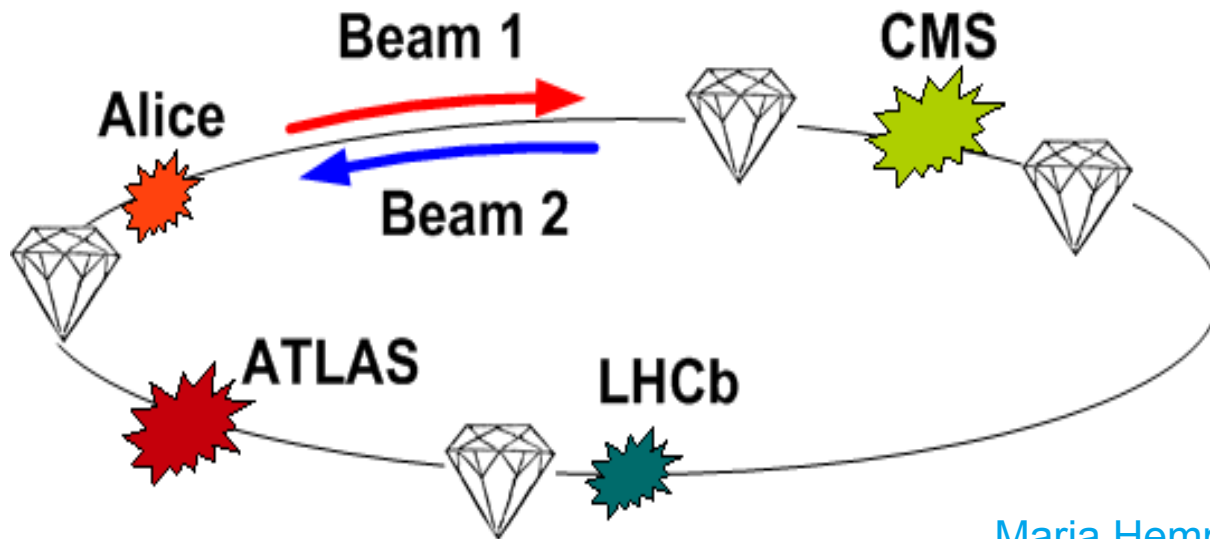


Status of BCM1F4LHC

Workshop on Fast Beam Conditions Monitoring



Maria Hempel
Status of BCM1F4LHC
Zeuthen, 02.02.2012

Content

1. Introduction

- a. Location
- b. Data Acquisition Chain

2. ADC Data

- a. Signal
- b. Baseline Monitoring
- c. Amplitude Spectra
- d. Arrival Time

3. TDC Data

4. Scaler Data

5. DIP Publisher

6. Summary

7. Next Tasks



1. Introduction

- a. Location
- b. Data Acquisition Chain

2. ADC Data

- a. Signal
- b. Baseline Monitoring
- c. Amplitude Spectra
- d. Arrival Time

3. TDC Data

4. Scaler Data

5. DIP Publisher

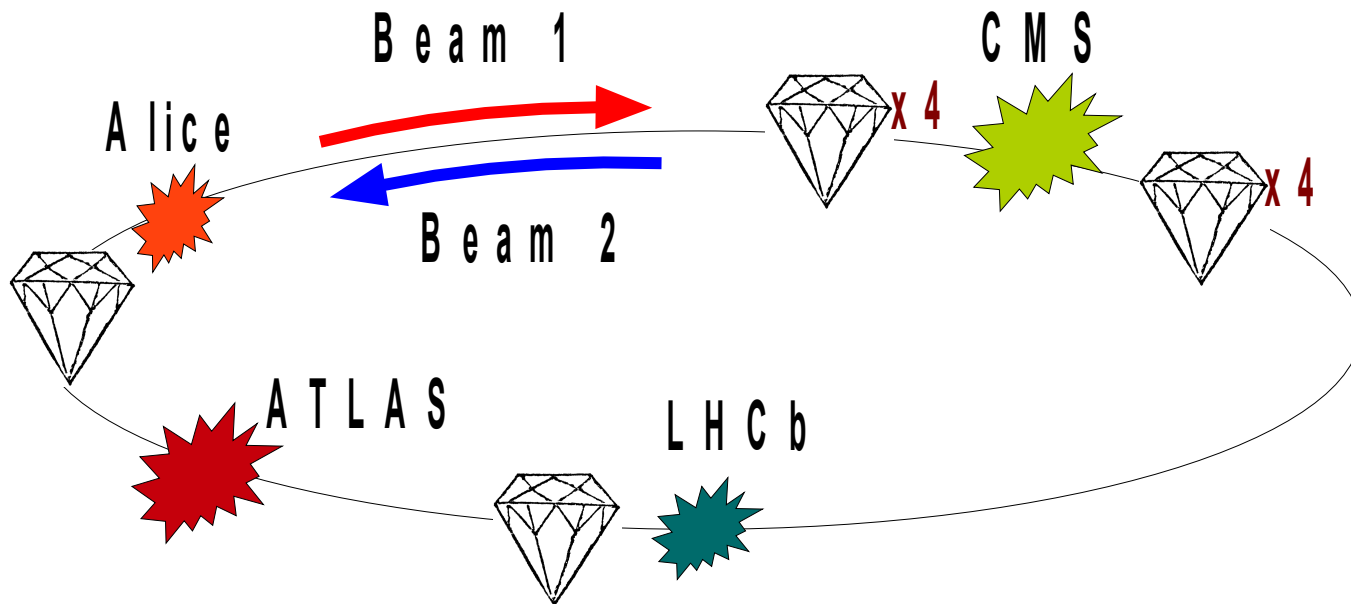
6. Summary

7. Next Tasks



Location

- 2 scCVD diamonds are installed at P2 (ALICE) and at P8 (LHCb)
- Both diamonds are already delivering signals
- 6 more diamonds will be installed along 2012



Location

> Diamond in P8:

