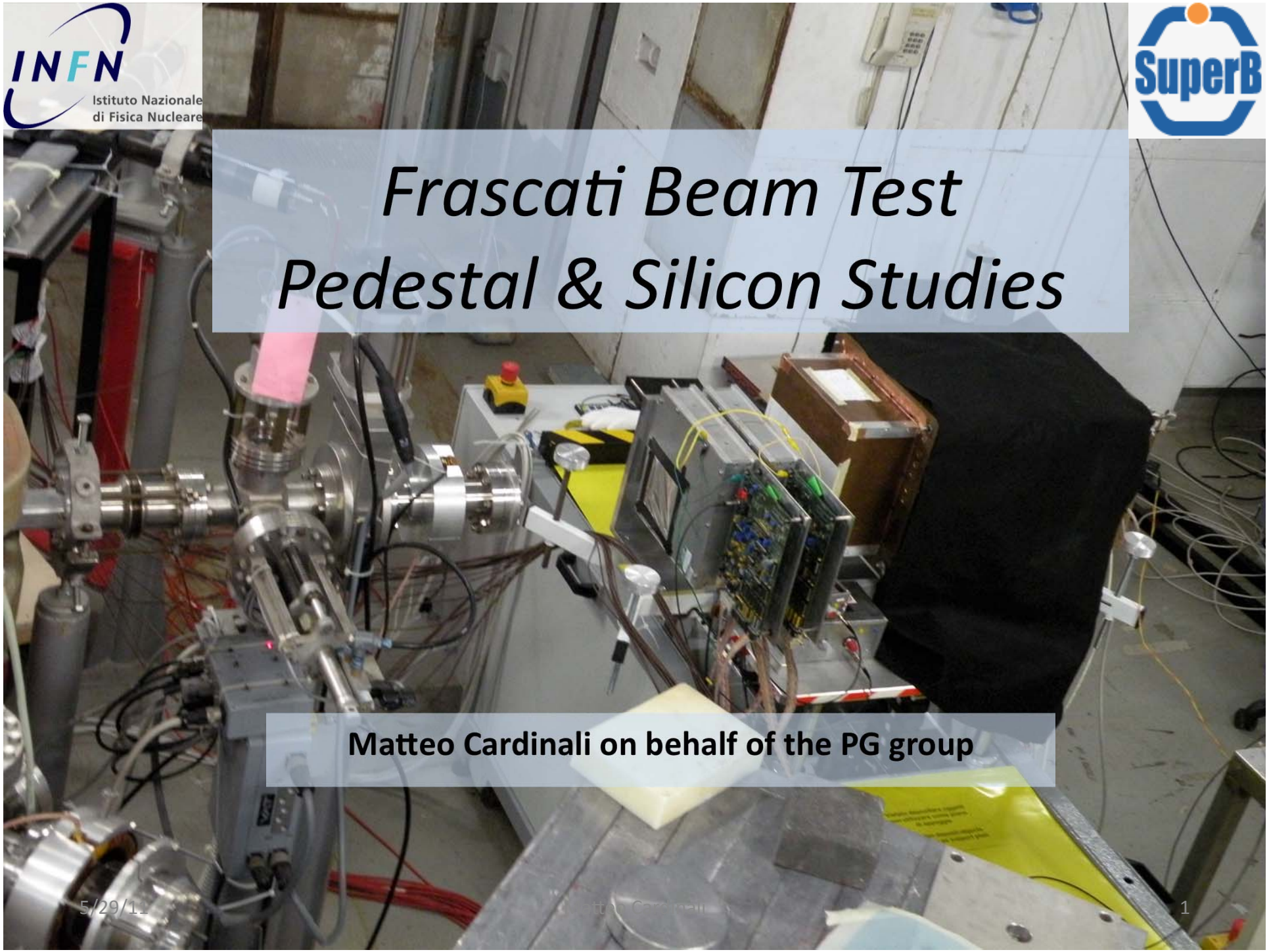


Frascati Beam Test
Pedestal & Silicon Studies

Matteo Cardinali on behalf of the PG group

Summary

- Pedestal Studies
  - Check possible dependence of mean energy deposited and FWHM from threshold and pedestal used
- Silicon Strips Detector Selection
  - Investigate any possible beam energy dependence and spread from events position on Silion Detector

Pedestal & RMS studies

Actually we have tested three way to evaluate pedestal:

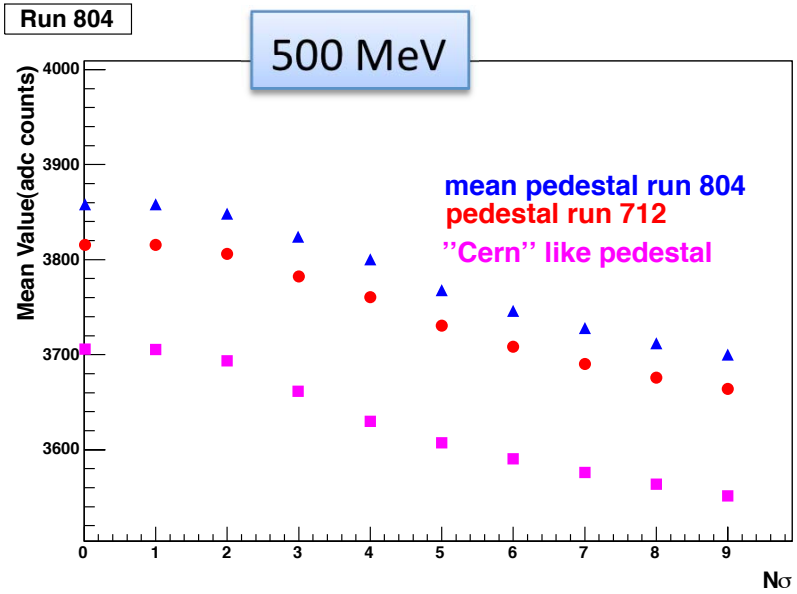
1. "Cern" like method: mean of the first 60 counts for each event

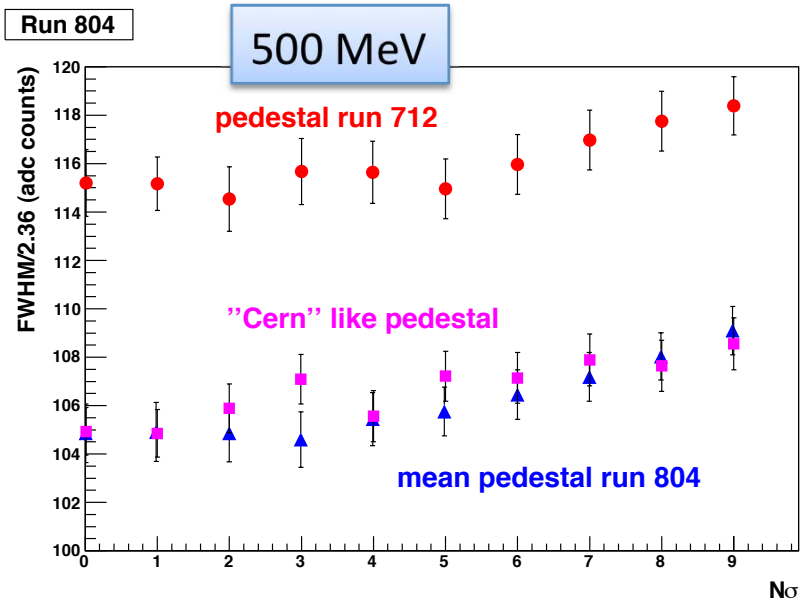
2. Pedestal Run 712: mean adc counts from the entire run

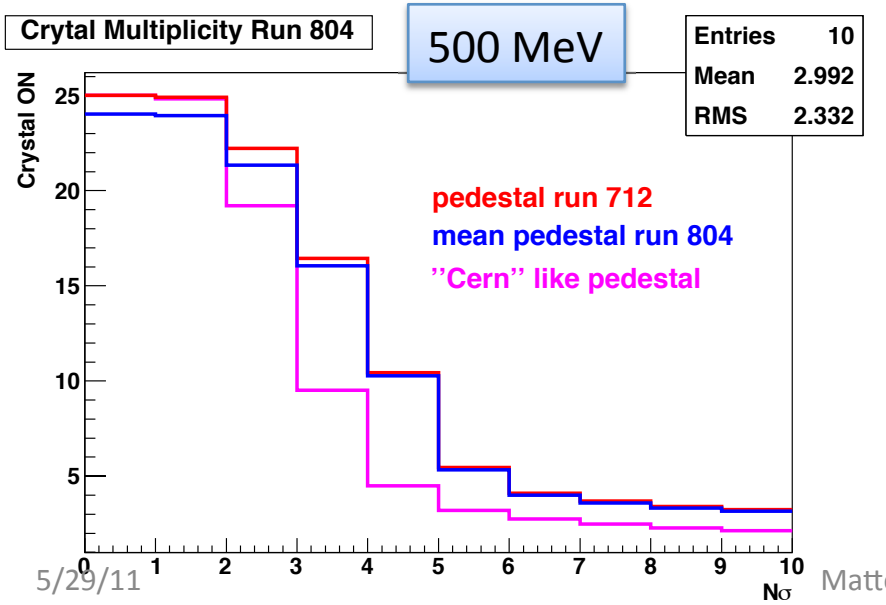
3. Mean pedestal run by run: mean on entire run of the average of the first 60 counts

We fix the RMS value for each channels from method 2, to consider better the fluctuations on a single counts

For run 804 at 500 MeV, changing number of RMS = Nσ, fill the energy histogram and fit it with CB. Results are shown here.

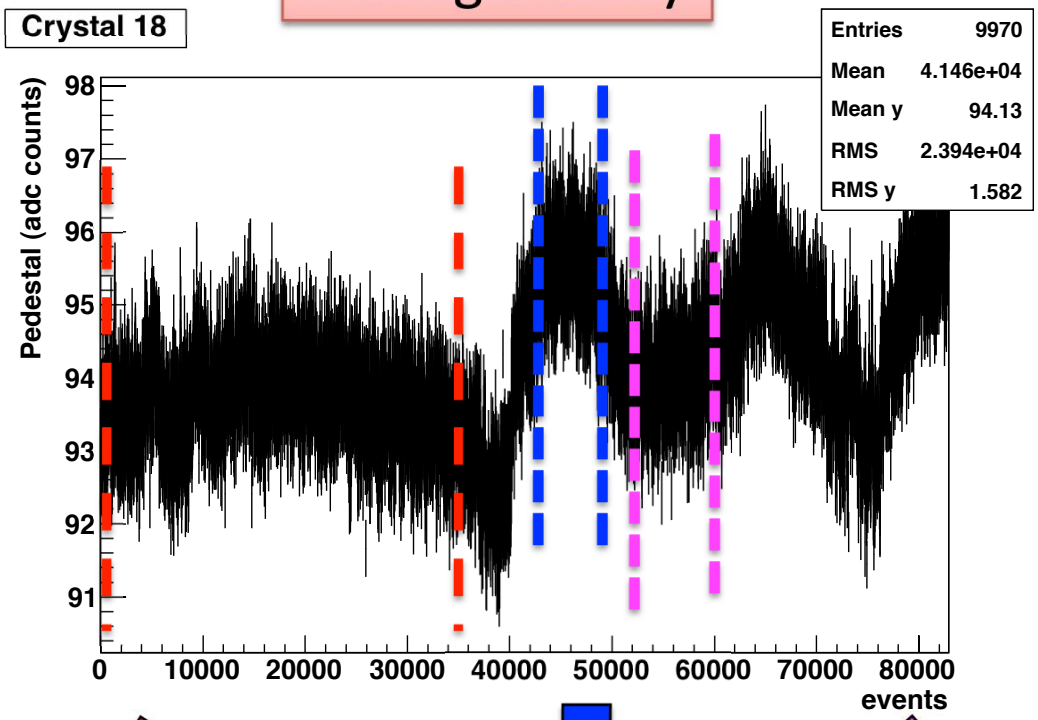






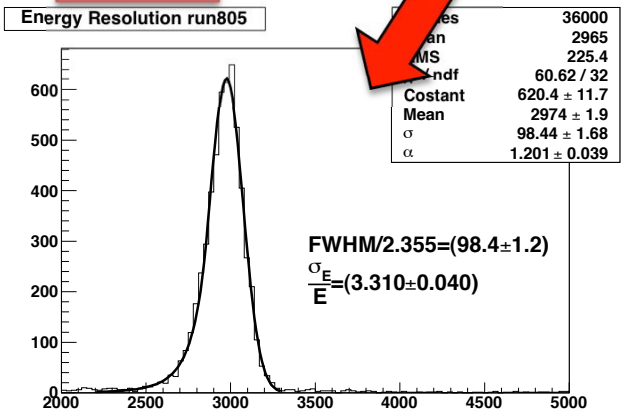
mean pedestal on the entire run 804 seems to be better than the others

Testing stabilty

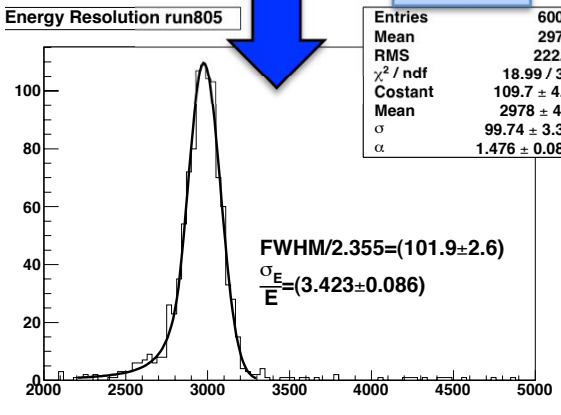


mean pedestal
run 805 **400 MeV**

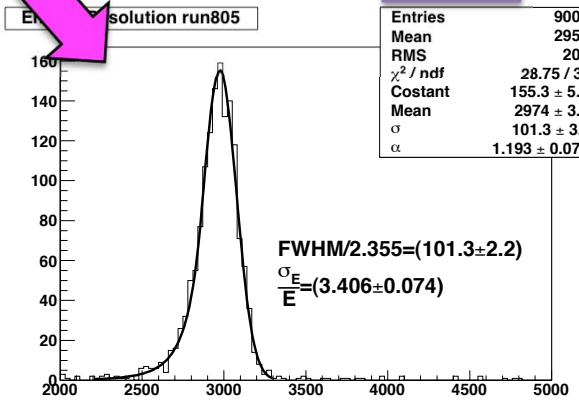
36000



6000

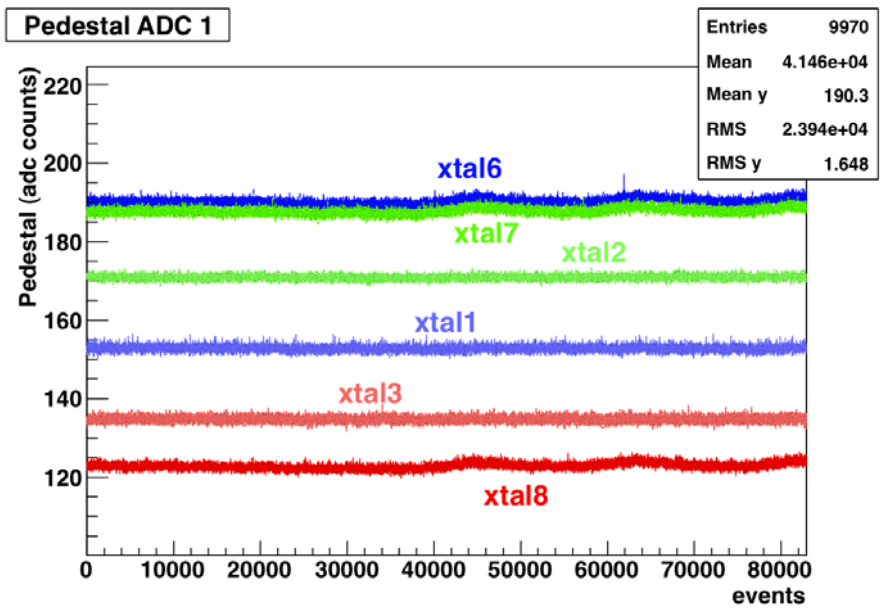


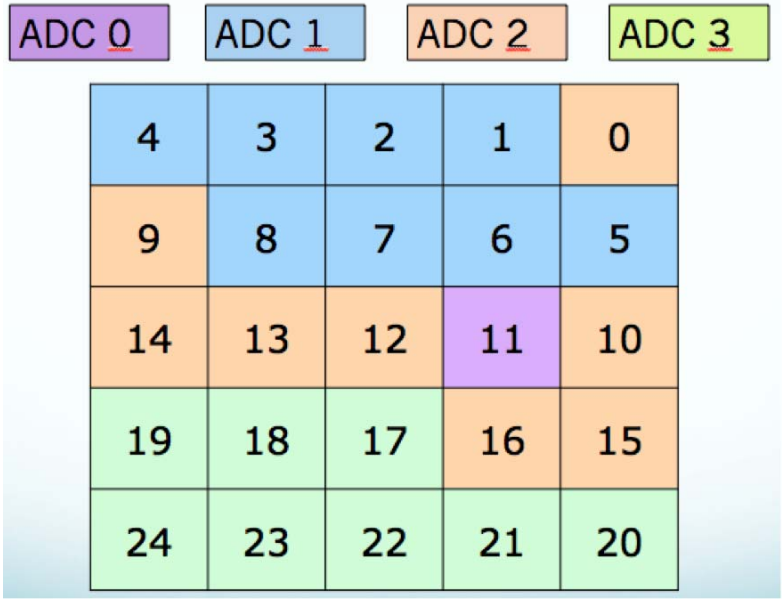
5000



Small resolution difference, maybe caused by statistic problem

ADC dependence?

