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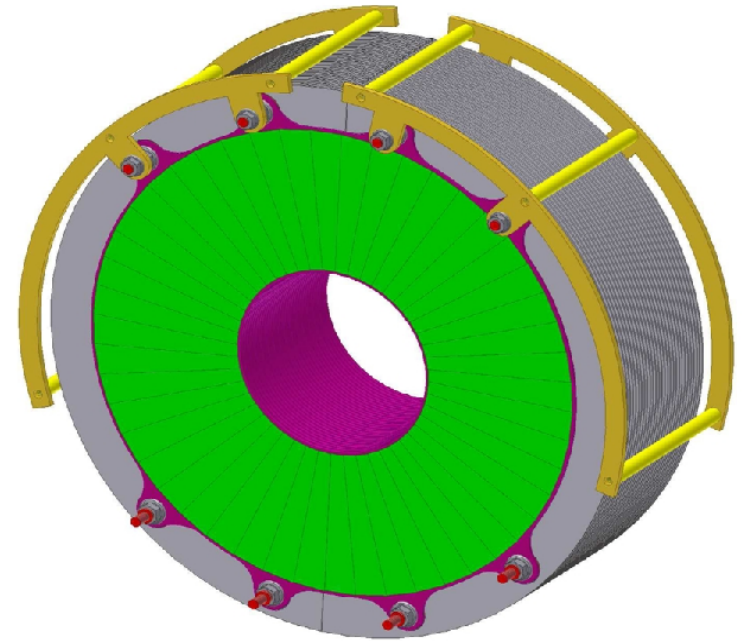
WP 6: Very Forward Calorimetry (Dr. Wolfgang Lohmann)

Supervisor: Dr. Leszek Zawiejski, Dr. Bogdan Pawlik, Dr.
Marek Idzik

Contents



- Project information
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Project overview



WP 6 – Very Forward Calorimetry

FCAL collaboration: ILC Forward CALorimetry

Design optimization of the ILC luminometer

Design of a prototype of a sensor plane and integration of the FE electronics.

Periodic test beam preparation and studies of the assembled sensor planes prototype in the beam.

Test beam data analysis and systematic study of the performance.

Close collaboration with IFJ-PAN and DESY.

Luminosity measurement



Bhabha scattering: elastic e^+e^-

Measurement: $L = \frac{N_B}{\sigma_B}$ N_B – Bhabha events
 L – luminosity

Cross section is known from theory: $\frac{d\sigma_B}{d\theta} \approx \frac{32\pi\alpha^2}{s} \left(\frac{1}{\theta^3} \right)$

