Plan – Charge Sharing

Planar and 3D Timepix in the time-over-threshold mode (TOT)

Cluster Analysis to find the

1. Number of clusters – which we keep consistent at ~400 khits
2. Percentage of clusters with large cluster sizes
3. Centroid (mass centre) of the cluster

We can then check this with results from Diamond expt.

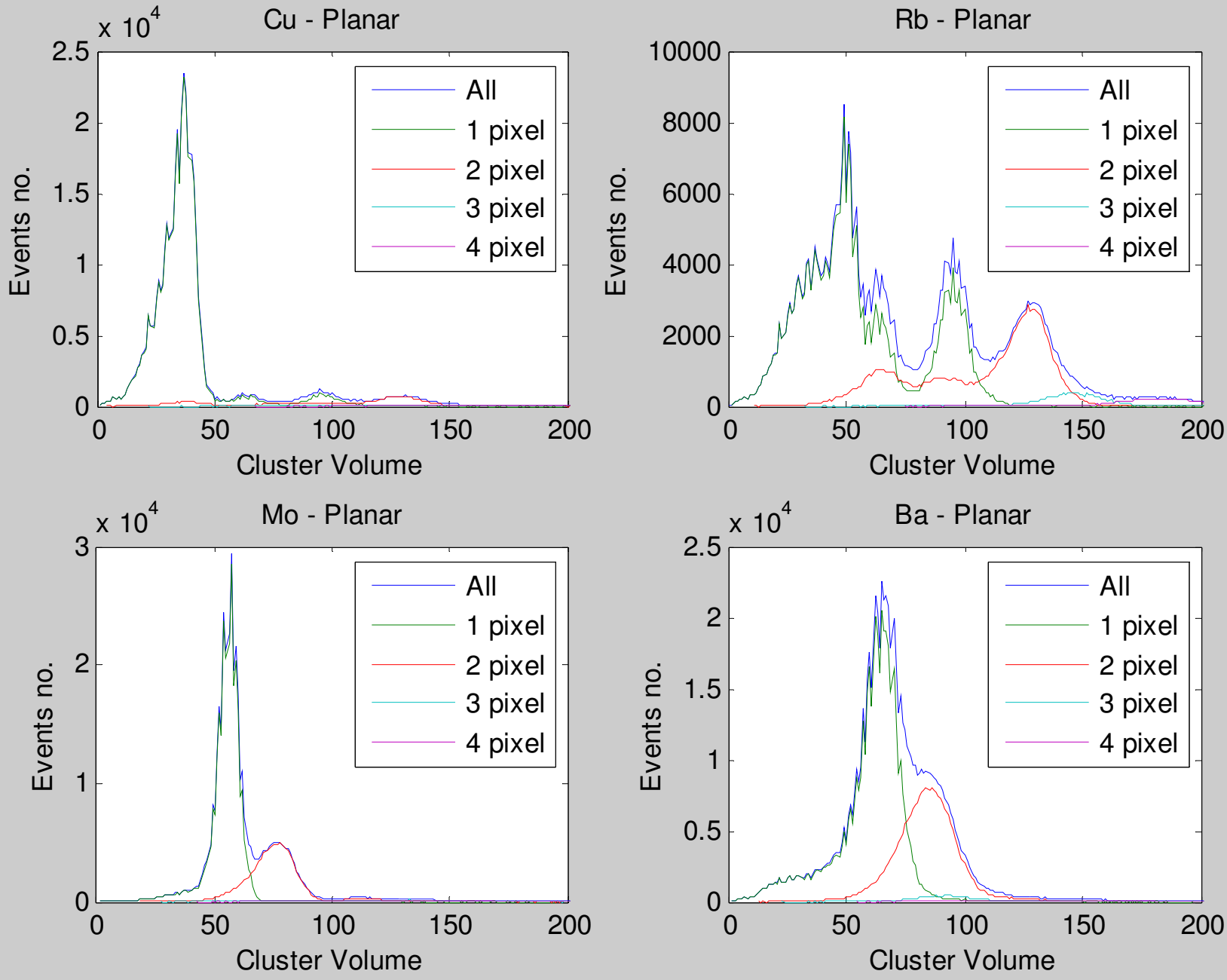
Plan – Efficiency

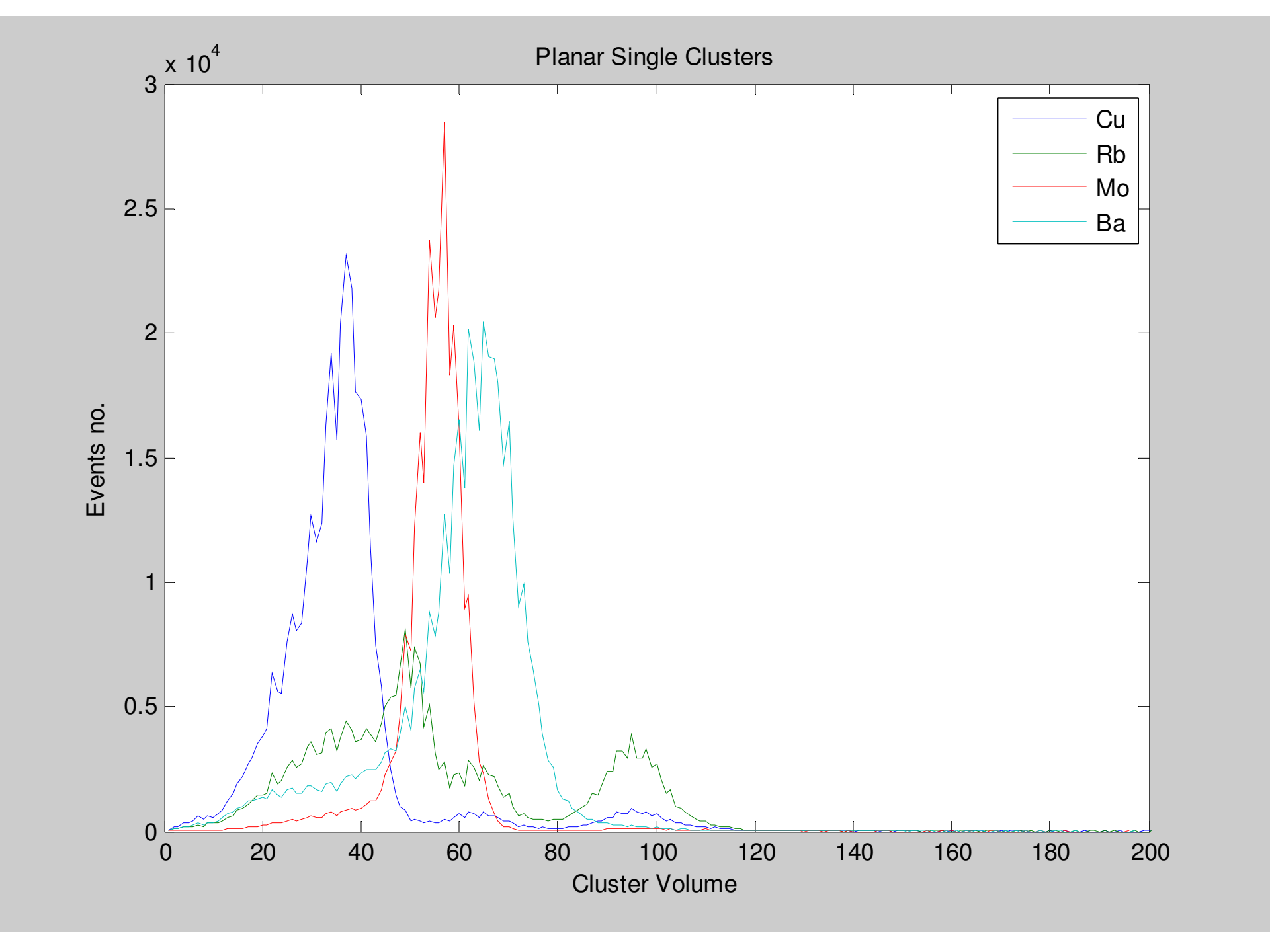
Planar and 3D Timepix in the Medipix mode

