

March 2012 DESY TestBeam

Reconstructed and Analysed 4A&B runs

Kenneth Wraight, Andrew Blue, Craig Buttar, Kate Doonan



University
of Glasgow

March 2012 Testbeam Data

2 Micron runs (4A&B) investigated

- Run 4A: SCC-31 (DUT0 (20)) and Micron1 (DUT1 (21))
 - Micron1 Bias, THL, temp and angle variations
- Run 4B: Micron2 (DUT1 (20)) and Micron3 (DUT0 (21))
 - Bias and angle variations

	SCC-31	Micron1 (& 2 & 3)	Mimosa
size	20x16.6 (18.6) mm ²	20x16.6 (18.6) mm ²	21.2X10.6mm ²
pixels	80x336	80x336	1152x576
pitch	50x250 um ²	50x250 um ²	0.0184x0.0184 um ²
thickness	250 um	300 um	0.2 (0.3) um

Number in brackets includes non-fiducial region

Micron1 & Micron2 have identical n-in-n technology
 Micron3 has n-in-p technology

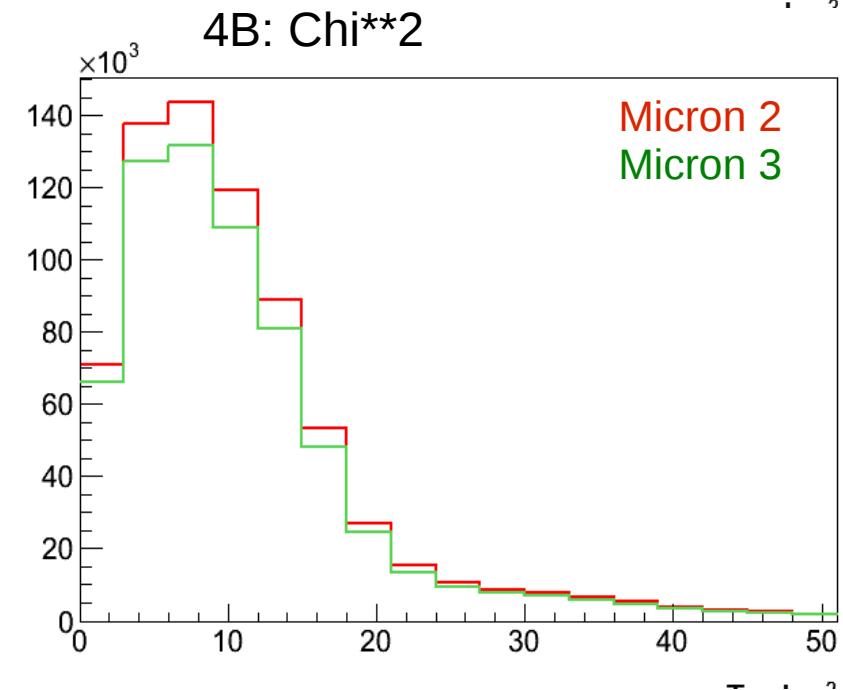
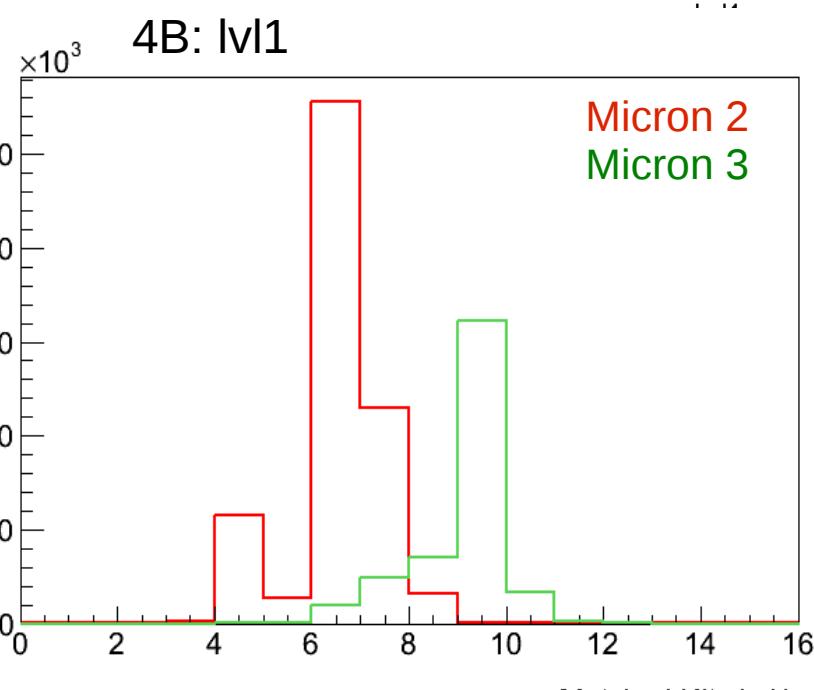
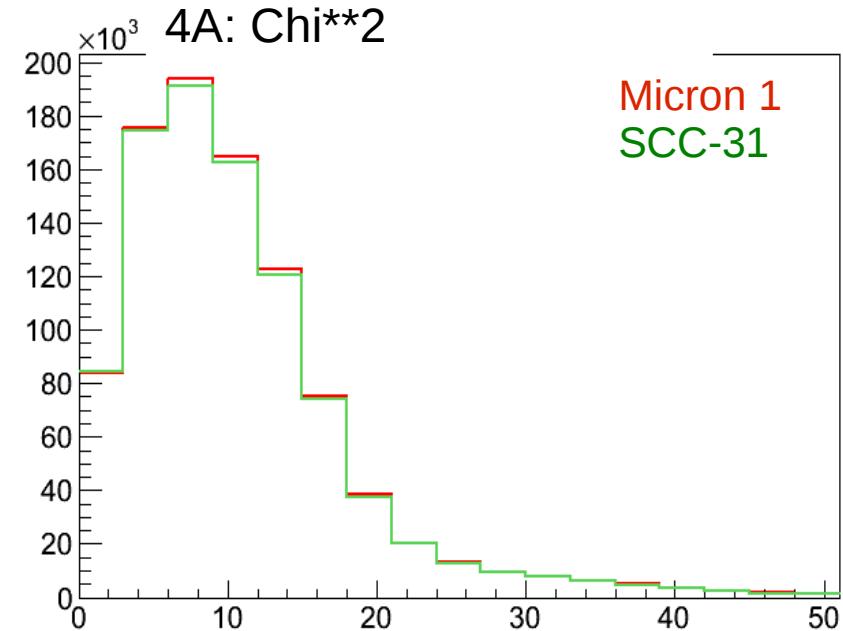
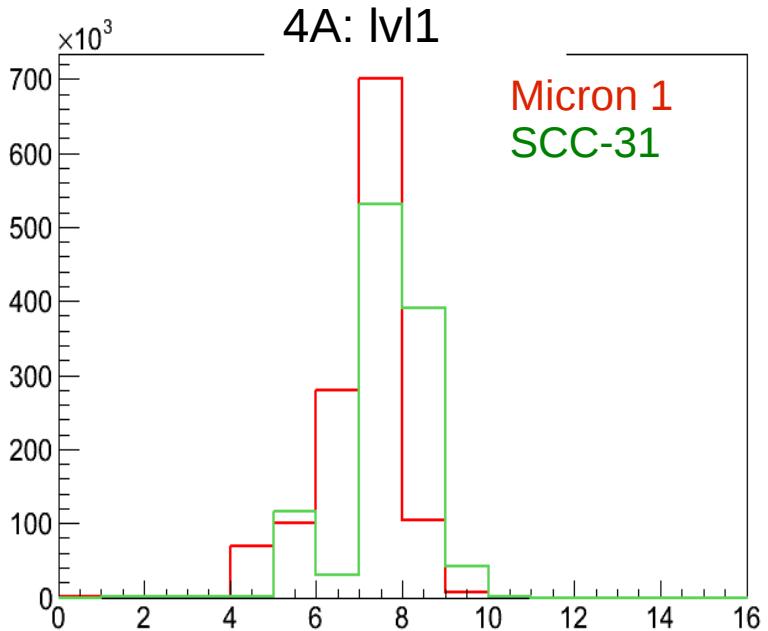
Reconstruction gear files

GeOID	DUT0	DUT1
(4A runs)	SCC31	Micron1
68	19cm	13cm
92	19cm	13cm ($\eta=15$)
94	19cm	13cm ($\phi=-15$)
(4B runs)	Micron3	Micron2
98	19cm	13cm
101	19cm	13cm ($\phi=-15$)
102	19cm ($\phi=-15$)	15cm

Analysis cuts

DUT	Lv1	chi**2
SCC31	6,10	15
Micron1	5,9	15
Micron2	5,7	15
Micron3	8,10	15

Analysis cuts examples (-50V)



06/11/13

4A runs

SCC-31 & Micron 1 sensors

March2012 < Atlas < TWiki - Mozilla Firefox

File Edit View History Bookmarks Tools Help

March2012 < Atlas < TWiki

https://twiki.cern.ch/twiki/bin/viewauth/Atlas/March2012#Batch_1

BBC - bbc.co.uk ho... Experimental Particl... CERN Users' pages Yahoo! Mail - The be... Kené's homepage

Batch 4a

eta= 0,15 and tilt= 0,15 degrees.

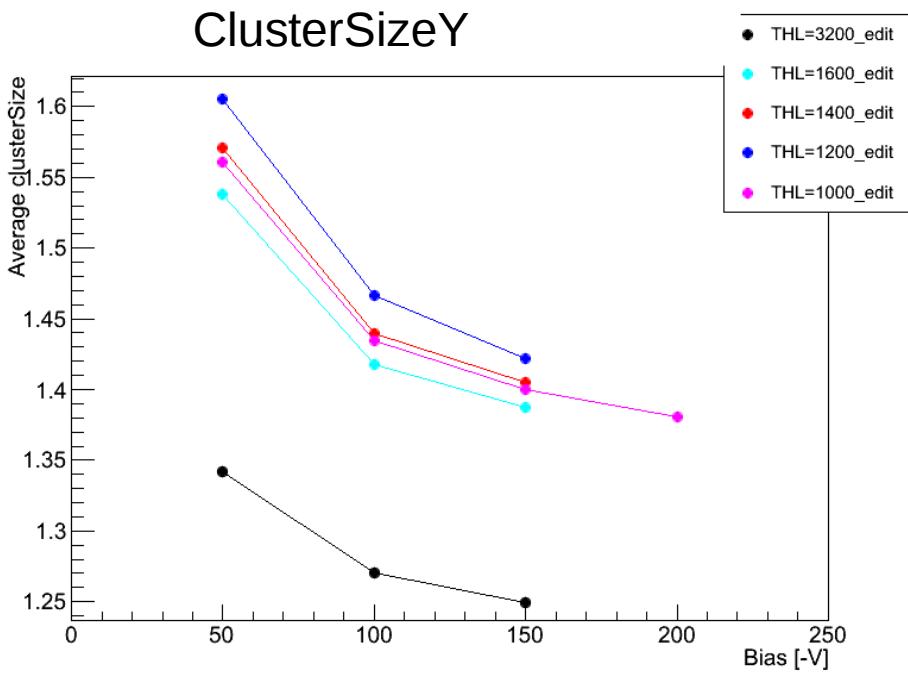
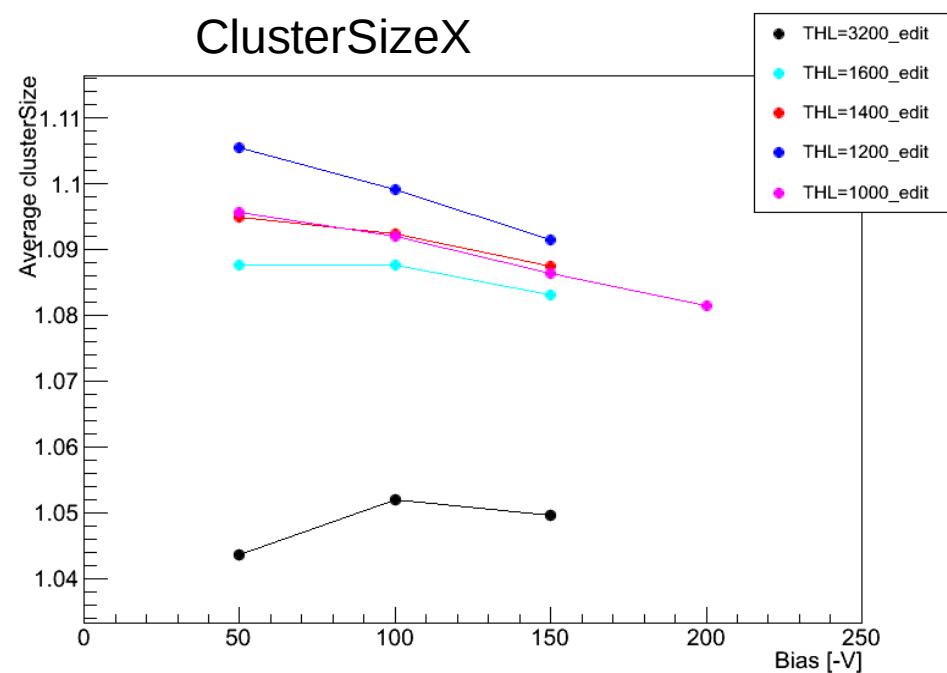
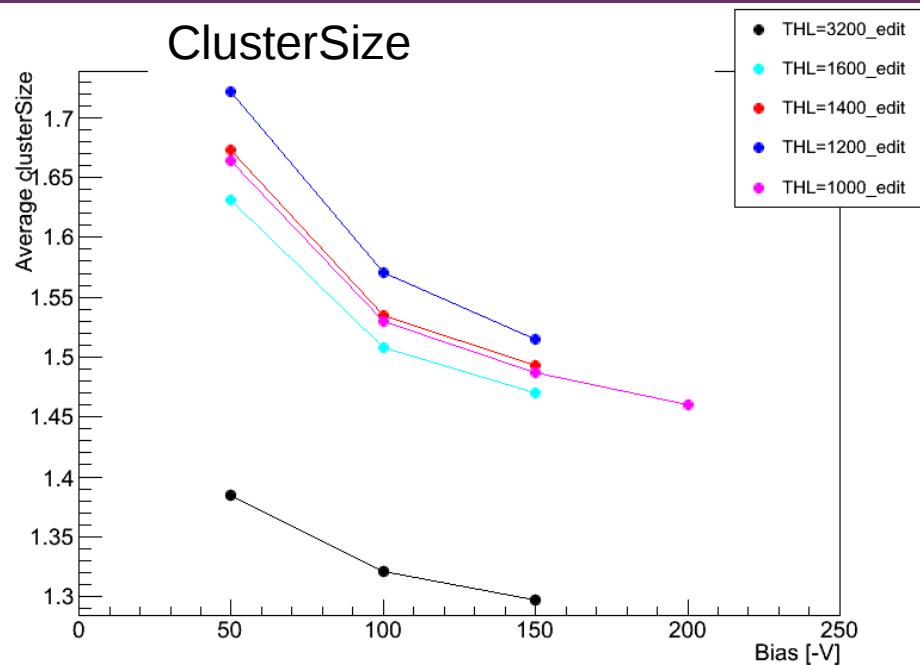
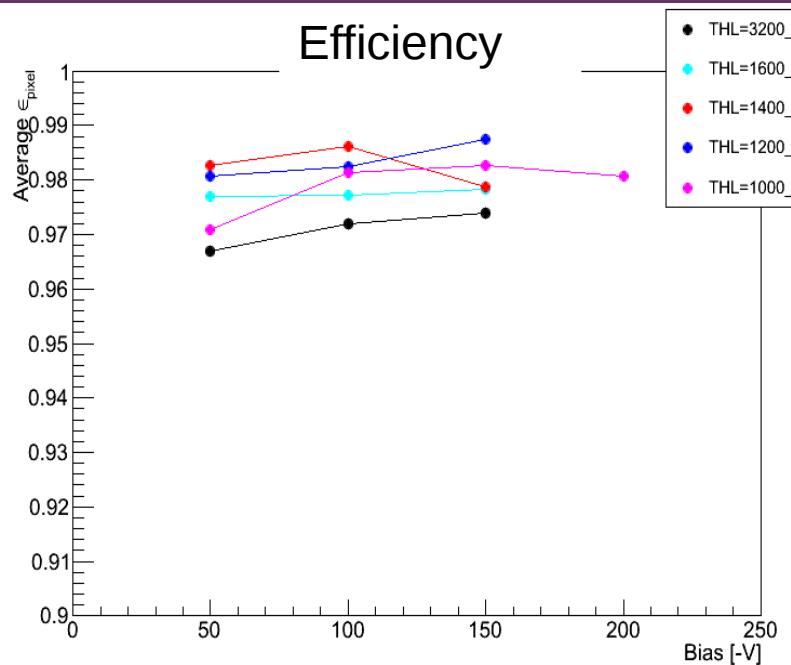
	DUT 0	DUT 1	
Module ID	SCC31	MICRON01	
SCC ID			
Sensor type	FE-I4 n-in-n	FE-I4 n-in-n	
Fluence	0	0	
LV (molex)			
Board ID			
HV Channel	1	2	
HV(V)	150 only	50, 100, 150, 200	
Sensor Temp	25, -25	25, -25	
Threshold	3200	3200, 1600, 1400, 1200, 1000	
T _{OT}	8tot=10ke	10tot = 20ke	
comments	ref		
z position	19cm +-0.1cm	13cm +-0.1cm	from back of mimosa plane 2 to back of DUT
for eta = 0 and phi = 15 DUT1 only, DUT0 ref			
z position	19cm +-0.1cm	15cm +-0.1cm	from back of mimosa plane 2 to back of DUT
for eta = 15 and phi = 0 DUT1 only, DUT0 ref			
z position	18.9cm +-0.1cm	13.1cm +-0.1cm	from back of mimosa plane 2 to back of DUT

