

Measuring charge sharing in the TPOL silicon detector

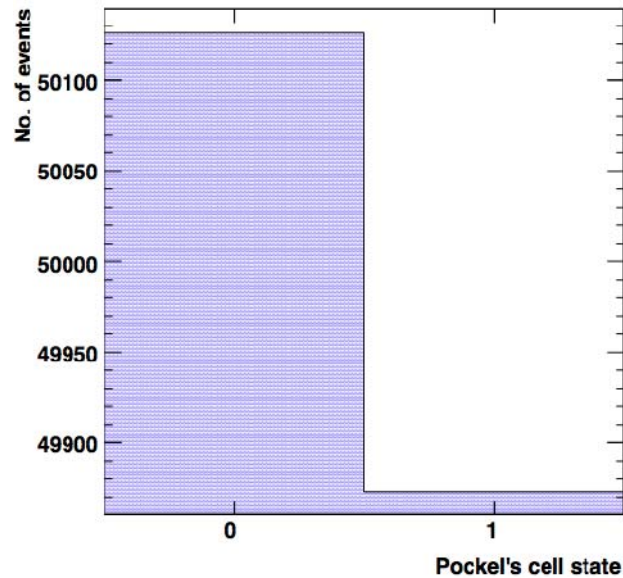
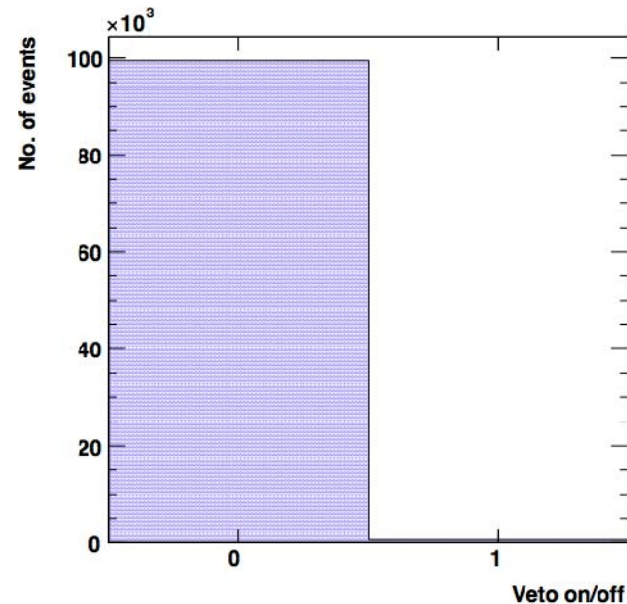
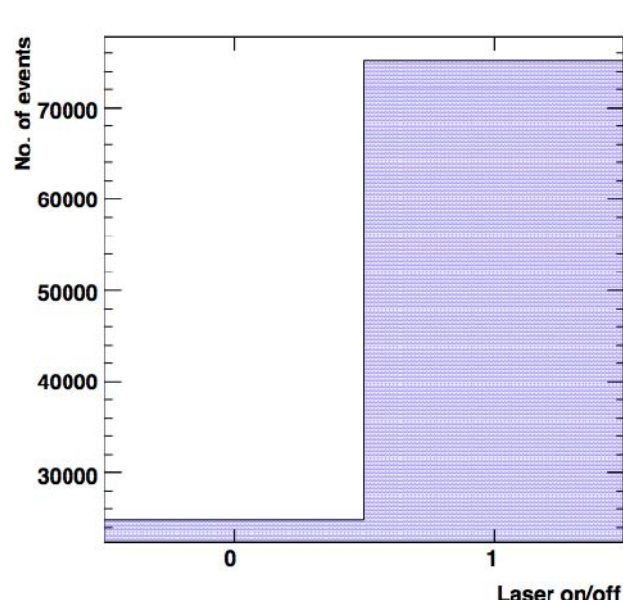
Alex Tapper

- Data sample and quality checks
- Measurement the charge sharing
- Cross checks
- Implementation in MC and comparison with data
- Conclusions

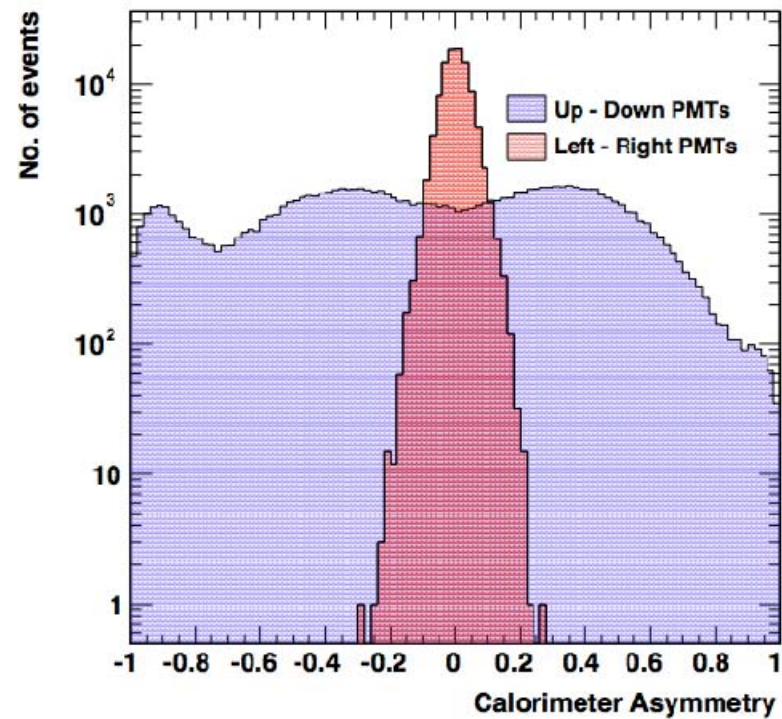
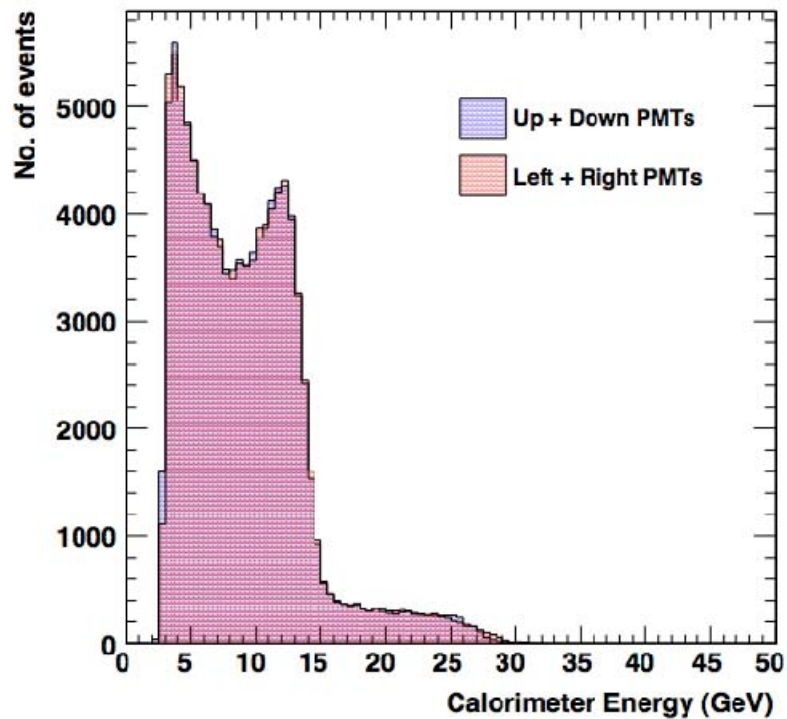
Data sample and quality checks

- Data comb2.12325
 - 99999 events
- Quick checks
 - Status of TPOL
 - Energy, laser, Pockel's cell, veto
 - Status of silicon
 - Pedestals, RMS noise and common mode
 - Clusters in silicon detector
 - Cluster characteristics
 - Correlation with calorimeter

