Analysis of the Test Beam Run at IHEP.

Common-Mode-Noise Correction Algorithm

For each channel in plane subtract pedestals, calculated from the revious 100 events.
Find pad with maximum signal (after pedestal subtraction) in the plane.
Calculate average signal (name it cmn_shift) and RMS from the rest of the channels in the plane.
If the RMS is less than the RMS from the previous 100 events then we have the Common-Mode-Noise case.
There are two cases of CMN correction when calculating the sum of the signals on the plane:

1) **total_sum.** Sum of all channels with subtracted pedestals and subtracted cmn_shift.
   In this case the pedestal peak tend to be distorted: all small signals by definition have smal RMS and therefore will give perfect zero in the sum.

2) **central_sum.** Sum of only 4 central pads with subtracted pedestals and subtracted cmn_shift. In this case there will be no distrortion of the pedestal peak.

Naming conventions

On all histograms the X axis corresponds to the global pad number GPN.

```
Plane 0. GPN   0:15,  ADC0
Plane 1. GPN  16:31,  ADC1. Disconnected.
Plane 2. GPN  32:47,  ADC2. In MIP run 28-29 ADC2 was not terminated, therefore was showing twice higher numbers
Plane 3. GPN  48:63,  ADC3.
Plane 4. GPN  63:79,  ADC3. Channel 6 dead
Plane 5. GPN  80:95,  ADC3.
Plane 6. GPN  96:111, ADC3.
Plane 7. GPN 112:127, ADC3. No negative signals.
```

Pad numbering:

```
4 8 12 16
3 7 11 15
2 6 10 14
1 5  9 11
```

Overall structure:

W(2.5mm), Si, W(2.5mm), Si, W(2.5mm), Si, ... Total : 3*5 layers, + 2*(W(15mm),Si,W(15mm),Si, W(15mm),Si)

Prerequisites. Raw data.

Protons 70 GeV, runs 46&54, Raw data.

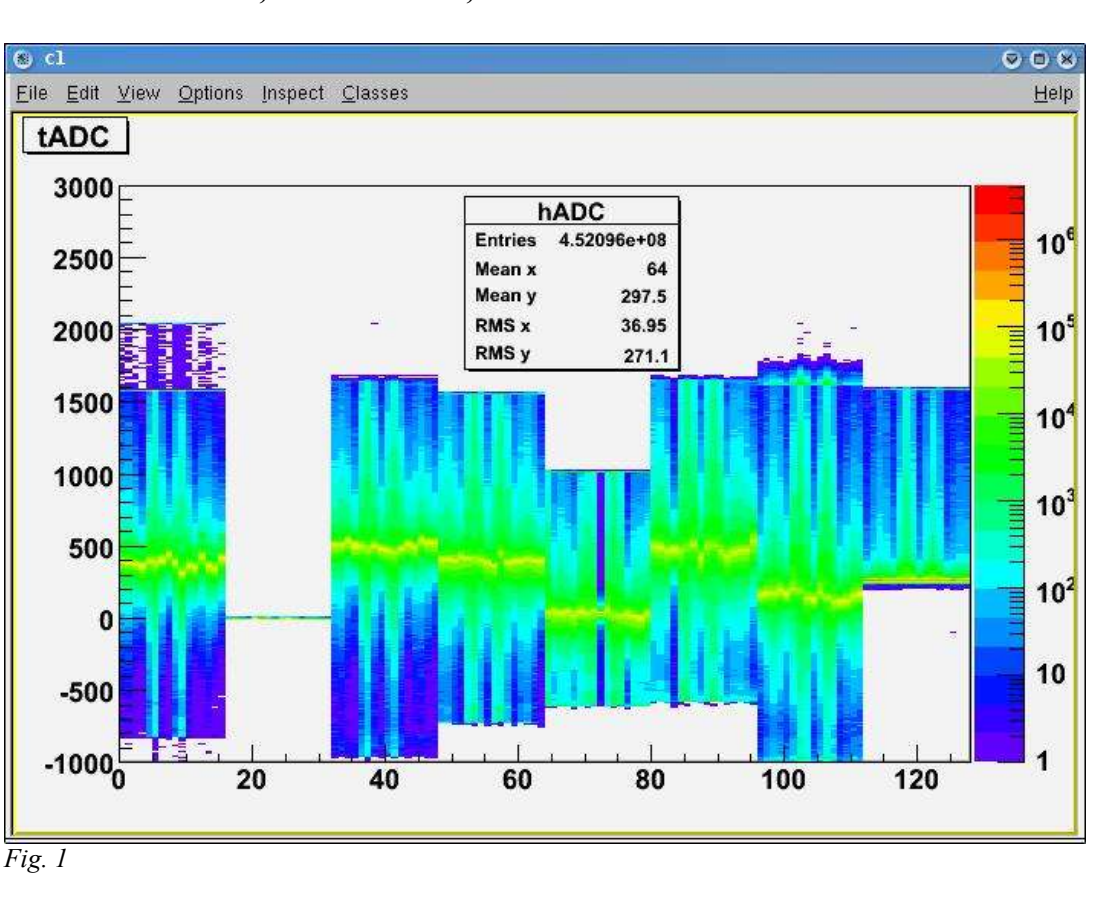

Fig. 1

Protons 70 GeV, runs 46&54, Pedestals subtracted.

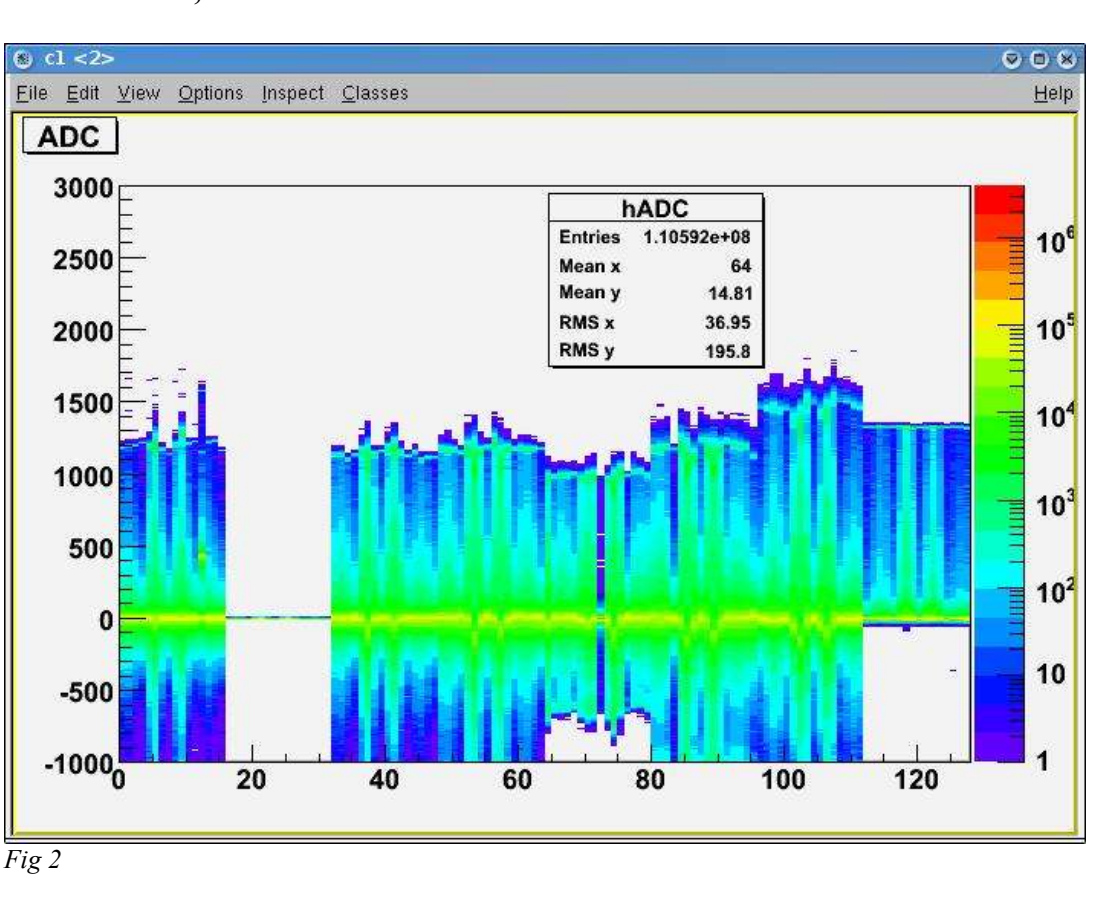

Fig 2

Protons 70 GeV, runs 46&54, Pedestals subtracted, Common-Mode-Noise corrected (total_cmn).