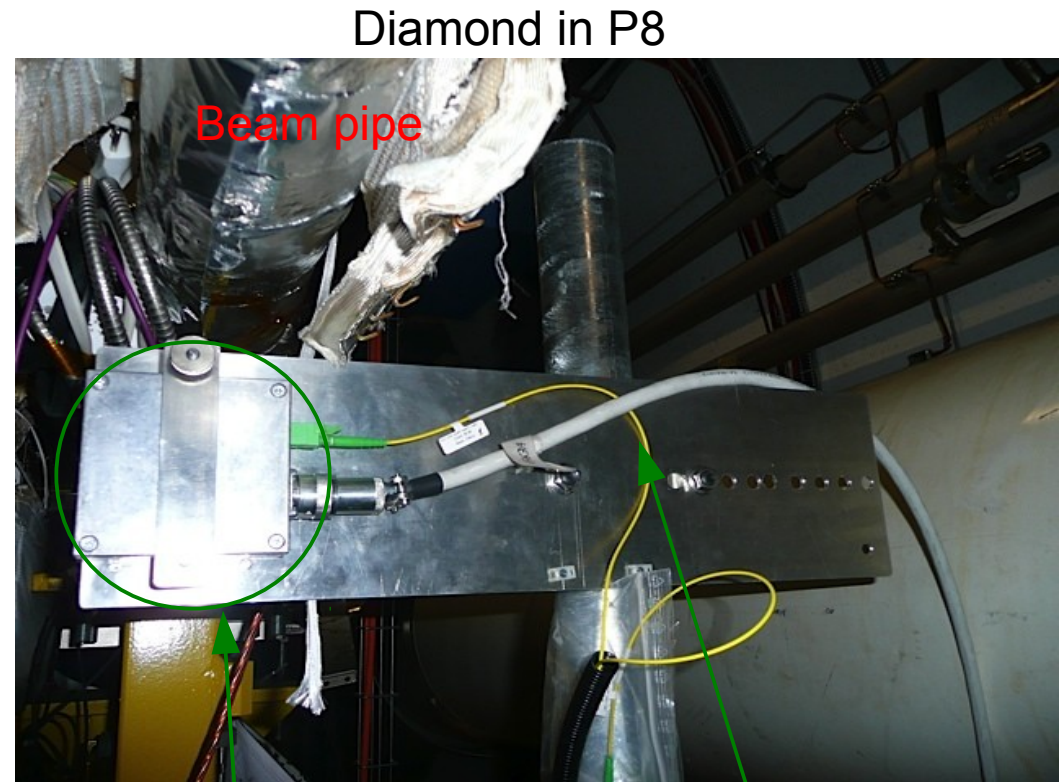
- 70.501 m from LHCb IP
- Close to one collimator
- Below the vacuum chamber
- 20 cm away from the center of the beam pipe

> Diamond in P2:

- Same distance to the Alice IP



Diamond in P2



Diamond in P8

Beam pipe

Diamond with
Front End
Electronic

Optical fiber

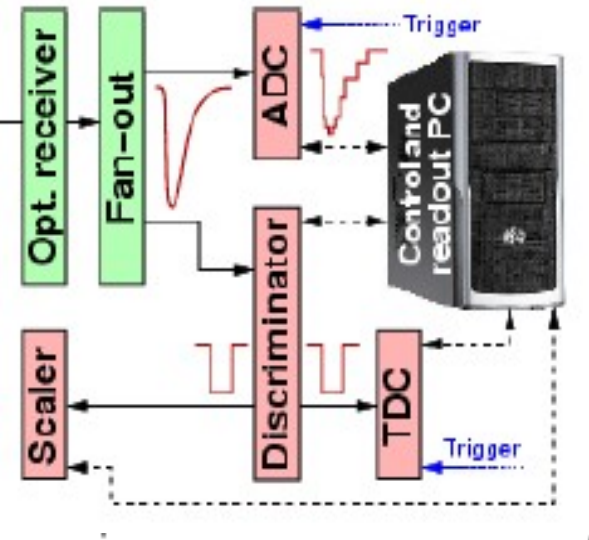
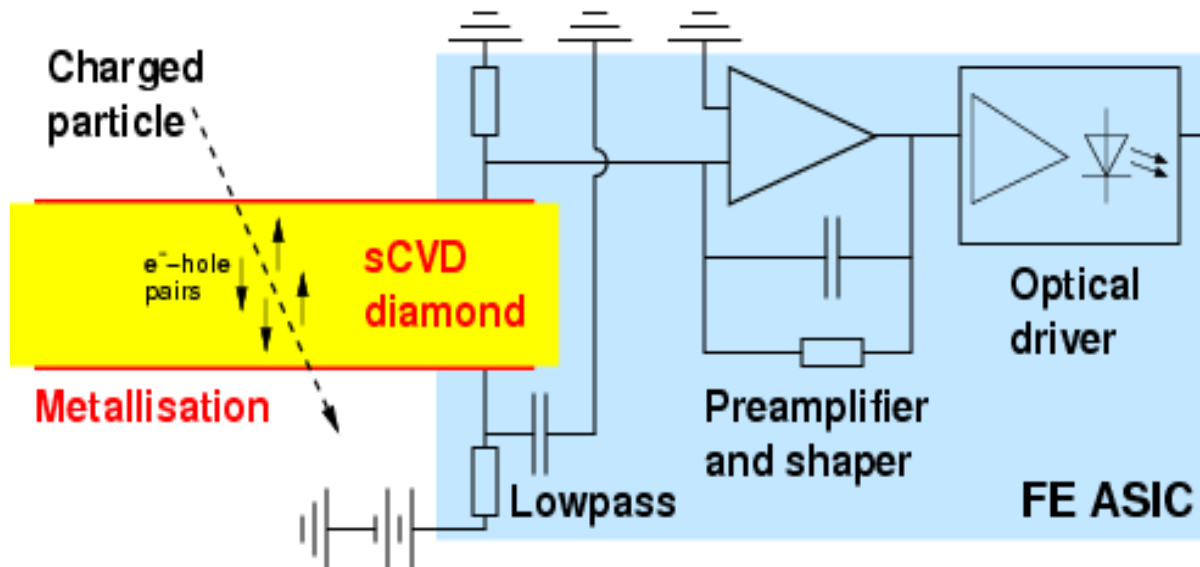
Data Acquisition Chain

> Front End:

- Metalized sensor operate as solid state ionization chamber
- Signal will be amplified by a charge sensitive amplifier
- Signal will be transmitted to the counting room as an optical signal

> Back End:

- Optical signal is converted to an electrical signal
- Main DAQ devices: ADC, Discriminator, TDC, Scaler



