

# 2007 CALICE Testbeam

Of course with focus on the HCAL

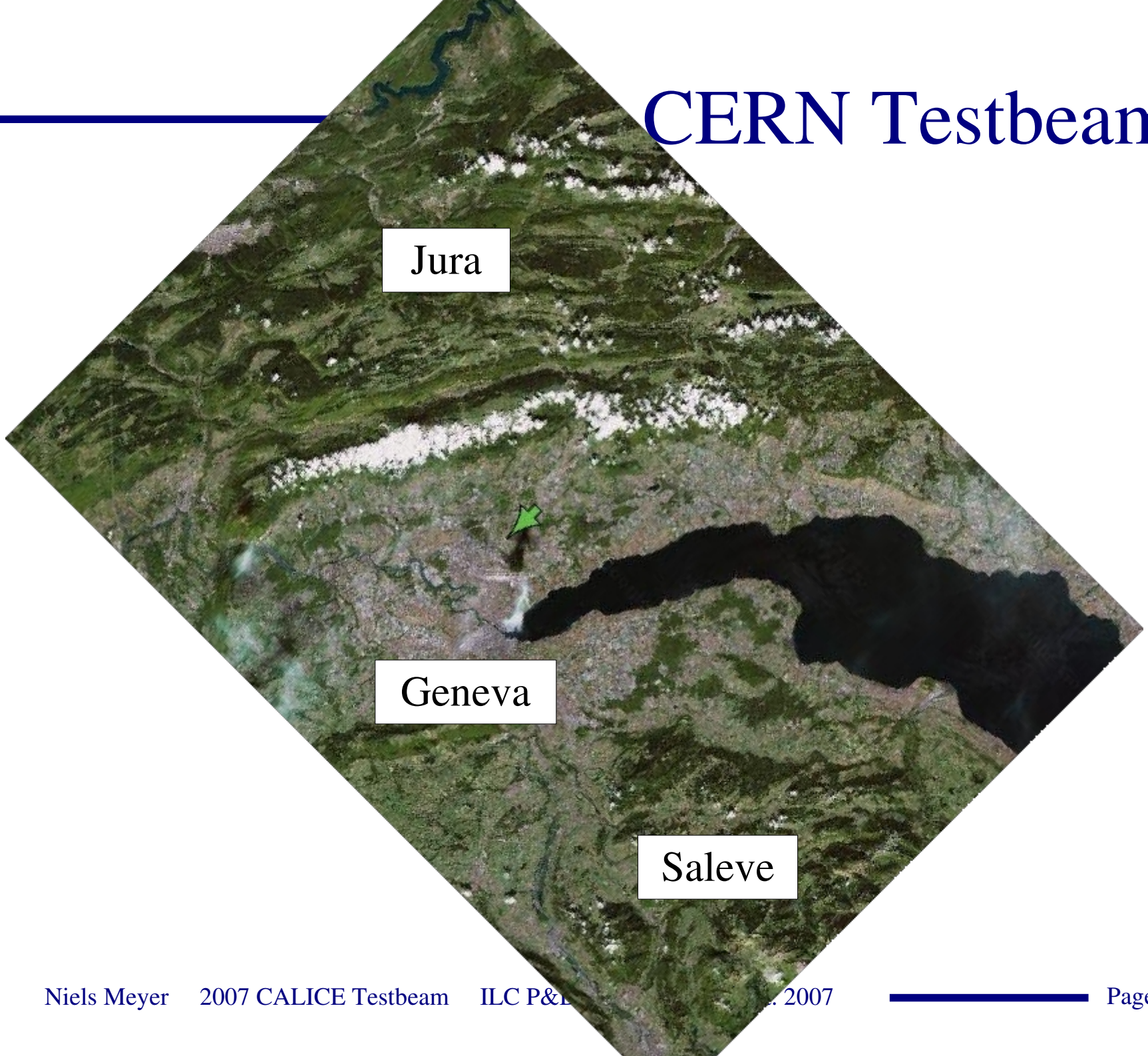
Niels Meyer

ILC Physics and Detector Meeting

02. October 2007

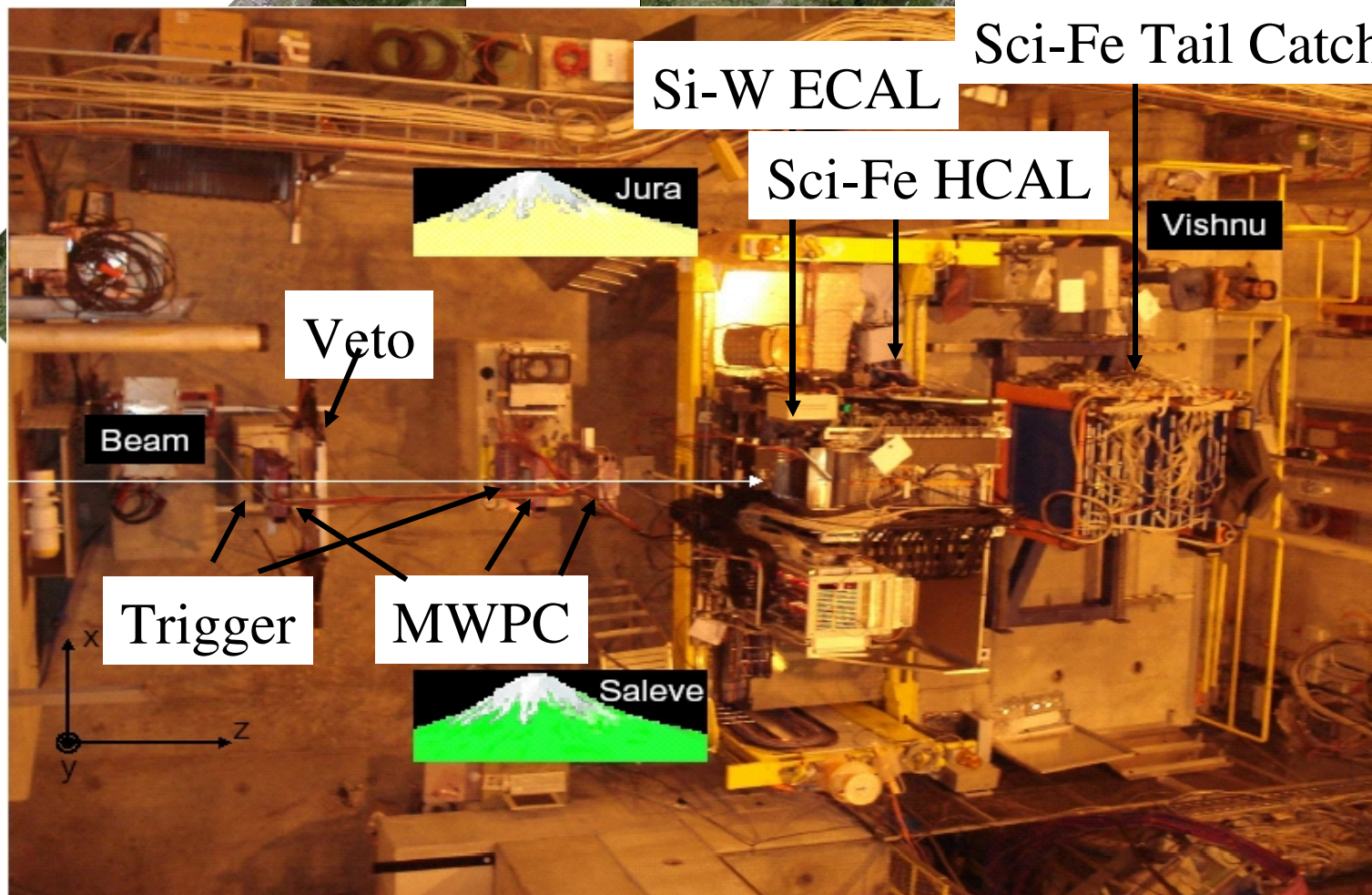
Setup – Data taking – HCAL response

# CERN Testbeam





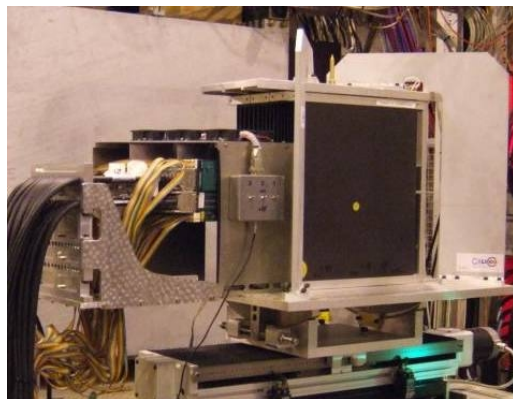
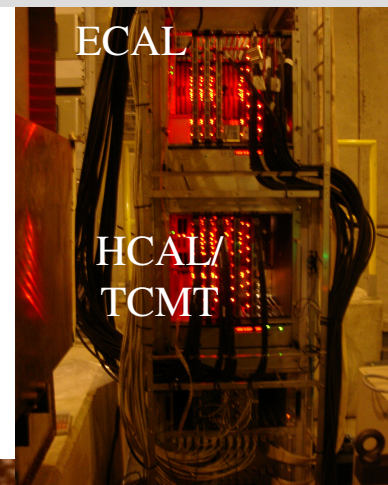
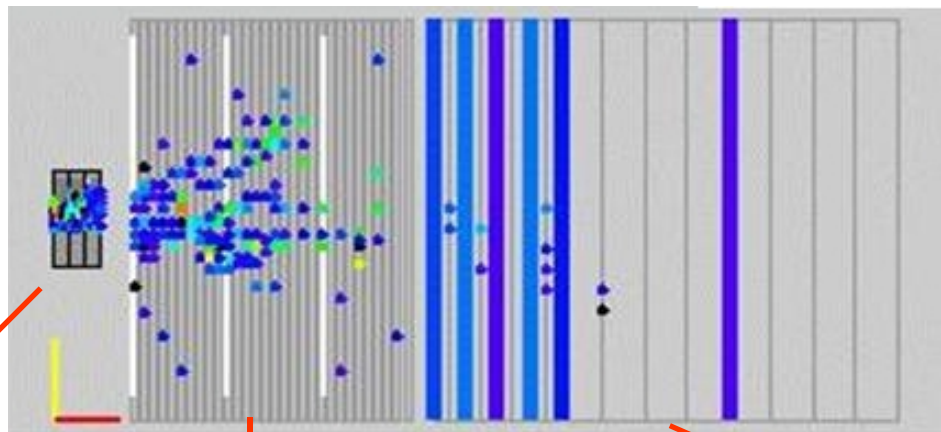
# CERN Testbeam



# CERN Testbeam

Common VME DAQ  
18'000 ch

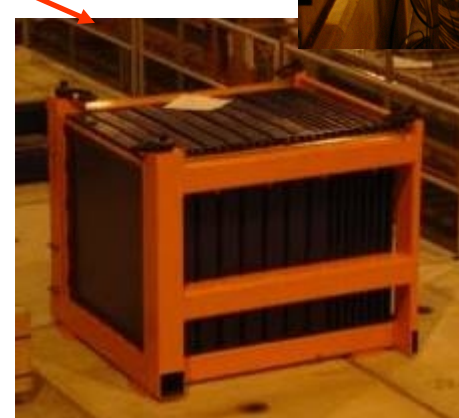
40 GeV pion shower  
@ CERN test beam



Si-W Electromagnetic calor.  
1x1cm<sup>2</sup> lateral segmentation  
1 X<sub>0</sub> longitudinal segment.  
~1λ total material



Scint. Tiles-Fe hadronic calor.  
3x3cm<sup>2</sup> lateral segmentation  
~4.5 λ in 38 layers