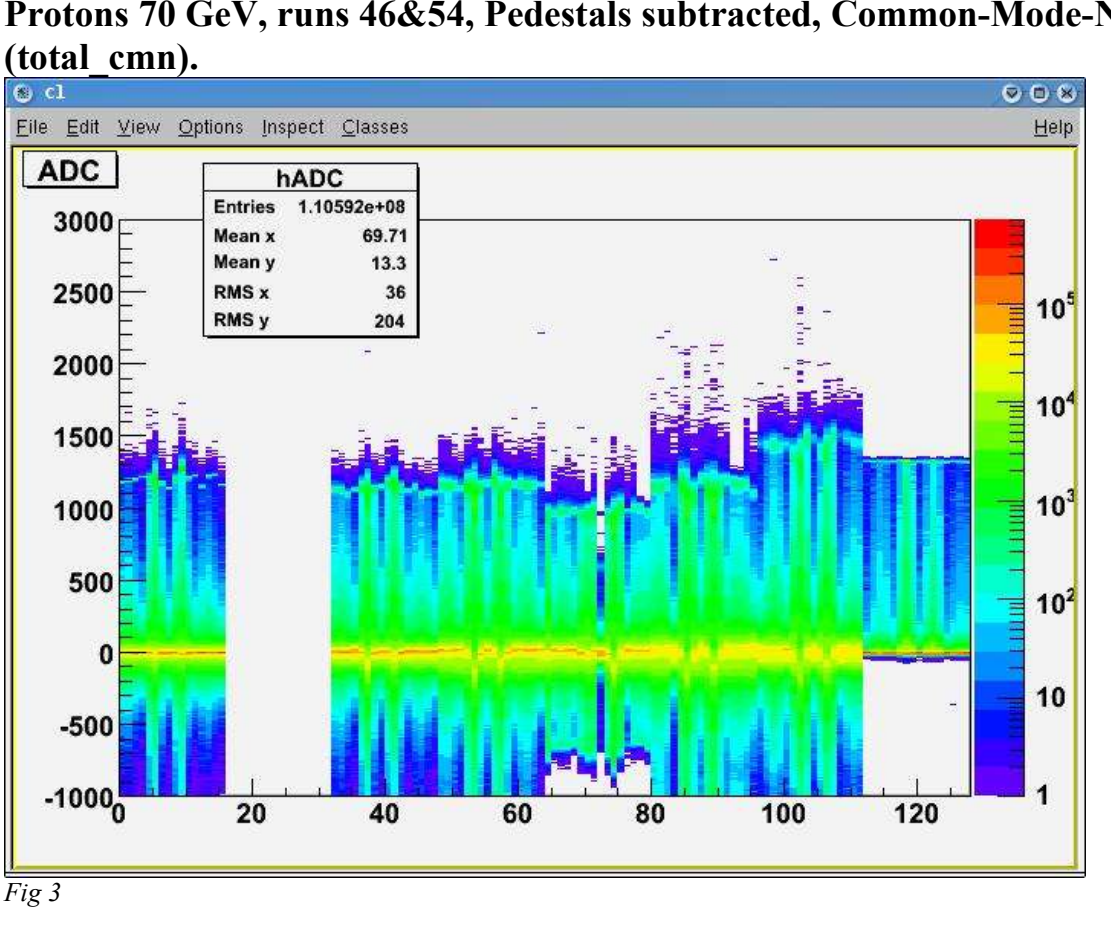

Fig 3

Positrons. Run 38. Wide front trigger. CMN-corrected (total_cmn)

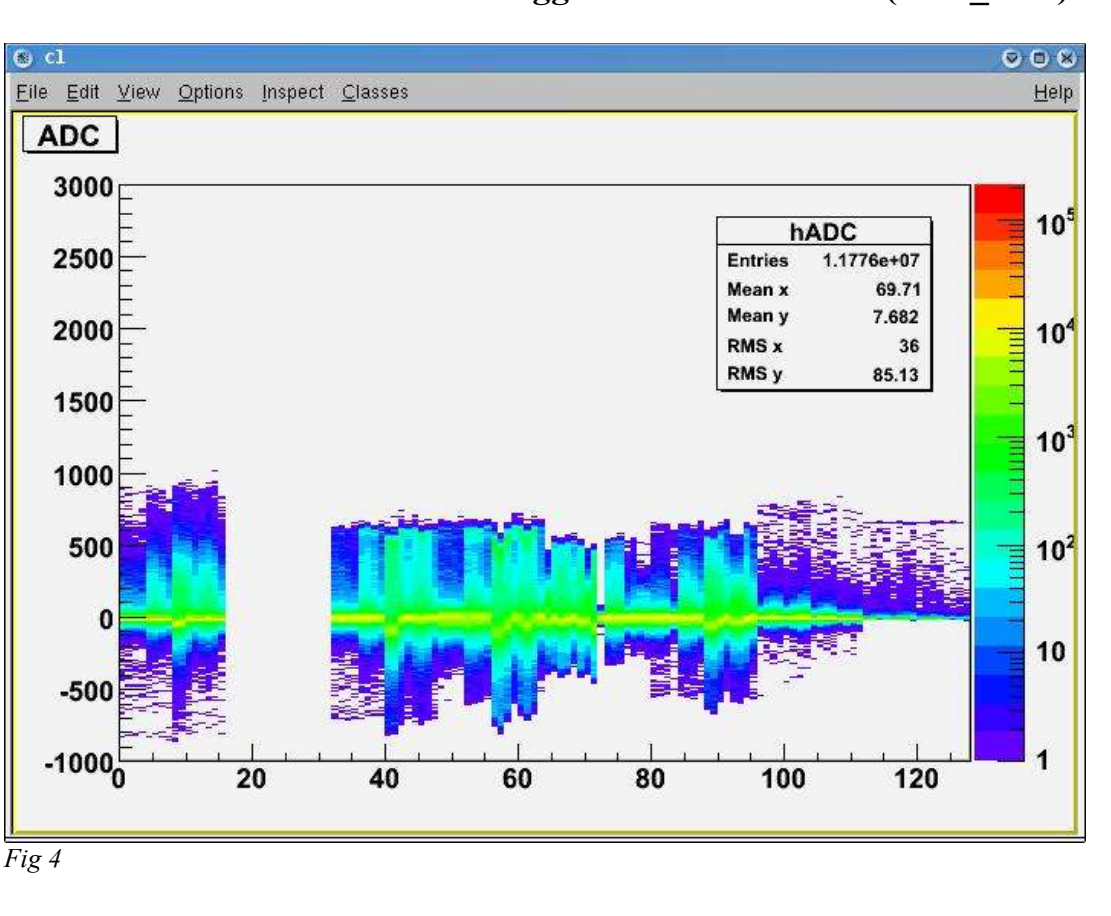

Fig 4

Positrons 10 GeV, Runs 28-29. MIP run. Beam absorber in front of the detector,

Pass-through trigger.
Pedestal subtracted, Common-Mode-Noise corrected.
Note. Values of ADC2 should be divided by 2 because the cable was not terminated.