Content

1. Introduction

- a. Location
- b. Data Acquisition Chain

2. ADC Data

- a. Signal
- b. Baseline Monitoring
- c. Amplitude Spectra
- d. Arrival Time

3. TDC Data

4. Scaler Data

5. DIP Publisher

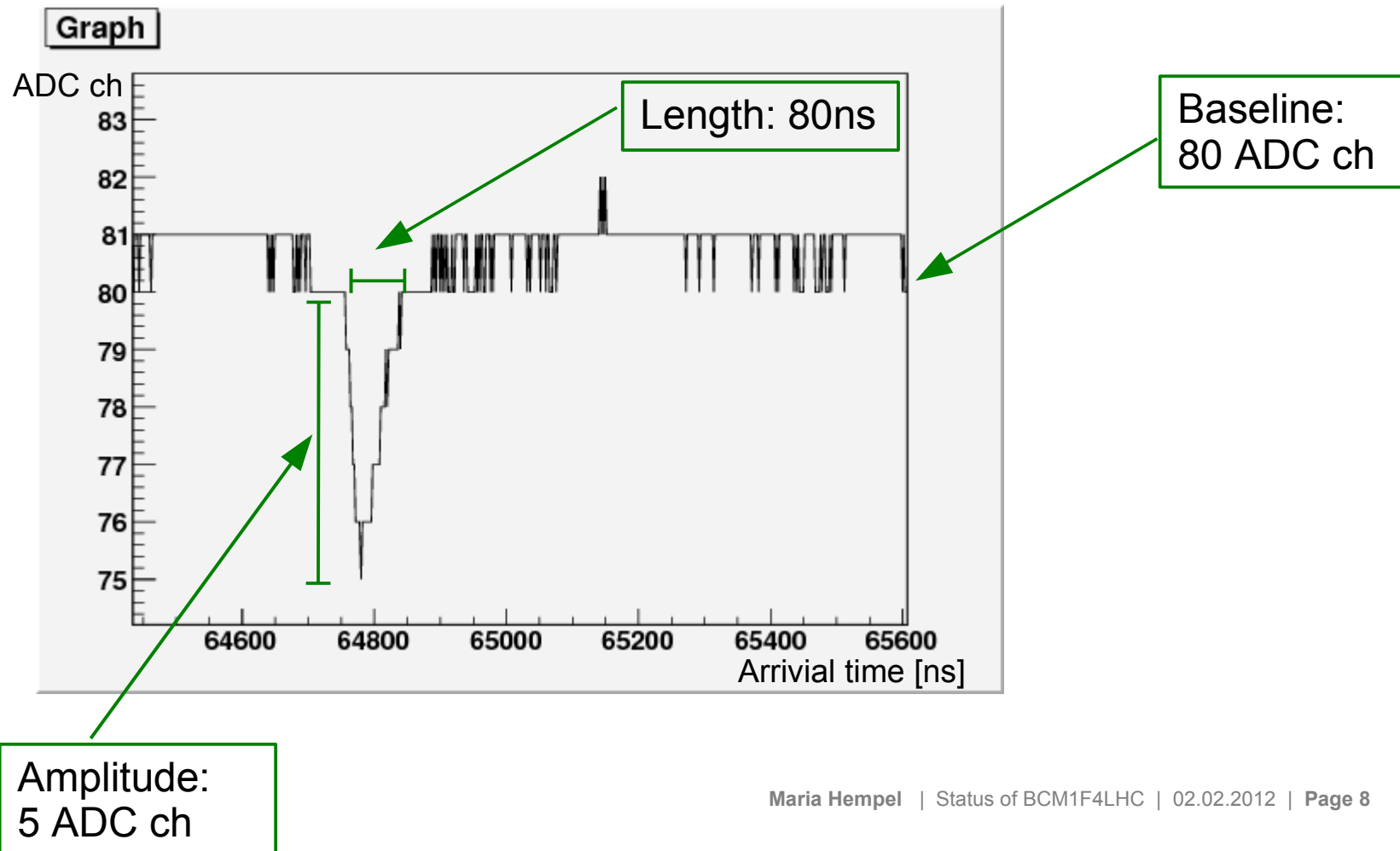
6. Summary

7. Next Tasks



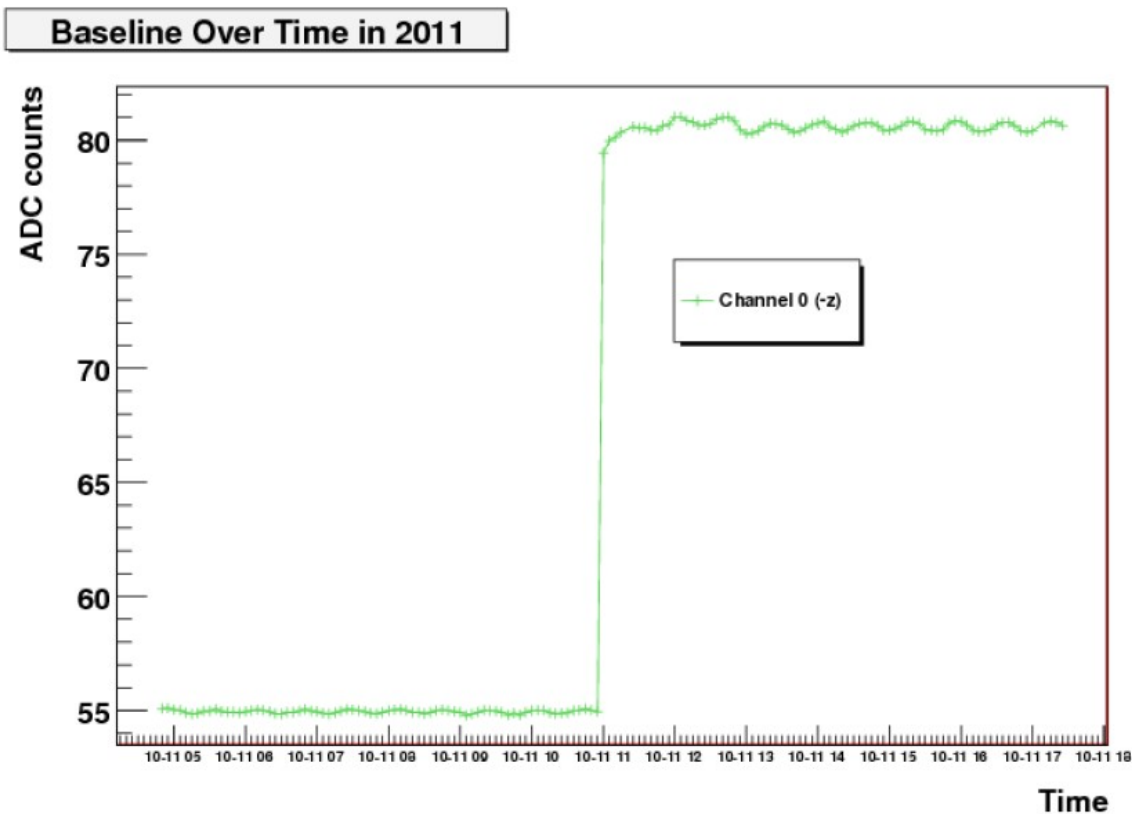
Signal

- Signal from diamond in P8
- Important values: baseline, length and amplitude



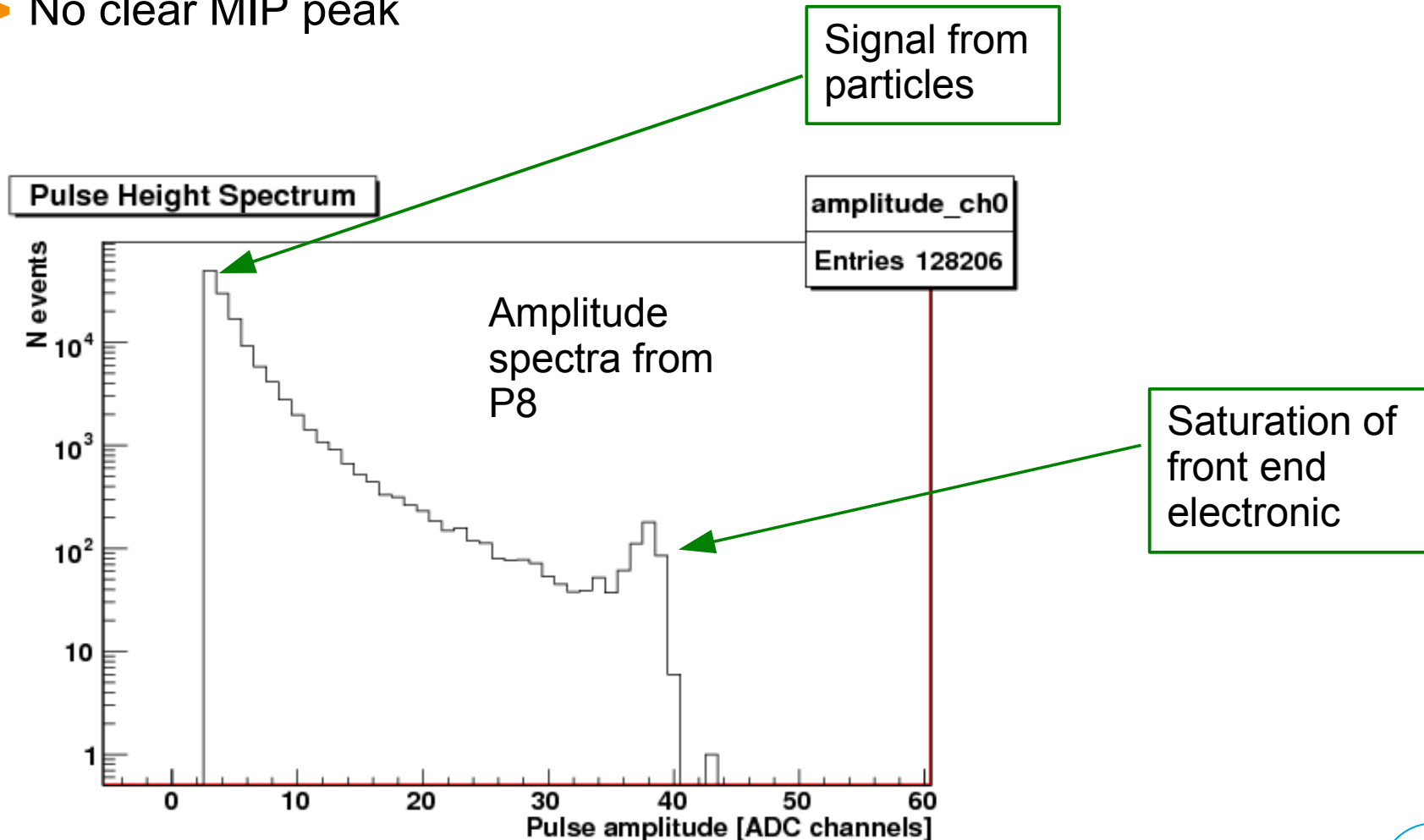
Baseline Monitoring

- Before 12th October: baseline around 55 ADC ch
 - Lot of noise
- After 12th October: baseline around 80 ADC ch
 - Change of cable and less noise



