

PCB Irradiation Test – First Analysis Steps



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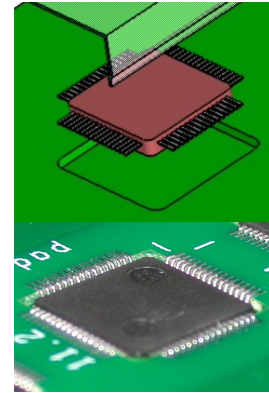
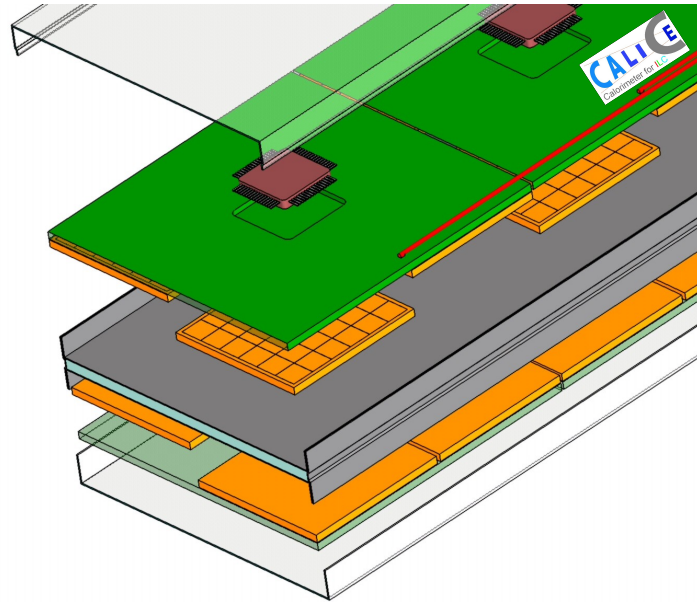


- Purpose
- Experimental Setup
- Check of 'usefulness' of data



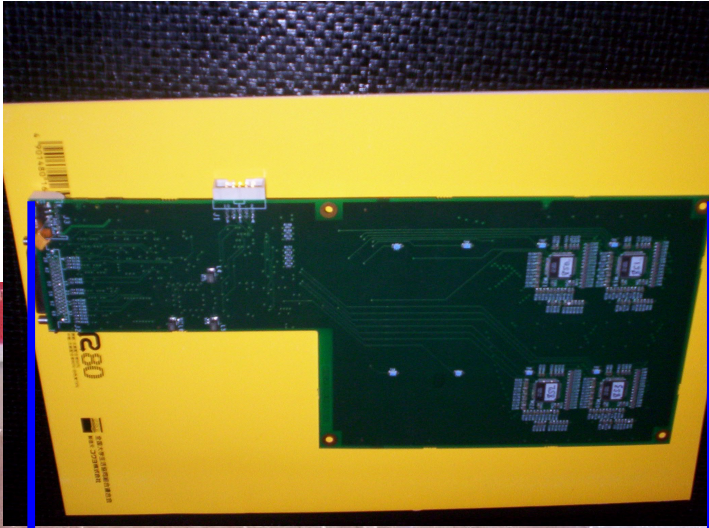
Introduction

Calorimeter Electronics to be interleaved with layer structure

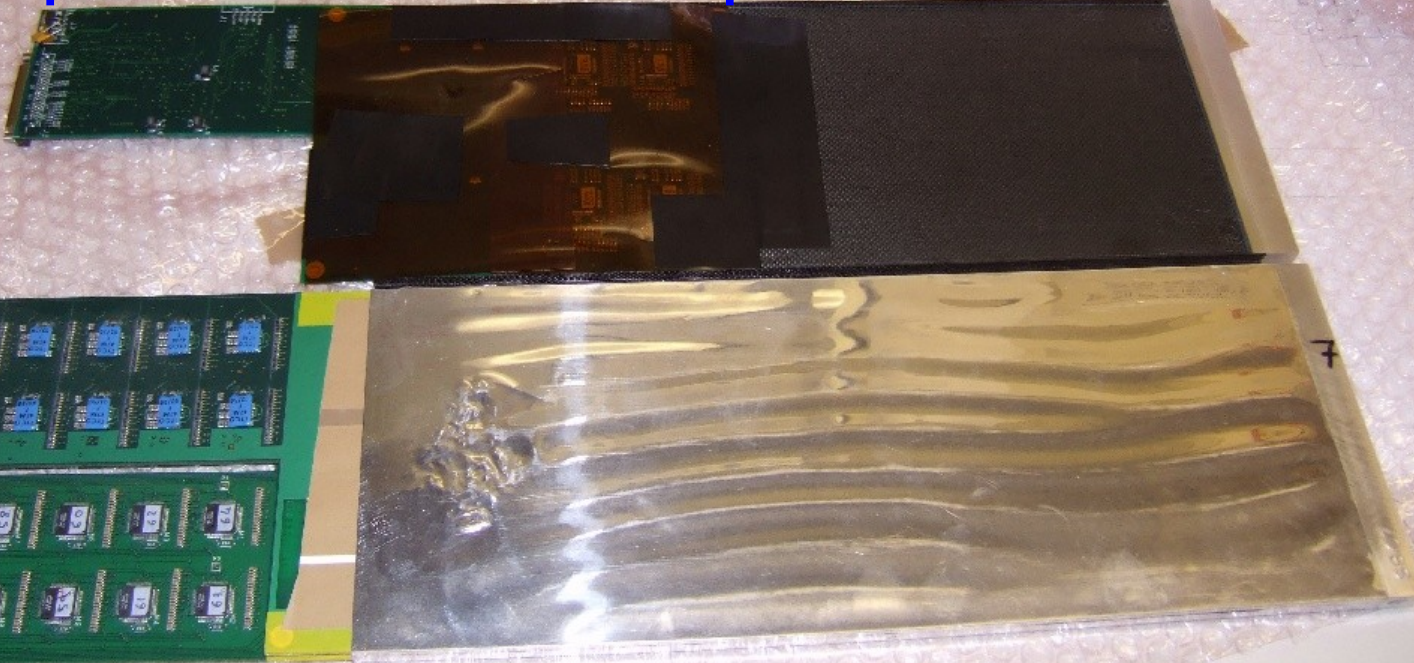


Do high energetic showers create signals directly in electronics ?
If yes, Rate of faked signals ?