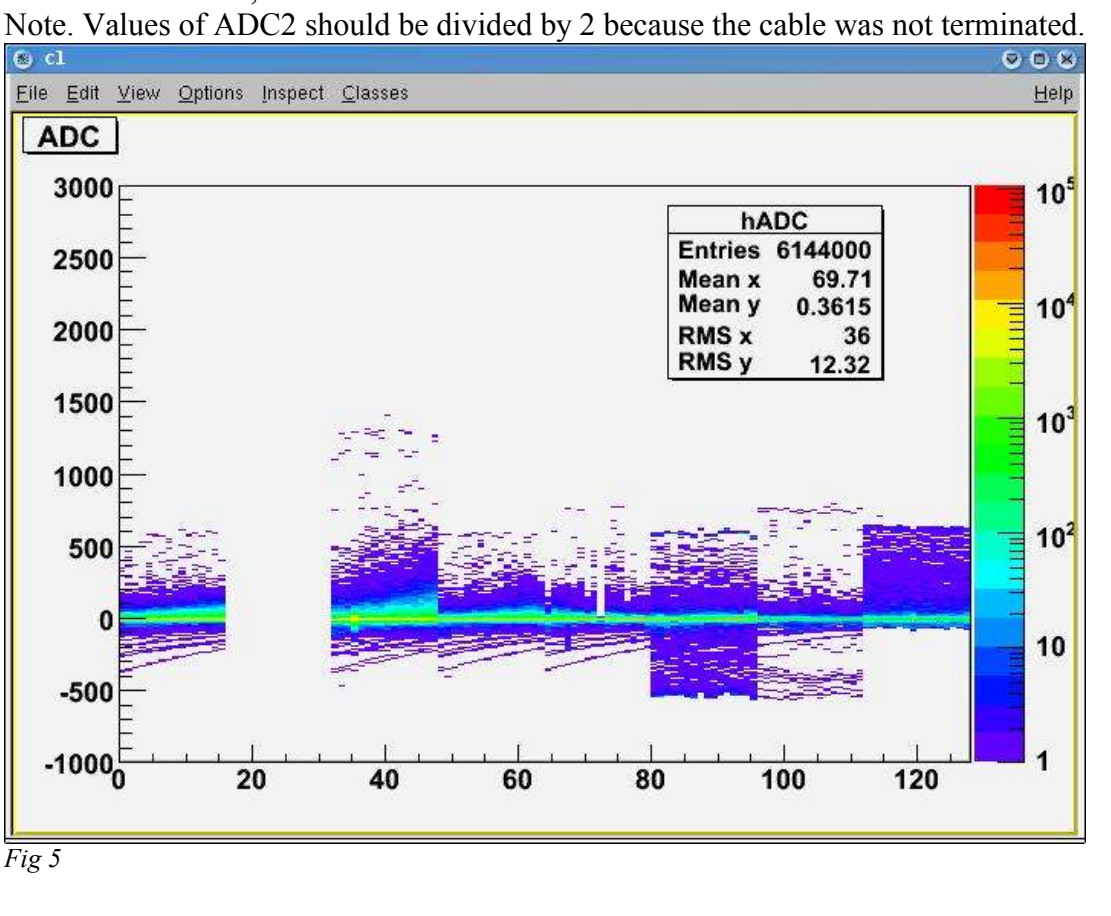

Fig 5

The same run. Total histogram of ADC0 channel 0. This is how pedestals looks like.

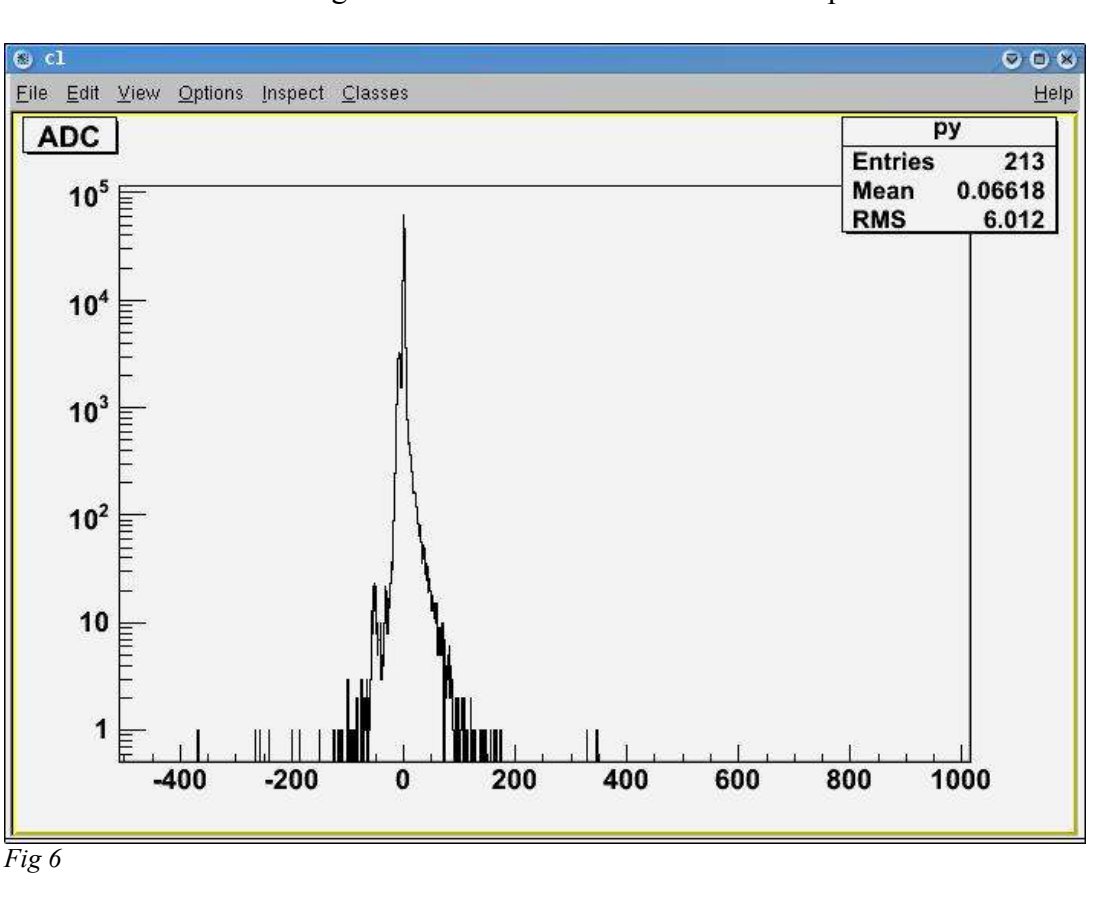

Fig 6

Common-Mode-Noise rejection (total_cmn). How it works

root [106] run_ihep("../data/raw_runs_28-29_MIP/",0)

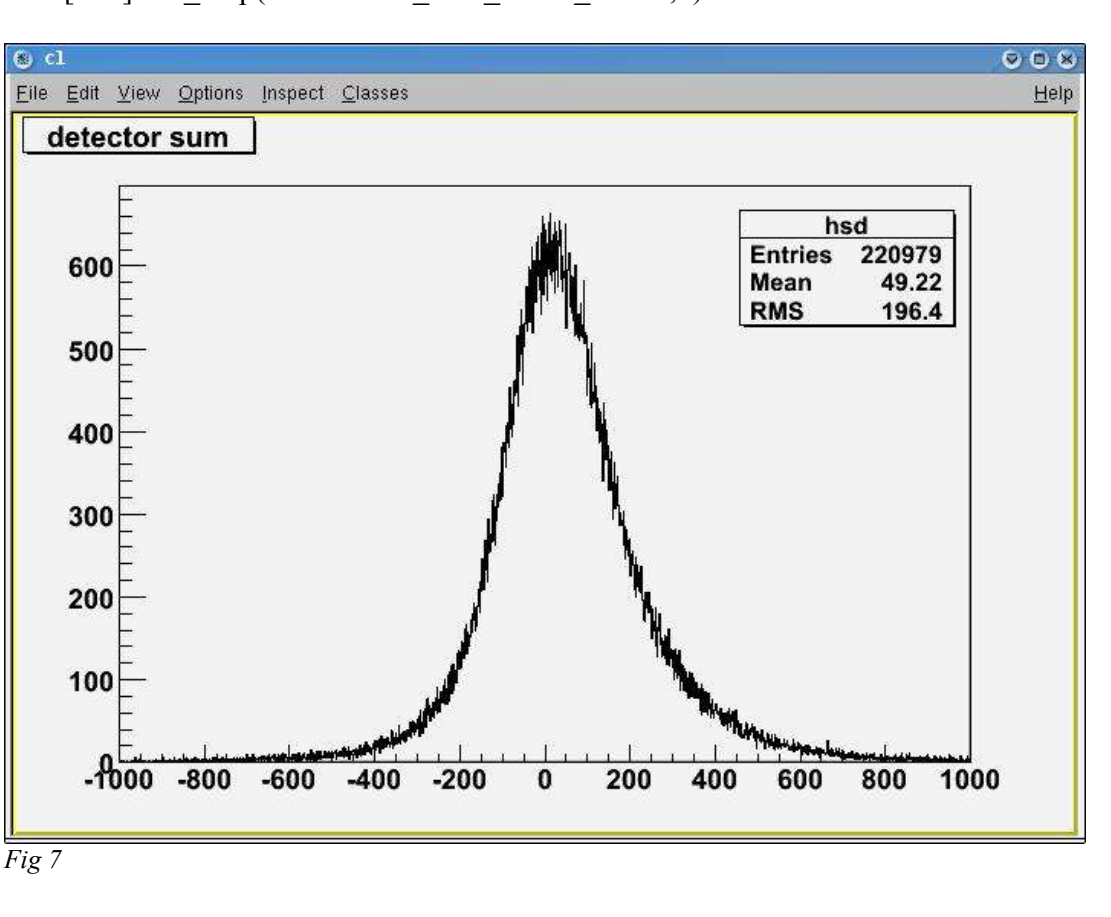

Fig 7

MIP run

run_ihep("../data/raw_runs_28-29_MIP/",1)

