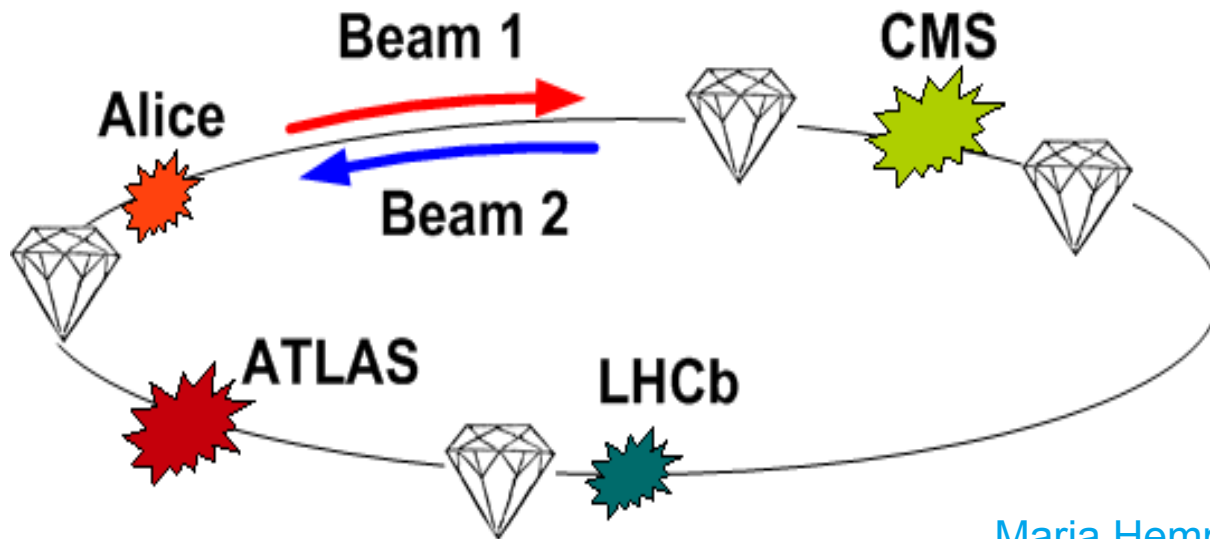


Status of BCM1F4LHC

Workshop on Fast Beam Conditions Monitoring



Maria Hempel
Status of BCM1F4LHC
Zeuthen, 02.02.2012

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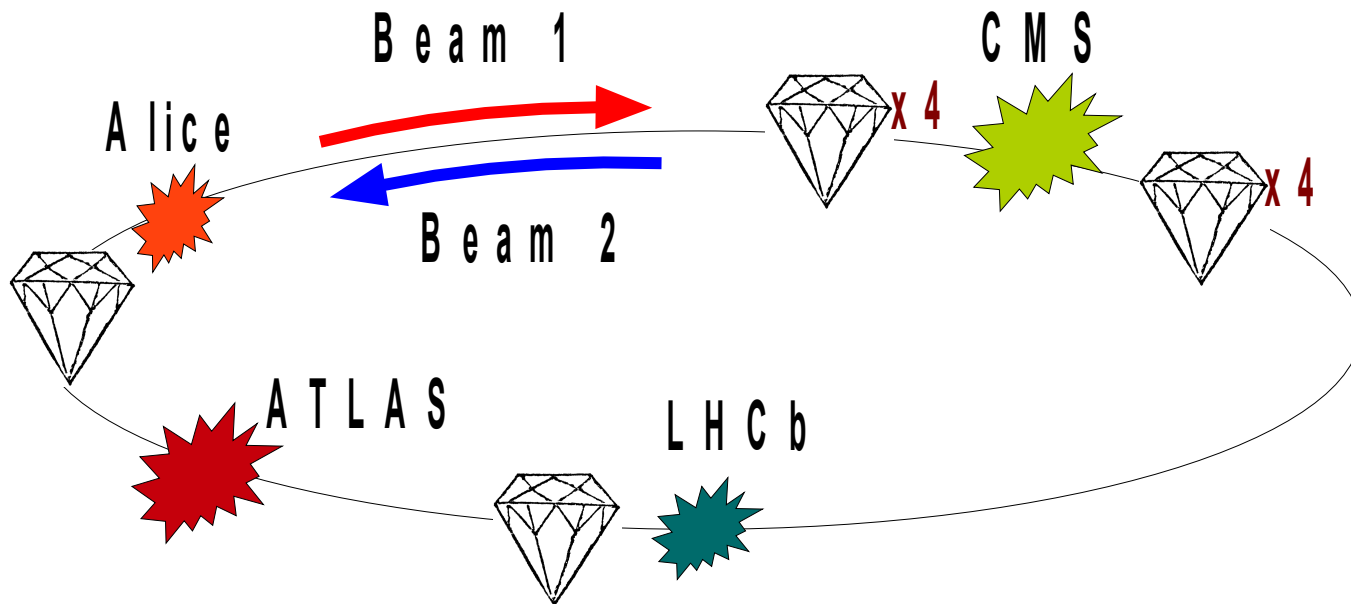
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Location

