Light Injection Data Taking

Installation Workshop

October 2001

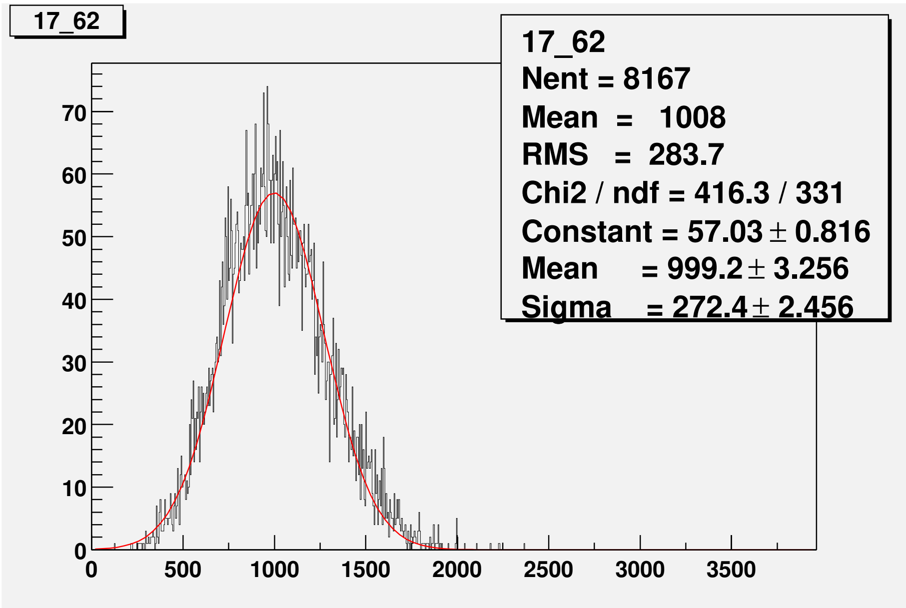
Data Taken:

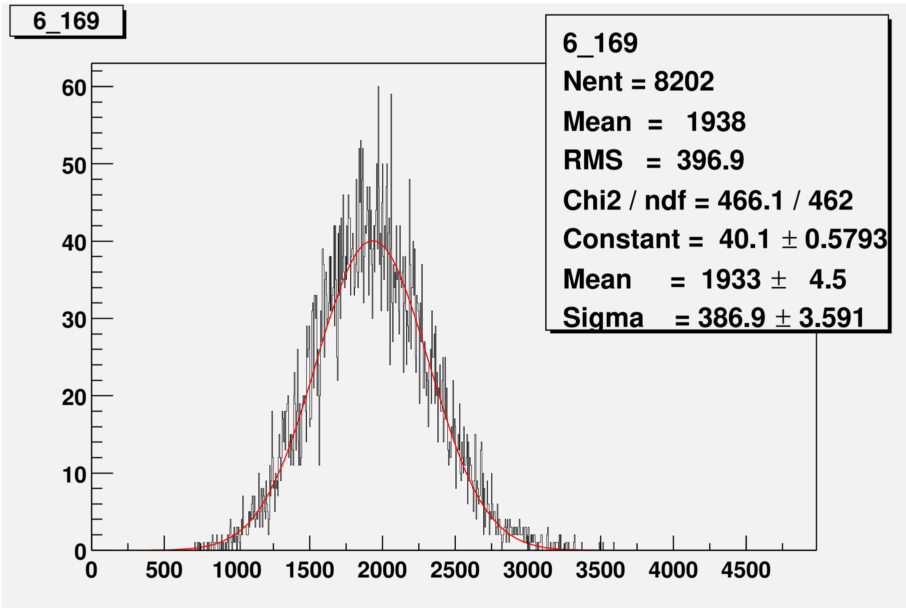
- Planes 5-20 connected to pulser box on west side
- DAQ reading out both sides using plane trigger (4/5) to select pulser events, (Trigger MUX box not yet connected)
- Each LED pulsed 10,000 times at high light level
- For LED 10: 12 runs taken using different pulser settings -> gain curves for 10 strips on each of 15 planes

