ADC Radiation Measurements

BRM Meeting
6th December 2011

Maria Hempel

Brandenburgische
Technische Universität
Cottbus

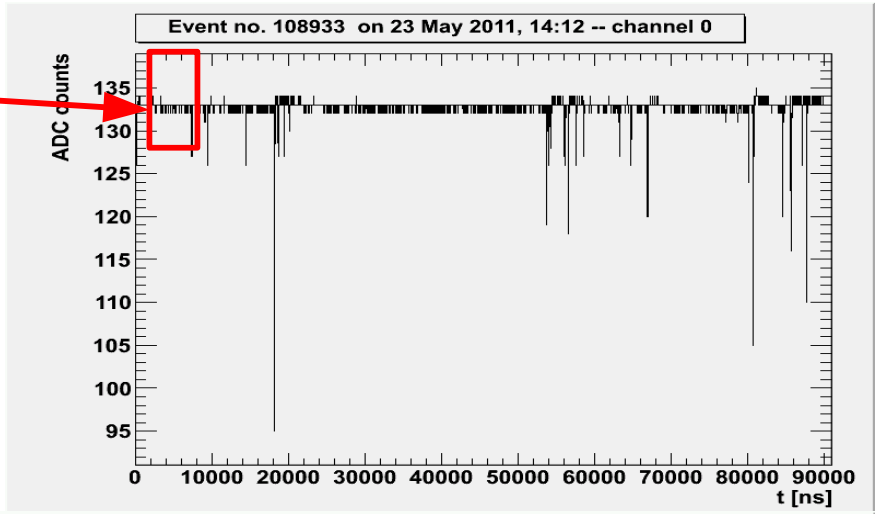
DESY

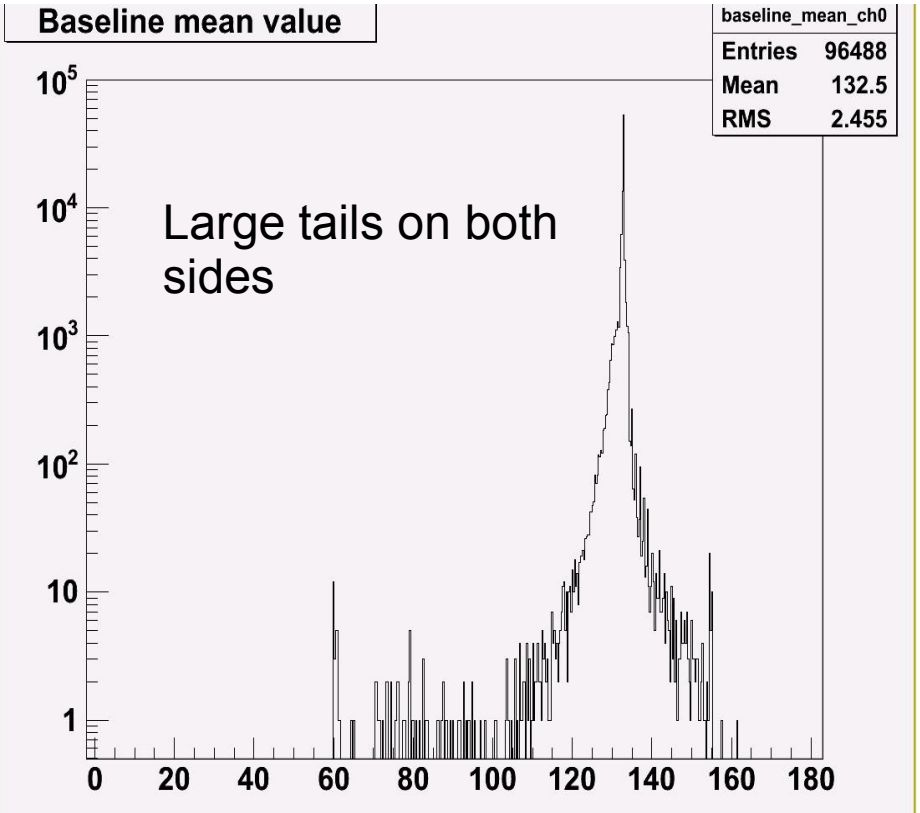
Outline

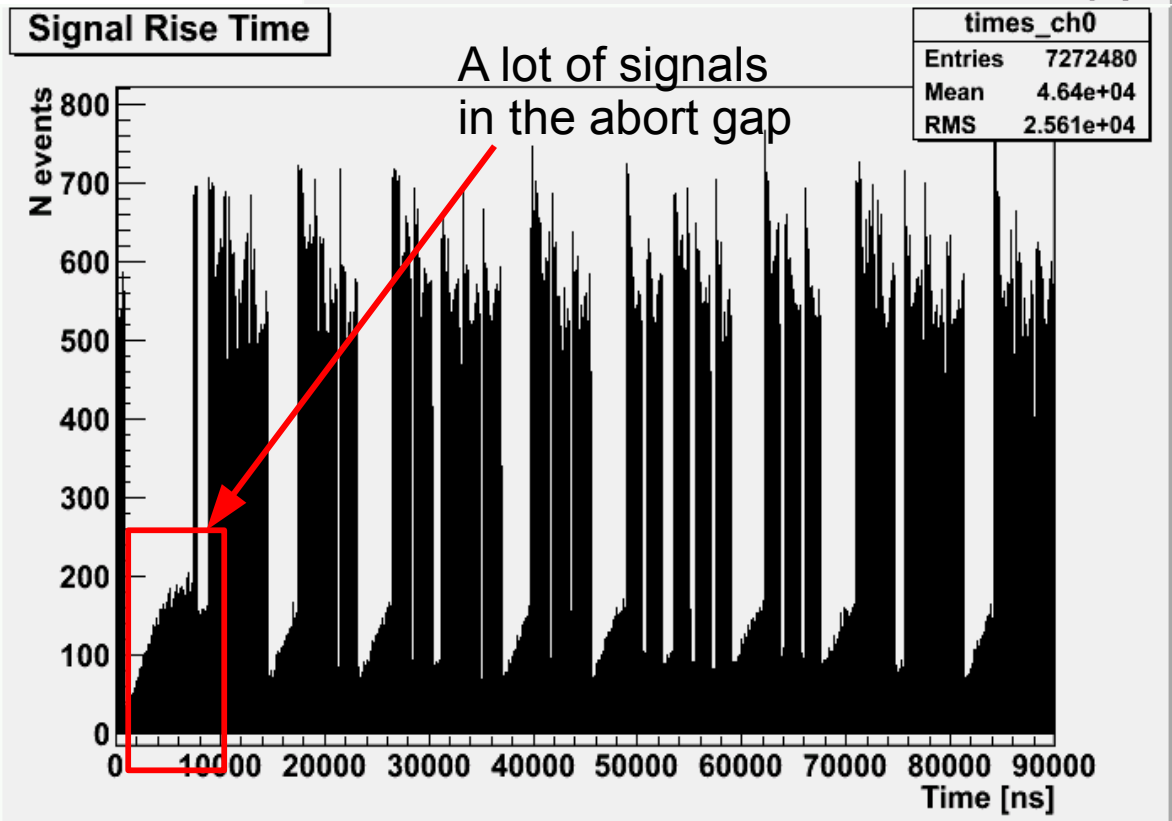
- Baseline Calculation
- Definition of Parameters
- Amplitude Spectra
- Test Pulses over Lumi
- MIP and Saturation Peak over Lumi
- MIP Peak over High Voltage
- Conclusion