Path for config files: <- UPDATE

Run range: XY - YZ

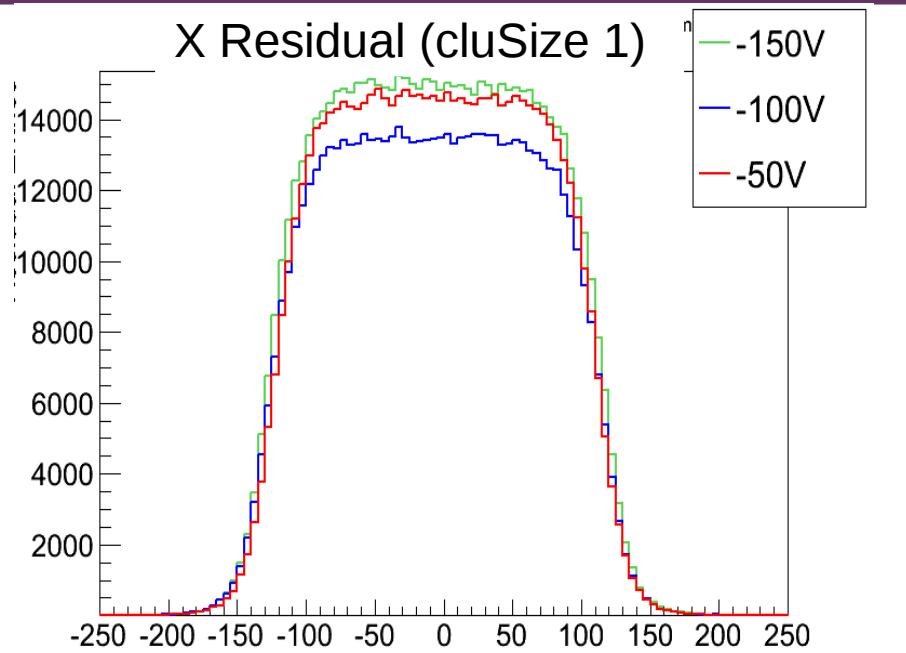
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Micron1 Efficiency plots (X-axis= Bias)

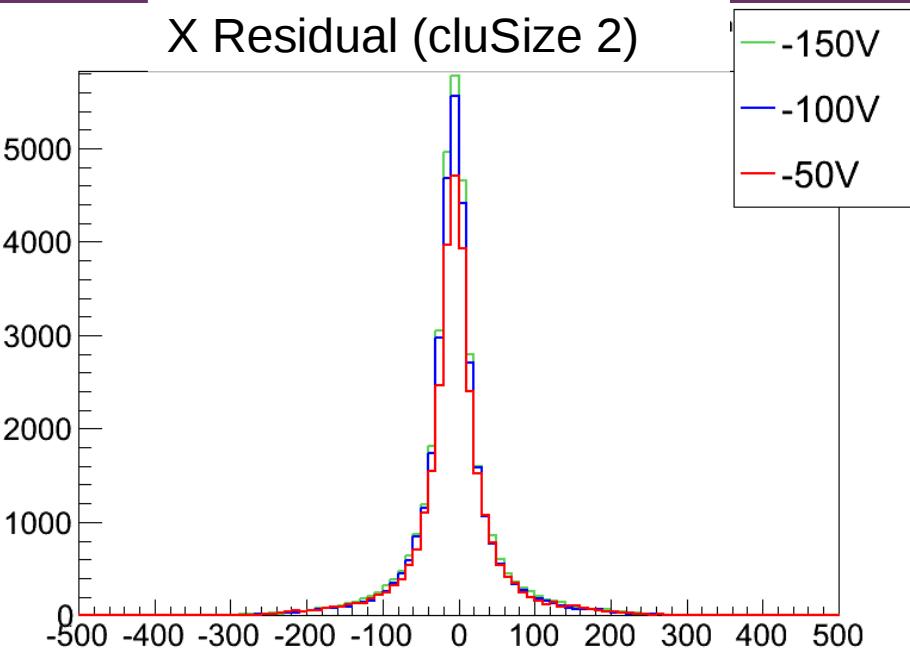


06/11/13 Micron 1 Residuals overlays (THL=3200e)

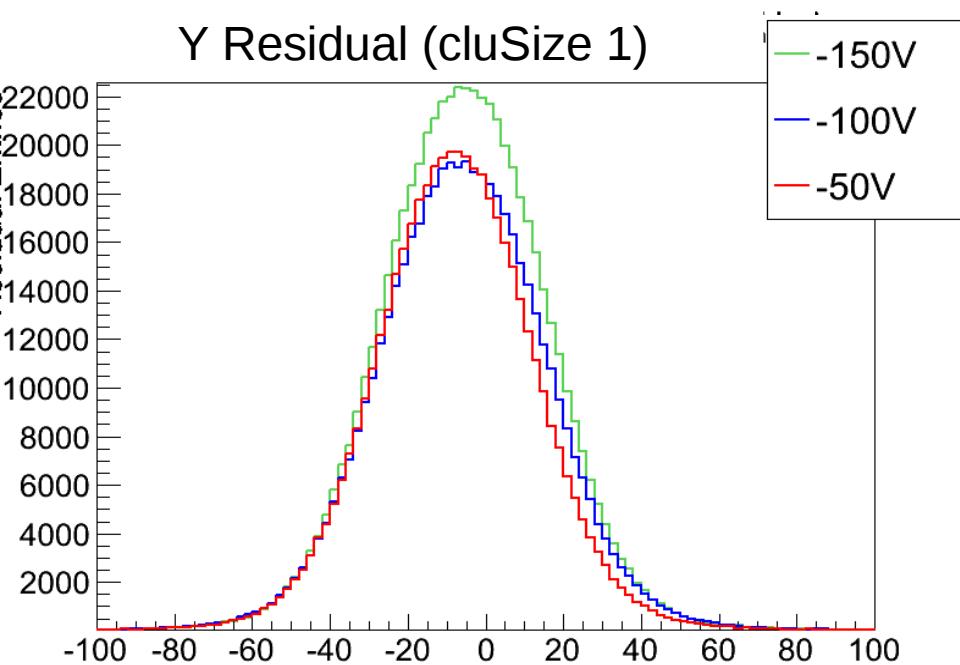
X Residual (cluSize 1)



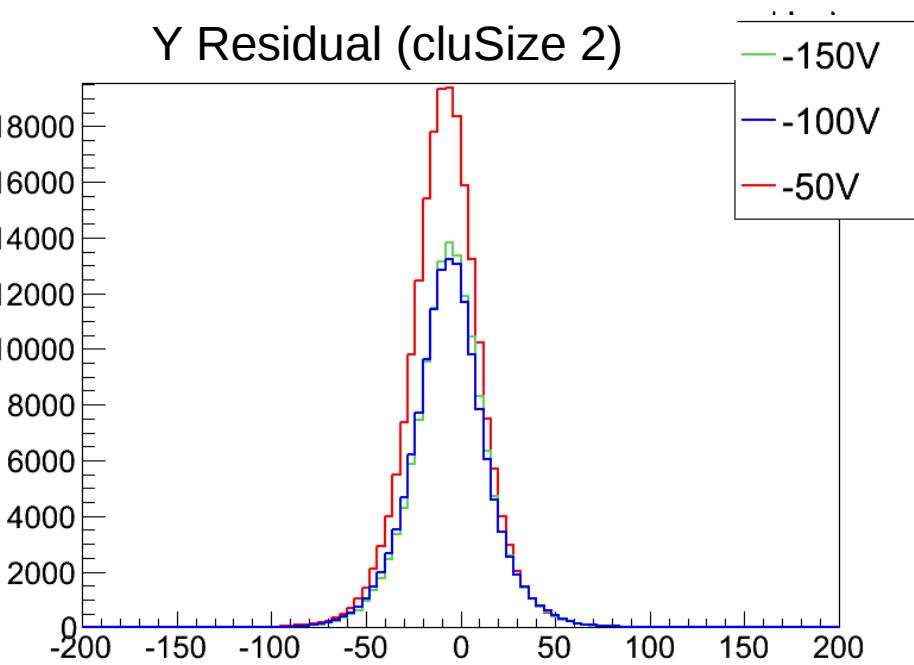
X Residual (cluSize 2)