- 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

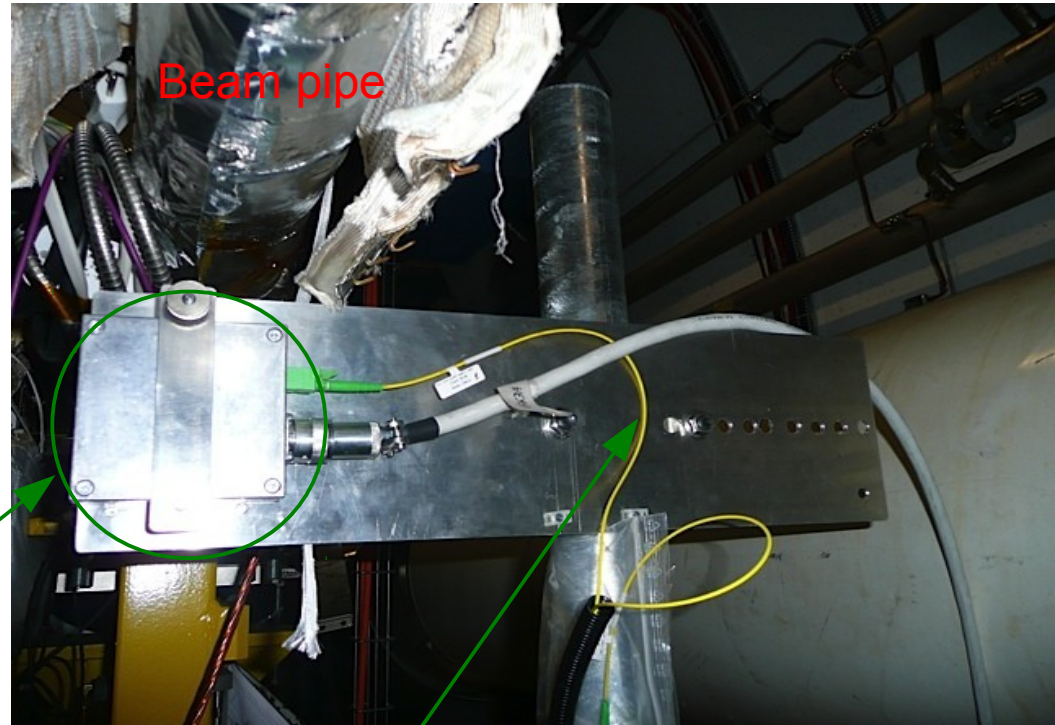
➤ Diamond in P8:

- 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 P8



Diamond with
Front End
Electronic

Optical fiber

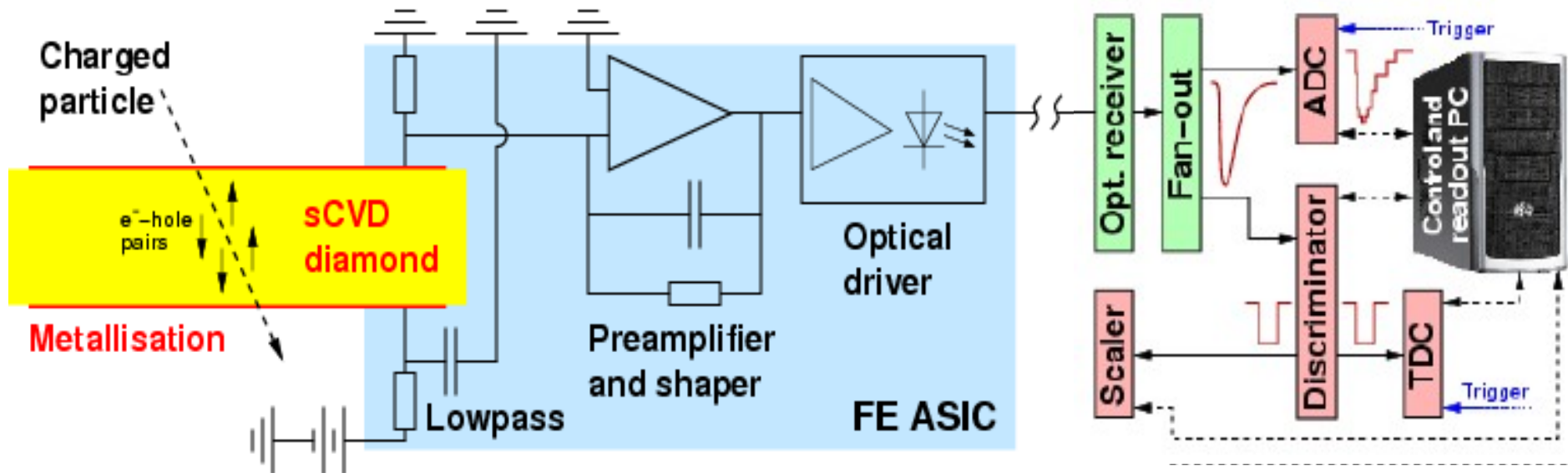
Data Acquisition Chain

➤ 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



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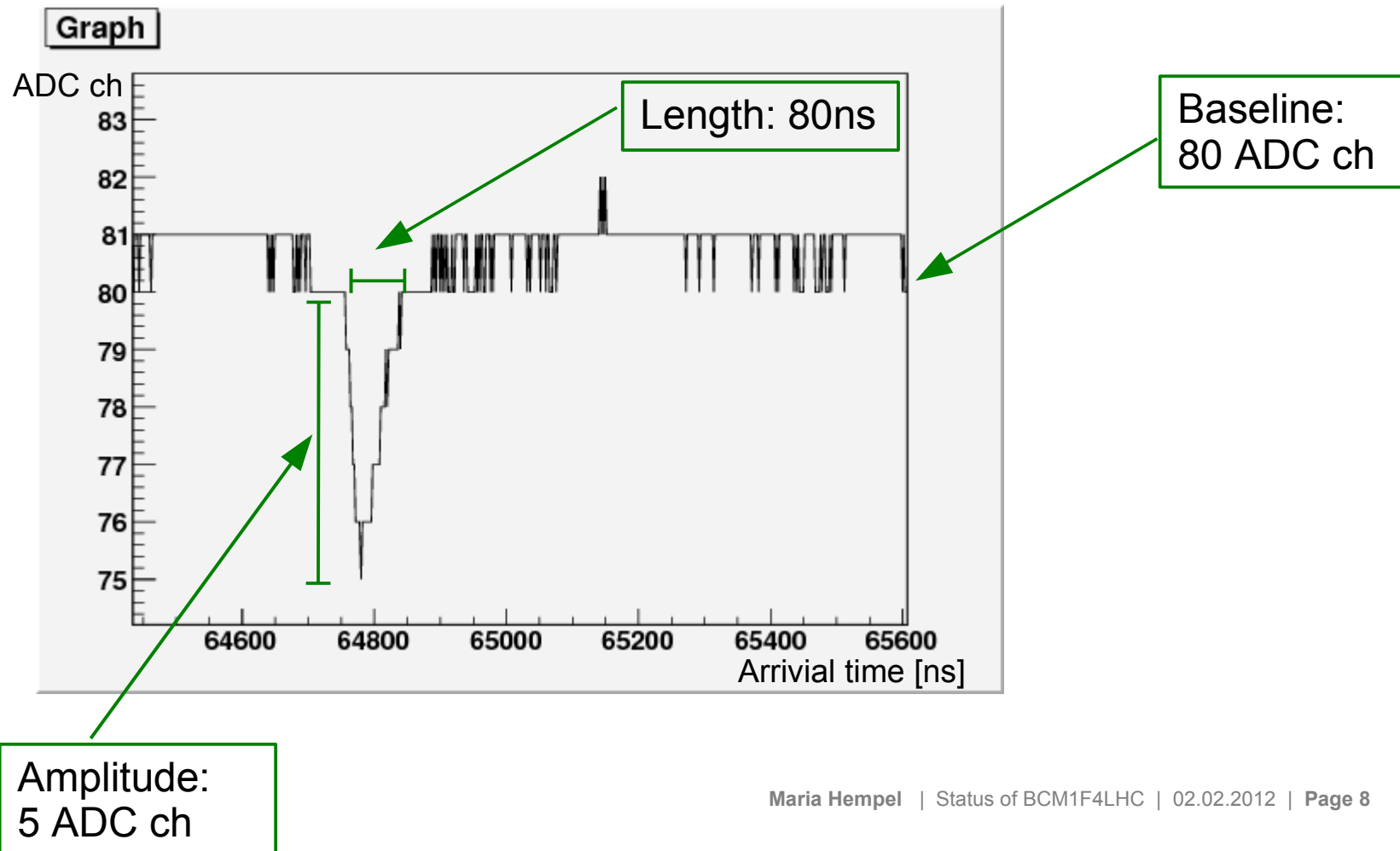
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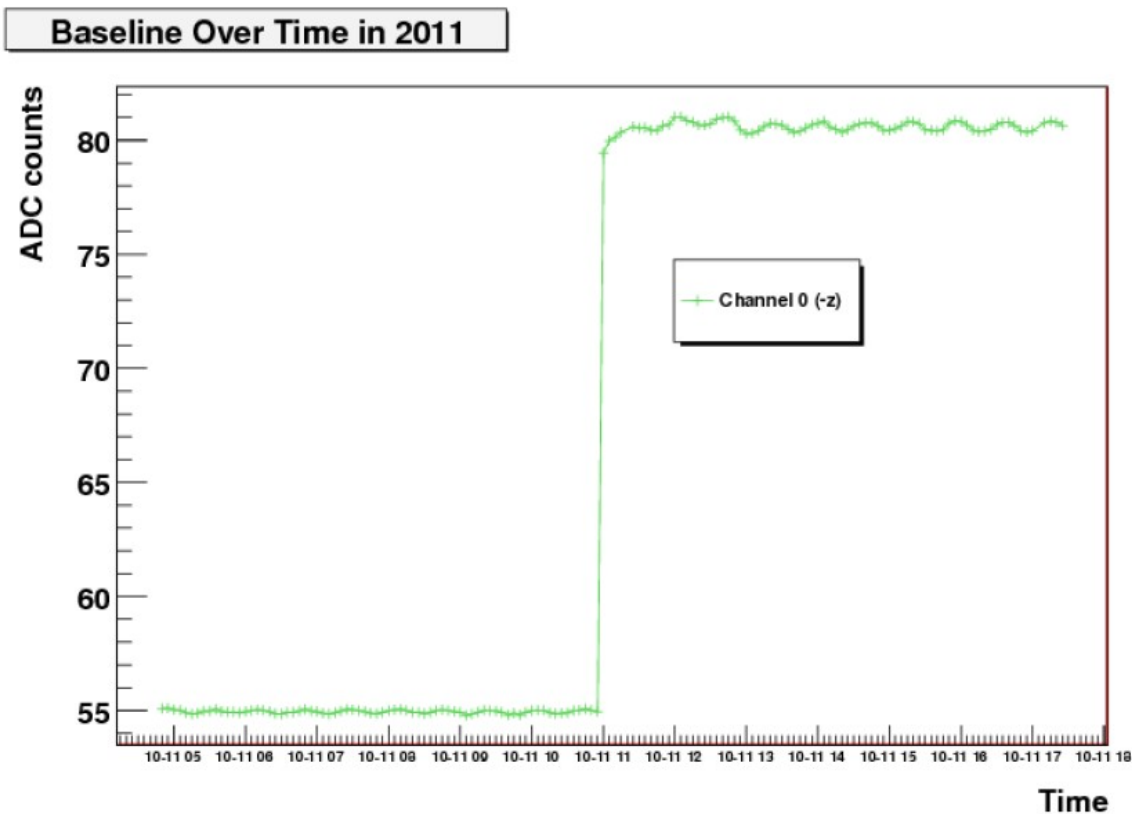
Signal