Laser, veto and Pockel's cell

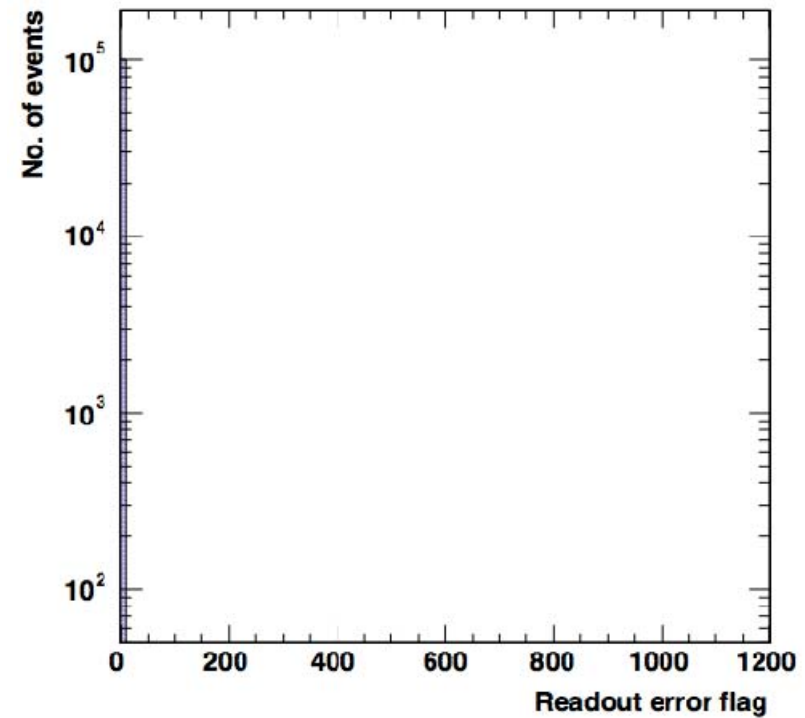
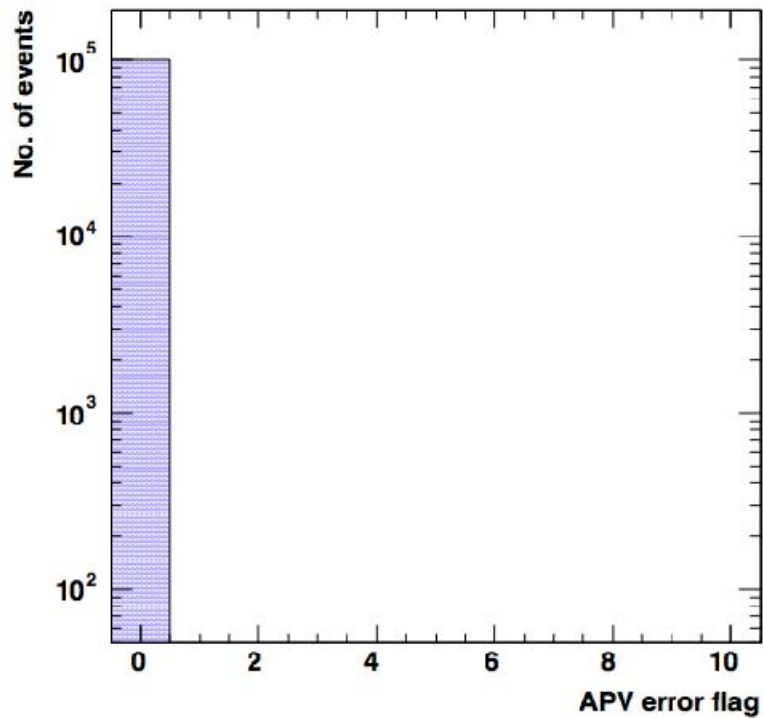


CALO energies and asymmetries

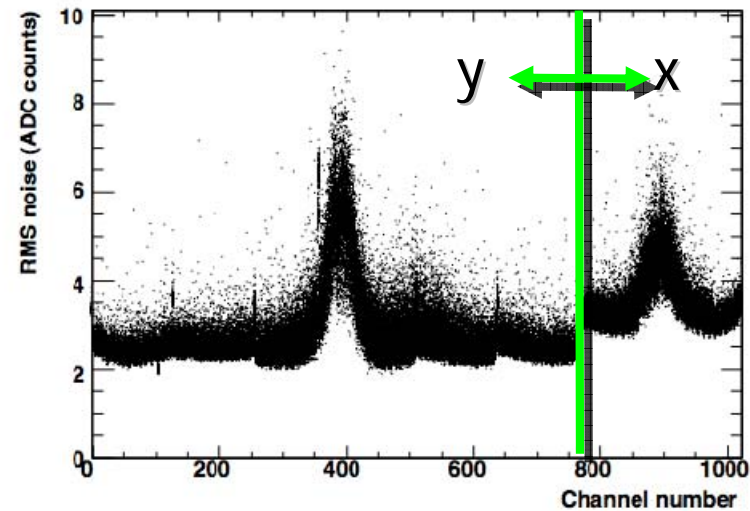
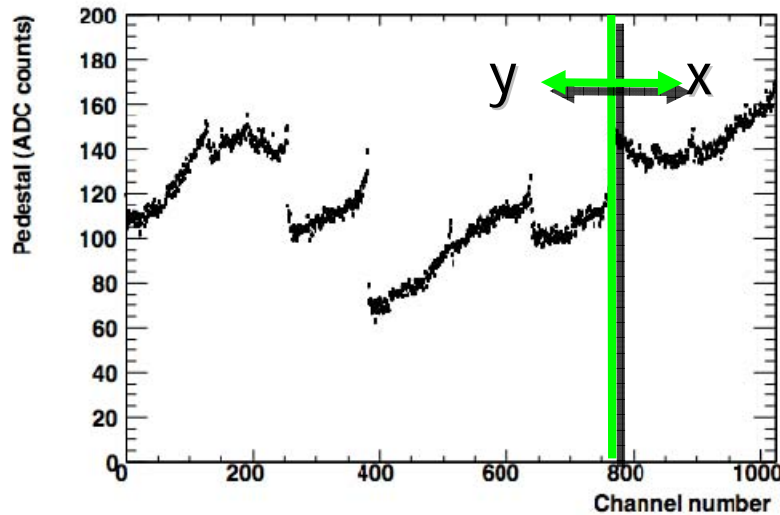


Error flags in silicon system

- No errors observed

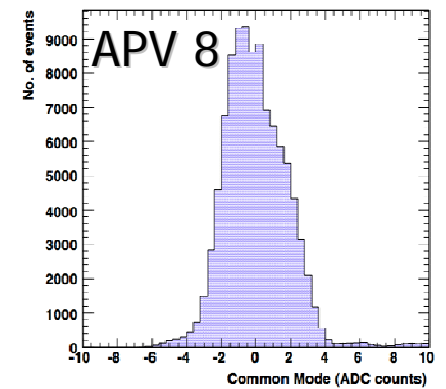
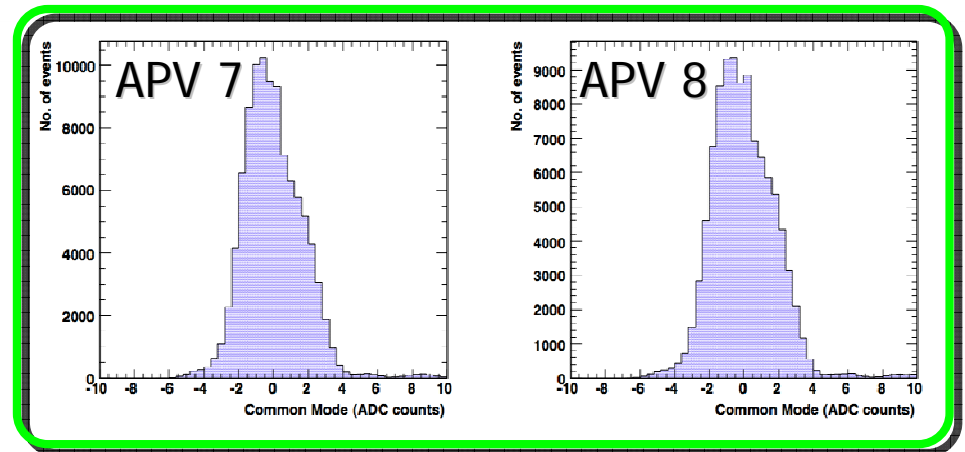
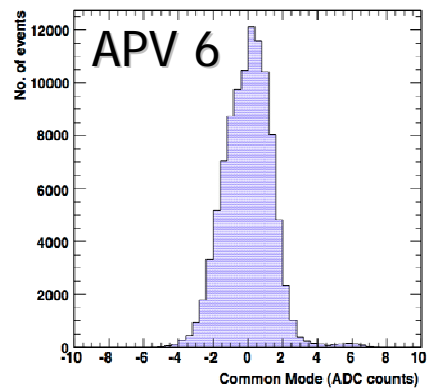
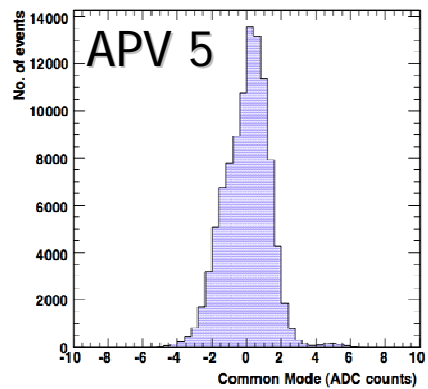
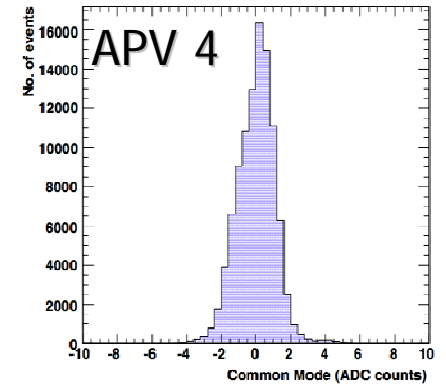
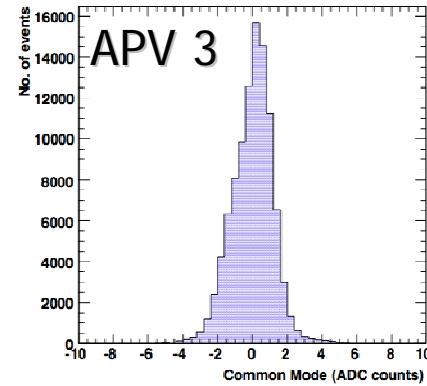
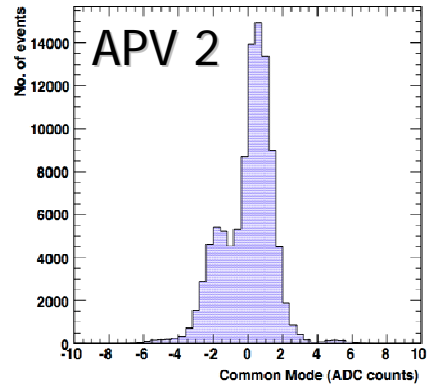
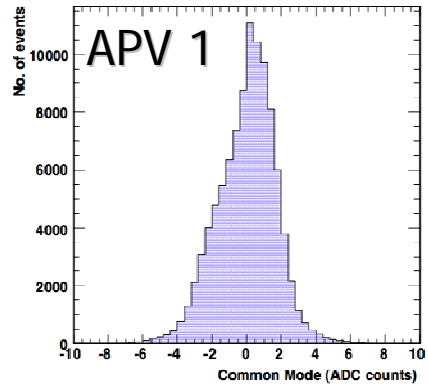


