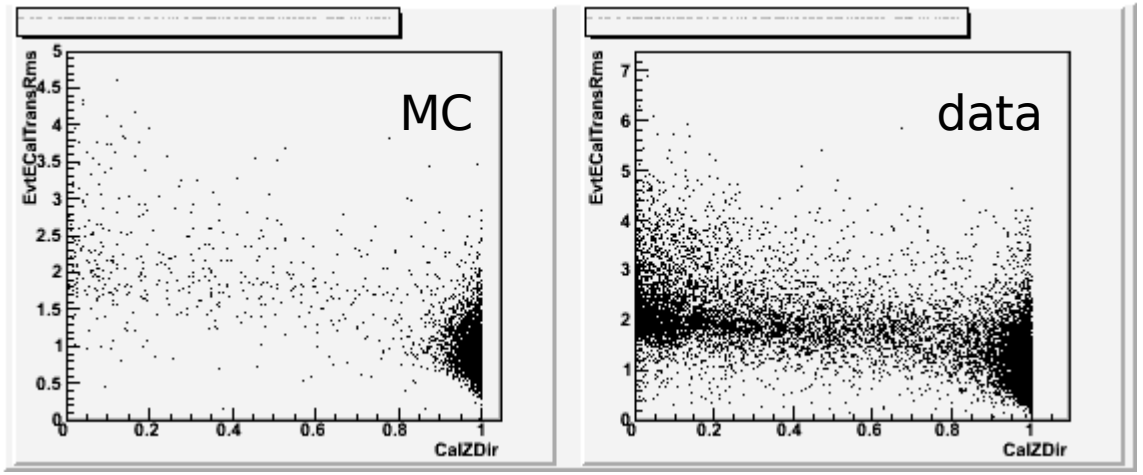
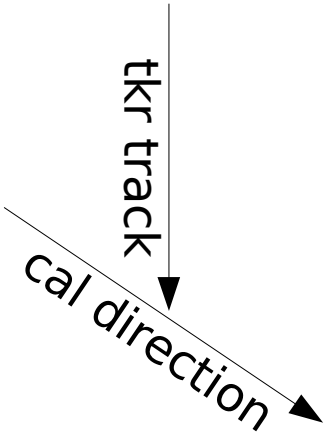
Looking at some weird (CAL) events

Looking at *normally incident* protons and electrons
Many events in tbeam data have *transverse* recon'ed cal track, very few in MC
See, ex, EvtCalTransRms vs CalZDir:





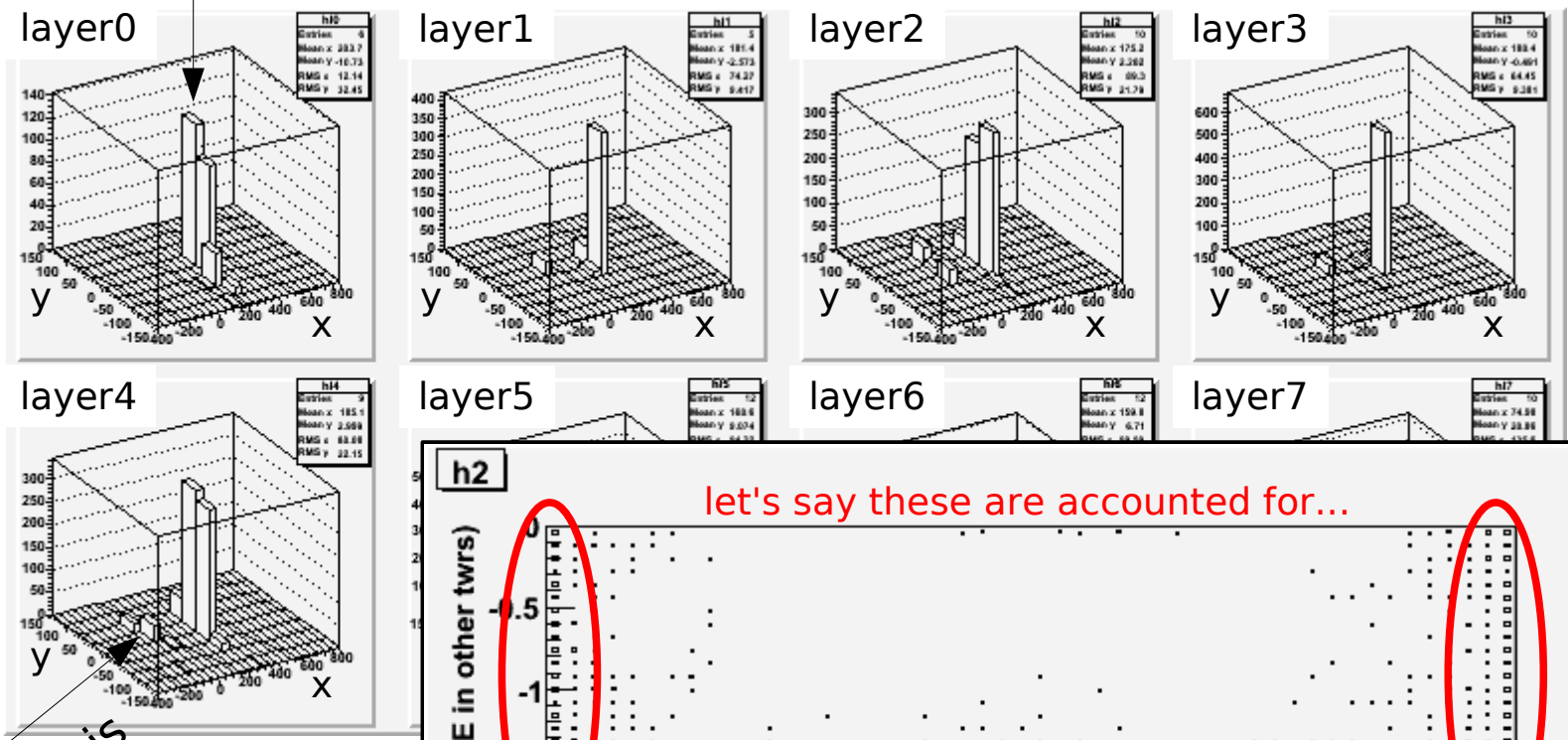
In some cases there is an additional energy deposit away from the main track, even in another tower, thus dragging the recon'ed cal shower axis along the x direction
But: the number of such event is in no way enough to explain the plot above