Special PCB in Ecal Prototype during CERN 07 testbeam – Experimental Setup I



Test PCB
- equipped with
PHY3 Chip Set

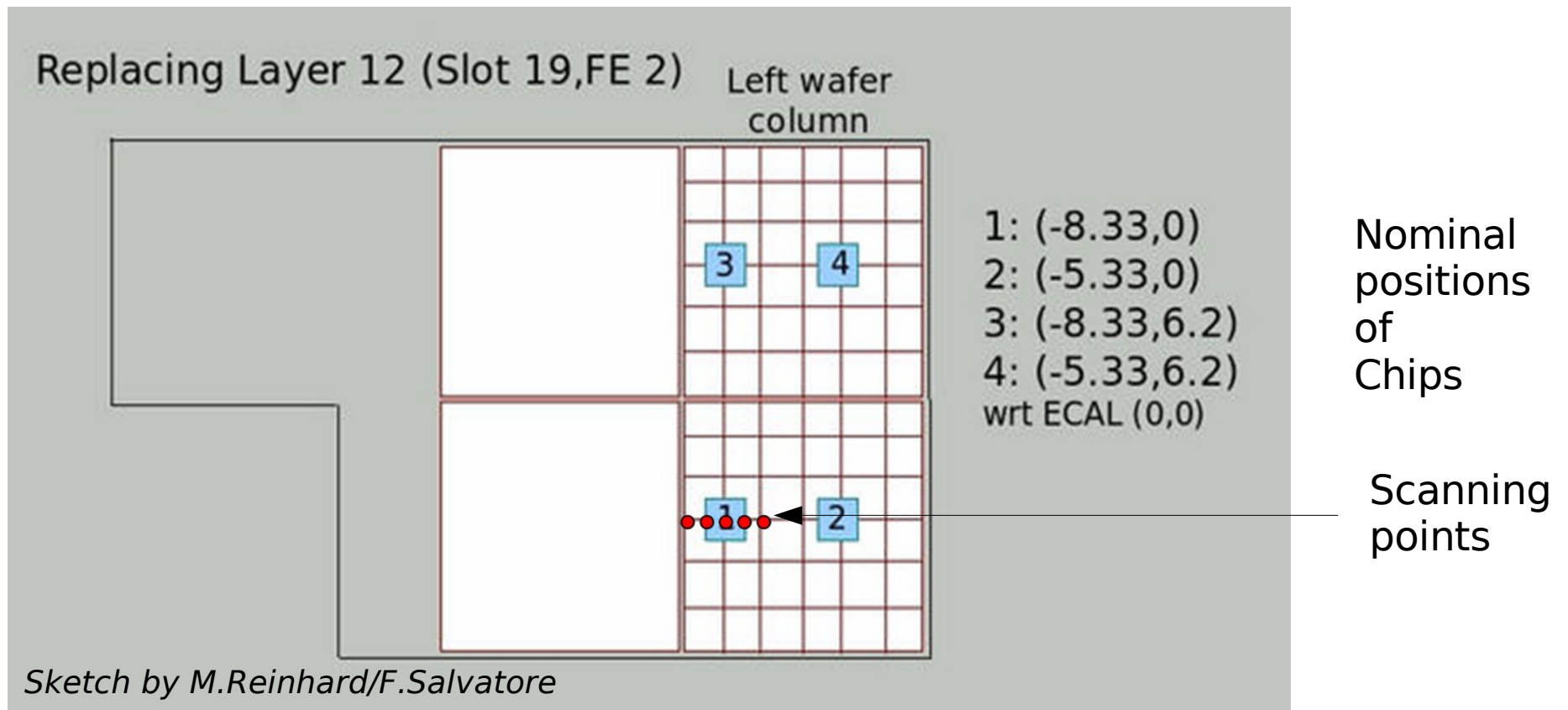


Prepared Slab
- W dummy
- capton and paper
for electrical shielding

Usual Slab

Special PCB in Ecal Prototype during CERN 07 testbeam – Experimental Setup II

- PCB positioned at place of layer 12 in Ecal ~ shower maximum
x,y position identical to layer 2
- Schematic view of test PCB - 'Expect' signals from 72 pads, $4 \times 18 = 2$ Wafer

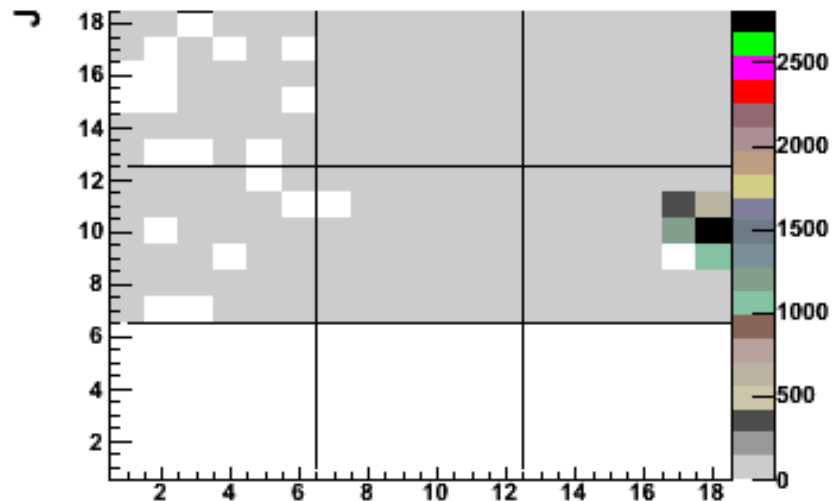


- $7 \cdot 10^6$ Triggers with 90 GeV Electrons (- $1 \cdot 10^6$ with 70 GeV Electrons)
At least 250 K at each scanning point
Runs 331462 – 331518
Today: Analysis of 10k Events per analysed run
- Runs were subject to the same data processing chain as 'usual' runs

First Steps of Data Analysis – Rough Alignment Studies

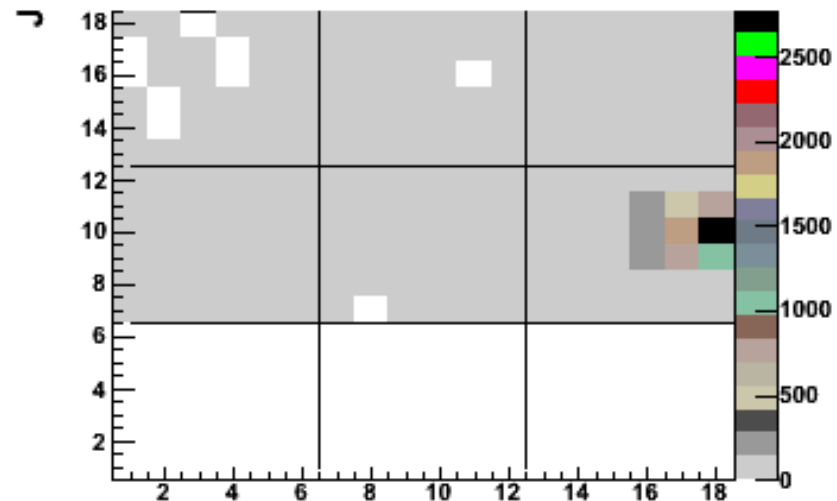
Beam Impact at nominal center of Chip 1 (-8.33,0) cm