Pedestals and RMS noise



- Pedestals and noise stable over run
- Can see signal from beam in noise

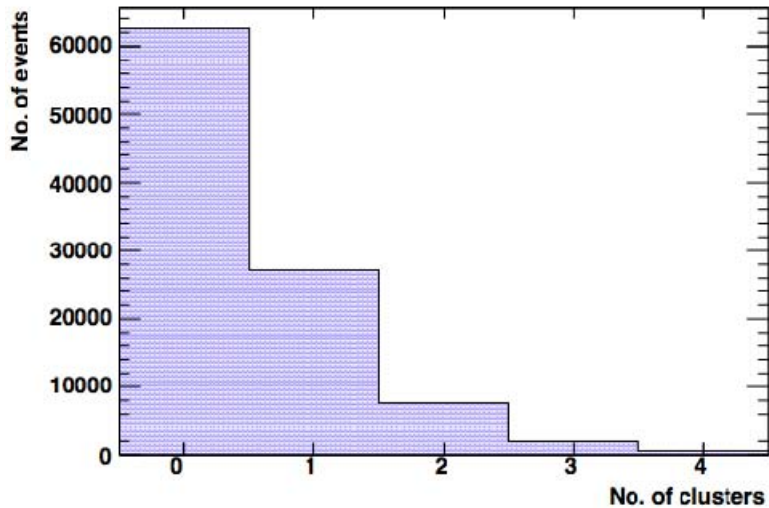
Common mode noise



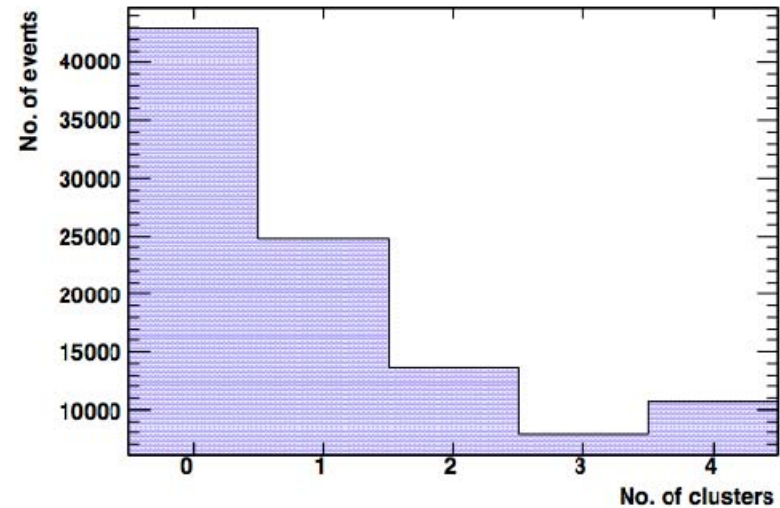
y detector plane

x detector plane

Number of clusters

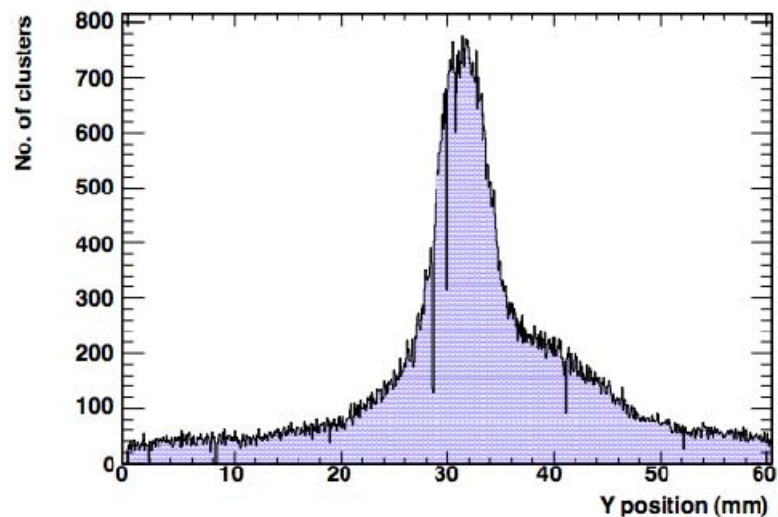
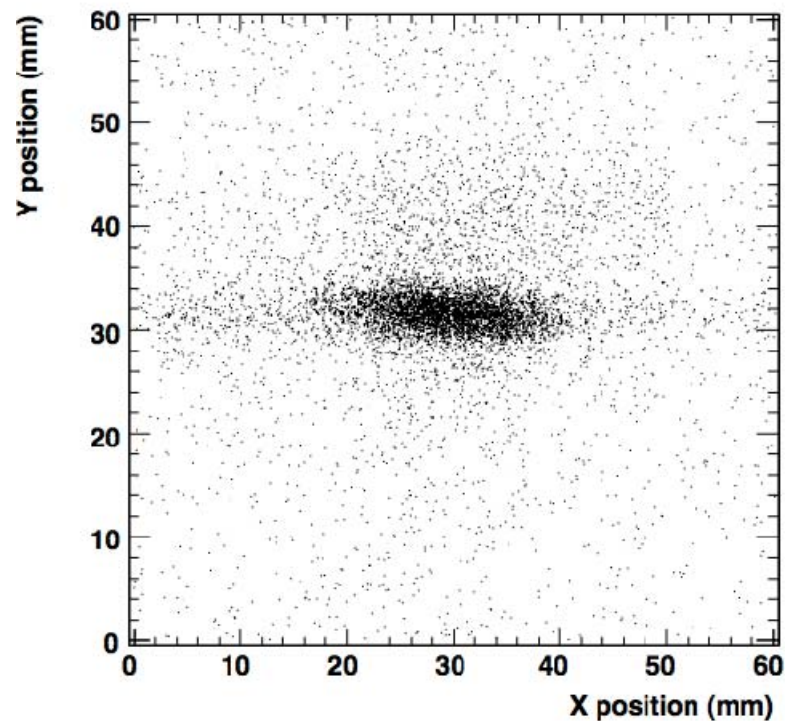
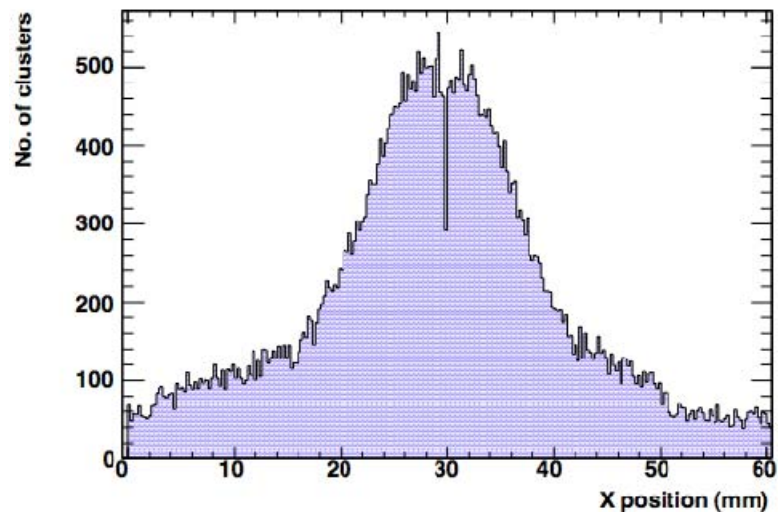