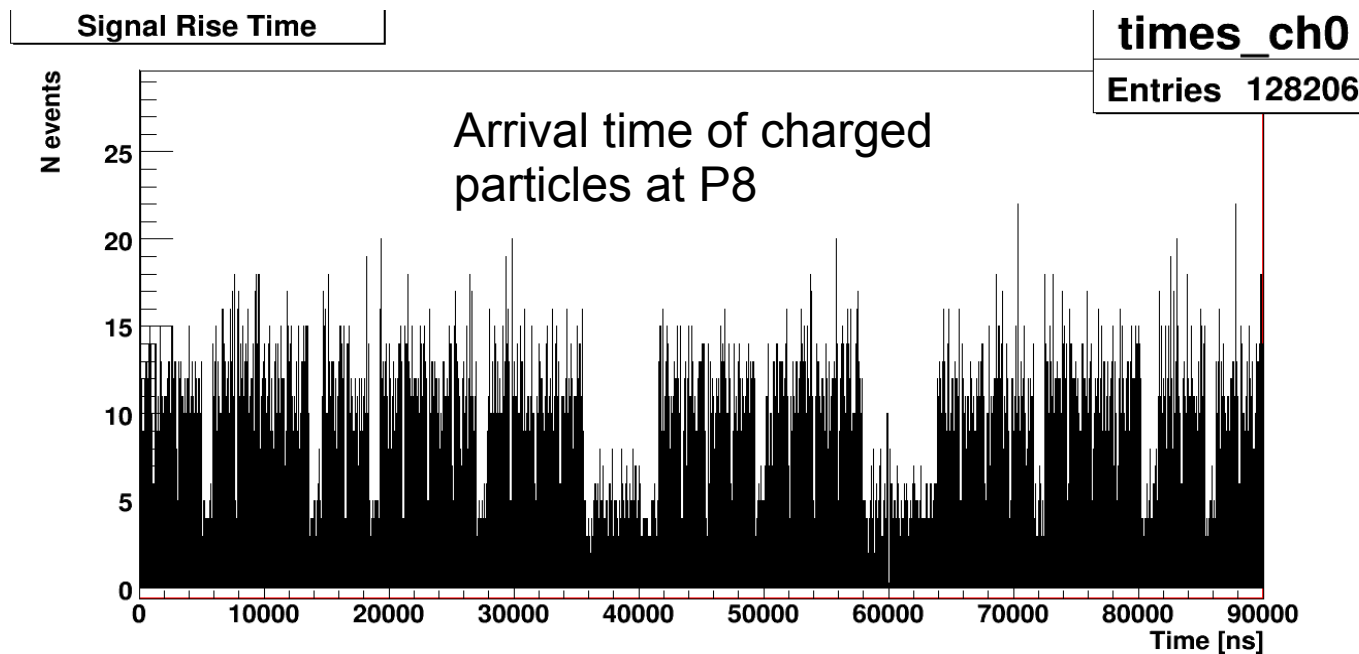
Amplitude Spectra

- Similar to BCM1F in CMS
- No clear MIP peak



Arrival Time

- Arrival time of particles in P8
- Low rate in spite of proton run
- Particle rate for heavy ions too small