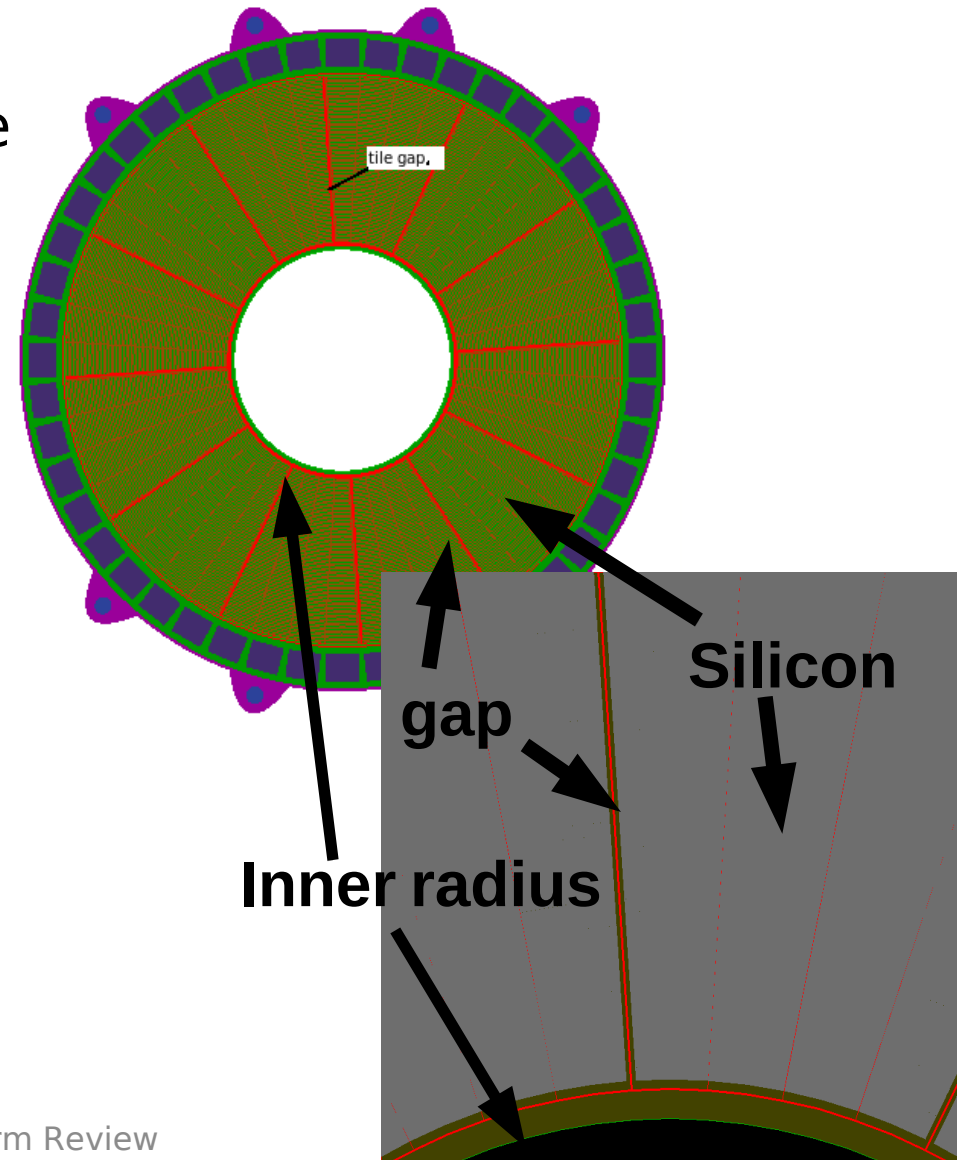
Measure N_B to calculate L

L is then used to calculate the cross sections of other processes

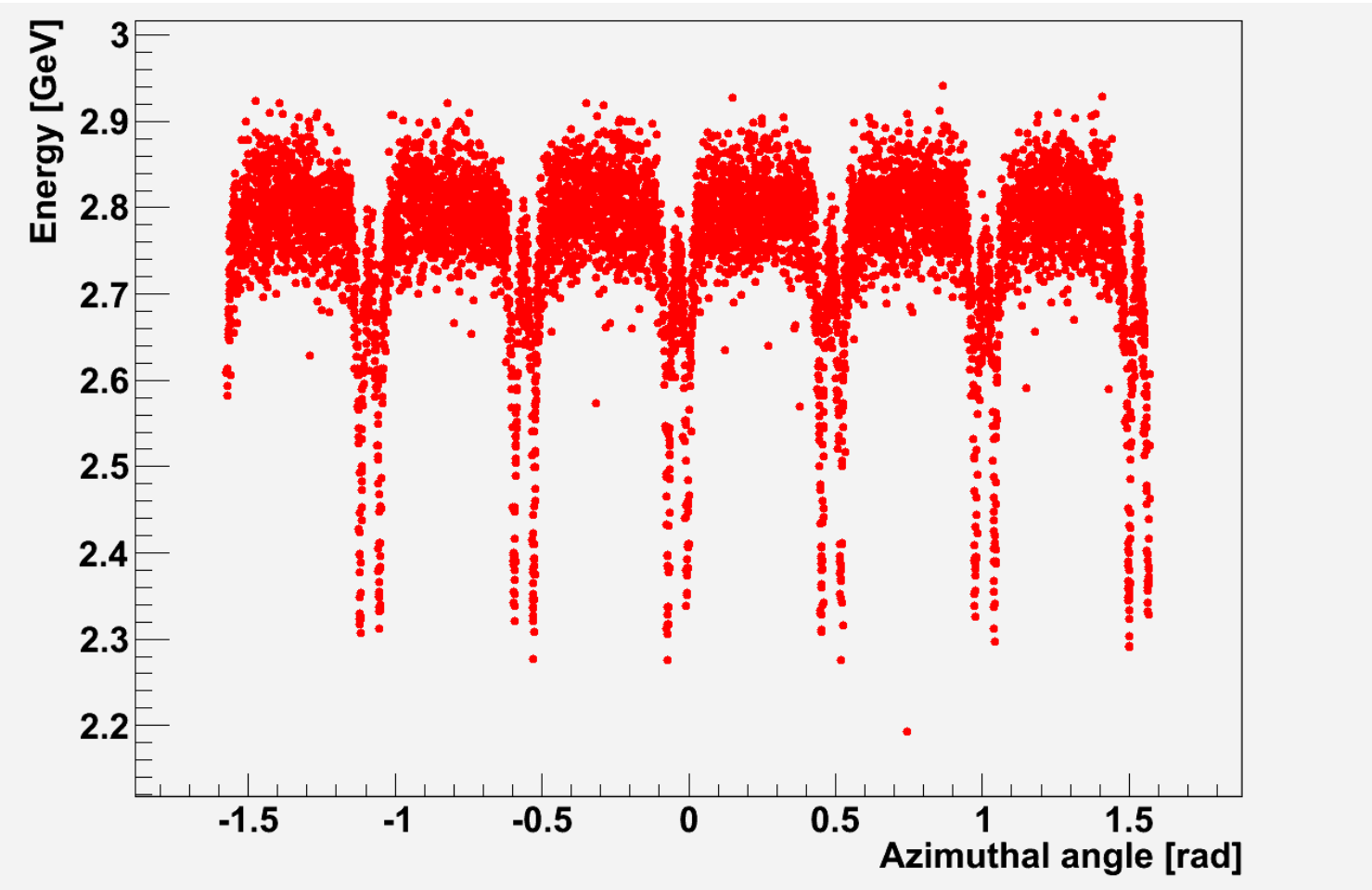