Layer_0_hist



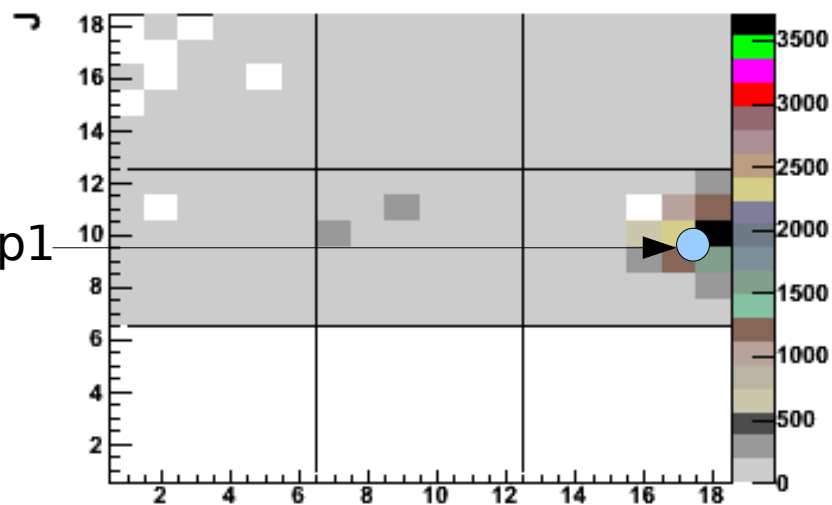
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Layer_1_hist



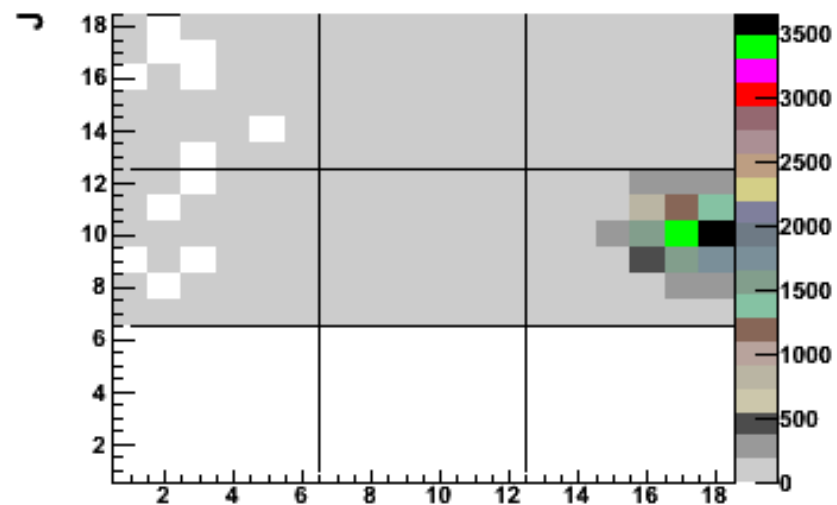
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Layer_2_hist



