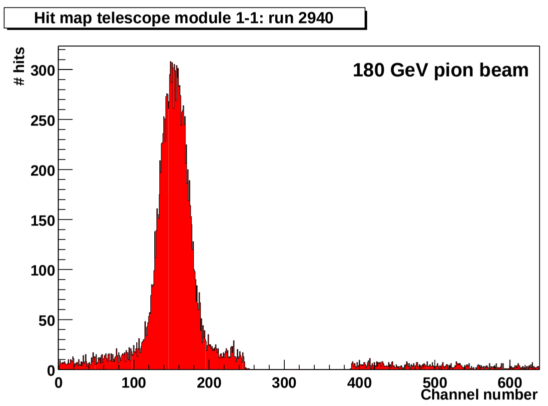
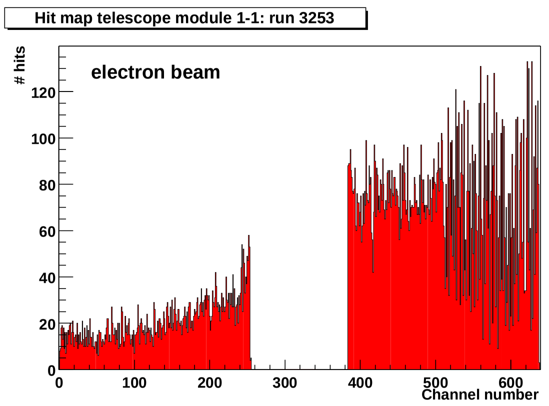
- The program
- Alignment
- DST production - status
- Analysis - getting started
- Plans for October - 25 ns beam

- A total of $\sim$ 800 runs, 15000 events each (or 30 GB of raw data)
- Magnetic field
- Incidence angle $\rightarrow$ 10 points
- Edge ON/OFF
- Beam position studies
  - barrel edge/gap/corner
  - end-cap near/far studies
- One week of parasitic TileCal beam
  - beam particles, energies, profiles

Telescope modules have inefficient regions.

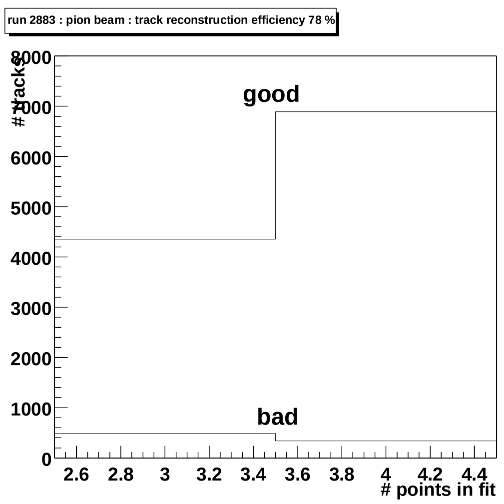




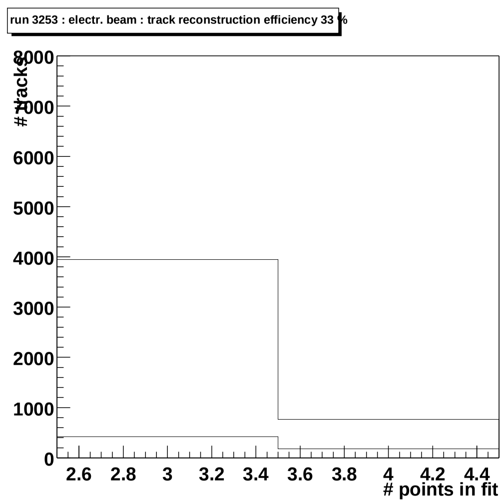
Track reconstruction efficiency:

	4 point tracks	3 point tracks	total
efficiency run 2883	48 %	30 %	78 %
impurity run 2883	2 %	3 %	6 %
efficiency run 3253	5 %	27 %	33 %
impurity run 3253	1 %	3 %	4 %

“normal” 180 GeV pion beam

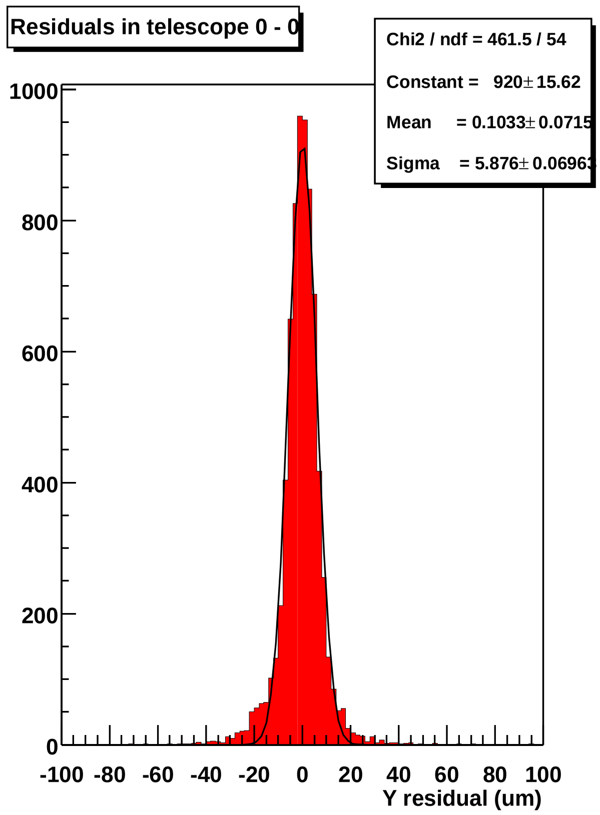


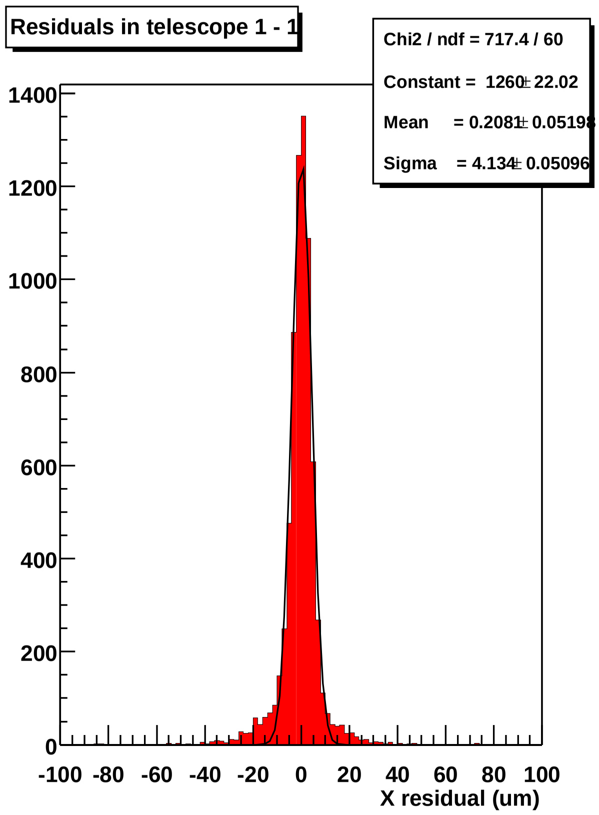
“TileCal” broad electron beam



IRAM clustering is not optimum (less so than last year).