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



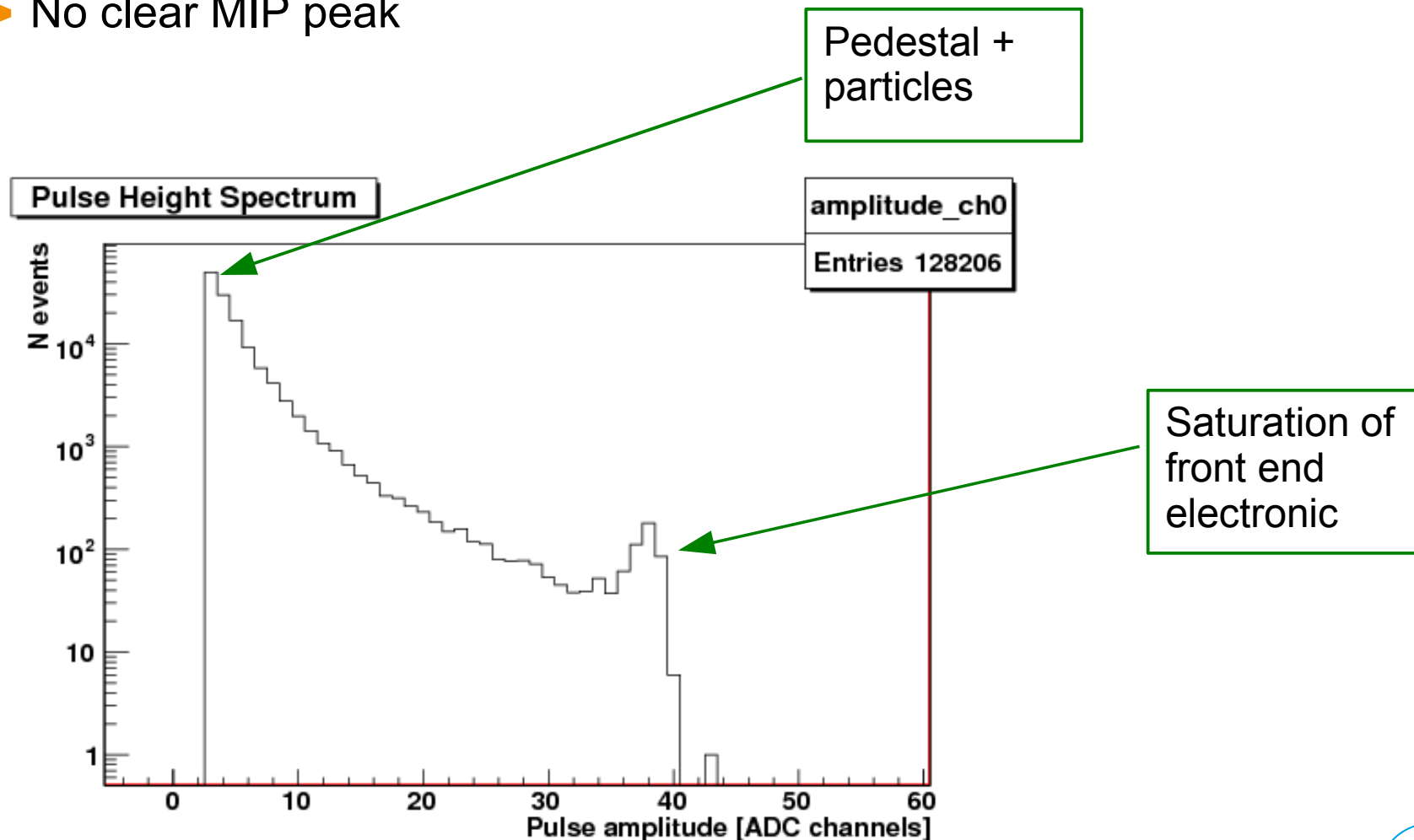
Baseline Monitoring

- 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