Content

1. Introduction

- a. Location
- b. Data Acquisition Chain

2. ADC Data

- a. Signal
- b. Baseline Monitoring
- c. Amplitude Spectra
- d. Arrival Time

3. TDC Data

4. Scaler Data

5. DIP Publisher

6. Summary

7. Next Tasks

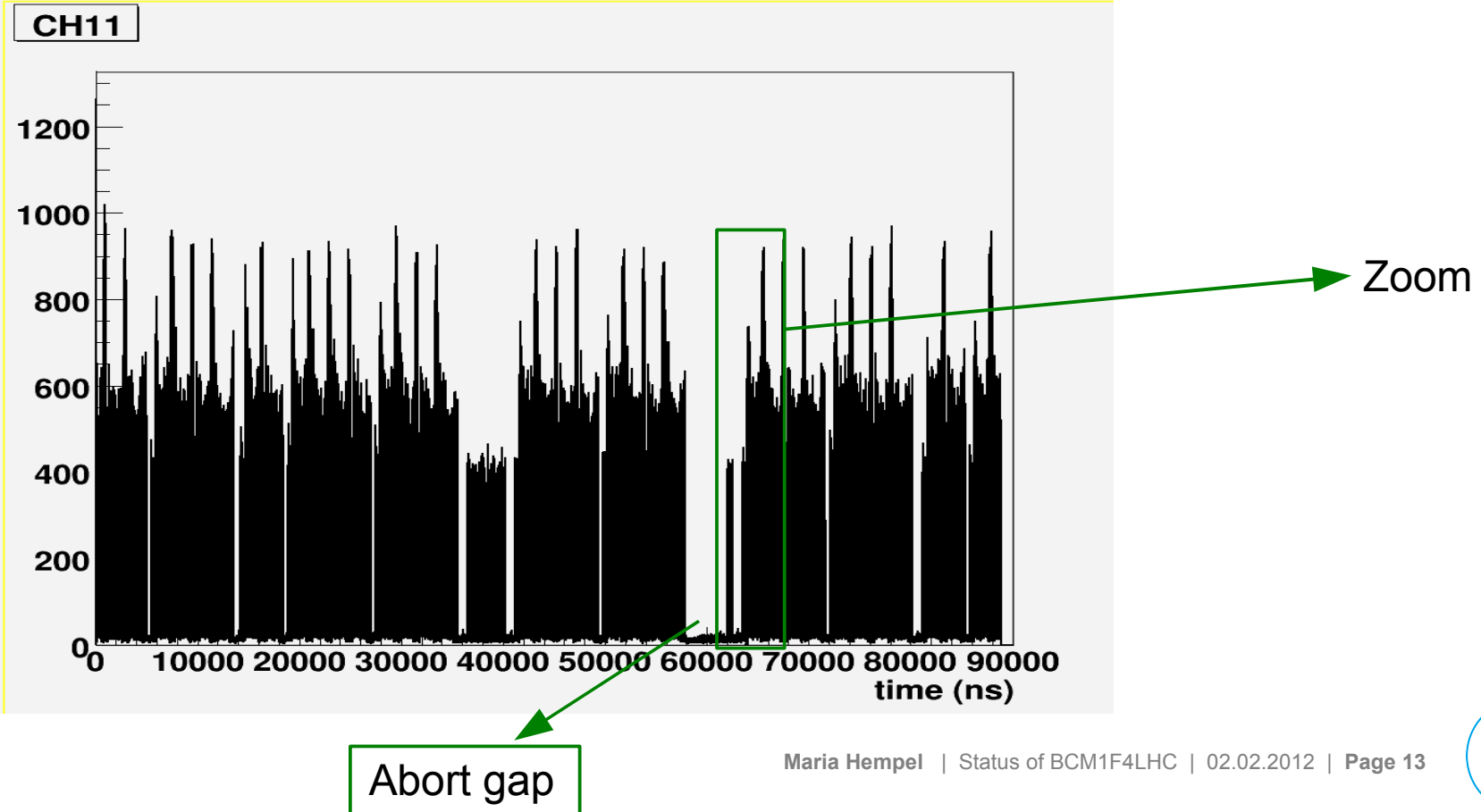


TDC Data

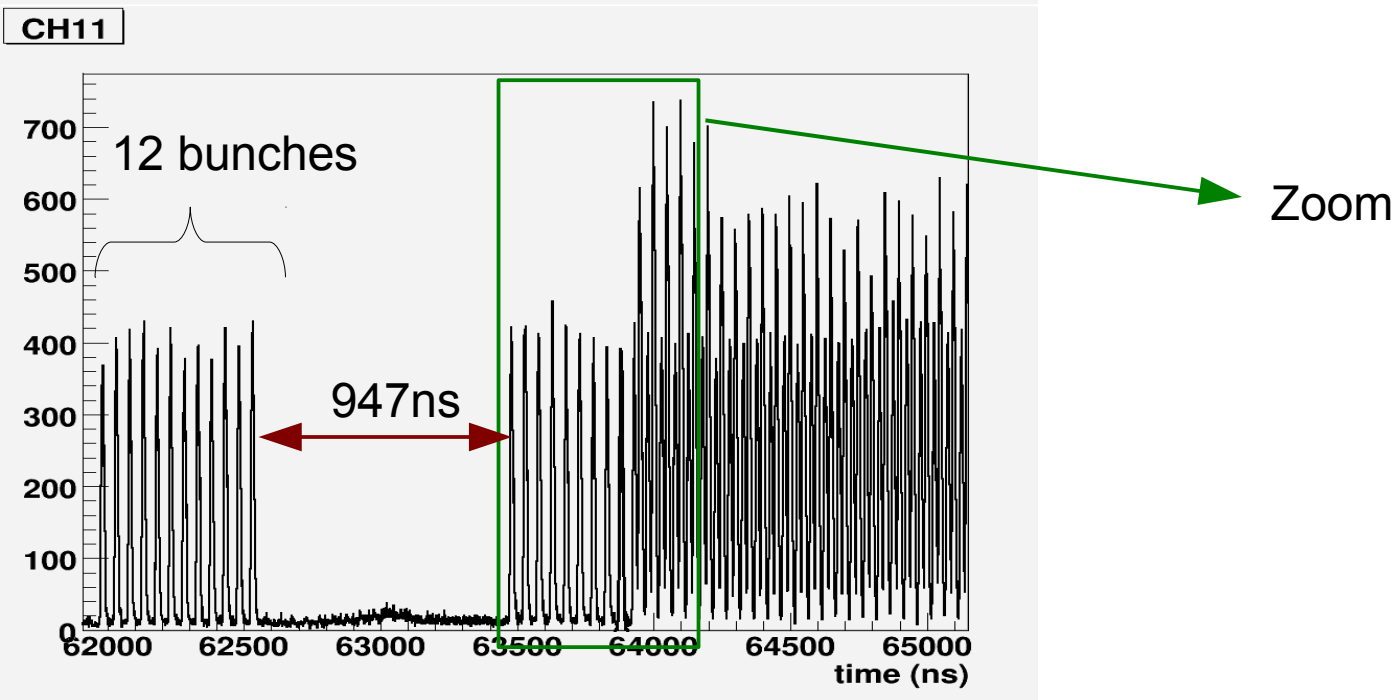