x detector plane



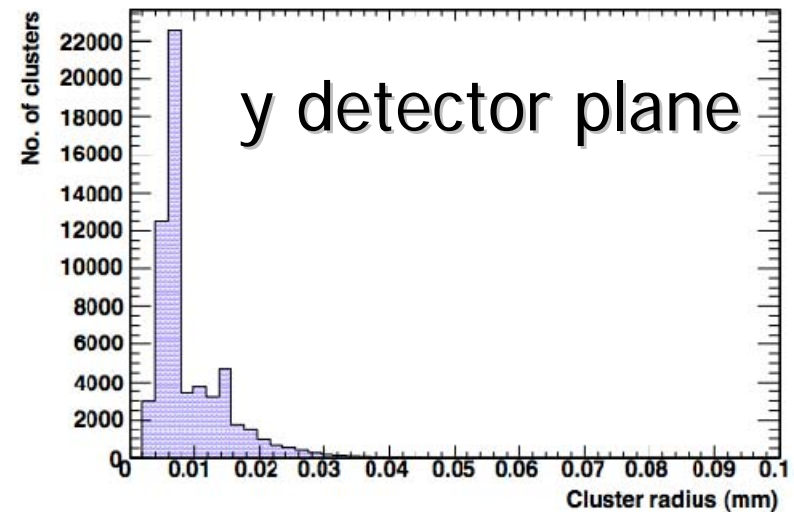
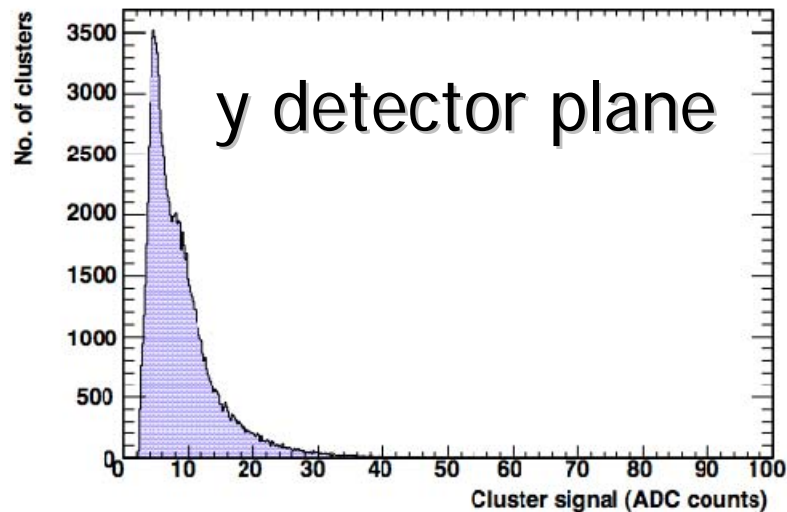
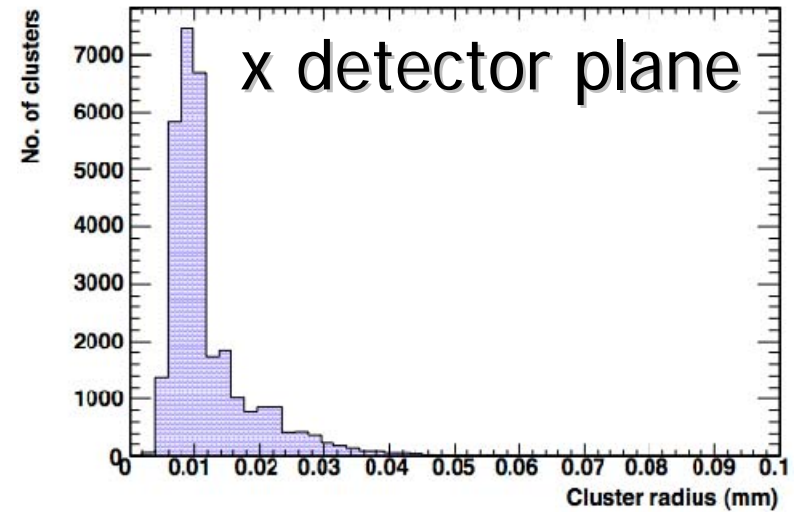
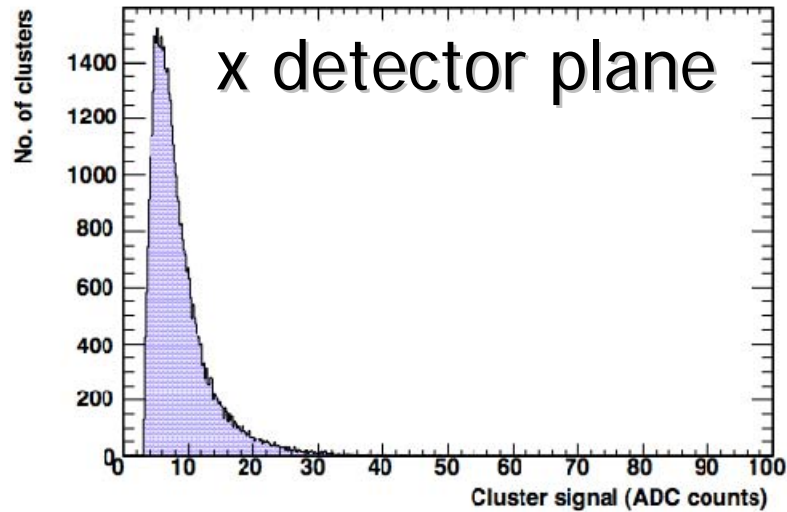
y detector plane

Cluster x and y positions

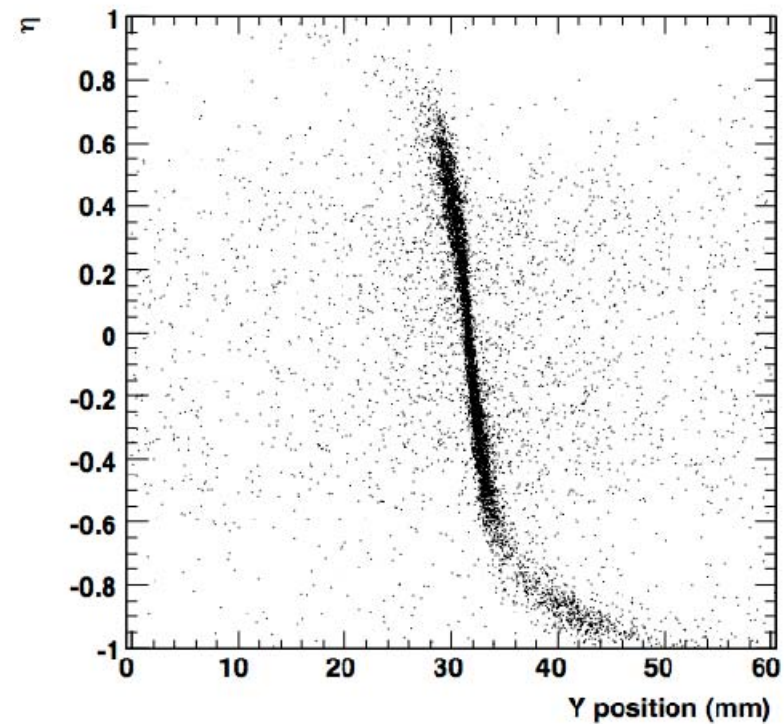
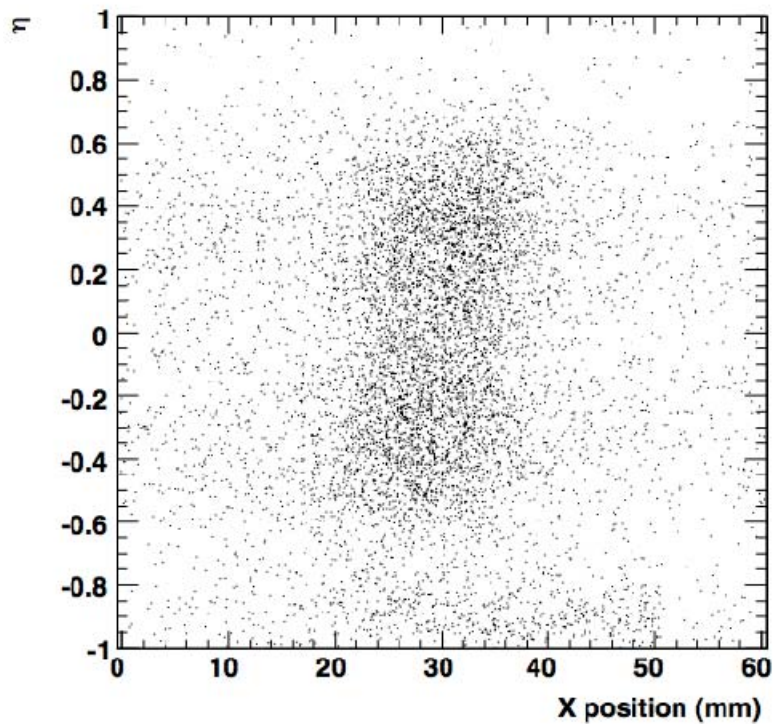


