SiW ECAL Performance During FNAL May Running

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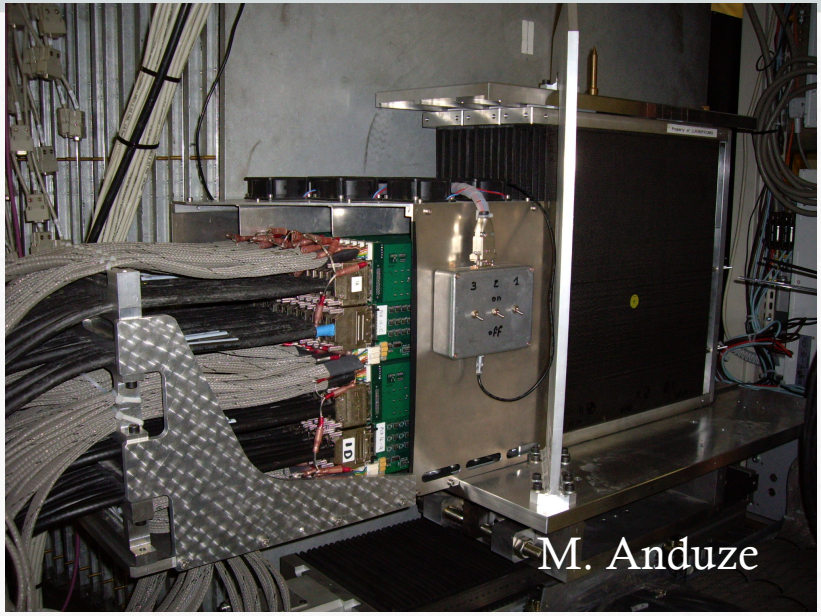
LAL ORSAY

OUTLINE

- Configuration and Data Taken
- General Performance
- Problems
  - The Hold/Calibration Story
  - Noise/Pedestal Shifts
  - Dead Cells
  - Cooling Issue
- Conclusions