First, cutting those events is simple but it's not enough
Second, what can be said of events with shower direction pointing along the Y dir?

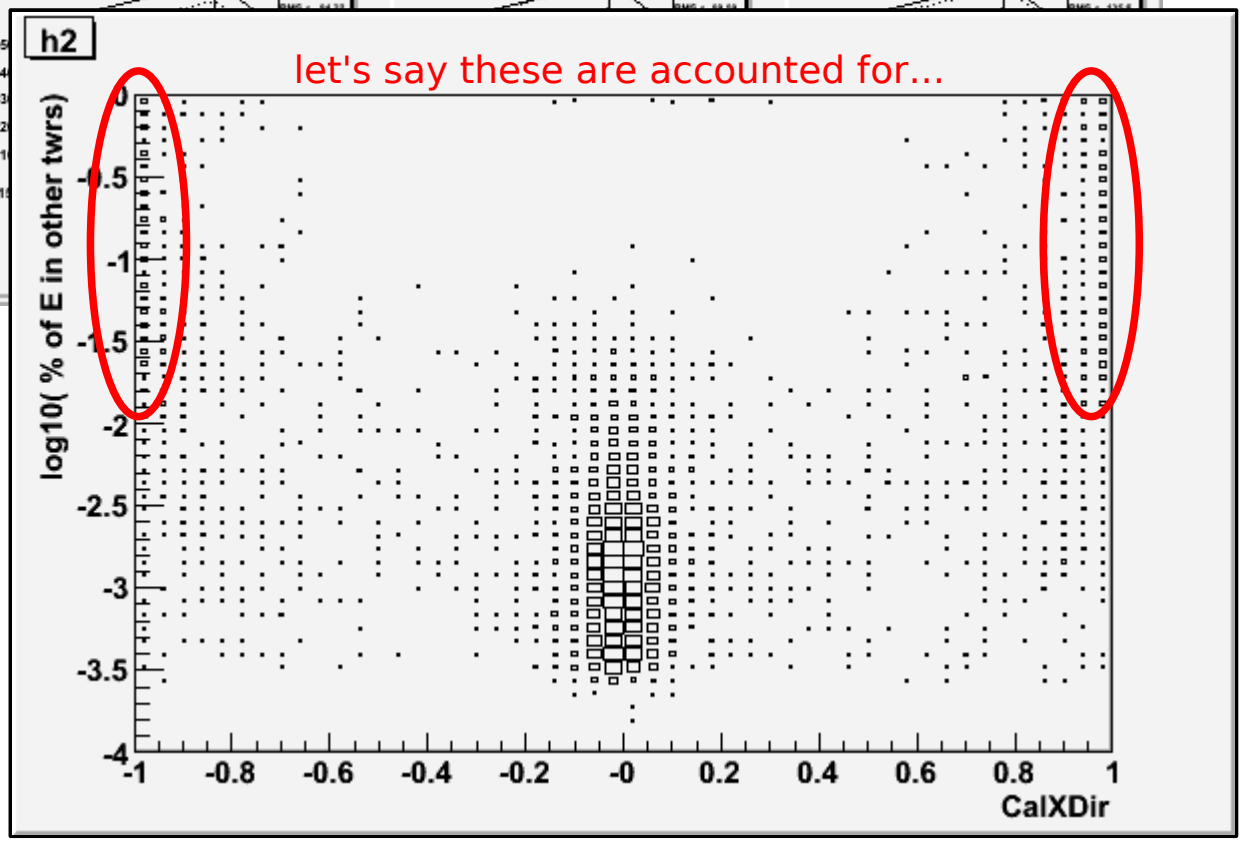
(there are also some events where several crystals report position exactly at their upper end, maybe it's correct)

e beam

See:



what's this

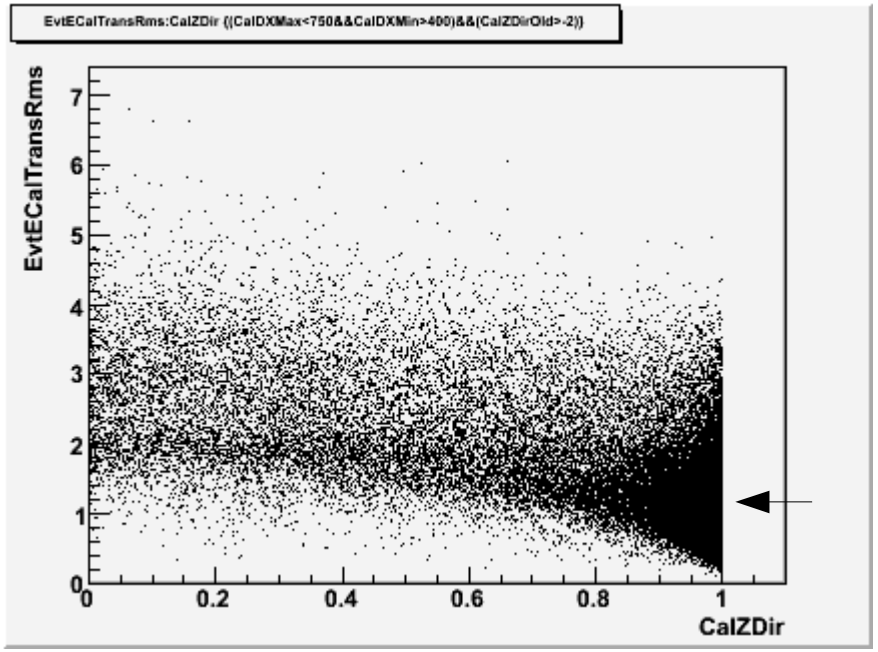


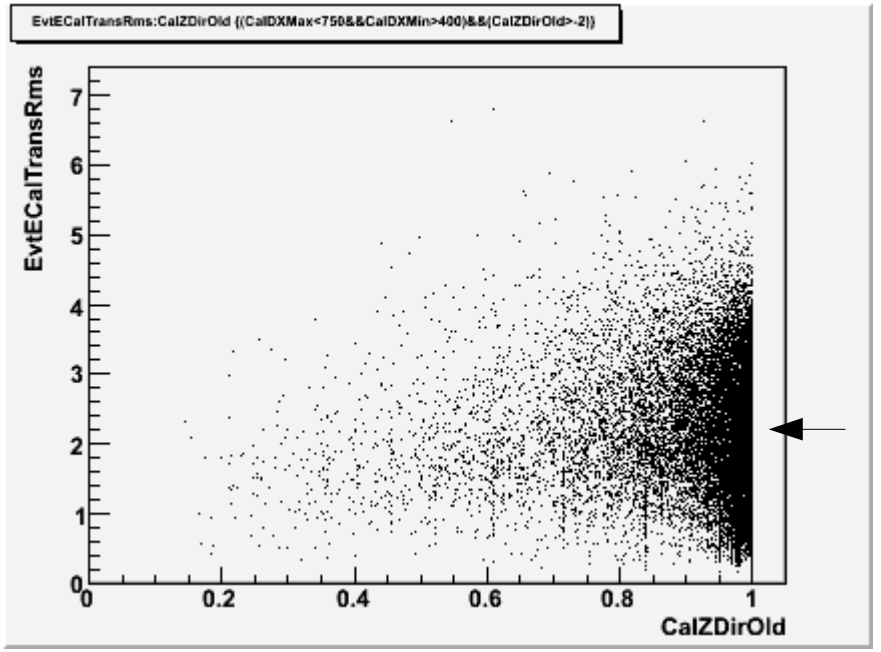
Unable to understand
events with no “strays”
or events with Y pointing
Nothing really weird is there when looking at the ReconEvent data

Look at method?

Older way of Cal* calculation was based on XZ,YZ covariances (across crystals)
Was replaced with advanced Momentum Analysis
Do they react differently to imperfect CAL calibration?