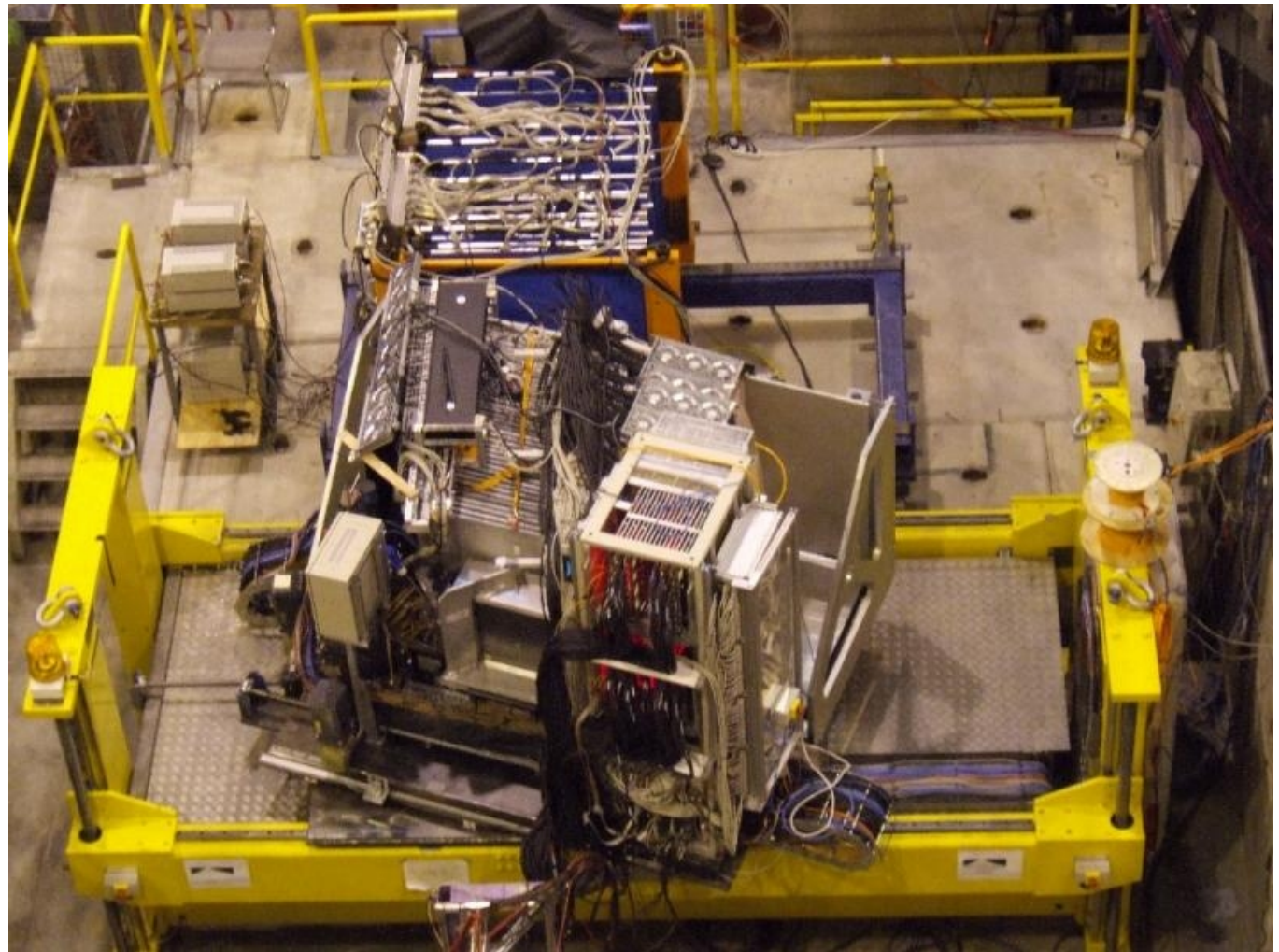
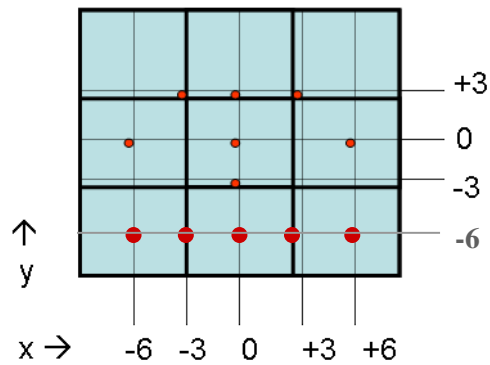


Scint. Strips-Fe Tail Catcher  
& Muon Tracker  
5x100cm<sup>2</sup> strips  
~5 λ in 16 layer

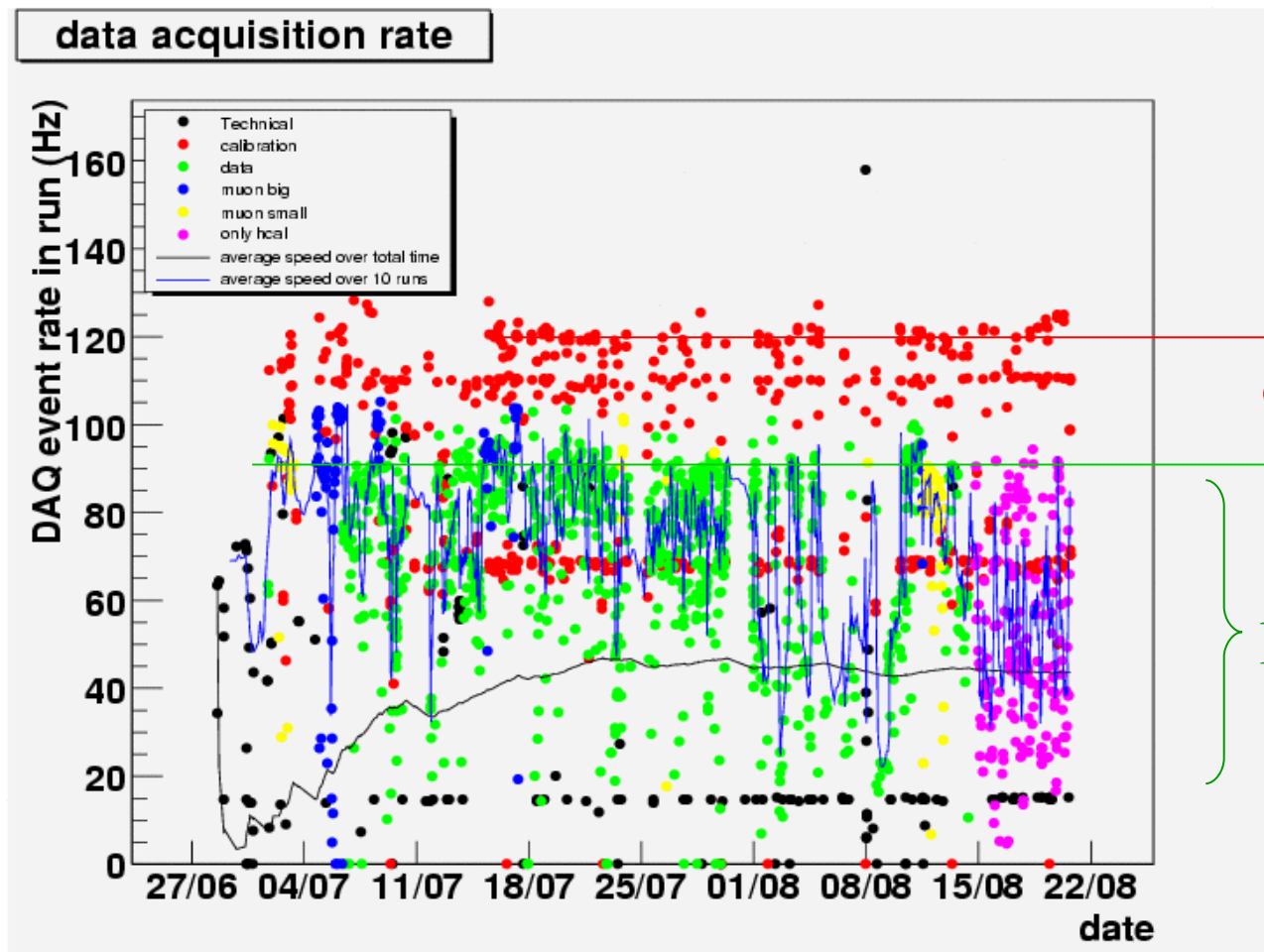


# CERN Testbeam

position scan points:



# Detector Performance



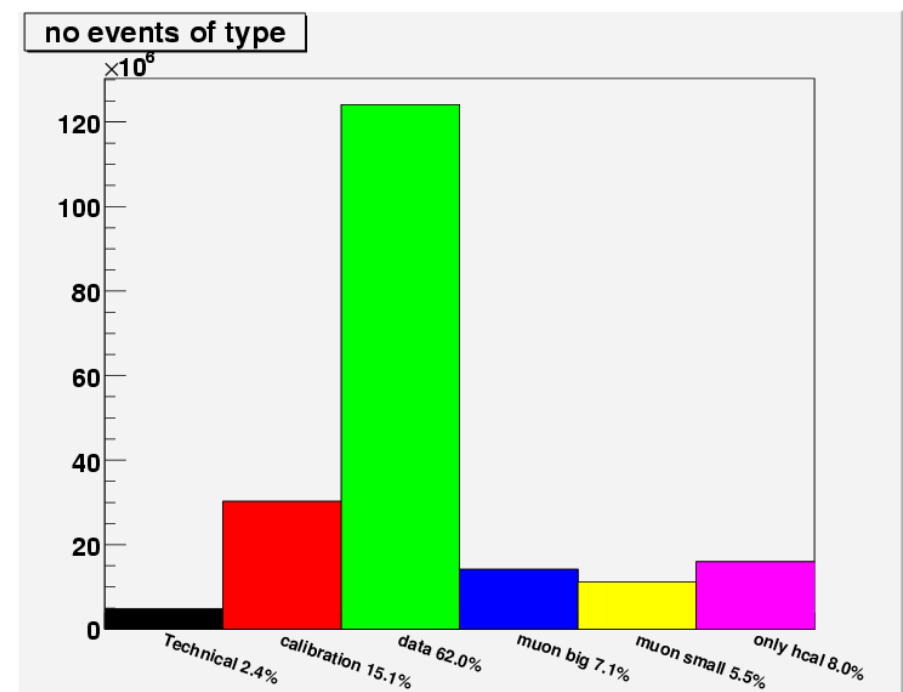
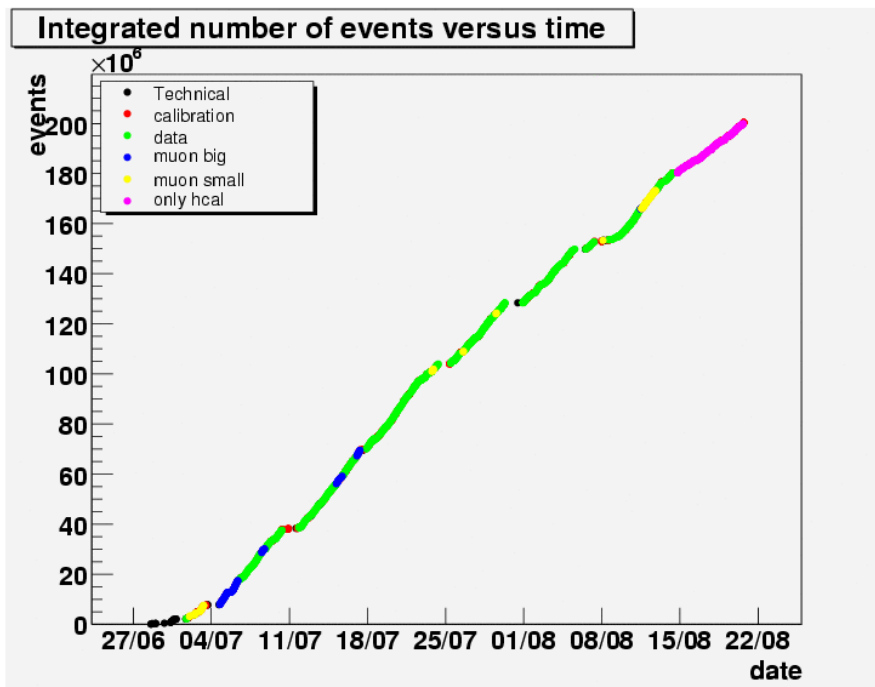
120 Hz limit of DAQ  
out of spill

90 Hz limit of DAQ  
in spill

limited by beam rate

# Detector Performance

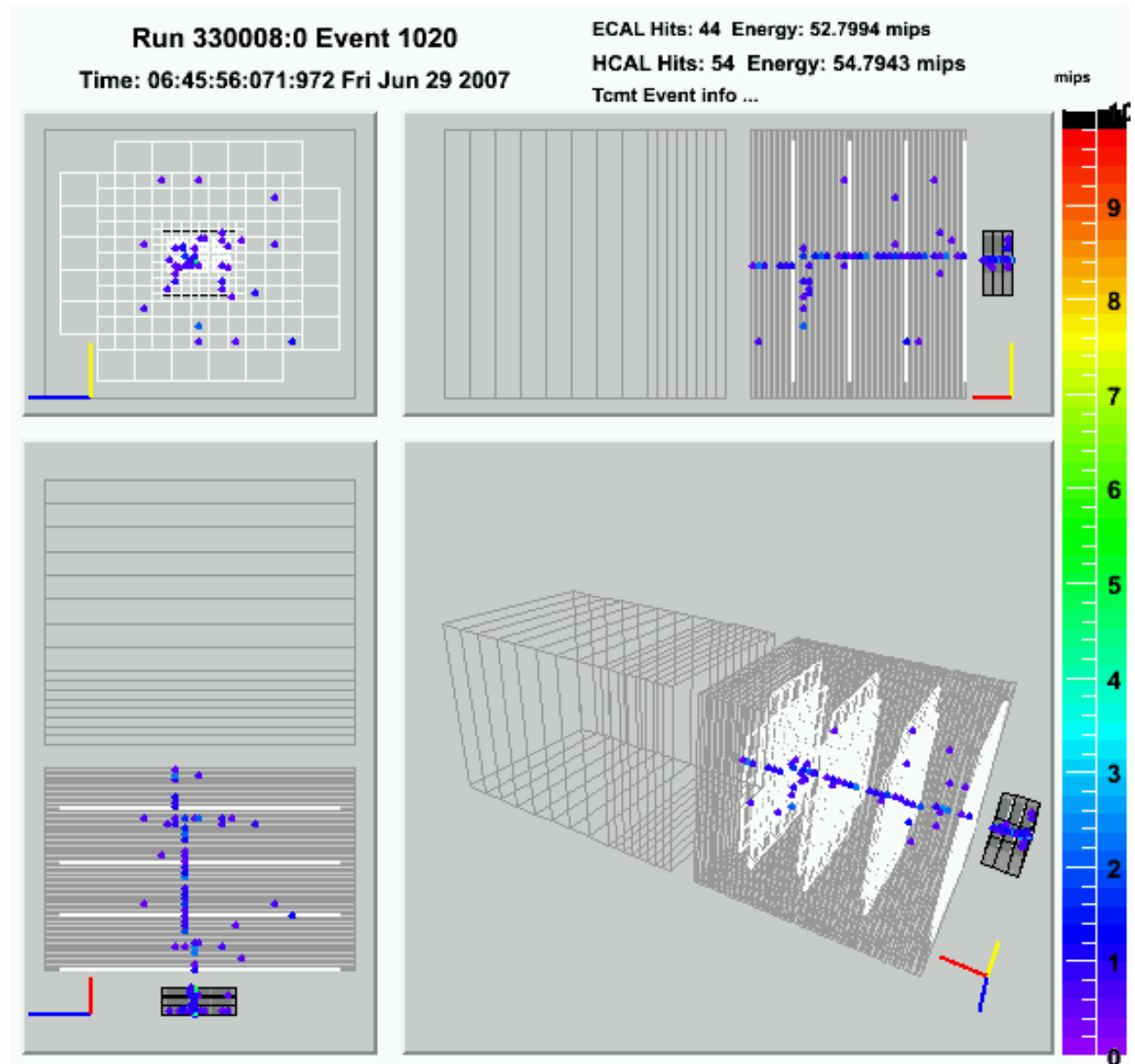
Total data taking time	7 weeks
SPS uptime	80.7 %
Beam controlled by H6B	76.1 % (94.4 % of uptime)
DAQ on beamData	60.2% ( <b>79.1 %</b> of beam in H6B)
DAQ on calibration	7.8 %



