Closing the Loop on ND vs FD

- We will measure π, p, e response spectra for ND and FD electronics
- How do differences between CALDET and Near and Far detectors affect calibration
  - E.g. – light level
- Is it worth trying to understand response in terms of low-level electronics response?

Detector Response

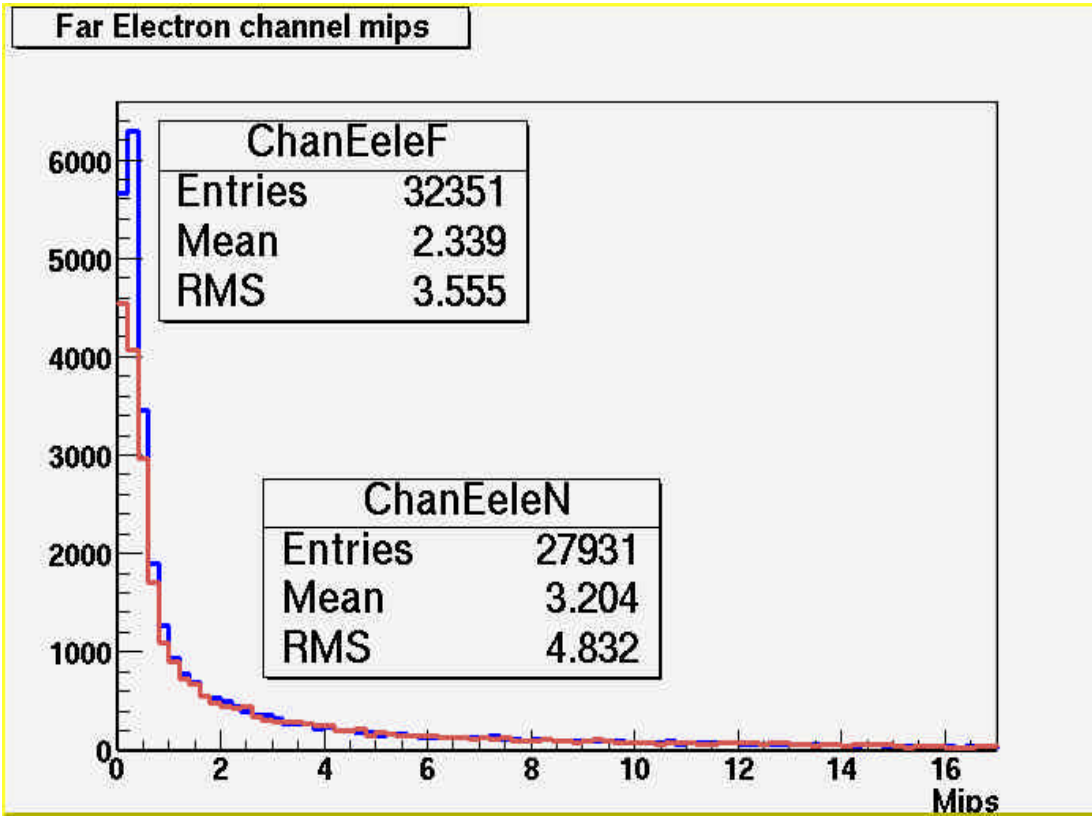
- Response to an energy distribution can be characterized as
  - Channel energy deposition distribution for type of interaction
    - Mip, EM shower, Hadronic shower
    - Same for ND, FD, but not know without bias of one or the other
  - Mean PE per channel energy (channel by channel)
    - Measurable with standard MINOS techniques
  - Electronics response difference?
    - Measured by LI, but will we fit little wiggles?

MINOS analysis of ADC/PE and PE/MIP

- ADC/PE “unbiased”
  - statistical treatment gives underlying mean PE
- Data for ADC/PE taken with no readout suppression
- Muon Calibration:
  - Mean response (with corrections) to muons. Threshold effects at low light levels?

MIP distribution for electrons in ND, FD electronics

- True energy distribution not known with great precision
- Measurement biased by lightlevel, electronics
- These measured distributions differ mostly due to light level, but also threshold effects
- It would be hard to use these distributions to model ND/FD response difference



Possible approach to caldet crosscheck

- For “less biased” measure of shower channel energy distributions…
  - can we increase PEs/MIP in CALDET vs Near and Far detectors?
  - Can we run at all with lower thresholds at CALDET? (no?)
  - Does it really matter? By definition, low energies are involved.

- Map ND and FD response with teststand system
  - Similar to studies Nicolai Tobien and P.S. did for QIE
  - Laser/POPOP/WLS to illuminate PMTs
  - No readout suppression
  - High linearity PIN diode with 20-bit ADC for reference

Teststand possibility

- Fermilab Lab-5 teststand
- Readout of QIE via CAMAC
- Possible (in principle) to read out small number of FD channels
  - If we can get them…
- Good summer student project with a post-doc to supervise?