Configuration

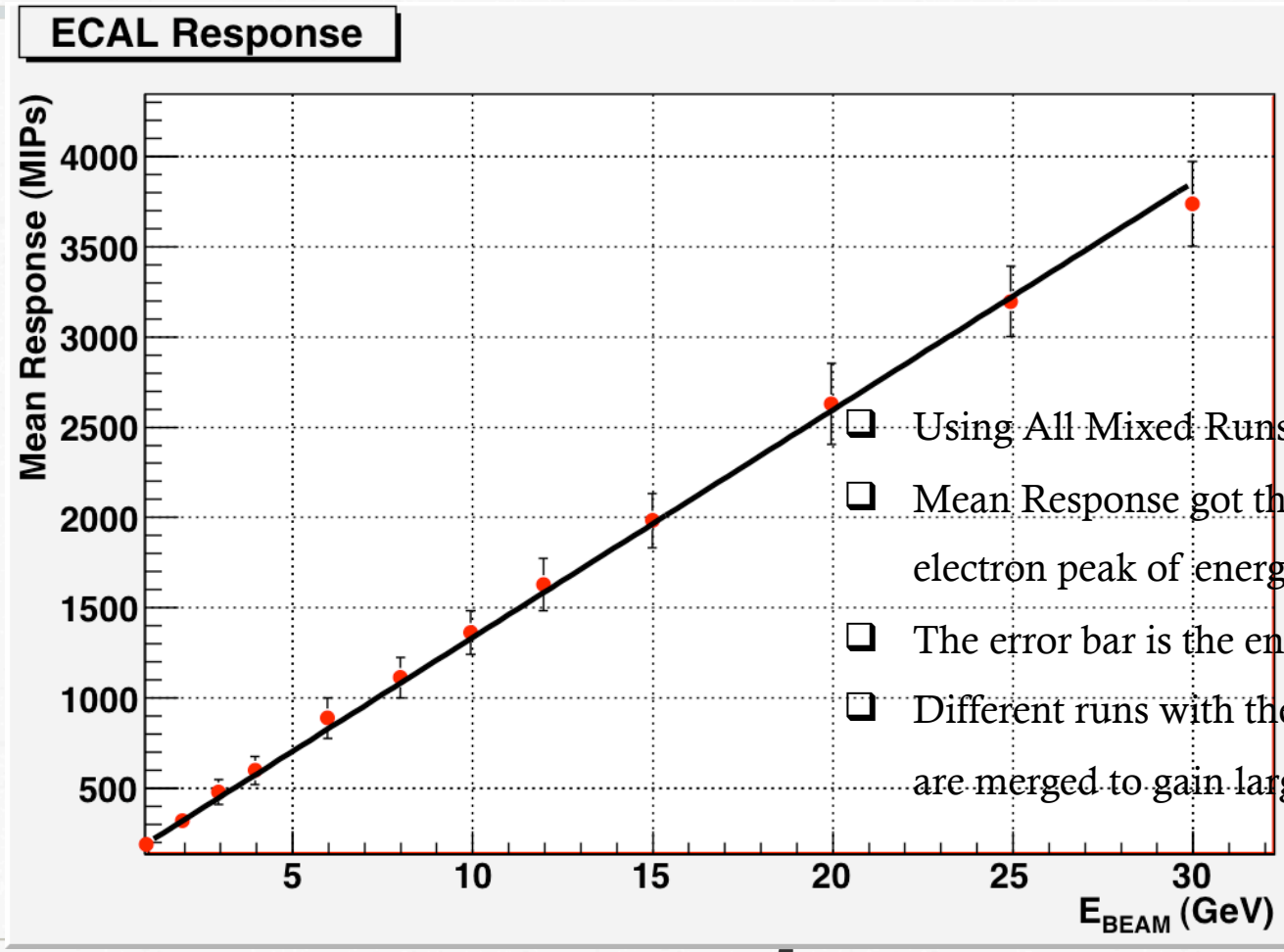
- Fully Equipped
  - 3x10 Layers, Si-W
    - $0.4X_0$, $0.8X_0$, $1.2X_0$
    - $24X_0$ total
  - Each layer 3x3 wafers
  - Each wafer 6x6 pads
  - 9720 channels total
    - 216 channels/PCB Center Part
    - 108 channels/PCB Bottom Part
- New Patch Panel (P. CORNEBISE)



Data Taken

- ~100% uptime of ECAL
- 851 Runs in Total
  - 482 combined, 124 EcalOnly, 247 HcalOnly
- Mainly Mixed Runs and Pion Runs at Stage x=0.1mm; y=-14.7mm,θ=0:
  - Mixed: 1/2/3/4/6/8/10/12/15/20/25/30 (GeV)
  - Pion: 1/2/3/4/6/8/10/30/40/50/60 (GeV)
  - >100k each
- Muon Calibration Runs:
  - Trigger 100x100, hold at 14 ticks
  - Trigger 100x100, hold at 3 ticks
  - Trigger 20x20, hold at 13 ticks
- Event rate is far lower than CERN beam
  - Electron composition in beam is decreasing while the momentum increasing