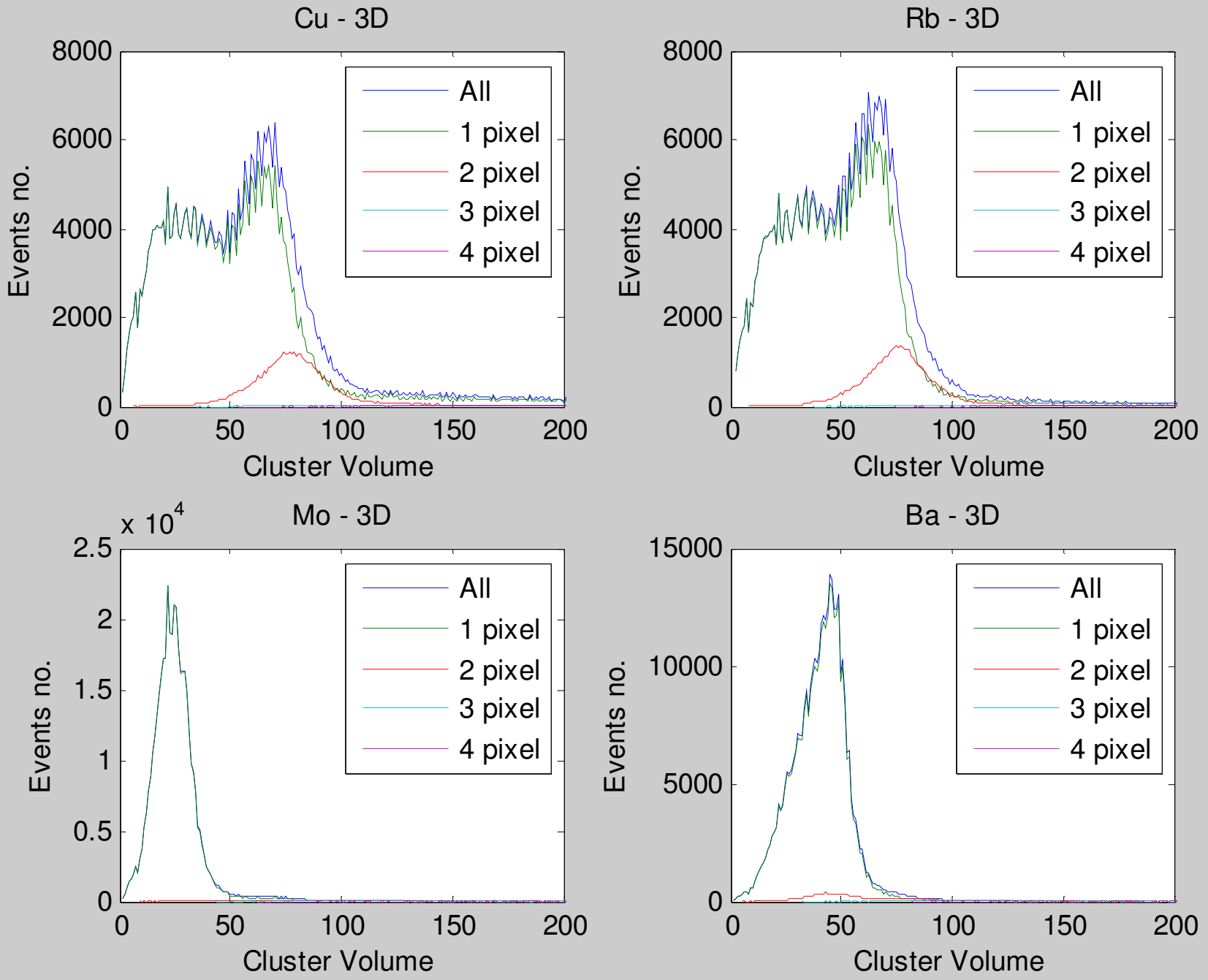
Leave exposed for a large number of frames with a consistent geometry