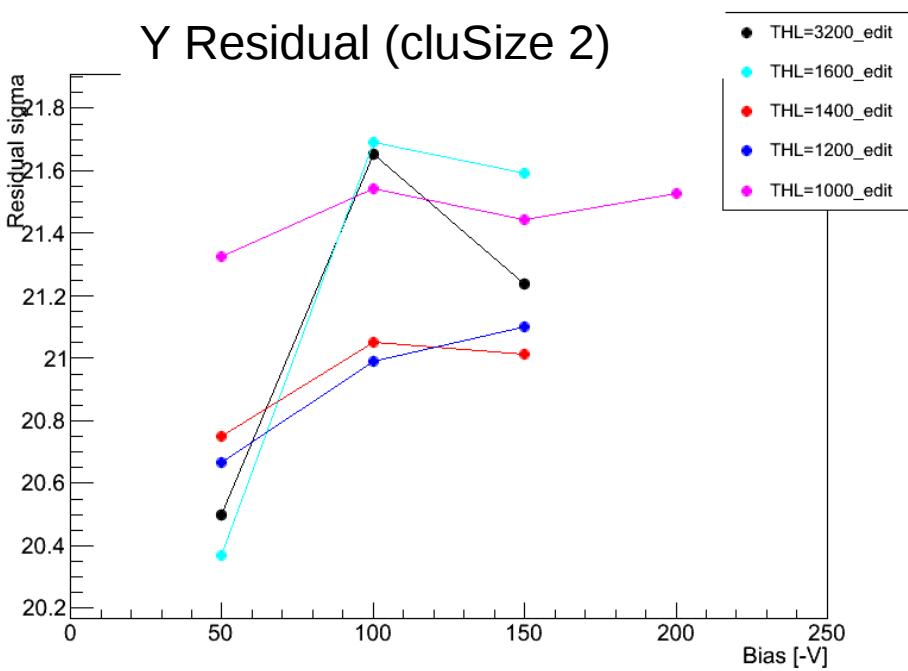
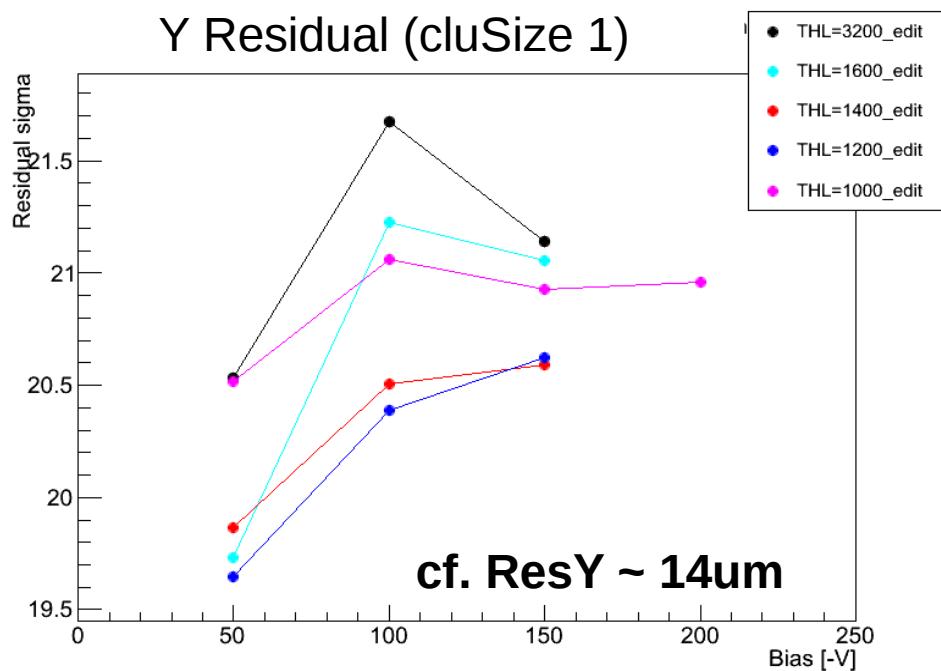
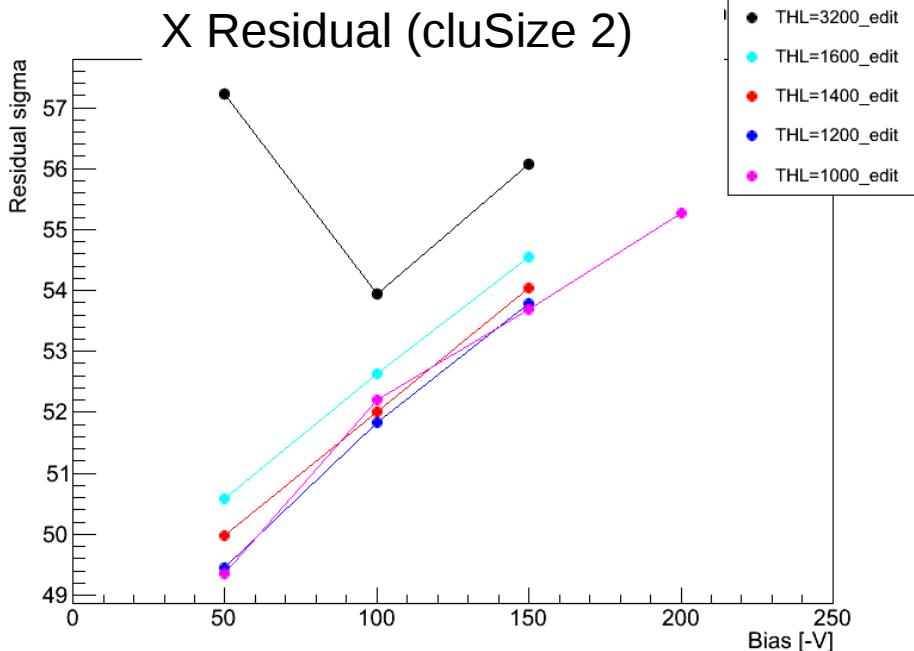
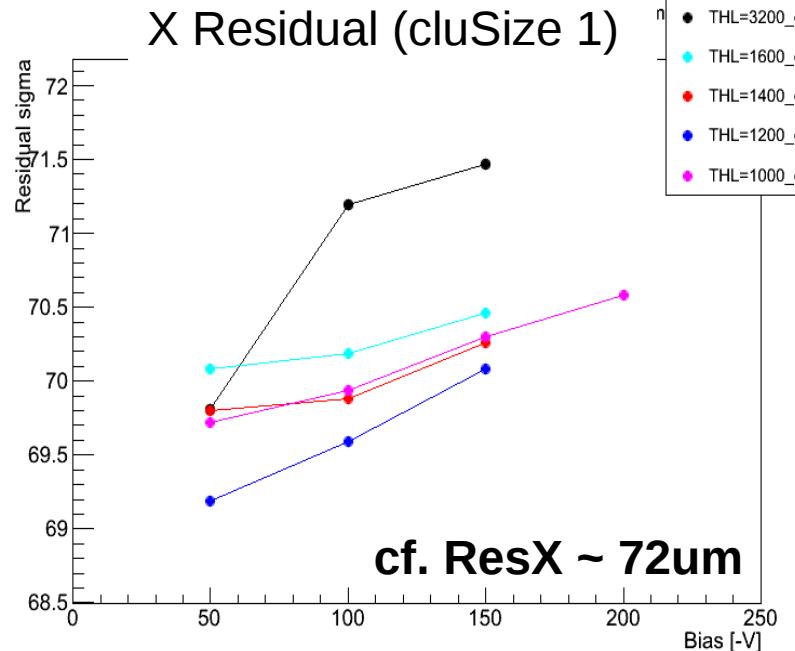
Y Residual (cluSize 1)



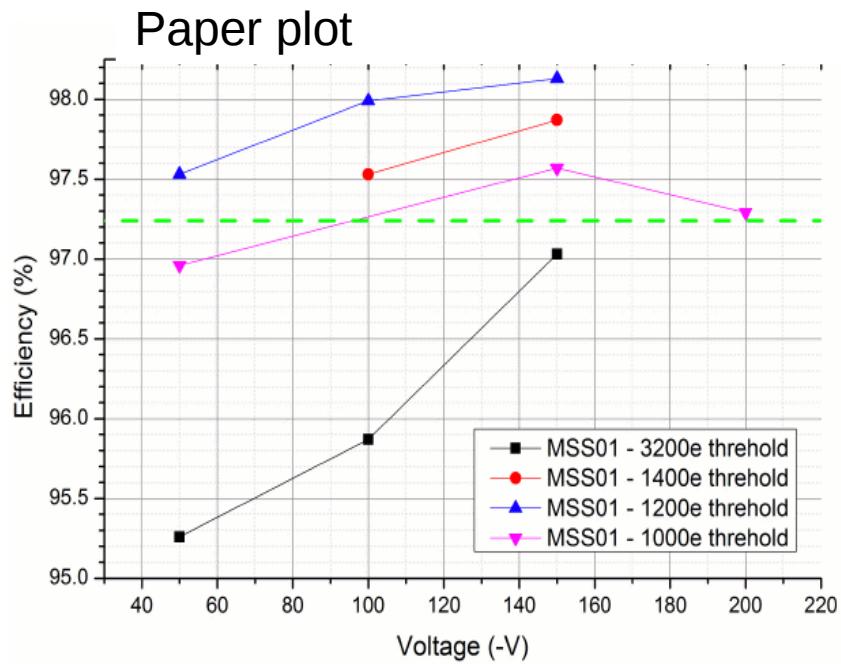
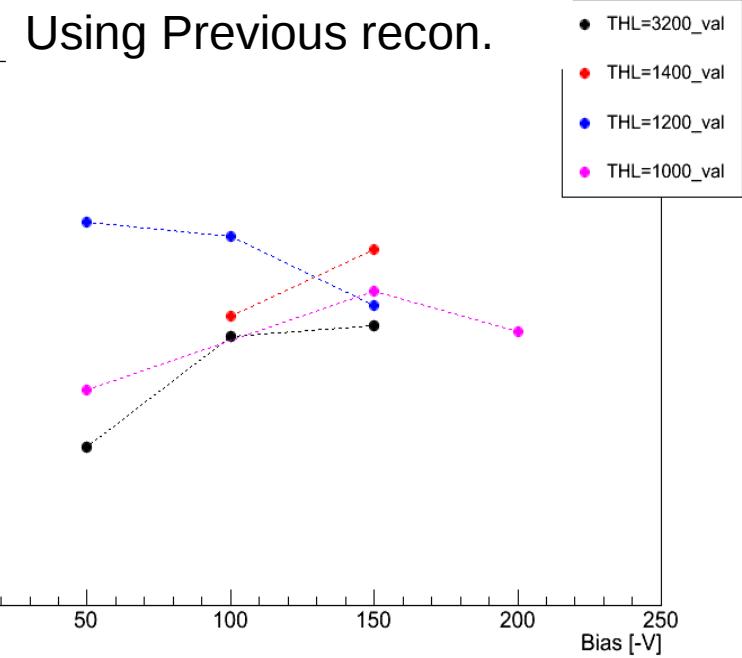
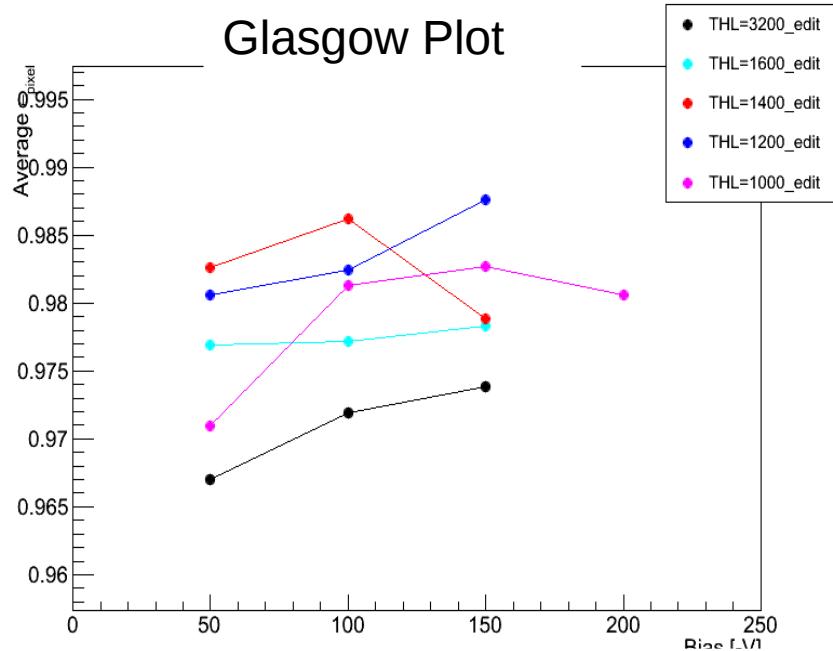
Y Residual (cluSize 2)



06/11/13 Micron 1 Residuals plots (X-axis= Bias)



Micron1 Efficiency Comparison



No agreement between

Glasgow results (top left)

Previous recon. + new analysis (top right)

Previous published results (bottom left)