Software reclustering of the telescope clusters leads to a quite significant improvement of the track extrapolation.



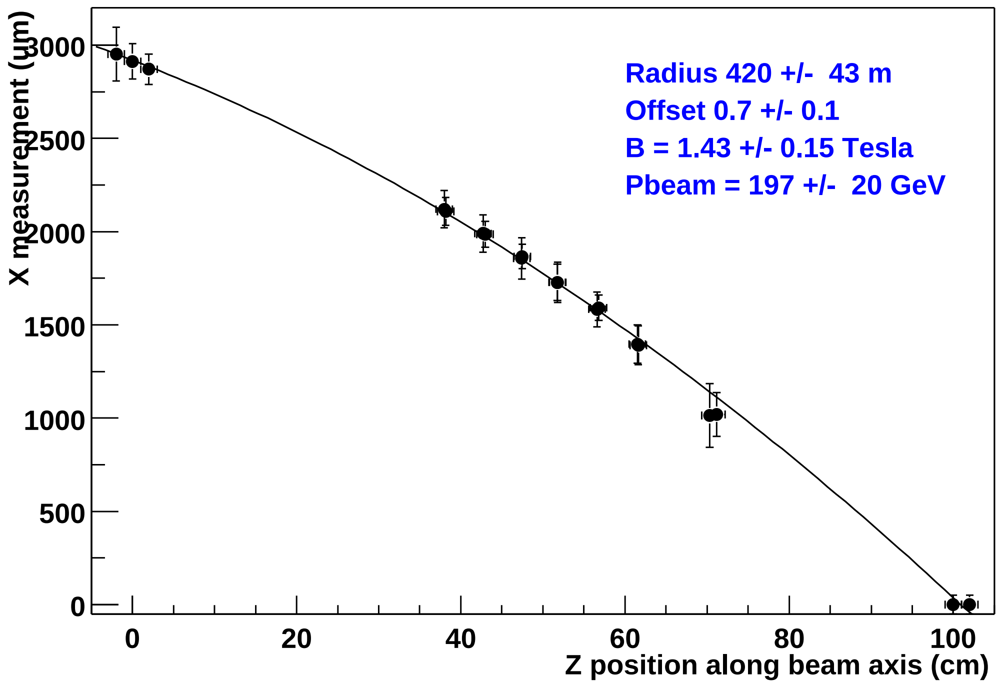


Track extrapolation precision:

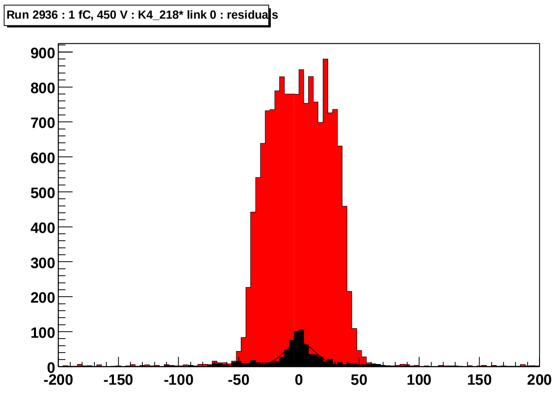
$\sim 5\mu m$ in X

$\sim 4\mu m$ in Y

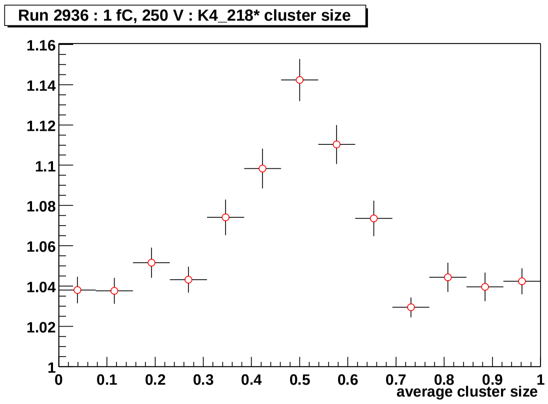
Track curvature in magnetic is absorbed in re-alignment



spatial resolution...



... and charge sharing

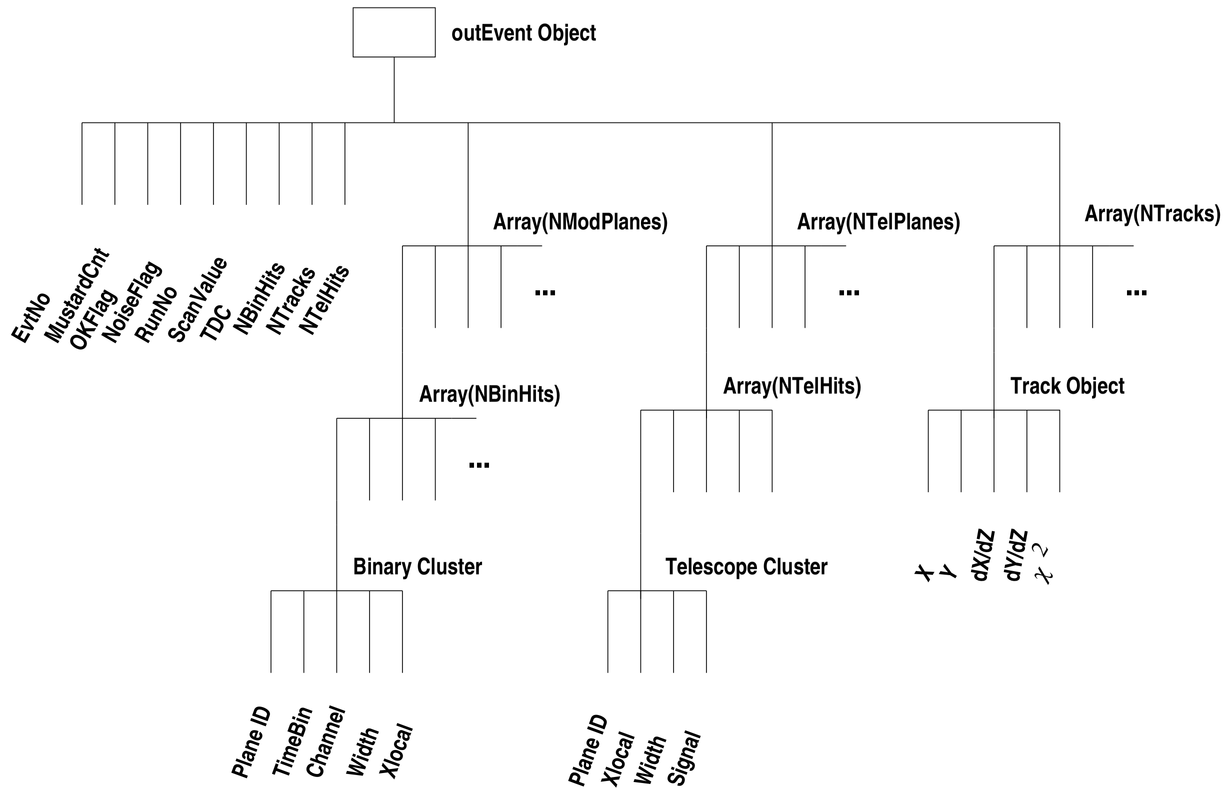


Realign every time the setup changes:

- magnetic field
- incidence angle
- beam
- other accesses

A total of 30 alignment files available from
$http://ific.uv.es/sct/tb01/align_2/$

DST: ROOT TTree structure containing all DUT, telescope, TDC and track information



- ROOT version 3.01
- The hit buffer is subdivided in individual links
- Run parameters stored in ROOT file
- Documentation and skeleton macros

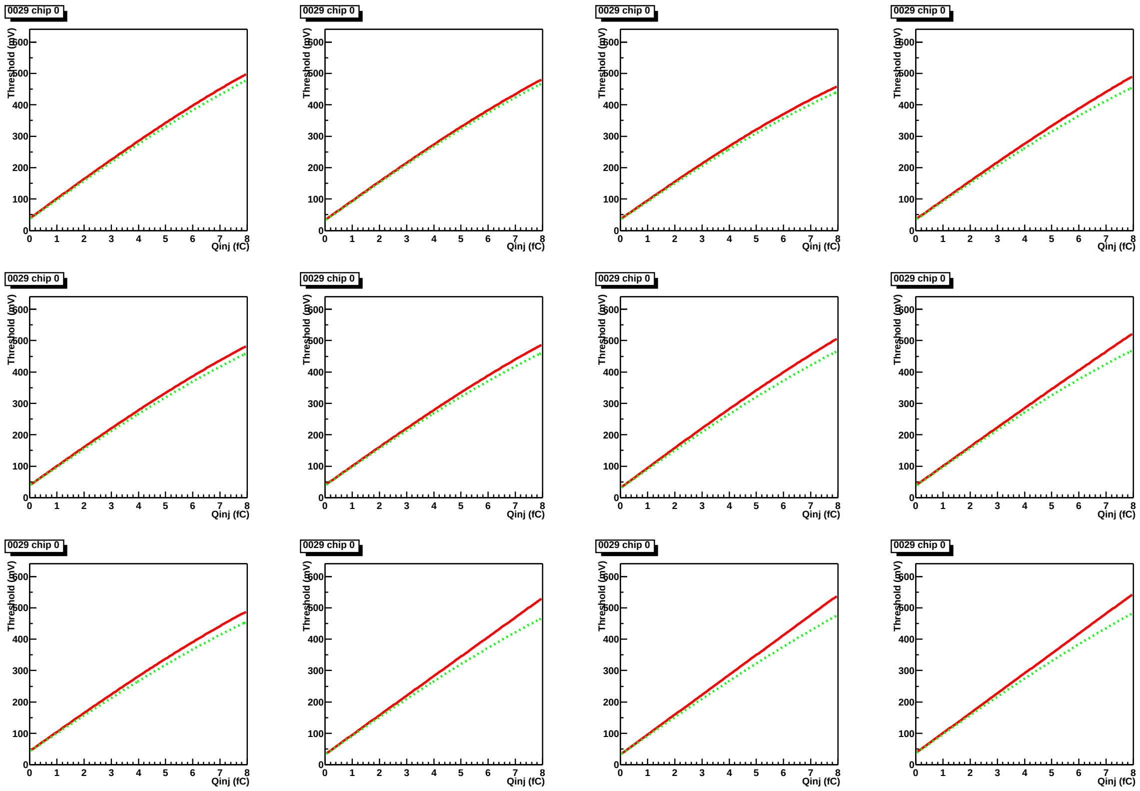
- Use of the VIKING telescope impossible with intense beam
- Tracking can be done using SCT modules in X,Y,X,Y configuration
- Four good modules would be needed apart from those under test

- Final offline finishing up
- Various analyses are well under way
- DSTs available on the CASTOR tape storage system

  $/castor/cern.ch/atlas/testbeam/sct/2001/dst_2/$
- Alignments available on the Valencia offline webpage

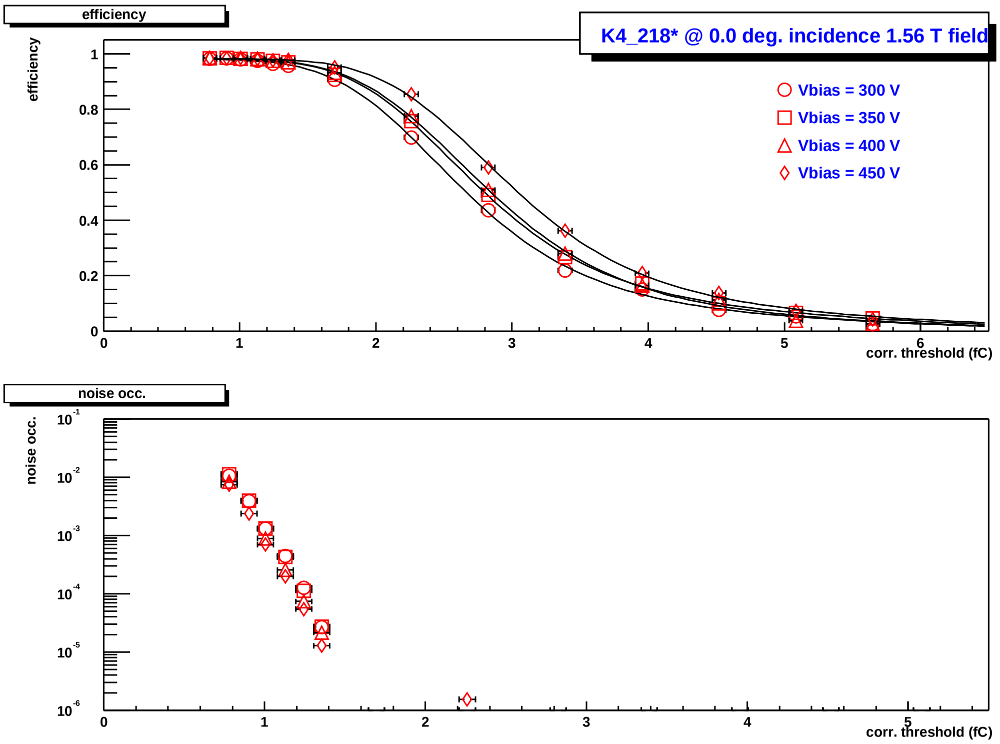
  $http://ific.uv.es/sct/tb01/align_2$

Two calibrations (determinations of the response curve) were done in situ. They agree well between each other. A small difference with the pre-TB characterisation can be understood as a temperature effect.