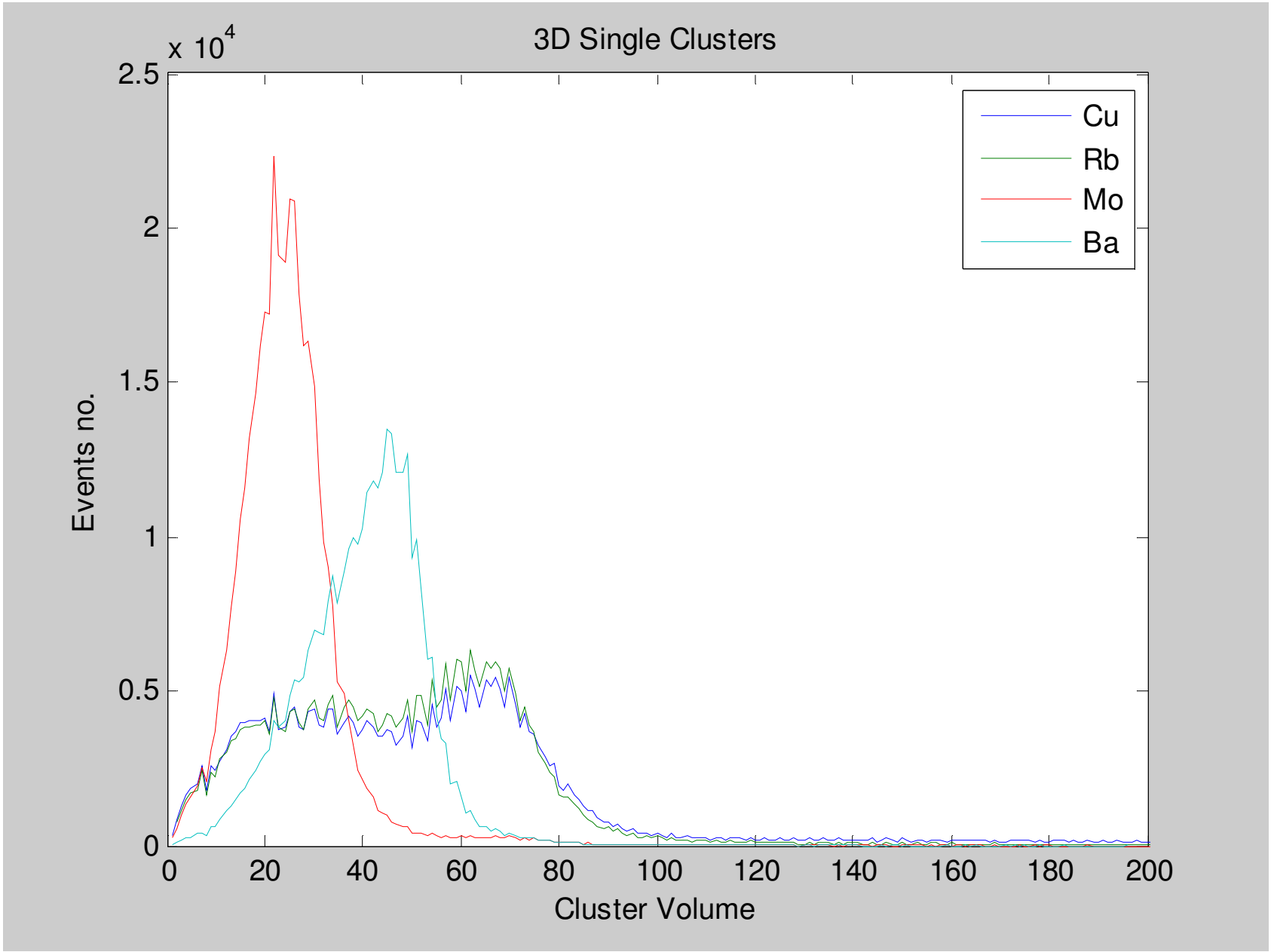
1. We know the flux at the detector surface we can calculate the efficiency from the number of counts/frame
2. Compare the ratios of the efficiencies of planar and 3D to those estimated from Diamond expt.

	Planar		3D	
	Single	Cluster size>1	Single	Cluster size>1
Cu 8.04keV	89.3%	10.7%	86.8%	13.2%
Rb 13.37keV	64.3%	35.7%	87.5%	12.5%
Mo 17.44keV	68.3%	31.7%	98.5%	1.5%
Ba 22.10keV	62.2%	37.8%	95.8%	4.2%


Cu - Planar
x 10^4
Events no.
Cluster Volume
All
1 pixel
2 pixel
3 pixel
4 pixel
Rb - Planar
Mo - Planar
Ba - Planar