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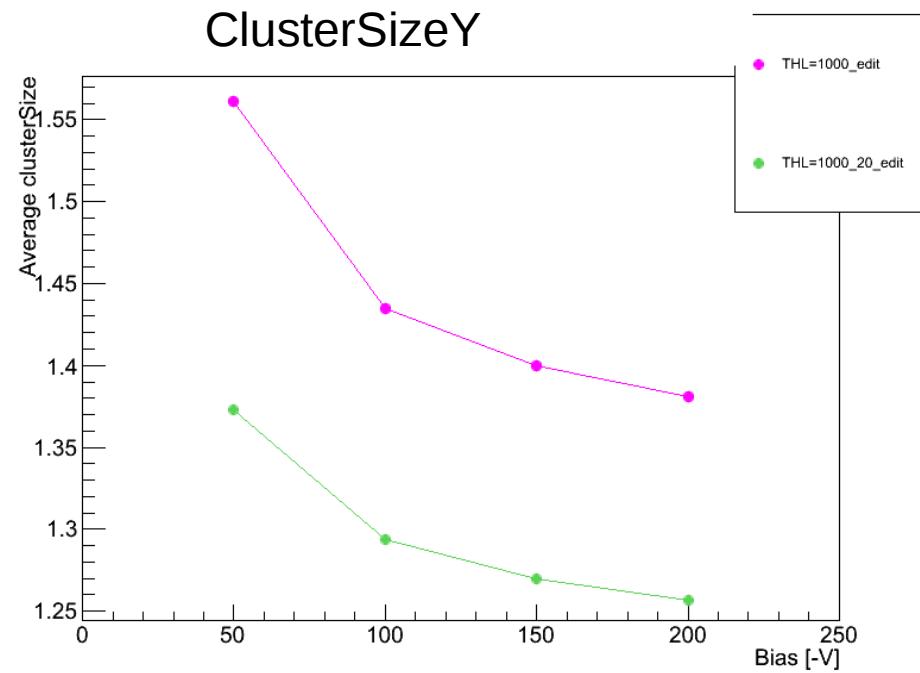
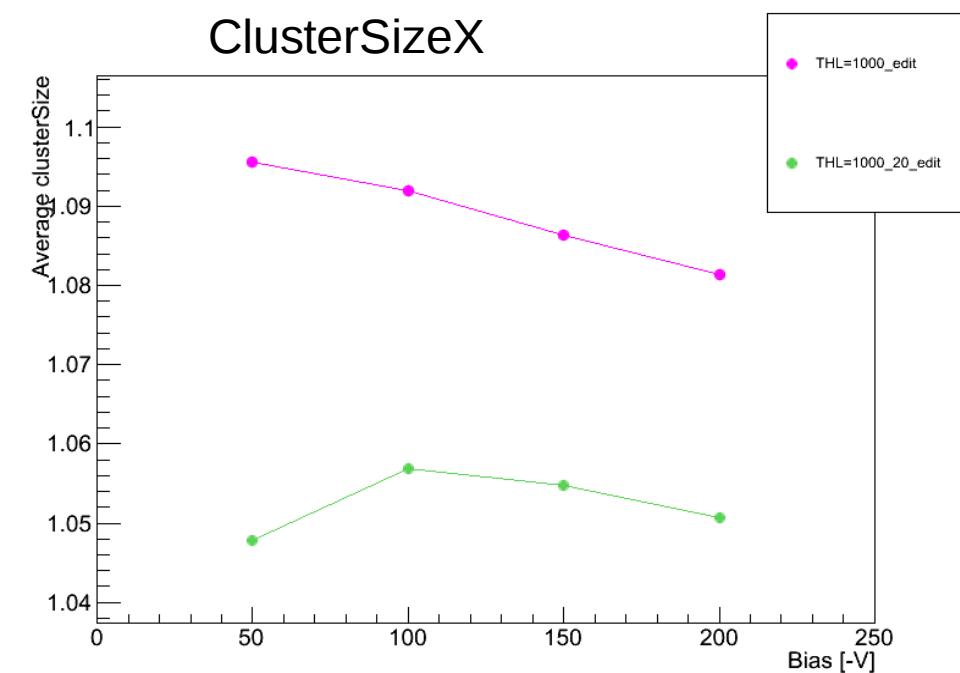
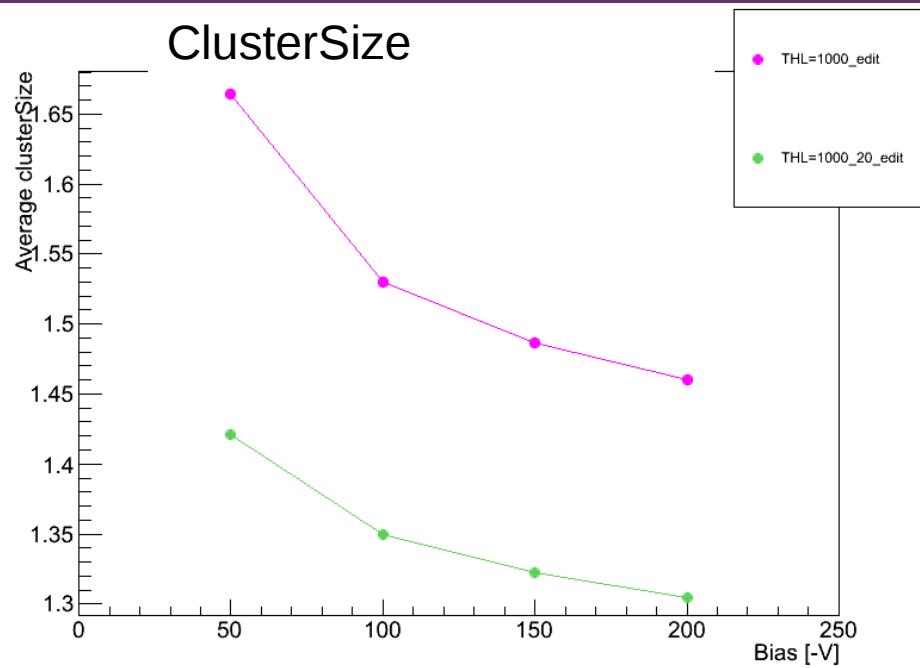
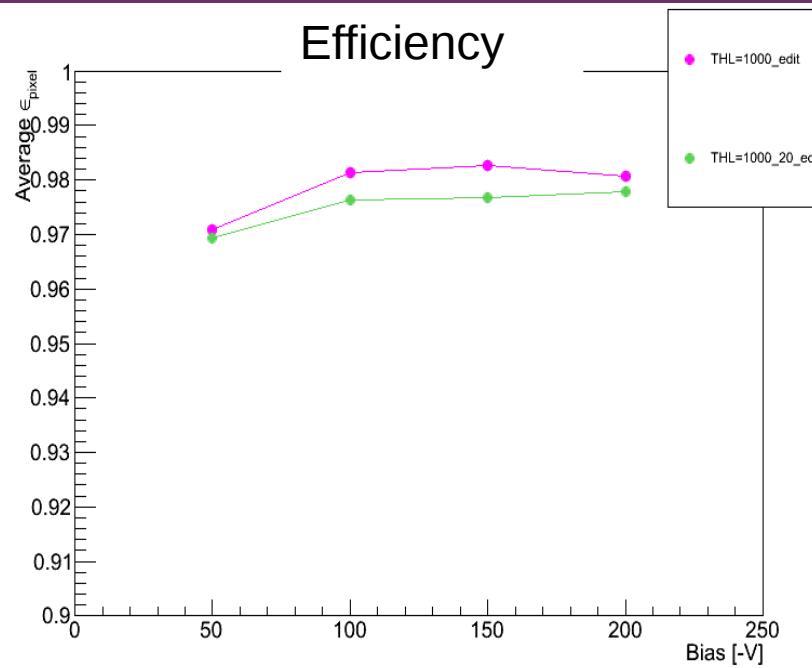
Efficiency comparison to previous

Previous results published: <http://dx.doi.org/10.1016/j.nima.2013.03.034>

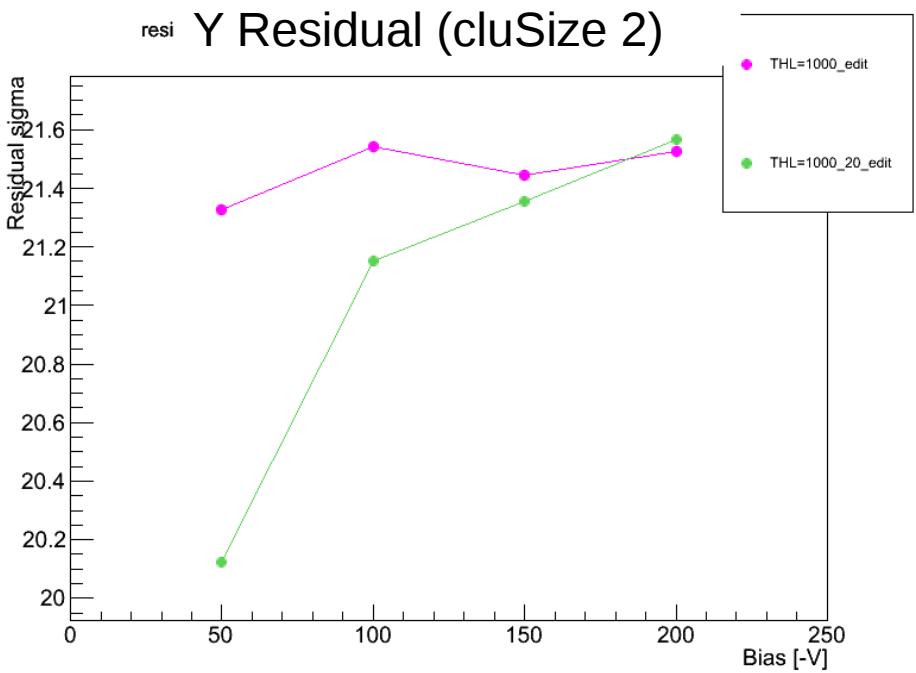
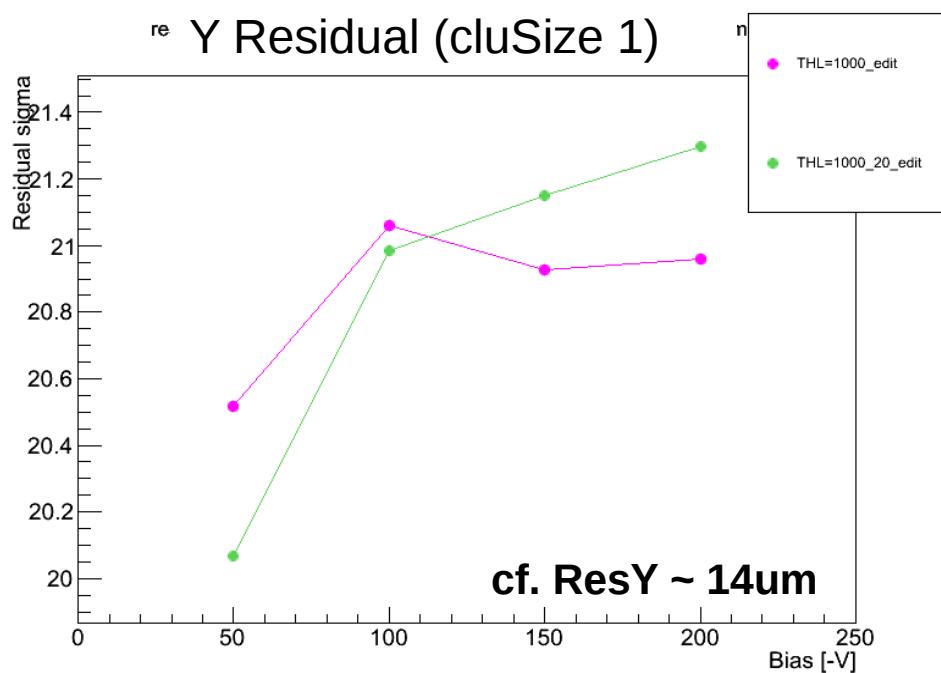
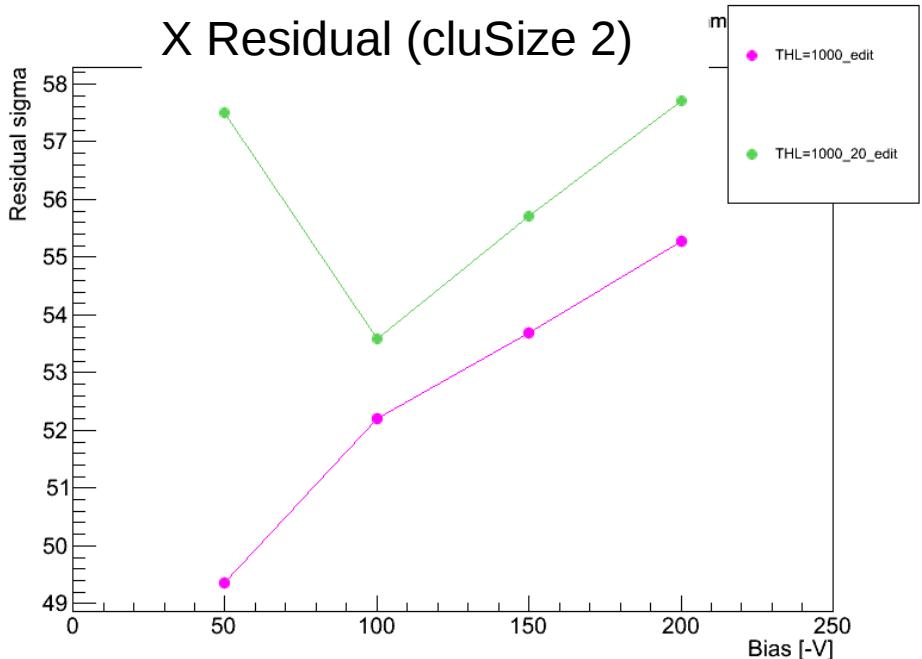
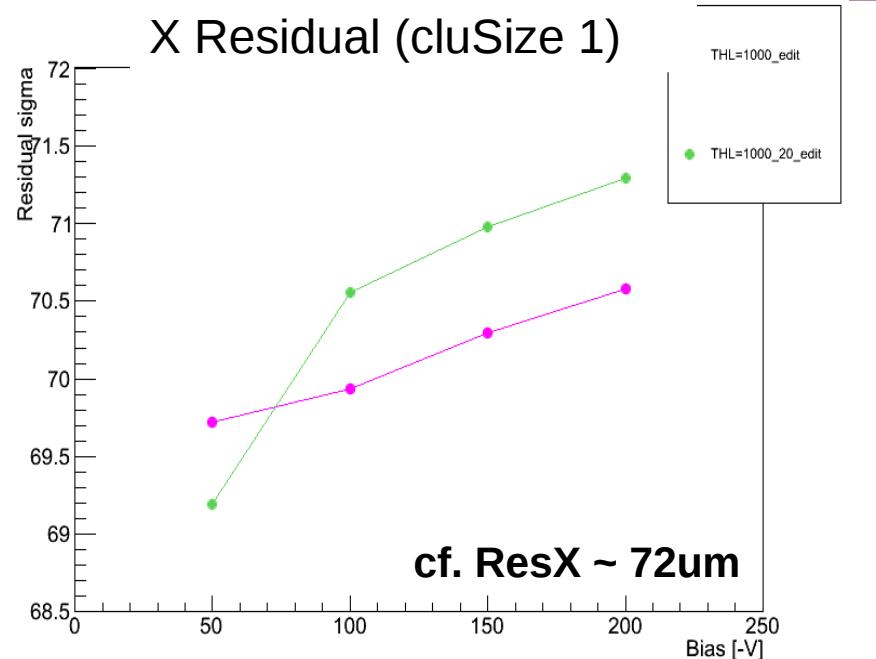
THL=3200e	50V	100V	150V	200V
previous	95.26	95.87	97.03	--
current	96.70	97.19	97.38	--
difference	1.441	1.323	0.355	--
THL=1400e	50V	100V	150V	200V
previous	--	97.53	97.97	--
current	98.26	98.62	97.88	--
difference	--	1.094	-0.089	--
THL=1200e	50V	100V	150V	200V
previous	97.53	97.99	98.13	--
current	98.06	98.25	98.76	--
difference	0.53	0.257	0.26	--
THL=1000e	50V	100V	150V	200V
previous	96.96	--	97.57	97.29
current	97.09	98.13	98.27	98.06
difference	0.131	--	0.698	0.772

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Micron1 Temp. Efficiency (X-axis= Bias)



06/11/13 Micron1 Temp. Residuals plots (X-axis= Bias)



4B runs

Micron 2 & Micron 3 sensors

March2012 < Atlas < TWiki

https://twiki.cern.ch/twiki/bin/view/Atlas/March2012#NEW_Useful_links

BBC - bbc.co.uk homepage Experimental Particle Physics CERN Users' pages Yahoo! Mail - The best mail... Kené's homepage

Run range: XY - YZ.