Baseline Calculation

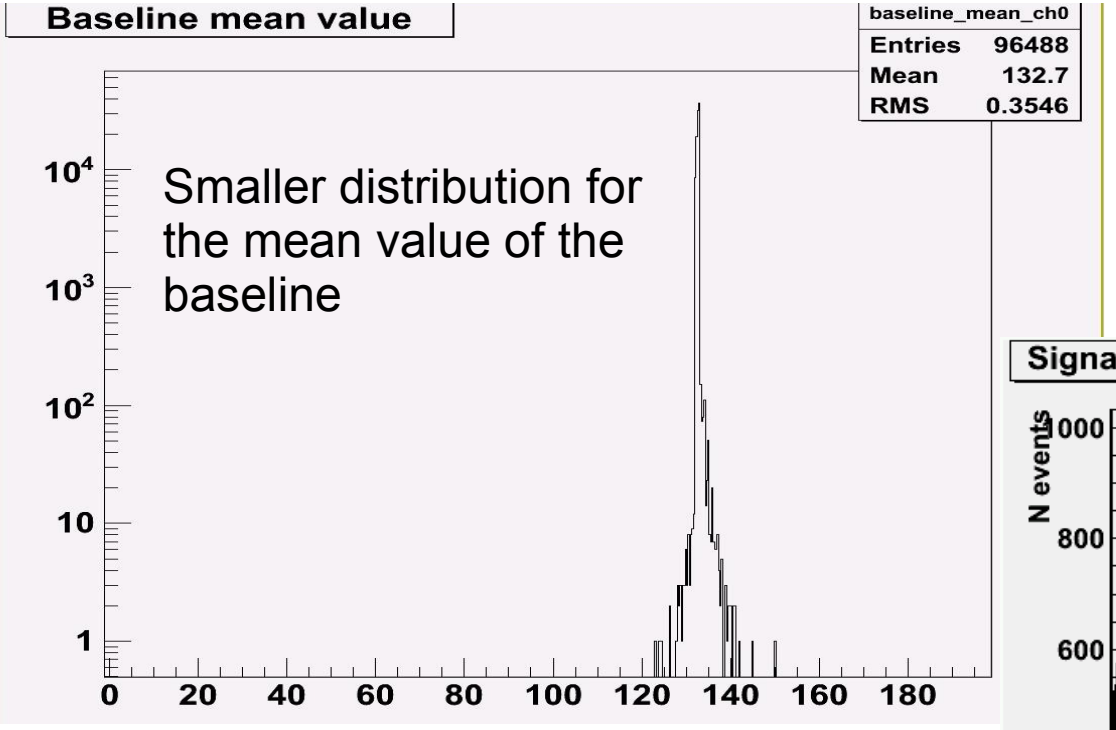
- Take 50 ADC bins at the beginning of LHC cycle
- Add the 50 corresponding ADC counts
- Calculate the mean value