Single cluster events

Cluster charge and radius

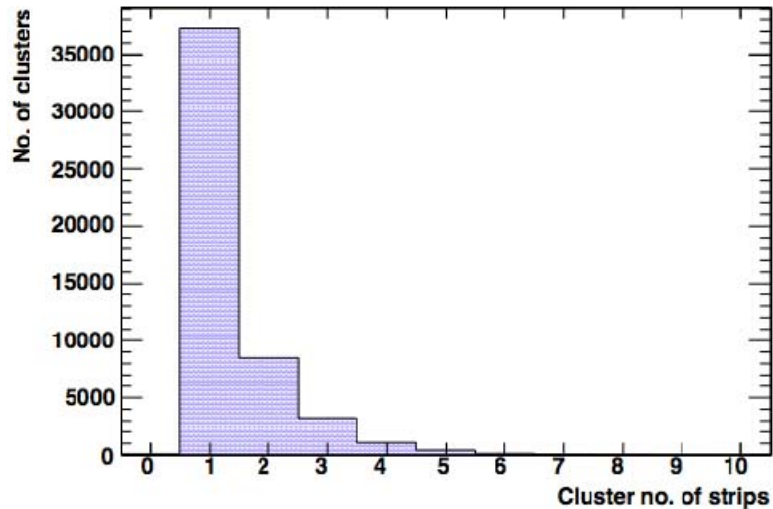


CALO-Si correlations

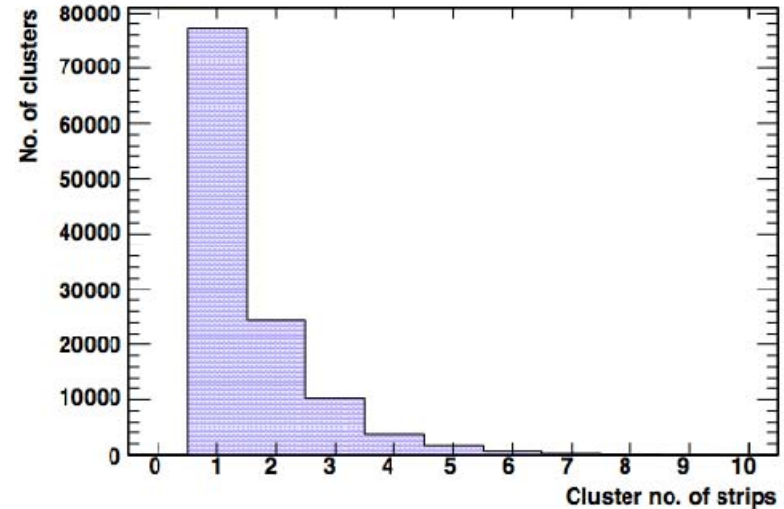


- Single silicon cluster events

Number of strips per cluster



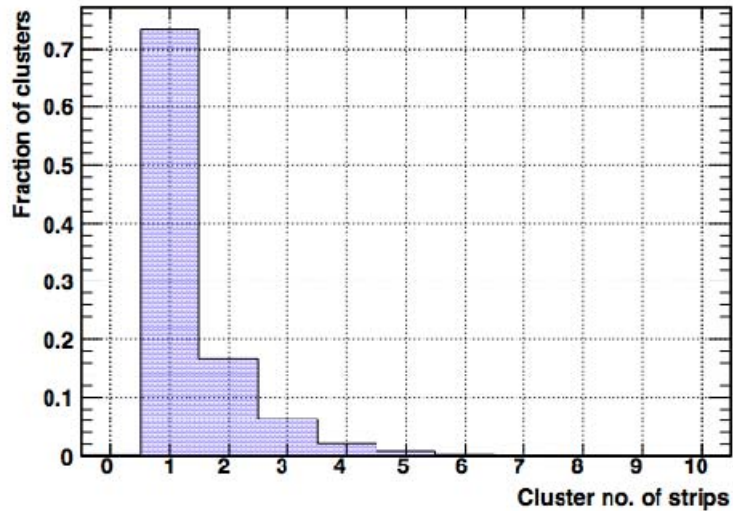
x detector plane



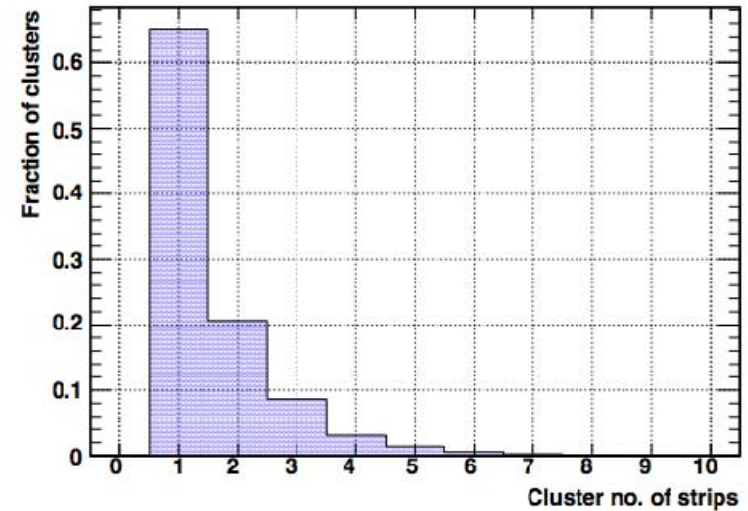
y detector plane

Charge sharing measurement

Charge sharing measurement

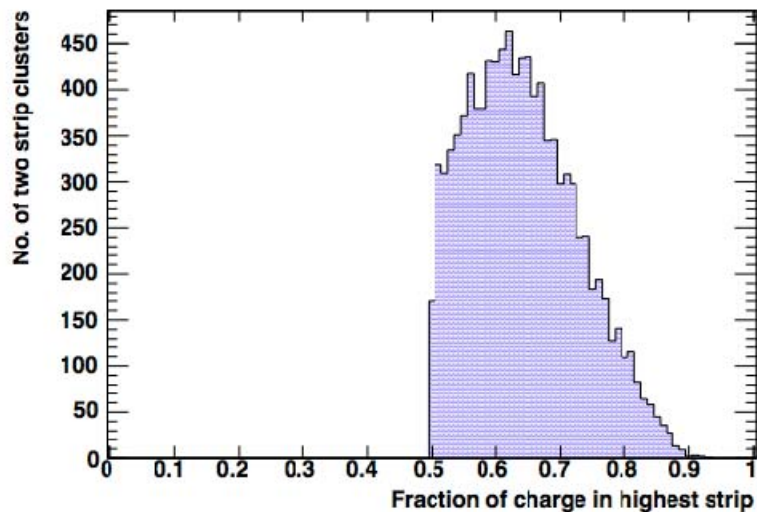


x detector plane

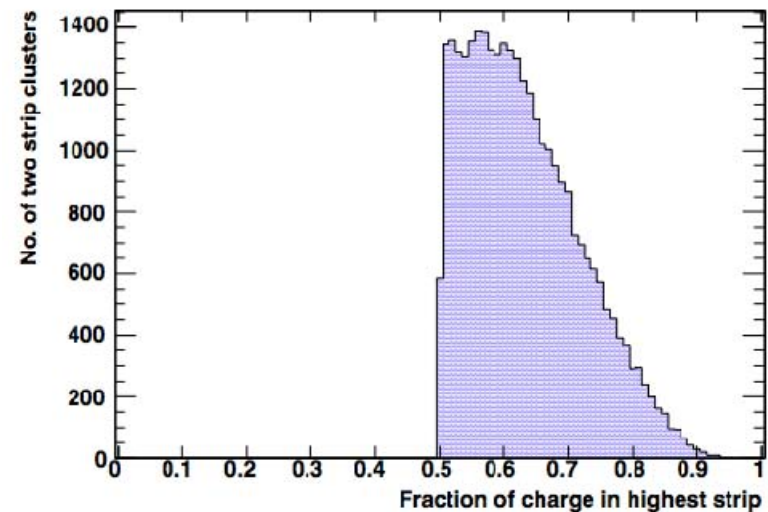


y detector plane

Charge sharing measurement

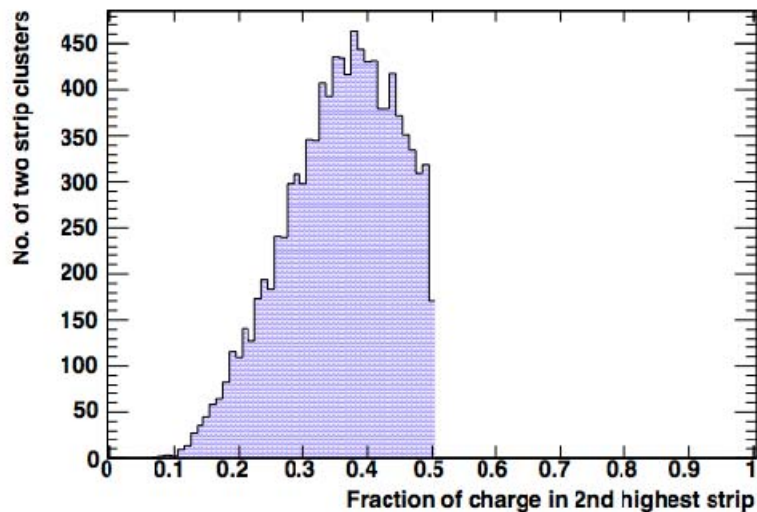


x detector plane

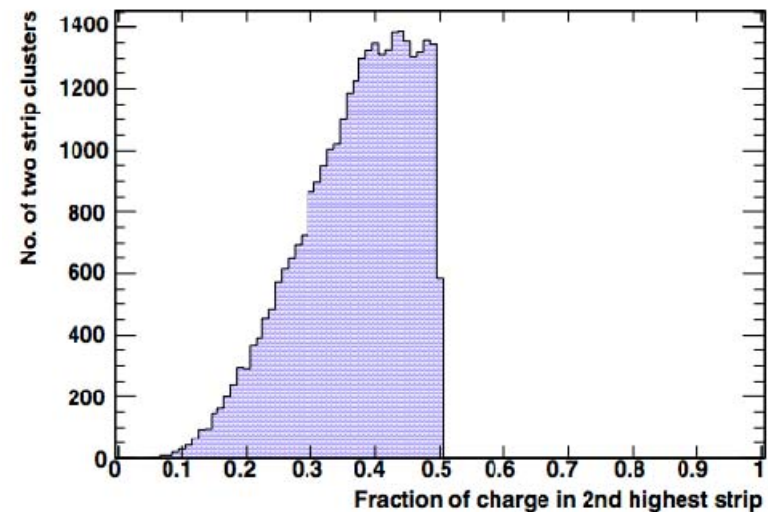