Batch 4b

eta= 0 and tilt= 0,15 degrees.

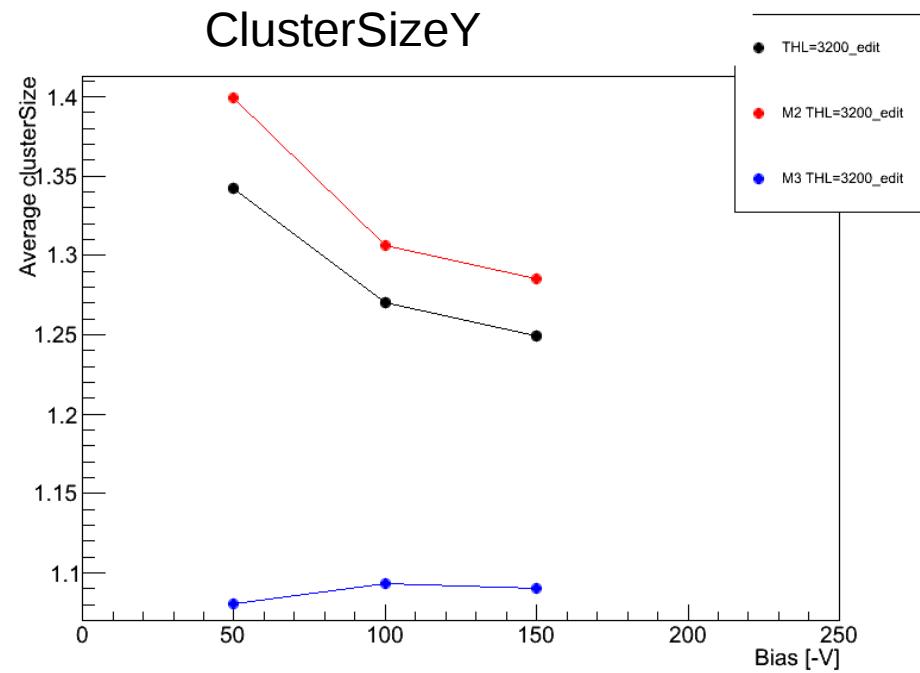
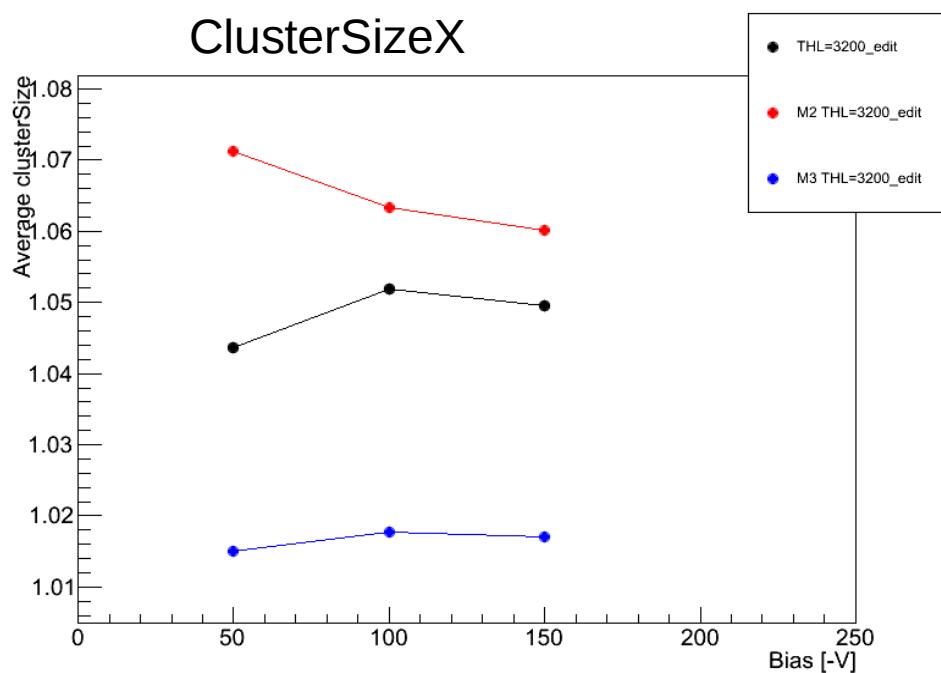
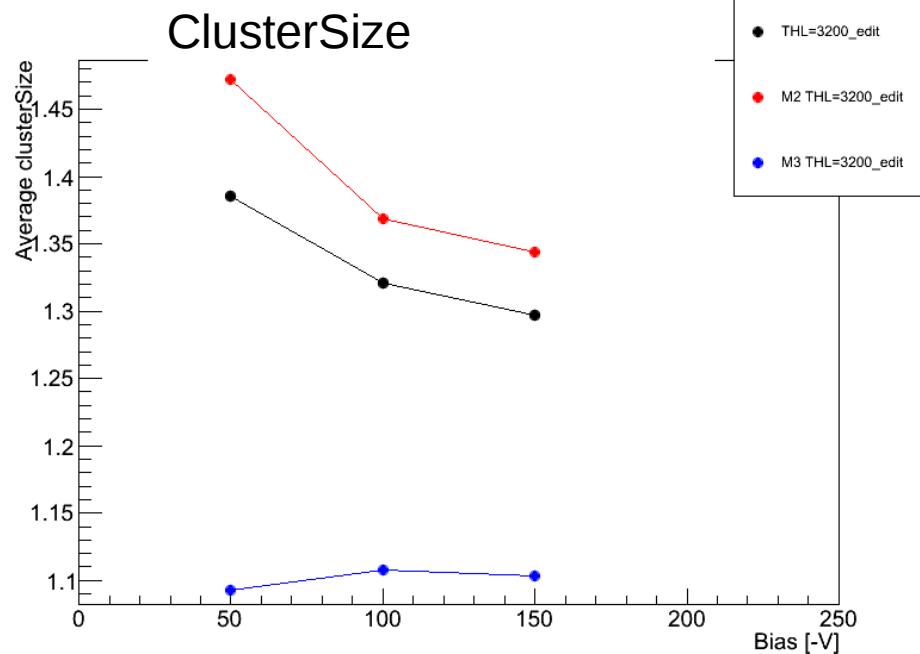
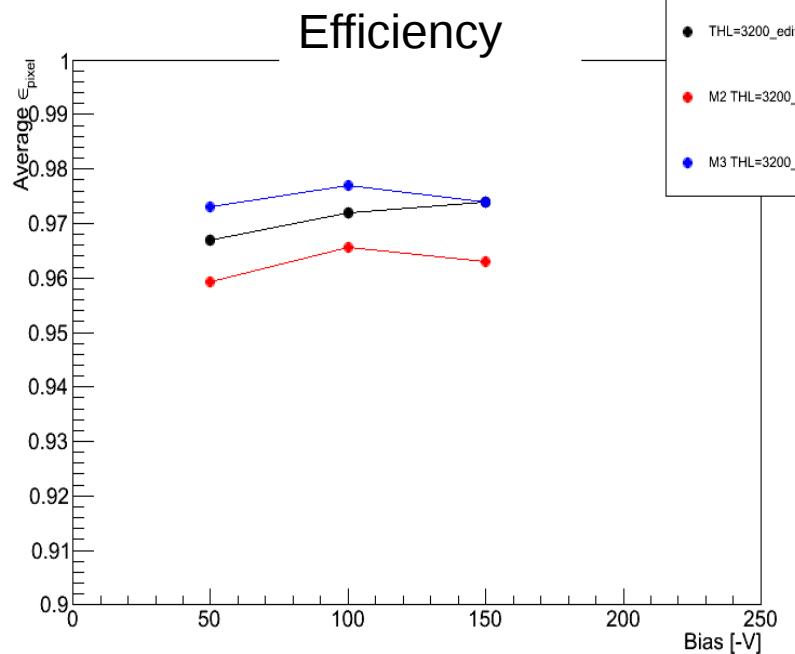
	DUT 0	DUT 1	
Module ID	MICRON03	MICRON02	
SCC ID			
Sensor type	FE-I4 n-in-p	FE-I4 n-in-n	
Fluence	0	0	
LV (molex)			
Board ID			
HV Channel	1	2	
HV(V)	100	100	
Sensor Temp	25	25	
Threshold	3200	3200	
ToT	10tot=20ke	10tot = 20ke	
comments	ref		
for eta = 0 and phi = 0			
z position	19cm +-0.1cm	13cm +-0.1cm	from back of mimo plane 2 to back of DUT
for eta = 0 and phi = 15 DUT1 only, DUT0 ref			
z position	19cm +-0.1cm	15cm +-0.1cm	from back of mimo plane 2 to back of DUT
for eta = 0 and phi = 15 DUT0 only, DUT1 ref			
z position	19.5cm +-0.1cm	15cm +-0.1cm	from back of mimo plane 2 to back of DUT

Path for config files: <- UPDATE

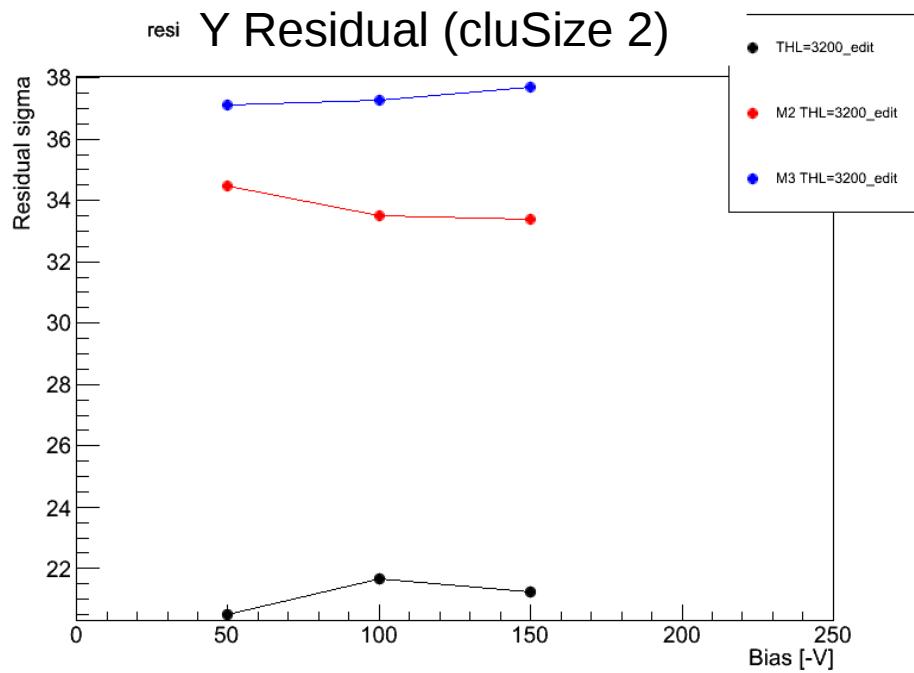
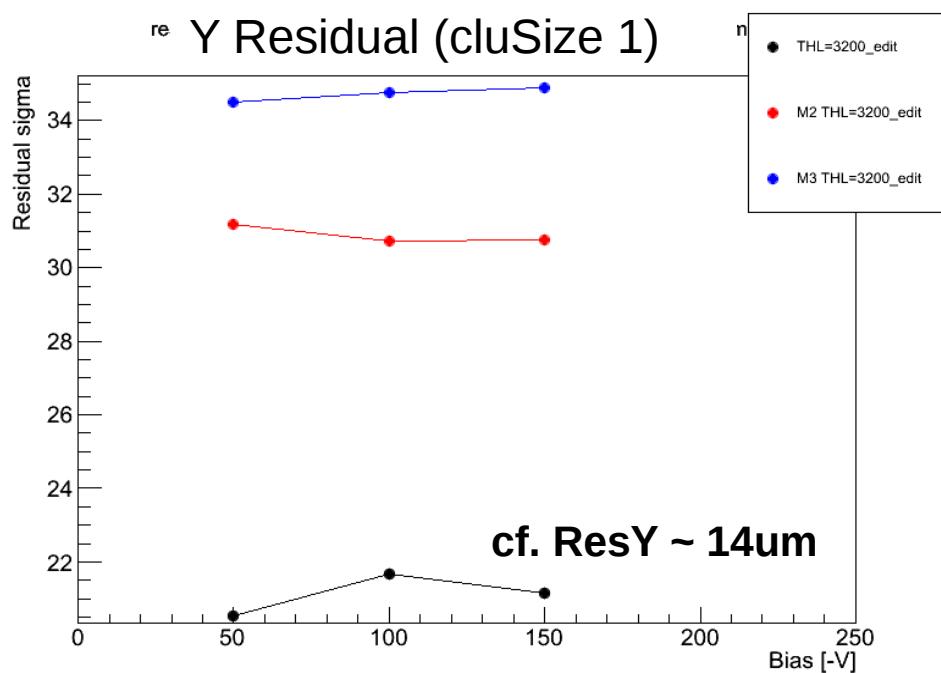
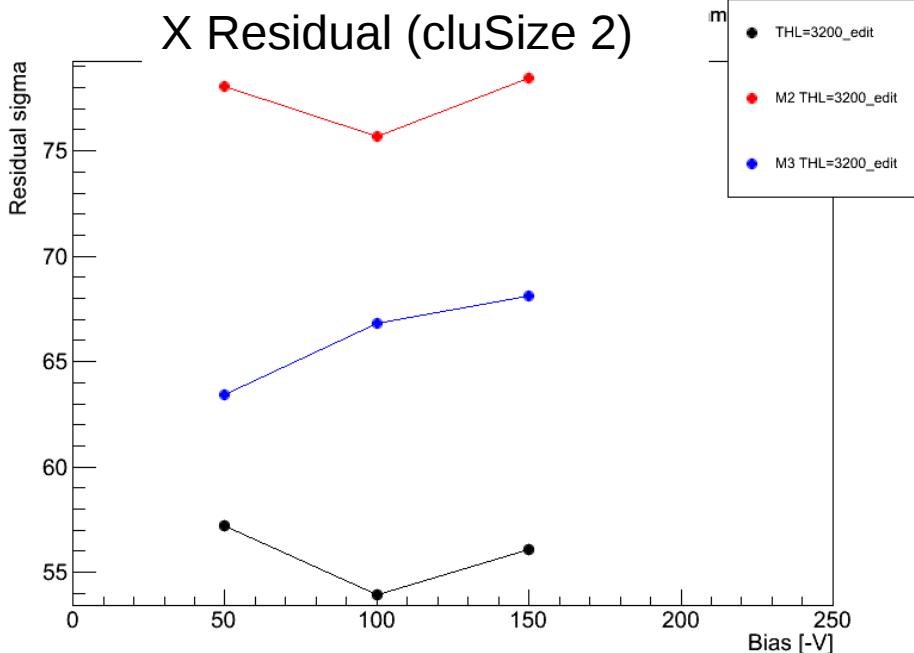
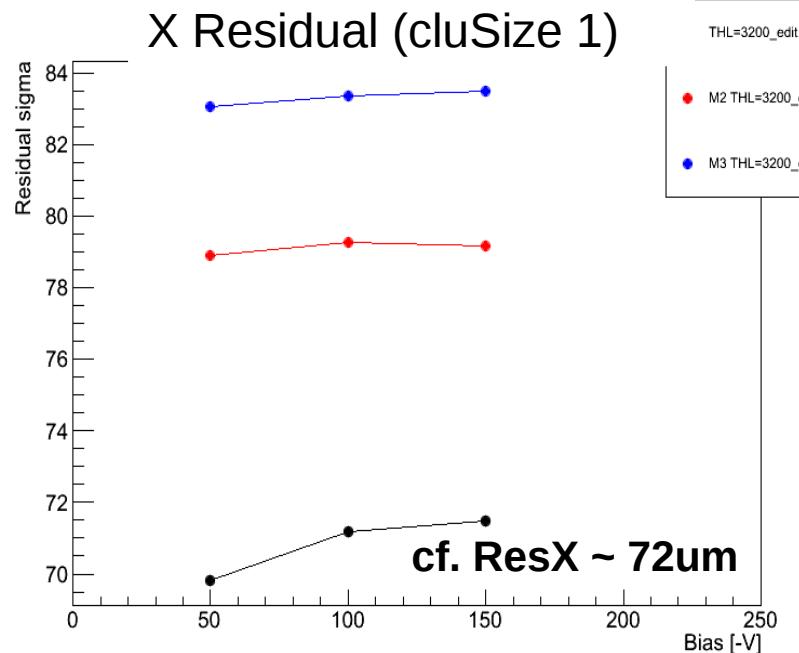
Run range: XY - YZ.