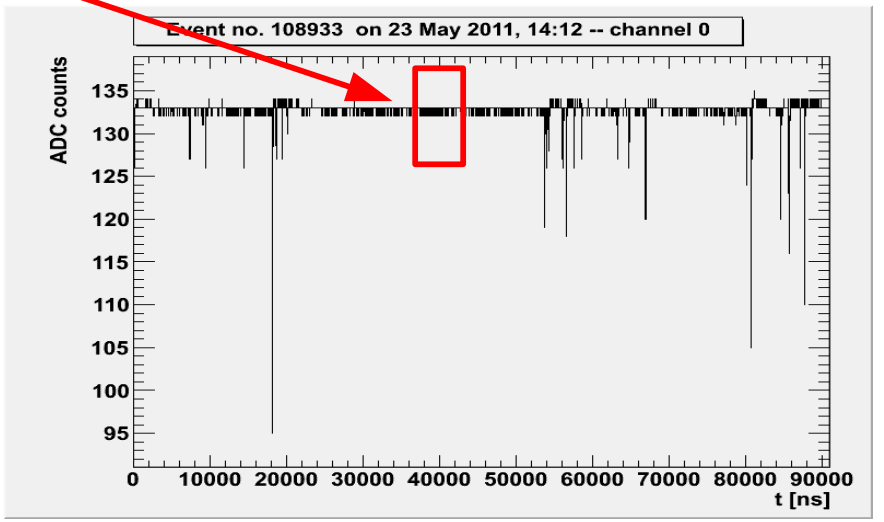


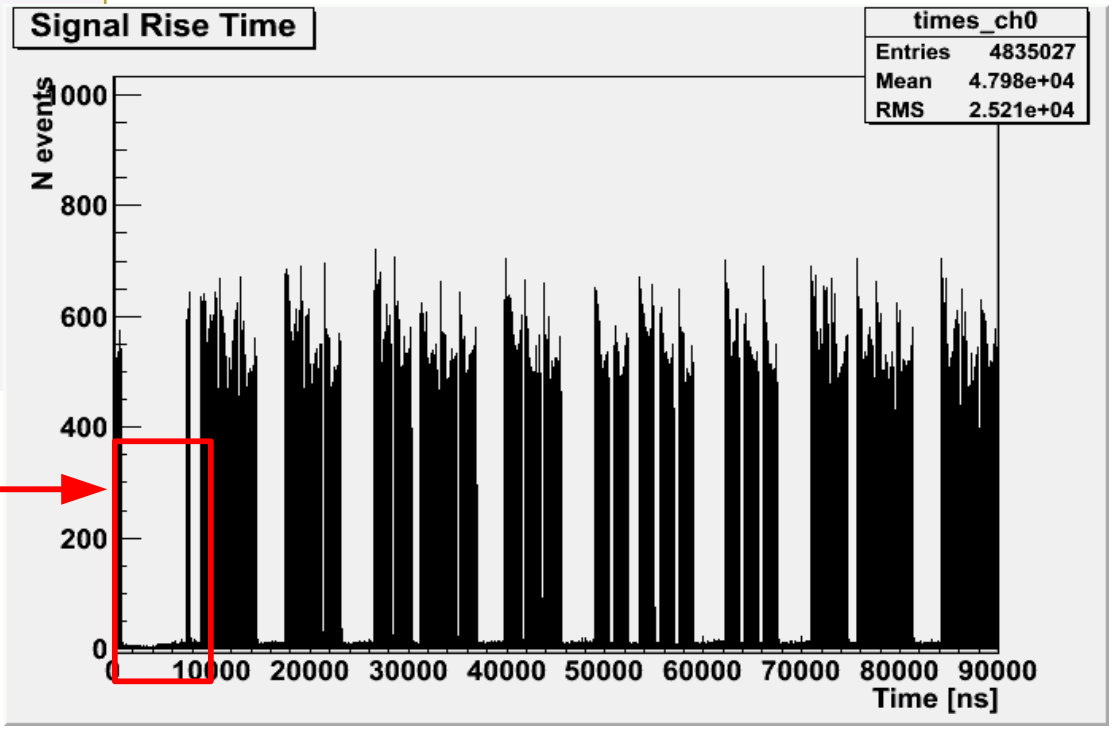




- Calculation of baseline during the abort gap
- Starting the calculation at 4000ns