- Only TDC data of P8
- Measures the arrival time of charged particles

One LHC cycle with fill scheme:

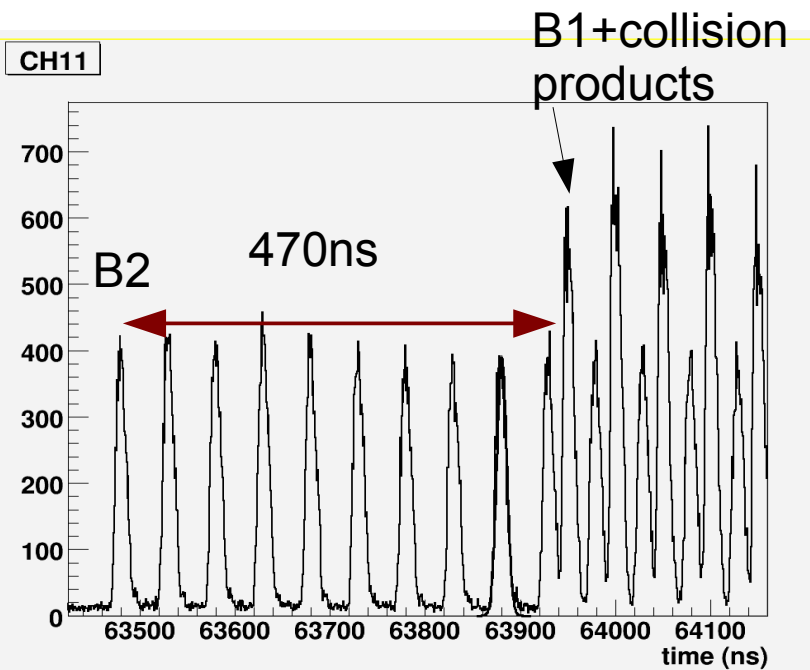
50ns_1380b+1small_1318_39_1296_144bpi



TDC Data

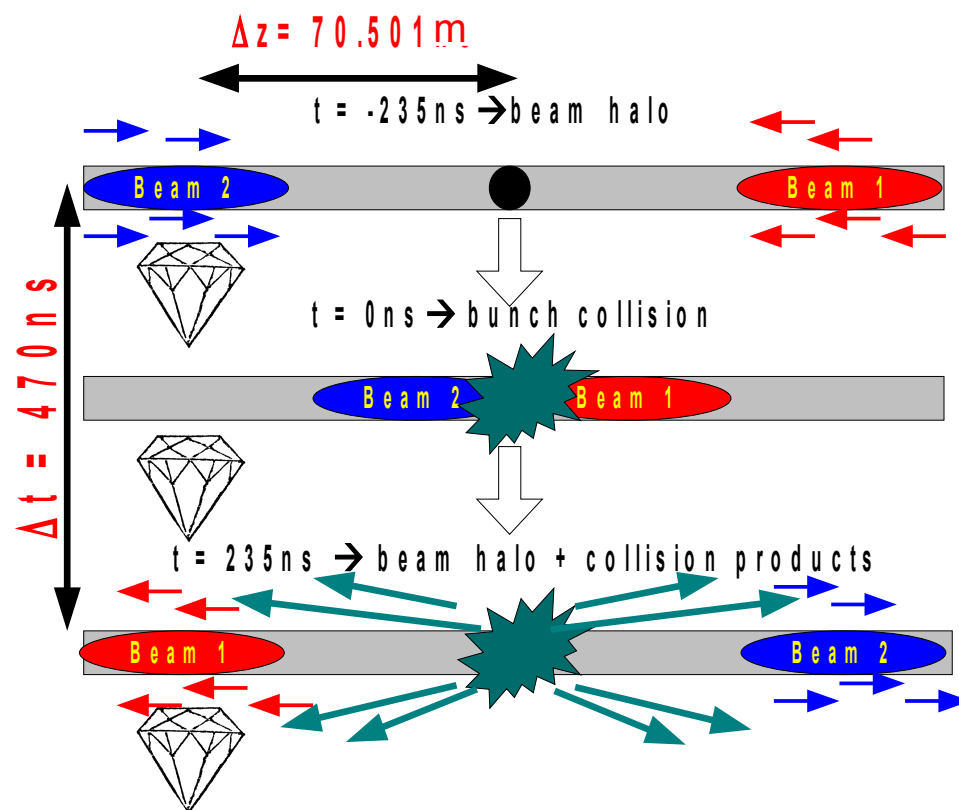


- B1: 12 bunches, 1100ns difference to next bunch
- B2: 12 bunches, 950ns difference to next bunch