Samples

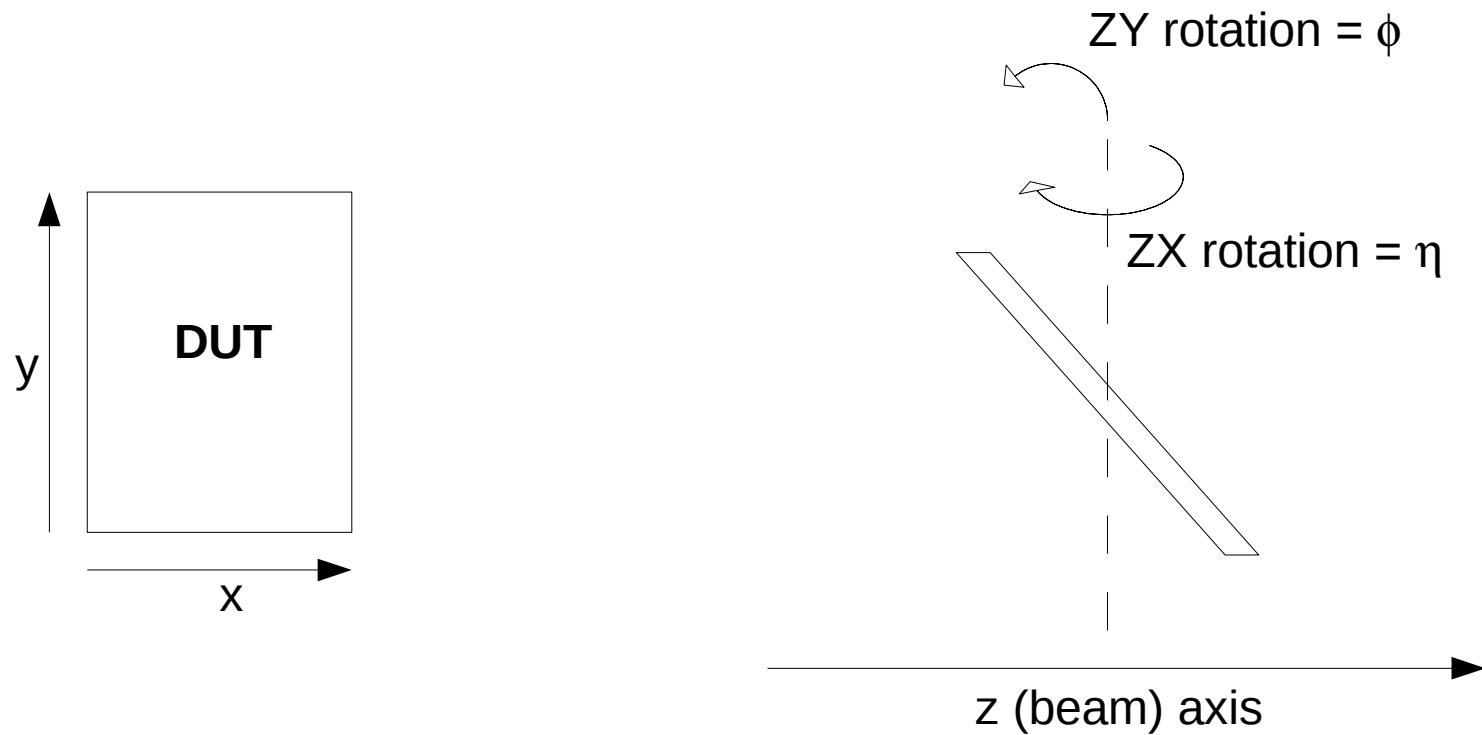
06/11/13 Micron 1,2&3 Efficiency plots (X-axis= Bias)



06/11/13 Micron 1,2&3 Residual plots (X-axis= Bias)



Tilting detector --> Greater cluster size



η tilt --> larger X clusters

ϕ tilt --> larger Y clusters

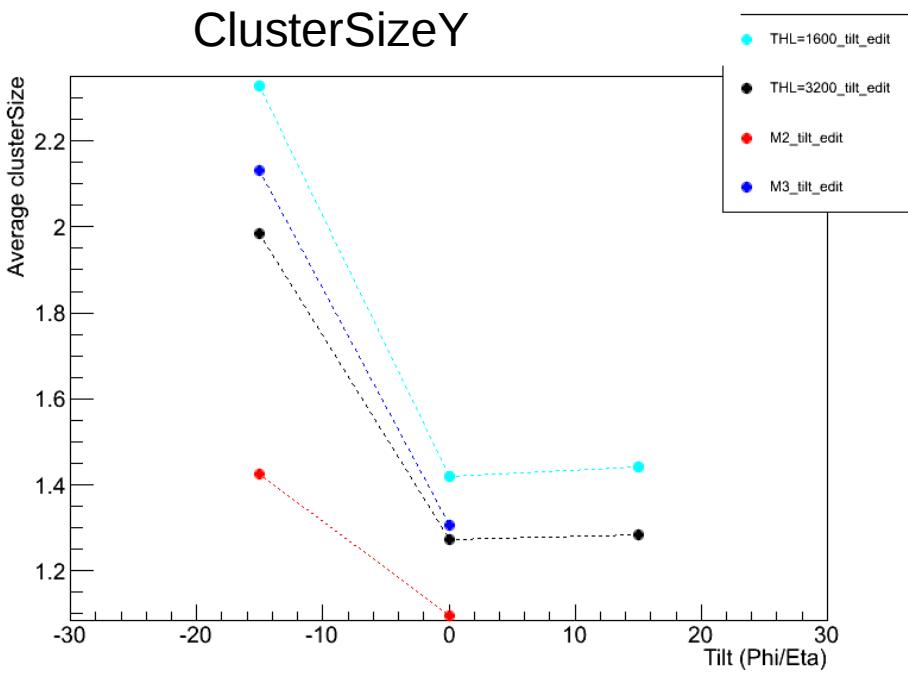
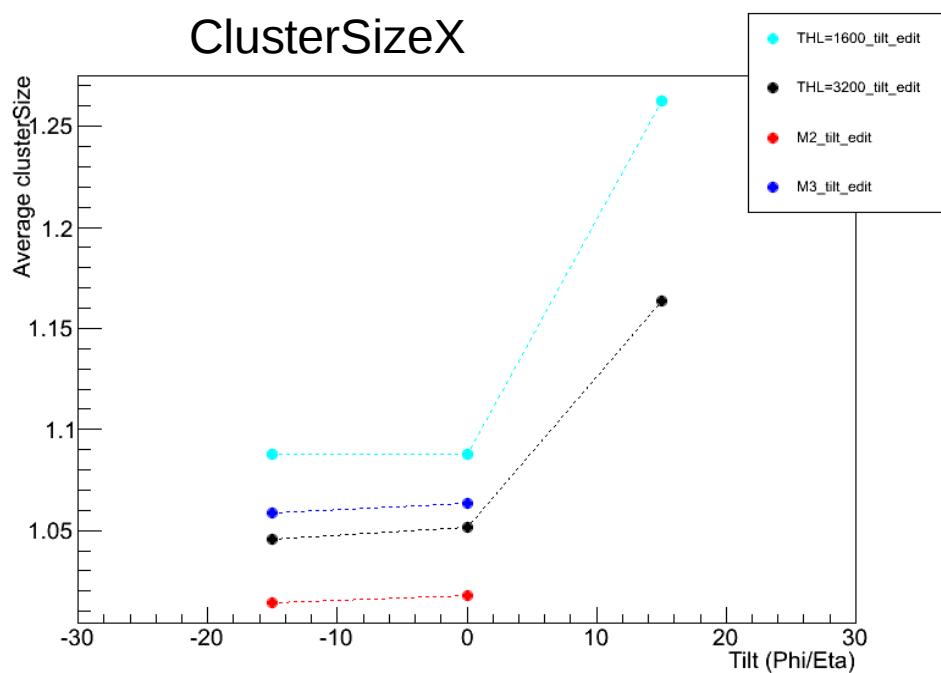
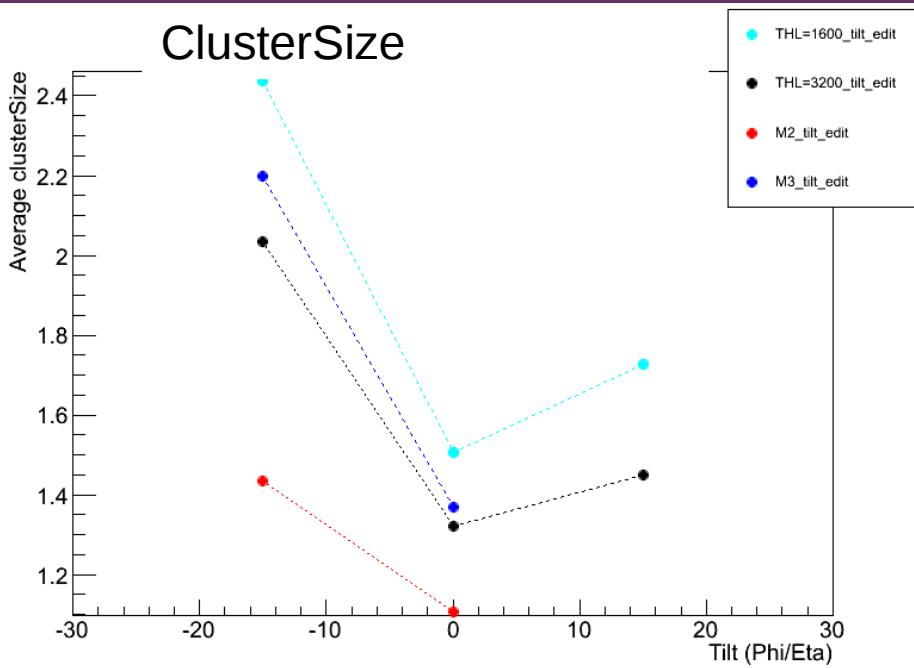
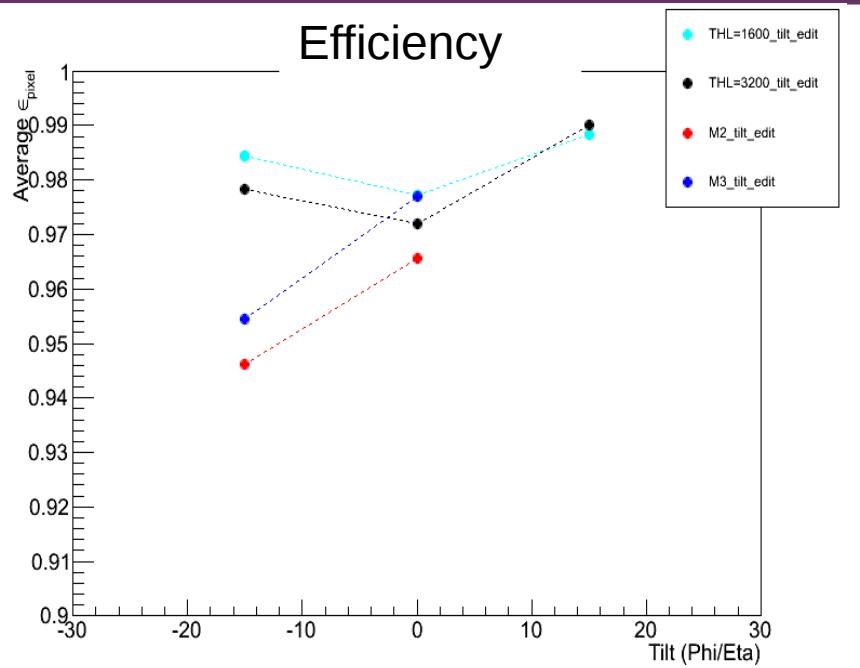
This can be used to confirm orientation

