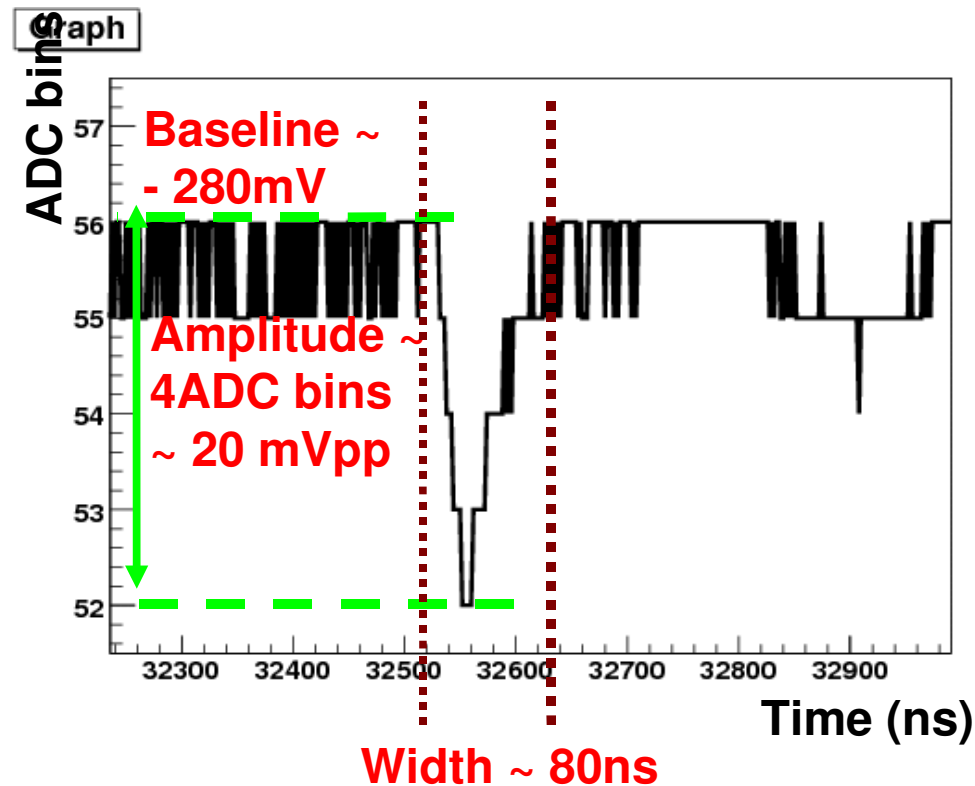
- ADC daq time window = 1 orbit (89000 ns)
- 1 ADC bin $\sim 5\text{mV}$