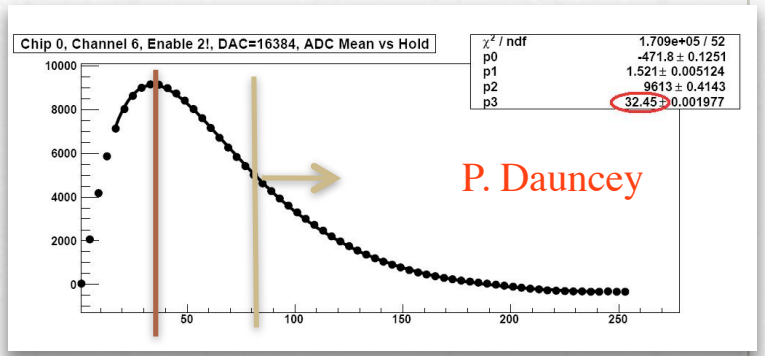
General Performance

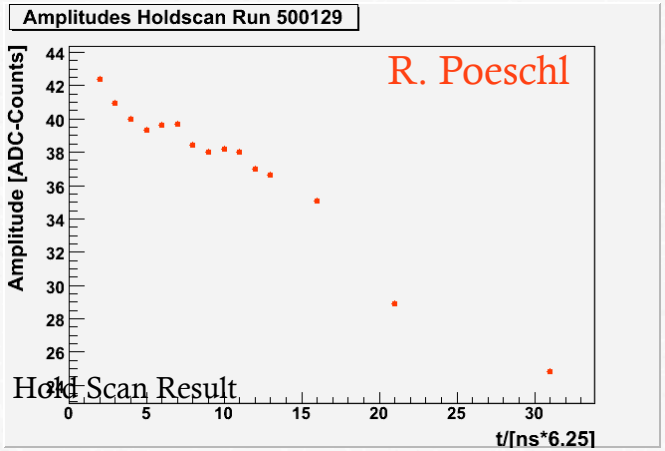


- Using All Mixed Runs
- Mean Response got through fitting the electron peak of energy distribution
- The error bar is the energy resolution
- Different runs with the same momentum are merged to gain large statistics

Hold/Calibration Story

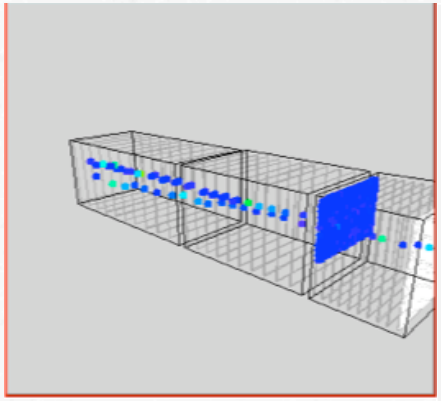
- Hold Value
  - The time to read the detector pad signal after the trigger opened the daq gate, in the unit of tick, 1 tick=6.25 ns
  - The right hold value should be the one that on the peak of the pad signal
  - Different triggers may have different delays to open the daq gate, so the hold value should be adjusted for different triggers
- Situation at FNAL
  - For muon calibration runs, the Cerenkov Trigger comes too late that the ECAL signal peak already passed.
  - We do calibration runs off-peak
  - Potential effects
    - Increasing the noise
- Still many unsettled issues: see Marcel's talk later.