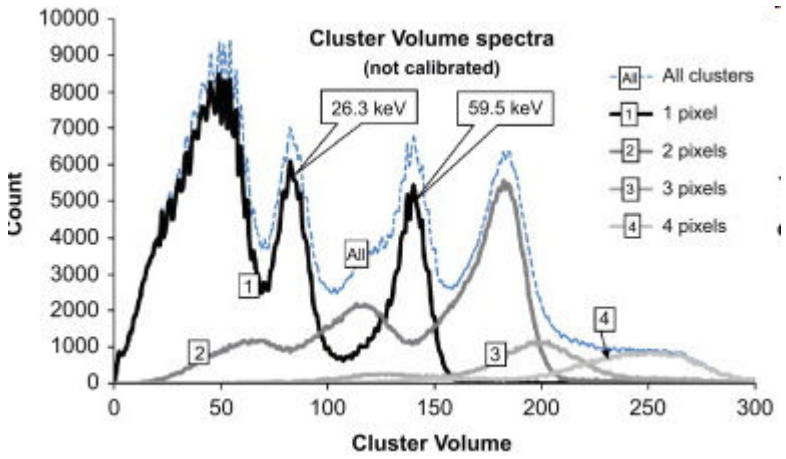

Planar Single Clusters
x 10^4
Events no.
Cluster Volume
Cu
Rb
Mo
Ba
0
0.5
1
1.5
2
2.5
3
0
20
40
60
80
100
120
140
160
180
200

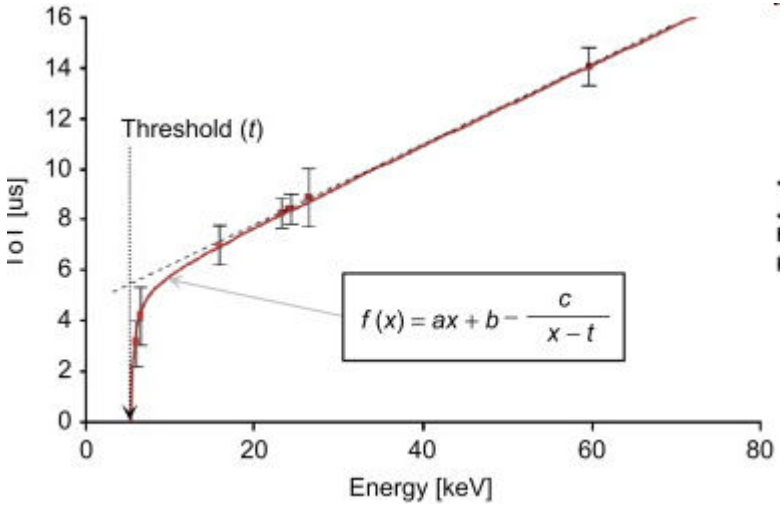

Cu - 3D
Rb - 3D
Mo - 3D
Ba - 3D
Events no.
Cluster Volume
x 10^4
All
1 pixel
2 pixel
3 pixel
4 pixel
0
50
100
150
200
2000
4000
6000
8000
0.5
1
1.5
2
2.5
5000
10000
15000

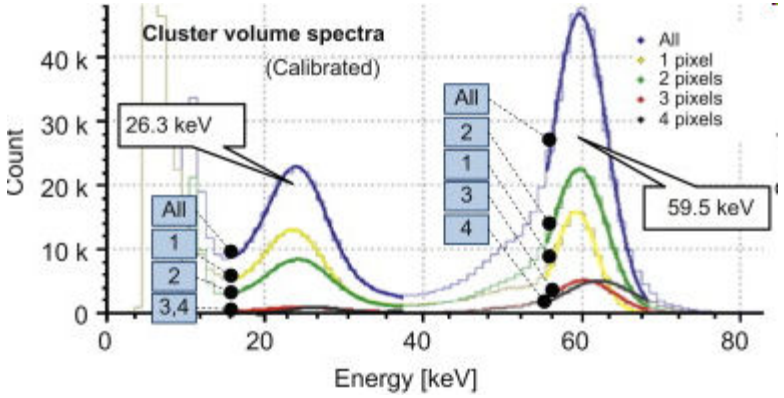

3D Single Clusters
x 10^4
2.5
2
1.5
1
0.5
0
Events no.
0
20
40
60
80
100
120
140
160
180
200
Cluster Volume
Cu
Rb
Mo
Ba