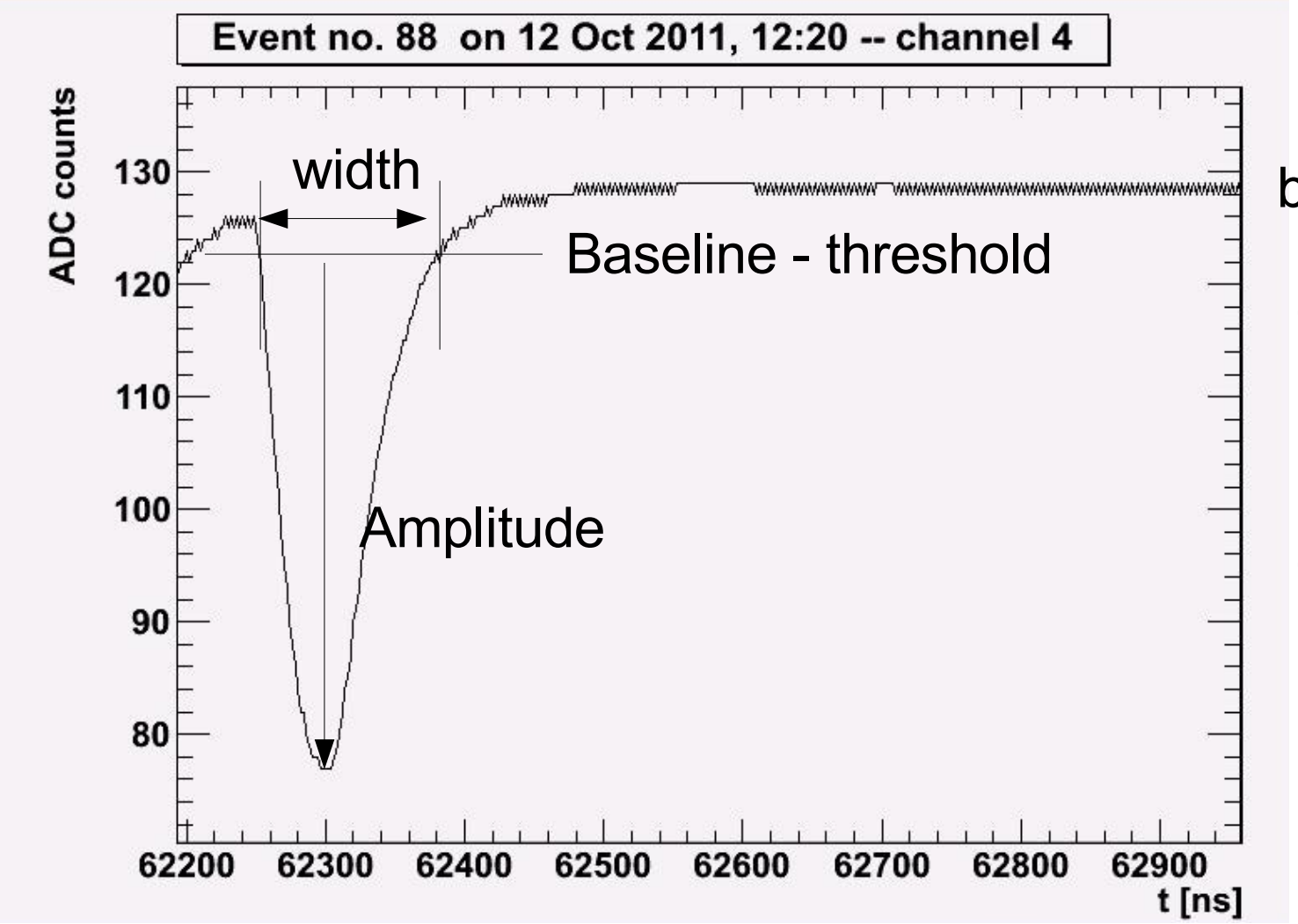




Less signals in the abort gap

Definition of Parameters

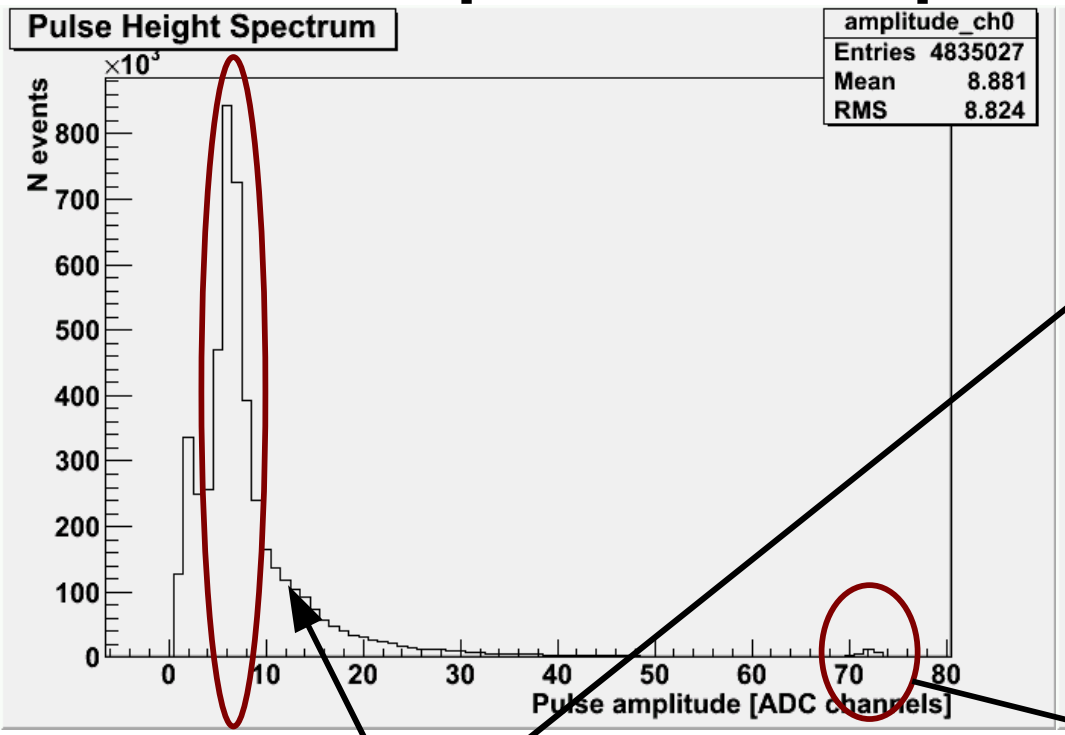
Zoom of one Signal

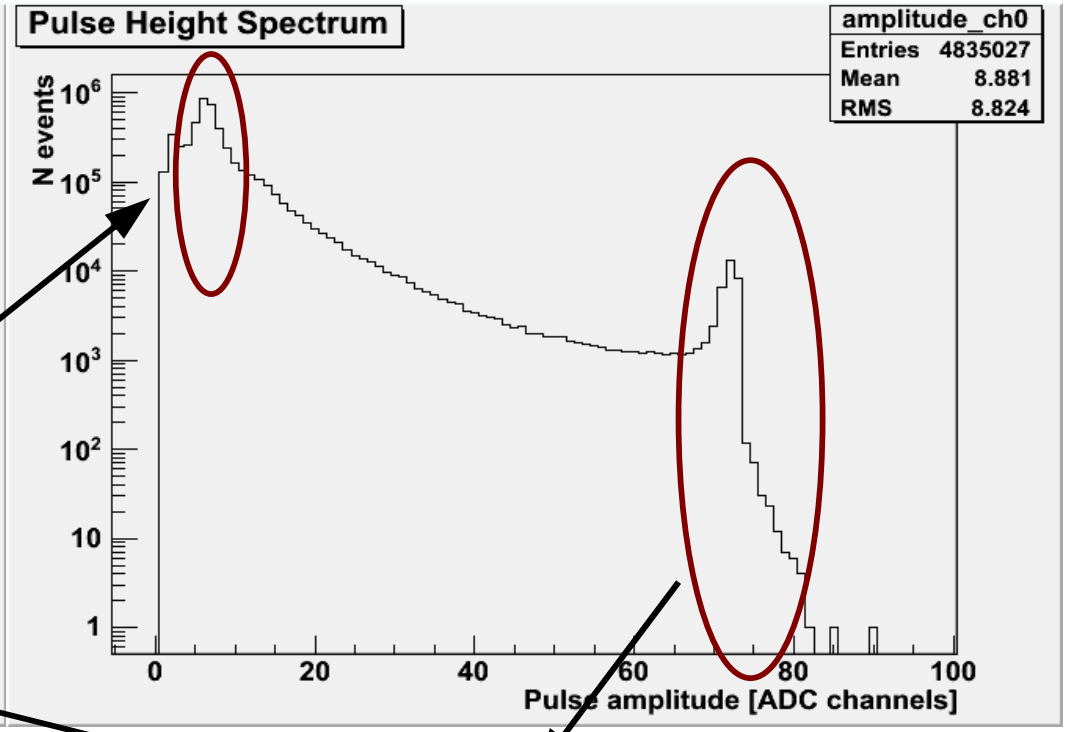


baseline

- Threshold is set in the analysis program
- Take only signals which are larger than a minimum signal width of 4 bins