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Layer_3_hist



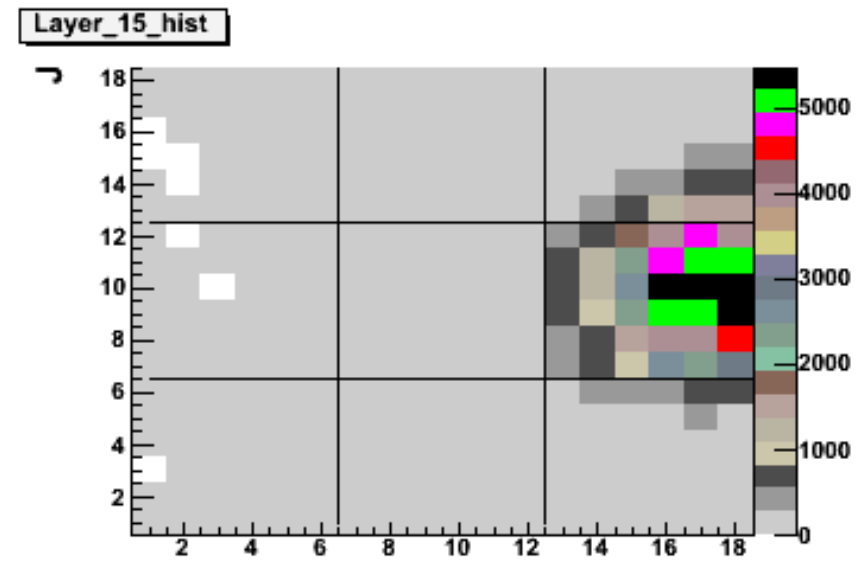
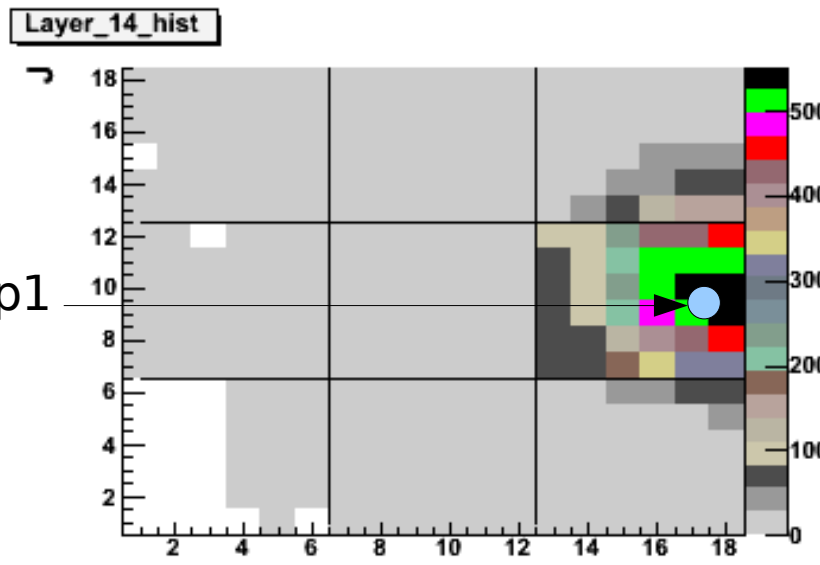
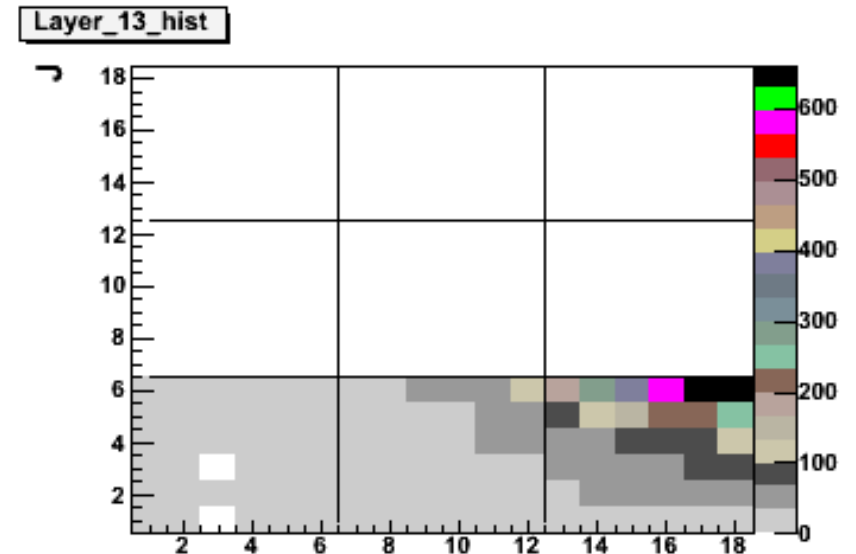
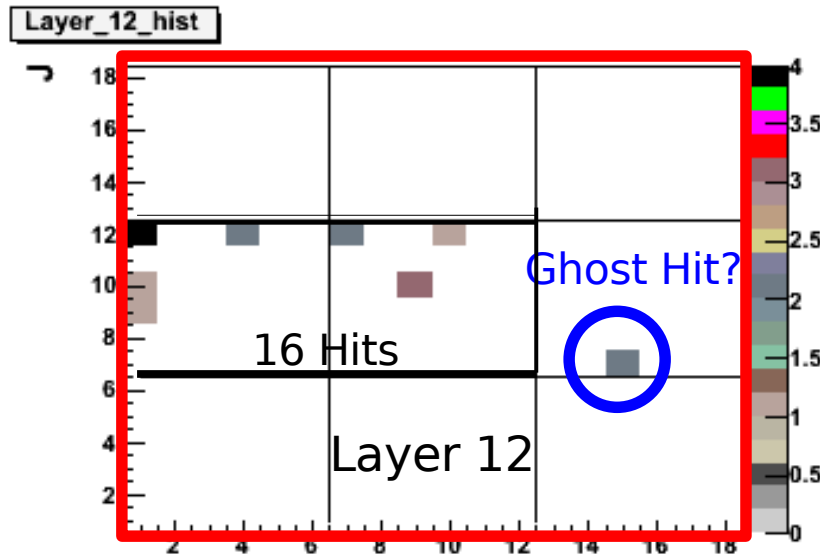
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Projection of
Center of Chip1
onto layer 2

Looks like we've shot a bit too high and too close to the Ecal Border

First Steps of Data Analysis – Rough Alignment Studies

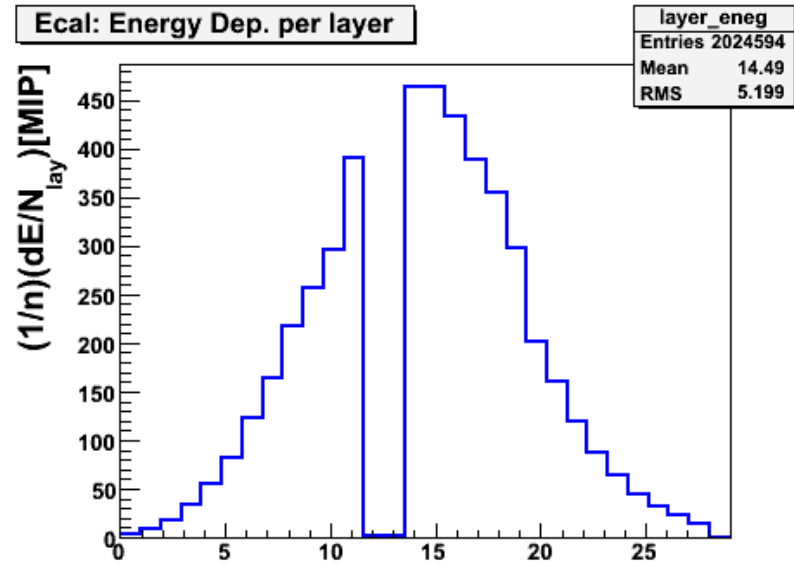
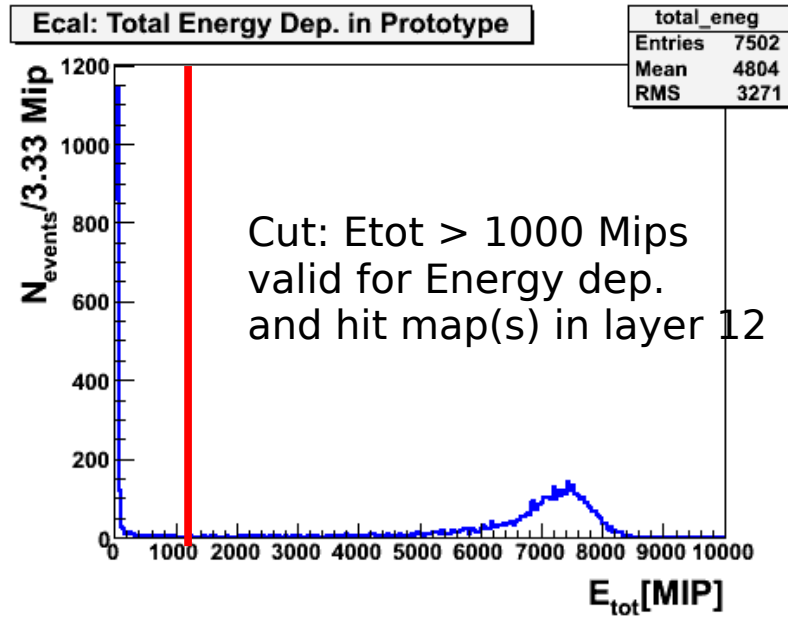
70 GeV e⁻ - Beam Impact at nominal center of Chip 1 (-8.33,0) cm