- > 10 small bunches
- > Time difference between first small bunch and first larger bunch: 470ns

- > Different rates for beam halo and collision products



Content

1. Introduction

- a. Location
- b. Data Acquisition Chain

2. ADC Data

- a. Signal
- b. Baseline Monitoring
- c. Amplitude Spectra
- d. Arrival Time

3. TDC Data

4. Scaler Data

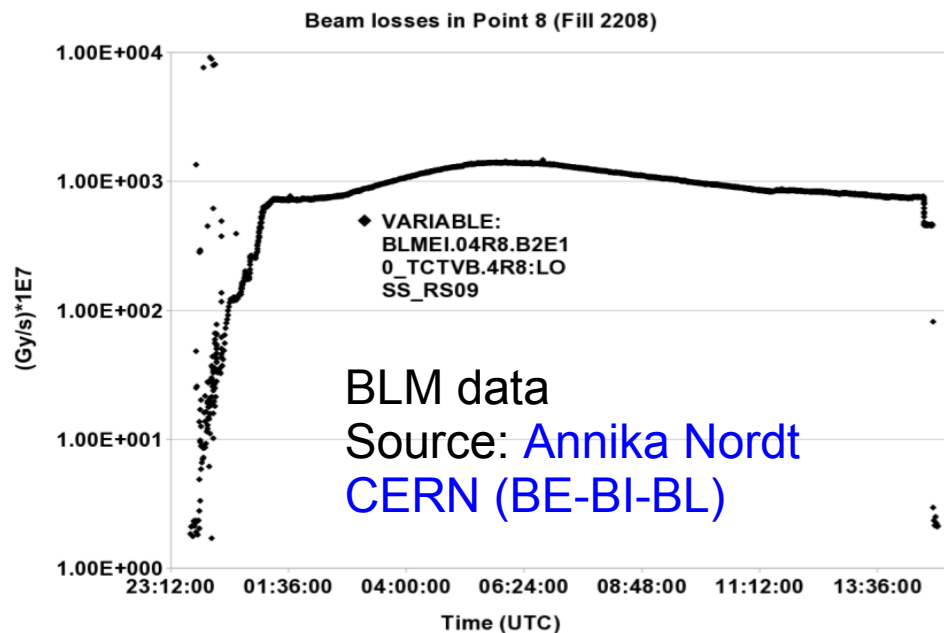
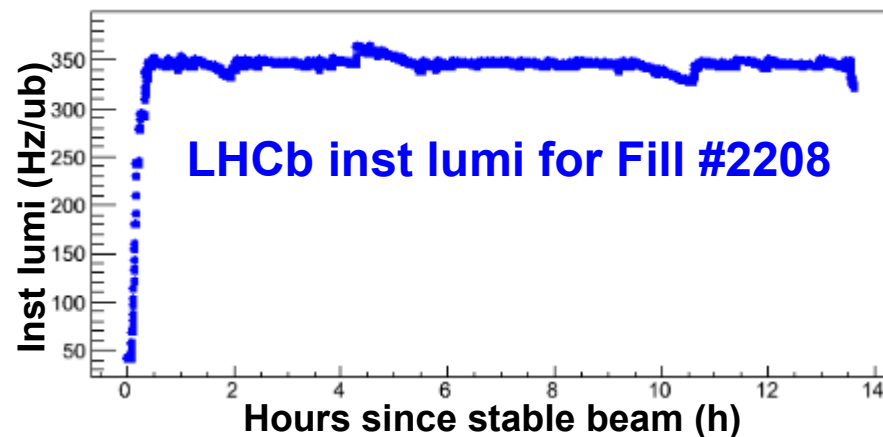
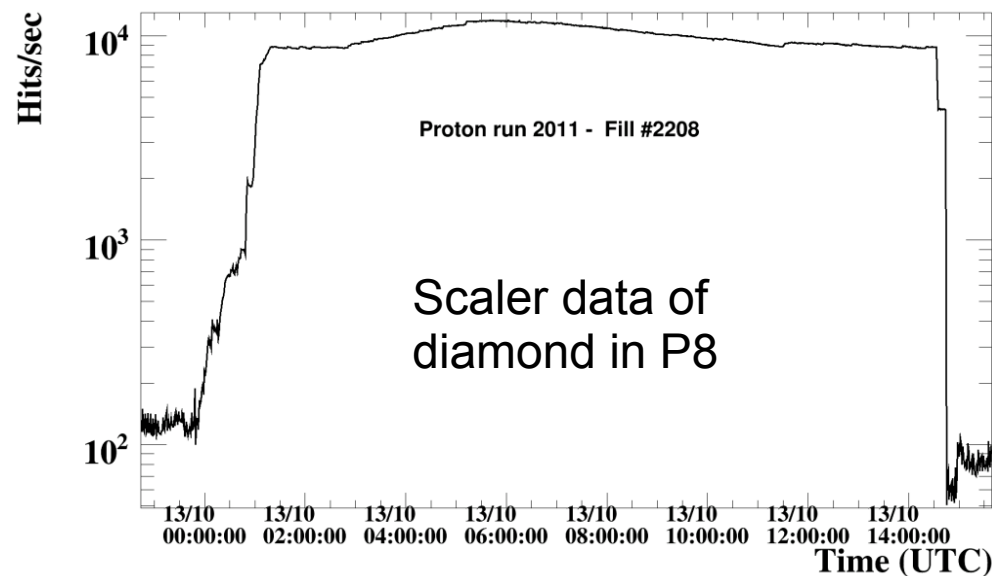
5. DIP Publisher