This is true for all modules!!!

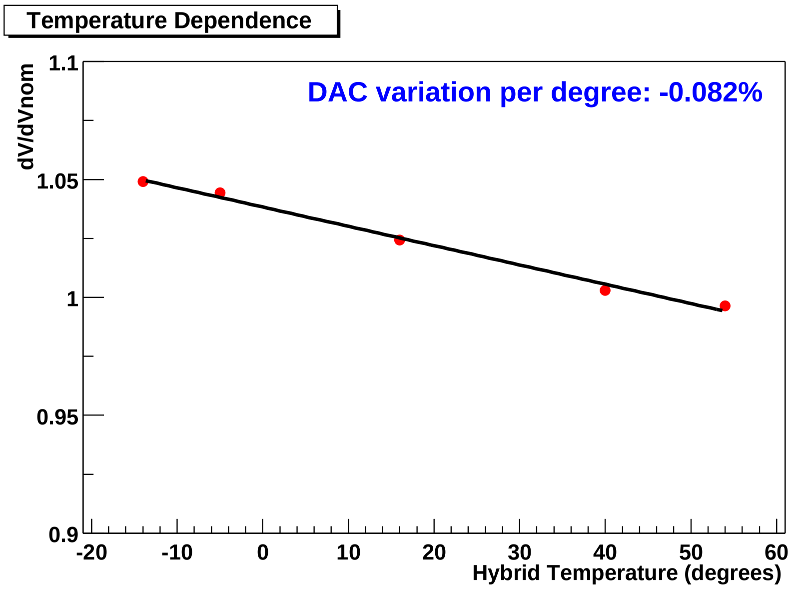
Cross-check the calibration by measuring the median charge (in fC) in one scan (250/450 Volt, perpendicular incidence, B=1.56 Tesla)



The threshold scale has been corrected for the calibration capacitance. The correction factor (1.13 for all ABCD3T modules, 1.07 for K4-200) was obtained from measurements of test structures on the wafer.

Module	type	T_{hyb}	Q_m	gain (mV/fC)	ENC 2 fC	S/N
0029-0	B	-6	3.35			
0029-1	B	-6	3.15			
0018-0	B	-7	3.25	66.8	1156	15.5
0018-1	B	-7	3.39	61.1	1270	14.5
0020*-0	B_{irr}	-5	3.12	35.9	1582	10.9
0020*-0	B_{irr}	-5	3.27	35.2	1625	11.2
0037*	B_{irr}	-4	2.93	34.3	1670	9.7
0037*	B_{irr}	-4	2.73	32.4	1723	8.8
0035	B	-1	3.75	54.7	1282	16.2
0035	B	-1	3.63	57.0	1283	15.7
0036	B	-7	3.61	58.4	1241	15.9
0036	B	-7	3.57	55.5	1243	16.1
K4-218*	EC_{irr}	4	2.99	32.4	1710	9.6
K4-218*	EC_{irr}	4	3.14	31.2	1825	9.5
K4-229	$inner$	25	3.48	55.5	1210 (!)	15.9
K4-229	$inner$	25	3.25	53.1	1050 (!)	17.1
K4-200	EC	11	3.70	49.6	1687	12.1
K4-200	EC	11	4.4	51.4	1924	12.6

The Cal (and Thr) DAC respons was found to depend on temperature (http://ific.uv.es/sct/electronics/dactempdep)



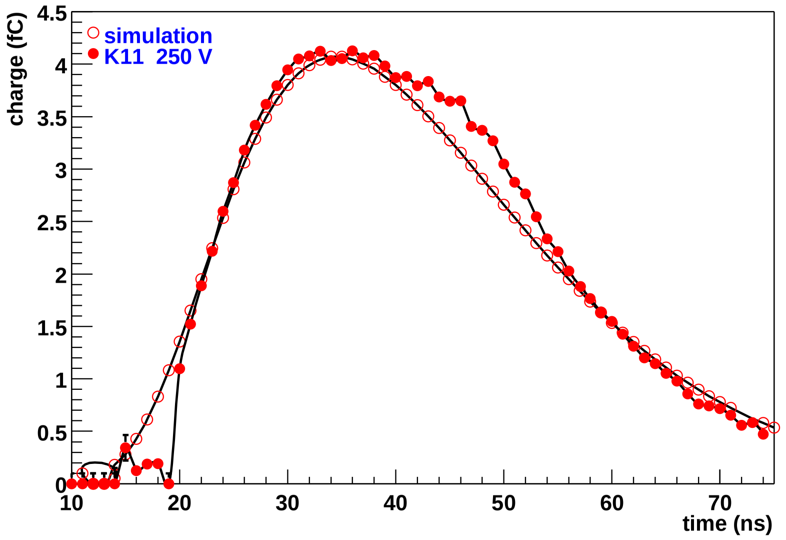
The same result for the temperature dependence is obtained on an irradiated module.

The measurements favour a reduced response (3 to 5 %) in the irradiated module, but can also be explained as chip to chip variations.

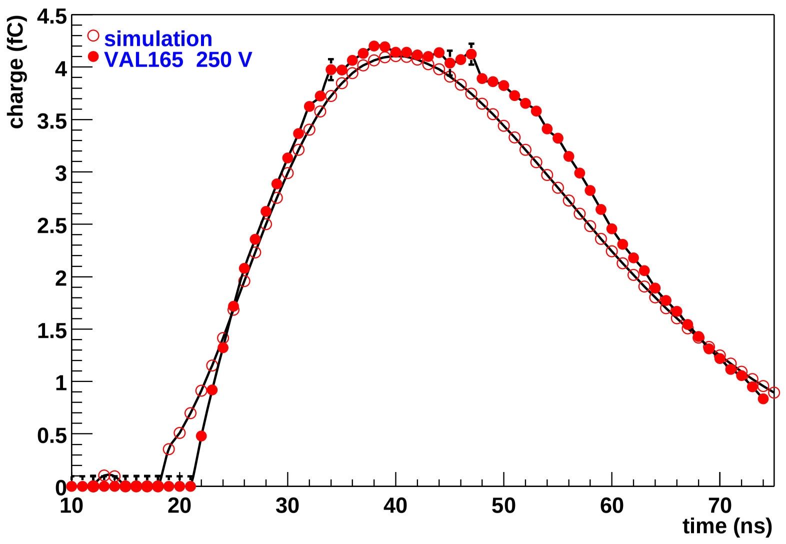
Possible causes/explanations for differences in median charge between equal modules or event the two sides of the same module:

- Analysis errors - independent analysis gives similar results
- Timing differences - TDC cuts verified in pulse shape reconstruction
- Individual inefficient channels - not found in efficiency vs # plot
- Detector thickness - known to be very uniform
- Temperature - small effect, only significant in K4-229
- Batch to batch variations - nearly all chips from same batch
- Batch to batch variations C_{cal} - corrected using measurements on test structures
- Chip to chip variations - up to $\sim 7\ \%$?