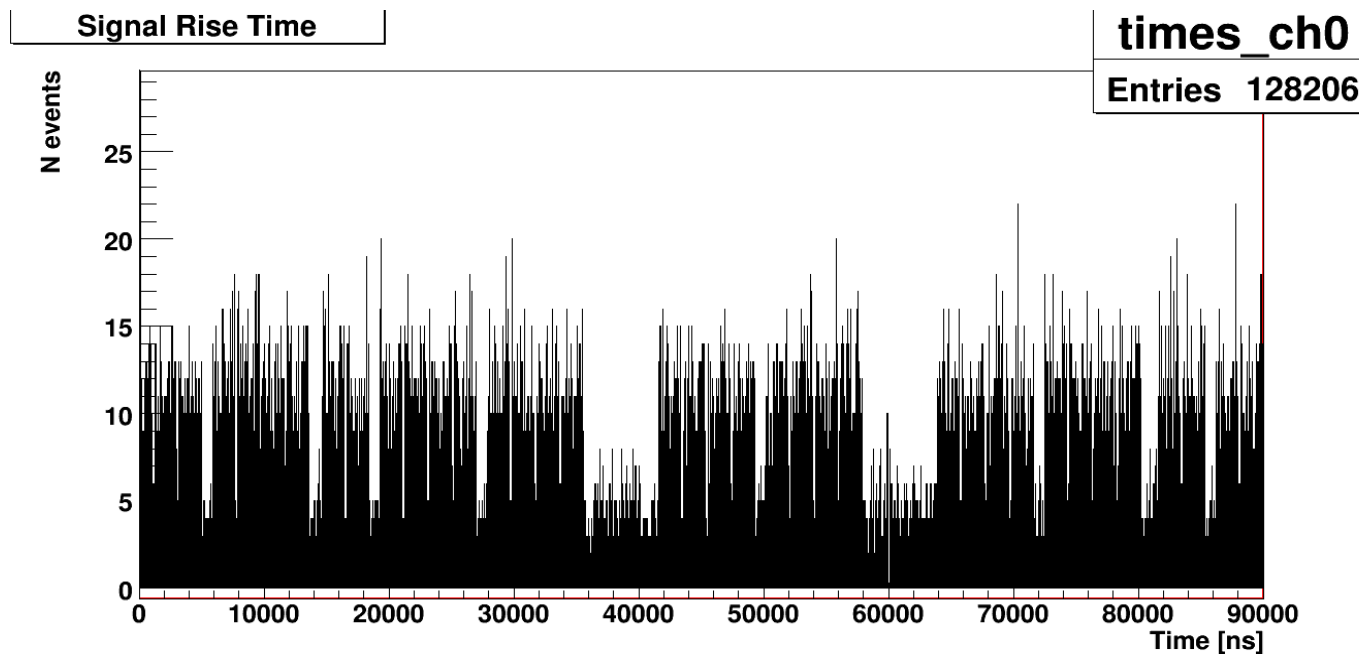
Amplitude Spectra

- 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



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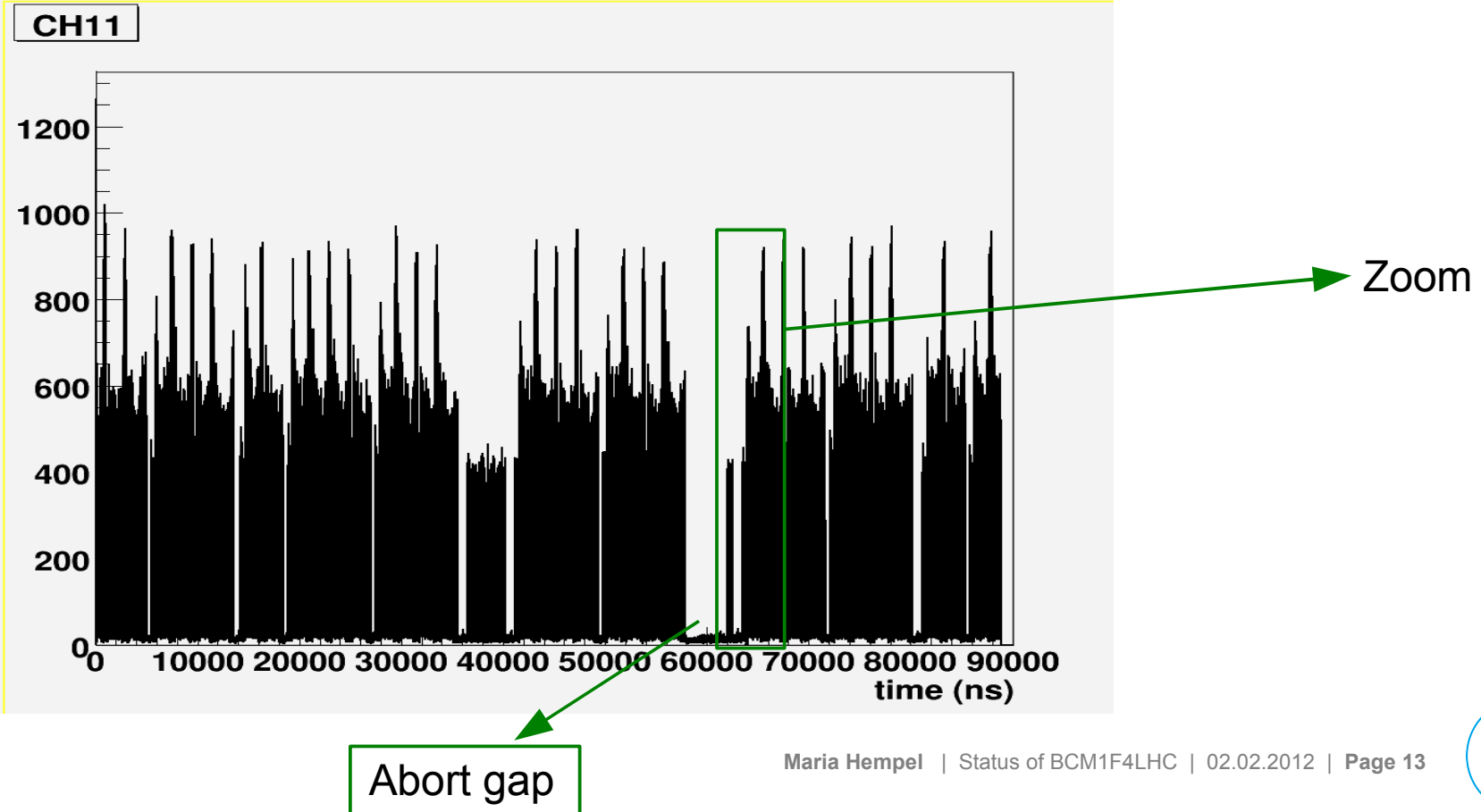