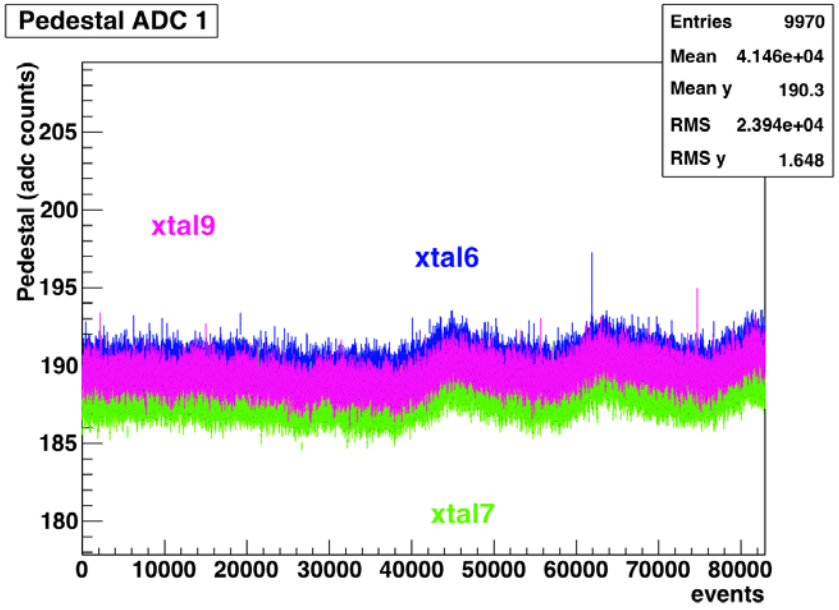




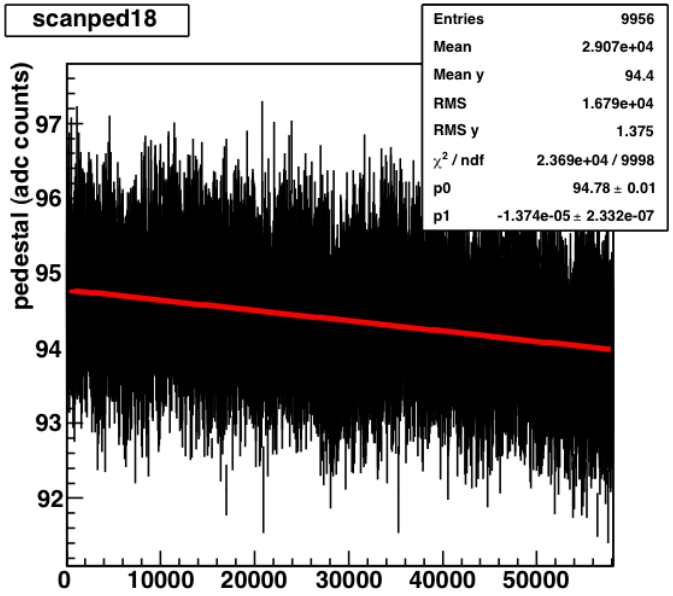
mean pedestal
run 805 **400 MeV**

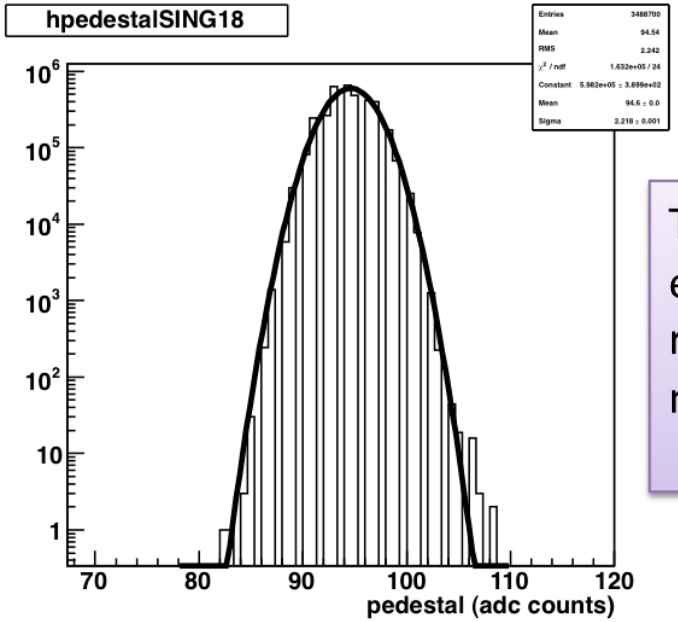
Channels in same ADC do not have similar trend

Needs of more studies



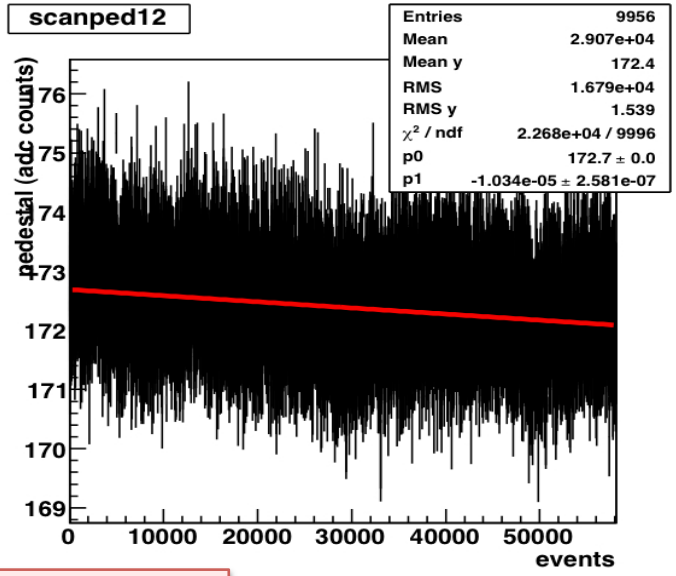
For the RUN 804 there is a particular dependece of the pedestal