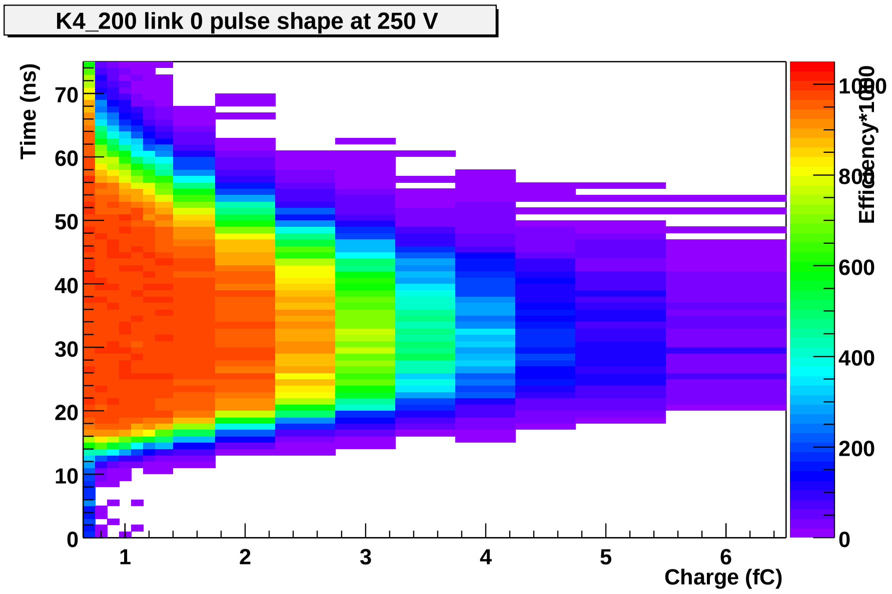
In the beam test at KEK in December 2000:



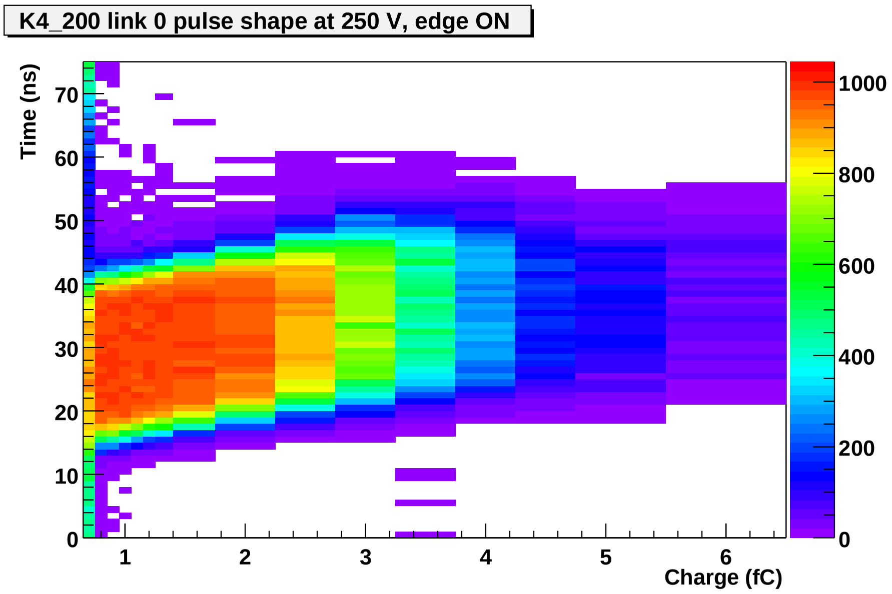
Barrel module. Best fit $\tau_p = 22ns$.



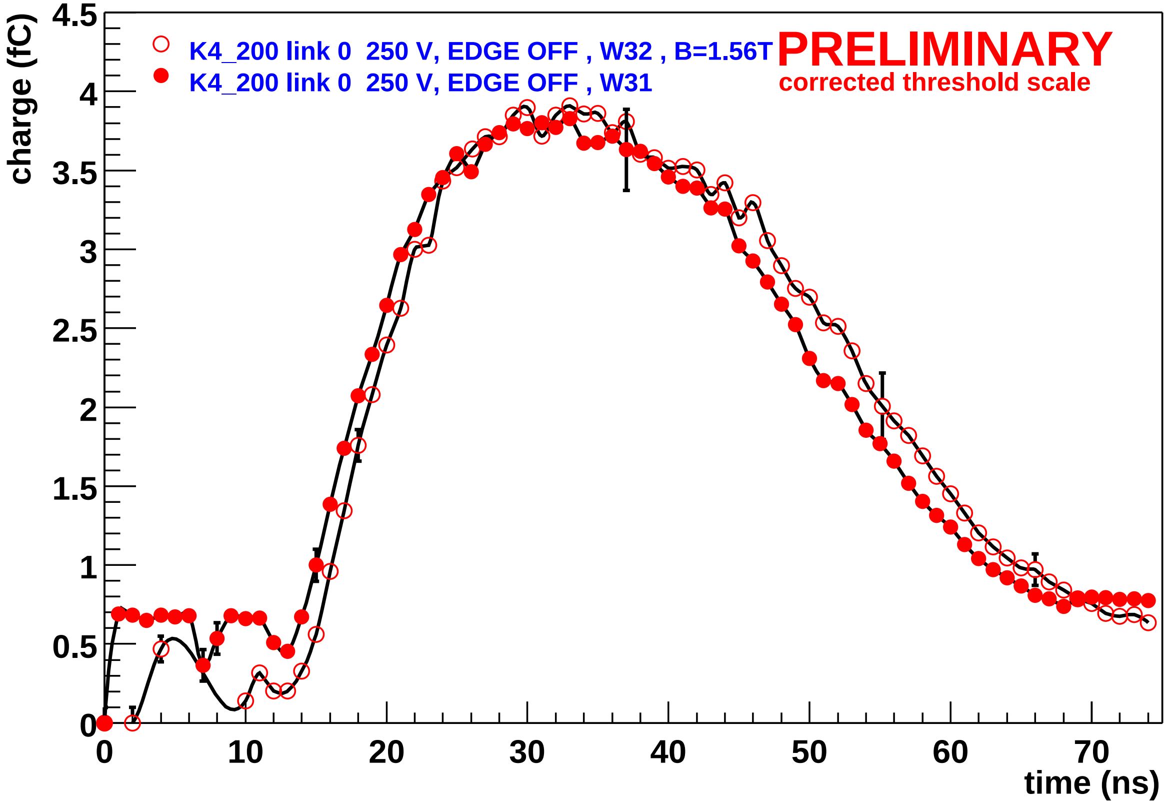
End cap (K3-outer) module. Best fit $\tau_p = 24ns$.