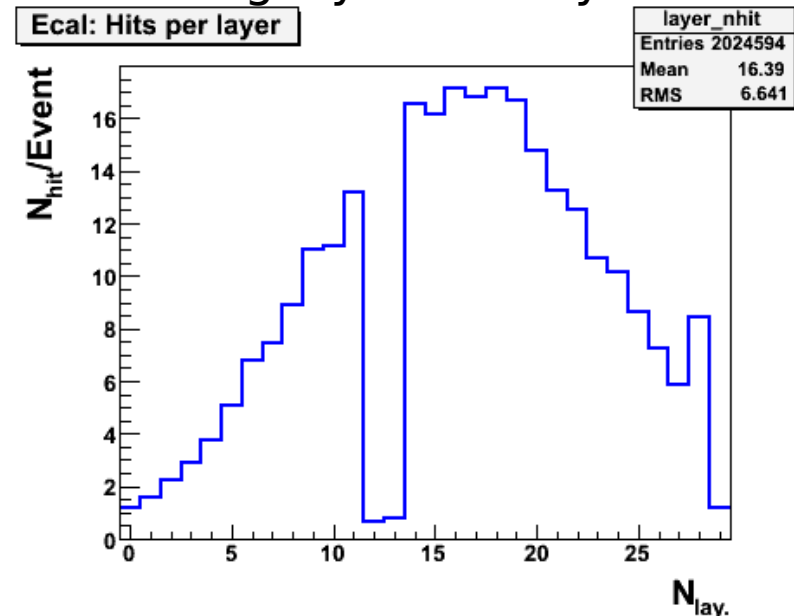
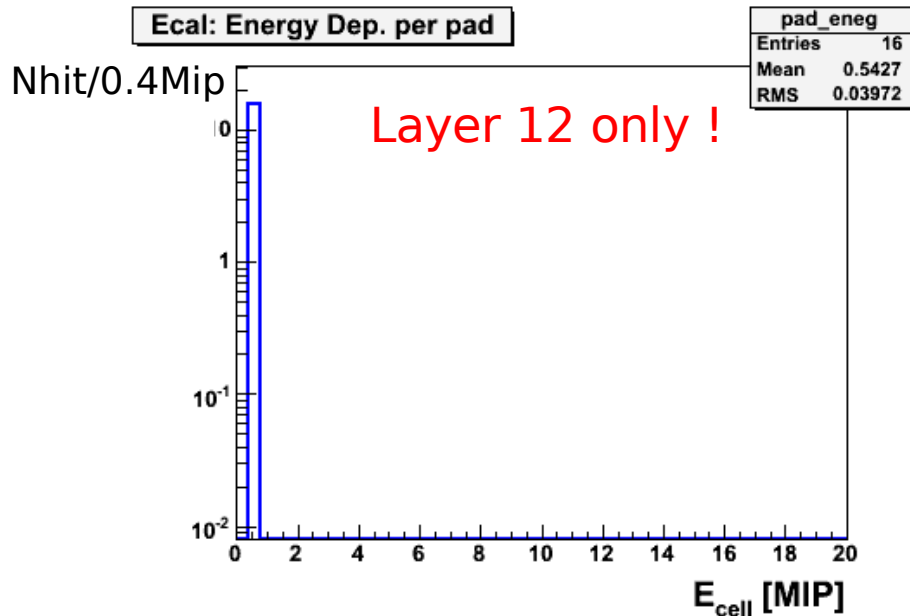
Projection of Center of Chip1 onto layer 14