TDC Data

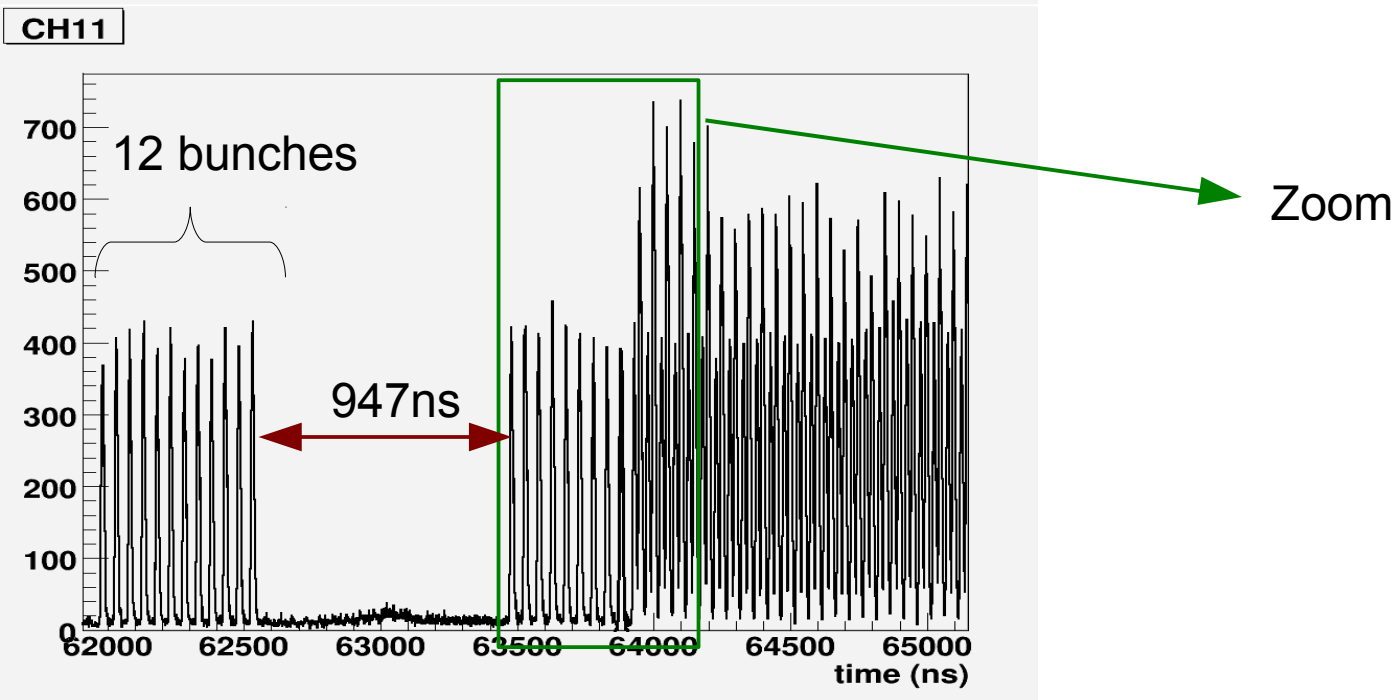
- Only TDC data of P8
- Measures the arrival time of charged particles

One LHC cycle with fill scheme:

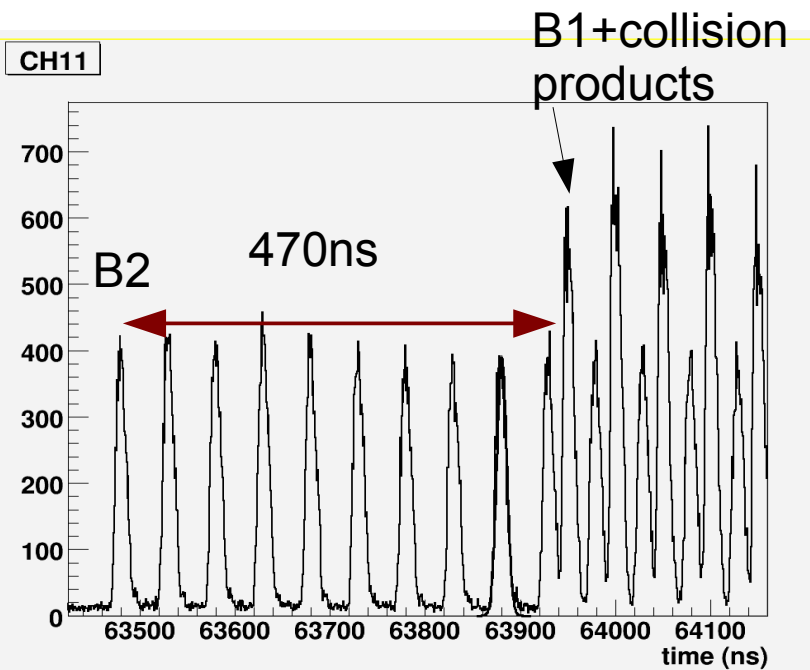
50ns_1380b+1small_1318_39_1296_144bpi



TDC Data

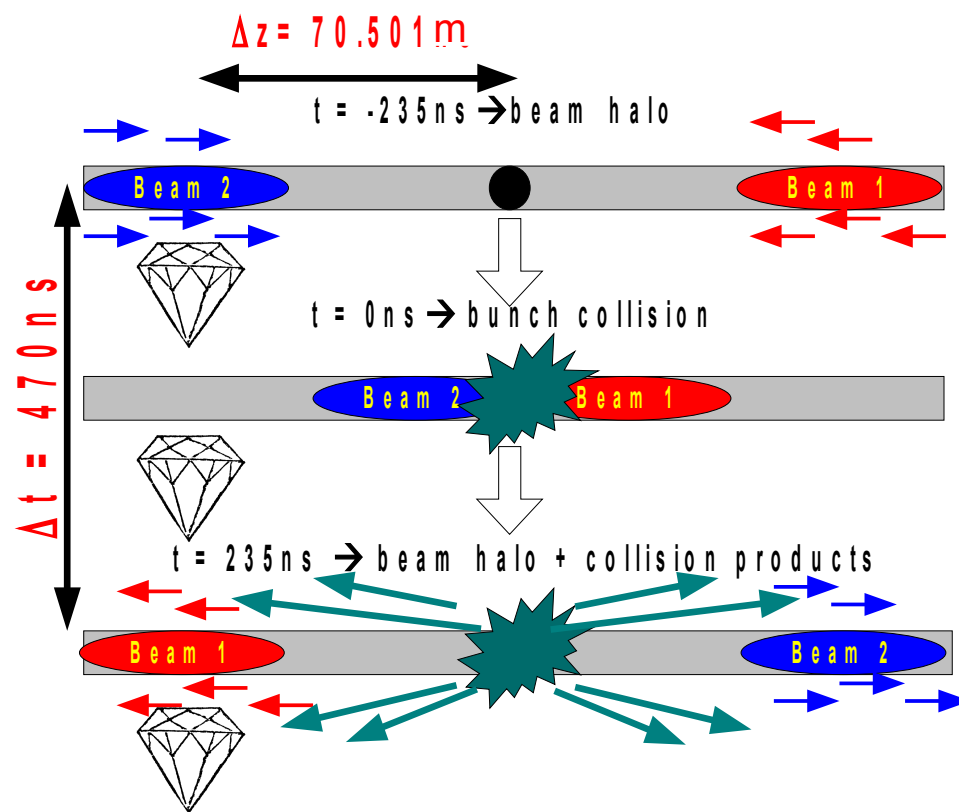


- B1: 12 bunches, 1100ns difference to next bunch
- B2: 12 bunches, 950ns difference to next bunch



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

- > Different rates for beam halo and collision products



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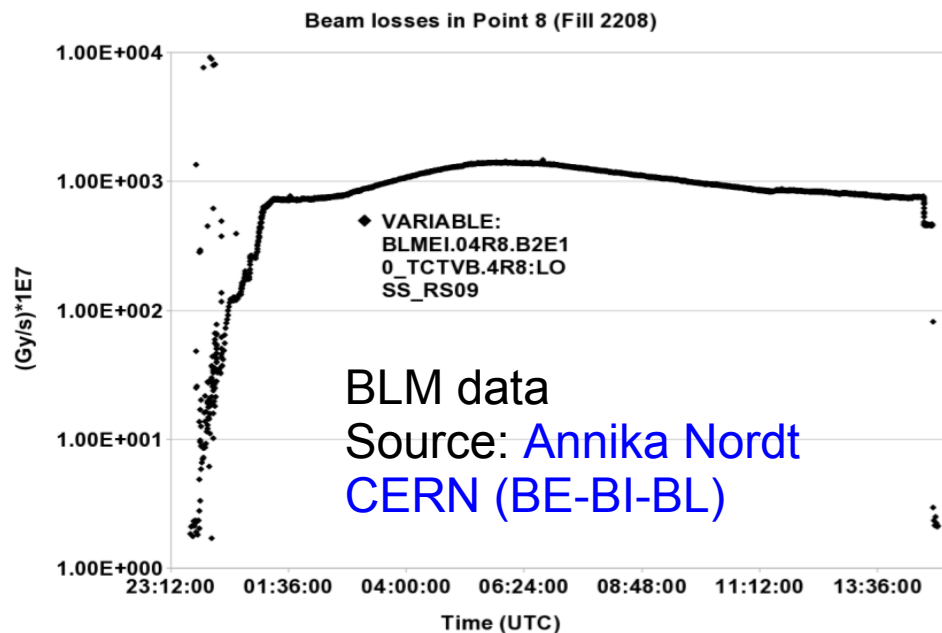
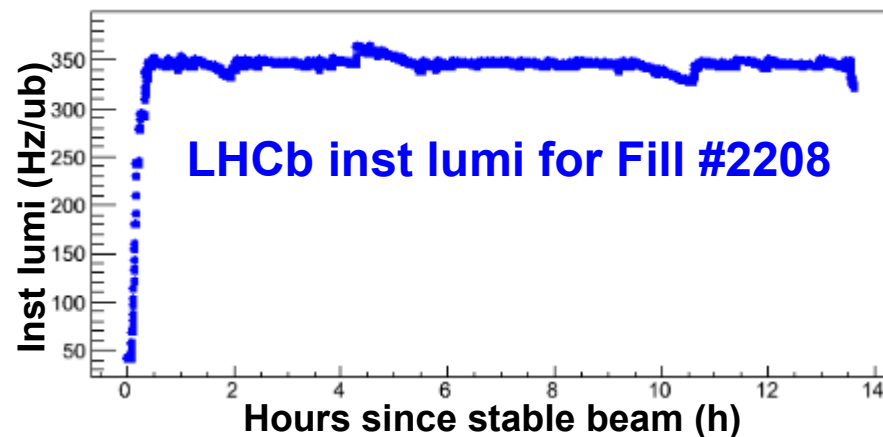
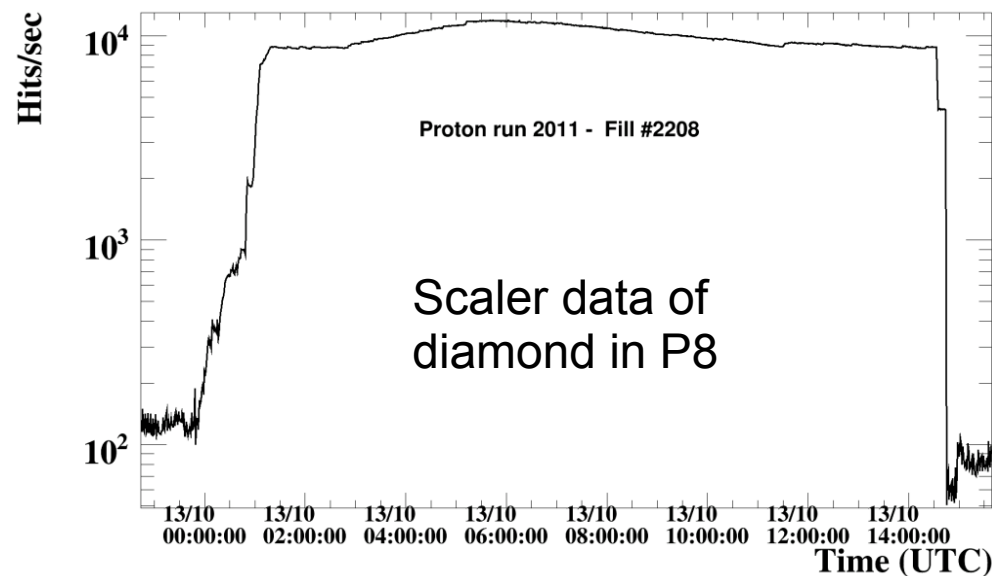
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Scaler Data