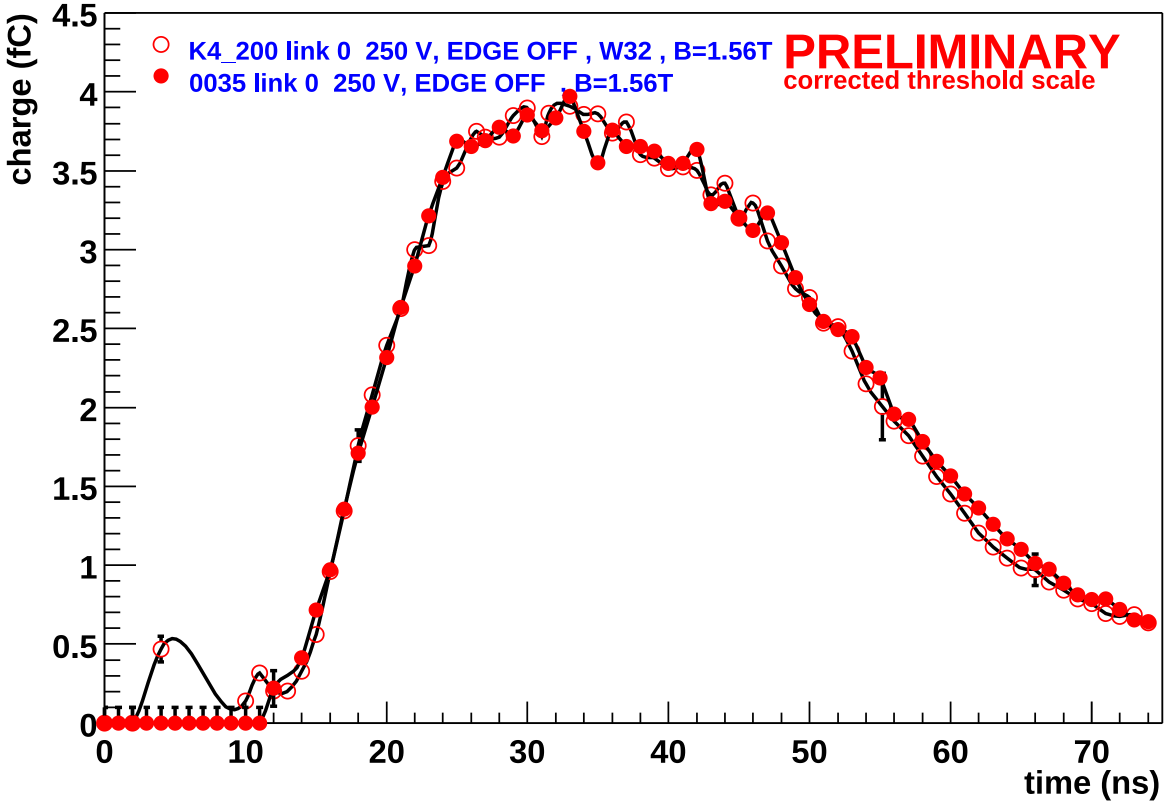
Efficiency as a function of threshold and charge deposition time. Comparator in LEVEL mode.



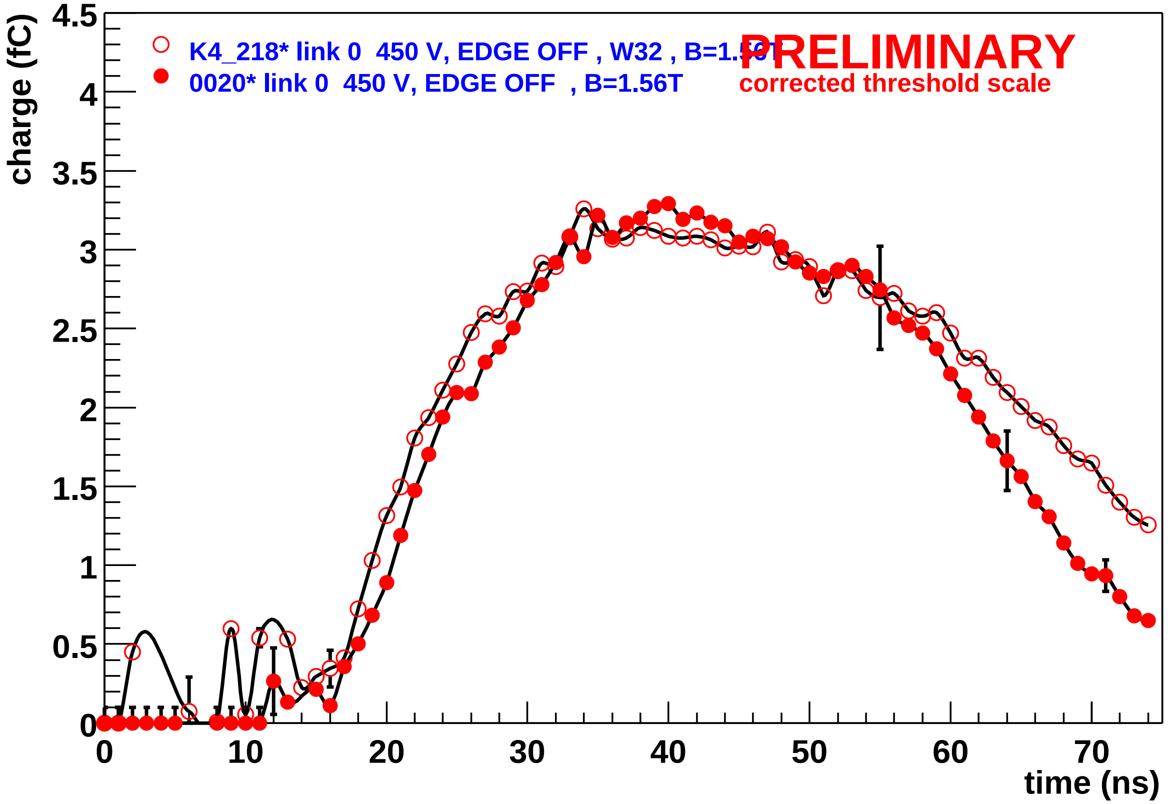
Efficiency as a function of threshold and charge deposition time. Comparator in EDGE mode.