Deliverable 1: MC simulation



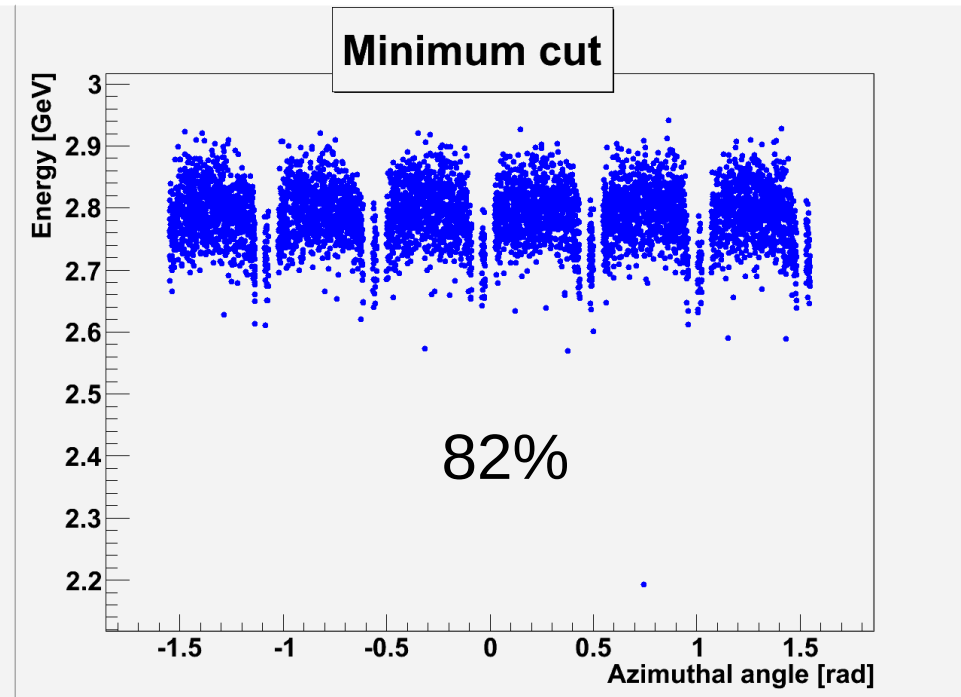
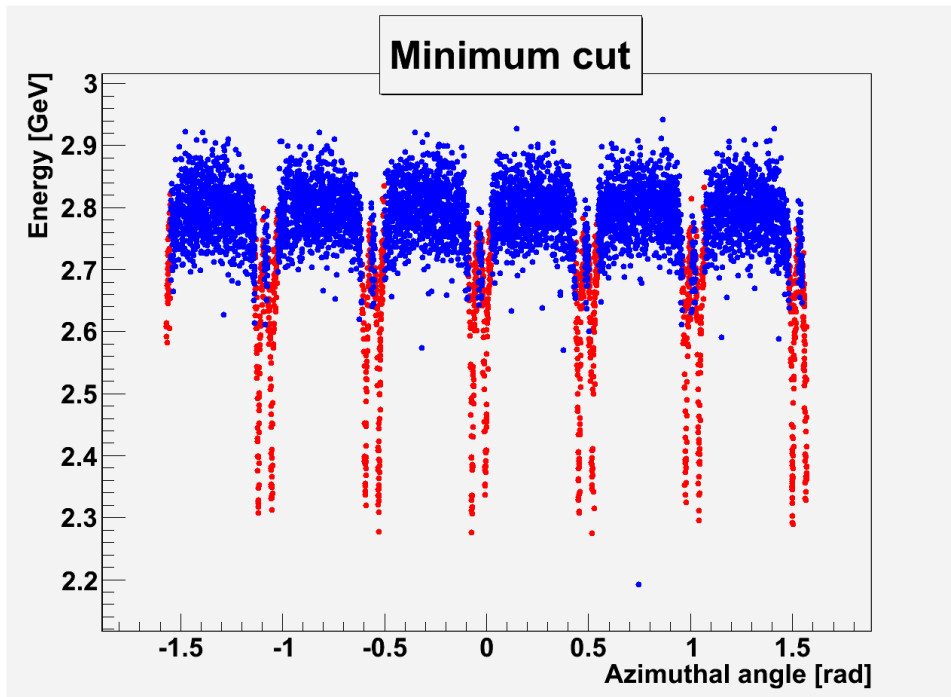
- Built first LC model with tile gaps
- Consecutive LC layers rotated by 3.75°
 - Still observe energy loss in gaps
 - How well does this compensate for energy resolution?
 - Can we further compensate for energy loss?