y detector plane

Charge sharing measurement

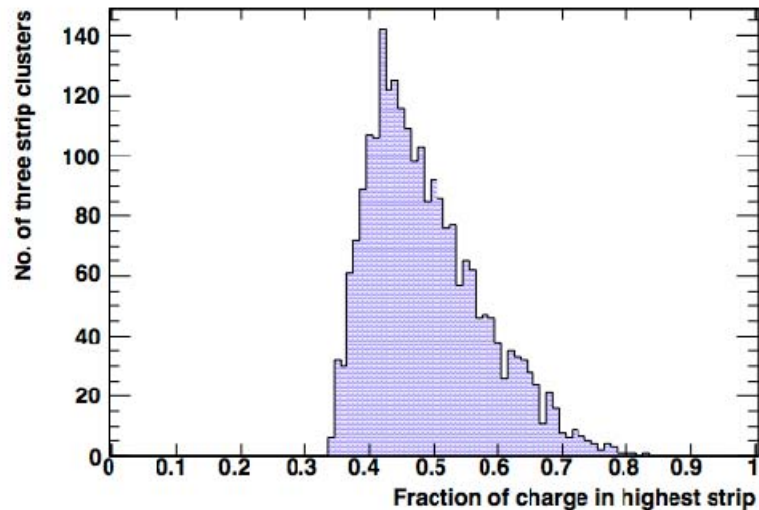


x detector plane

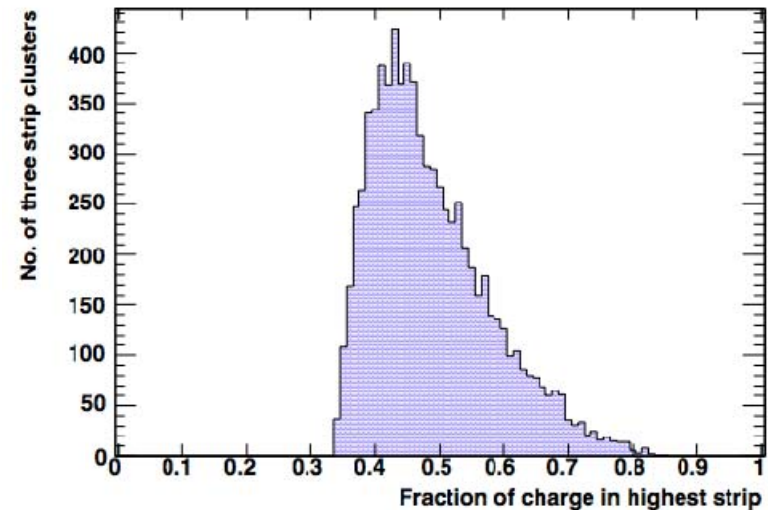


y detector plane

Charge sharing measurement

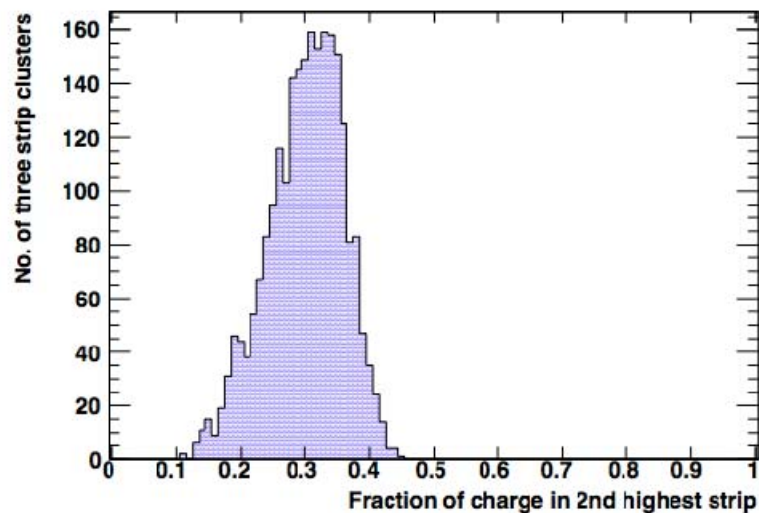


x detector plane

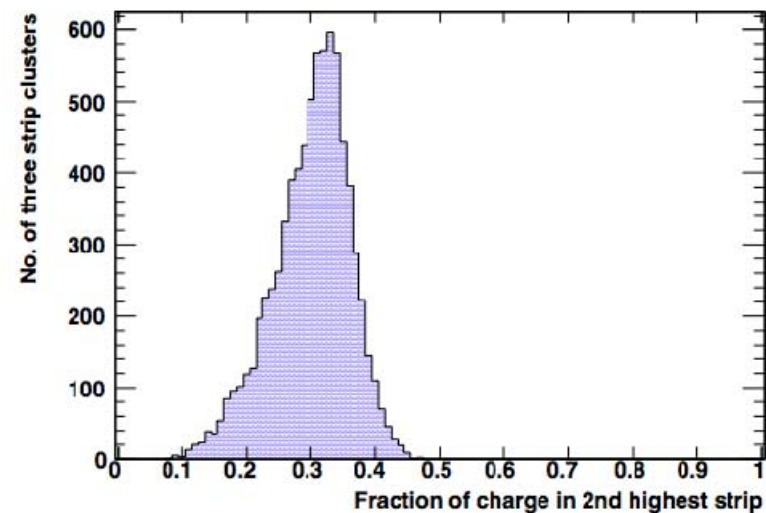


y detector plane

Charge sharing measurement

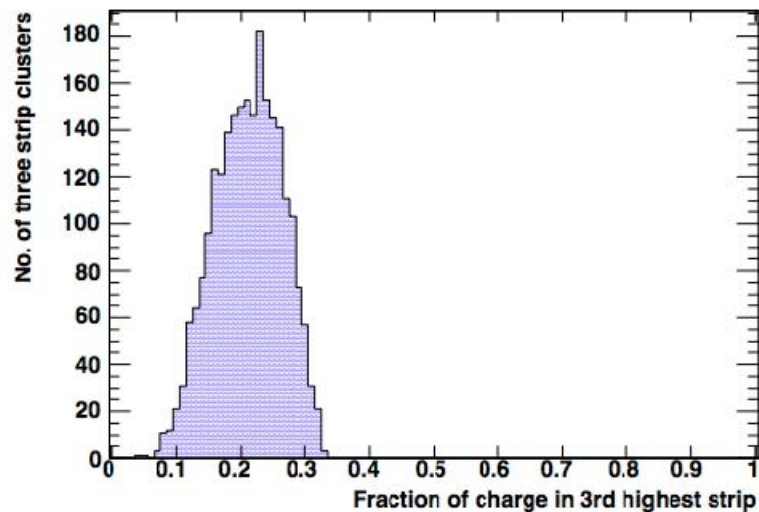


x detector plane

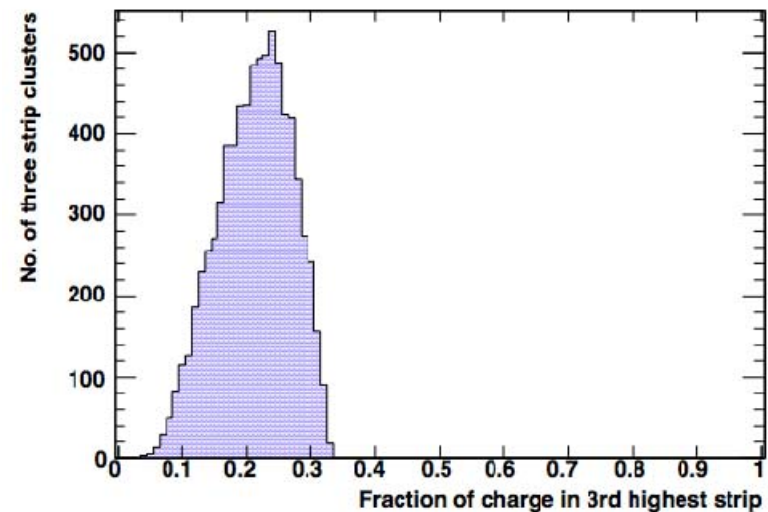


y detector plane

Charge sharing measurement



x detector plane



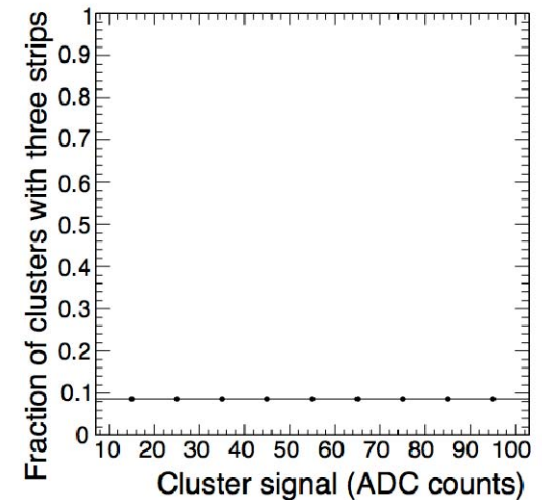
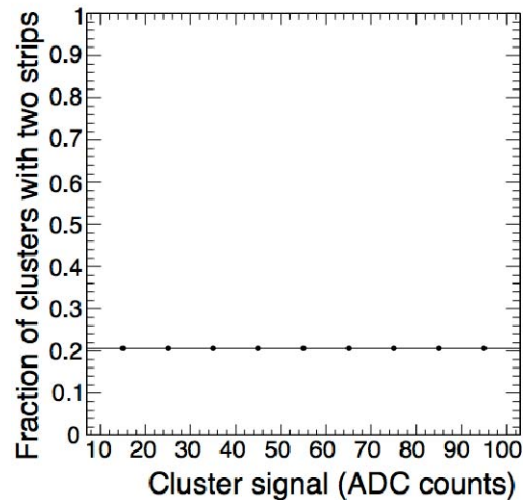
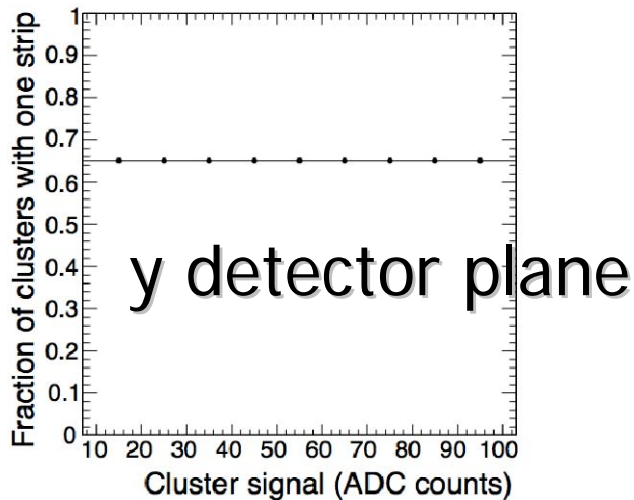