- Chip 1 well 'touched' by shower maximum
- Small Activity in Layer 12

Basic Spectra



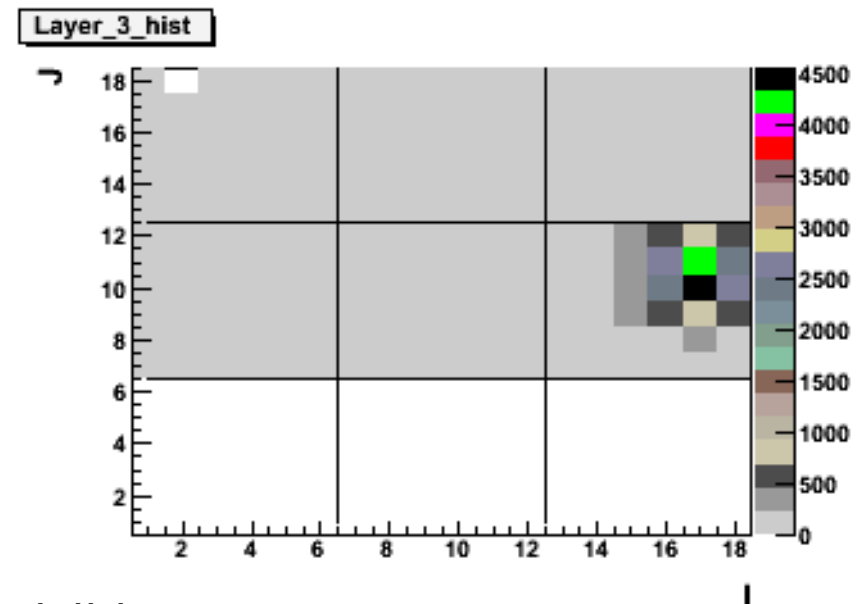
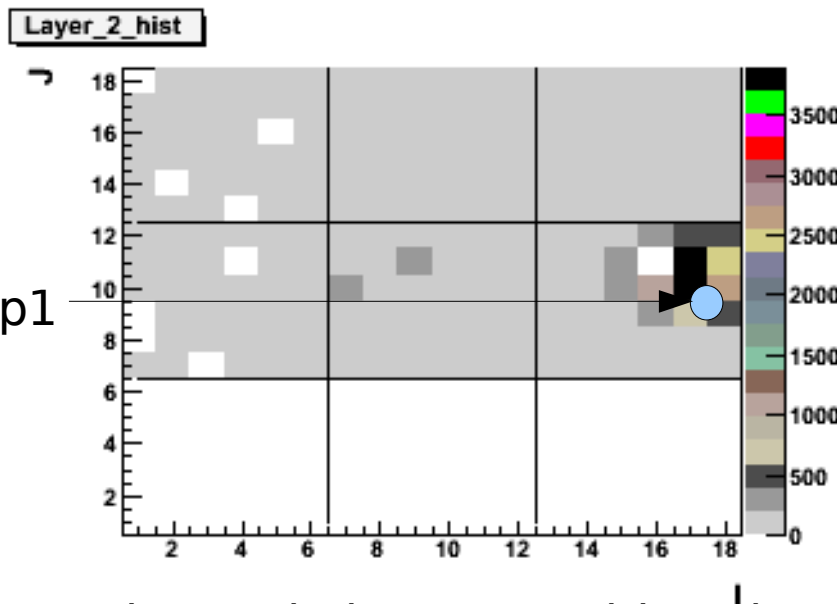
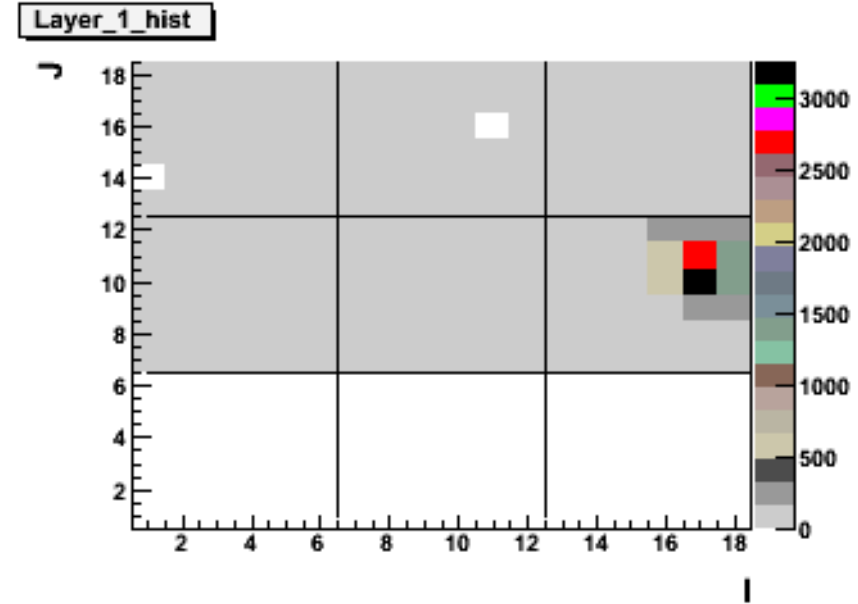
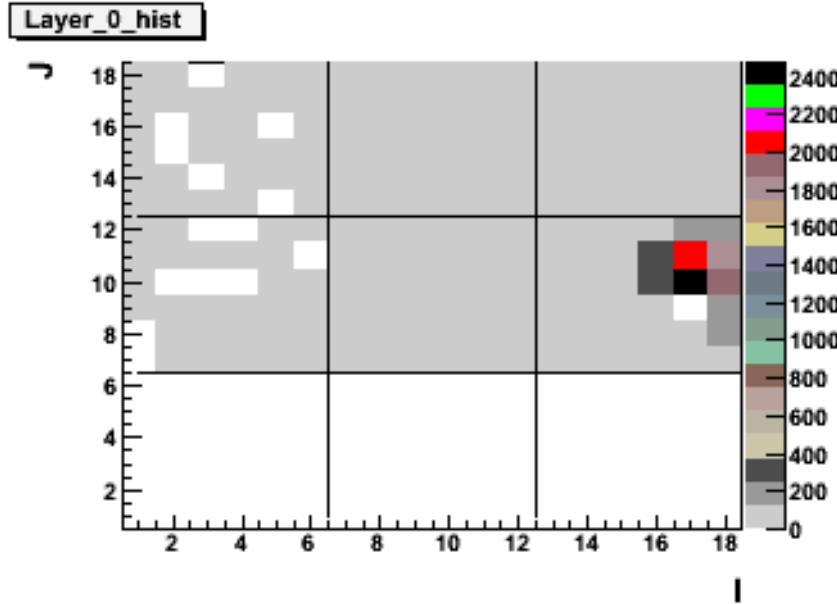
Missing layers clearly visible



No signal beyond 1 MIP!!!

