

Summary of the spring Micromegas beam test

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THANKS FOR PARTICIPATION IN PREPARATION AND SHIFTS:

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THANKS TO THE SACLAY ELECTRONICS TEAM
TO CORNELL AND DESY MECHANICS TEAMS

The run was short but efficient :

mounting on May 5 and 6 (commissioning of new module and new electronics)

preparation 20th to 25th of May (alignment, timing, B=0 cosmic data)

Magnet and beam on 26th evening

Data taking for the next 7 days

(2 days with resist. ink and 4 days with C-loaded kapton)

Record of 6 weekend days and holidays in 12 days.

TWO MAIN GOALS :

-Compare the two resistive coverlays

-Compare electronics with and without shaping

A few (minor) incidents occurred :

Field cage : 5 M Ω between the 1st and 7th strip, instead of 6.
Could be due to a short between 2 strips.

Total chain 1st to cathode : 208 1 M Ω . Should be 210 M Ω .

Conclusion : 1 M Ω lost at $z < 0$, plus maybe 1 at $z > 0$. To be checked in air or TPC open.

Water : dew point probe told 500 ppm water whereas drift velocity favoured 100 or less : solved by cleaning the mirror (O. Schäffer).

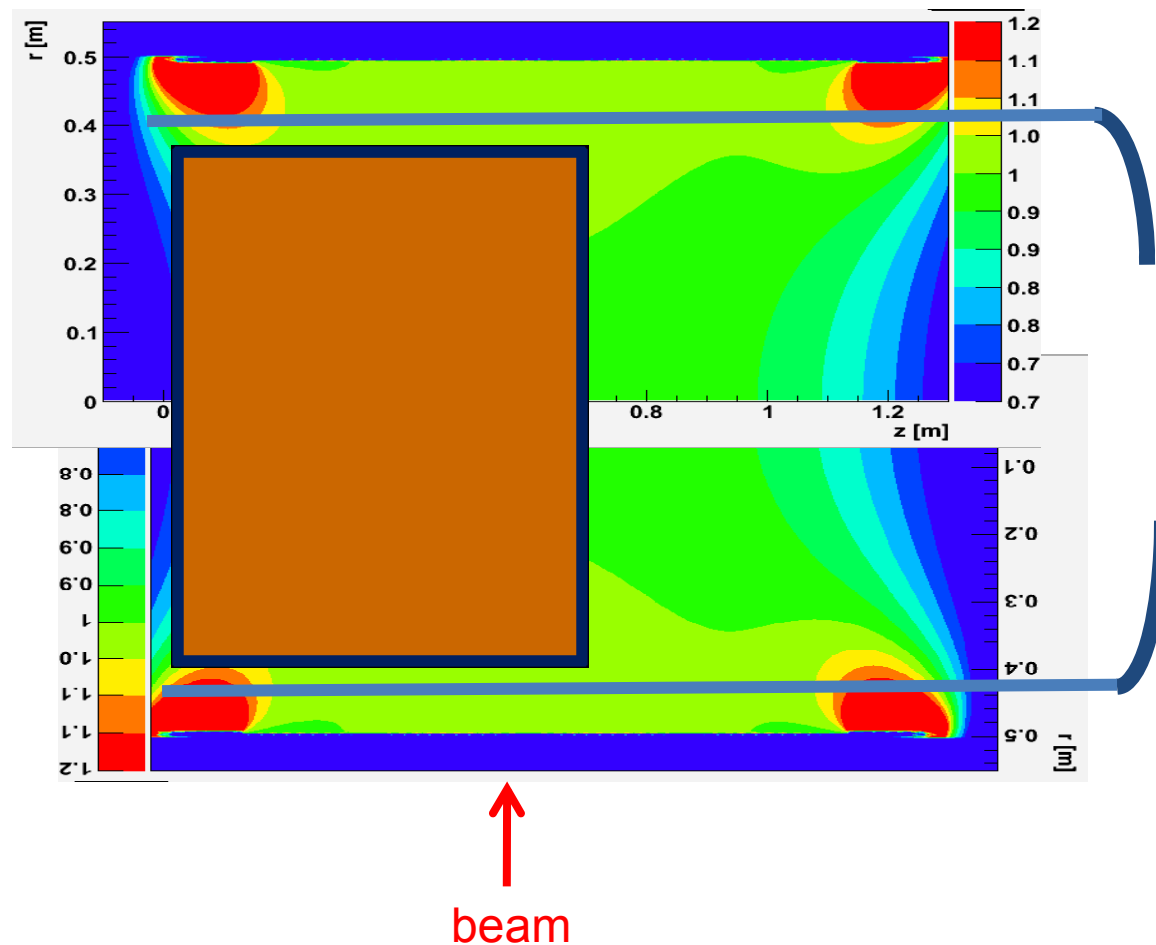
Magnet fast discharge on June 1 at 18:30 (noticed at 19:15)
recovered in a few hours (thanks to Takeshi)

Overall a very quiet and smooth data taking period.