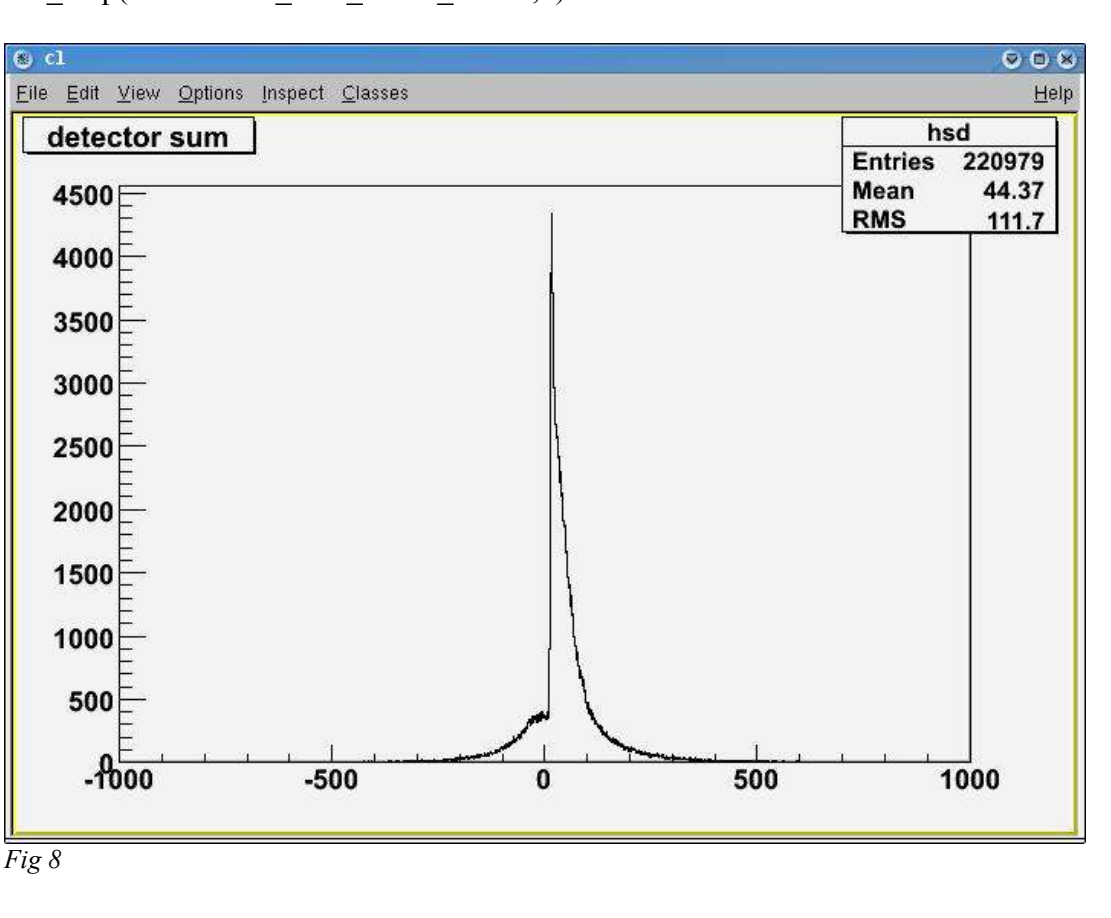

Fig 8

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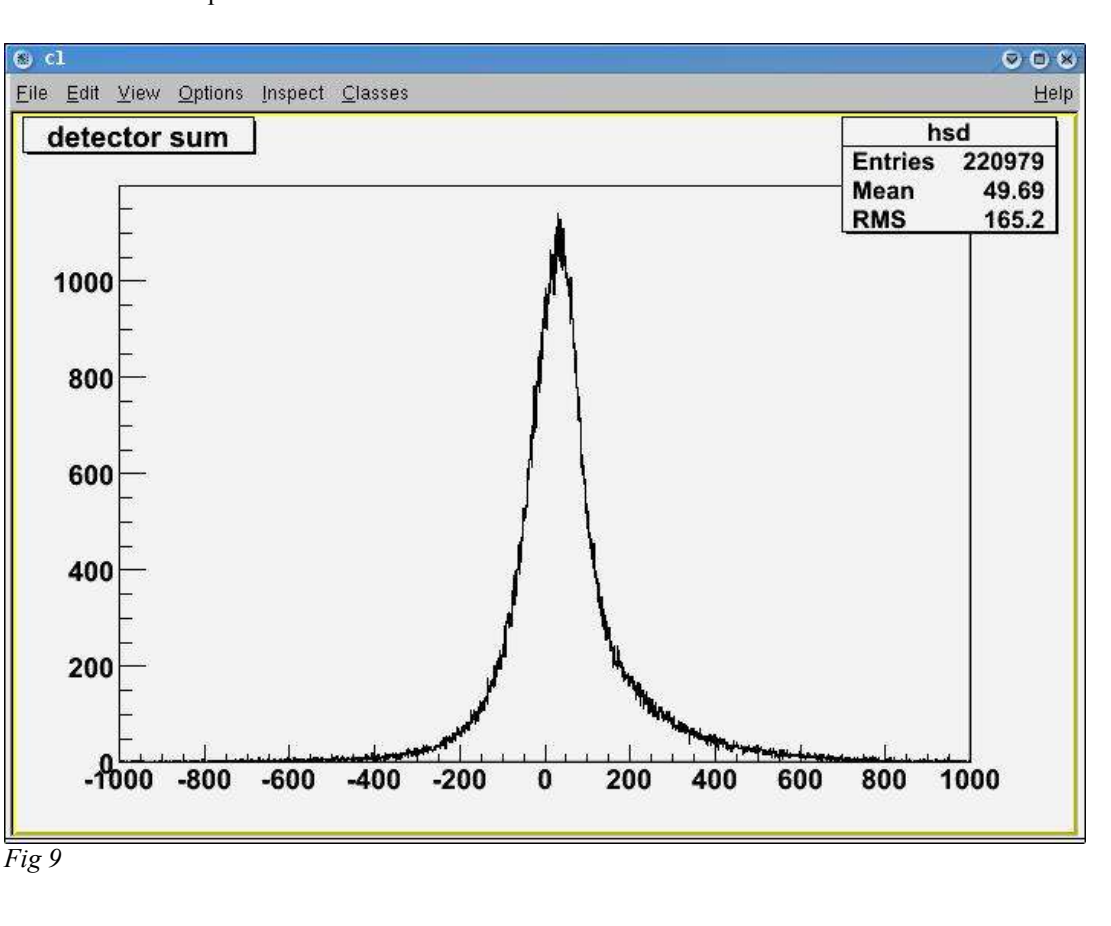

Fig 9

12/02/05 04:47:41 pm Effect of CMN correction on plane sums

On all figures below are 9 histograms. From left to right, top to bottom:

1. Central sum of the plane 0
2. All amplitudes after CMN correctios
3. Sum of the plane 2
4. Sum of the plane 3
5. Sum of the plane 4
6. Sum of the plane 5
7. Sum of the plane 6
8. Sum of all 7 planes
9. Total sum of all 7 planes

No CMN correction.

run_ihep("../data/raw_runs_38-01_e_wide_adc_-50_50/",0)