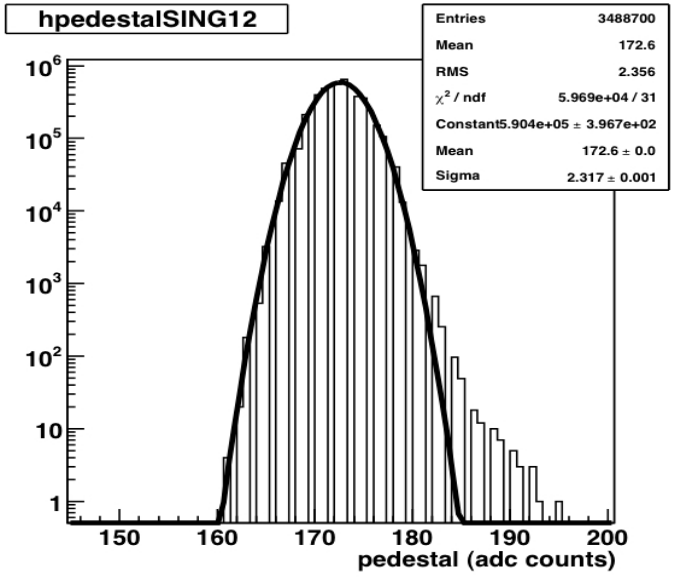




This trend can produce effects both on energy resolution than in multiplicity

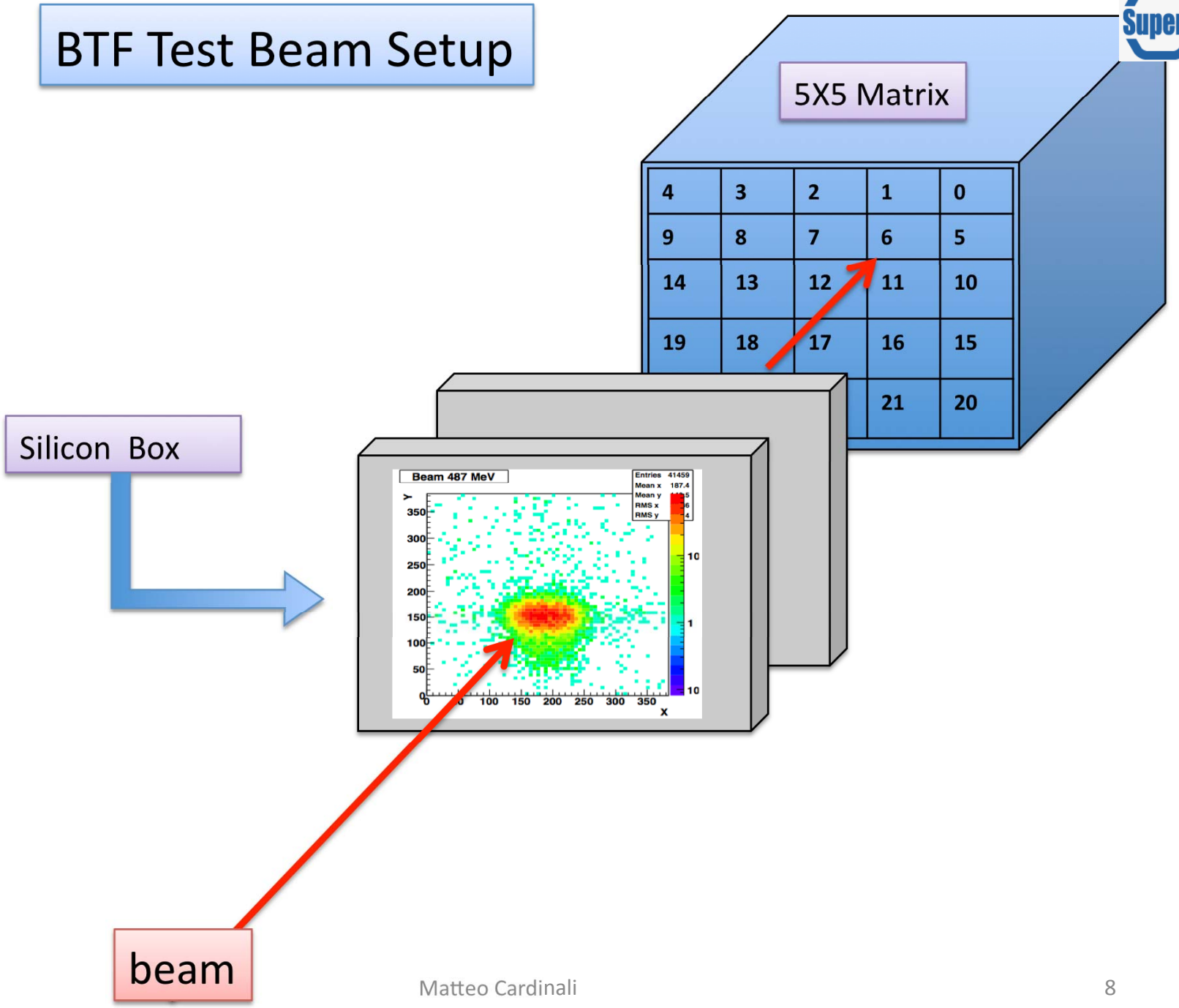
RUN 804
500 MeV





need of systematic study

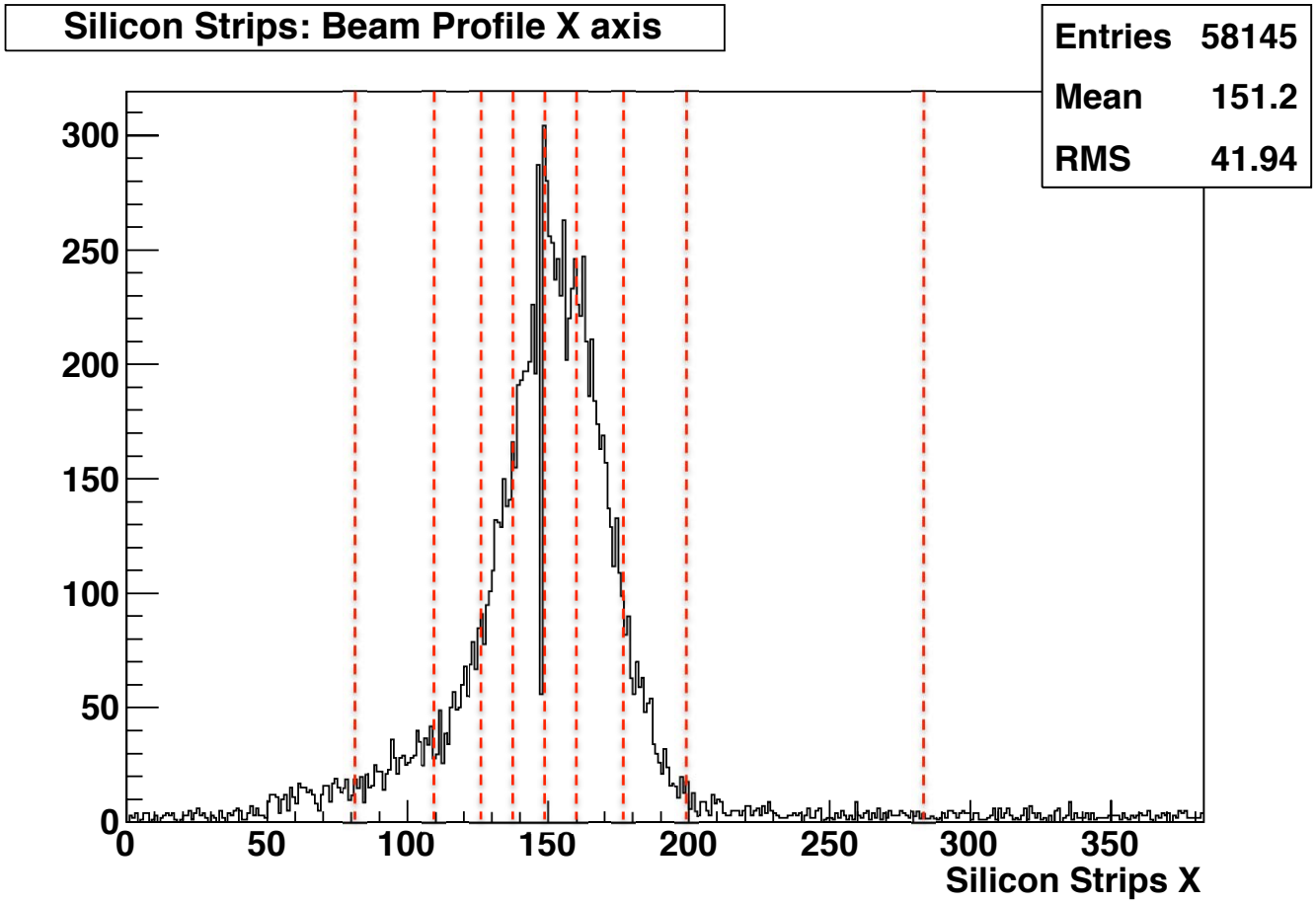
BTF Test Beam Setup



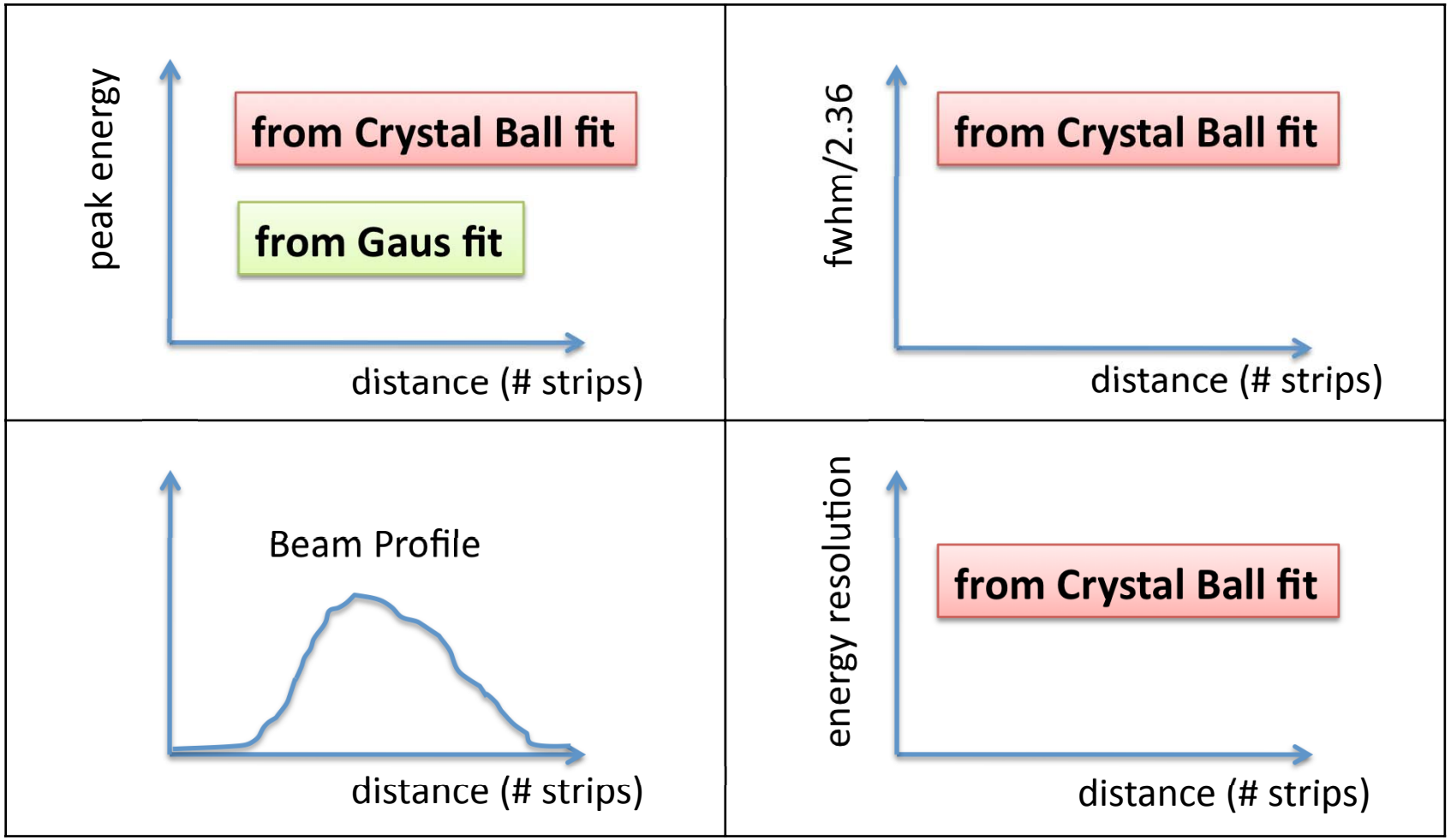
•Divide the selected RUN into N parts, where $N = \frac{Events \quad with \quad e^-}{1000}$

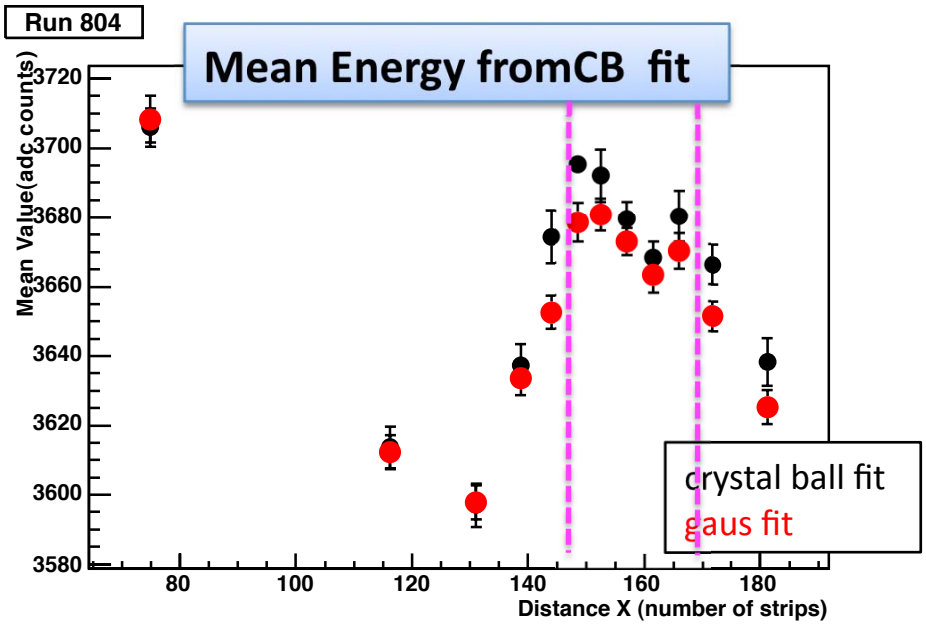
•Each part has 1000 Silicon Strips events

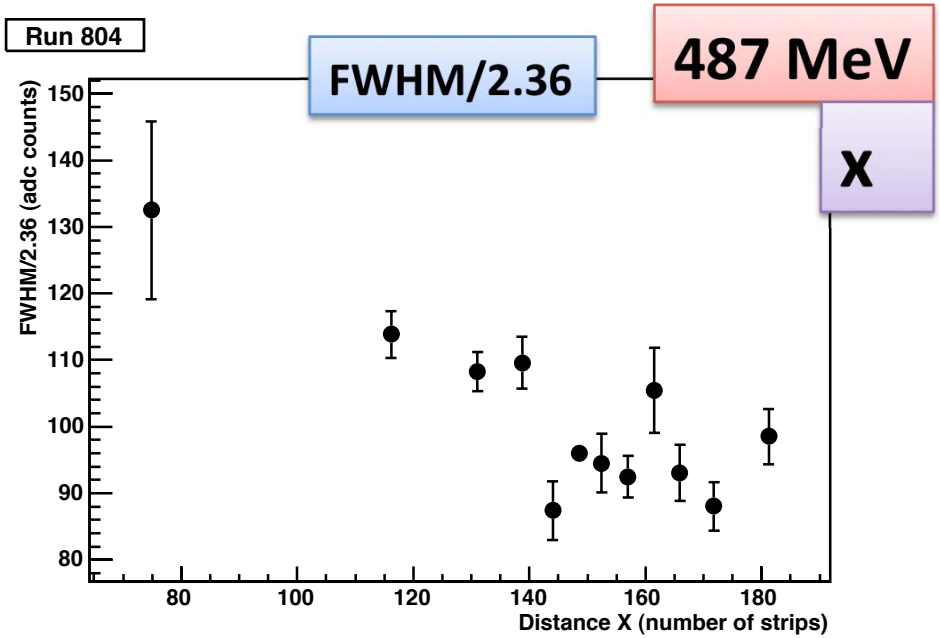
•For each selections, fill an histogram of energy and fit it with a Crystal Ball (and a Gauss function) to measure mean energy and fwhm.

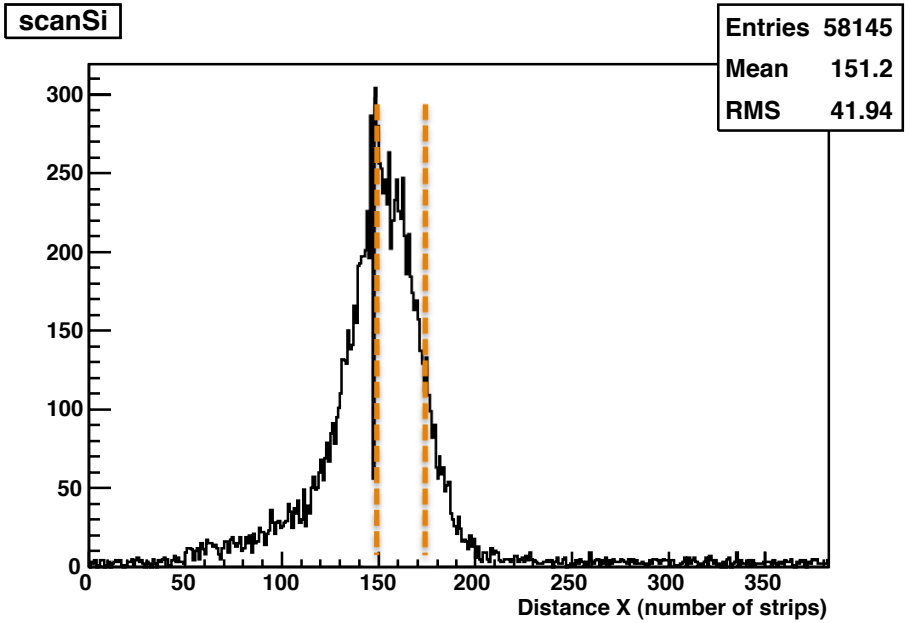


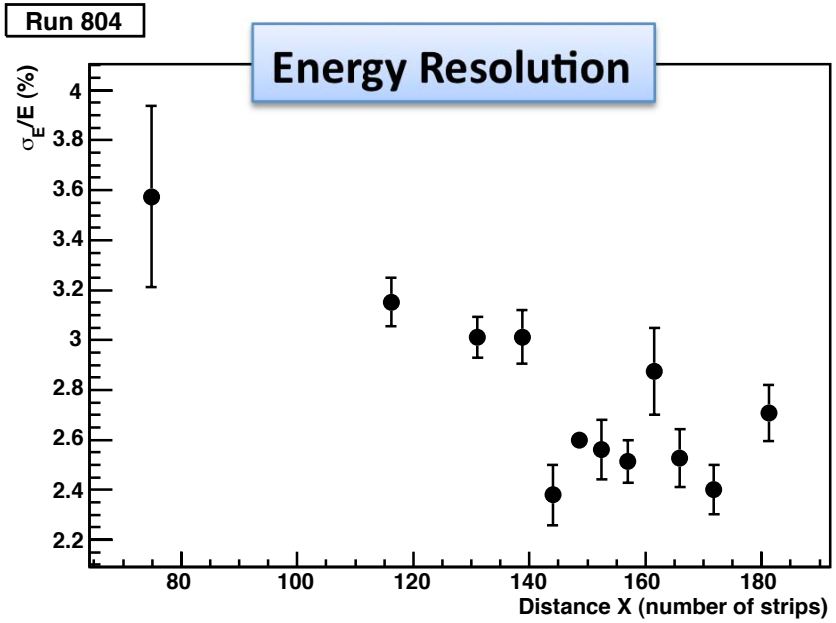
Si-Strips Studies



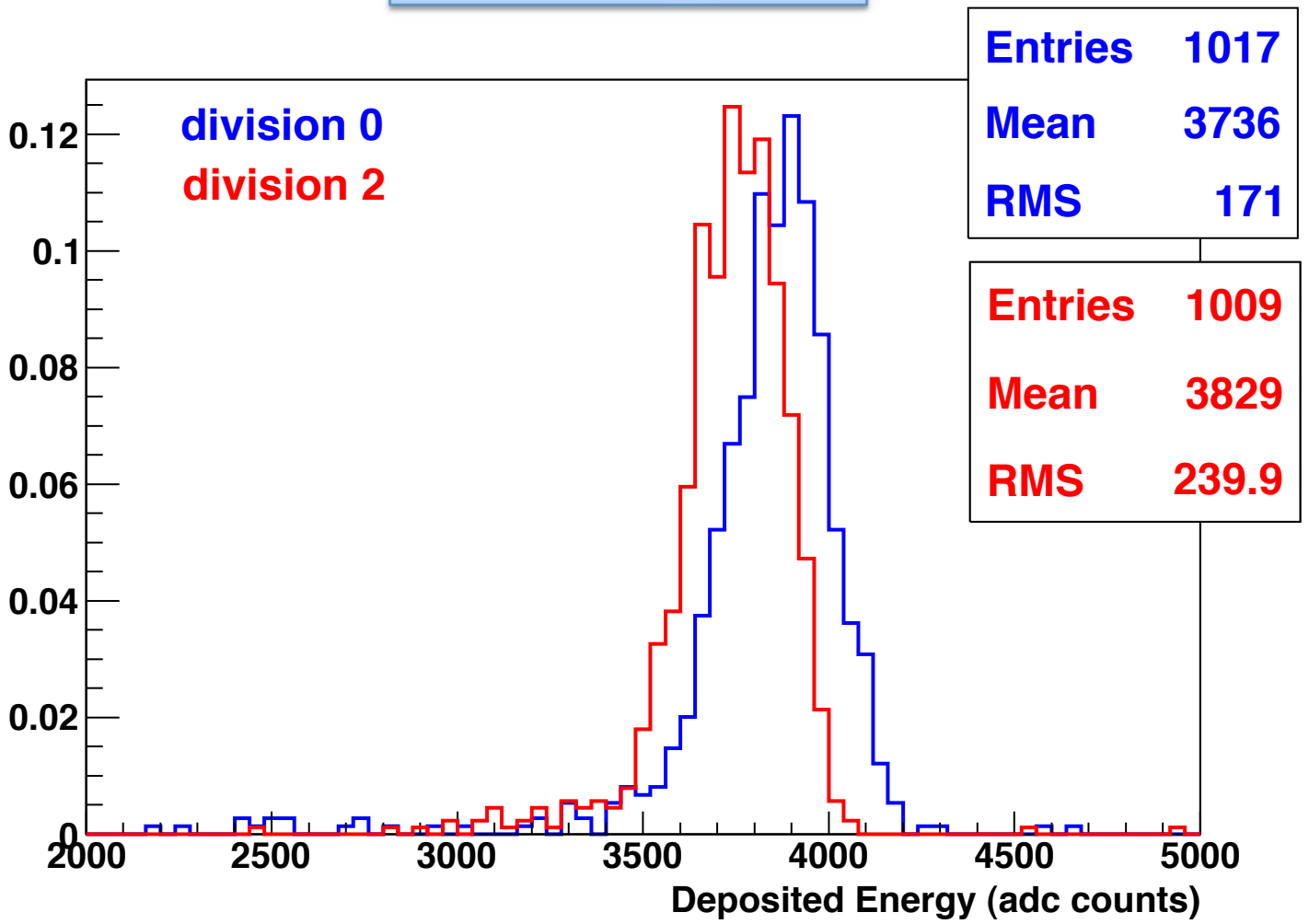

Run 804
Mean Energy fromCB fit
Mean Value(adc counts)
Distance X (number of strips)
crystal ball fit
gaus fit