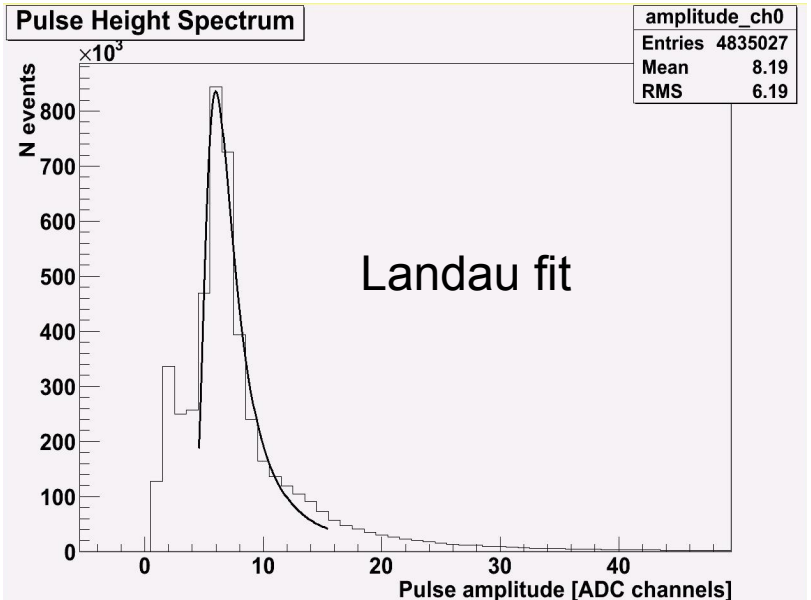
Amplitude Spectra

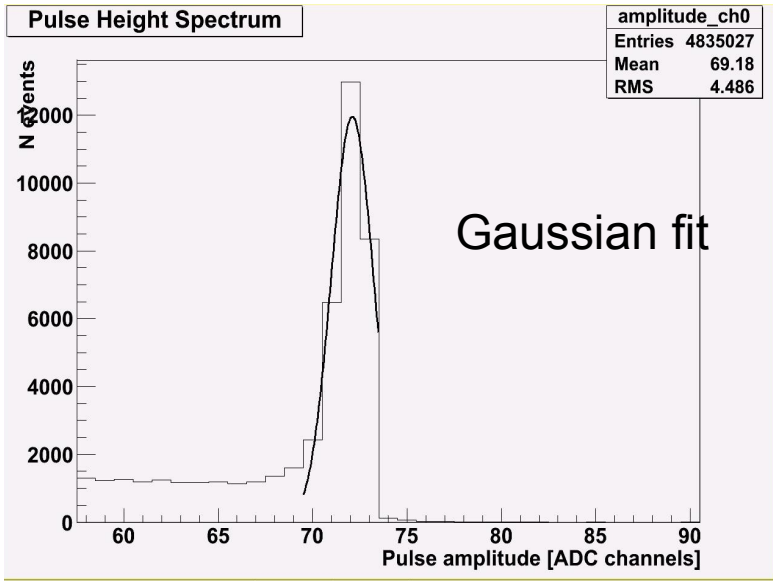




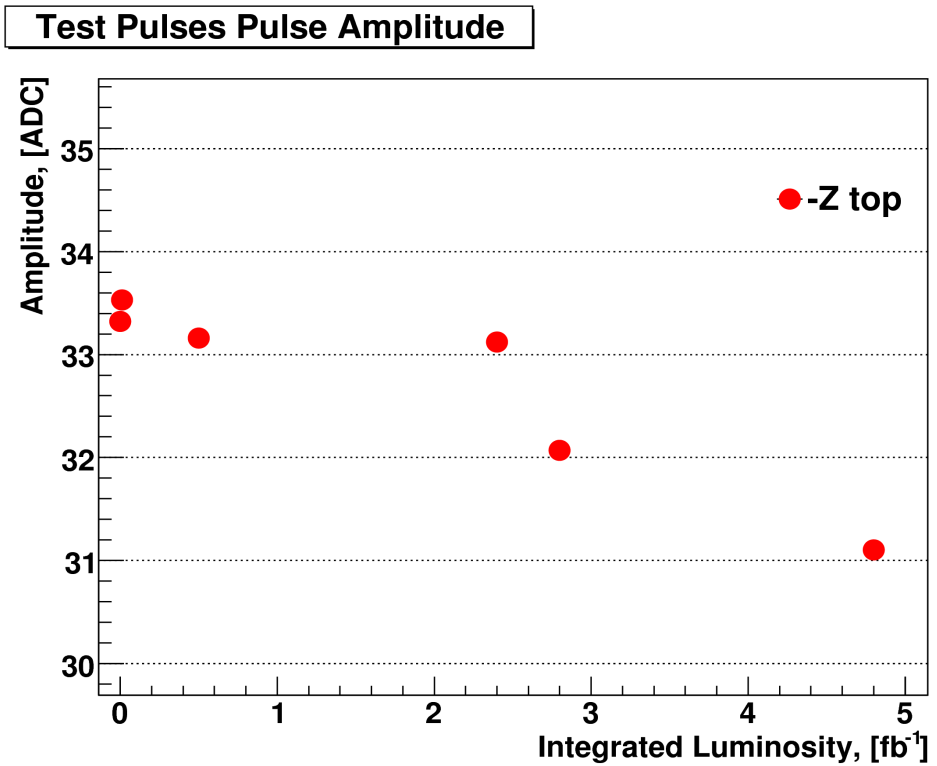
MIP Peak