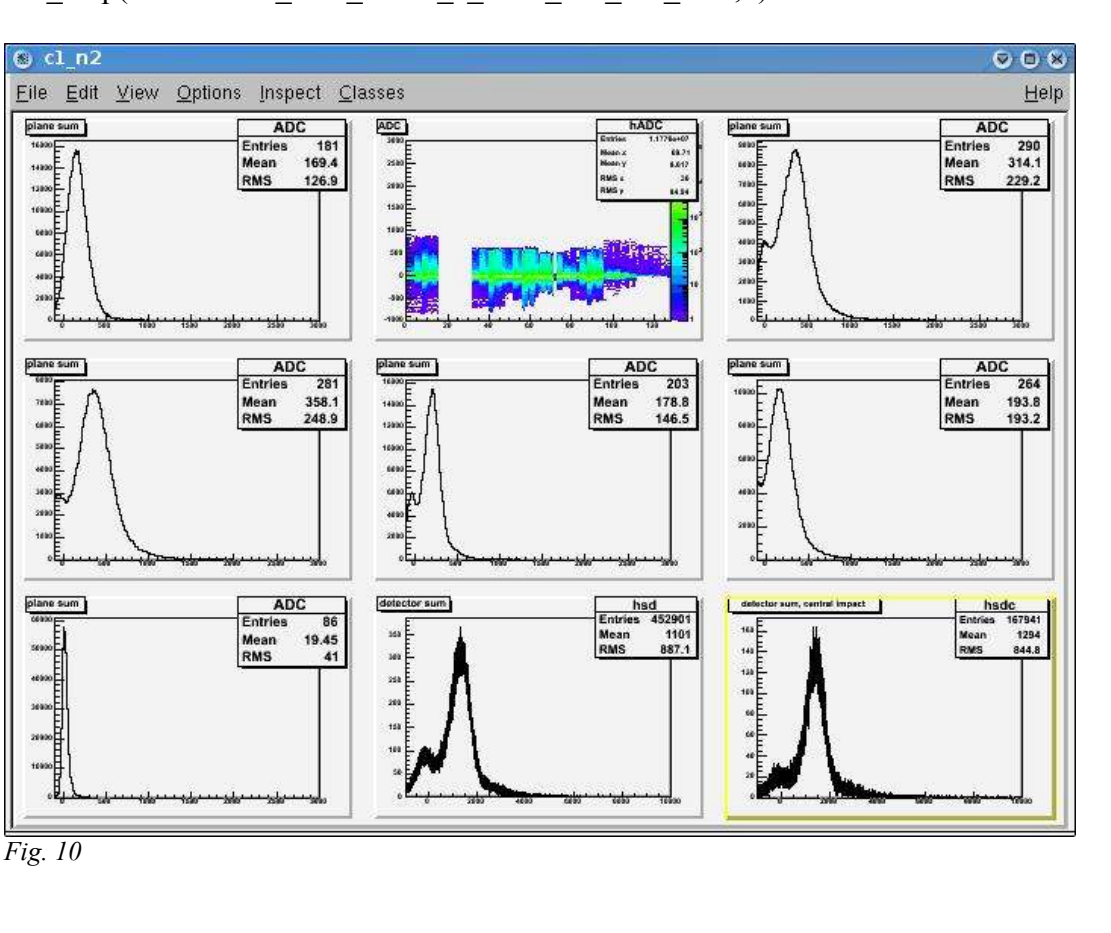

Fig. 10

CMN condition if((plane_rms < gADCrms[adc])

TFile *ff = new TFile("hists/total_120201_14_11_05_05_07_50.038.root")

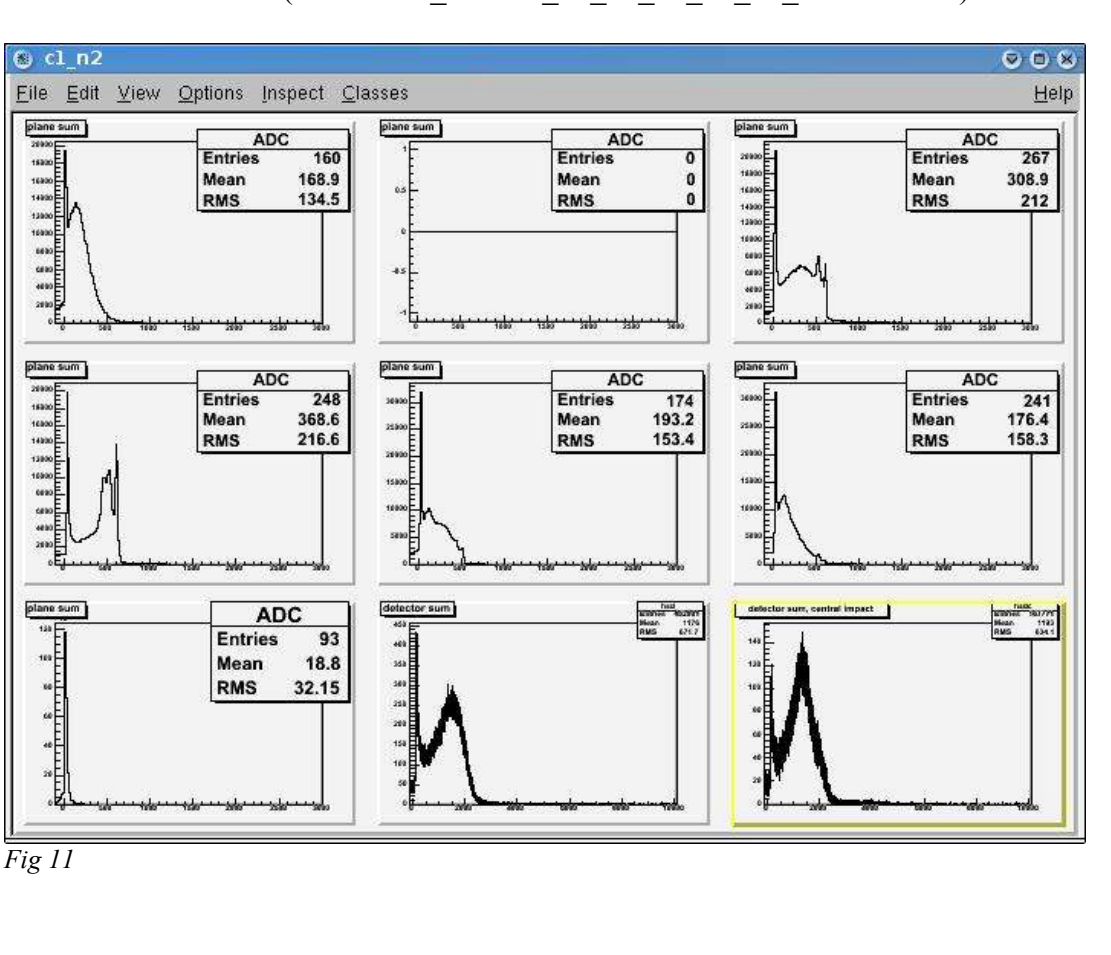

Fig 11

CMN condition if((vmax > gADCrms[adc]) && (plane_rms < gADCrms[adc]))

TFile *ff = new TFile("hists/total_120216_14_11_05_05_07_50.038.root")