Run 804
FWHM/2.36
487 MeV
X
FWHM/2.36 (adc counts)
Distance X (number of strips)


scanSi
Entries 58145
Mean 151.2
RMS 41.94
Distance X (number of strips)

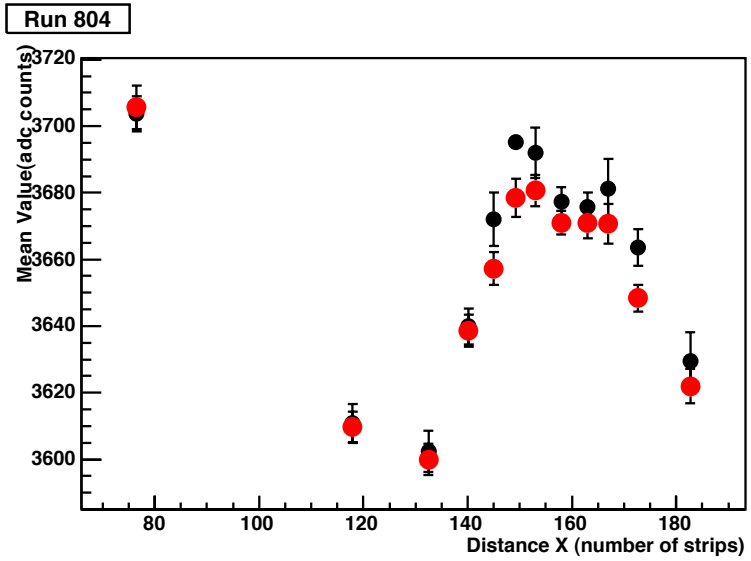

Run 804
Energy Resolution
σE/E (%)
Distance X (number of strips)

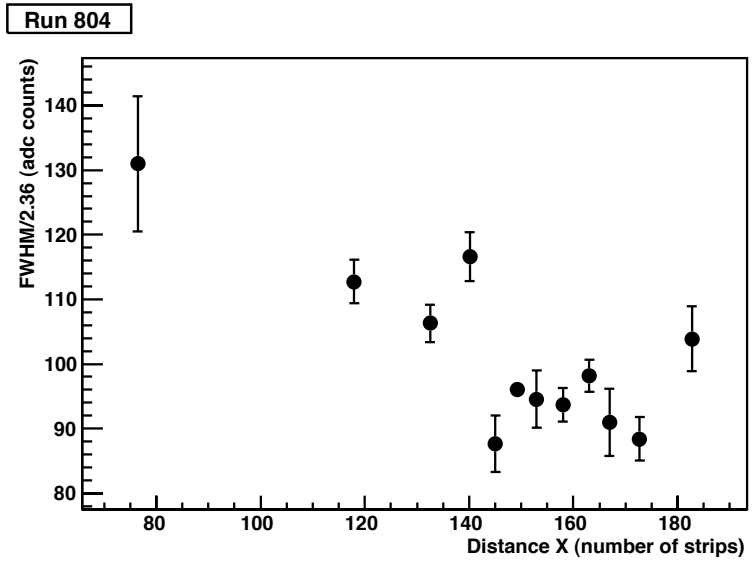
Mean Energy Shift

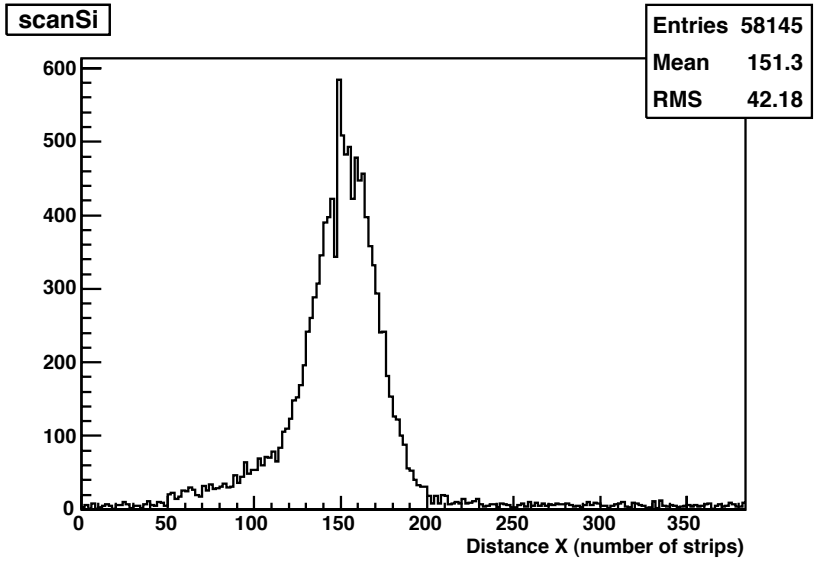


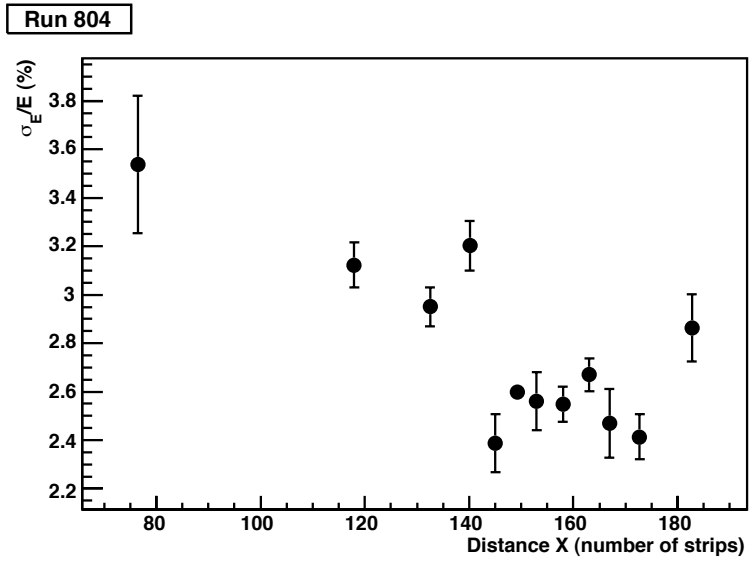
- There is a macroscopic shift of the energy distributions
- Need of a selection strategy to reduce shift

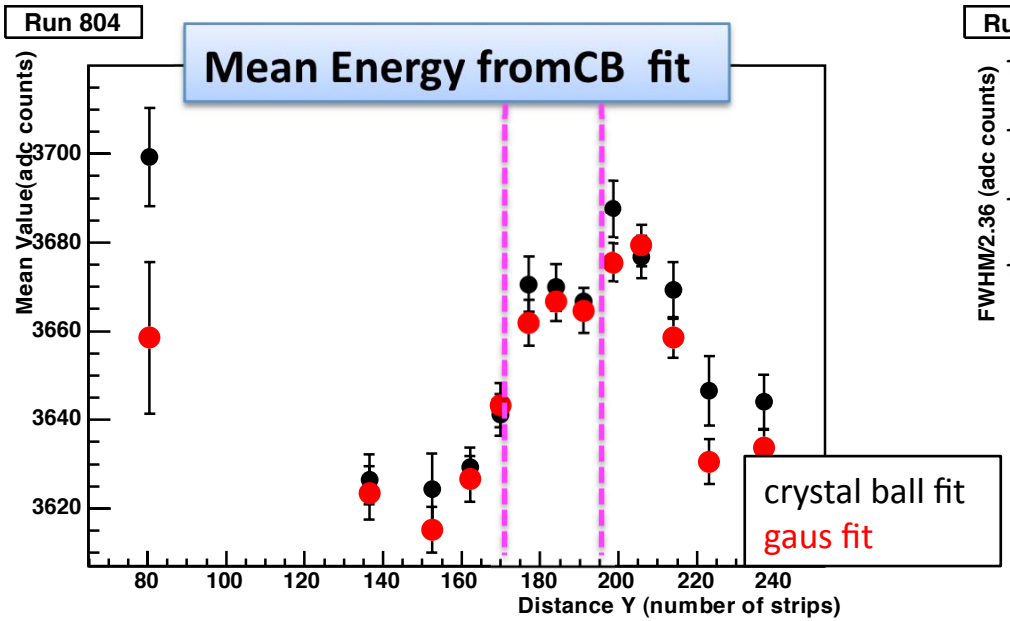
Making selection of 1000 events with a REBINNED beam profile, we find same distributions