Before 12th Oct 2011 @ 11am

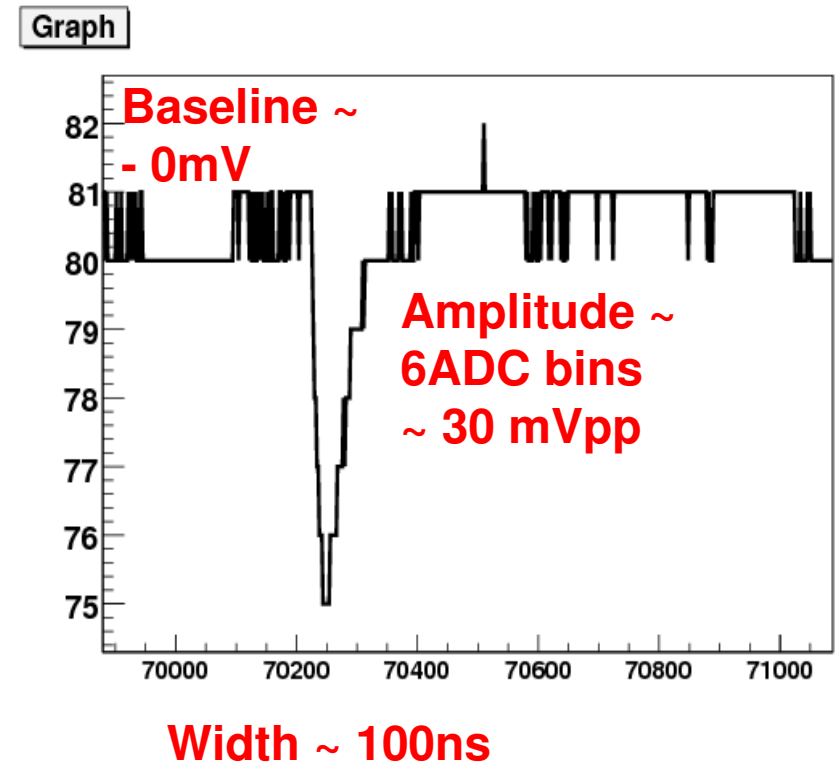


Sampled signals

Before 12th Oct 2011 @ 11am



After 12th Oct 2011 @ 11am



From Olga Novgorodova

ADC spectra

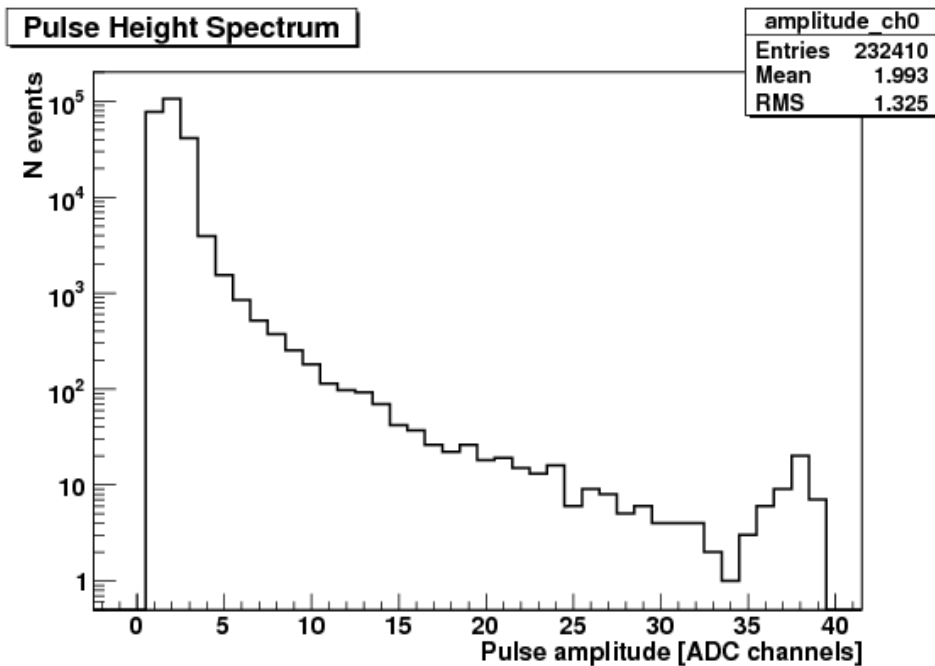
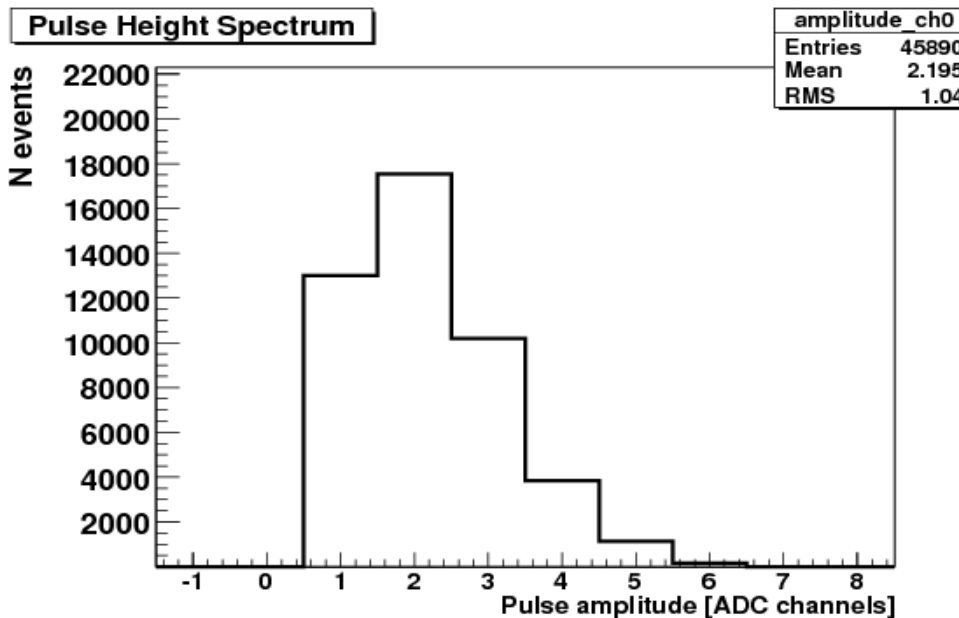