TOT calibration

Pixel detectors for imaging with heavy charged particles
Jan Jakubek *et al.*



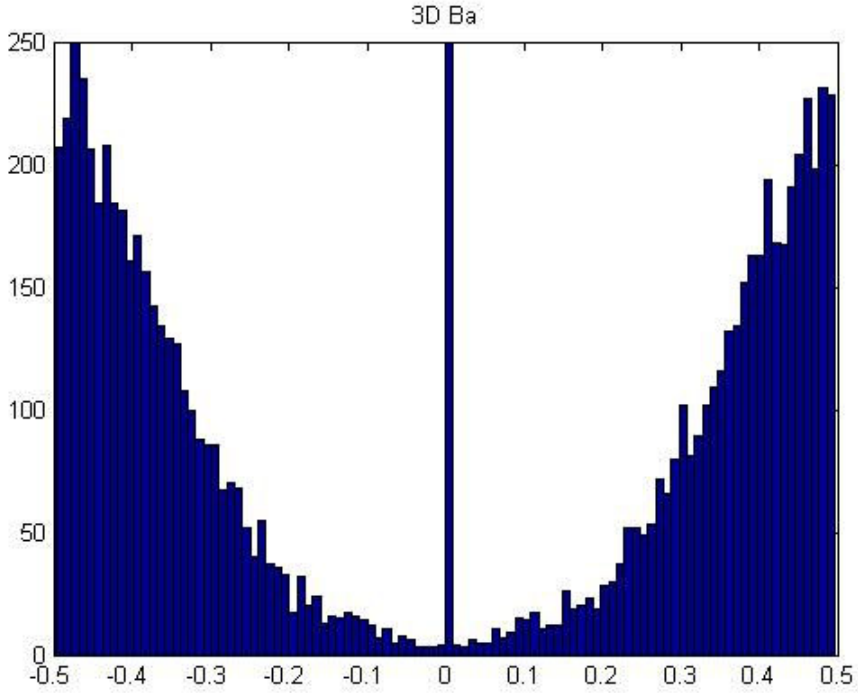


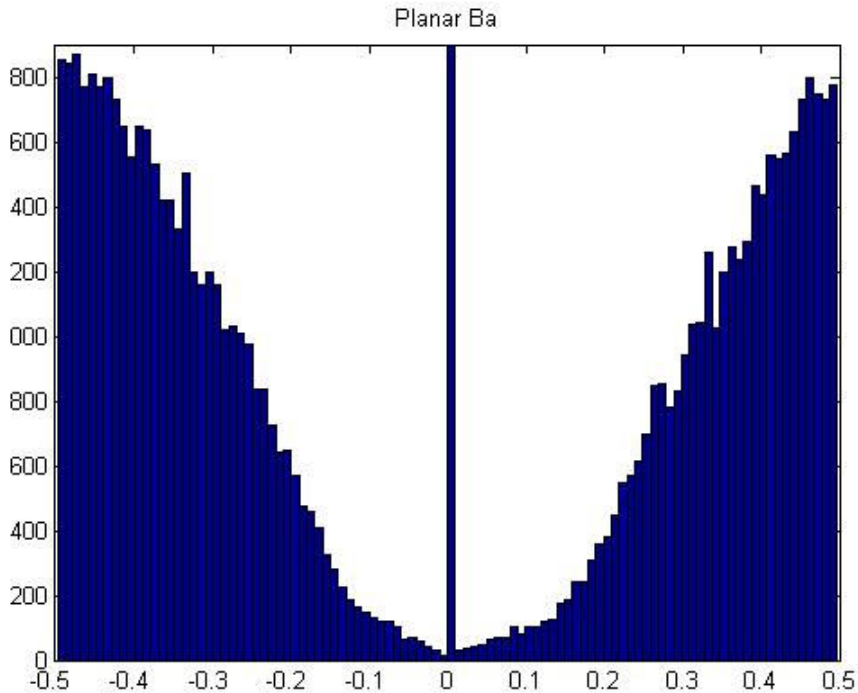


Mass Centre

1. If there is less charge sharing we should see a higher amount of charge kept in the centre (main pixel) pixel and the mass centre should be closer to the centre of the pixel

2. From the mass centre for 2 pixel clusters can calculate the ratio of charge in one pixel to the neighbour


3D Ba
250
200
150
100
50
0
-0.5
-0.4
-0.3
-0.2
-0.1
0
0.1
0.2
0.3
0.4
0.5


Planar Ba
800
600
400
200
000
800
600
400
200
0
-0.5
-0.4
-0.3
-0.2
-0.1
0
0.1
0.2
0.3
0.4
0.5