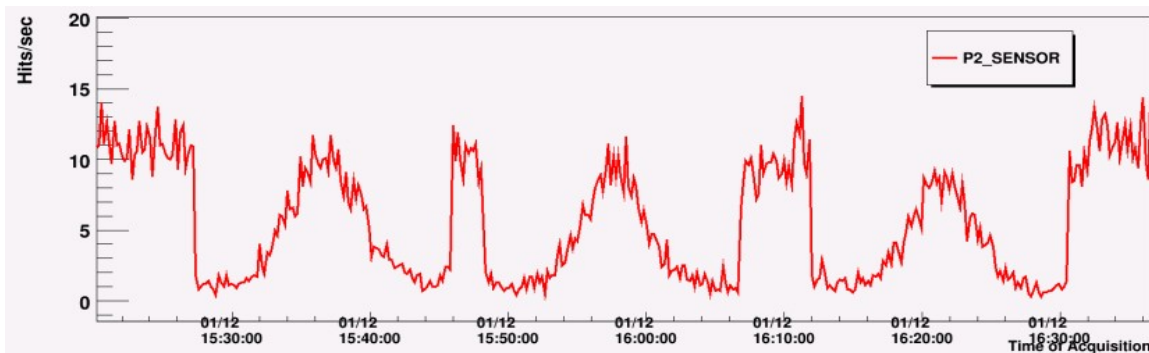
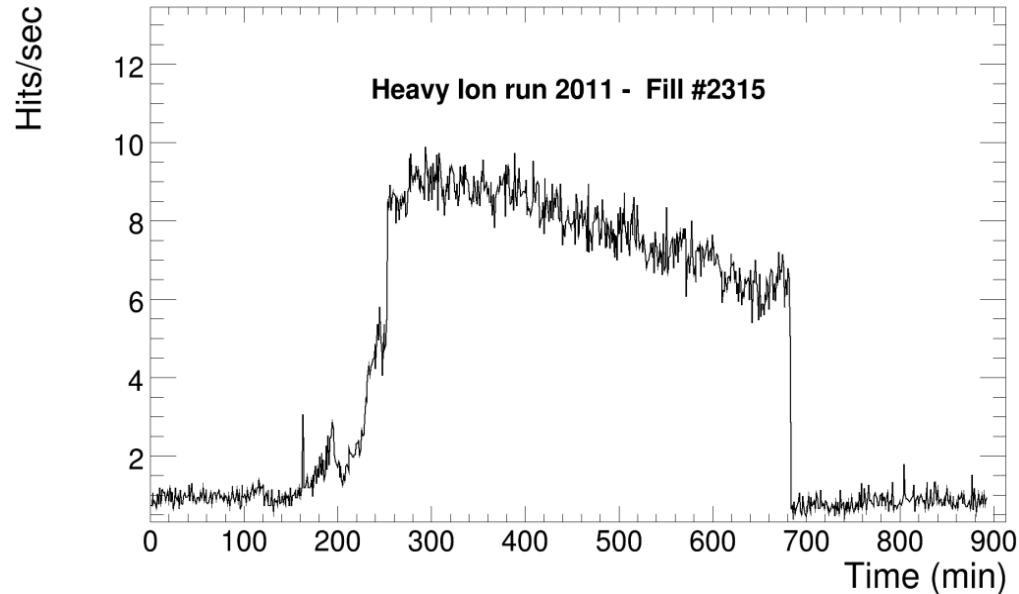


- Behavior of Scaler rates are similar to BLM measurements
- Scaler rates due to collision products, beam halo and bad vacuum quality



Scaler Data

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



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Summary

- 2 diamonds are already installed
- First results are promising
- ADC signals are small
- TDC can differentiate between beam halo and collision products
- Scaler rates behave as BLM measurements
- Scaler is sensitive to heavy ions



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Next Tasks

- Installing the software at the new computer
- Saving data at CASTOR
- Measure beam losses per bunch (if possible)