After 12th Oct 2011 @ 11am

From Olga:

“Now amplitude spectrum looks like for the BCM1F setup, but smaller and MIP signals are not visible on the spectrum.

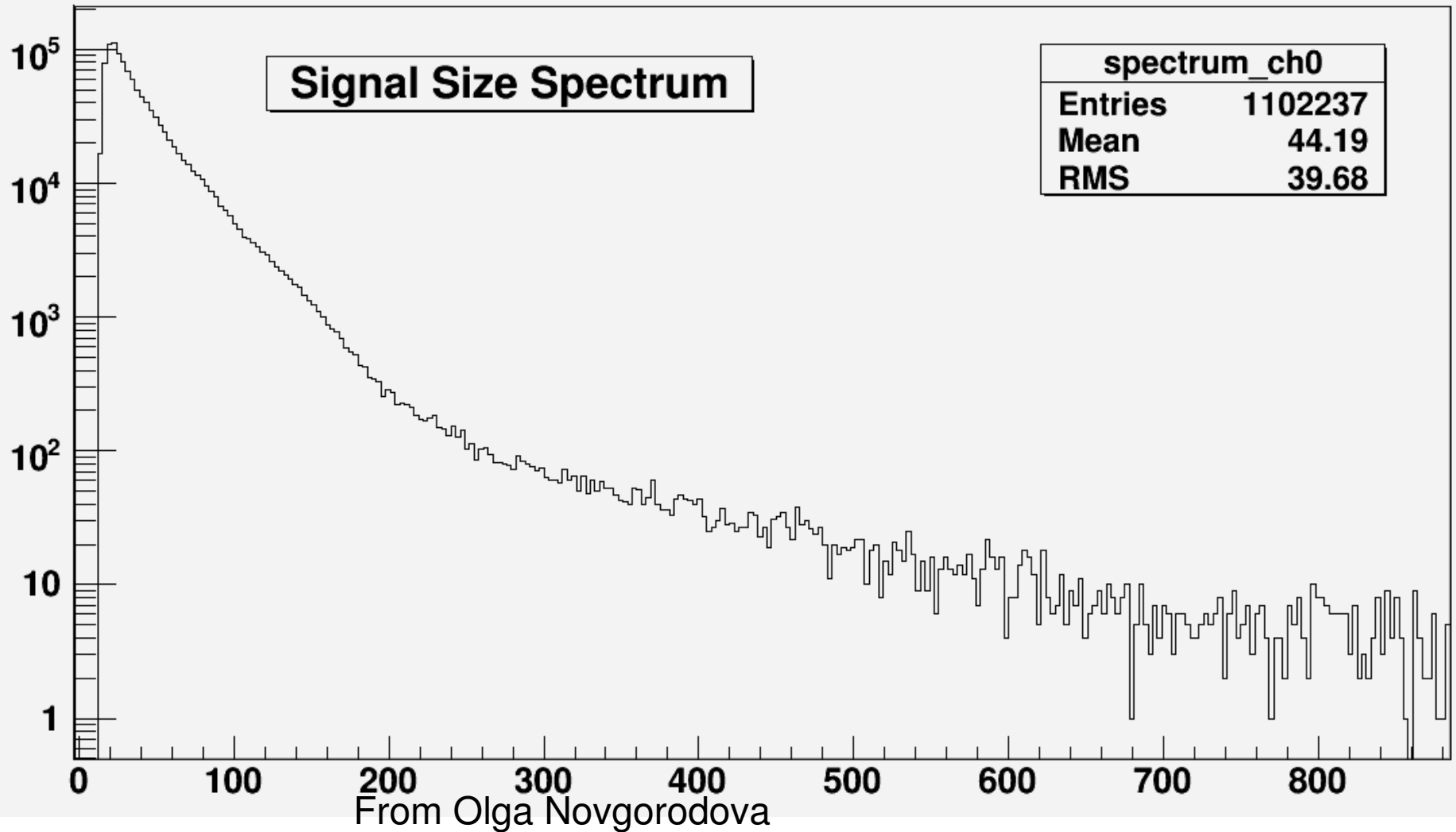
Signals became bigger, I did not find that signals in all orbits up to now”