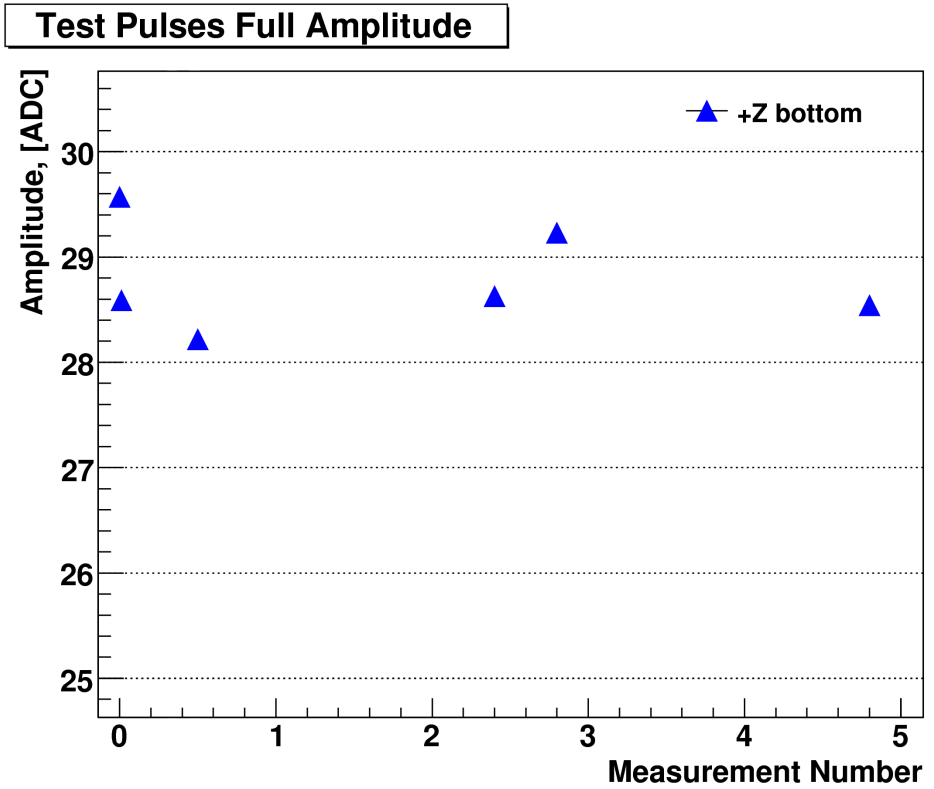
Saturation Peak





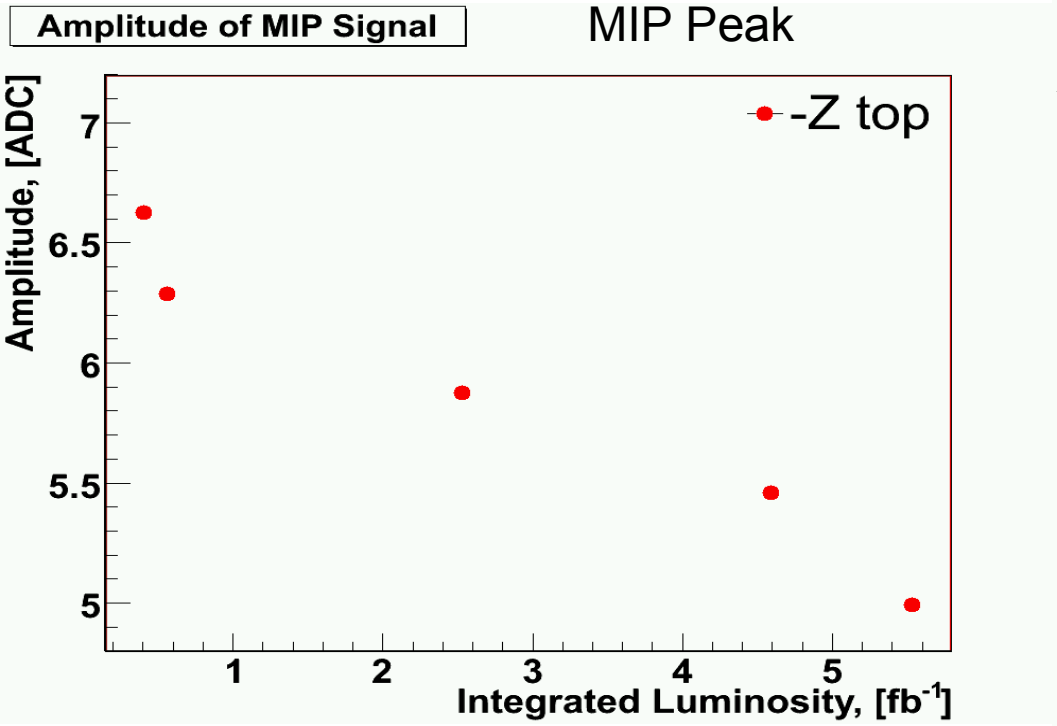
Test Pulses over Lumi

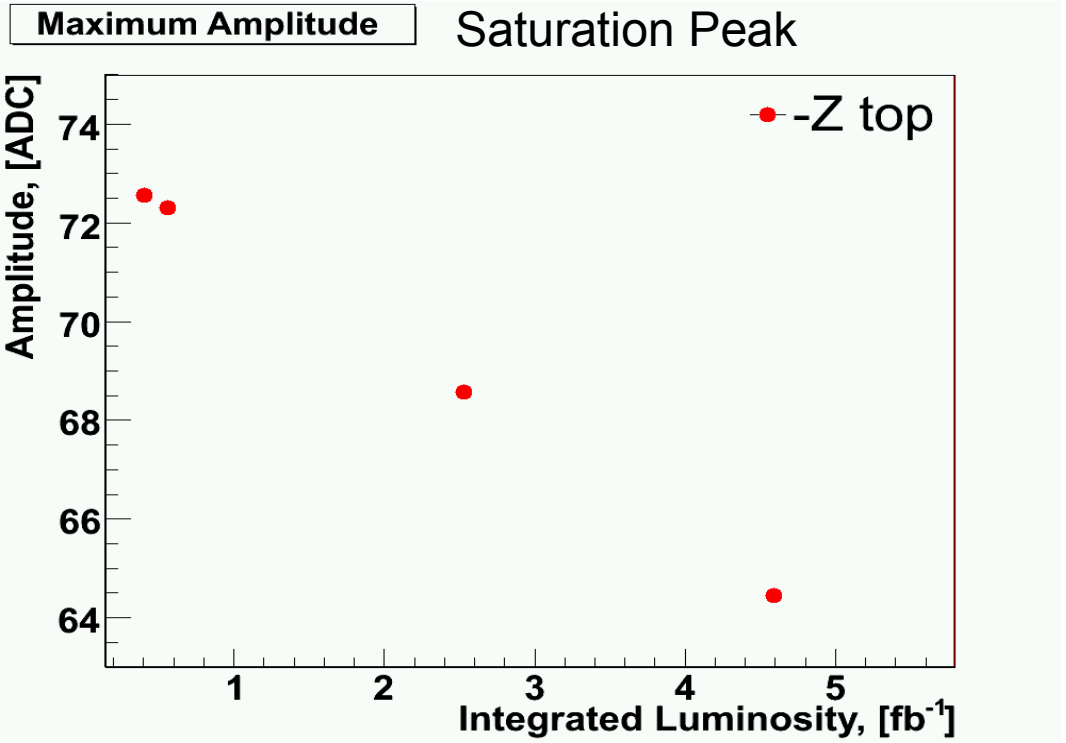