1st test: run 1423, normal protons, 6 GeV



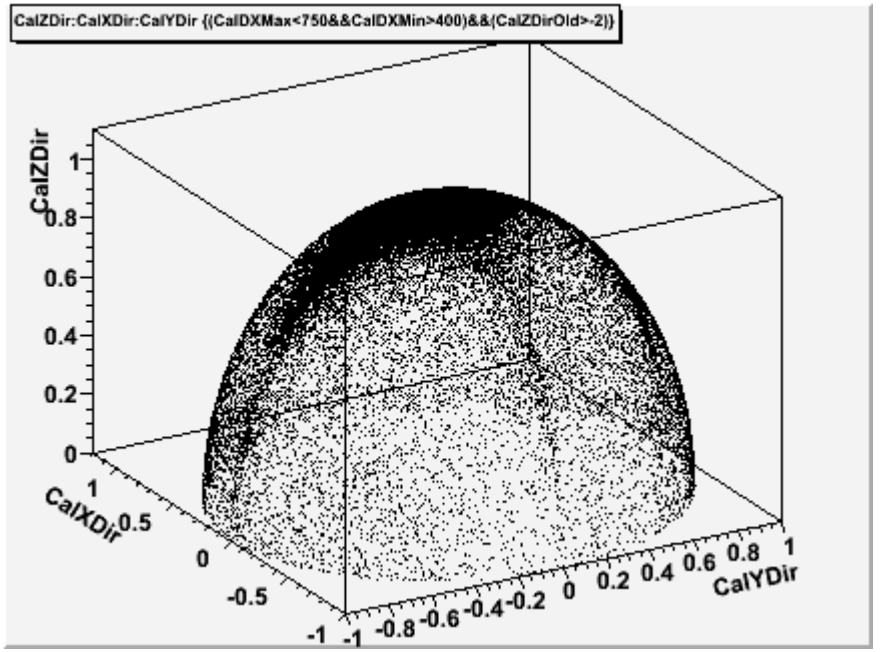


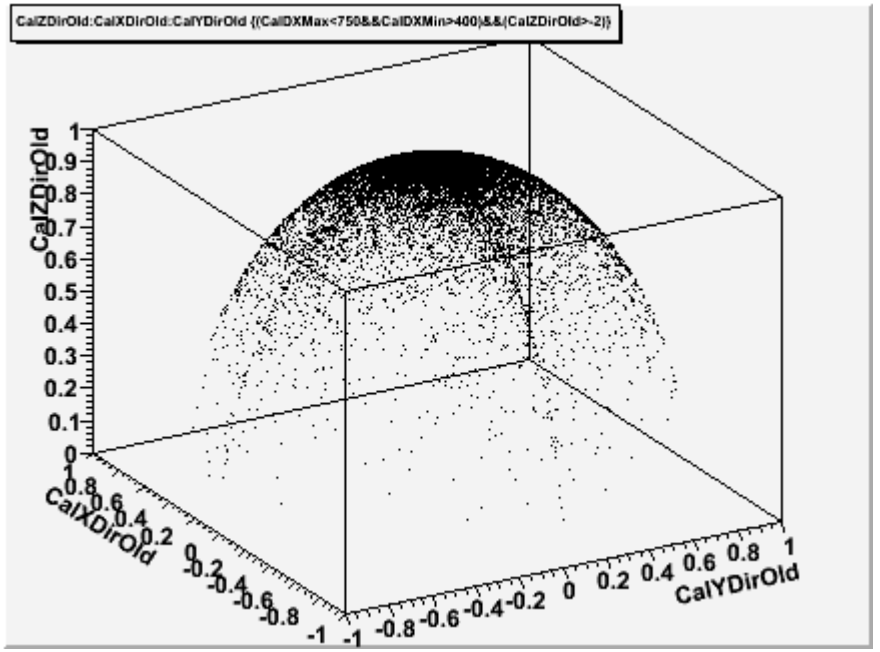
this is new PMA analysis

this would have been old dir.
I replicated it in a ROOT macro

Mind that to make plots above I have already cut out events with CAL hits out of “main” tower