First Steps of Data Analysis – Rough Alignment Studies

Moving towards Center of Ecal (-7.8,0) cm



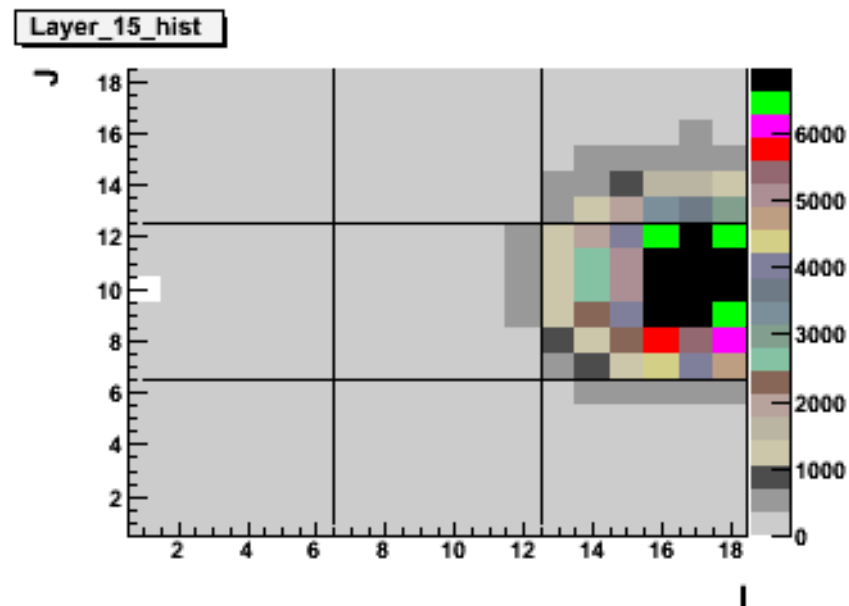
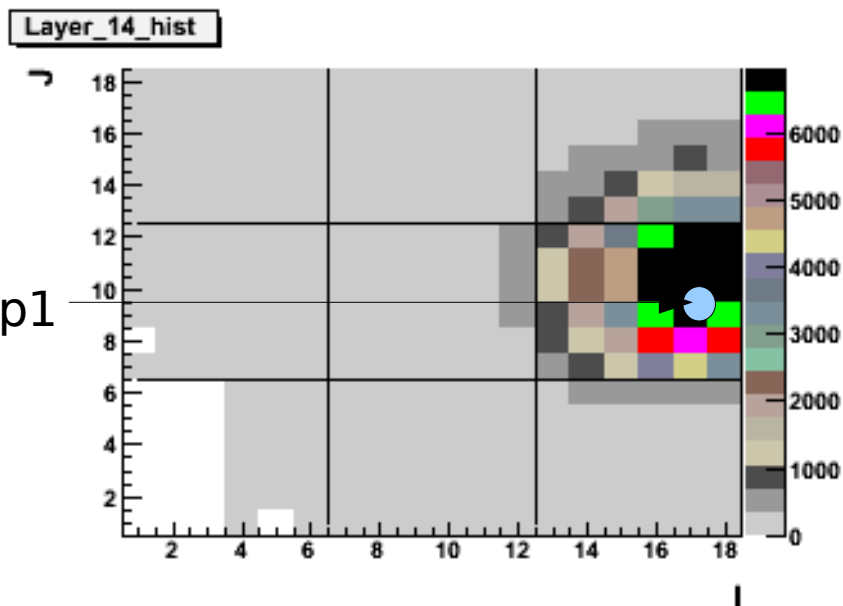
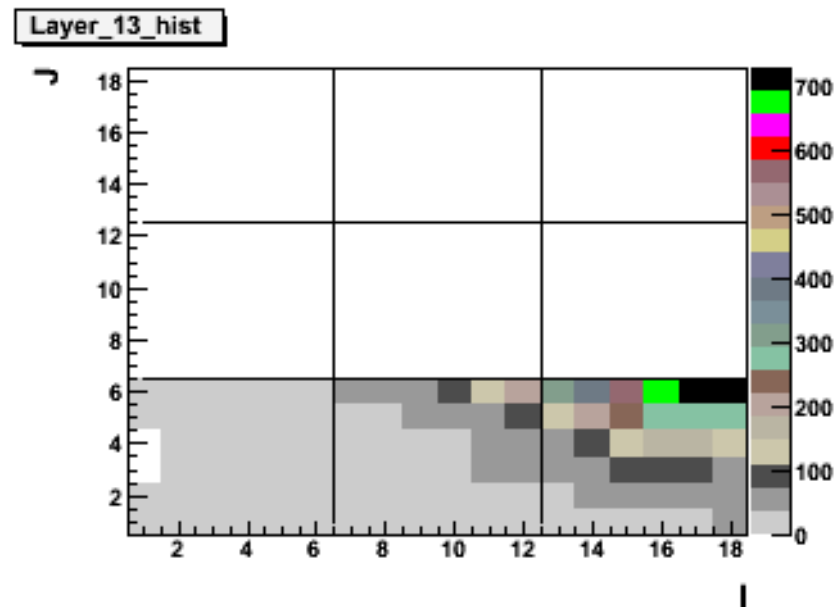
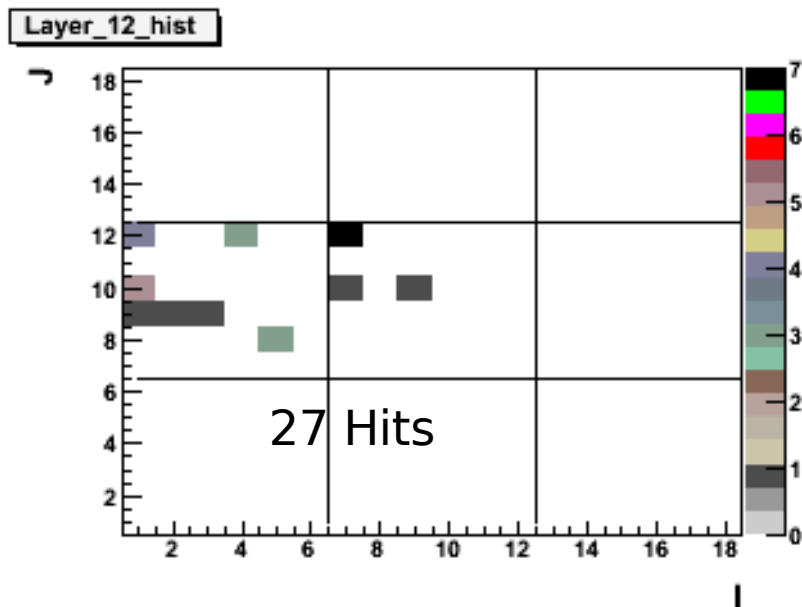
Projection of Center of Chip1 onto layer 2

Change in impact position clearly visible

'Beam Spot too far left and too high ? - More detailed study needed !