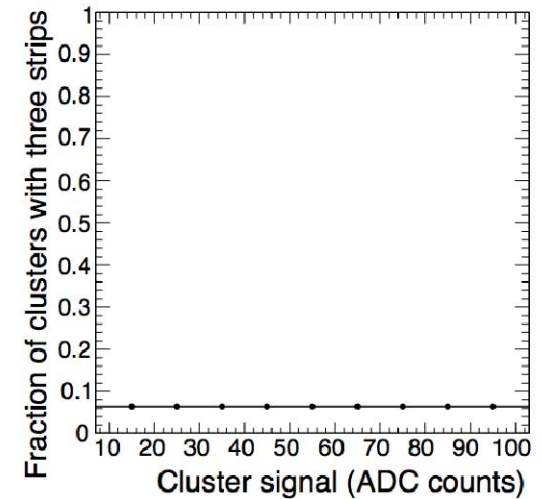
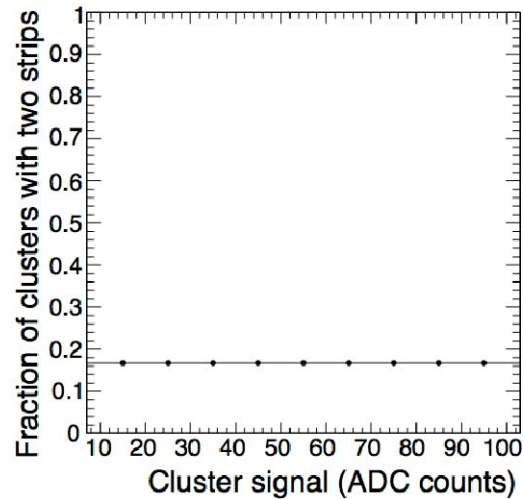
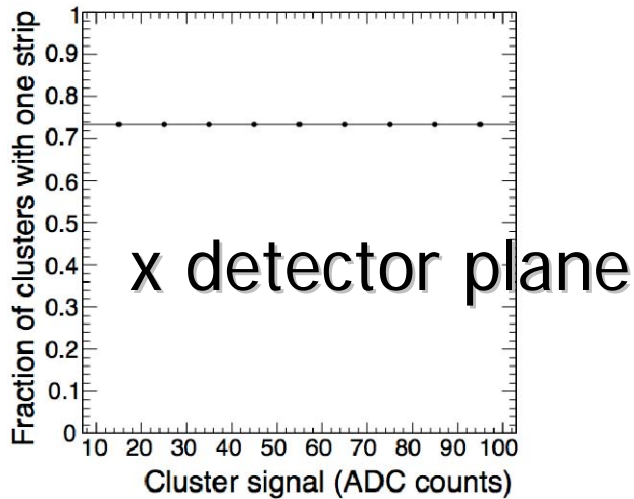
y detector plane

Summary of results

	Number of strips in cluster					
	x detector			y detector		
	1	2	3	1	2	3
Fraction of clusters	0.73	0.17	0.06	0.65	0.21	0.09
Fraction of charge in highest charge strip	1.0	0.64	0.49	1.0	0.63	0.49
Fraction of charge in 2 nd highest charge strip		0.36	0.30		0.37	0.30
Fraction of charge in 3 rd highest charge strip			0.21			0.21

- Numbers are the mean of each distribution

Cluster charge dependence

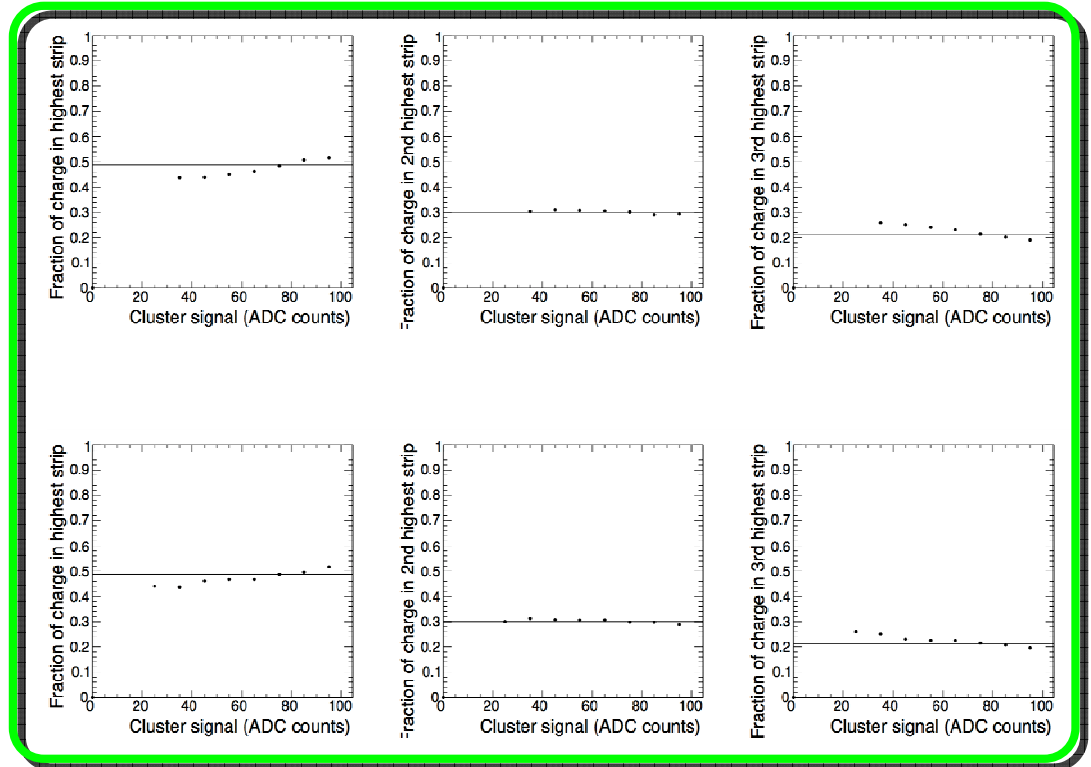
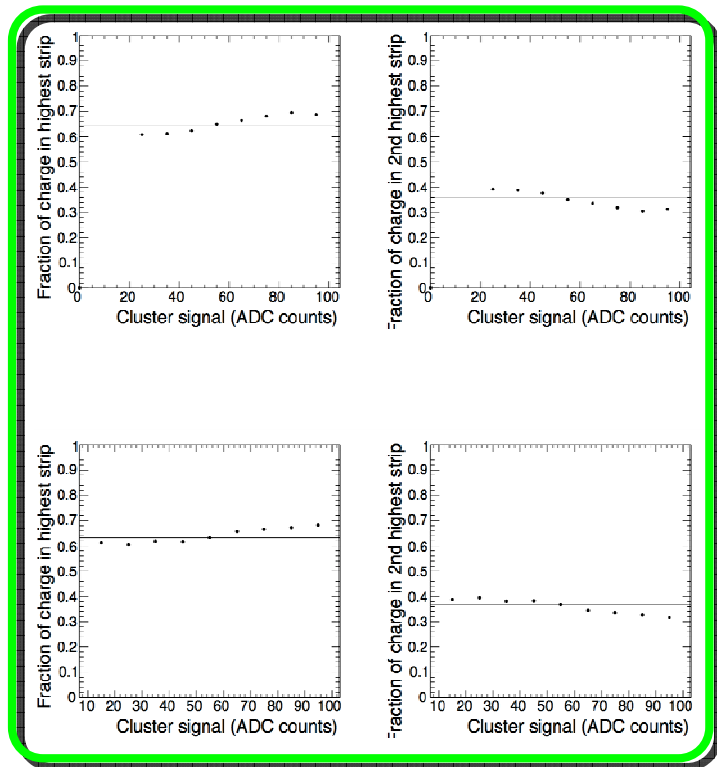