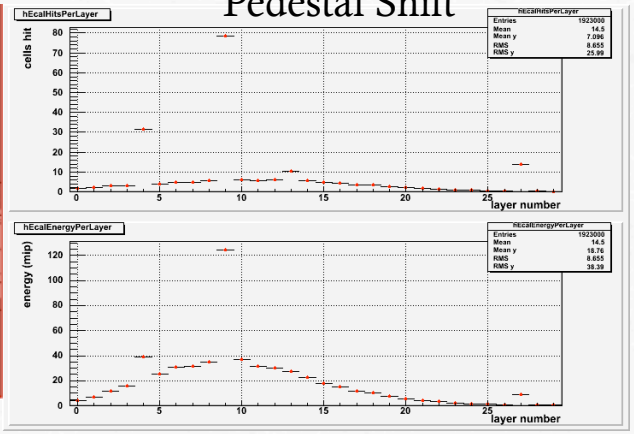


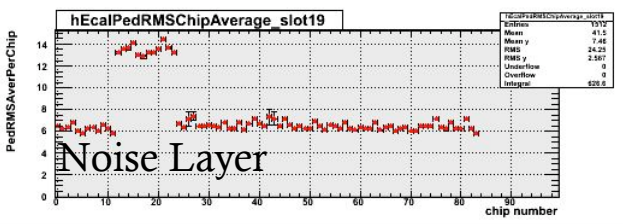
Noise and Pedestal Shifts Issues

- With us for three years… Still there!
- Phenomenon:
  - Full PCB
  - Only Center PCBs
    - Bottom PCBs never
  - Randomly
    - Sometimes this layer, sometimes the others
- Solution:
  - For pedestal shifts:
    - Can be corrected in reconstruction
    - E.g. recalculate the pedestals in reconstruction
  - Noise: No valid solution yet…
    - Attempt to tighten the screws
    - Attempt to ground the SCSI plugs



Pedestal Shift

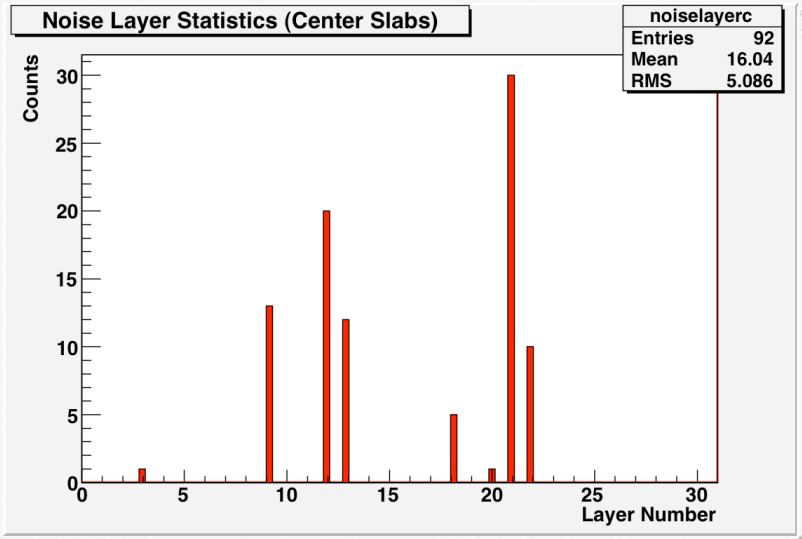


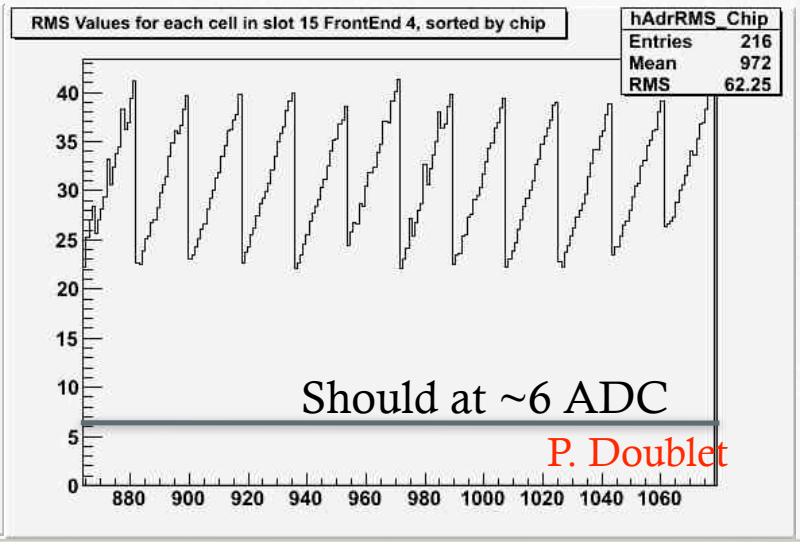


Noise Layer

Noise and Pedestal Shifts Issues

- Some More about the noise and pedestal unstable
  - Counting noise/pedestal unstable layers of every run
    - Only certain center PCBs
  - Zoom into the noise PCB
    - Seems that the noise is increasing each reading circle