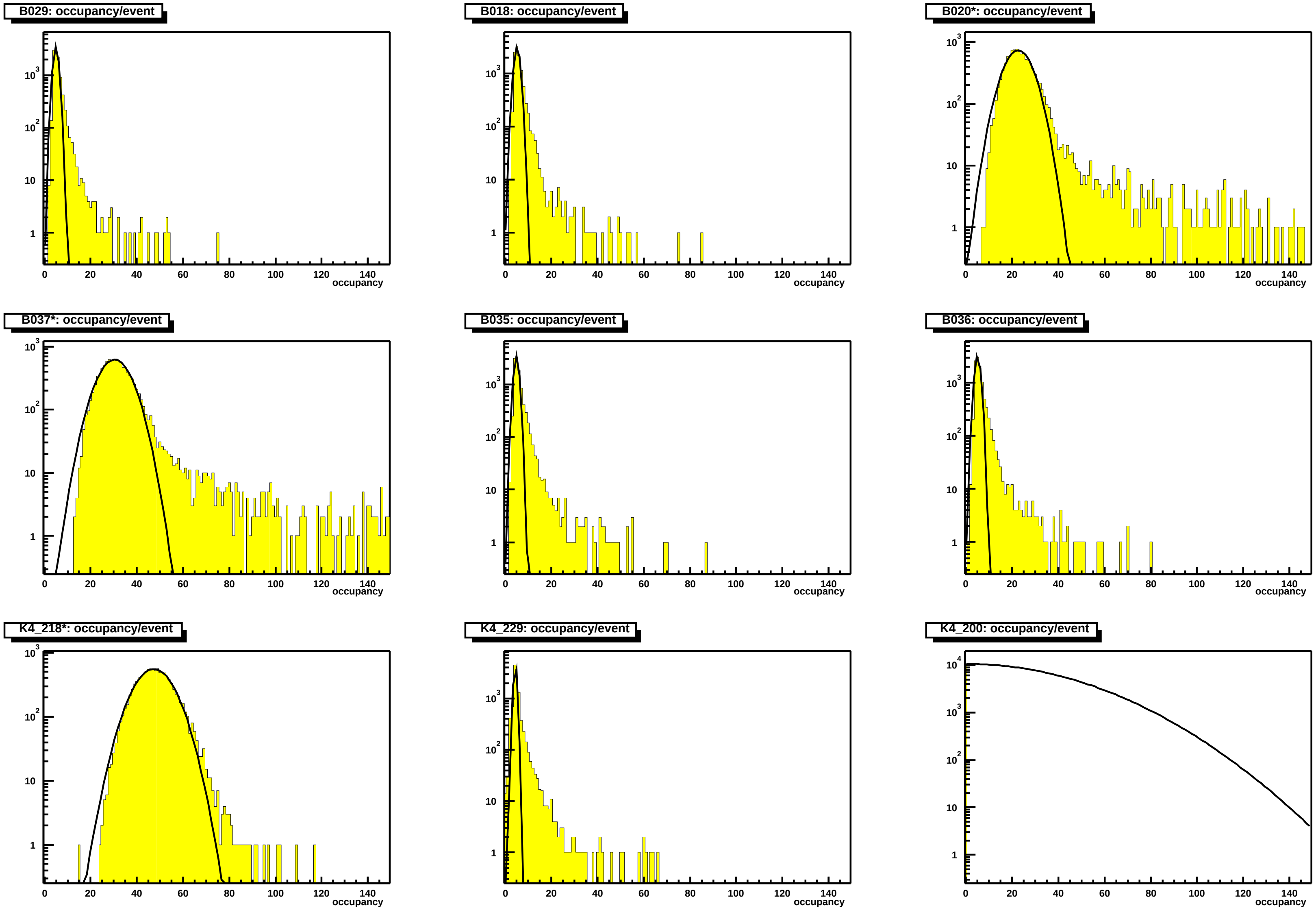
End-cap module (beam in W31 and W32)



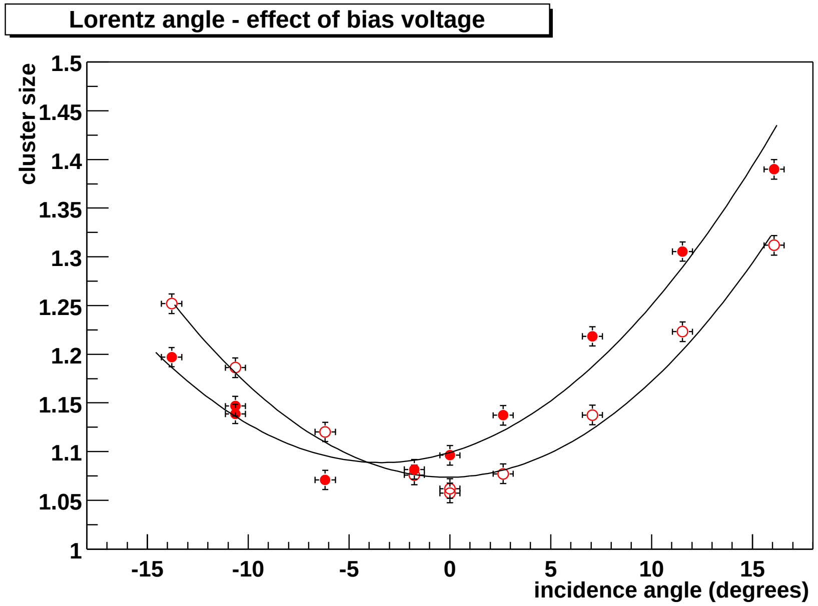
End-cap and barrel module

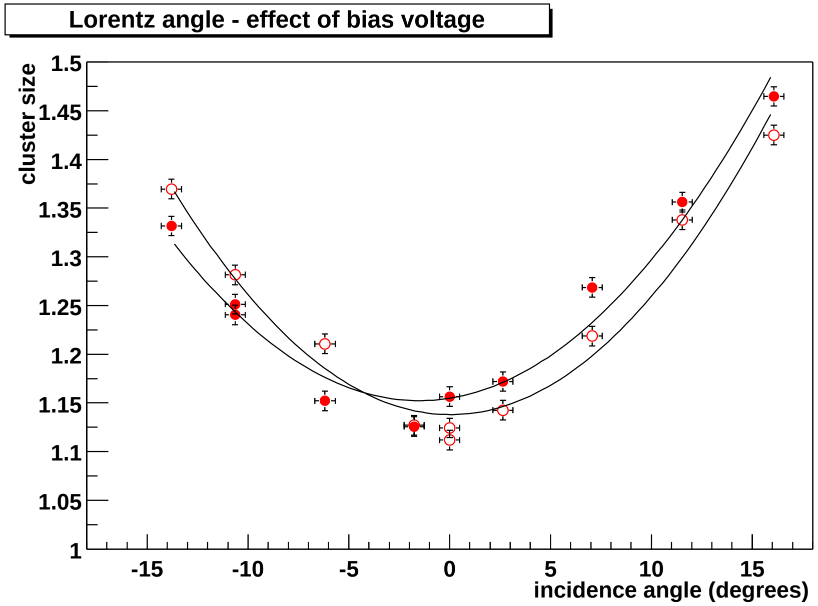


Irradiated end-cap and barrel module


B029: occupancy/event
B018: occupancy/event
B020*: occupancy/event
B037*: occupancy/event
B035: occupancy/event
B036: occupancy/event
K4_218*: occupancy/event
K4_229: occupancy/event
K4_200: occupancy/event
occupancy
0 20 40 60 80 100 120 140
1 10 10^2 10^3 10^4