Before 12th Oct 2011 @ 11am

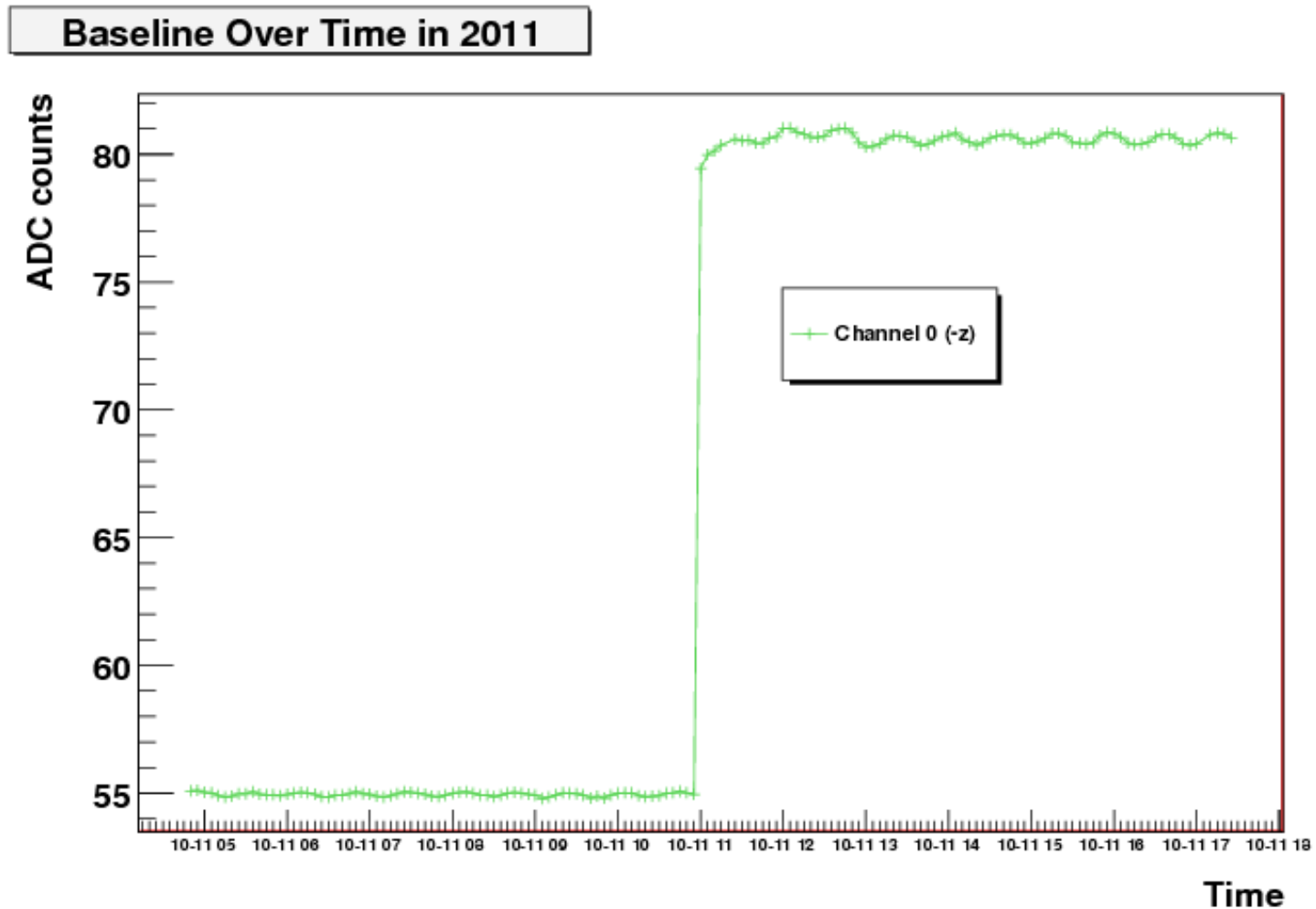


From Olga Novgorodova

ADC spectra

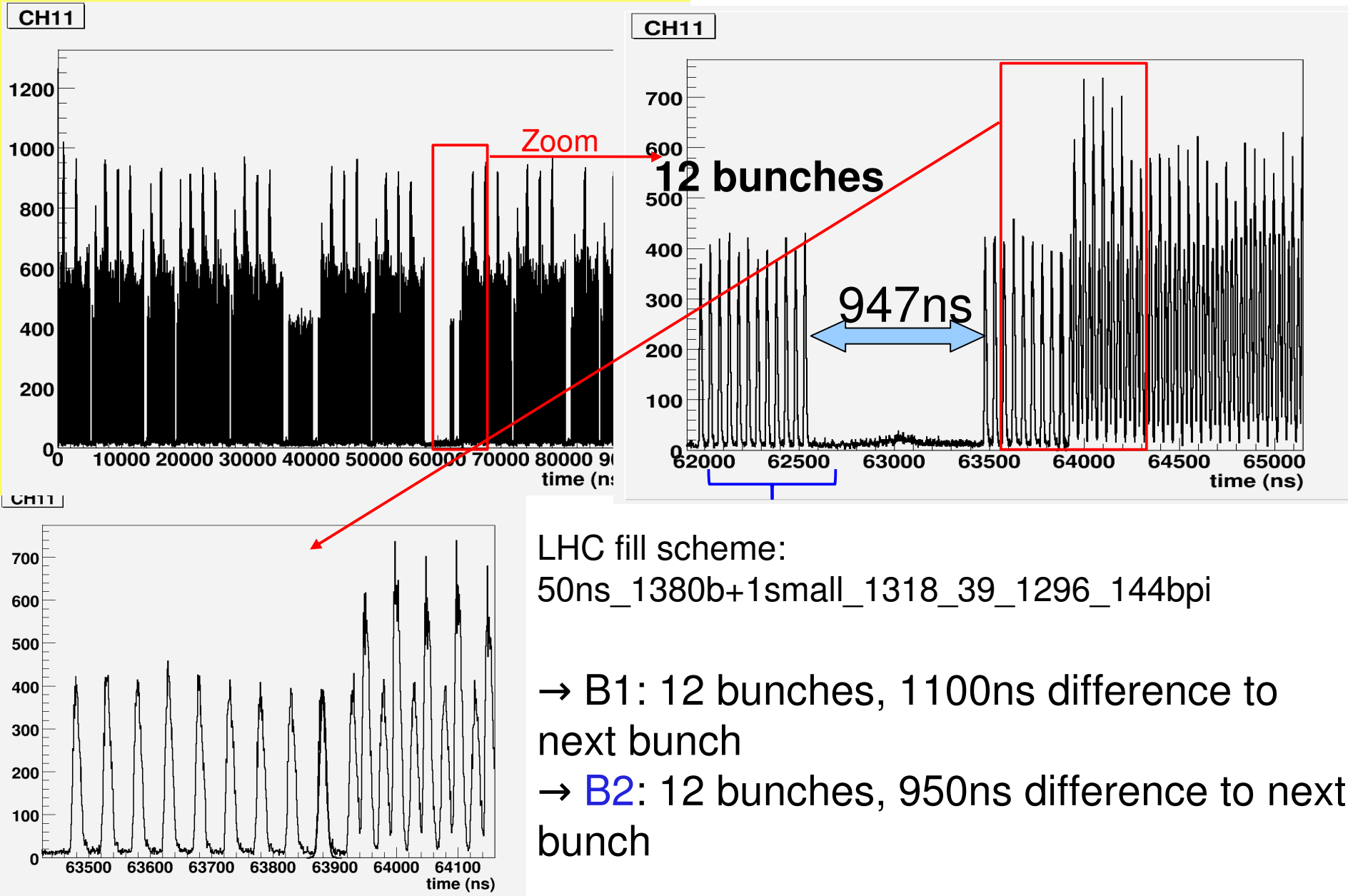