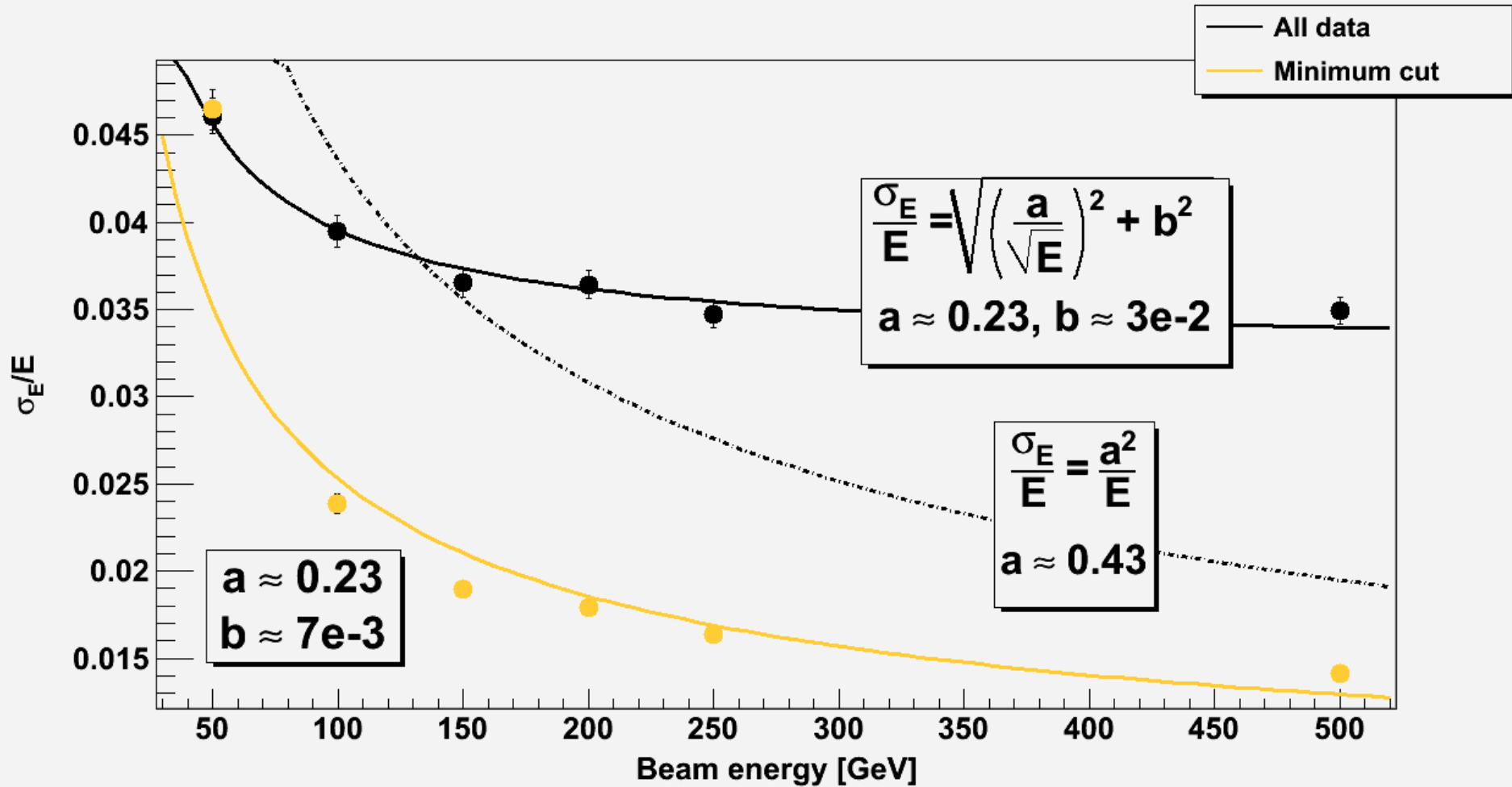
Energy deposition



Selection cuts



Total energy resolution



Deliverable 2: Test beam



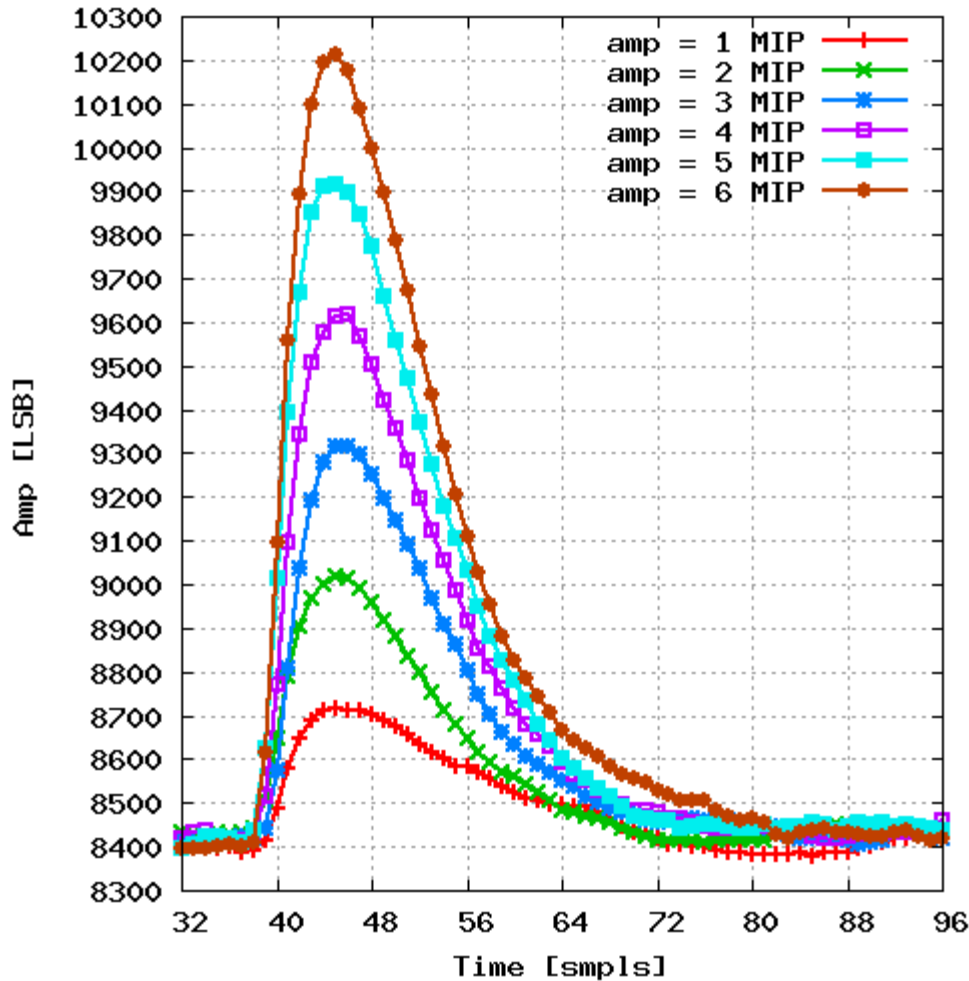
Jul 30-Aug 13, DESY-Hamburg