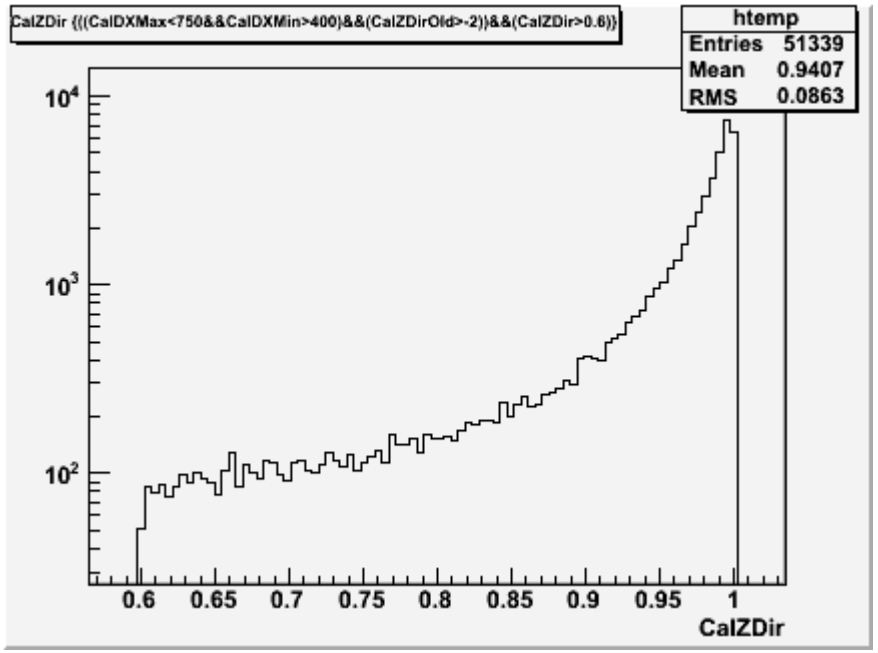
… more plots …

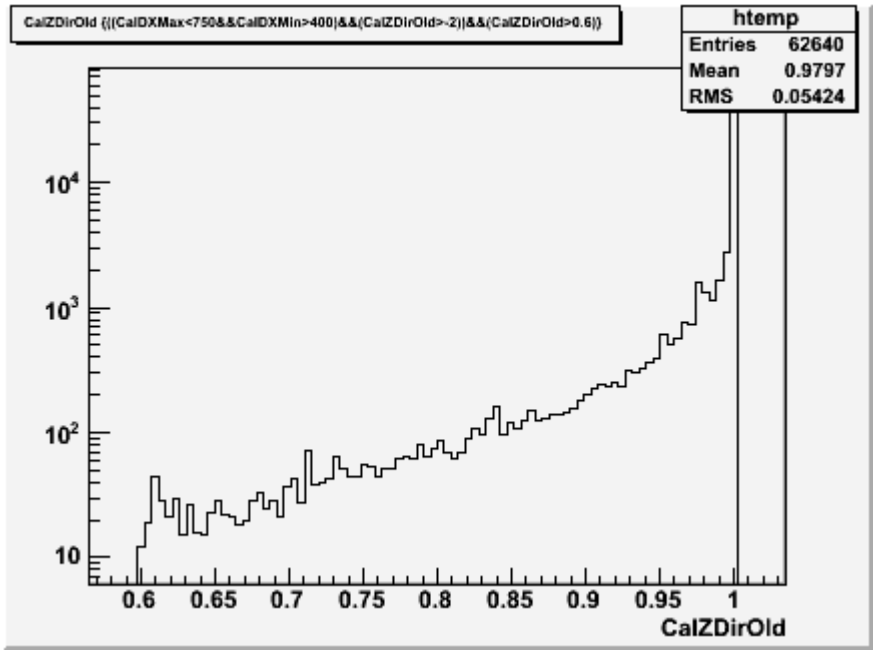




current

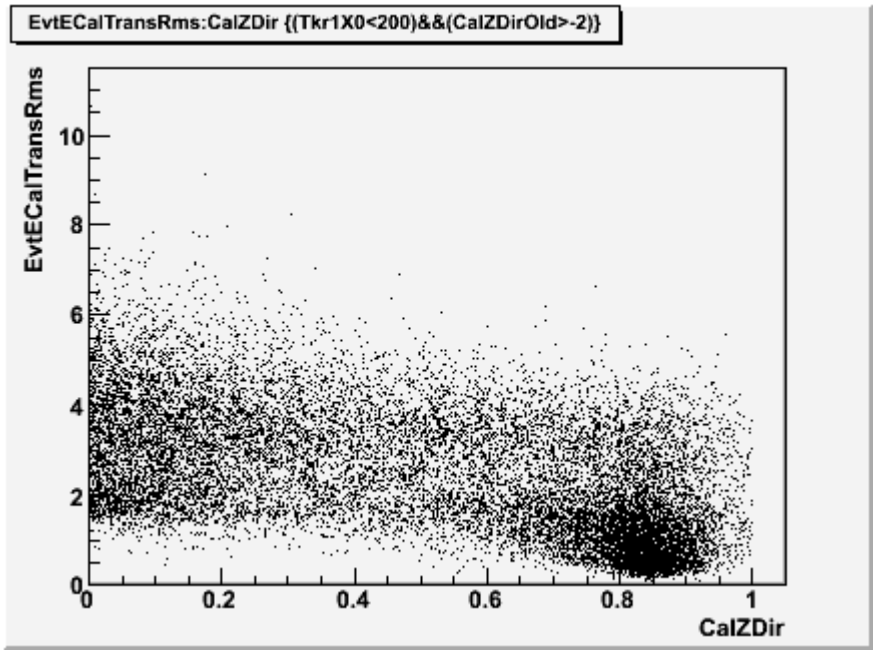
older