Baseline monitor: running continuously and publishing data



From Olga Novgorodova

5.3 TDC Time Plot



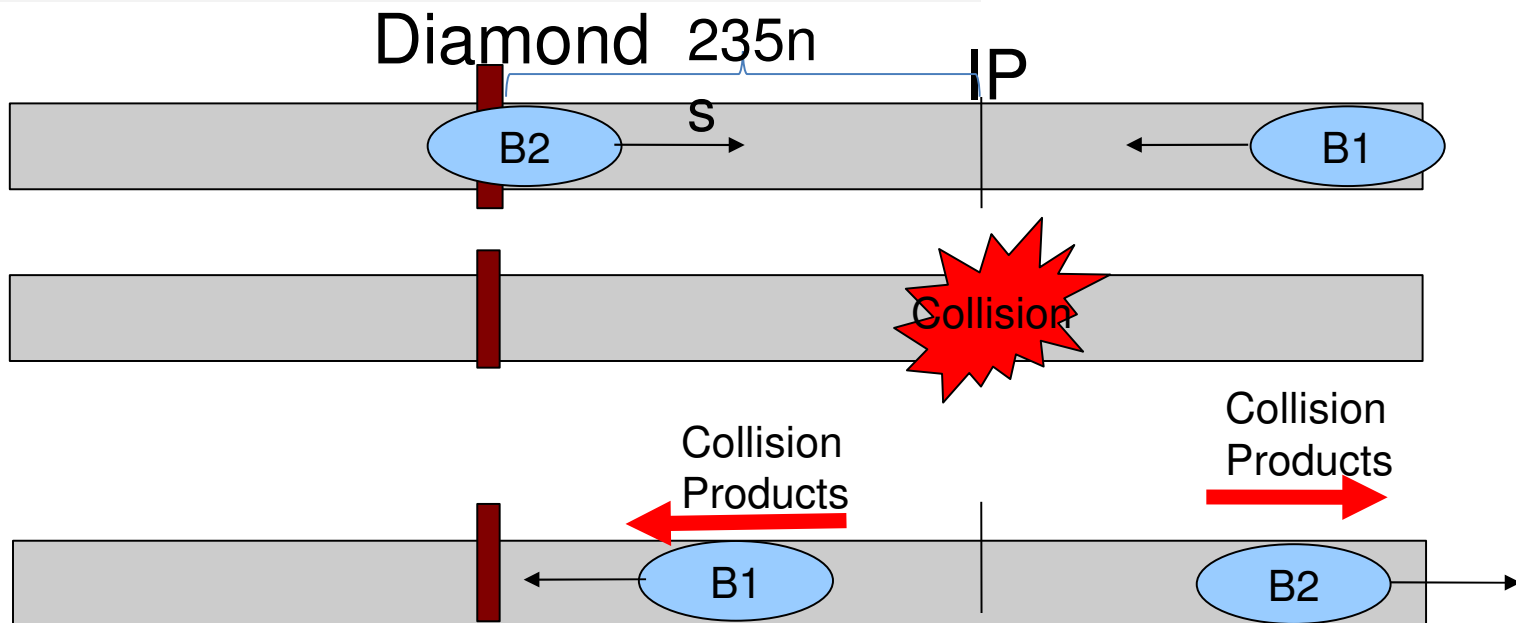
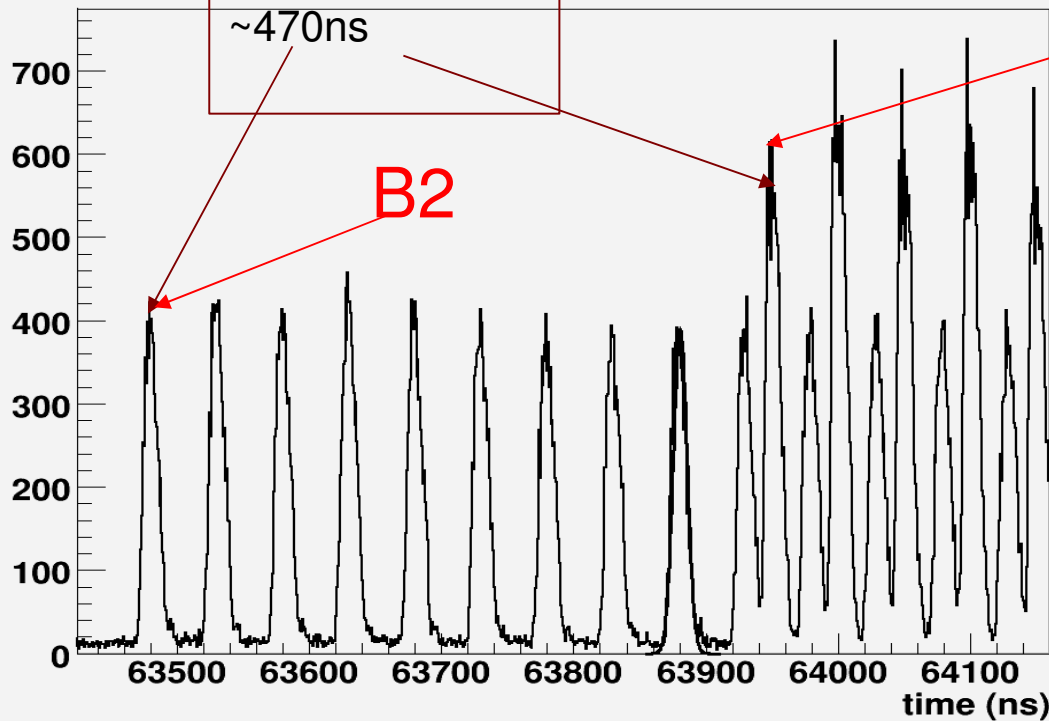
CH11