Single tile sensor prototype with 8-channel ASIC and 14-bit ADC prototype

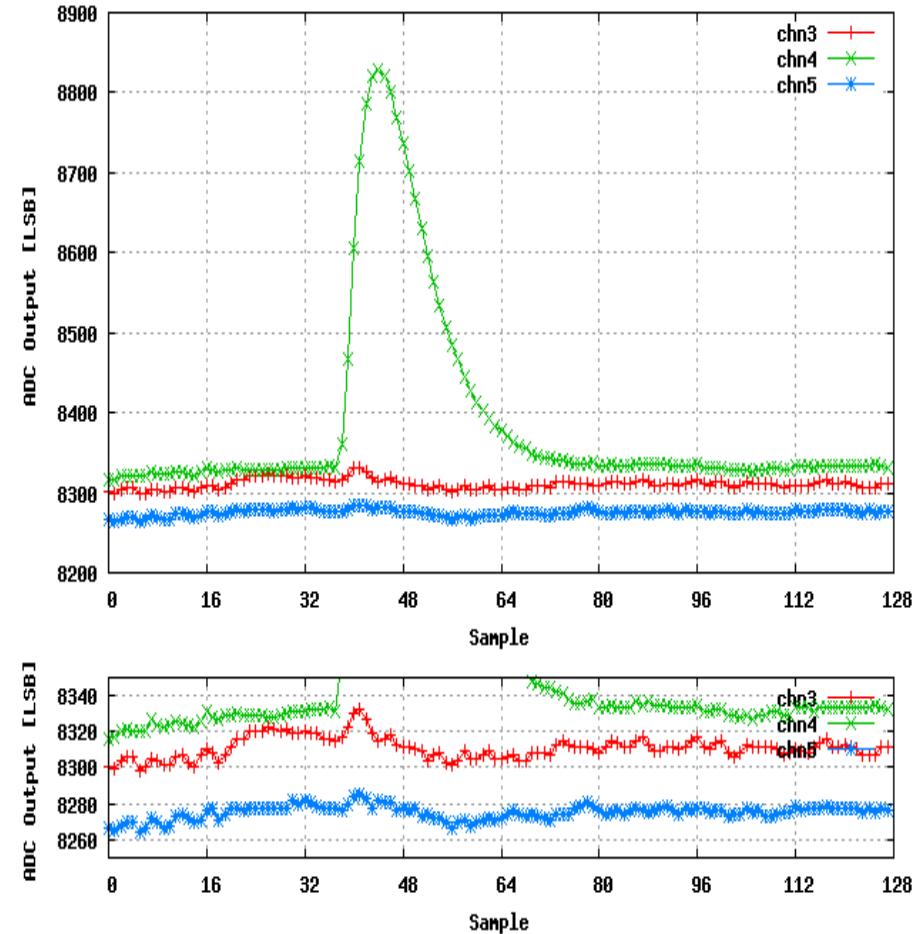
With and without tungsten absorbers, simulating different depths in the detector