High Light Level Data

Looking at west side data:

Typical ADC Distributions:



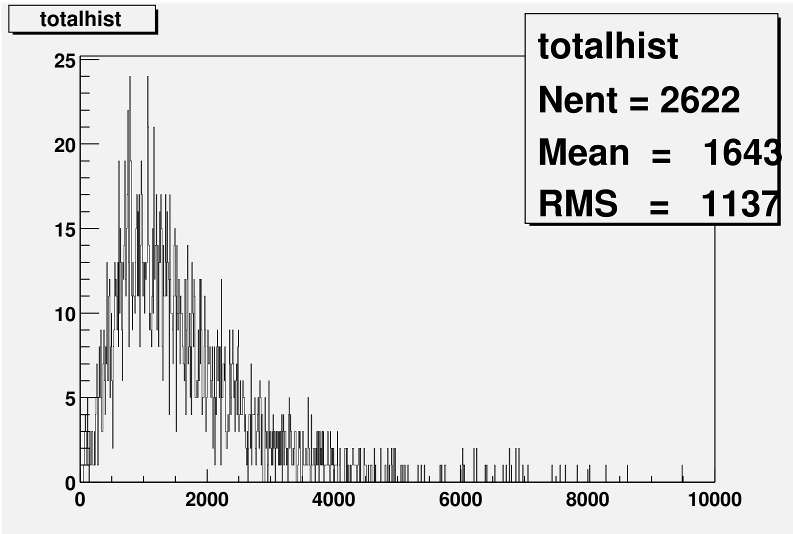


Distributions fitted with Gaussians

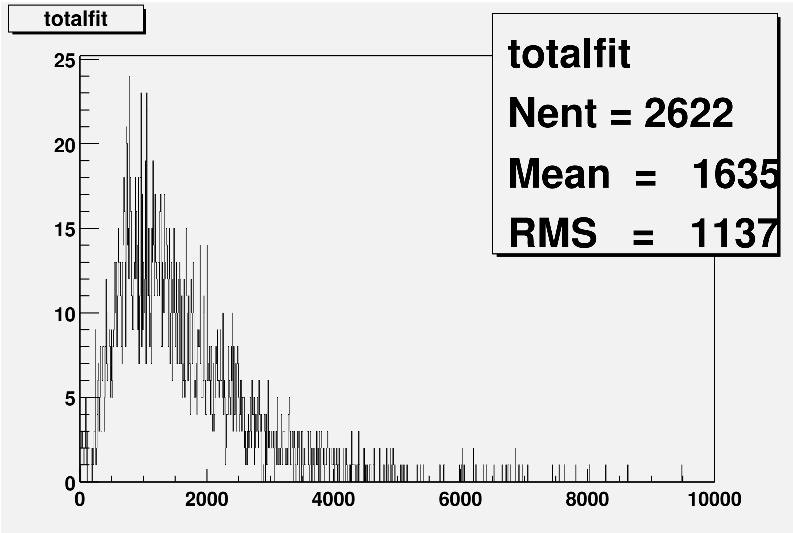
High Light Level Data

Distribution of Means:

From histos:



From fits:

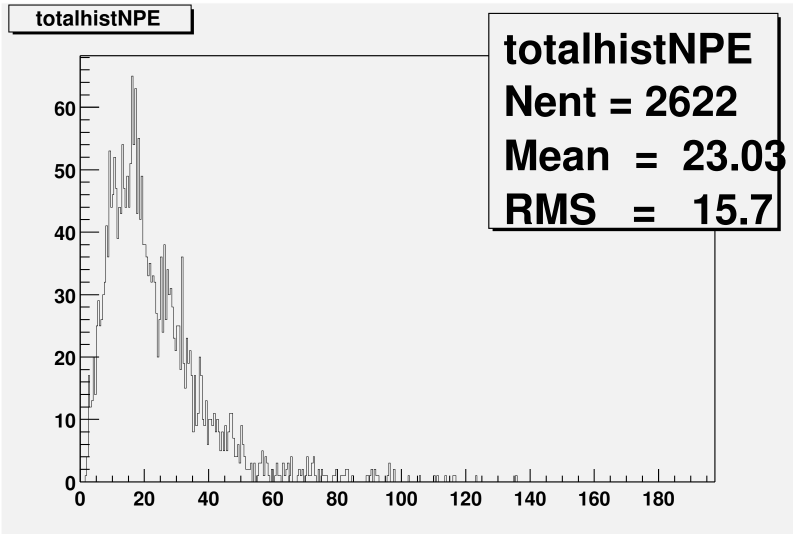


i.e. highest light levels typically correspond to $\sim$1600 ADC counts

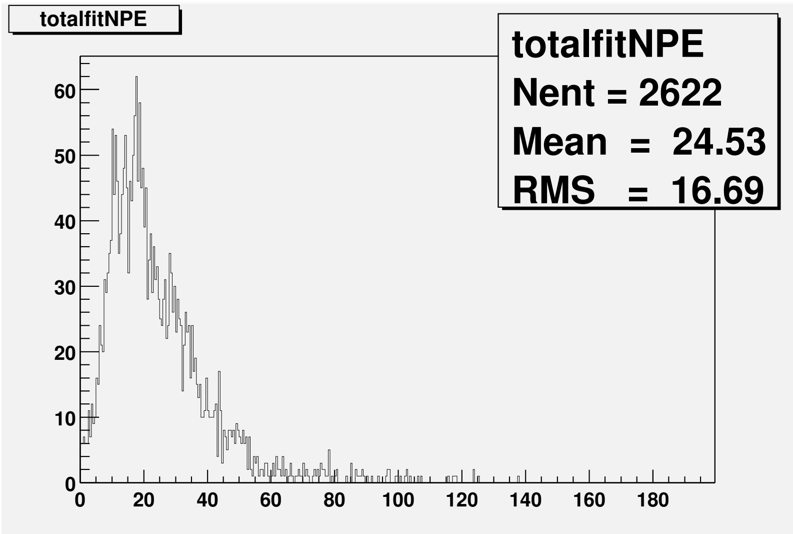
High Light Level Data

Now, using mean/sigma method for calculating NPEs:

From histo mean and RMS:



From fit mean and sigma:

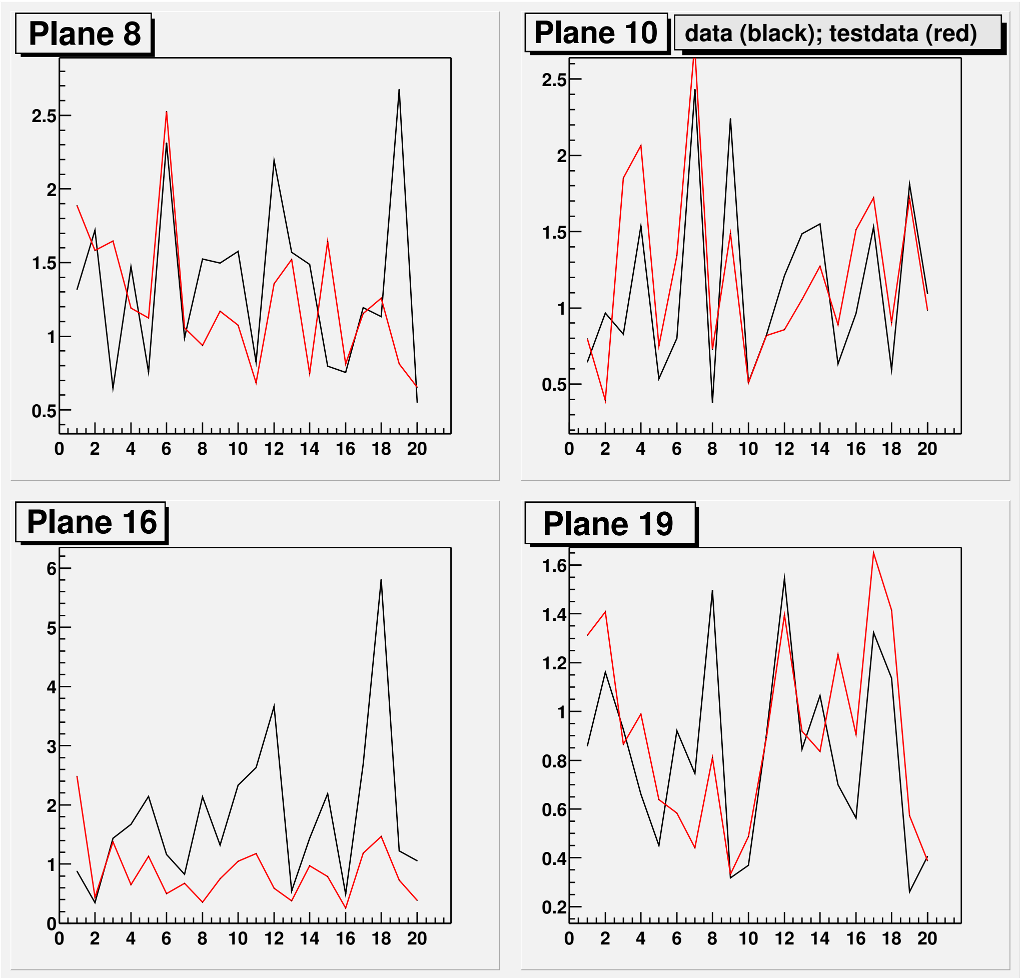


Typically ∼23-24pes are seen at PMTs

High Light Level Data

Comparison of Data Collected with Test Data Collected

Calculate relative light at each LIM from test data and compare with brightest strip for each LIM:

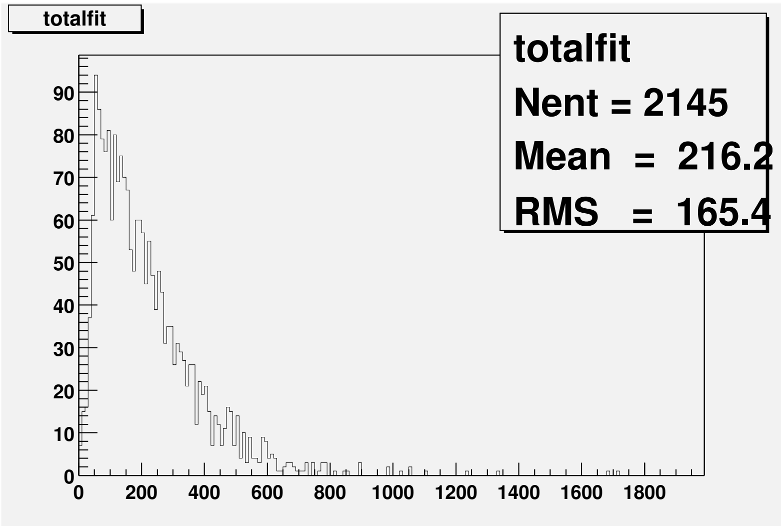


Expected light levels at LIMs correlate with signals at phototubes

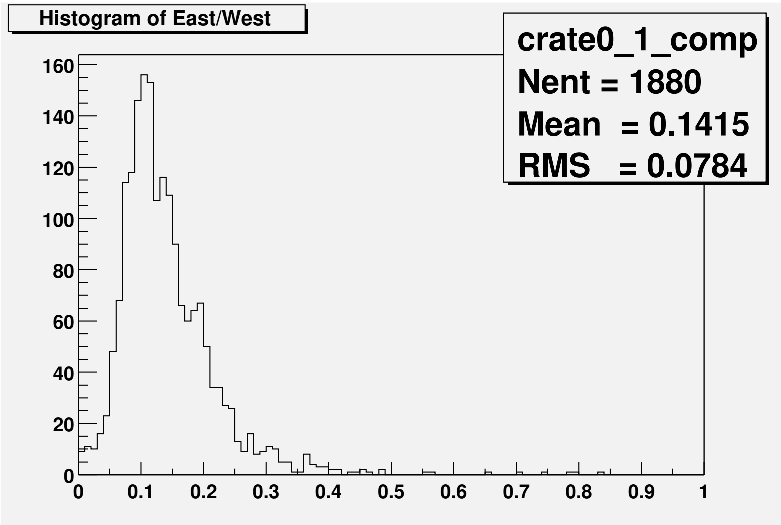
High Light Level Data

Looking at east side data

Light Levels are much lower. Look at distribution of means from fits:



Histogram fraction of light seen on east compared to west by strip:

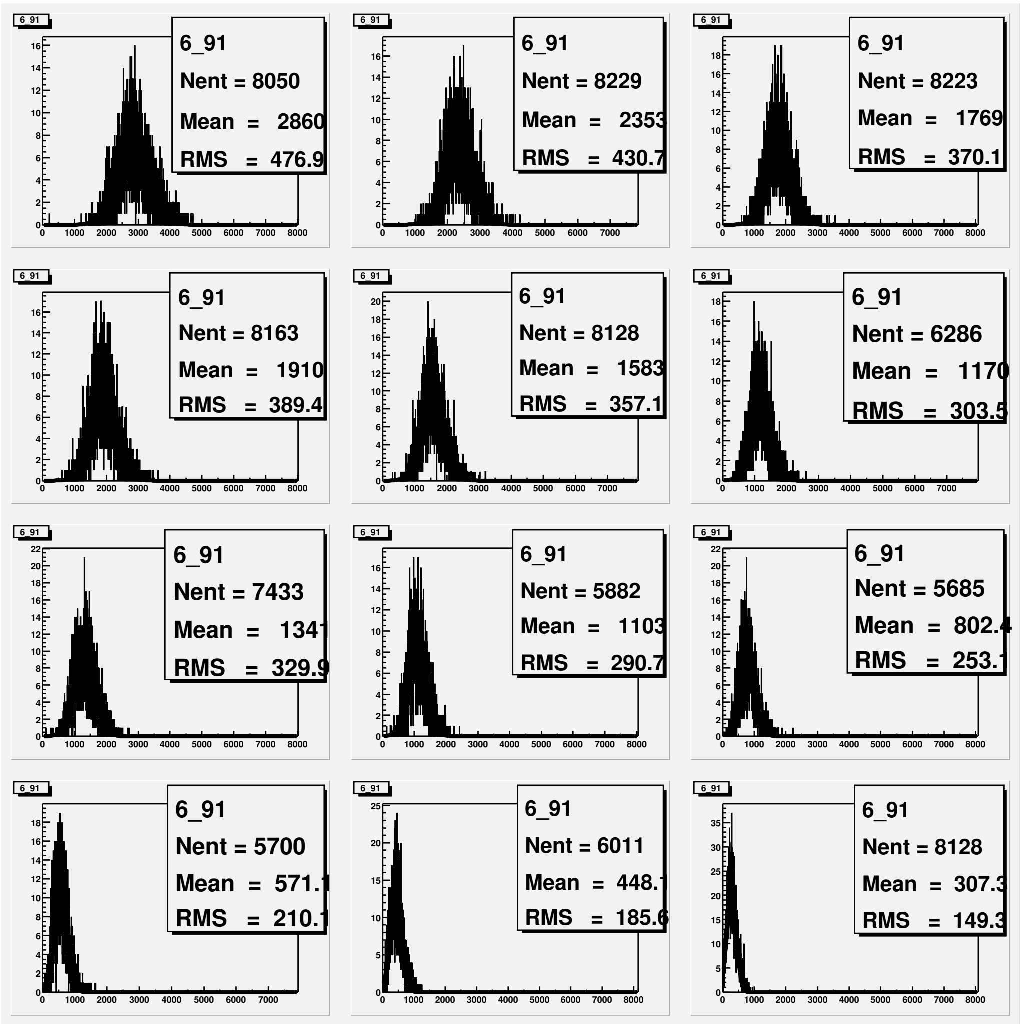


So, typically ∼14% of light seen on west side is seen on east.

From transmission tests, get ∼20% transmission through a module.