# events versus time

# Calibrations

'First' event,  
aproximate MIP,  
working point not  
yet tuned





# Calibrations

## MIP:

98% of 7608 channels calibrated

## Gain:

94% calibrated, 4% no LED avail.

## Intercalibration:

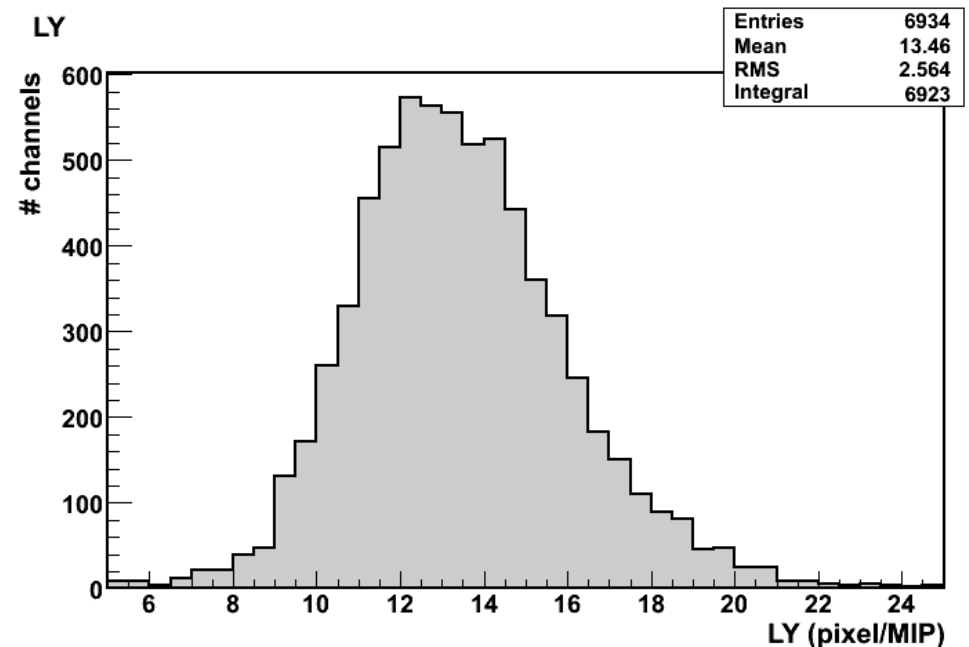
93% calibrated, 4% no LED avail.

## Lightyield:

average is 13.5, close to 15

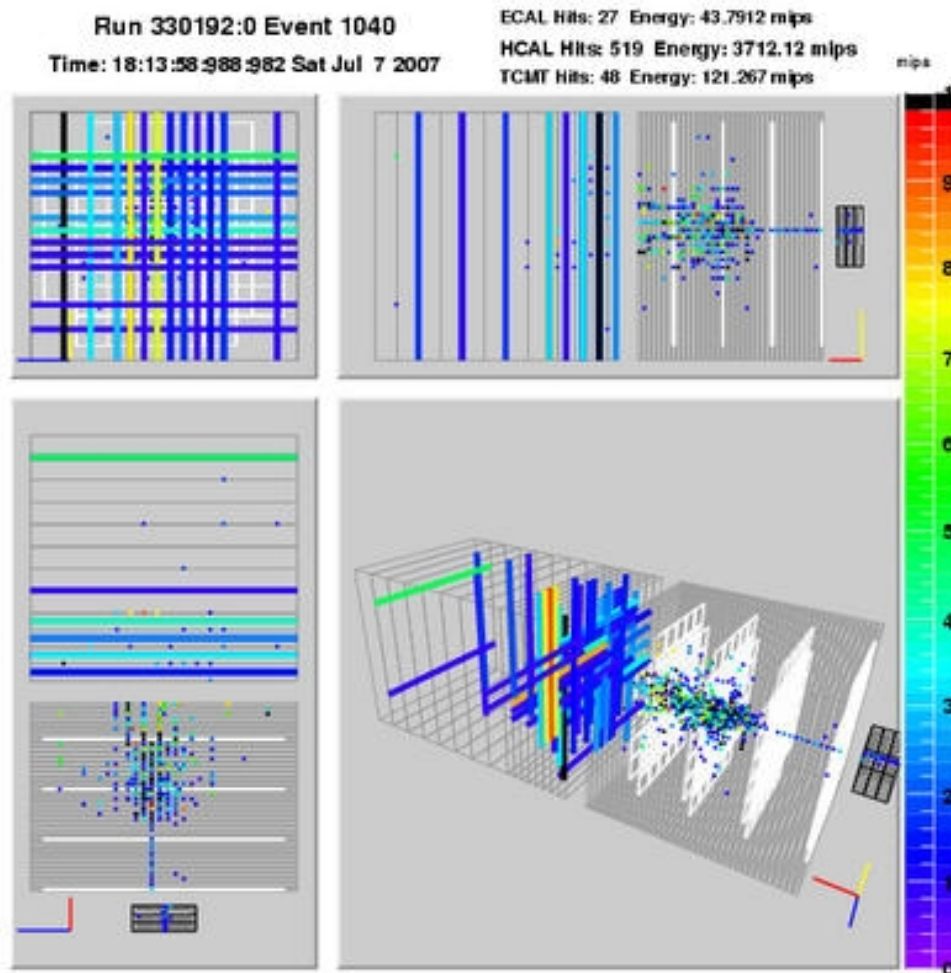
## Stability:

gain has 2.6% RMS overall,  
including T variations



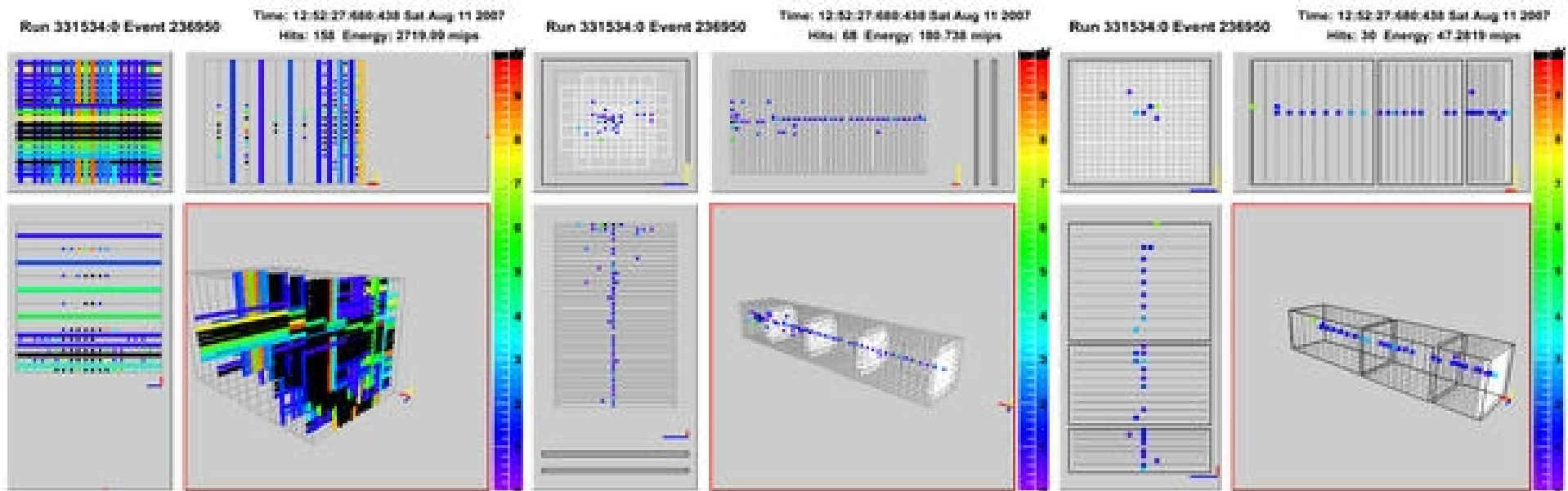
# Lots of nice data

That's the hadron showers we wanted to see...