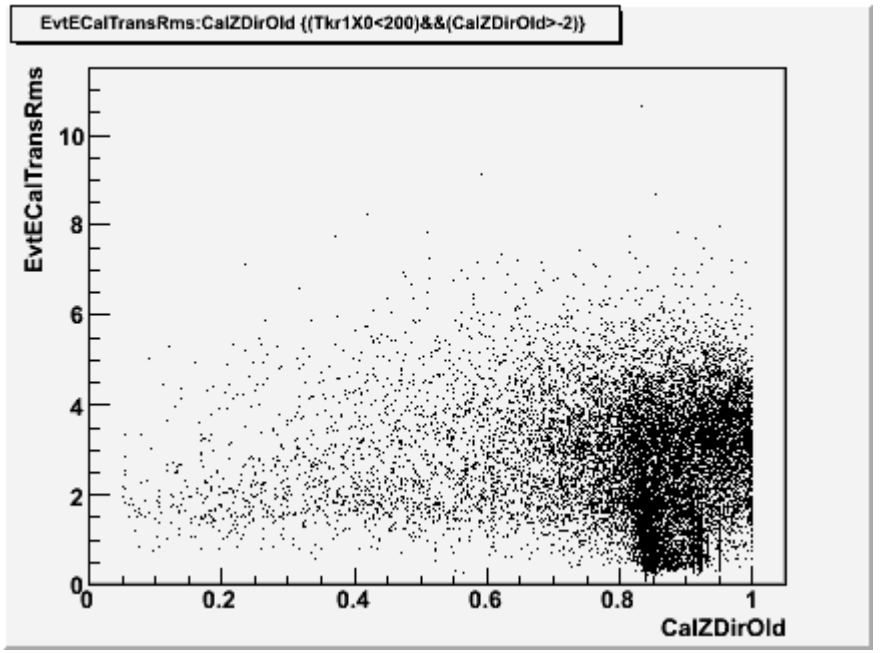


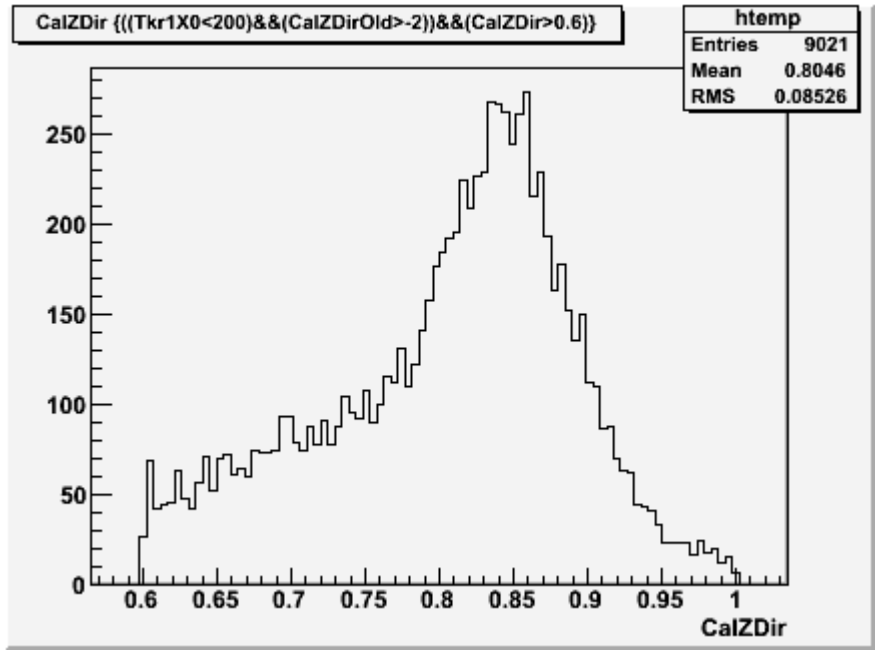


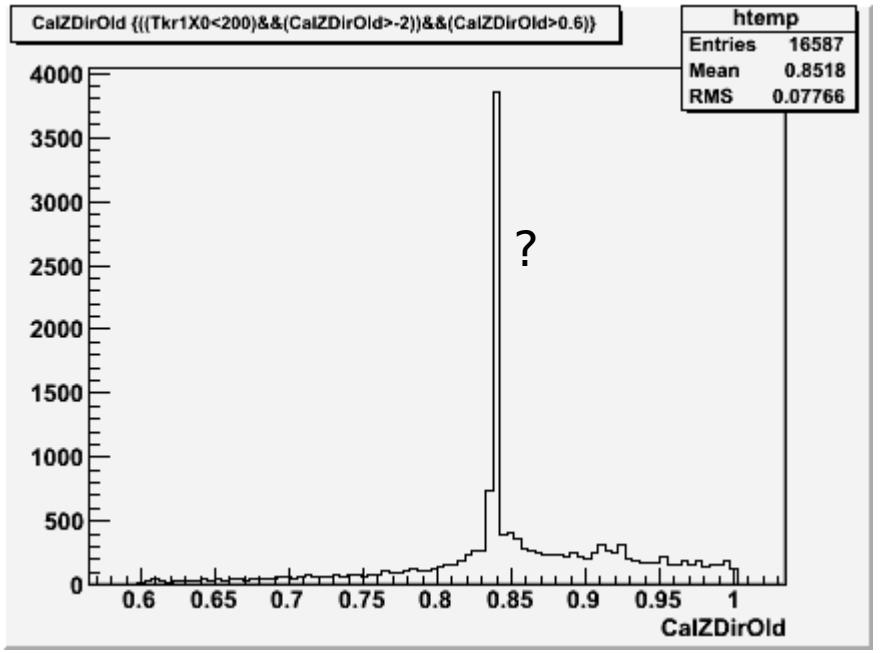
protons at an angle

2nd test: 1368 30deg protons, 10 GeV:





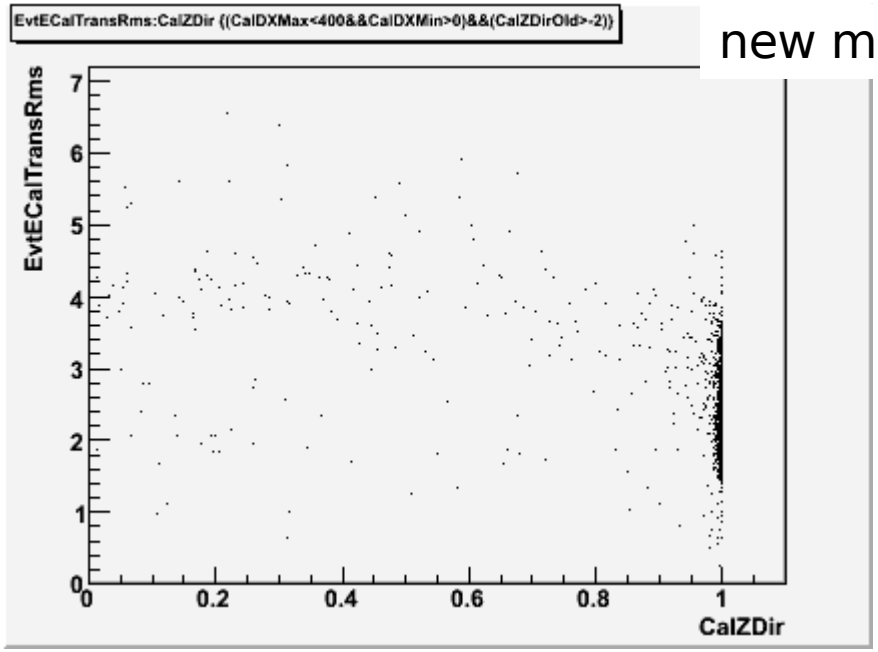


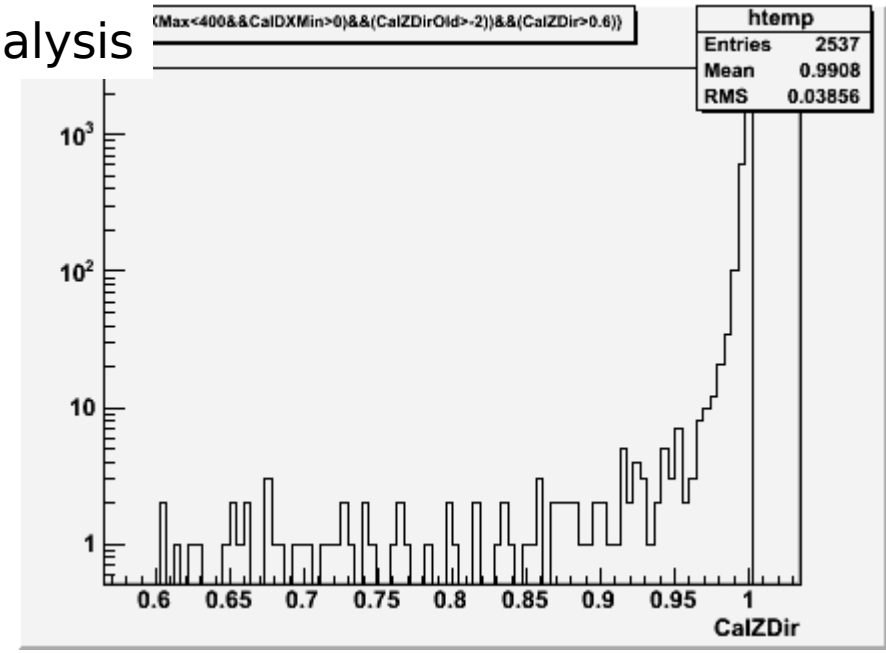


easier: electrons

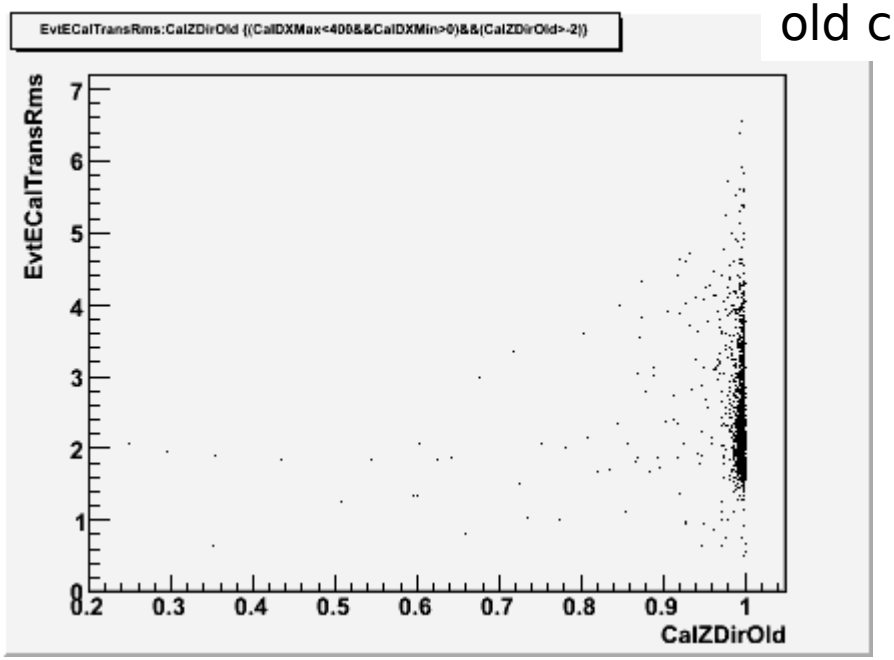
3rd test: run 1147, normal electrons, 5 GeV: effect is there, but **much** smaller