First Steps of Data Analysis – Rough Alignment Studies

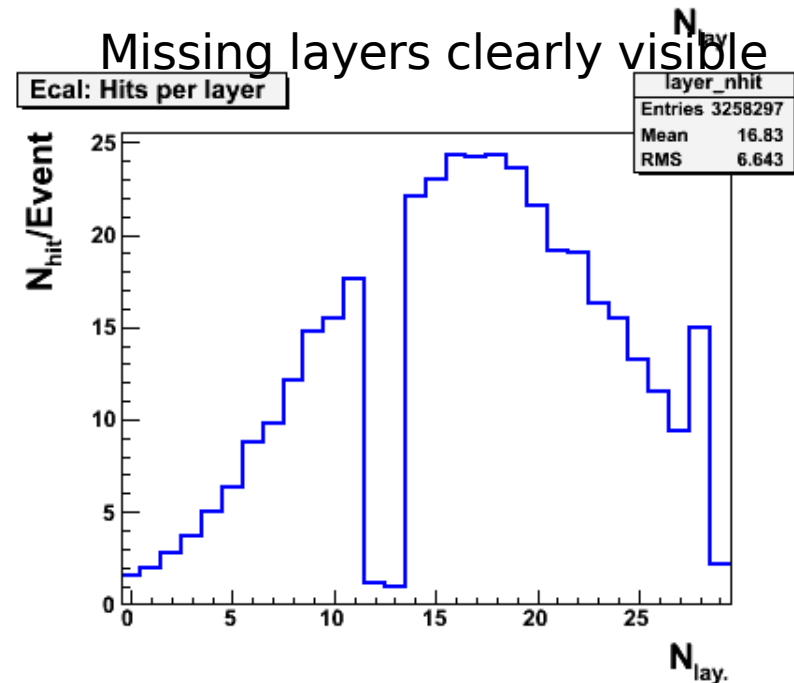
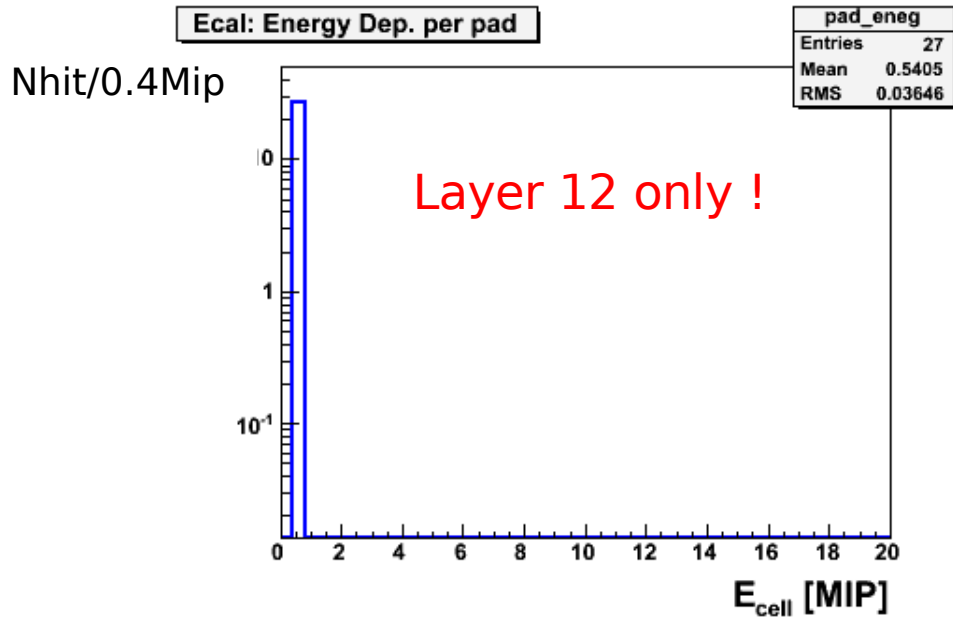
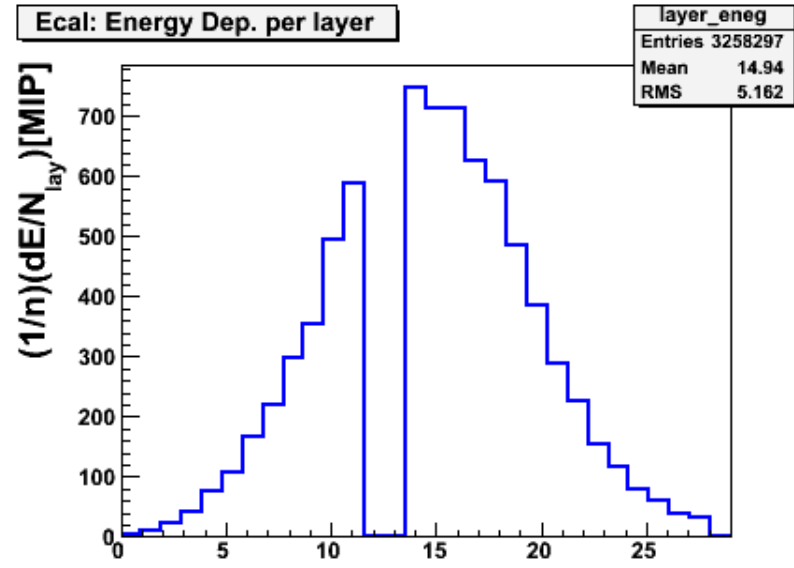
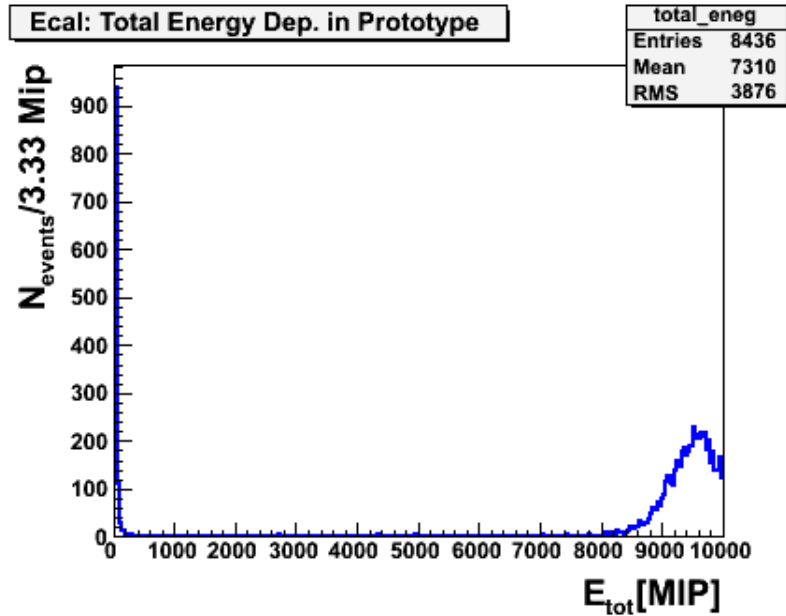
90 GeV e⁻ - Moving towards Center of Ecal (-7.8,0) cm



Projection of Center of Chip1 onto layer 2

- Chip 1 well 'touched' by shower core
- Small Activity in Layer 12 (bit larger than for 70 GeV and 'nominal' Center)

Basic Spectra



No signal beyond 1 MIP!!!
70 GeV -> 90 GeV Layer 12 outside of shower maximum

Summary and Outlook

- Start of Analysis of PCB irradiation test
- Huge Statistics available

Data are useful for envisaged studies

- Looks like the chosen impact points have missed the chip(s) a bit
Still enough events in which the Chips were hit
- So far no evidence for faked signals by electronics
Studies for one other chip performed but not shown today
All signals below 1 Mip
- To be done ...

Analysis to be extended to all Chips and impact positions (+larger statistics)
Correlation between Nhits and Position of Hits and Impact Points

Dedicated selection of Events in which the Chips were hit at different positions
(by Drift Chamber information and/or COG of Shower)
Understanding of noise of tested board w.r.t 'normal' boards
Prediction of Particle Event Composition by MC