Time difference:
~470ns

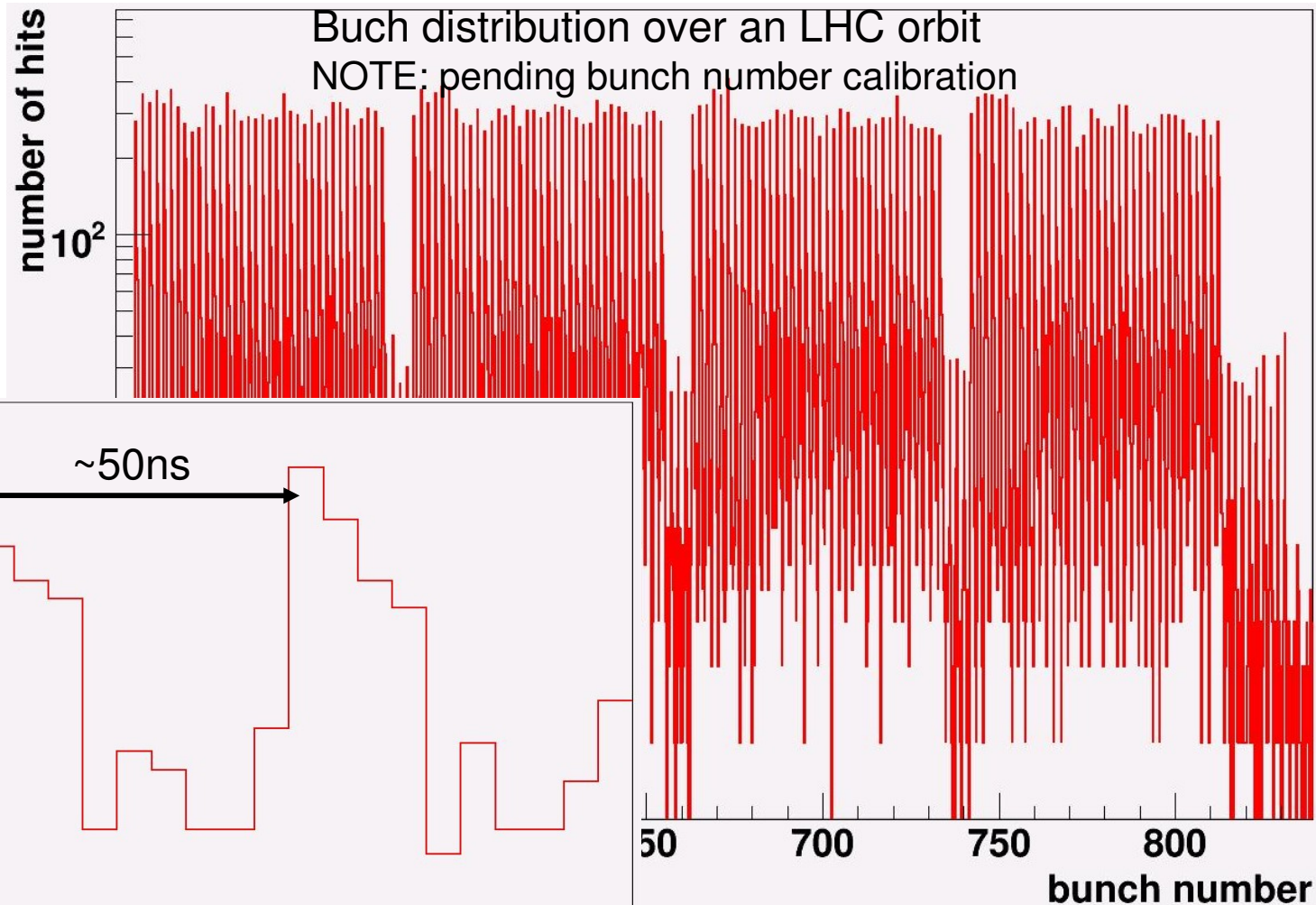
B2

B1+collision
n products

Distance between
IP and diamond:
70m $\rightarrow$ 235ns

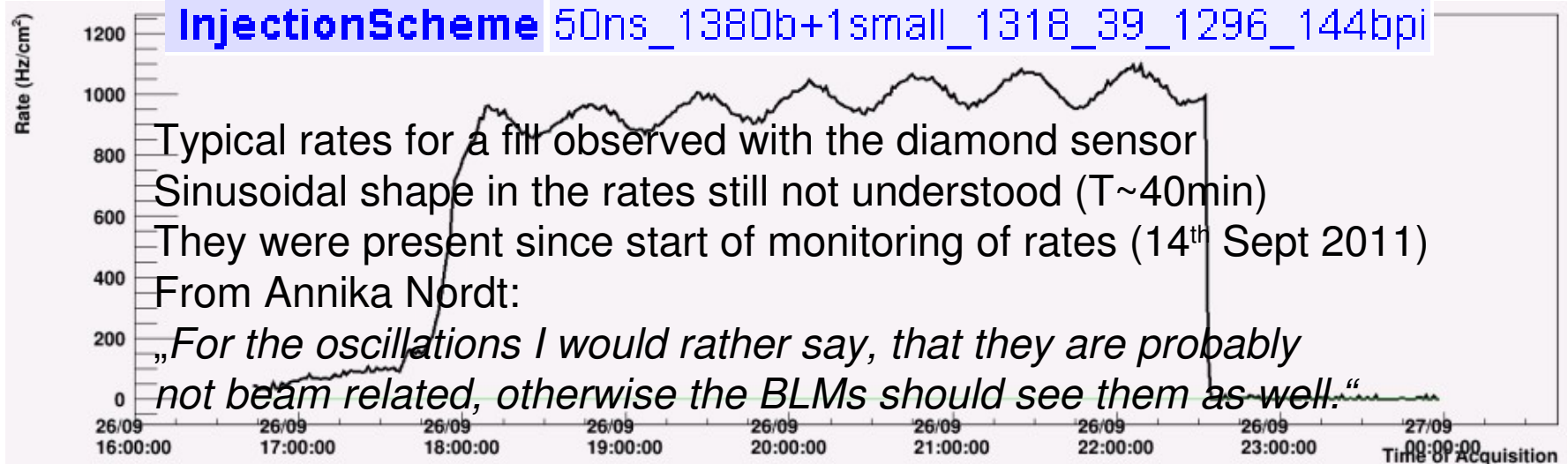
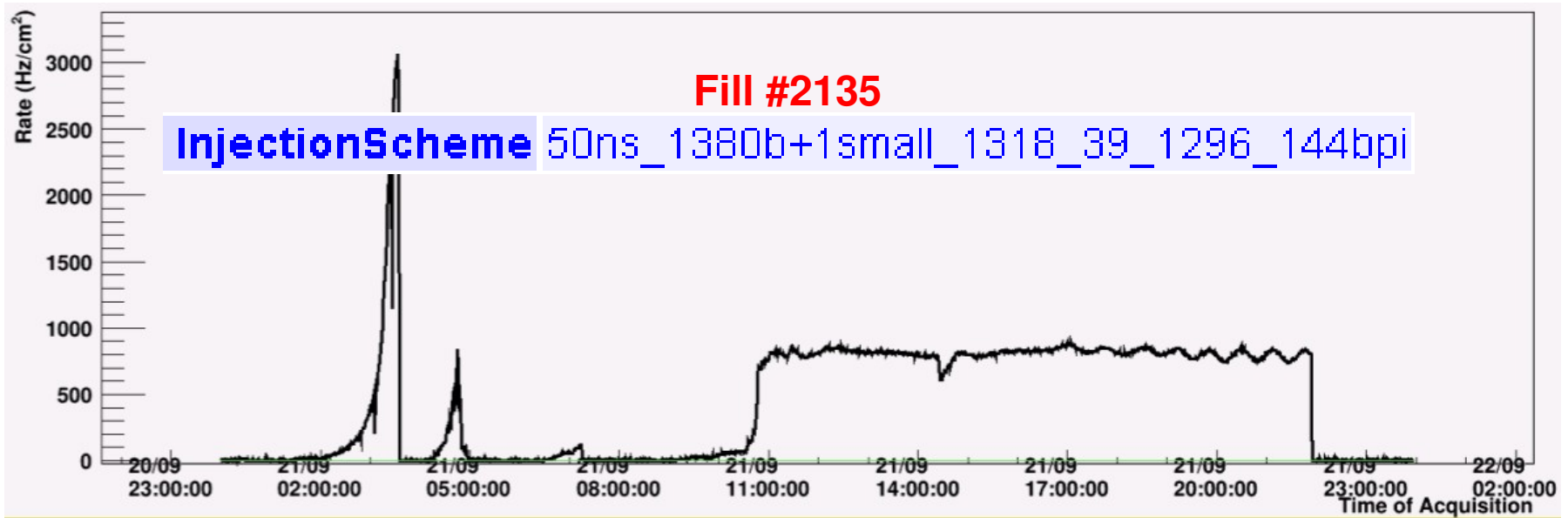