Recording noise

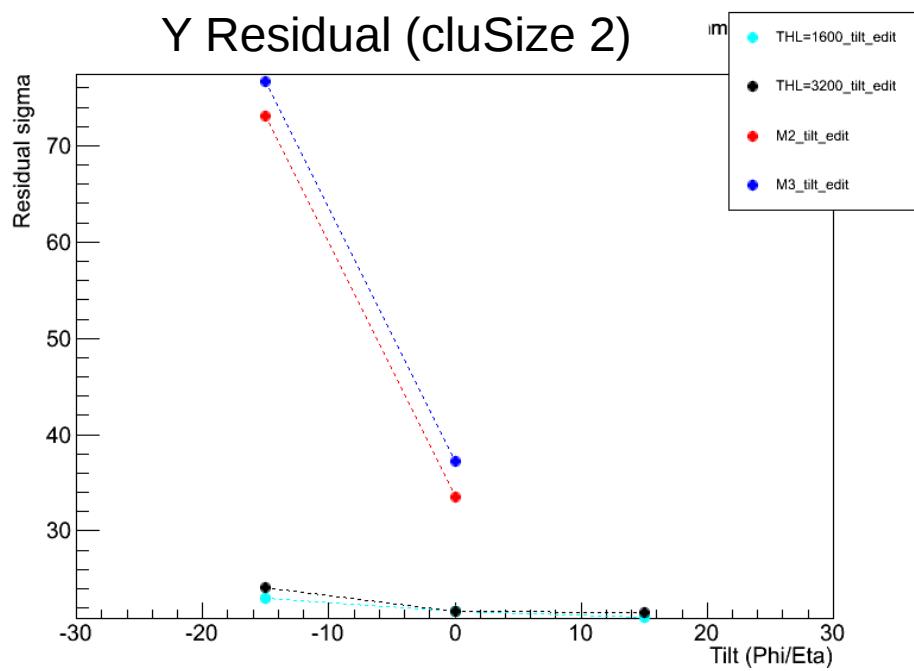
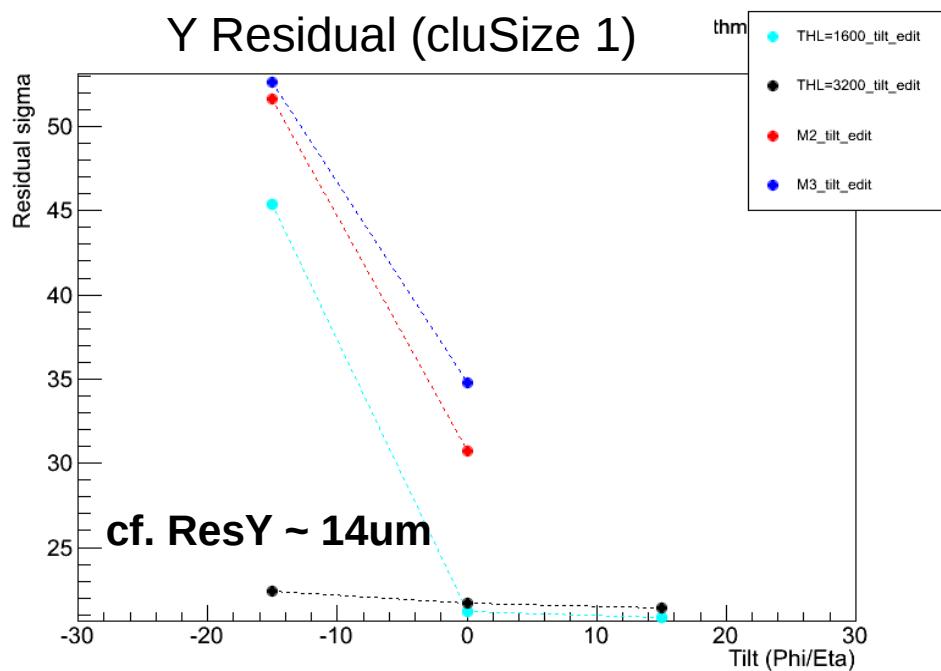
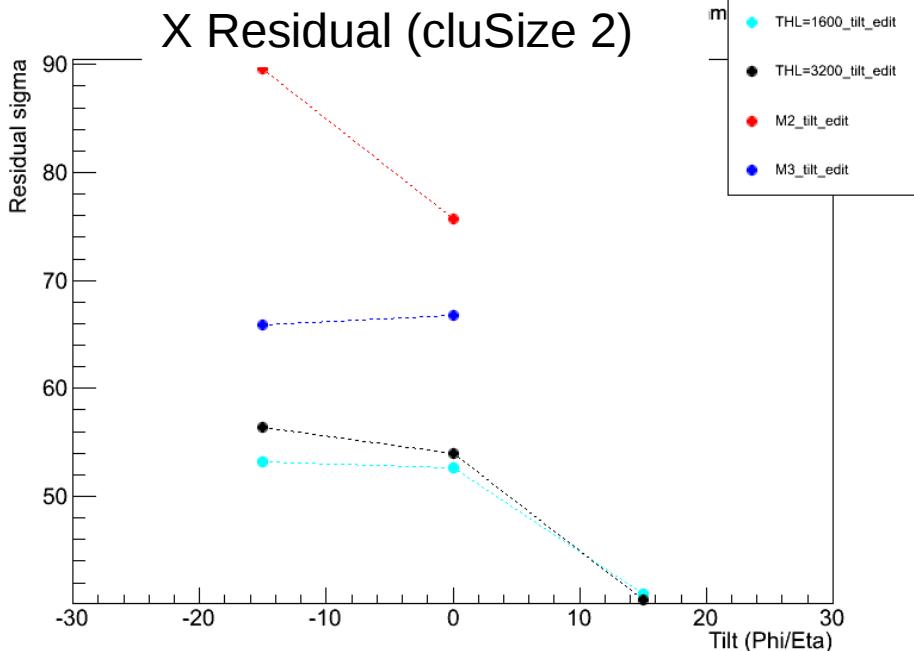
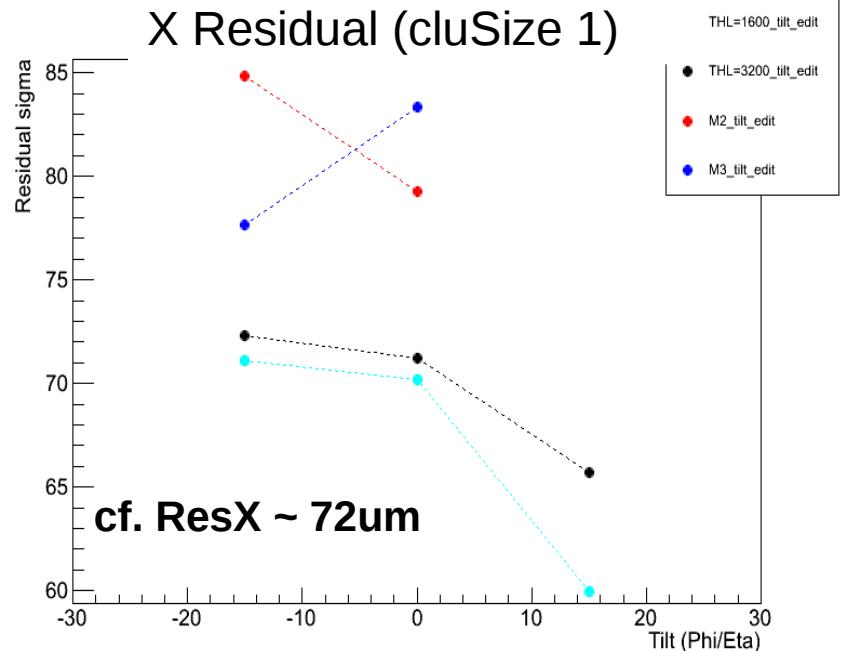
Inconsistent records of DUT positions and orientations

	DUT 0	DUT 1
4a runs	SCC31	MICRON01
twiki	19, 19, 19 cm 0, 0, 0	13, 15, 13 cm 0, phi=15, eta=15
spreadsheet	--- 0, 0, 0	--- 0, phi=15, eta=15
email	19, 19, 19 cm 0, 0, 0	13, 13, 13+0.85 cm 0, eta=15, phi=-15
Used	19, 19, 19 cm 0, 0, 0	13, 13, 13 0, phi=-15, eta=15
4b runs	MICRON03	MICRON02
twiki	19, 19, 19.5 cm 0, 0, phi=15	13, 15, 15 cm 0, phi=15, 0
spreadsheet	SCC31 0, 0, 0, eta=15	MICRON1 0, phi=15, eta=15, 0
email	19, 19, 19+0.85 cm 0, 0, phi=-15	13, 13+0.85, 13 cm 0, phi=-15, 0
Used	19, 19, 19 cm 0, 0, phi=-15	13, 13, 13 cm 0, phi=-15, 0

06/11/13 Micron Tilted Efficiency plots (X-axis= phi/eta)



06/11/13 Micron Tilted Residuals (X-axis= phi/eta)



- Unable to reproduce previous testbeam analysis of 4A runs
 - Neither Glasgow reconstructed & analysed data nor original reconstructed data (see back-up) match previous result
 - Possible reasons: reconstruction version, analysis details
- However, results seem reasonable
 - X resolution around expected, Y resolution higher than expected
- Managed to reconstruct & analyse temp, tilted and M2&3 runs despite poor documentation
 - Poorer performance found after cooling
 - Clustersize used to determine orientation
 - Micron3 device different behaviour from Micron 1&2
- Ready to upload tbtrack/analysed files to grid/EOS if approved

backup



University
of Glasgow

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Run numbers

THL/Bias	-50V	-100V	-150V	-200V
3200e	2742-2774	2777-2810	2812-2848	--
1600e	2854-2891	2893-2935	2937-2973	--
1400e	2979-3021	3022-3067	3070-3102	--
1200e	3203-3239	3164-3200	3103-3163	--
1000e	3241-3278	3279-3322	3328-3373	3378-3415
1000e (-20oC)	3532-3571	3494-3530	3455-3490	3417-3453

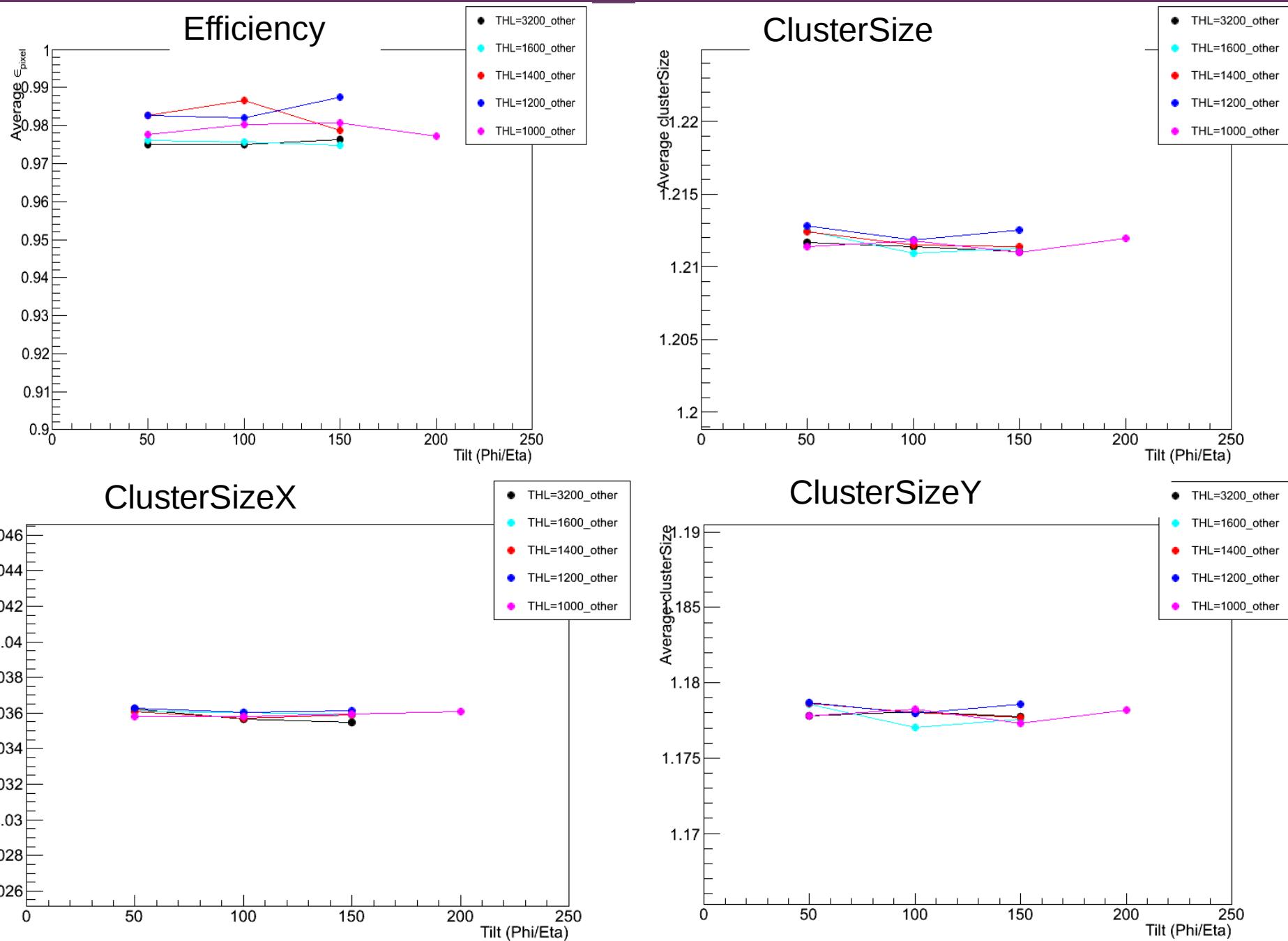
	No Tilt	Eta Tilt	Phi Tilt
Micron 1 (1600e)	2893-2935	3910-3986	3753-3813
Micron 1 (3200e)	2777-2810	3820-3909	3710-3749