Check ADC results with simulation

Testbeam - timing



Time response of single front-end channel



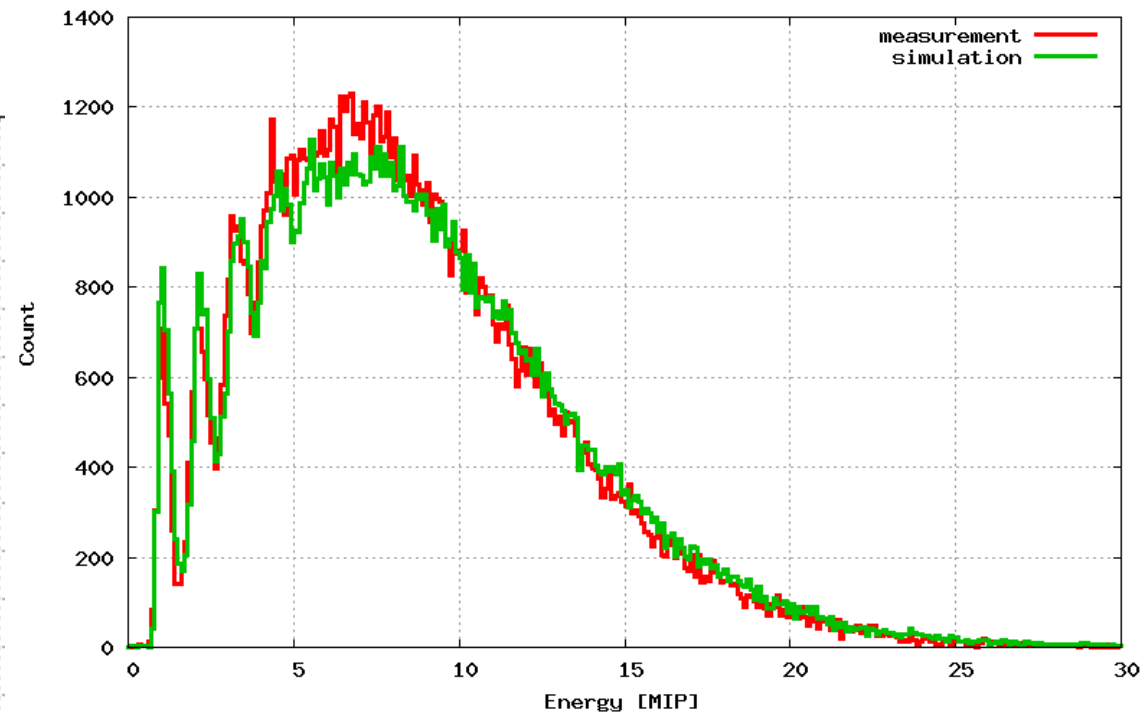
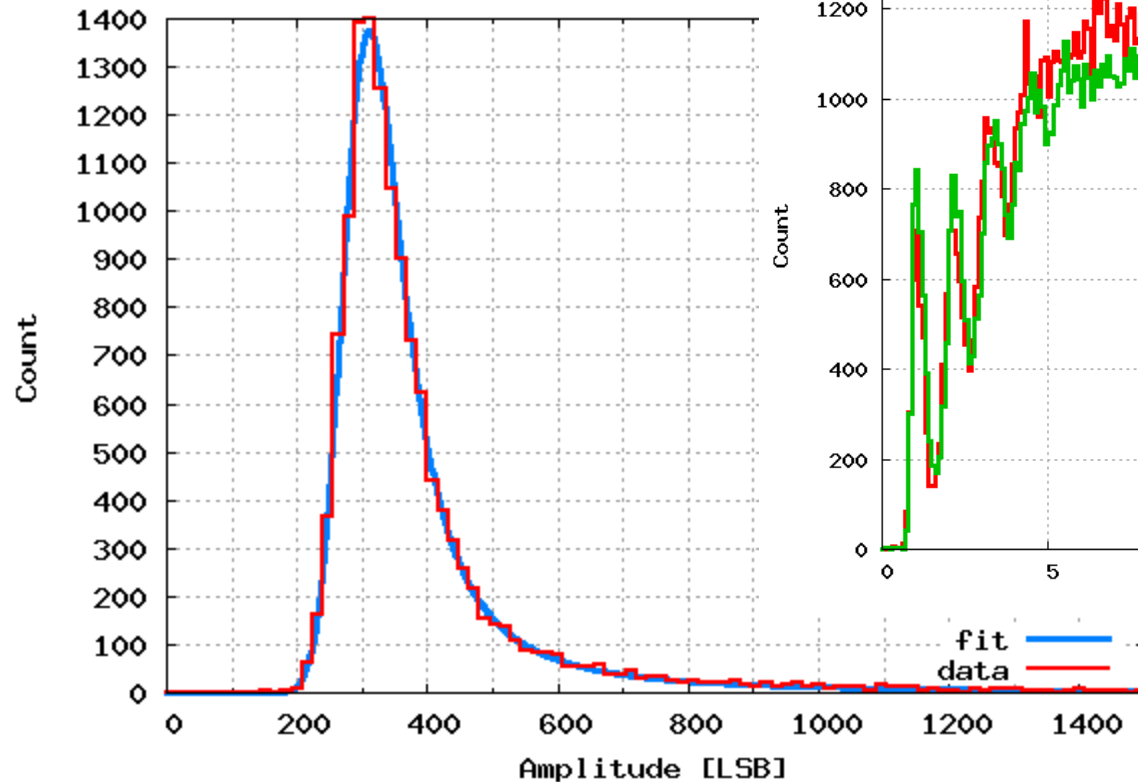
Neighboring signals

Testbeam - amplitude



Measurement (red) versus simulation (green) for 2 X0, sum over all channels

Energy deposition in single channel fits Landau distribution



Activities



- MC-PAD training
 - Readout Electronics, Sept 2009, AGH-UST Krakow
 - Detector Simulation and Data Analysis, Jan 2010, DESY-Hamburg
 - Processing and Radiation Hardness of Solid State Detectors, Sept 2010, Ljubljana
- Presentations
 - FCAL June 2009, DESY-Zeuthen
 - FCAL Oct 2010, CERN
 - FCAL Mar 2010, IFJ-Pan Krakow
- Publications
 - Abramowicz *et. al.*, R&D for Very Forward Calorimeters for ILC Detectors, to be published in JINST
 - J. Błocki *et. al.*, LumiCal new mechanical structure, <http://www.eudet.org/e26/e28/>



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