# Lots of nice data

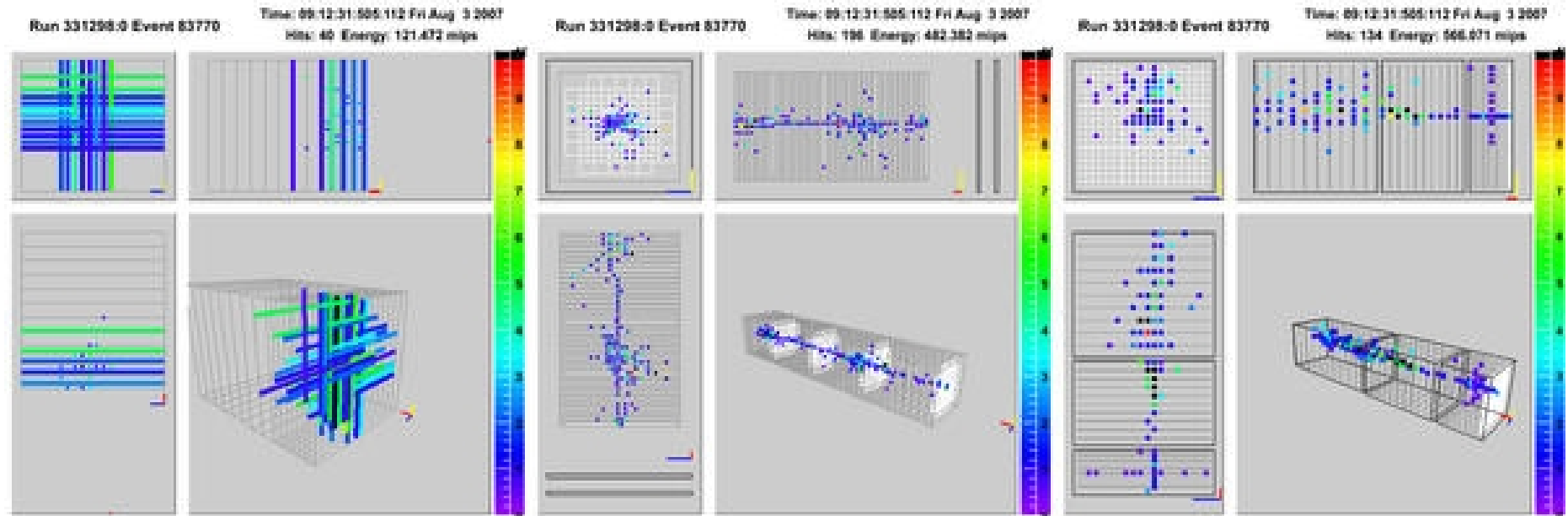
Showers starting only in the TCMT





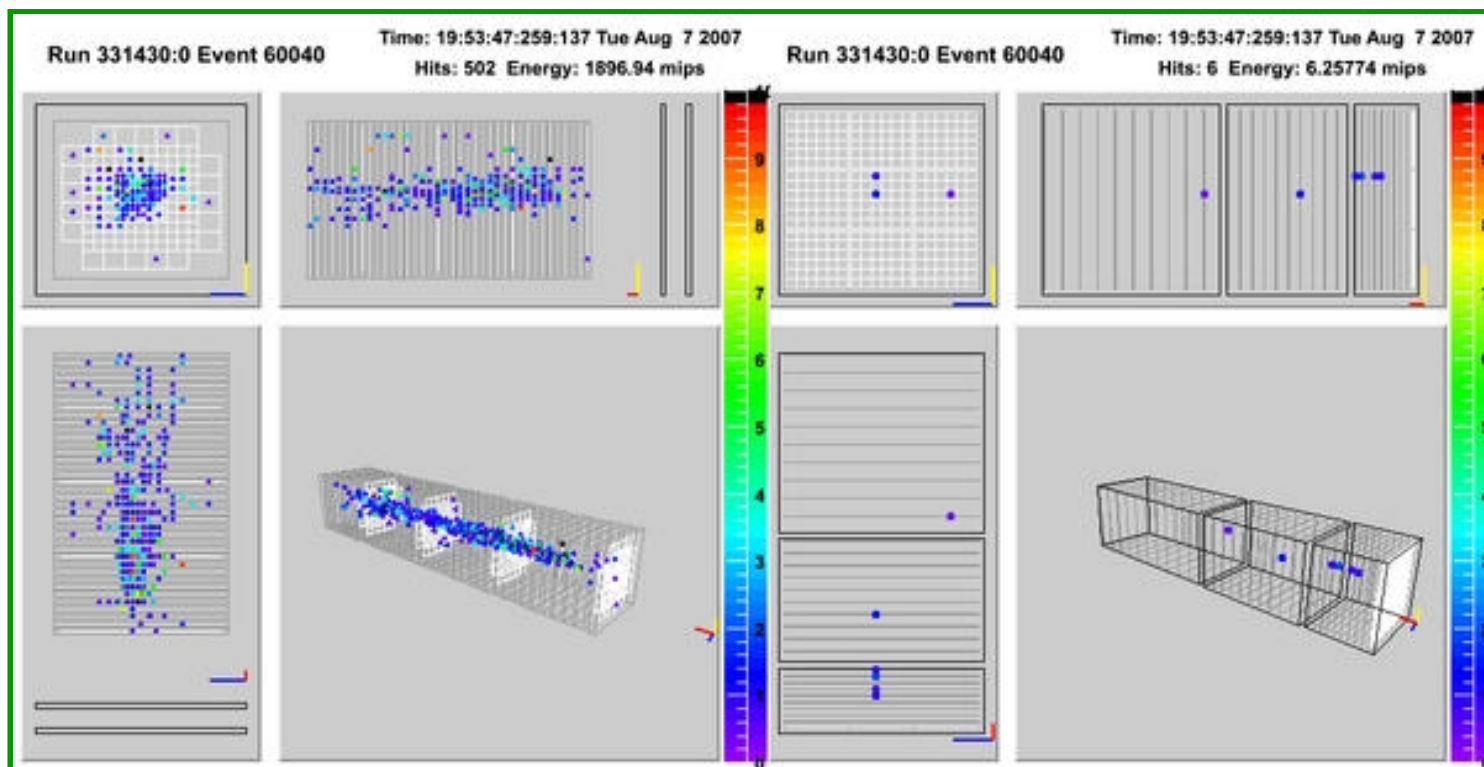
# Lots of nice data

A special event: one interaction in every detector



# Lots of nice data

A peculiar one: HCAL shower, but empty ECAL



# HCAL Standalone Positron Data

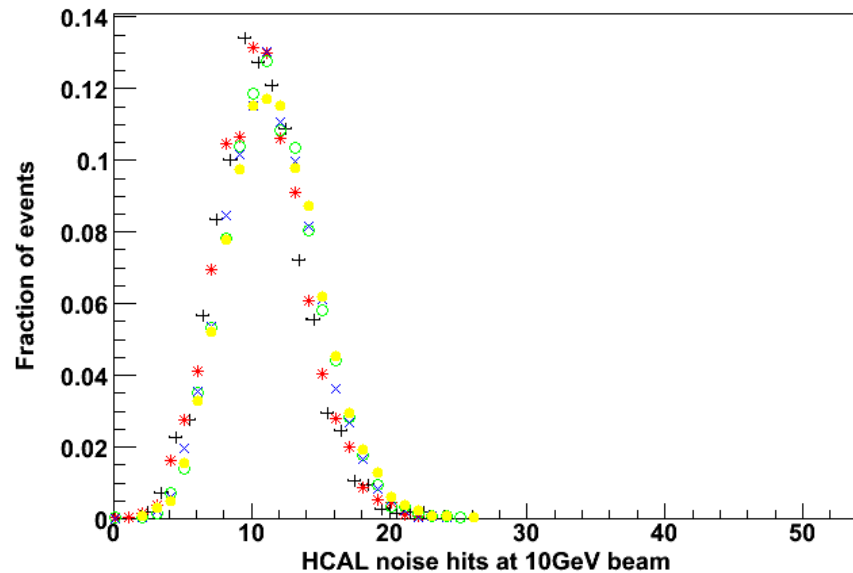
Full matrix in beam energy and incidence angle available,  
often even with two stage positions

angle	0°		10°	20°			30°	
position	-8.8,6.2	0.0,0.0	0.0,0.0	0.0,0.0	-6.0,0.0	0.0,0.0	+6.0,0.0	-6.0,0.0
6 GeV								350392
10 GeV	350118	350144	350171	350247	350278	350320	350346	350385