Gain Curve Data

ADC Distributions for various light levels:



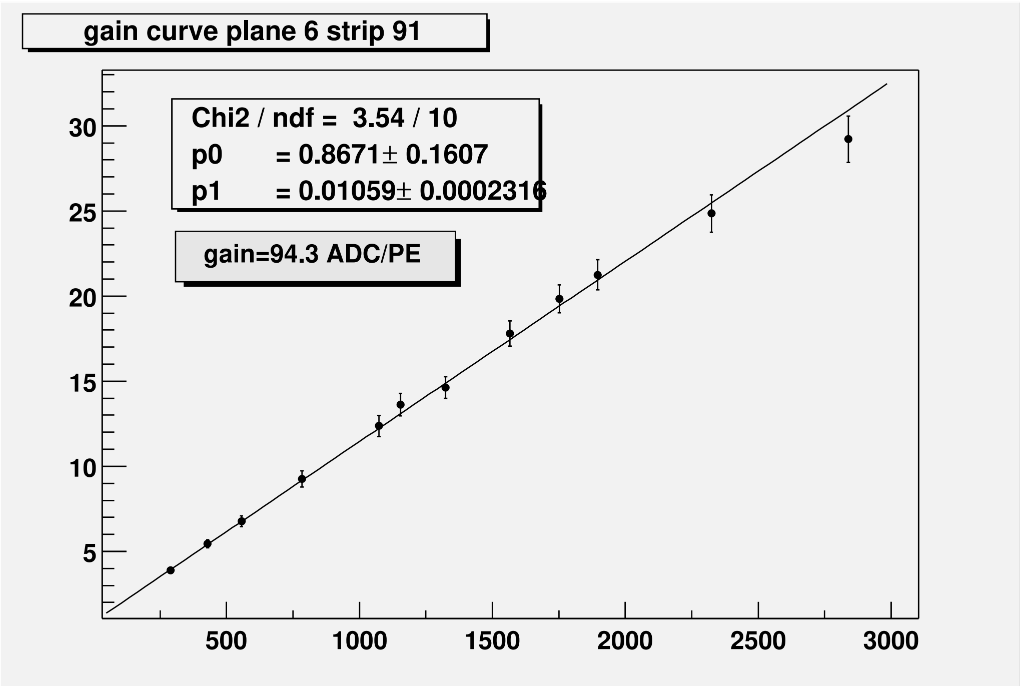
(From top to bottom, height: 1000,700,500,200; From left to right, width: 7,5,3)

Gain Curve Data

Taking the mean and sigma from these distributions and calculating NPEs using mean/sigma method, can construct gain curves from these distributions. (PIN data not yet available)