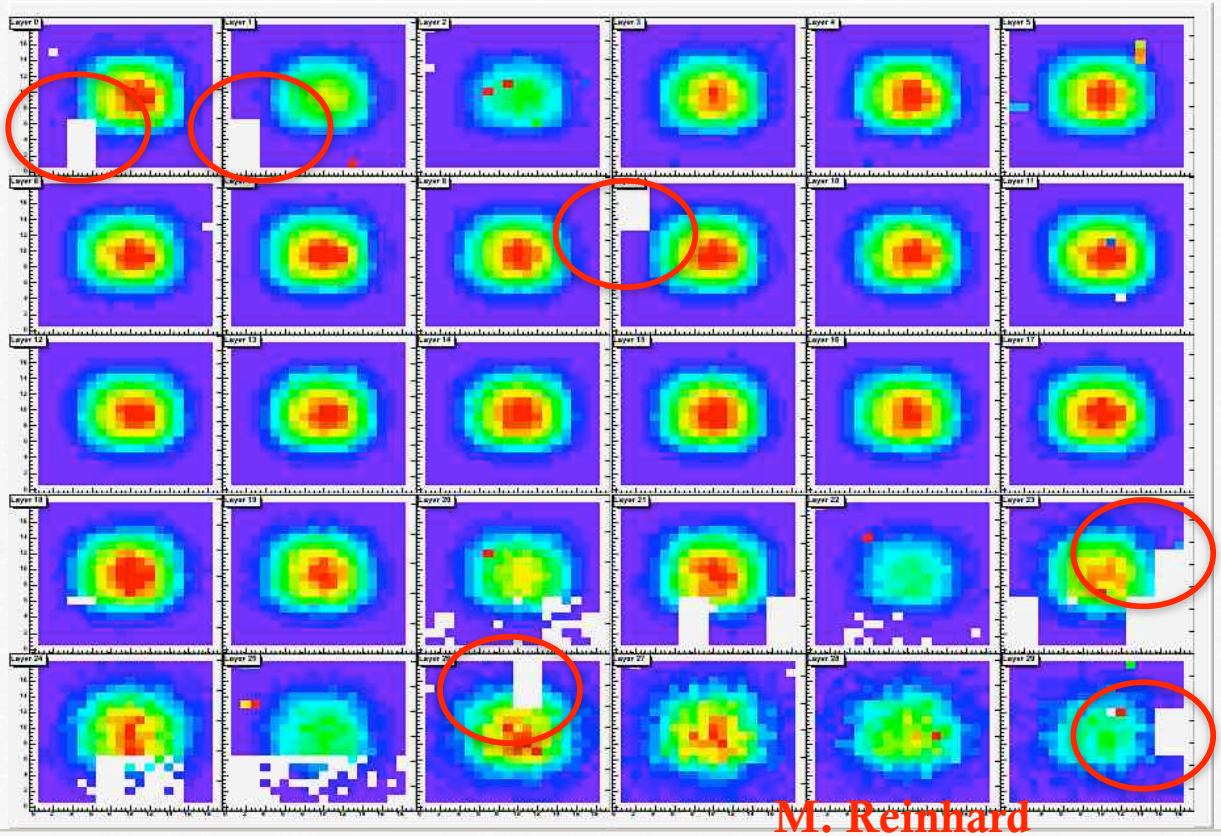




Dead Cells

- Before fasten the SCSI plugs on both ECAL side and CERC Side

Run500186



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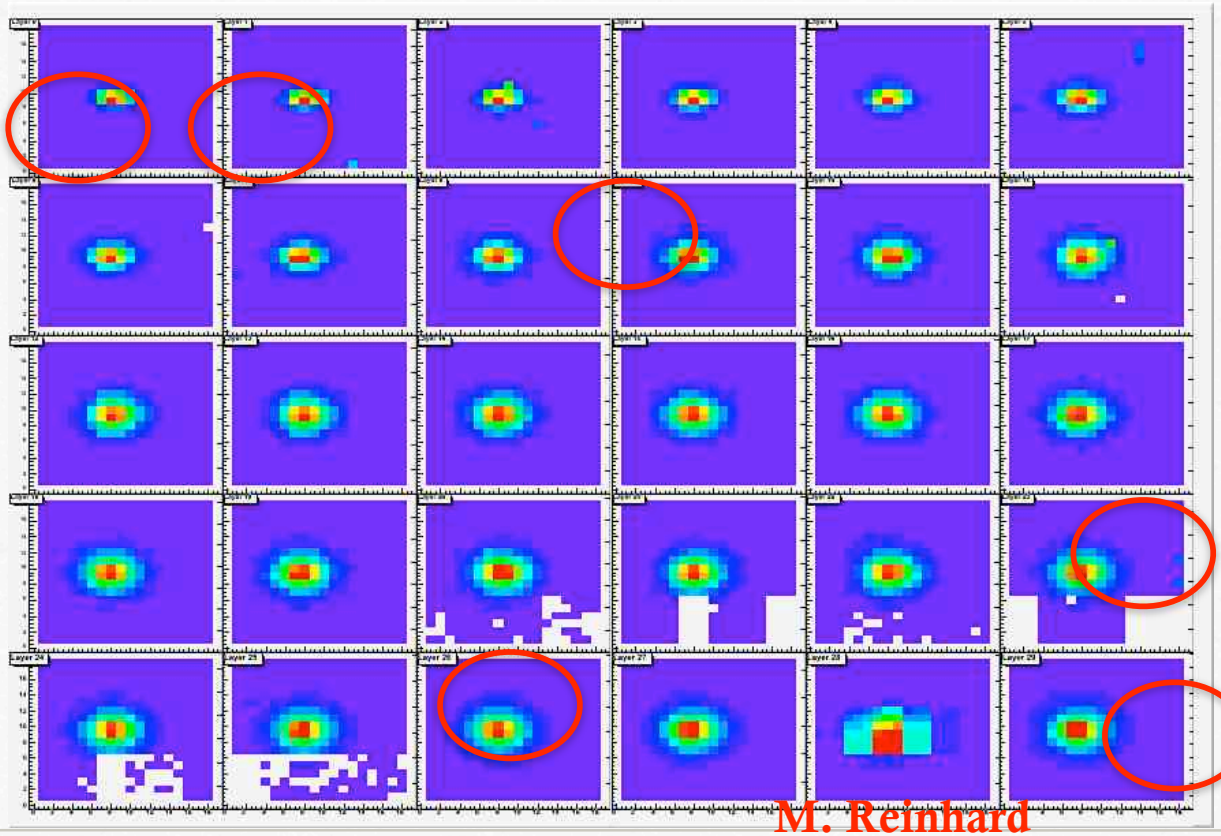
Dead Cells

- After fasten the SCSI plugs on both ECAL side and CERC Side

Run500236



M. Reinhard

Cooling Issue

- The power supply of ECAL cooling fans stopped to work in the morning of 15 May 2008. (M. Reinhard)
  - The cooling issue resulted the ECAL high voltage suffering a high current, and turned off automatically after some time.
  - After plugged in and out several times of the power cable, the power supply started to work again.
- Cooling issue became more severe in the afternoon of 26 May. Experienced high current of high voltage (R. Poeschl)
  - Hot weather at Fermilab
  - Power supply of cooling fans stopped to word again
  - Replaced by a new one
  - The new one was destroyed
  - Replaced by a third one, watching carefully….

Conclusion

- Stable running with fully equipped ECAL
  - A significant amount low energy pions
- Open issues to be settled for the July periods:
  - off peak running
  - noisy layers
  - cooling issue (new power supply for cooling fans)
  -