non-irradiated... ... and irradiated



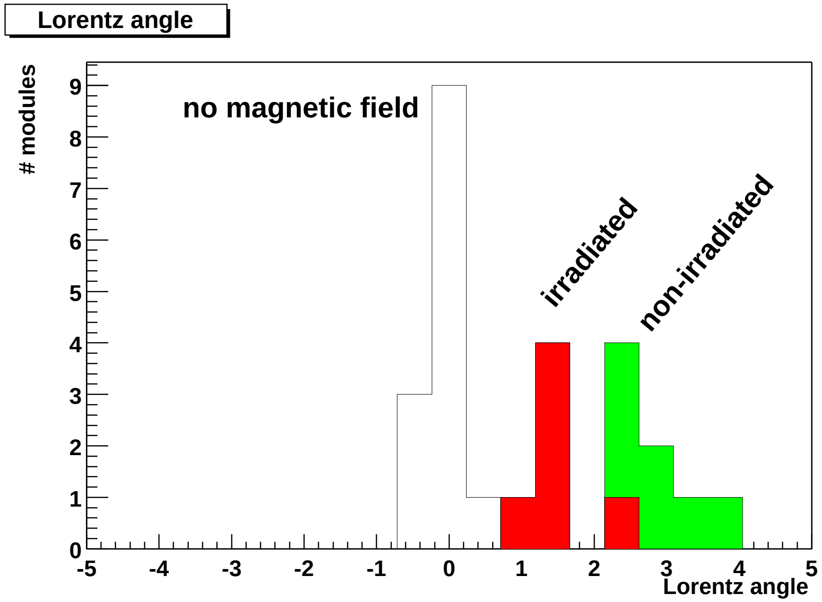


Lorentz angle is consistently lower in irradiated modules ($V_{bias} = 350V$) than in non-irradiated modules ($V_{bias} = 150V$)

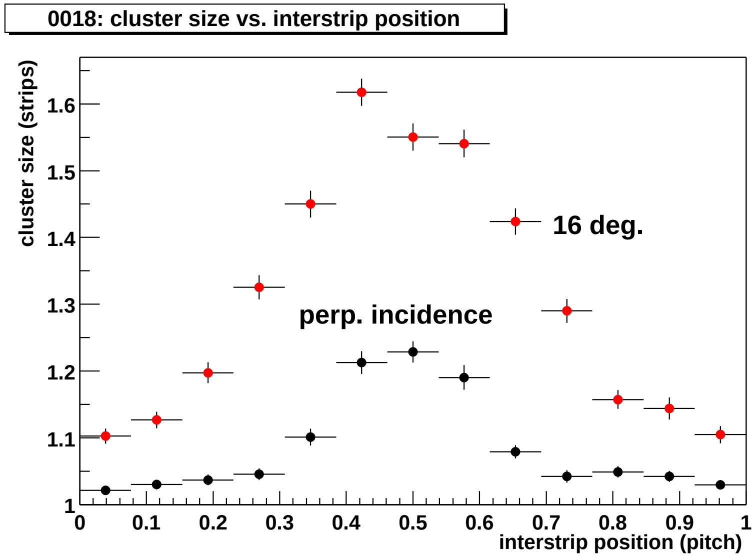
T. Lari, Lorentz angle variation with electric field for ATLAS silicon detectors, ATL-INDET-2001-004, predicts a small decrease of the Lorentz angle with increasing field:

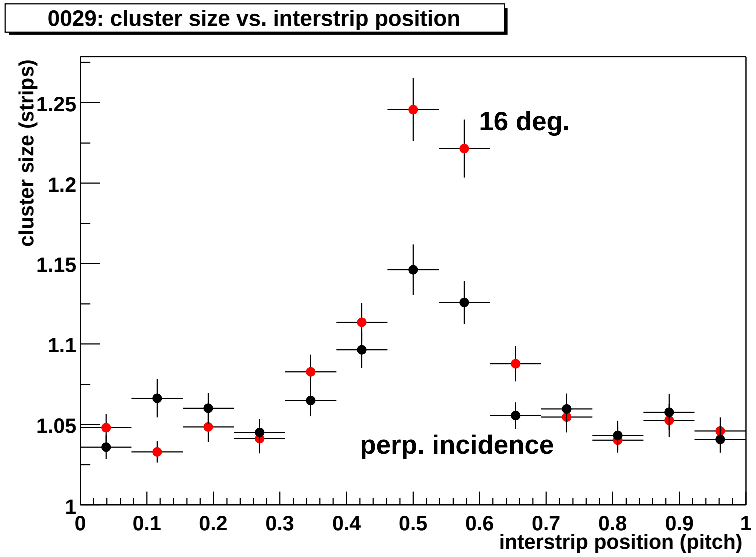
$\theta_L(150) = 4^o$

$\theta_L(350) = 3^o$



Non-perpendicular incidence leads to a longer path through the Silicon and thus to an increase of the signal...





...but when the rotation angle is perpendicular to the strips, increased charge sharing leads to a reduction of the median charge

Module	Charge (perp.)	Charge (16 ^{o})	ratio	1/cos(16^o)
0029-0	3.25	3.42	1.043	1.0403
0029-1	3.05	3.20	1.042	1.0403
0018-0	3.18	2.48	0.78	1.0403
0018-1	3.26	2.53	0.78	1.0403

- Absolute calibration ?
- The August 2001 test beam allows a complete characterisation of the performance of (irradiated) barrel modules in a magnetic field and under non-perpendicular incidence. Presented elsewhere.
- Edge sensing circuit OK $\rightarrow$ quantitative study under way
- Difference between end-cap and barrel pulse shape - observed in the KEK test beam - is no longer found
- Irradiated modules have significantly slower shaping than non-irradiated modules
- No dependence observed on the position of the beam with respect to the hybrid
- The Lorentz angle is lower for irradiated modules at 350 Volts than for non-irradiated modules at 150 Volts