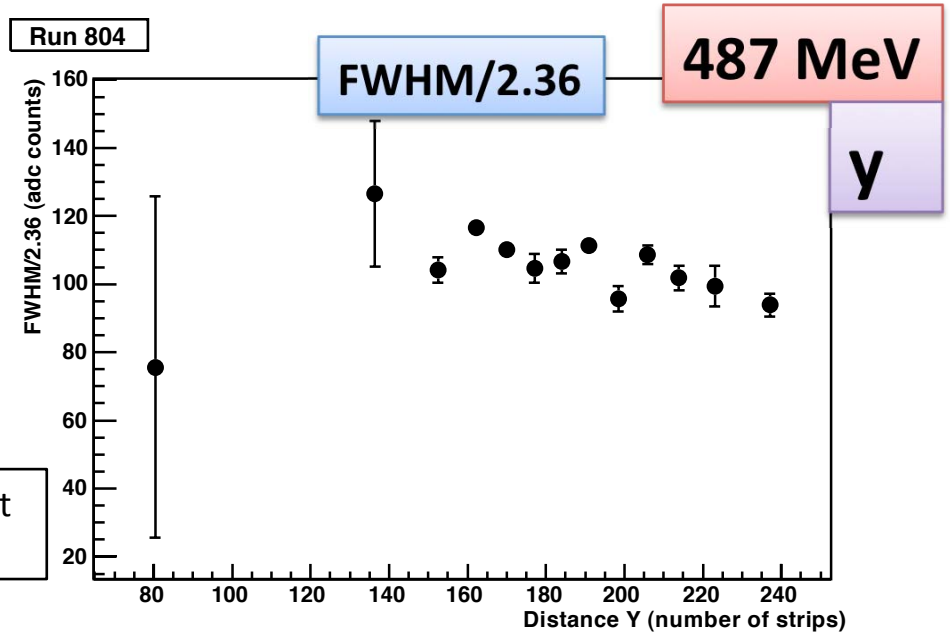


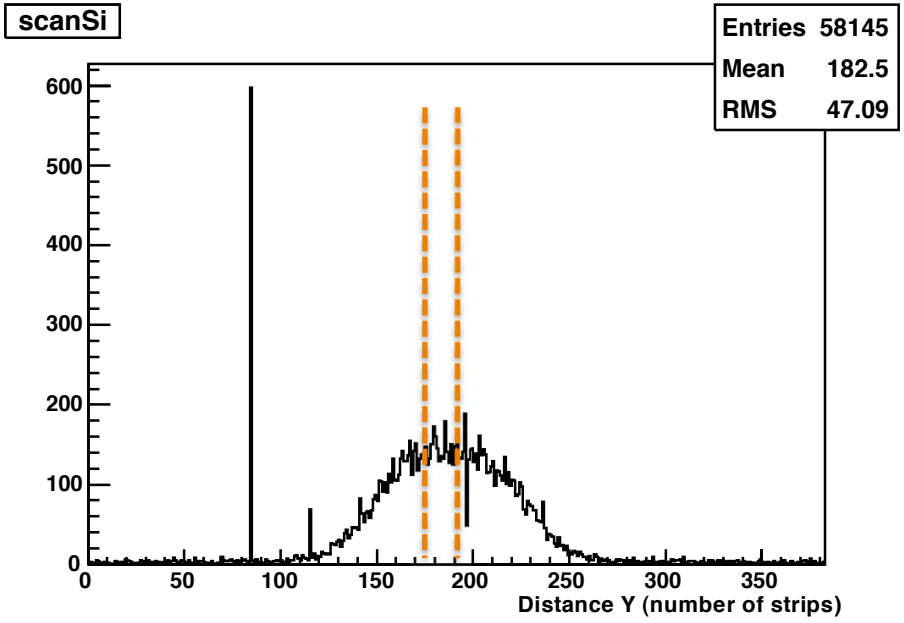


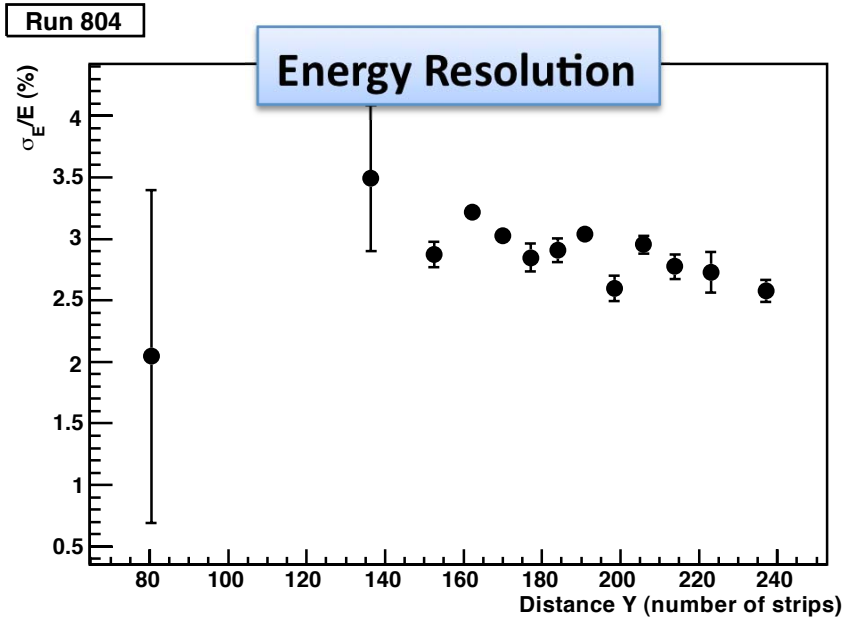


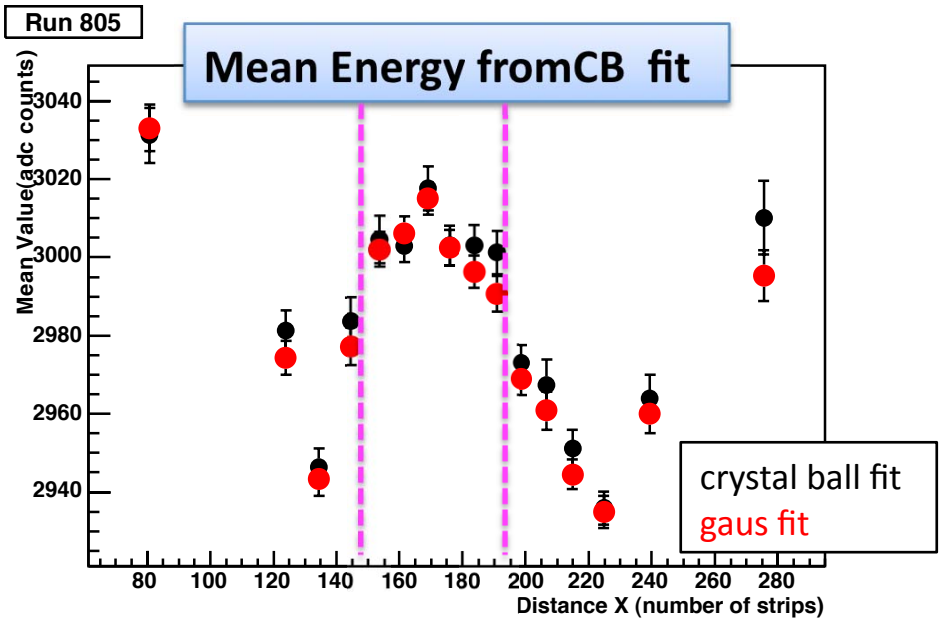


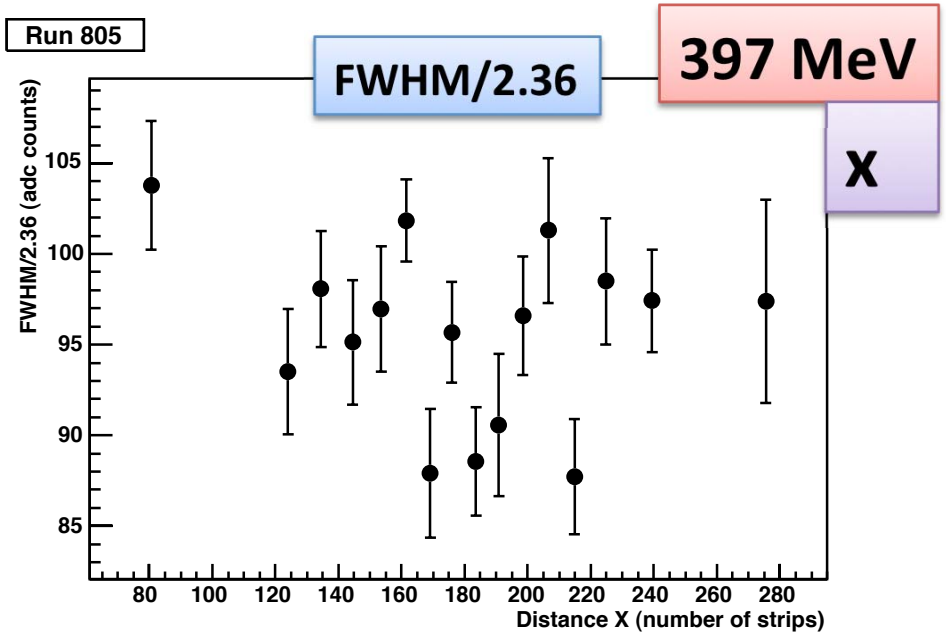

Run 804
Mean Energy fromCB fit
Mean Value(adc counts)
Distance Y (number of strips)
crystal ball fit
gaus fit

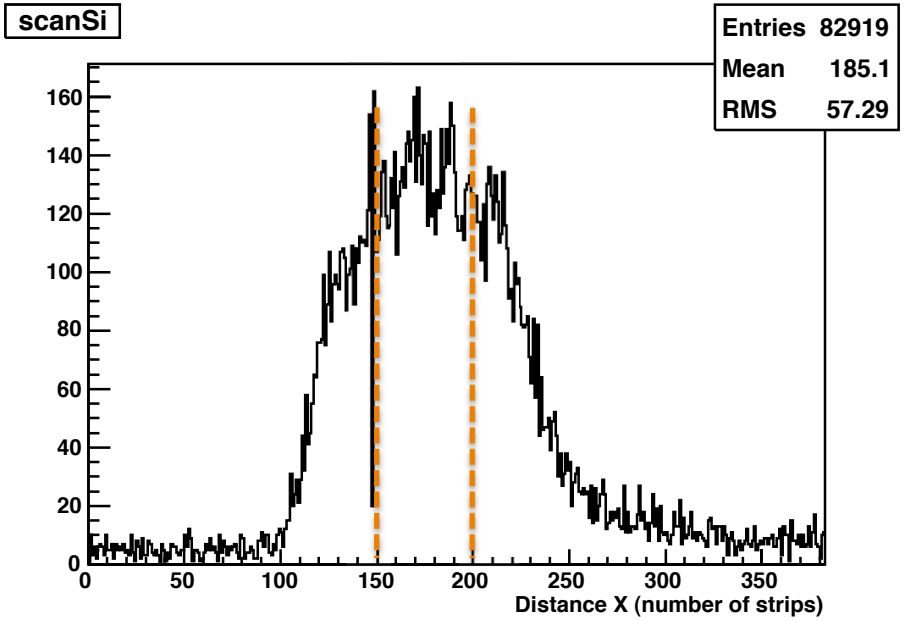

Run 804
FWHM/2.36
487 MeV
y
FWHM/2.36 (adc counts)
Distance Y (number of strips)

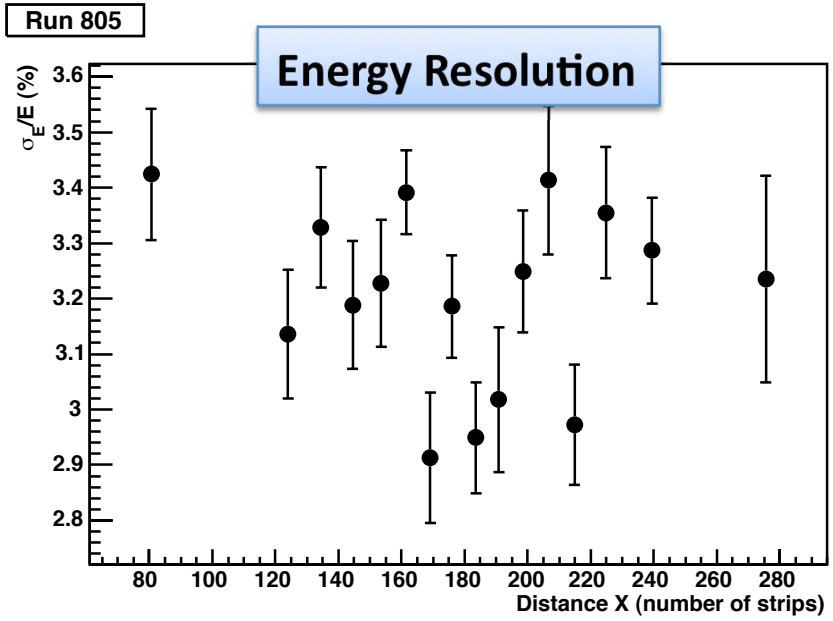

scanSi
Entries 58145
Mean 182.5
RMS 47.09
Distance Y (number of strips)

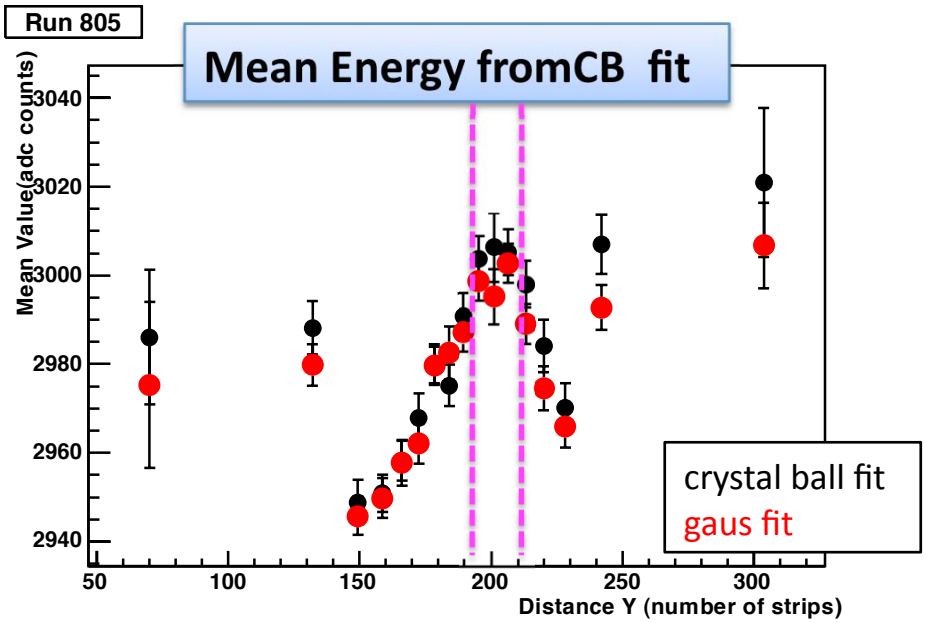

Run 804
Energy Resolution
σE/E (%)
Distance Y (number of strips)

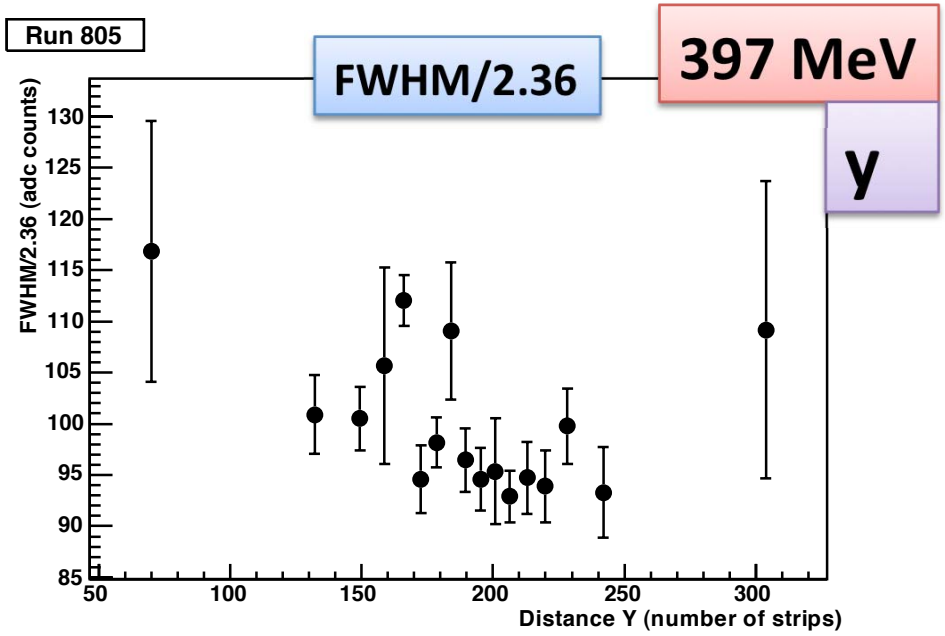

Run 805
Mean Energy fromCB fit
Mean Value(adc counts)
Distance X (number of strips)
crystal ball fit
gaus fit

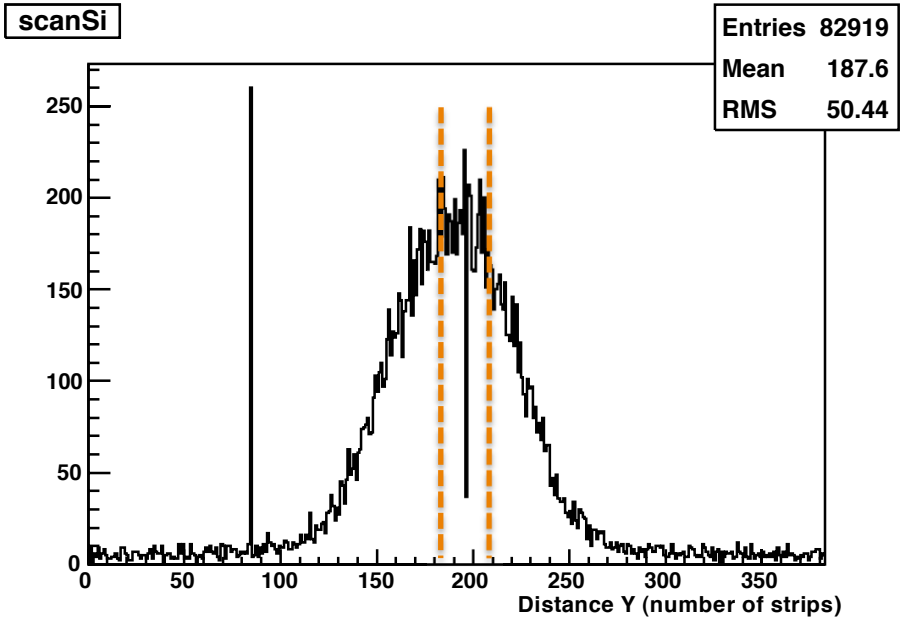

Run 805
FWHM/2.36
397 MeV
X
FWHM/2.36 (adc counts)
Distance X (number of strips)

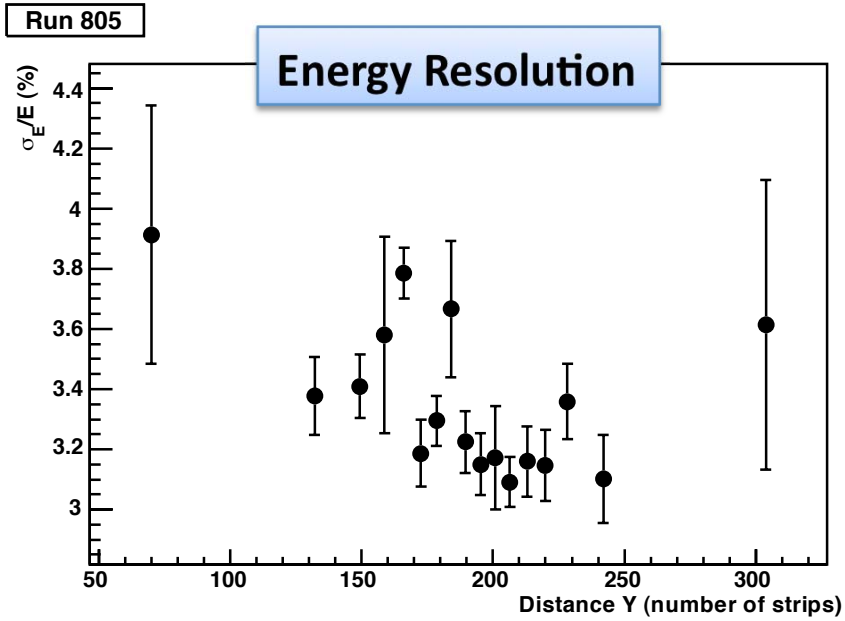

scanSi
Entries 82919
Mean 185.1
RMS 57.29
Distance X (number of strips)

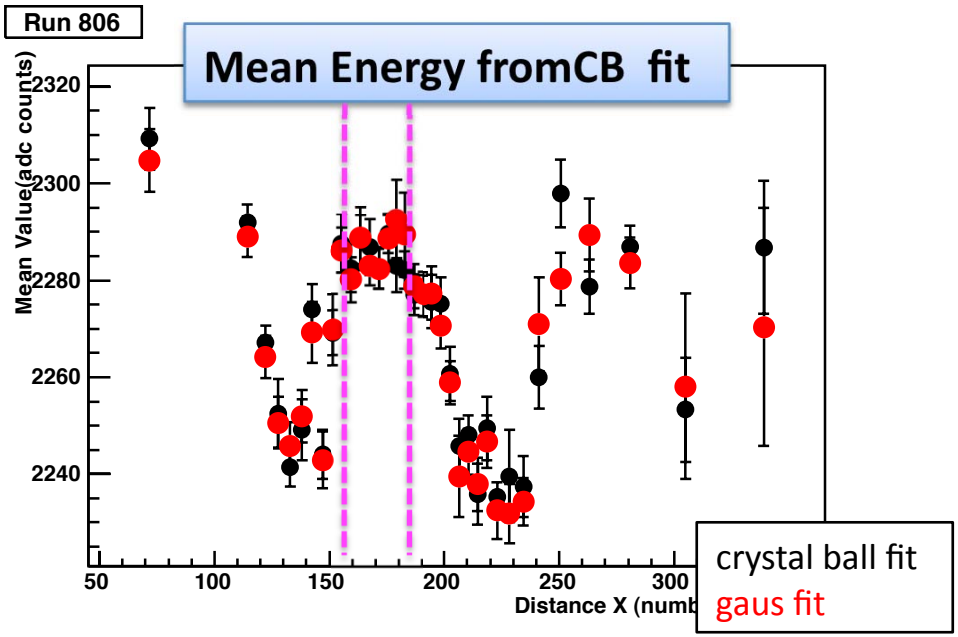

Run 805
Energy Resolution
σE/E (%)
Distance X (number of strips)