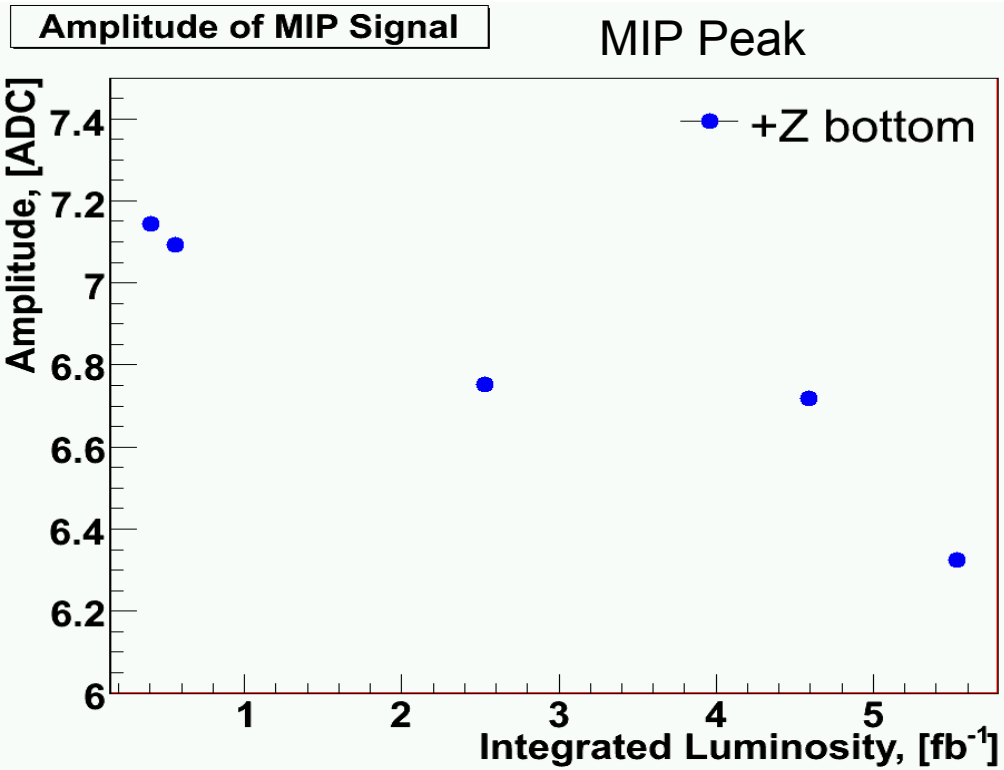
- For -Z top the position is decreasing
- For +Z bottom the position decreases and then increases