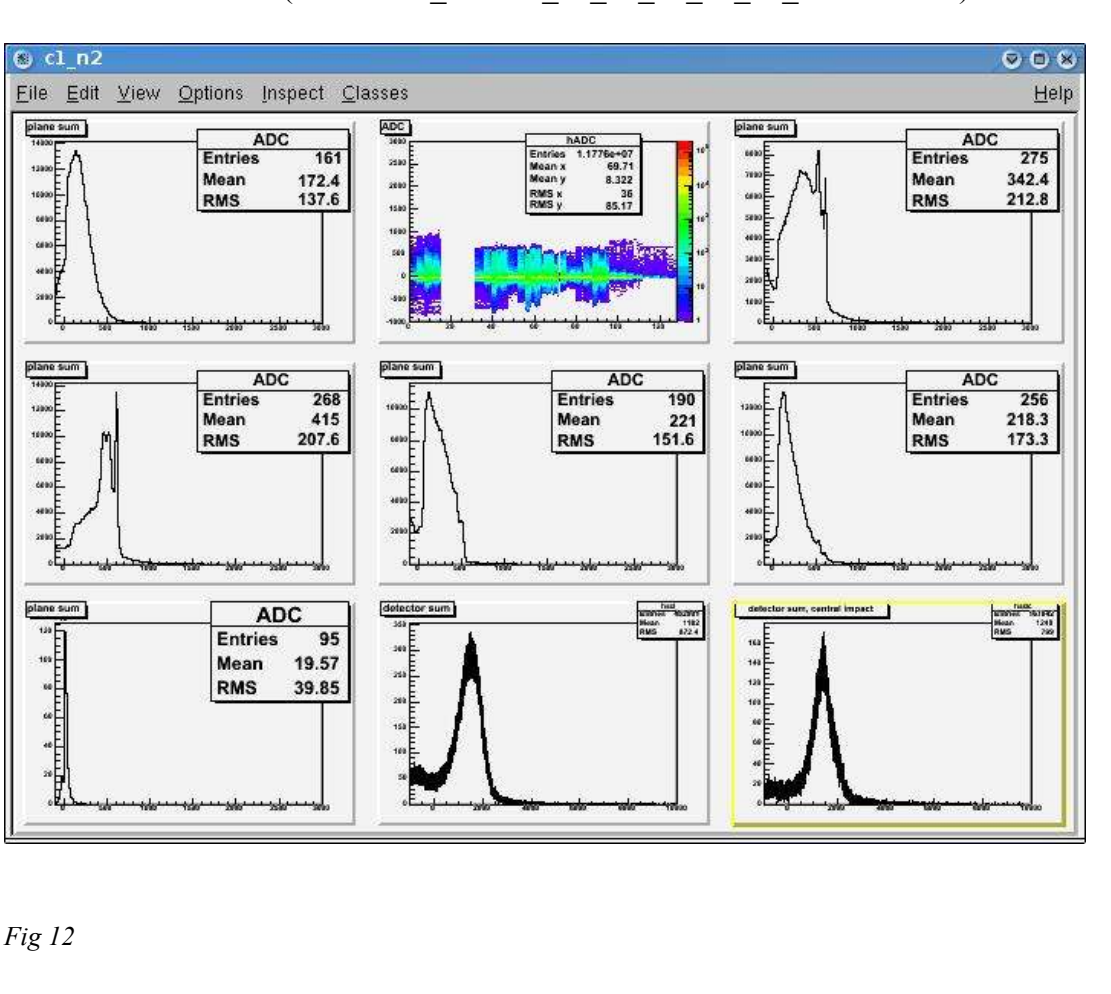

Fig 12

12/04/05 11:17:32 am

Results. CMN correction: central_sum.

On all figures below are 9 histograms. From left to right, top to bottom:

1) Central sum of the plane 0
2) All amplitudes after CMN correctios
3) Central sum of the plane 2
4) Central sum of the plane 3
5) Central sum of the plane 4
6) Central sum of the plane 5
7) Central sum of the plane 6
8) Central sum of all 7 planes
9) Total sum of all 7 planes

MIP run

run_ihep("../data/raw_runs_28-29_MIP/",1,29)