15 GeV	350117	350145	350172	350245	350273	350317	350347	350387
20 GeV	350114	350140	350173	350244	350265	350316	350348	350389
25 GeV	350113		350191	350243	350264	350315	350349	
30 GeV	350132	350146	350190	350242	350263	350313	350350	
40 GeV	350110	350147	350172	350241	350262	350312	350351	
50 GeV	350128	350154	350173	350240	350261	350311	350352	

In the following: preliminary calibrations,  
~5800 out of 7608 channels included



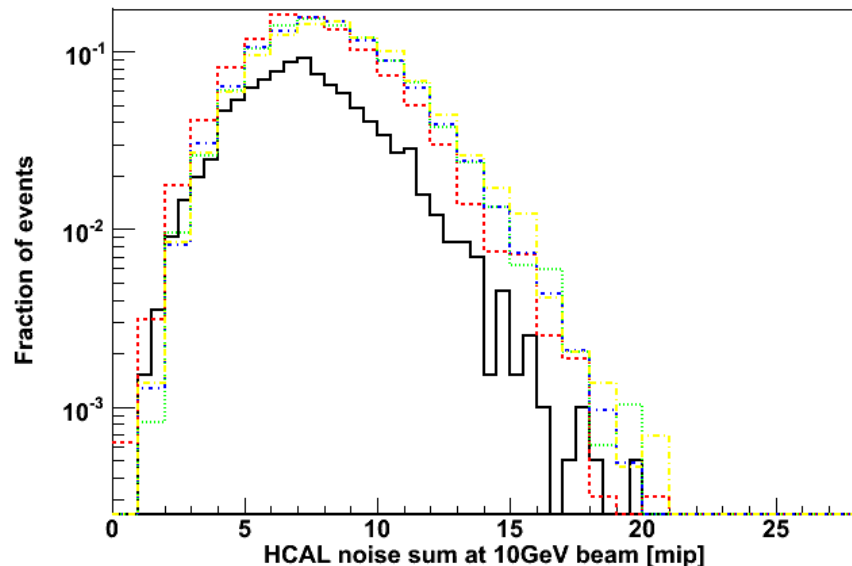
# HCAL Standalone Positron Data



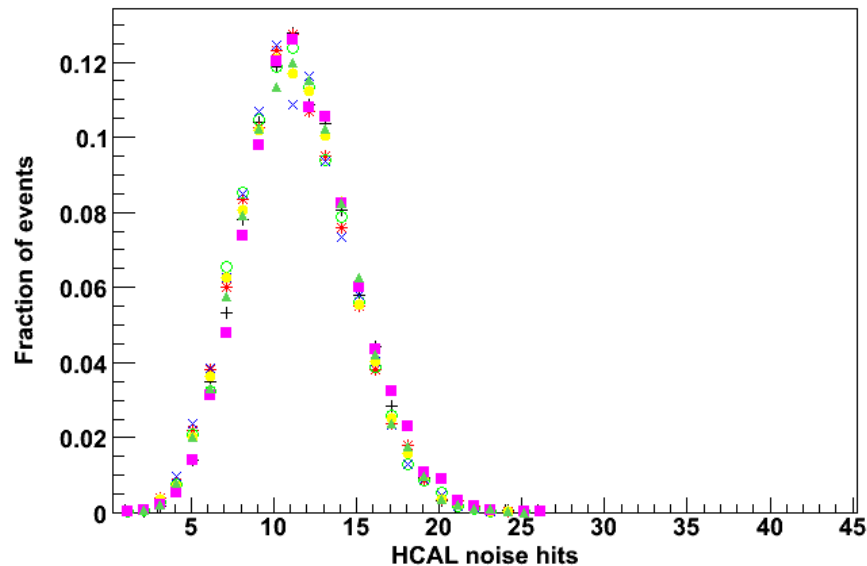
Stable noise conditions  
– all angles at same energy  
– all energies at same angle