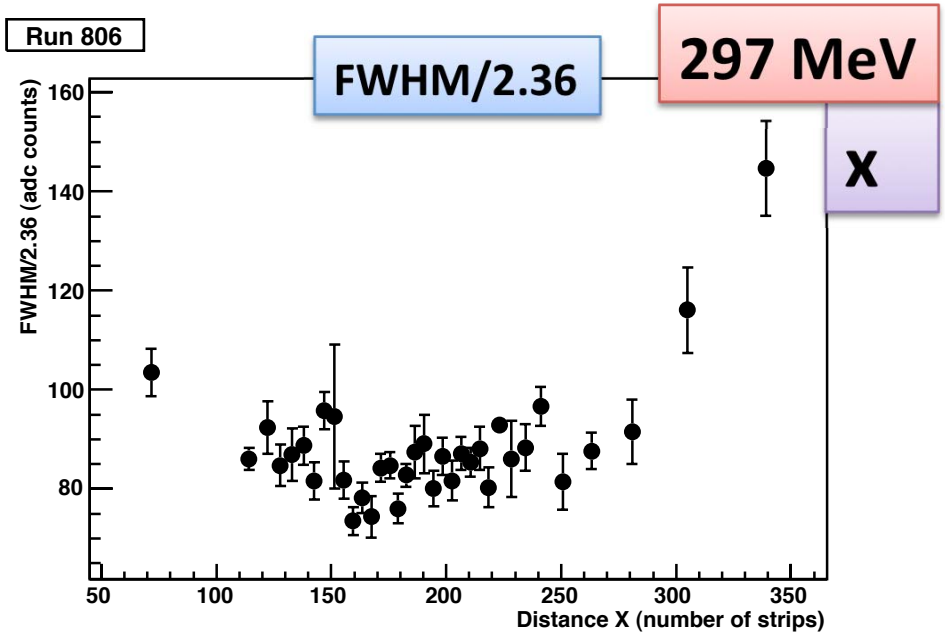

Run 805
Mean Energy fromCB fit
Mean Value(adc counts)
Distance Y (number of strips)
crystal ball fit
gaus fit

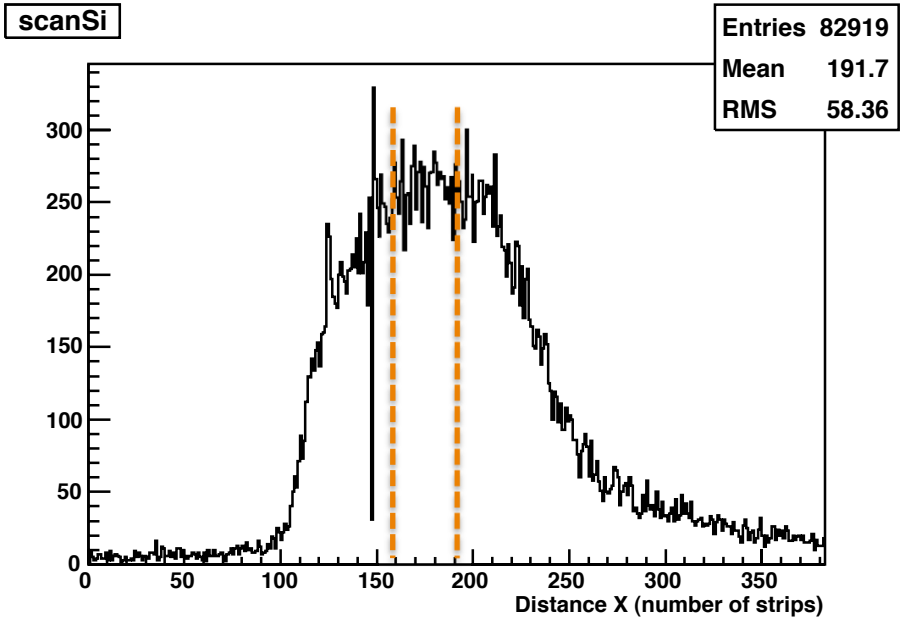

Run 805
FWHM/2.36
397 MeV
y
FWHM/2.36 (adc counts)
Distance Y (number of strips)

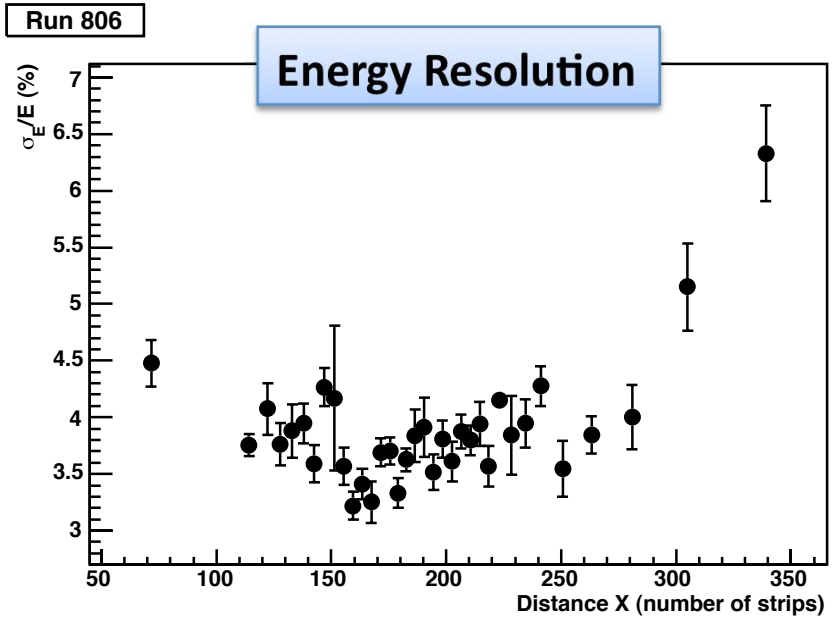

scanSi
Entries 82919
Mean 187.6
RMS 50.44
Distance Y (number of strips)

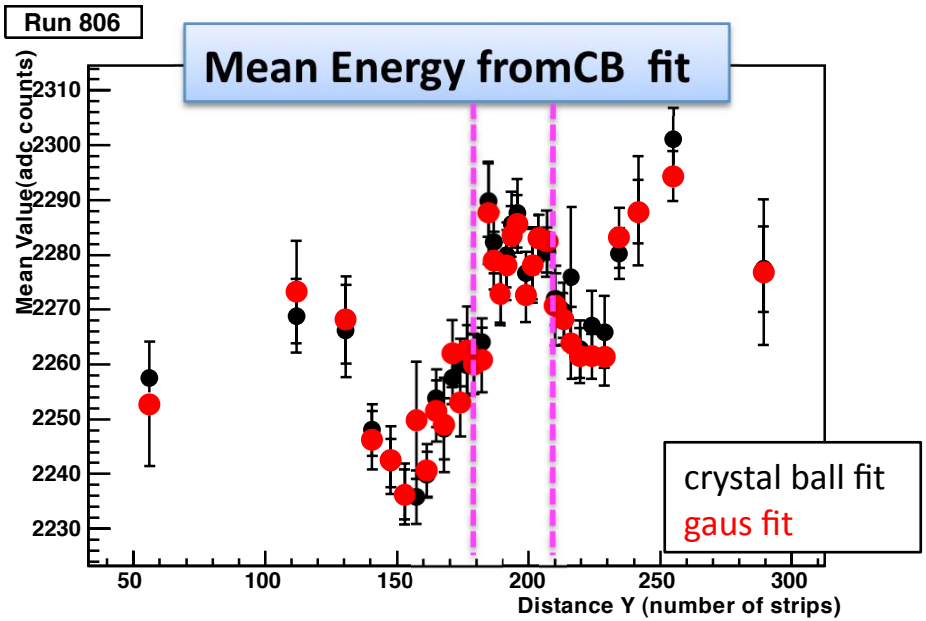

Run 805
Energy Resolution
σE/E (%)
Distance Y (number of strips)

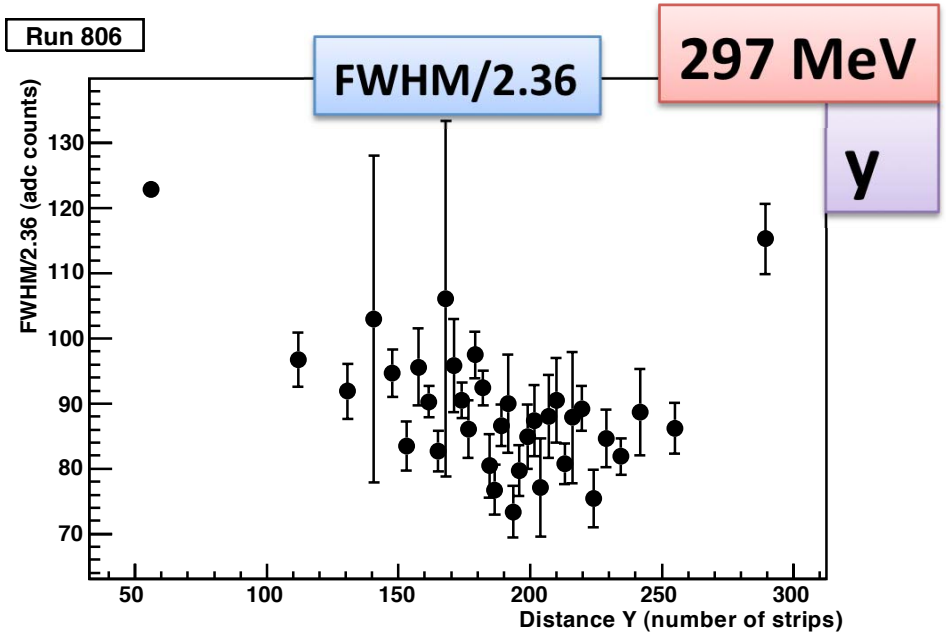

Run 806
Mean Energy fromCB fit
Mean Value(adc counts)
Distance X (numb
crystal ball fit
gaus fit

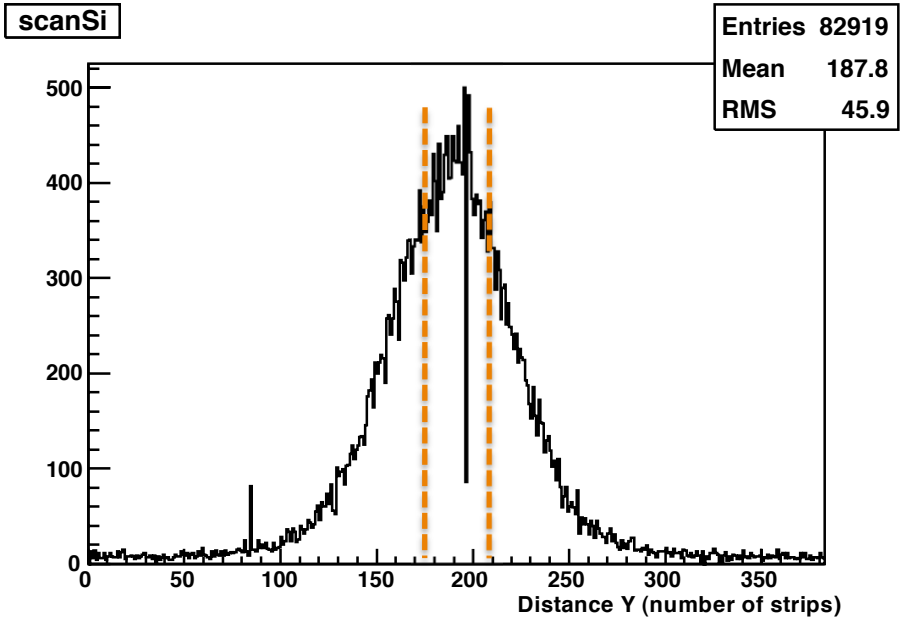

Run 806
FWHM/2.36
297 MeV
X
FWHM/2.36 (adc counts)
Distance X (number of strips)

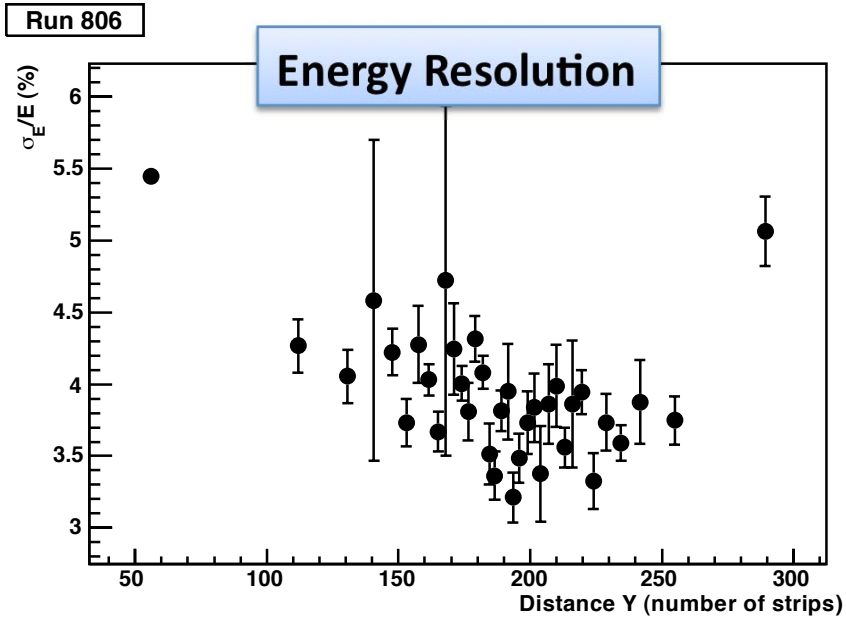

scanSi
Entries 82919
Mean 191.7
RMS 58.36
Distance X (number of strips)

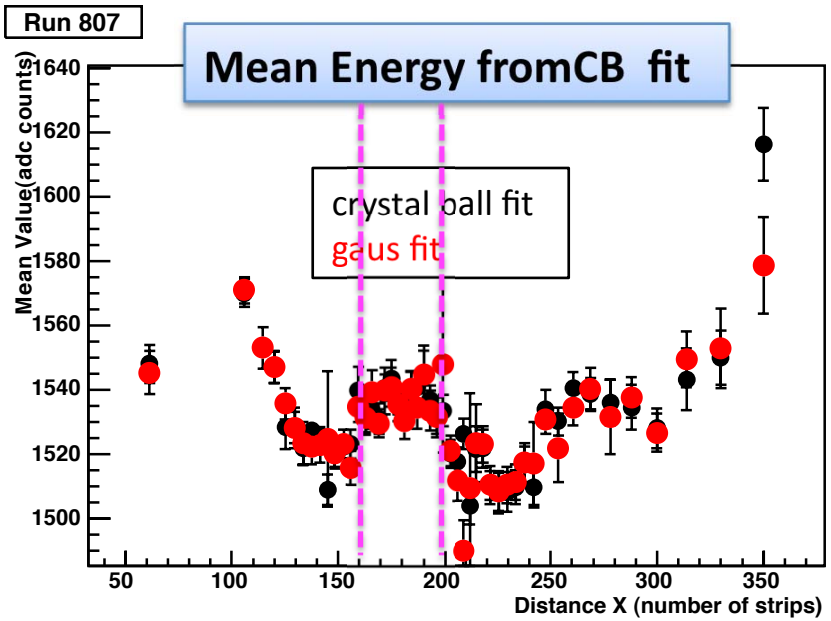

Run 806
Energy Resolution
σE/E (%)
Distance X (number of strips)