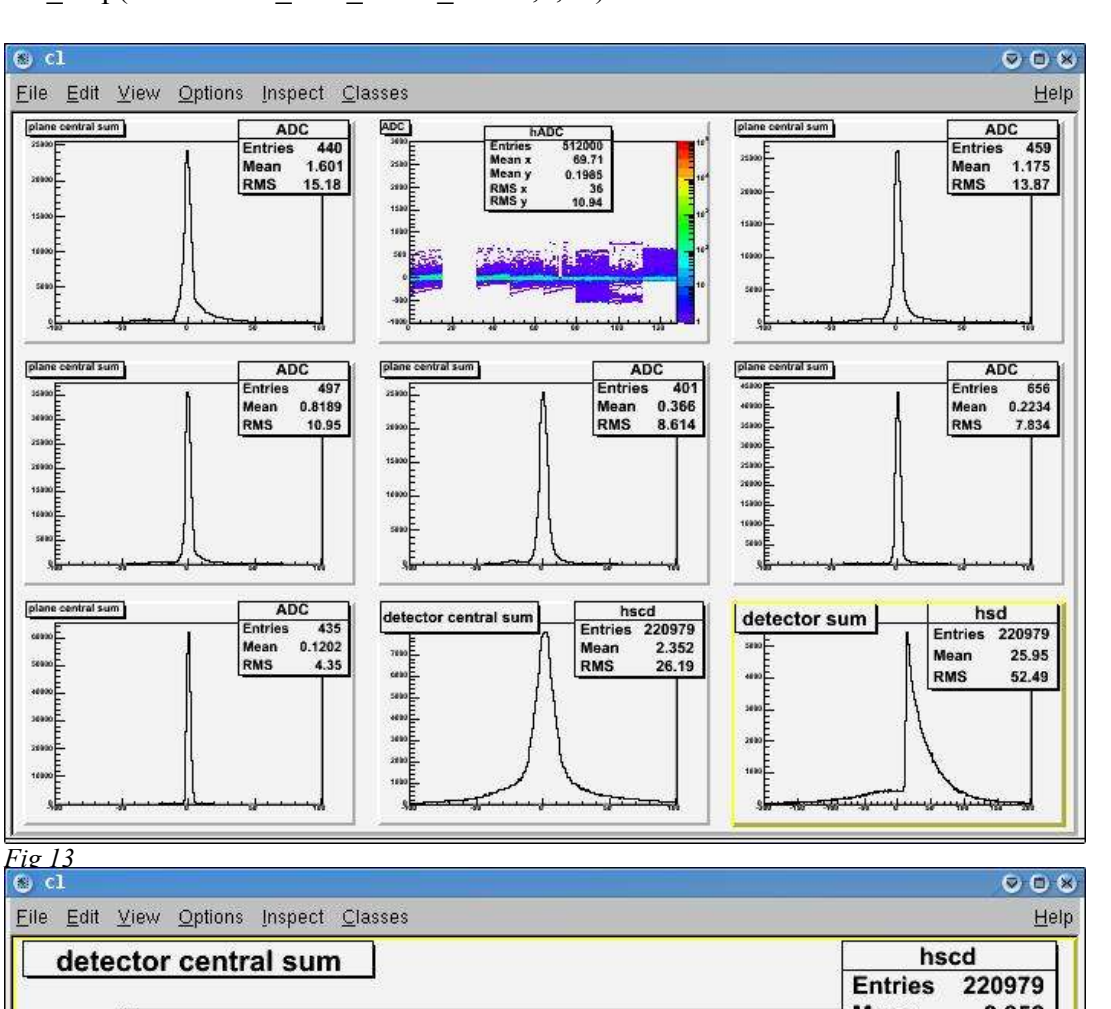

Fig 13

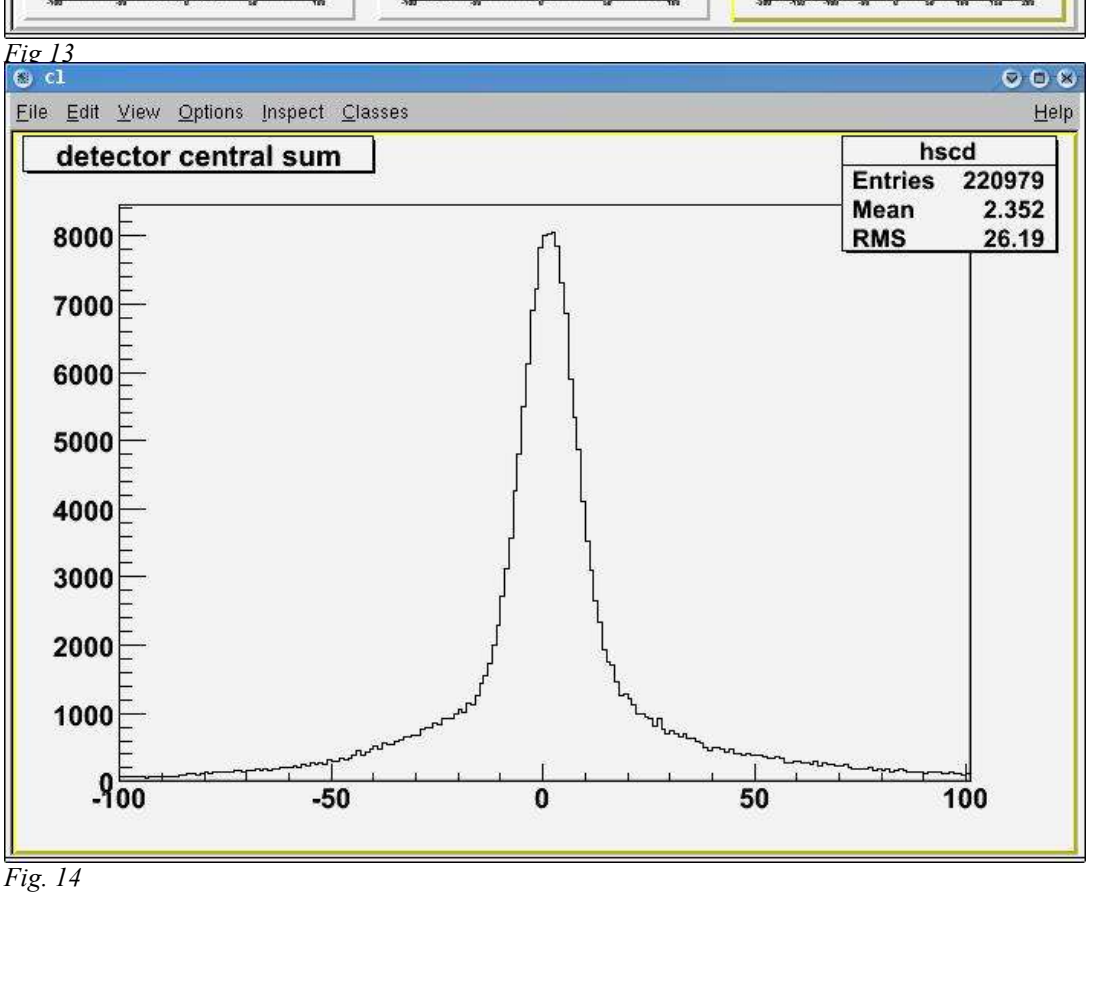

Fig. 14

Positron 10 GeV run

run_ihep("../data/raw_runs_38-01_e_wide_adc_-50_50/",1,38)

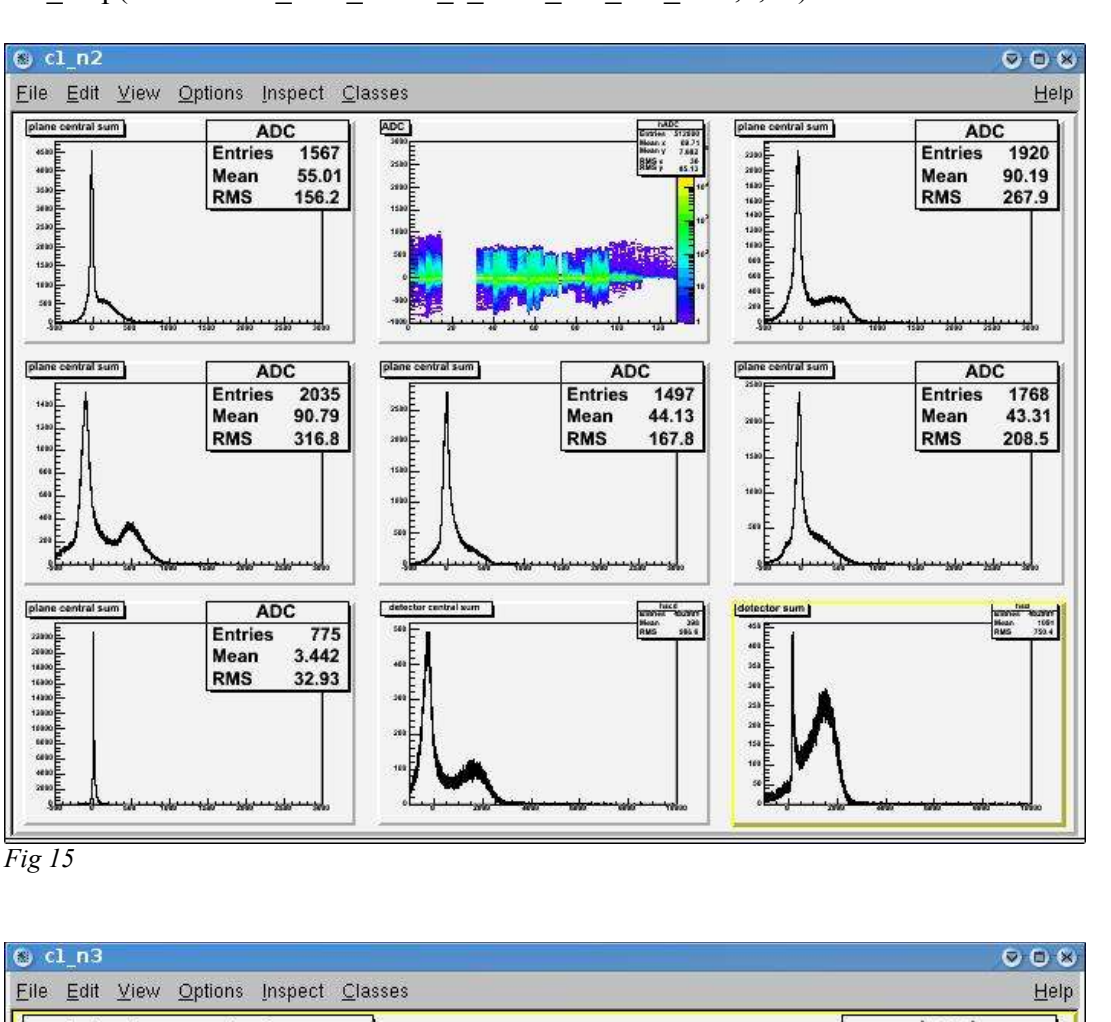

Fig 15

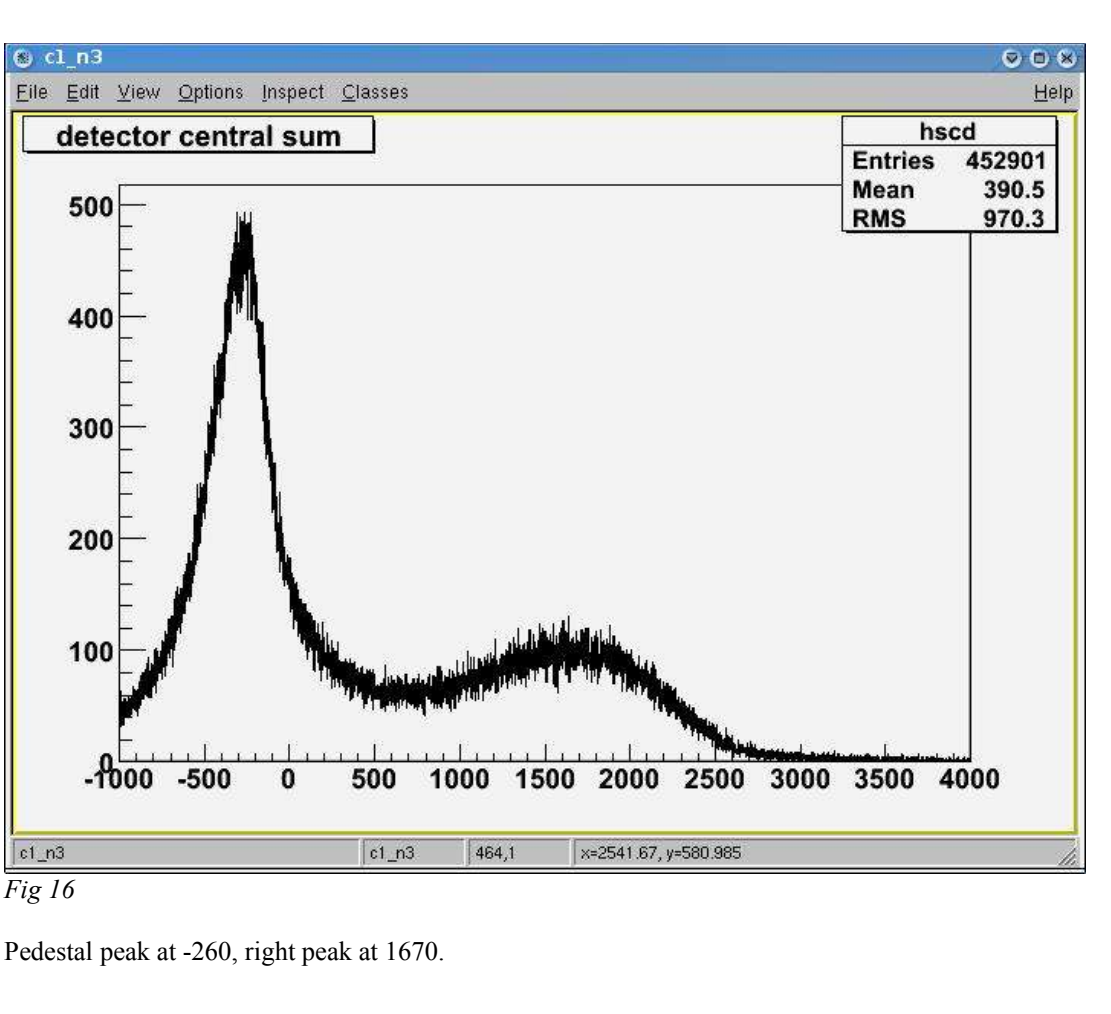

Fig 16

Pedestal peak at -260, right peak at 1670.