	-50V	-100V	-150V	Phi Tilt (-100V)
Micron 2	3991-4027	4030-4067	4066-4103	4154-3201
Micron 3	3991-4027	4030-4067	4066-4103	4109-4149

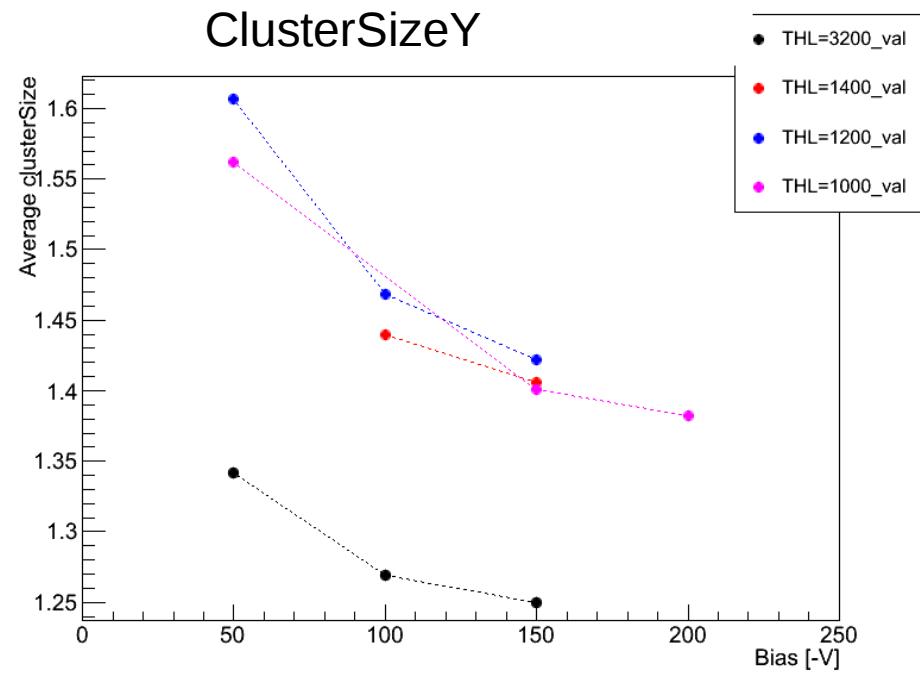
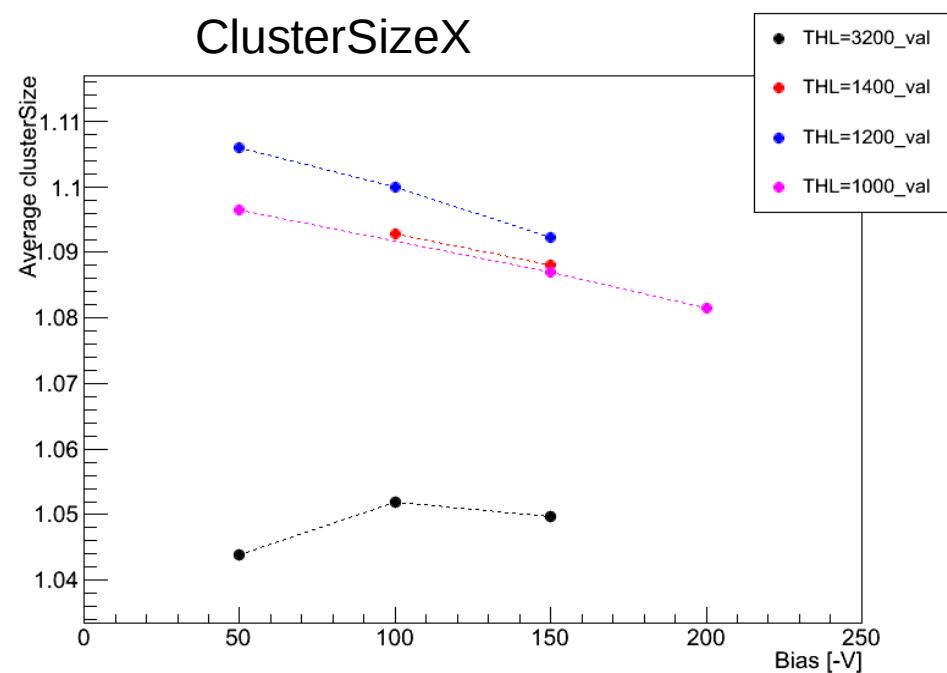
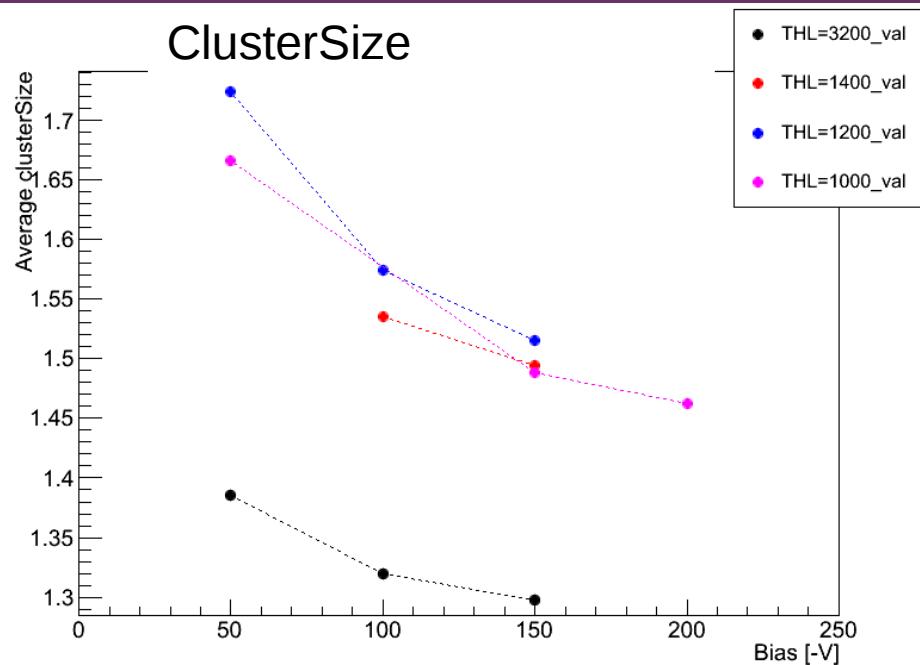
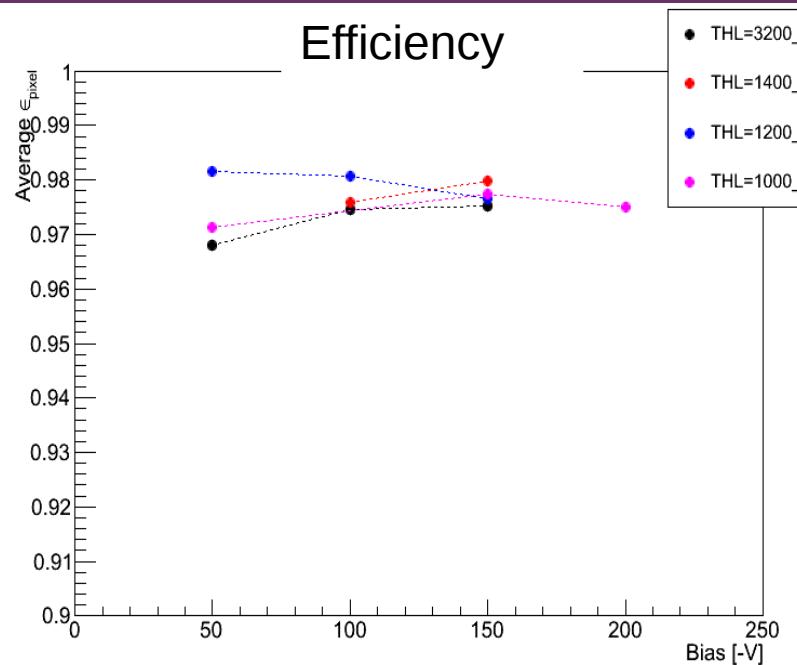
- Analysis has two parts: reconstruction and analysis
- reconstruction takes the raw data to analysable format in 5 steps
 - converter
 - clustering
 - hitmaker
 - align
 - fitter
- analysis has several steps
 - hotpixelfinder
 - checkalign (with masknoisyanddeadpixels=true)
 - geteatcorr
 - checkalign (with applyetacorr=true , applytransition=false)
 - user analysis (with applytransition=true)

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SCC-31 Efficiency plots (X-axis= Bias)

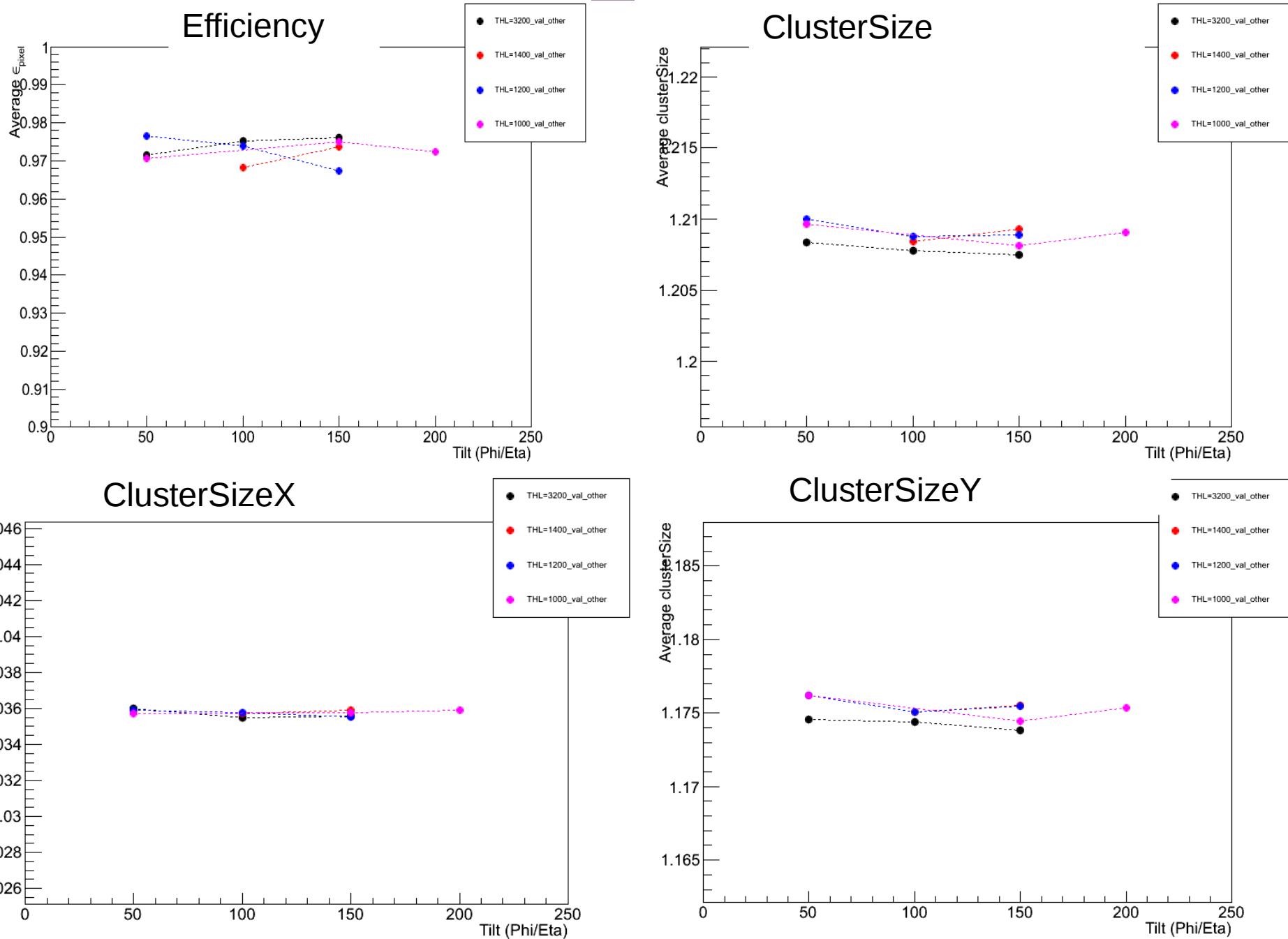


Micron1 using previous reconstruction



06/11/13

SCC-31 using previous reconstruction



06/11/13