First results: TDCs time information

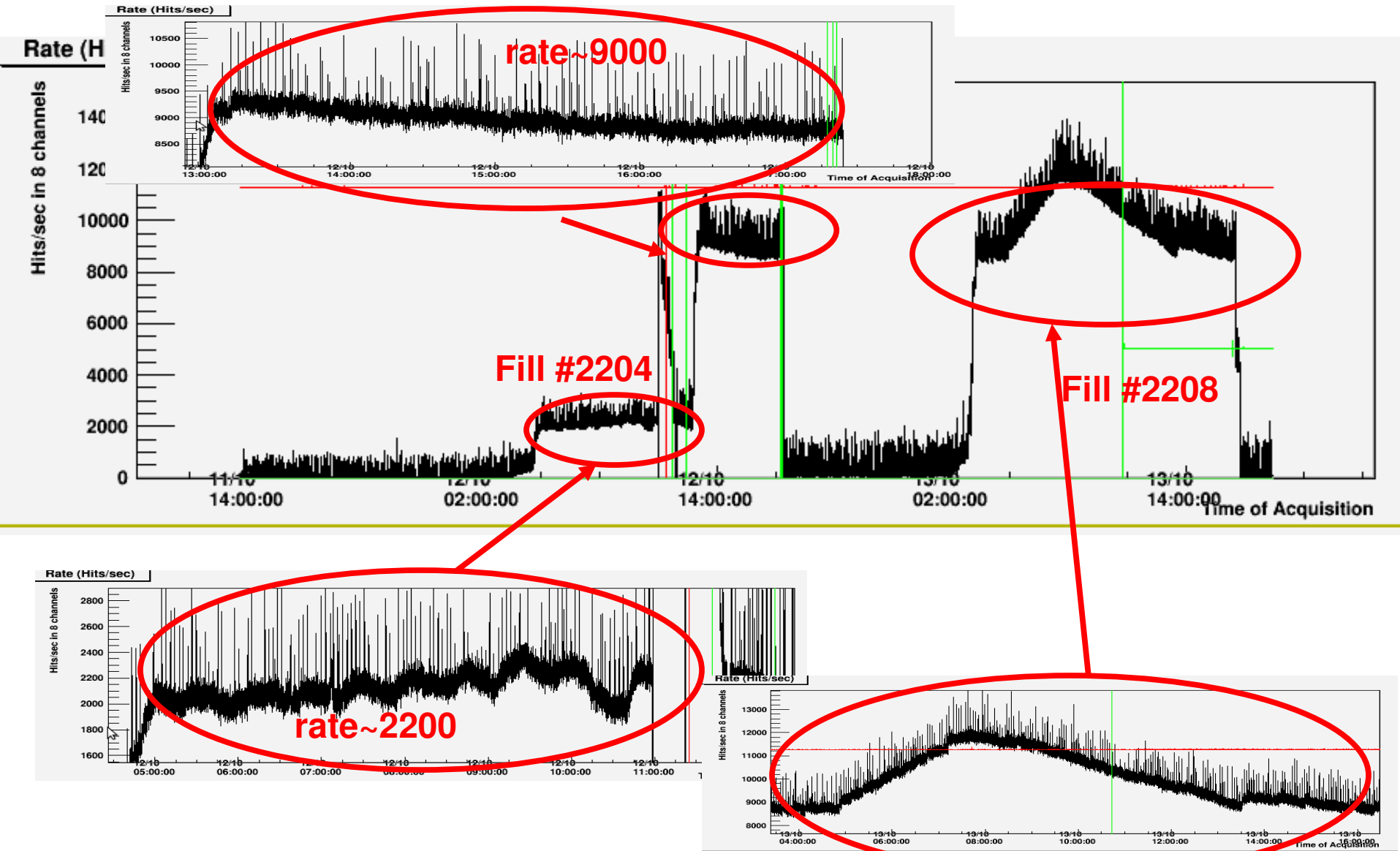


InjectionScheme 50ns_1380b+1small_1318_39_1296_144bpi

First results: Scalers rates

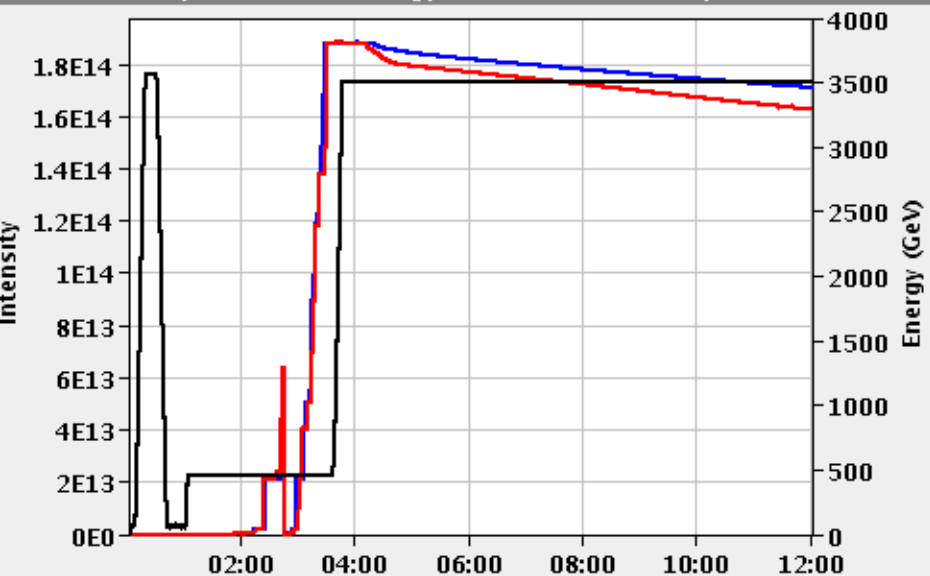


Scaler rates before and after change of optical receiver

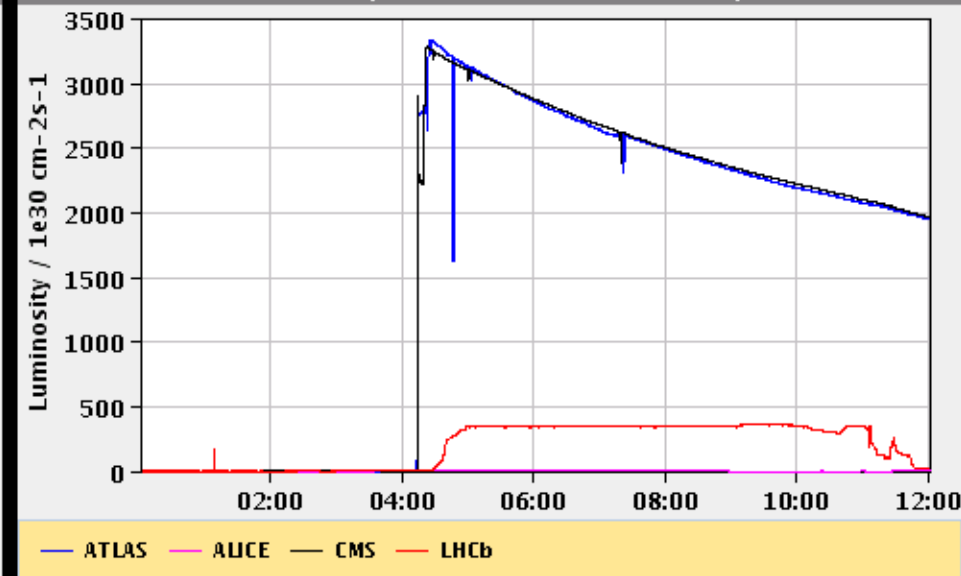


Energy: 3500 GeV I(B1): 1.75e+14 I(B2): 1.66e+14

FBCT Intensity and Beam Energy Updated: 12:01:30



Instantaneous Luminosity Updated: 12:01:33

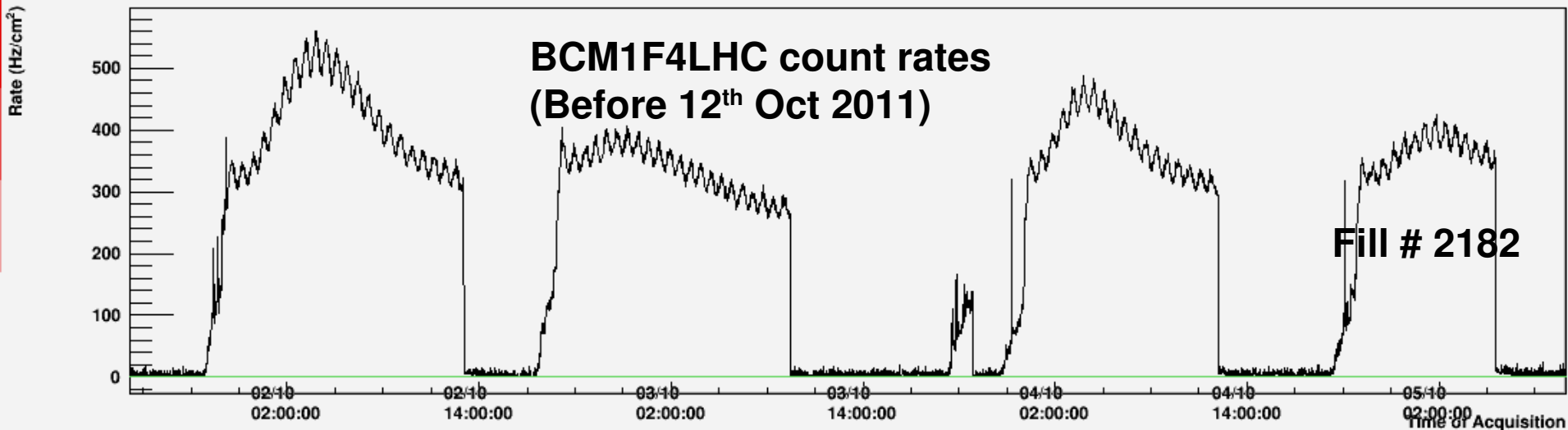


Comments 12-10-2011 11:23:36 :