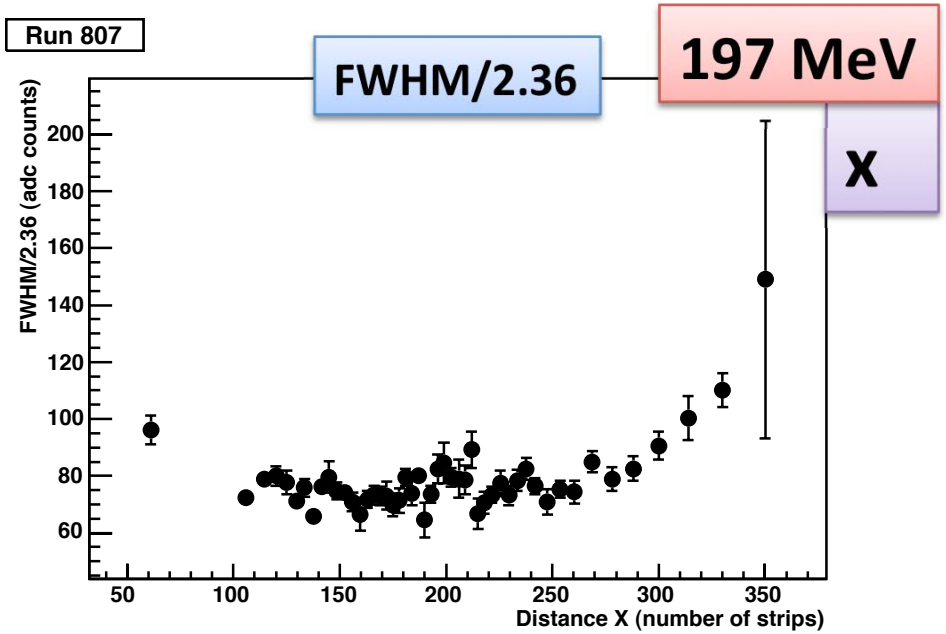

Run 806
Mean Energy fromCB fit
Mean Value(adc counts)
Distance Y (number of strips)
crystal ball fit
gaus fit

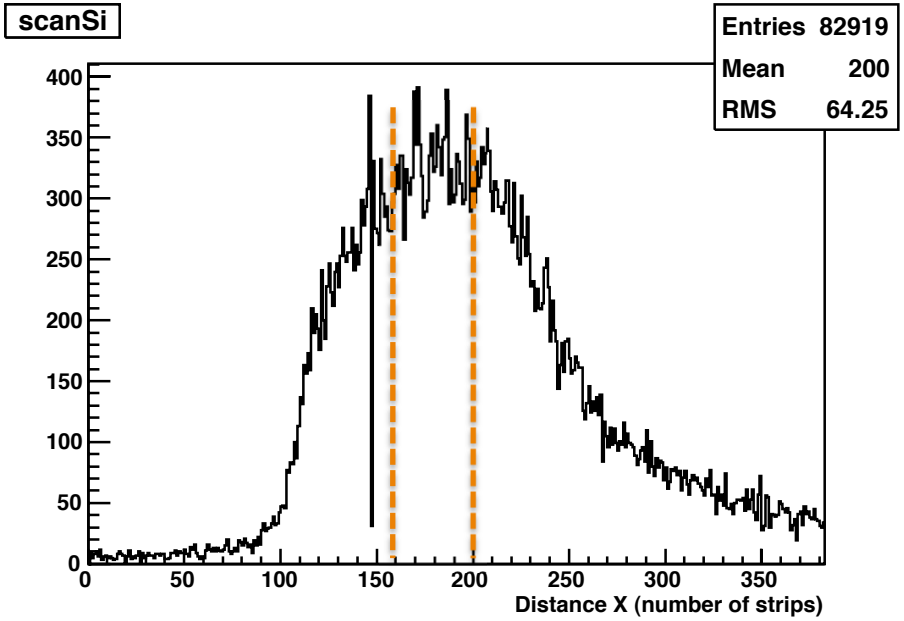

Run 806
FWHM/2.36
297 MeV
y
FWHM/2.36 (adc counts)
Distance Y (number of strips)

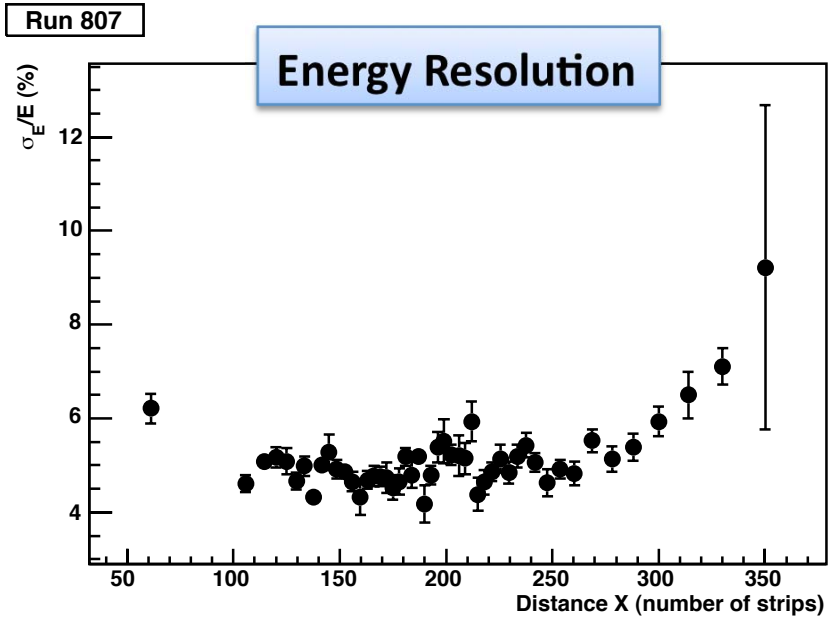

scanSi
Entries 82919
Mean 187.8
RMS 45.9
Distance Y (number of strips)

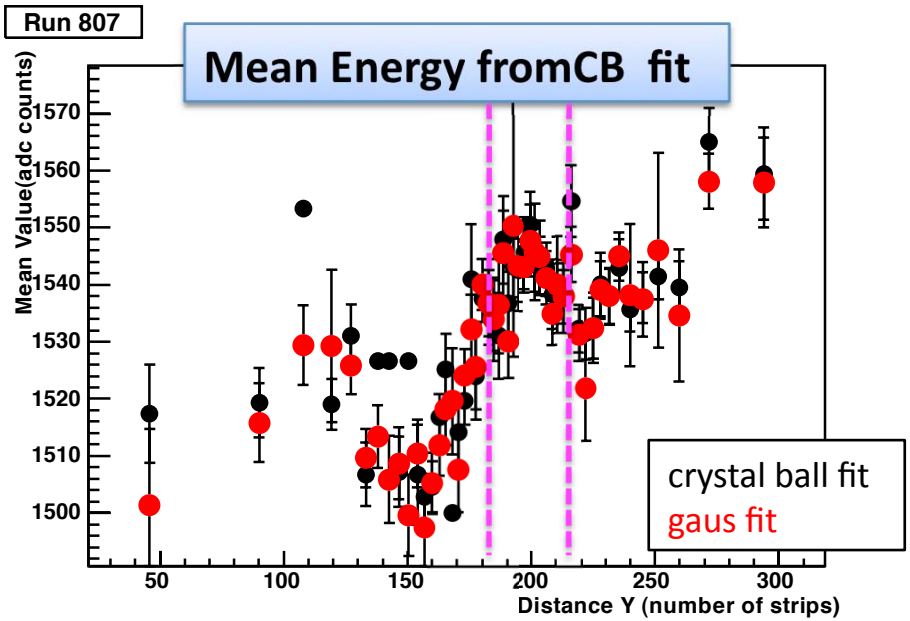

Run 806
Energy Resolution
σE/E (%)
Distance Y (number of strips)

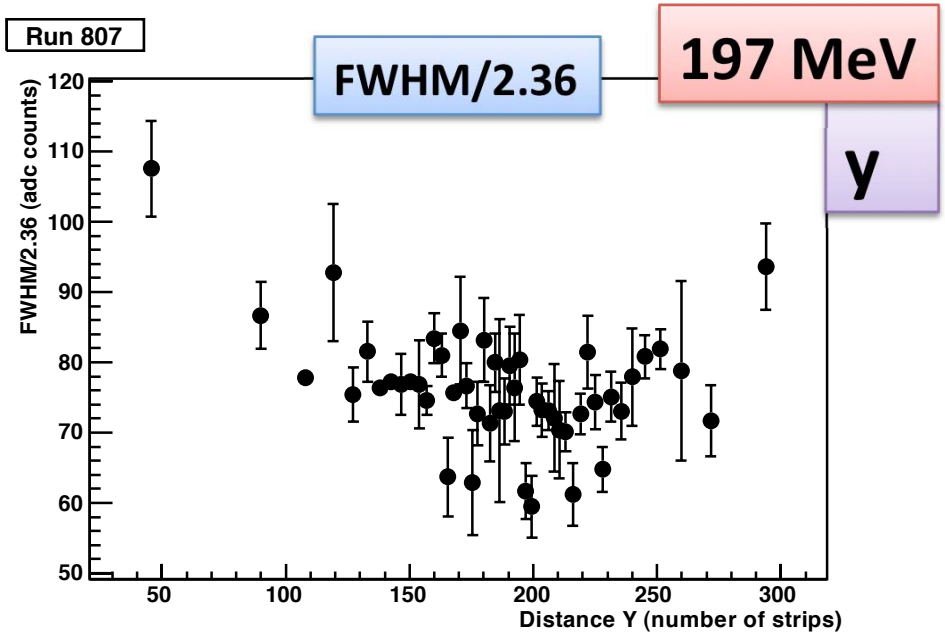

Run 807
Mean Energy fromCB fit
crystal ball fit
gaus fit
Mean Value(adc counts)
Distance X (number of strips)

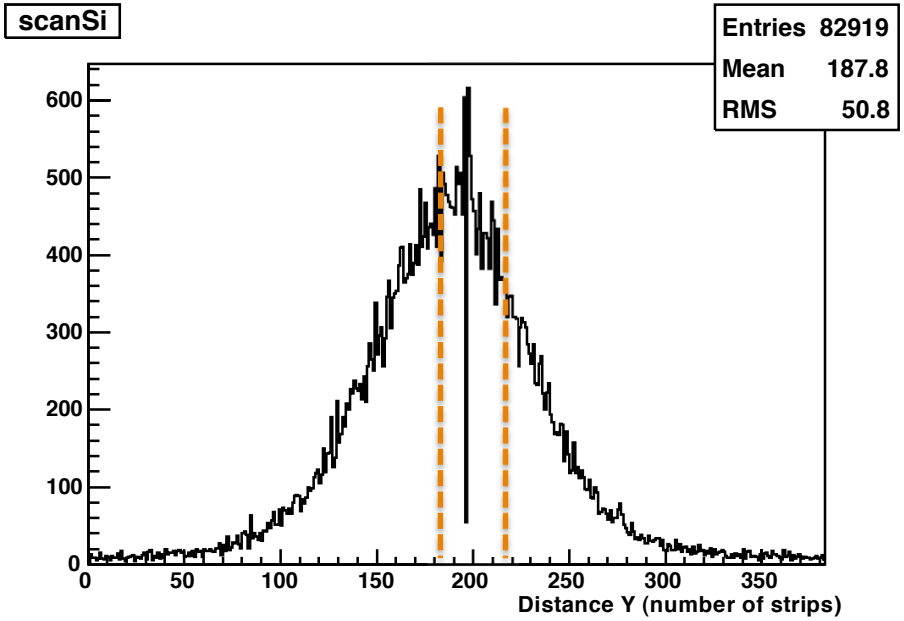

Run 807
FWHM/2.36
197 MeV
x
FWHM/2.36 (adc counts)
Distance X (number of strips)

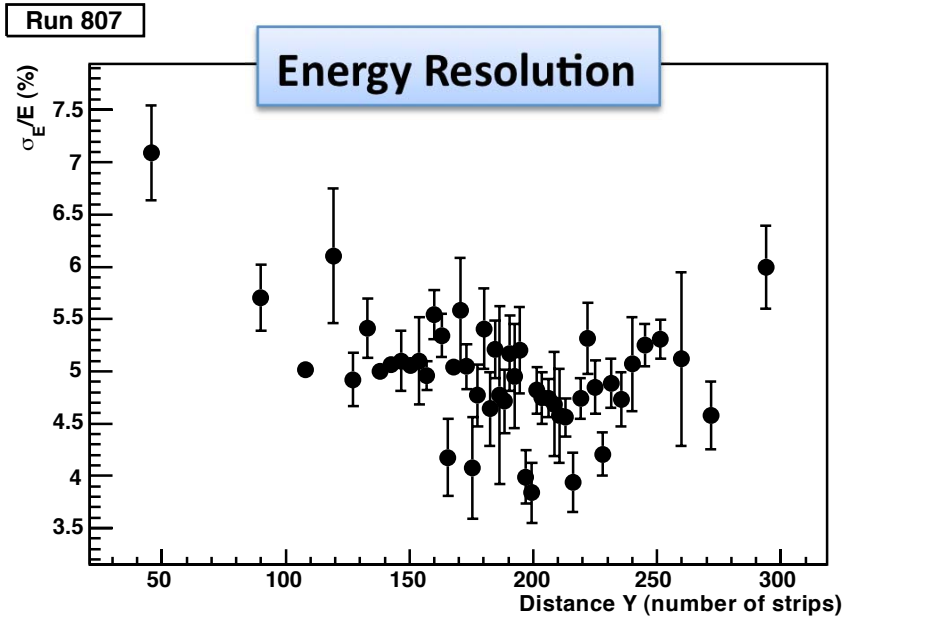

scanSi
Entries 82919
Mean 200
RMS 64.25
Distance X (number of strips)

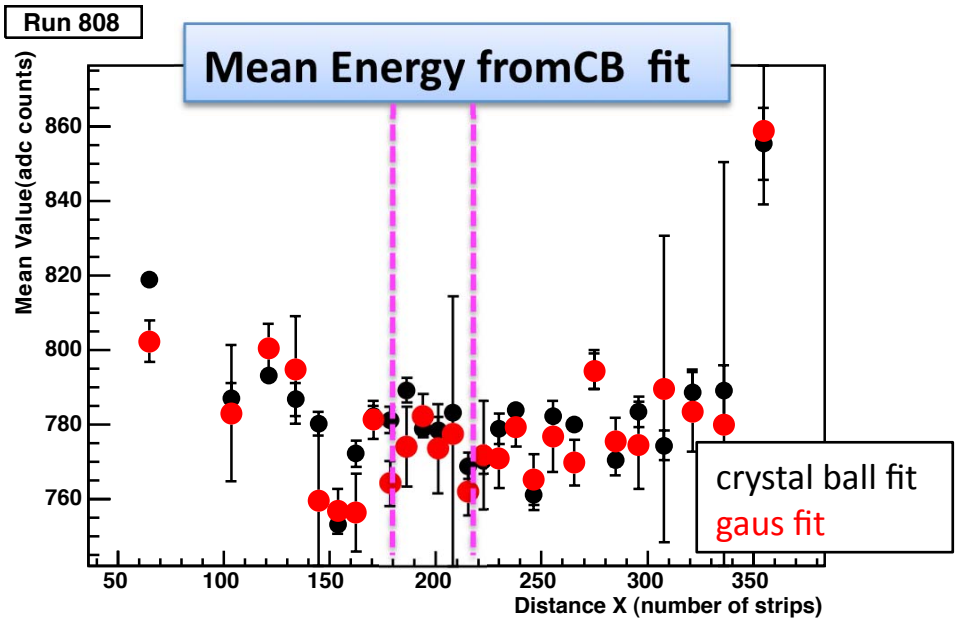

Run 807
Energy Resolution
σE/E (%)
Distance X (number of strips)