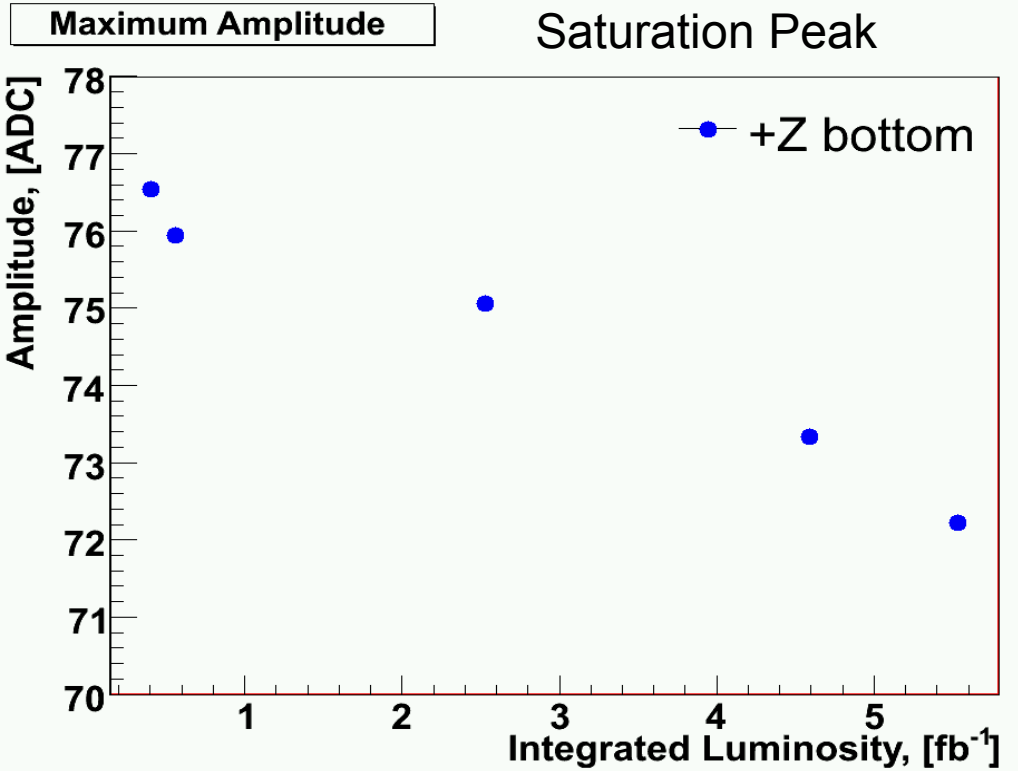
MIP and Saturation Peak over Lumi





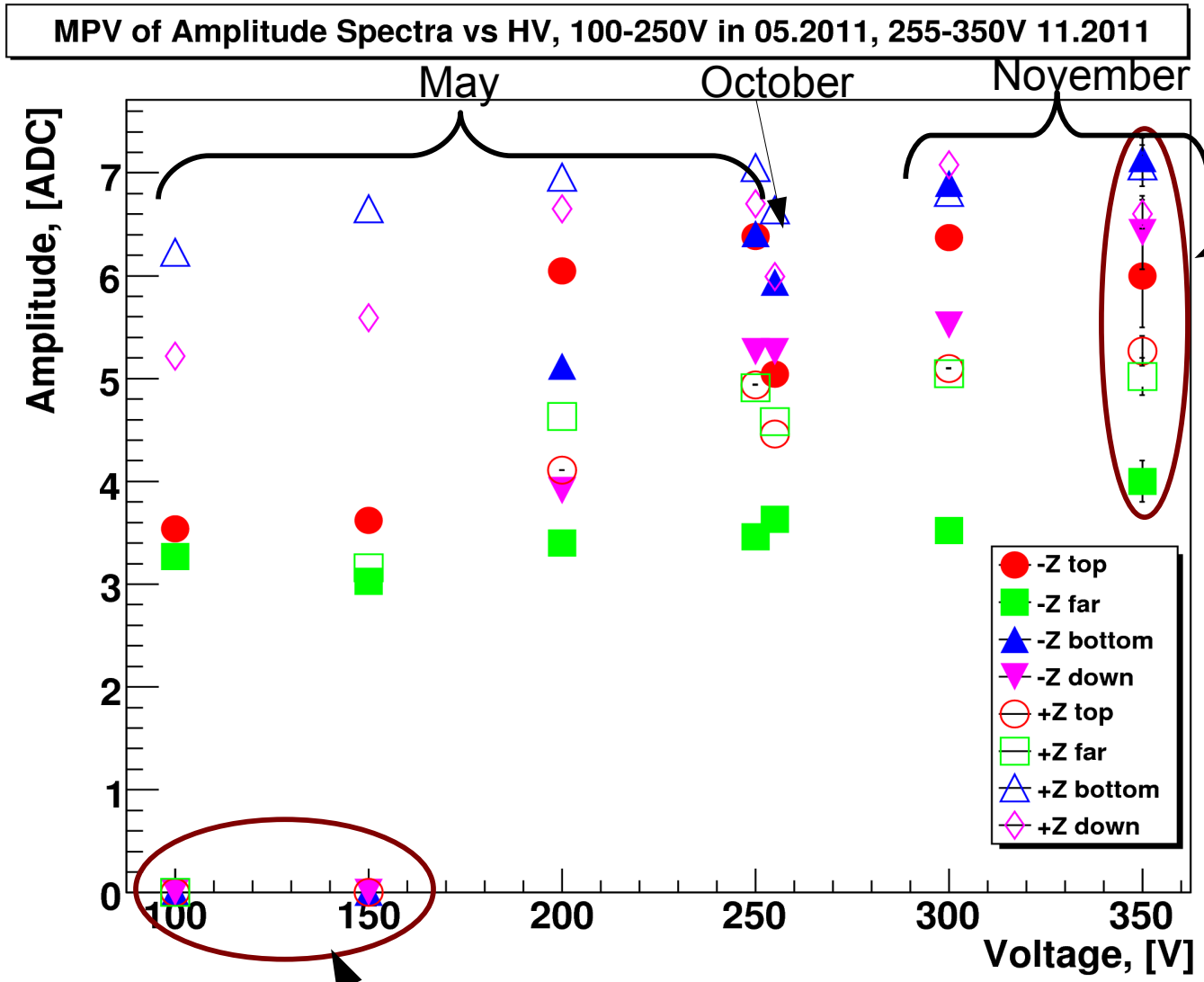
- Postion of MIP peak decreases
- Position of saturation peak decreases
- Conform with the test pulse results
- Radiation damage of the front-end electronic





- Position of MIP peak decreases
- Position of saturation peak decreases
- Different behavior as the test pulse measurement
- Radiation damage of the front-end electronic

MIP Peak over High Voltage



- Amplitude of MIP increases for higher voltages
- Amplitude decrease from May to October (radiation damage?)

--> Except -Z far

Conclusion

- Baseline is calculated in the abort gap
  - Less signals between the trains
- ch -Z top: test pulse results correspond with MIP Measurements
  - Amplitude decreases
- ch +Z bottom: test pulse results are different than the MIP measurements
  - Amplitude decreases and increases
- Radiation damage of the front-end electronic
- Amplitude of MIP peak increases for higher voltages