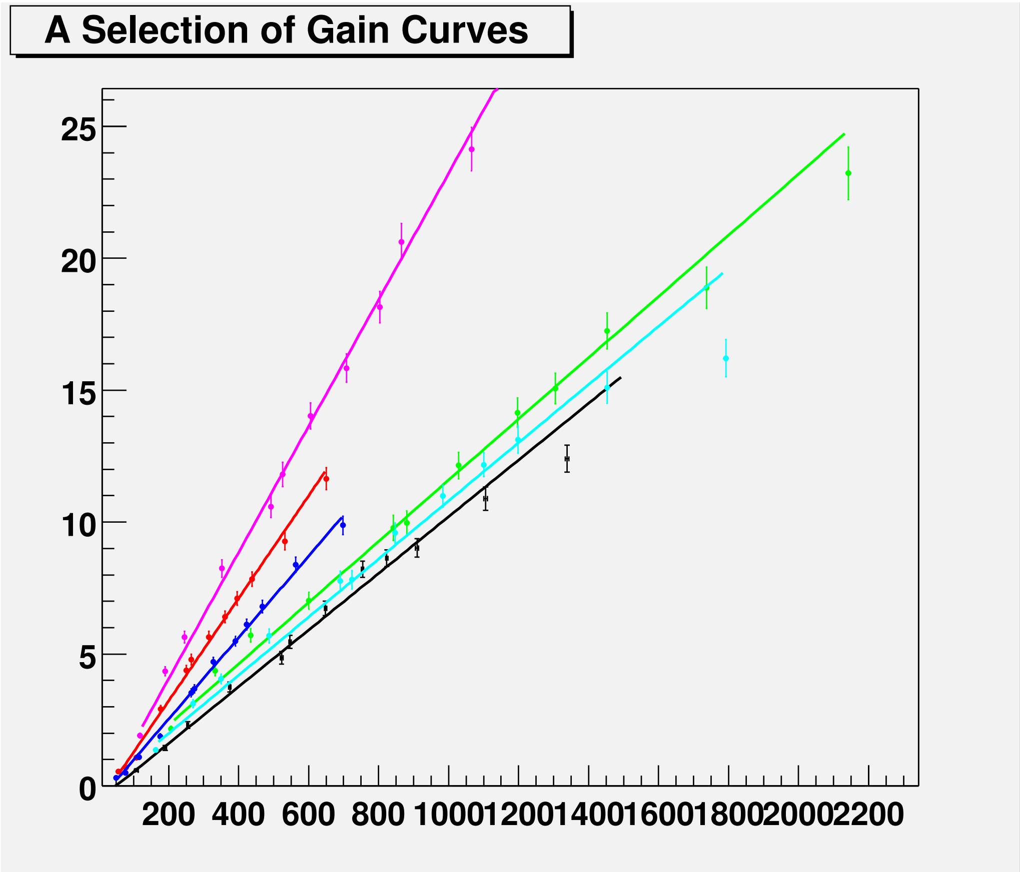
Examples (x-axis=ADCs; y-axis=NPEs):

From the distributions on page before:



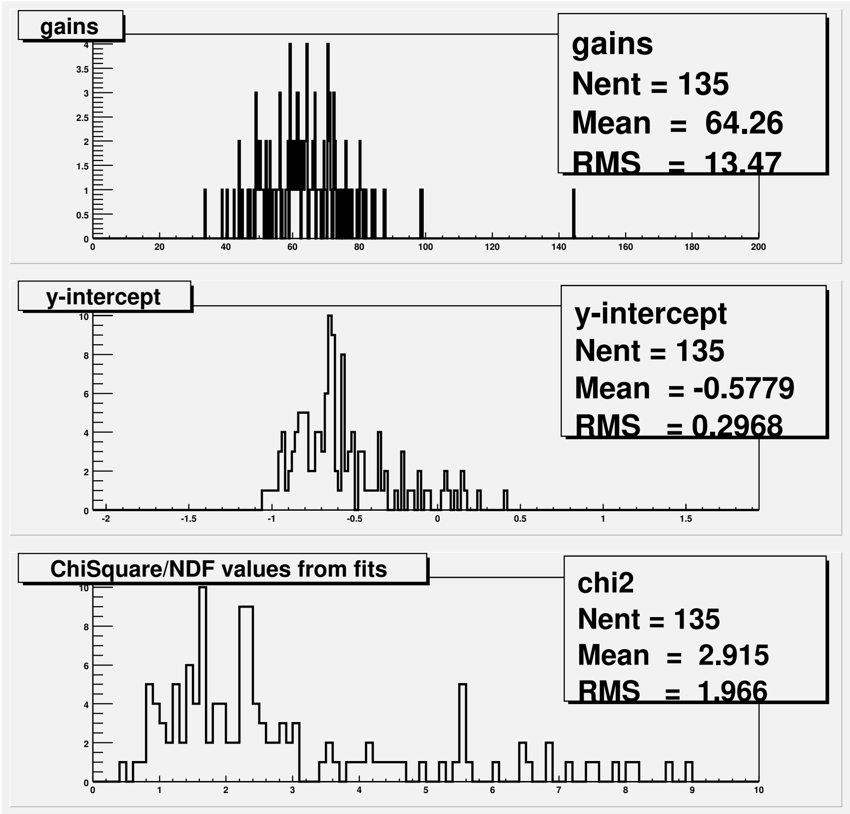
Gain Curve Data

A Selection of other gain curves:



Gain Curve Data

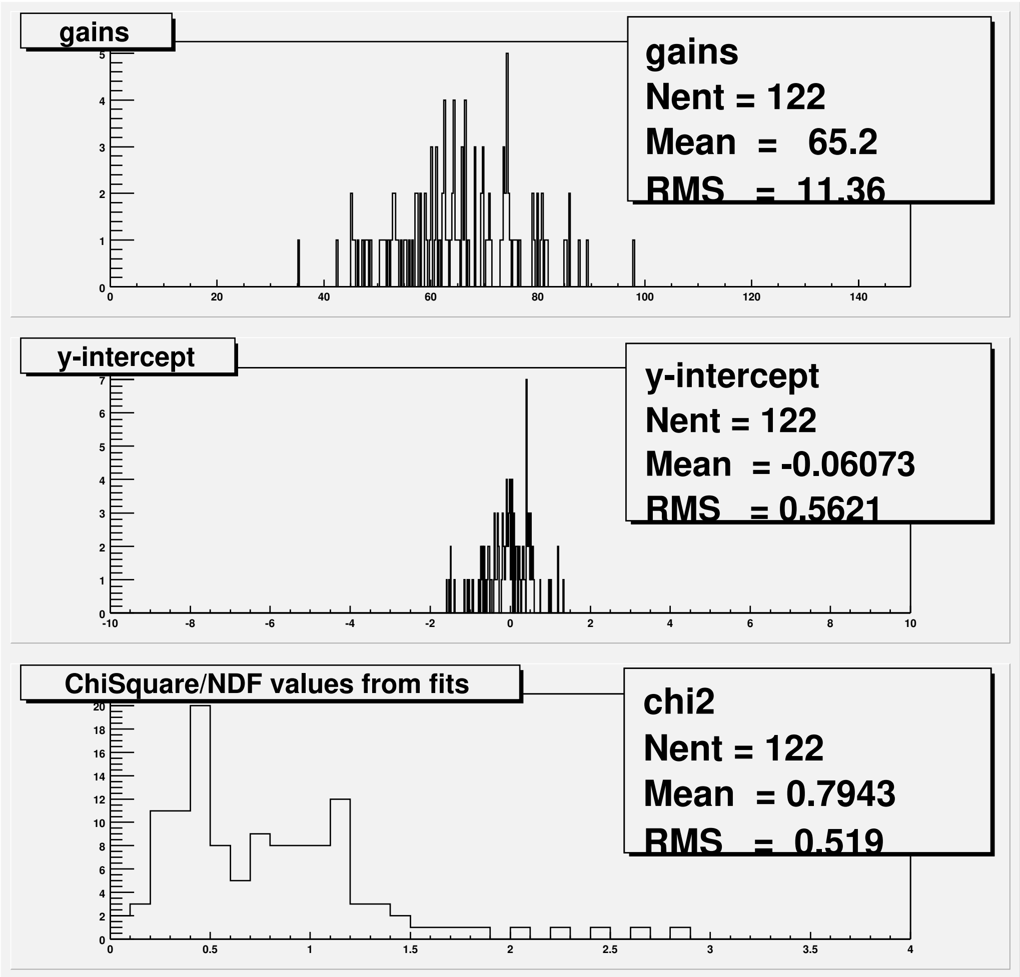
Summary plots of gains and y-intercepts from gain curve fits:



- Gains on average 64 ADC/PE from straight line fit
- Single pe peak measurements from singles data, showed gains to be ∼50-60 ADC/PE
- y-intercept is below zero => consistent with lower gains at low light levels.
- Low light level points on gain curves are wrong as data is sparsified

Gain Curve Data

Fit to a specified range instead: above 300 ADCs (<∼1% events in pedestal)



Now, fits are better; y-intercept passes approximately through zero; gains are ∼65 ADC/PE

Summary

- Highest light levels typically correspond to $\sim$1600 ADC counts $\approx$ 23-24pes
- Light yield on far side is $\sim$14% that seen on pulsed side
- Gain curves fit reasonably well with linear fit at higher light levels, giving average gains of 65