6. Summary

7. Next Tasks



Scaler Data

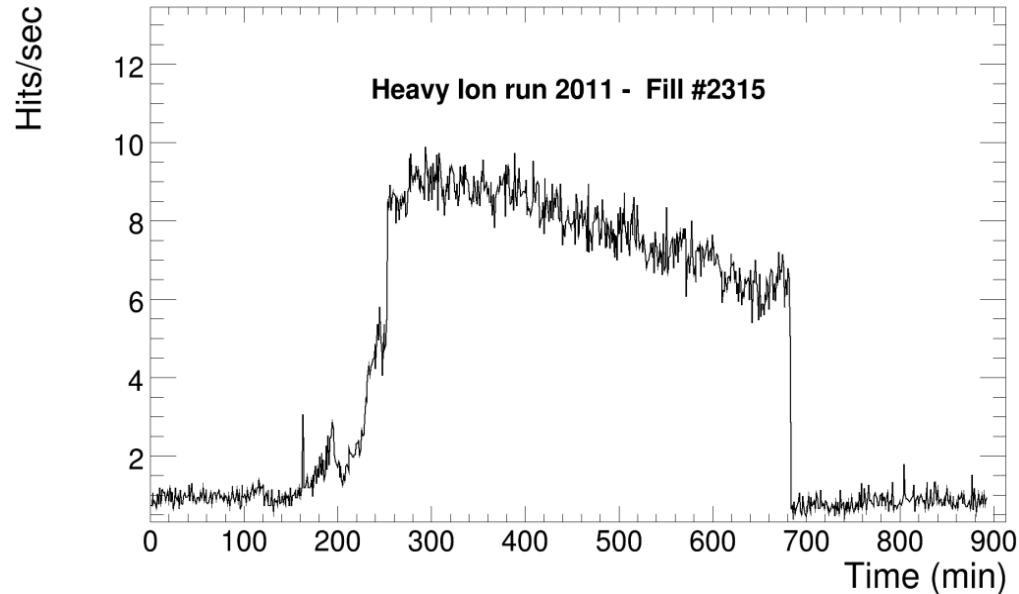


- Behavior of Scaler rates are similar to BLM measurements
- Scaler rates due to collision products, beam halo and bad vacuum quality

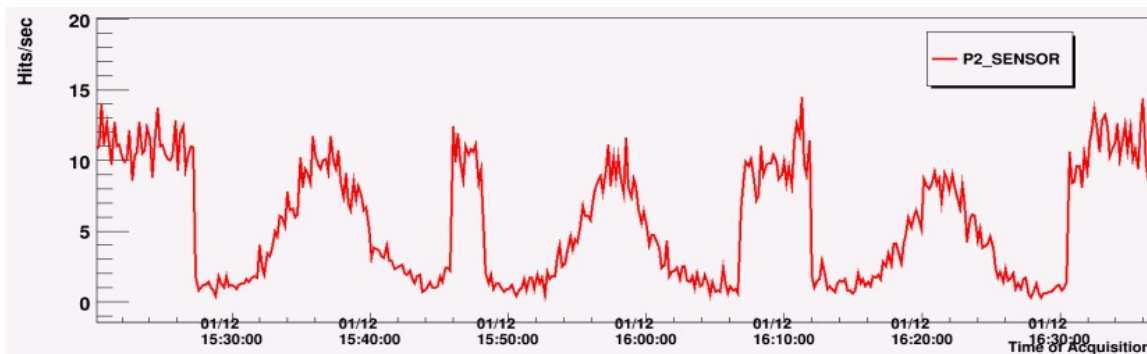


Scaler Data

- Scaler is sensitive for protons and heavy ions (smaller rates)



Scaler rates in P8



Scaler rates in P2:
Van-der-Meer scan

Content

1. Introduction

- a. Location
- b. Data Acquisition Chain

2. ADC Data

- a. Signal
- b. Baseline Monitoring
- c. Amplitude Spectra
- d. Arrival Time

3. TDC Data

4. Scaler Data

5. DIP Publisher

6. Summary

7. Next Tasks



DIP Publisher

- DAQ is connected to the General Purpose Network (GPN)
- Tunnel from GPN to Technical Network
- Monitor with standard tools
- Published data: ADC baseline and Scaler data

The screenshot displays the DIP Browser 5.4.2 application. On the left, a tree view shows the network structure: dip > CLOUD > CMS > BCM1F4LHC > ADC > baseline and SCALER > sc_rates. The main window shows two active subscriptions. The first, 'Subscription to dip/CMS/BCM1F4LHC/ADC/baseline', is connected and displays a table with columns Name, Type, and Value. The second, 'Subscription to dip/CMS/BCM1F4LHC/SCALER/sc_rates', is also connected and displays a similar table. A 'Server Info' dialog box is open in the foreground, providing details for the 'dip/CMS/BCM1F4LHC/ADC/baseline' server, including its name, last update time, and a list of connected clients. The interface also includes a 'Get Server Info' button and a status bar at the bottom.

Subscription to dip/CMS/BCM1F4LHC/ADC/baseline

Name	Type	Value
presenttime	int	0
uptime	int	0
Baseline	int[8]	42,48,137,138,137,142,134,138,

☐ Click here to enable log. Logging is disabled. [Get Server Info](#)

2012.01.30 18:46:42.051 CET(1327945602051) ~ Quality = Good :

Subscription to dip/CMS/BCM1F4LHC/SCALER/sc_rates

Name	Type	Value
time	int	1327945609
ScalerRates	int[16]	11270,40164773,0,0,0,0,0,0,0,0,0,0,0,0,10022,0,

☐ Click here to enable log. Logging is disabled. [Get Server Info](#)

2012.01.30 18:46:49.646 CET(1327945609646) ~ Quality = Good :

Server Info for dip/CMS/BCM1F4LHC/ADC/baseline

Server: BCM1F_ADC_Factory@pimpizord.cern.ch
Last Update: 2012.01.30 18:45:15
Clients connected: 3

17996@cs-ccr-cmw1.cern.ch
10399@pimpizord.cern.ch
10399@pimpizord.cern.ch

[UPDATE](#)

Found as many as 280 publications



Content

1. Introduction

- a. Location
- b. Data Acquisition Chain

2. ADC Data

- a. Signal
- b. Baseline Monitoring
- c. Amplitude Spectra
- d. Arrival Time

3. TDC Data

4. Scaler Data

5. DIP Publisher

6. Summary

7. Next Tasks



Summary

- 2 diamonds are already installed
- 2nd diamond was installed after the proton run
- First results are promising
- ADC signals are small
 - Only data from P8
- TDC can differentiate between beam halo and collision products
 - Only data from P8
- Scaler rates behave as BLM measurements
- Scaler is sensitive to heavy ions
 - Data from P8 and P2



Content

1. Introduction

- a. Location
- b. Data Acquisition Chain

2. ADC Data

- a. Signal
- b. Baseline Monitoring
- c. Amplitude Spectra
- d. Arrival Time

3. TDC Data

4. Scaler Data

5. DIP Publisher

6. Summary

7. Next Tasks



Next Tasks

- Installing the software to the new computer
- Saving data at CASTOR
- Publish data of TDC
- Measure the beam loss per bunch (if possible)