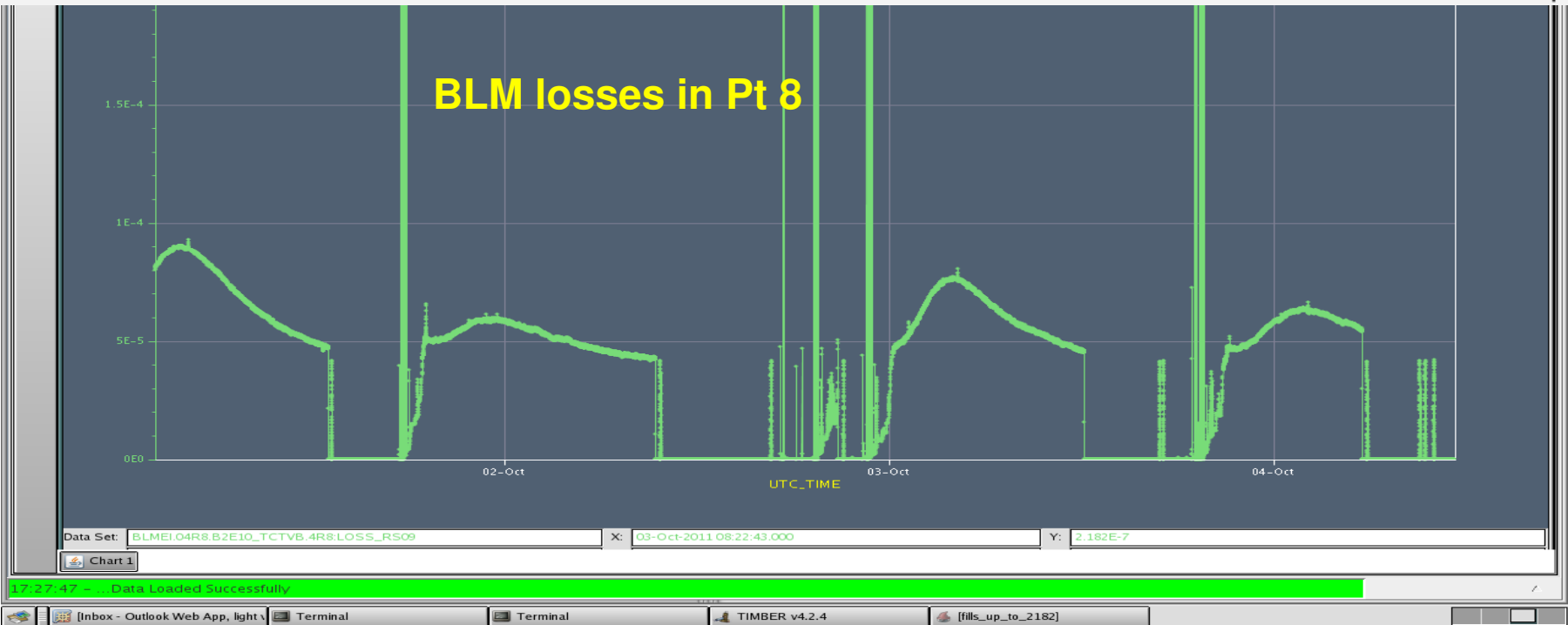
BIS status and SMP flags

B1 B2

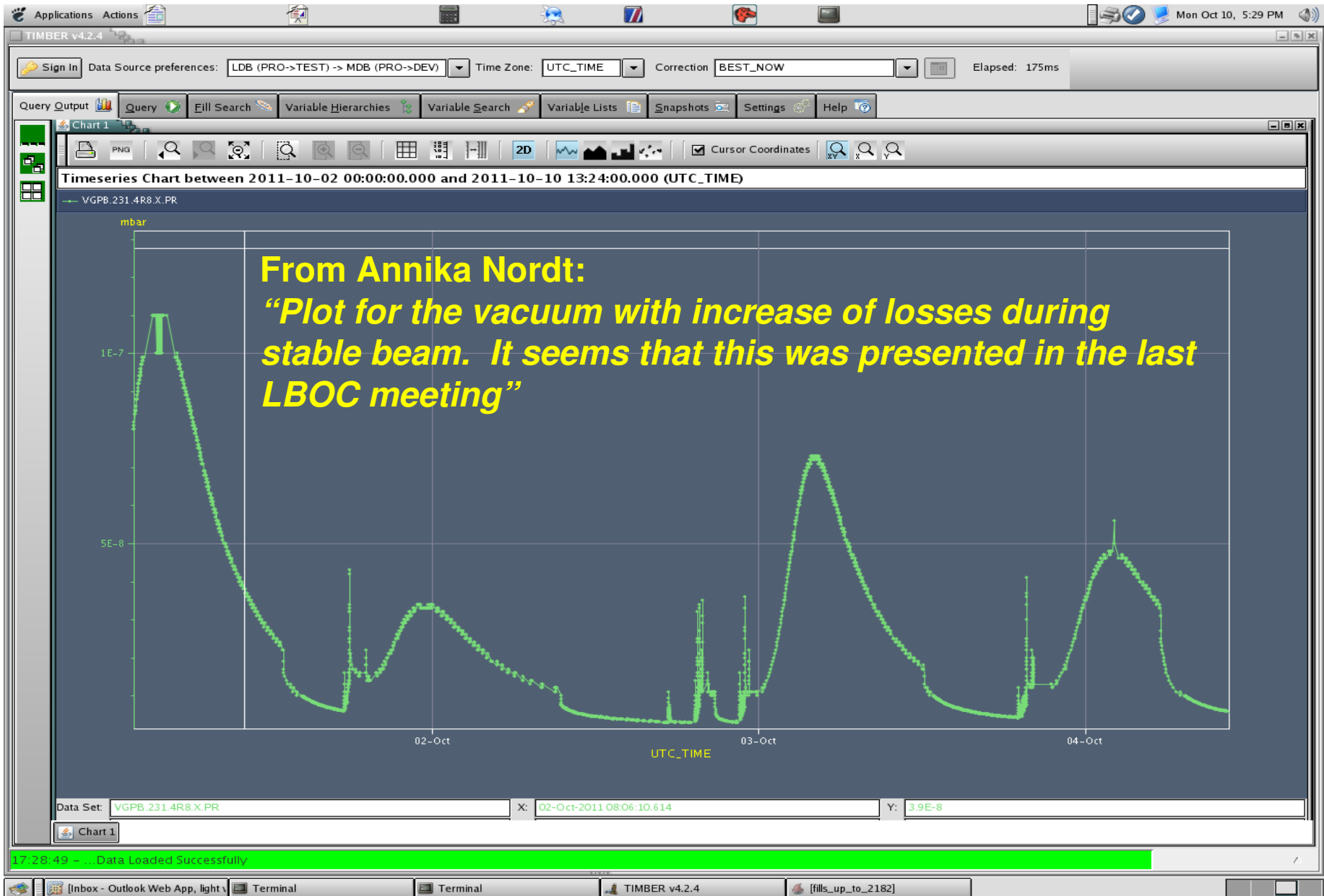
Correlations with LHCb lumi and vacuum quality



BLM losses in Pt 8

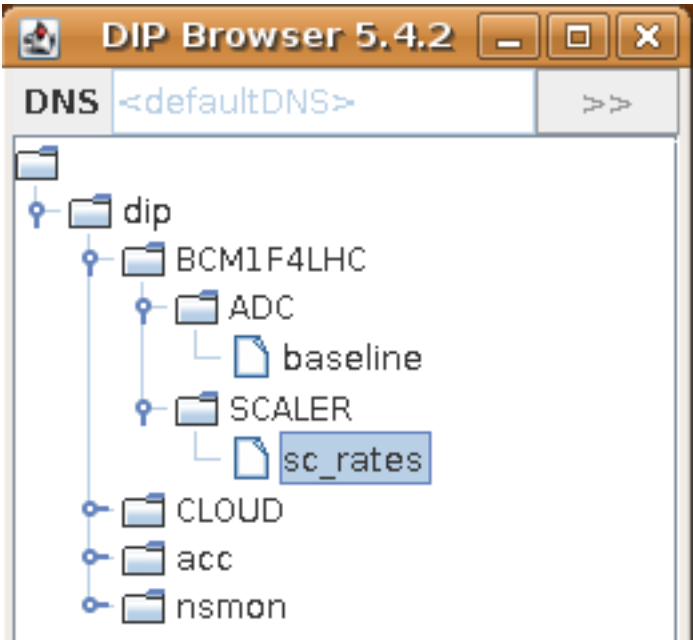


Vacuum



Data management

- Data files being stored locally-> move them to some central storage place
- Some data published to the GPN->needs to be exported to the CMS TN (David is on negotiations...)



DIP publishing

```
ssh -X blm@pimpizord.cern.ch
>cd /home/blm/software/dip-5.4.2
>./browser.sh
```

Baseline

Subscription to dip/BCM1F4LHC/ADC/baseline

Connected

Name	Type	Value
presenttime	int	0
uptime	int	0
Baseline	int[8]	84,141,140,139,139,143,143,140,

☐ Click here to enable log. Logging is disabled.

2011.10.13 20:16:39.599 CEST{1318529799599} ~ Quality = Good :

Get Server Info

Scaler rates

Subscription to dip/BCM1F4LHC/SCALER/sc_rates

Connected

Name	Type	Value
time	int	1318529938
ScalerRates	int[16]	11271,40170891,0,0,0,0,0,0,11271,91,50,0,0,0,0,0,

☐ Click here to enable log. Logging is disabled.

2011.10.13 20:18:58.194 CEST{1318529938194} ~ Quality = Good :

Get Server Info

To do list

- Calibration of offset of discriminator
- Threshold scan (has to be done before of proton run)
- Scalers, ADC, TDCs monitors
- Data migration to some central storage place