On average 11 noise hits  
in  $\frac{3}{4}$  of the calorimeter

Total energy is about 8 Mip



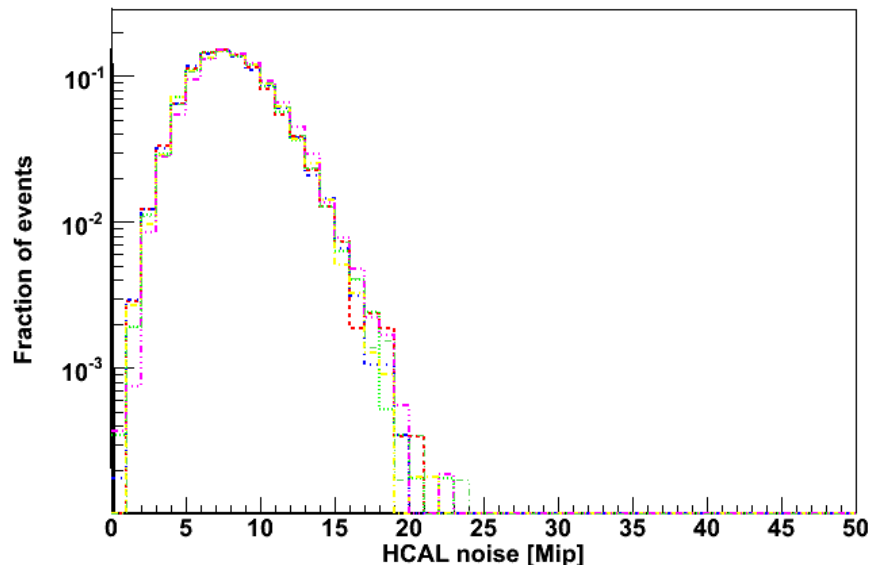
# HCAL Standalone Positron Data



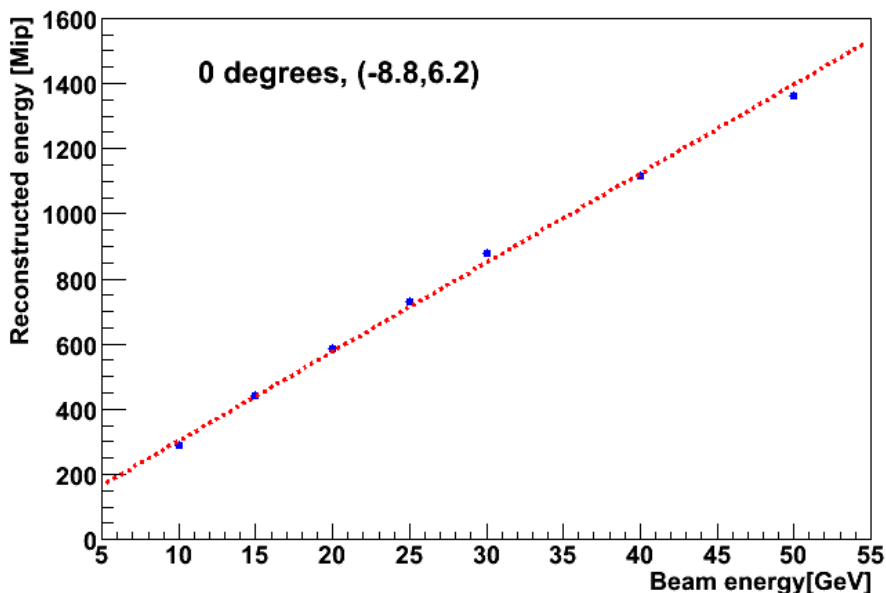
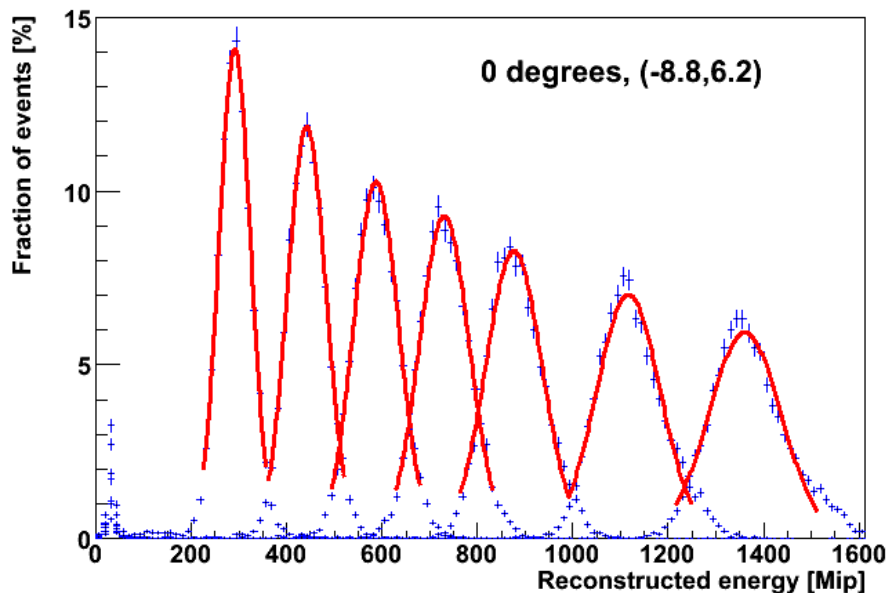
Stable noise conditions  
– all angles at same energy  
– all energies at same angle

On average 11 noise hits  
in  $\frac{3}{4}$  of the calorimeter

Total energy is about 8 Mip



# HCAL Standalone Positron Data



Very preliminary conversion factor  
from 20 GeV and 10 GeV beam

angle; pos.	GeV/mip	mip/GeV
→ 0; -8.8, 6.2	0.0336	29.76
0; 0.0, 0.0	0.0307	32.57
10; 0.0, 0.0	0.0287	34.84
20; 0.0, 0.0	0.0266	37.59
20; -6.0, 0.0	0.0289	34.60
30; 0.0, 0.0	0.0298	33.56
average:	0.0297	33.65

Preliminary calibrations,  
sanity check only !!



# Conclusions

2007 CERN testbeam has been a great success with 200M events recorded and the full program in angular/energy/position/particle scans accomplished

HCAL and TCMT fully instrumented for first time, ECAL almost.

HCAL calibrations partially tedious due to failing LED systems

Otherwise stable operation, first estimates on noise and response to positron data do not show obvious peculiarities

We have almost 14TB (!! ) data on disk, so now is the time of serious  
**analyzing**