Proton 70 GeV run

run_ihep("../data/raw_runs_46-54_p_narrow_adc_-25_25/",1,50);

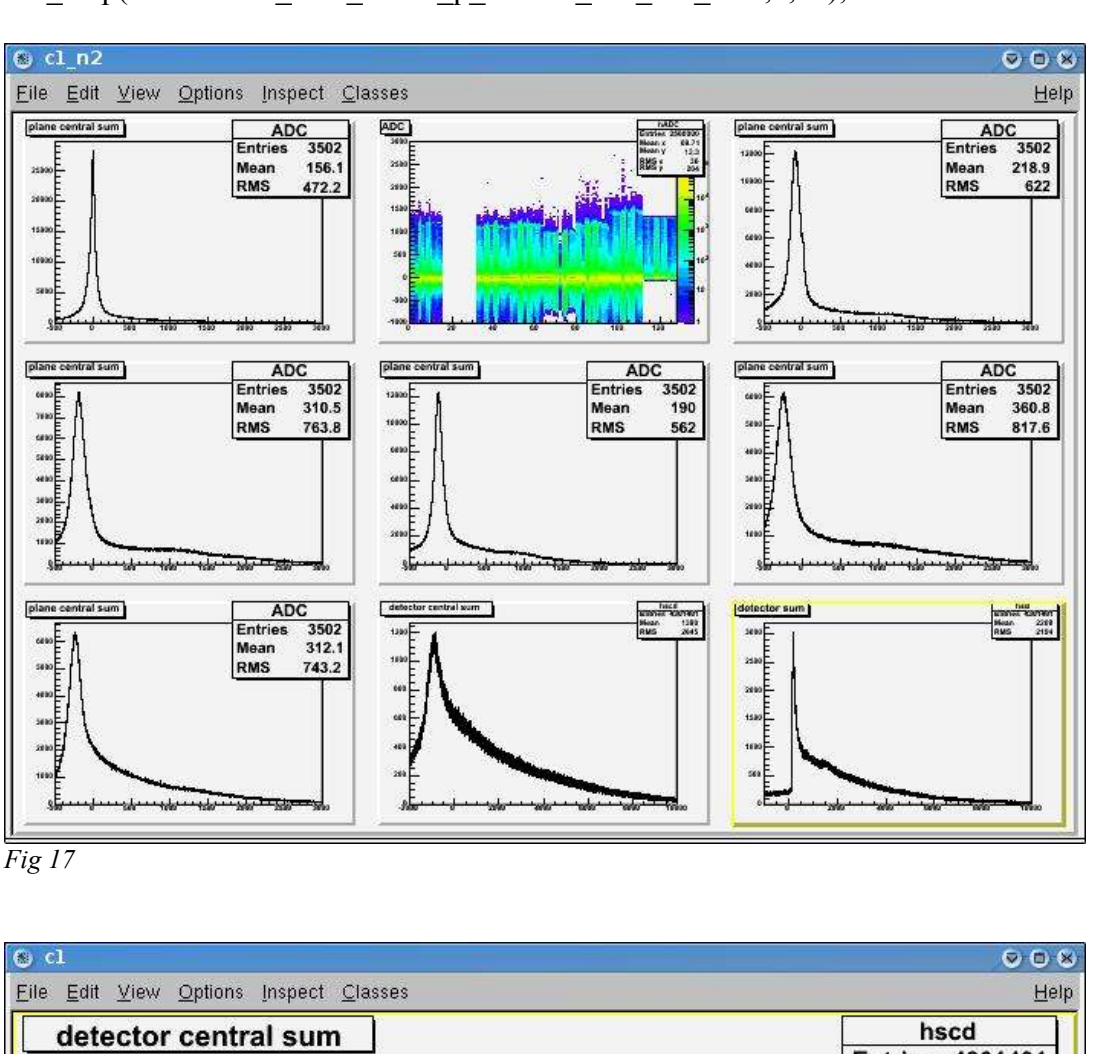

Fig 17

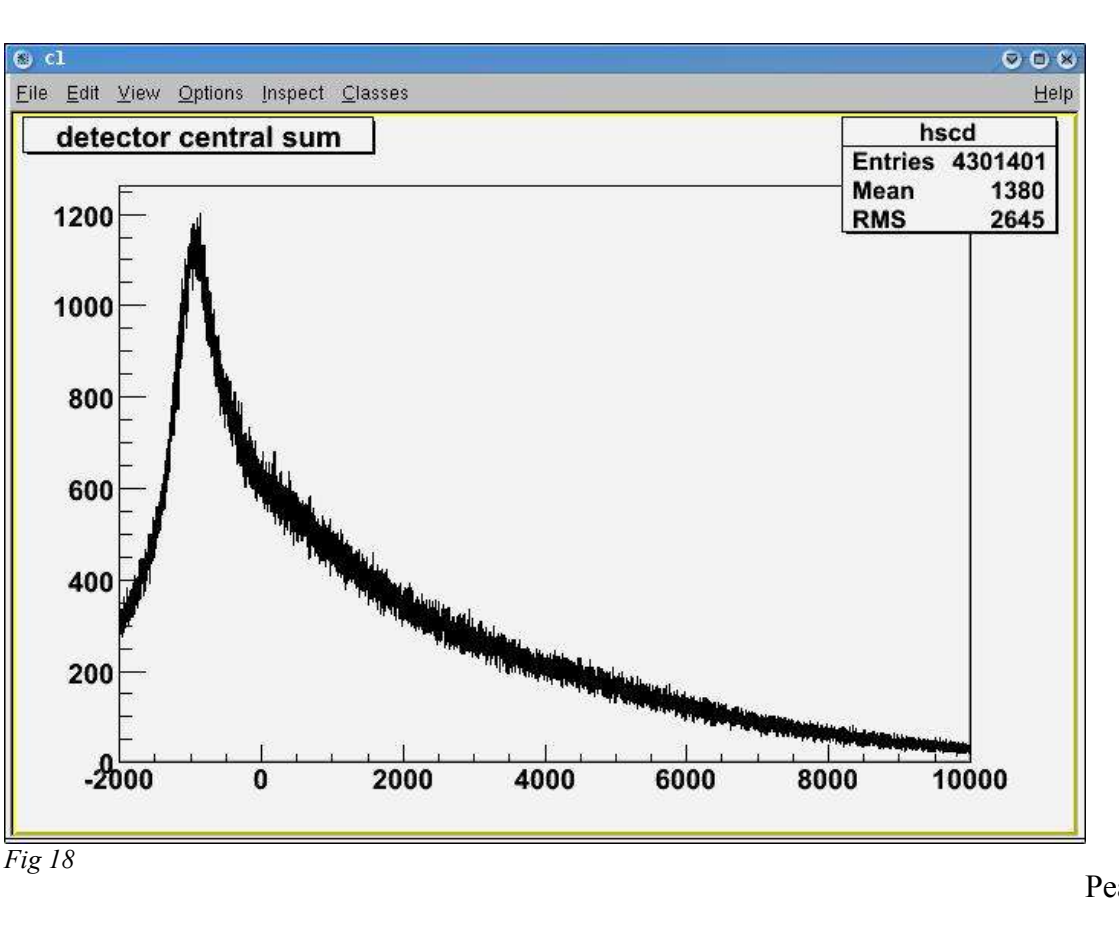

Fig 18

Peak at -892