- No dependence on charge

Cluster charge dependence

x detector

y detector

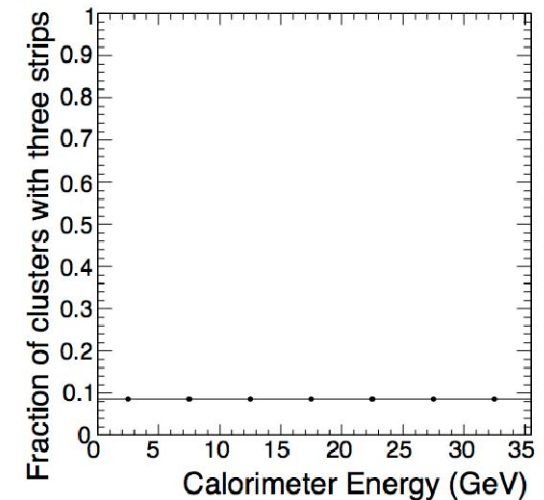
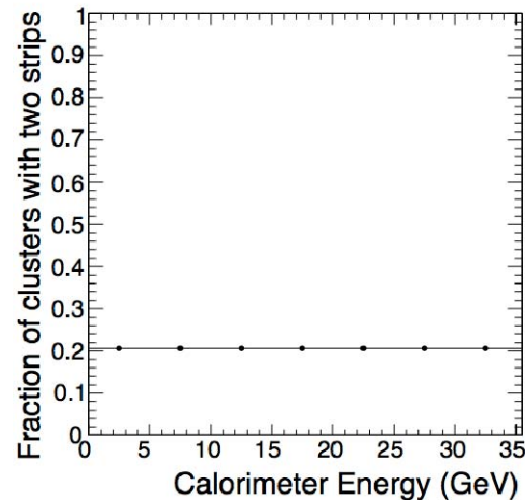
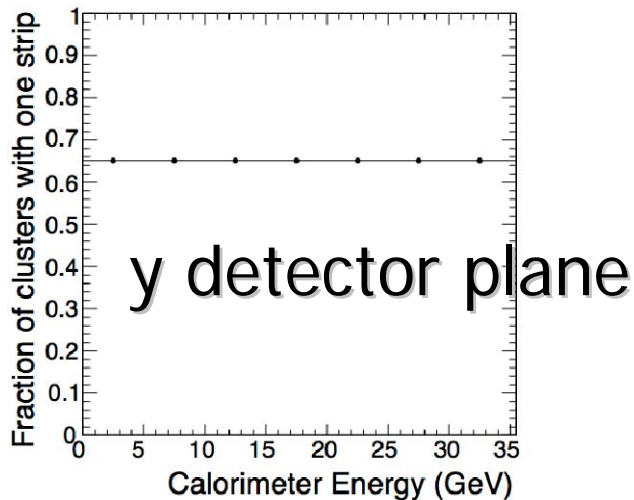
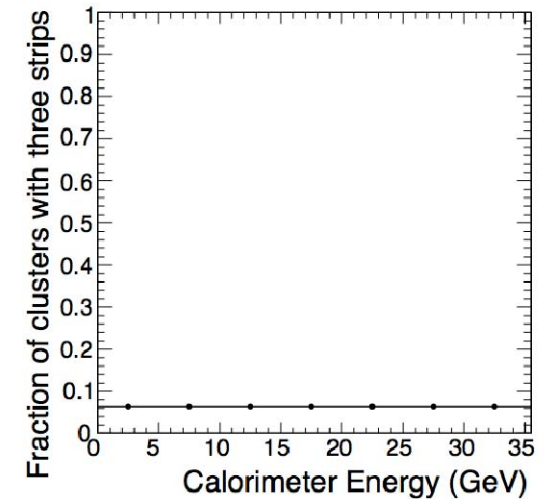
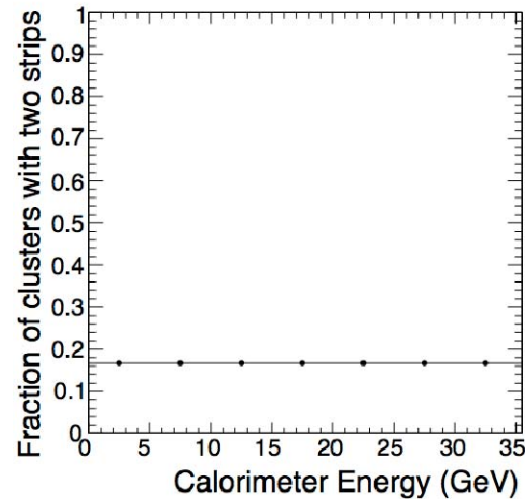
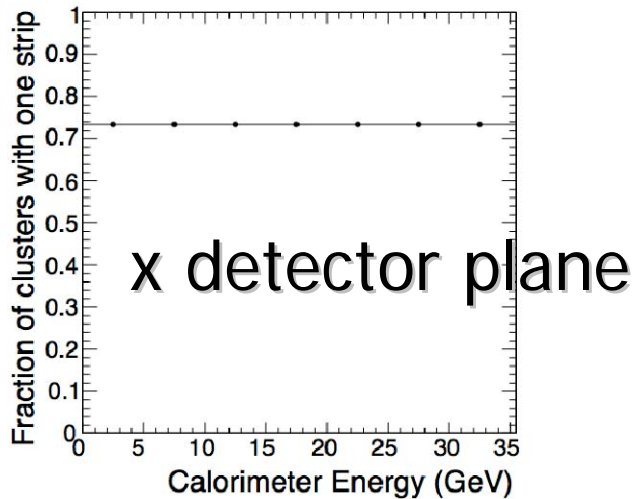


Clusters with 2 strips

Clusters with 3 strips

- No strong dependence on charge

Calorimeter energy dependence

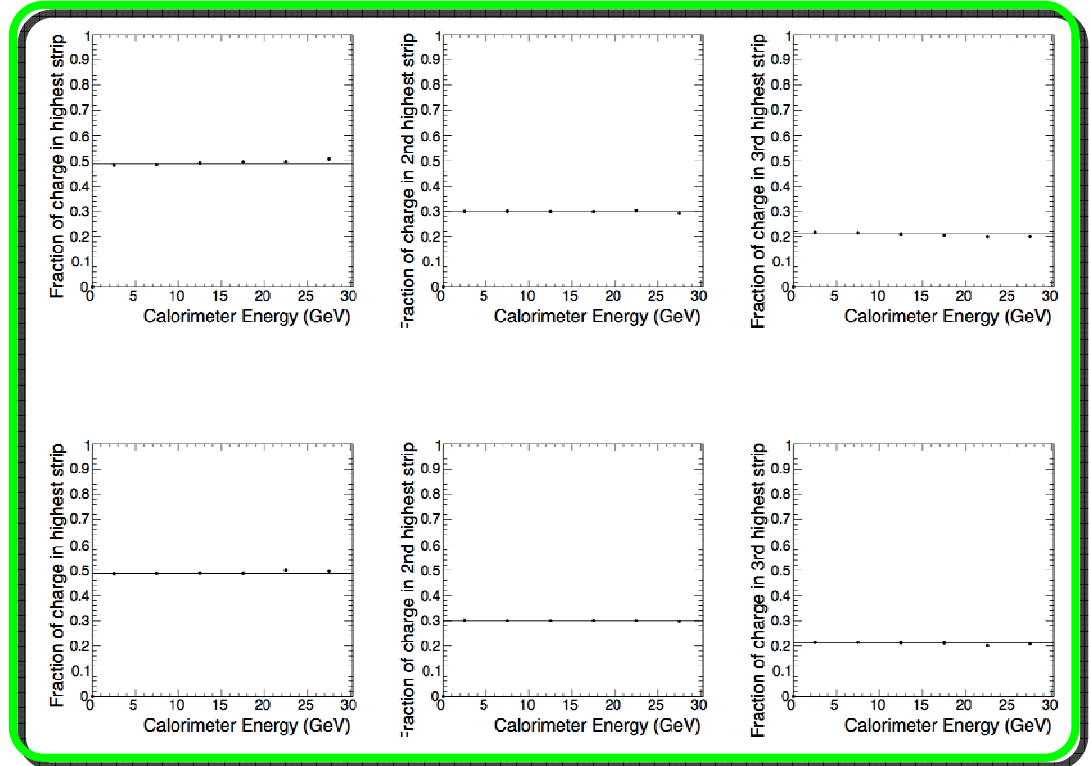
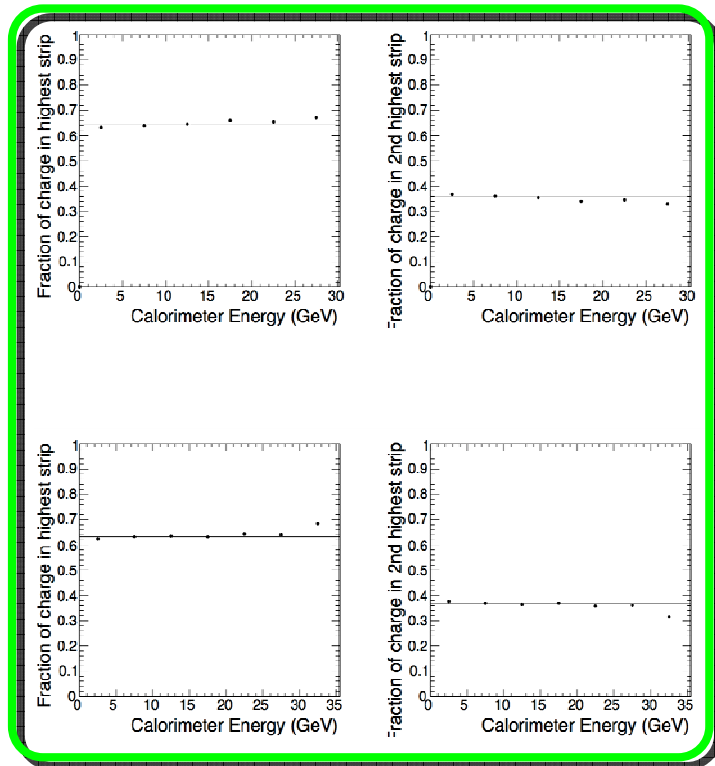


- No dependence on calorimeter energy

Calorimeter energy dependence

x detector

y detector



Clusters with 2 strips

Clusters with 3 strips

- No strong dependence on calorimeter energy

Conclusion

- Extracted charge sharing from data
- Sharing seems not to depend on energy or charge strongly
- Use this in MC to improve description of silicon data?
- Test in MC against data
- Test on runs with variety of conditions to check robustness