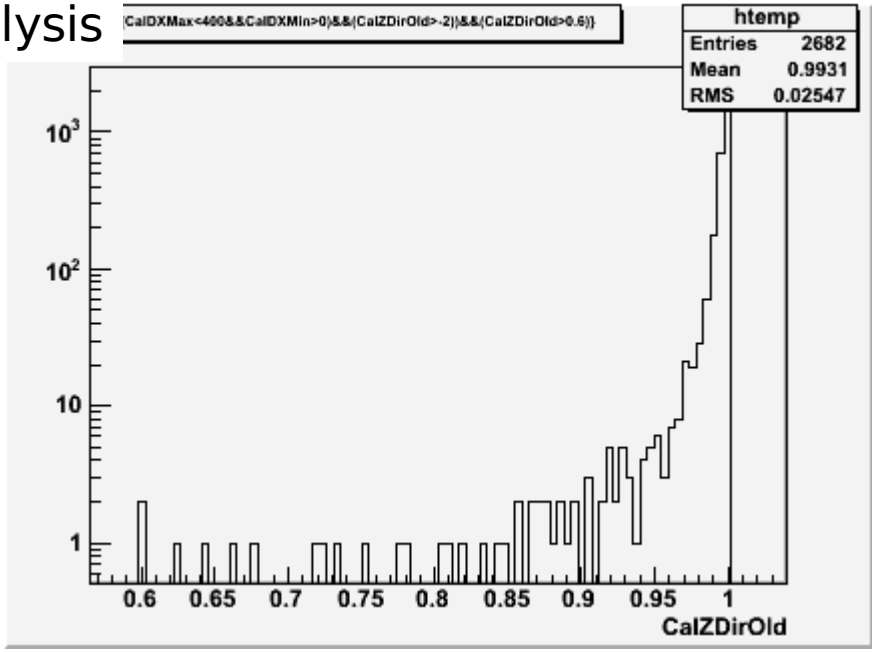
new moment analysis





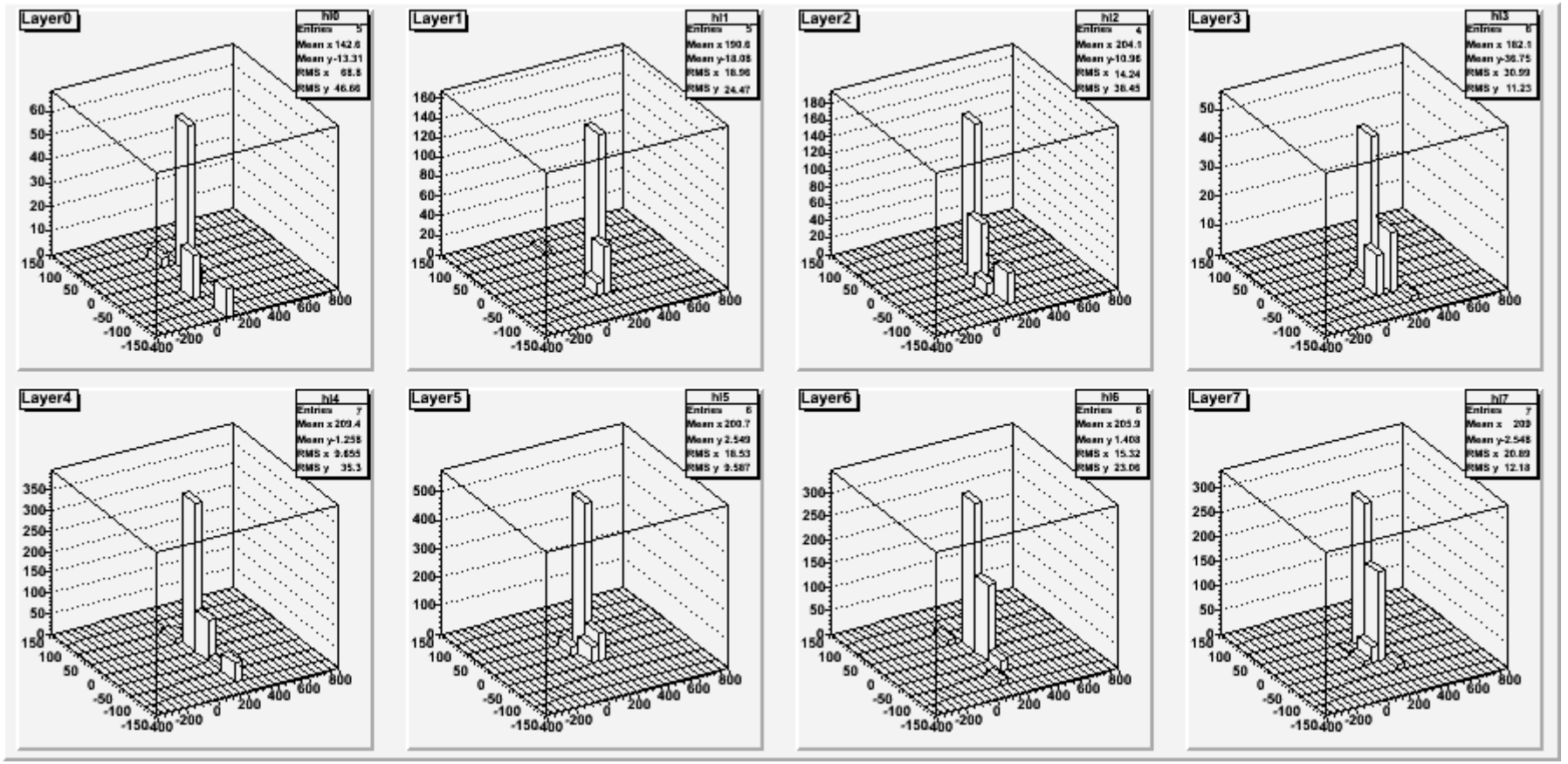
old covar. analysis





Investigate a “Y” event

Normal electrons, 5 GeV at (201,13,0), datafile 1147
Take an event (number 154) with **CalDir=(-0.040,-0.965,0.259)**
All fired CAL xtals fall within 24<x<350,-125<y<163



Why CAL points along the Y dir?
I find with old method CalDir=(-0.14,-0.12,0.98)

Conclusions

Latest CalDir recon method, Moment Analysis, is extremely sensitive (to calibration?)
Older approach was not so...
Is there a way to keep the new one (and its performances) but lessen this sensitivity?

Must understand **where** is the problem, but:
Old covariance method was easy easy
PMA seems much more complex
Let's see....

One could also retain both methods and consider the angle between the two recon'ed directions as a telltale sign that something is wrong

This pres. at http://sirad.pd.infn.it/glast/ground_sw/IA/data/cal_calculate_upd.pdf
Code too:
http://sirad.pd.infn.it/glast/ground_sw/IA/code/old_caldir_c.txt
http://sirad.pd.infn.it/glast/ground_sw/IA/code/caldirplot_c.txt

Thanks Tracy!