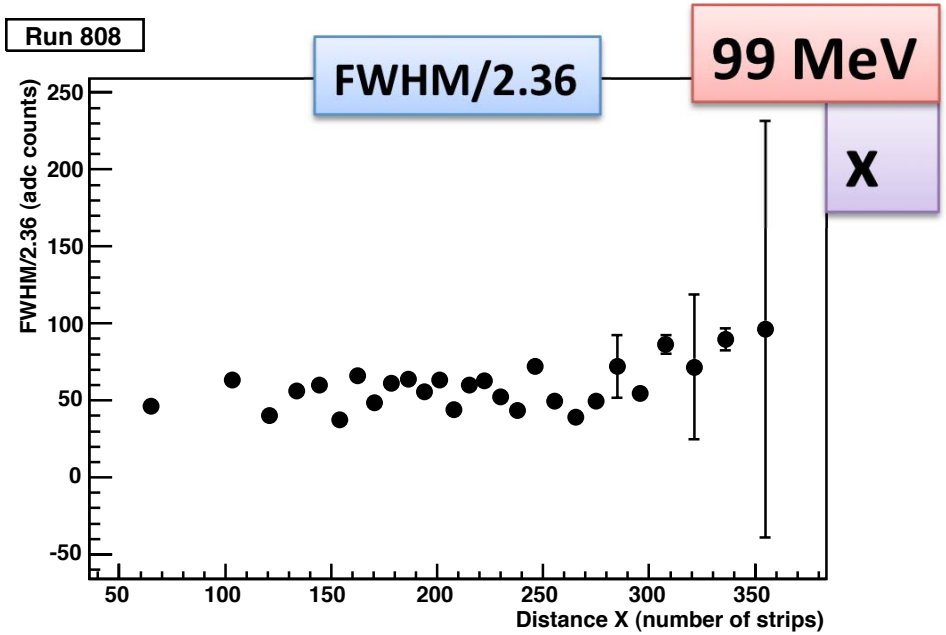

Run 807
Mean Energy fromCB fit
Mean Value(adc counts)
Distance Y (number of strips)
crystal ball fit
gaus fit

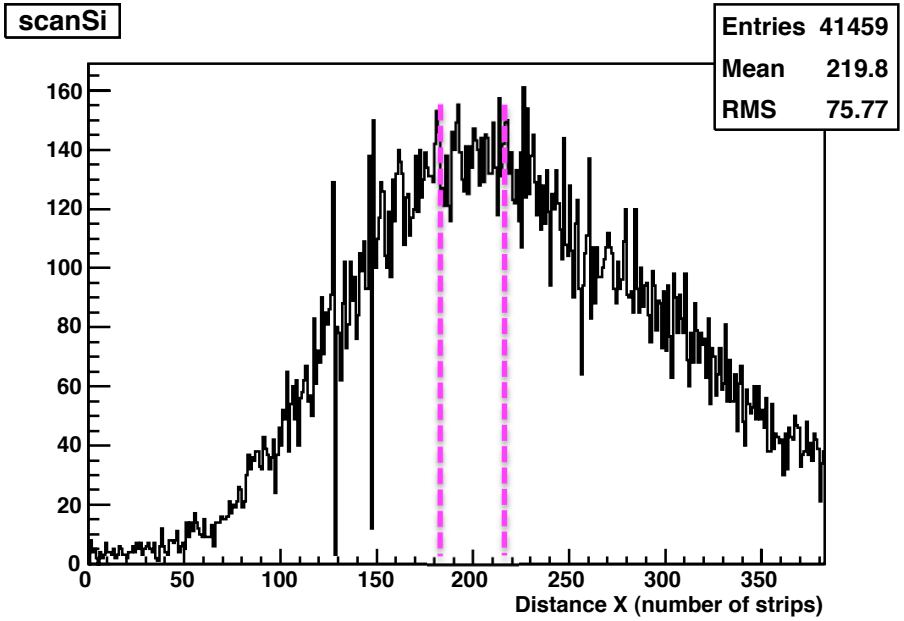

Run 807
FWHM/2.36
197 MeV
y
FWHM/2.36 (adc counts)
Distance Y (number of strips)

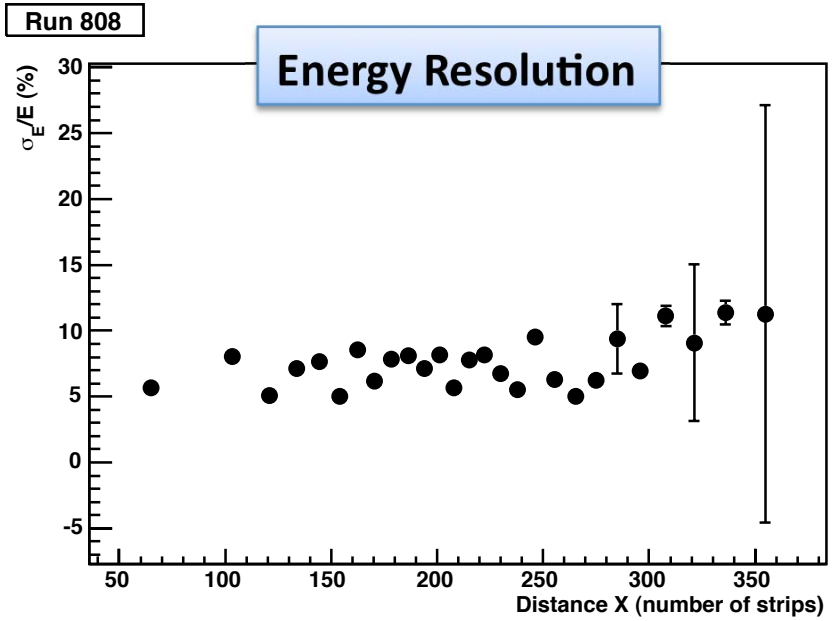

scanSi
Entries 82919
Mean 187.8
RMS 50.8
Distance Y (number of strips)

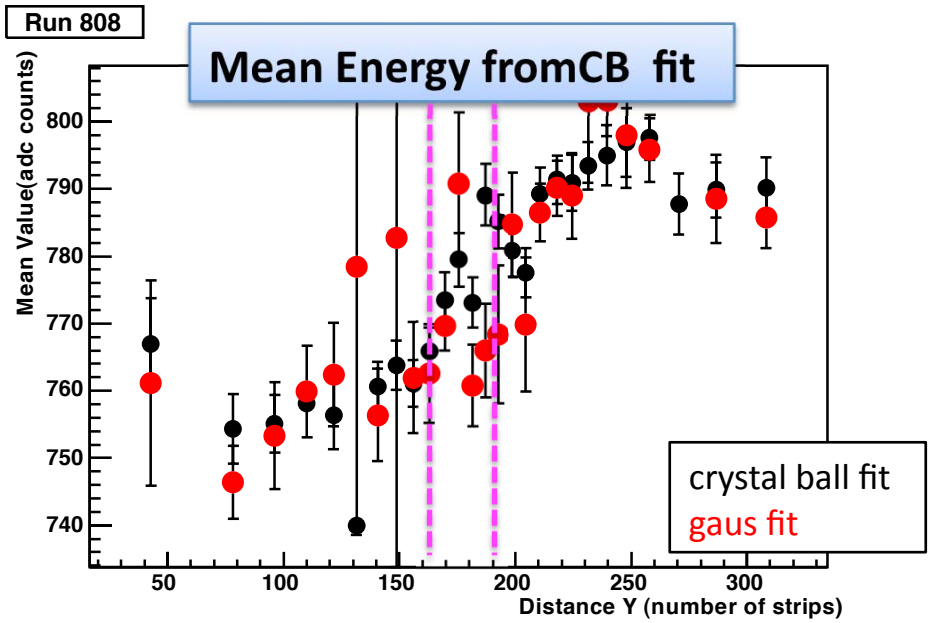

Run 807
Energy Resolution
σE/E (%)
Distance Y (number of strips)

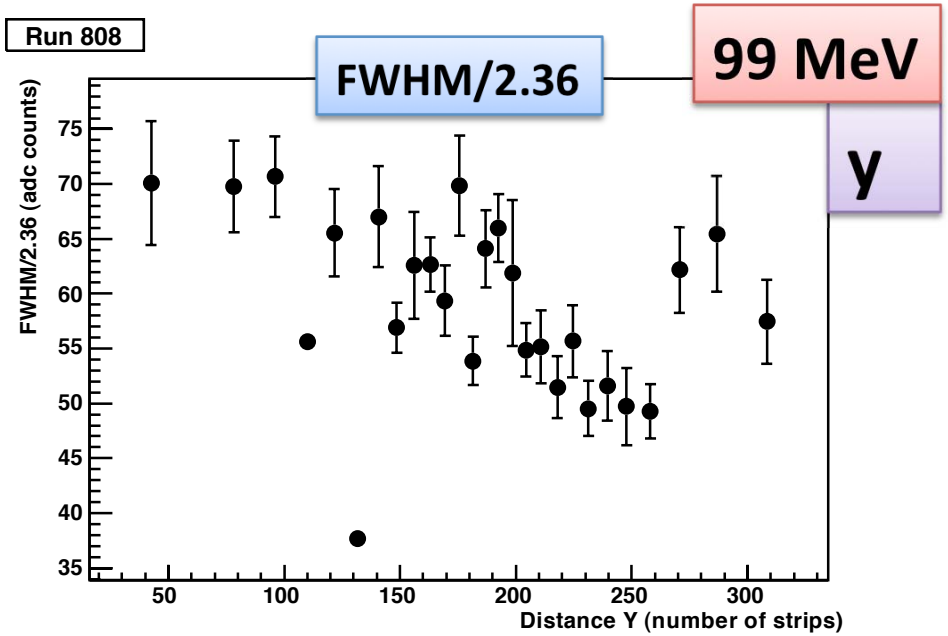

Run 808
Mean Energy fromCB fit
Mean Value(adc counts)
Distance X (number of strips)
crystal ball fit
gaus fit

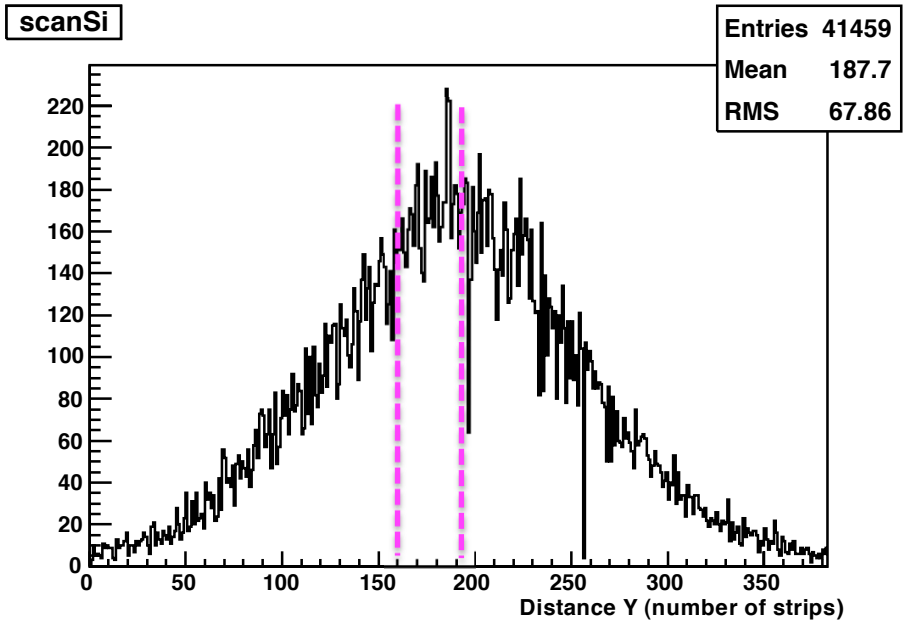

Run 808
FWHM/2.36
99 MeV
X
FWHM/2.36 (adc counts)
Distance X (number of strips)

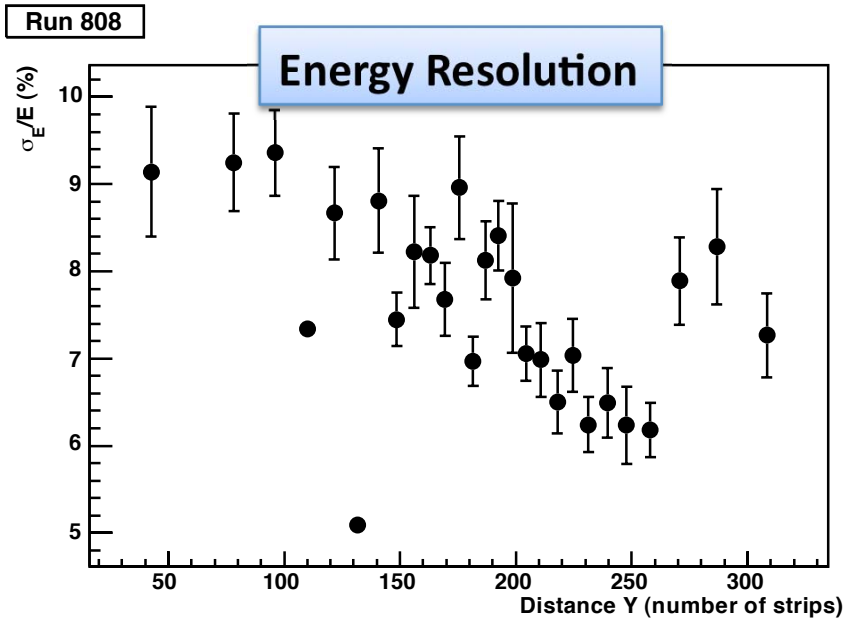

scanSi
Entries 41459
Mean 219.8
RMS 75.77
Distance X (number of strips)


Run 808
Energy Resolution
σE/E (%)
Distance X (number of strips)


Run 808
Mean Energy fromCB fit
Mean Value(adc counts)
Distance Y (number of strips)
crystal ball fit
gaus fit


Run 808
FWHM/2.36
99 MeV
y
FWHM/2.36 (adc counts)
Distance Y (number of strips)


scanSi
Entries 41459
Mean 187.7
RMS 67.86
Distance Y (number of strips)


Run 808
Energy Resolution
σE/E (%)
Distance Y (number of strips)

Final Selections

•If possible , select only range in with the mean energy spread is minimum

•If not, select the peak of the silicon strips distribution

Energy (MeV)	Xmin (strips)	Xmax (strips)	Ymin (strips)	Ymax (strips)
487	148	170	175	195
397	153	190	193	209
297	155	183	184	210
198	159	192	180	210
99	180	220	165	205

Conclusions

- Pedestal studies show a dependence of Mean Energy and FWHM/2.36 that must be considered:
  - mean pedestal method
  - need of pedestal trend effect studies

- Energy spread bigger than 1% declared

- Using a event by event position selection strategy, it's possible to reduce energy shift