DATA on DISK

- (being converted to LCIO)
- With the new module, we took 60keVts in low diffusion conditions and 80k at standard drift field conditions
- With the C-loaded kapton, we took 284 keVts at 8 different z values, and then 80 k in a gain scan, and 73 k with laser, 7 k at 2.2 GeV beam, 53 k at non-0 phi angle (5° , 10° and 15°) and some frequency scan (25,33,50 and 100 MHz)

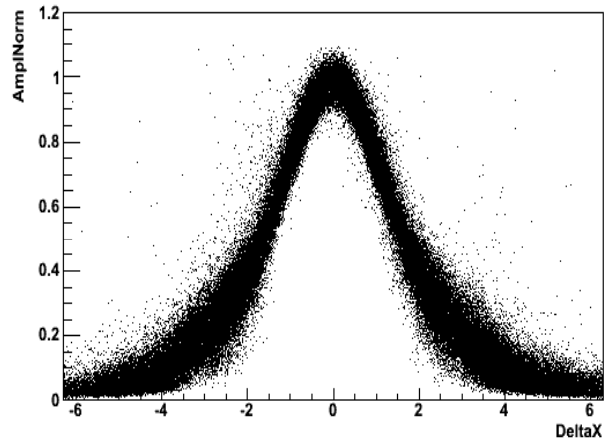
Analysis meeting (Thursday 28 May) : GEM and Micromegas have broadening and deterioration of resolution at $z > 40$ cm : due to low field 0.9 to 0.7 T in the last 20 cm (significant increase of transverse diffusion)



Resistive ink vs C-loaded kapton

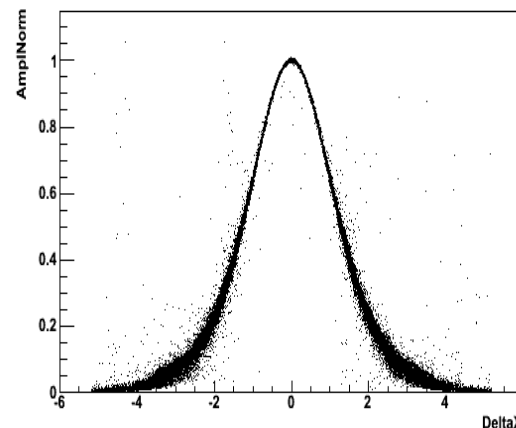
- Resol at 5 cm : 130 micron vs 70
- Prf much 'thicker'

AmplNorm:DeltaX (AmplNorm<=1.1 && AmplNorm>=0 && abs(PhiFit)<5*3.1415927/180.)

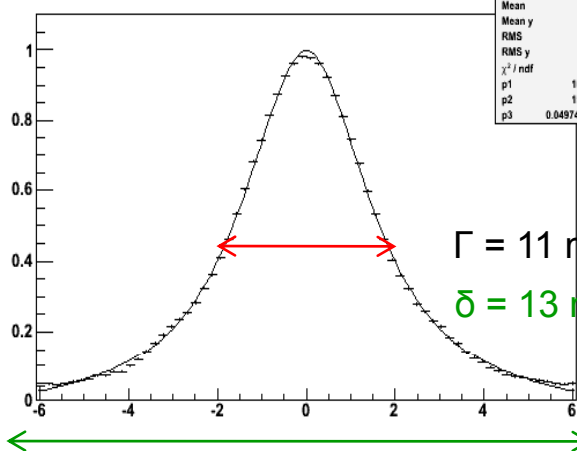


500 ns
shaping
in both
cases

AmplNorm:DeltaX (AmplNorm<=1.1 && AmplNorm>=0 && abs(PhiFit)<5*3.1415927/180.)



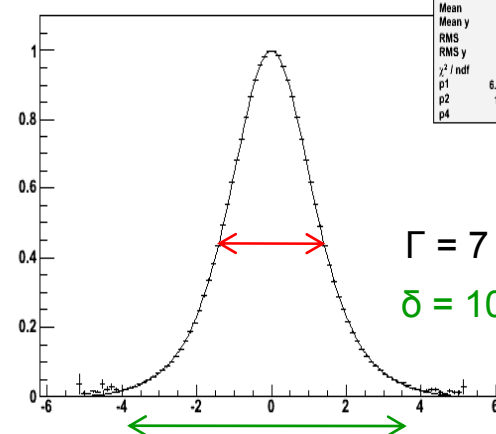
AmplNorm:DeltaX (AmplNorm<=1.2 && AmplNorm>=0 && abs(X0Fit)<3 && abs(PhiFit)<5*3.1415927/180.)



hPRF	
Entries	35366
Mean	0.01654
Mean y	0.3952
RMS	3
RMS y	0.3107
χ^2 / ndf	1514 / 0
p1	10.85 : 0.00
p2	15.27 : 0.80
p3	0.64974 : 0.00000

$\Gamma = 11 \text{ mm}$
 $\delta = 13 \text{ mm}$

AmplNorm:DeltaX (AmplNorm<=1.1 && AmplNorm>=0 && abs(PhiFit)<5*3.1415927/180.)

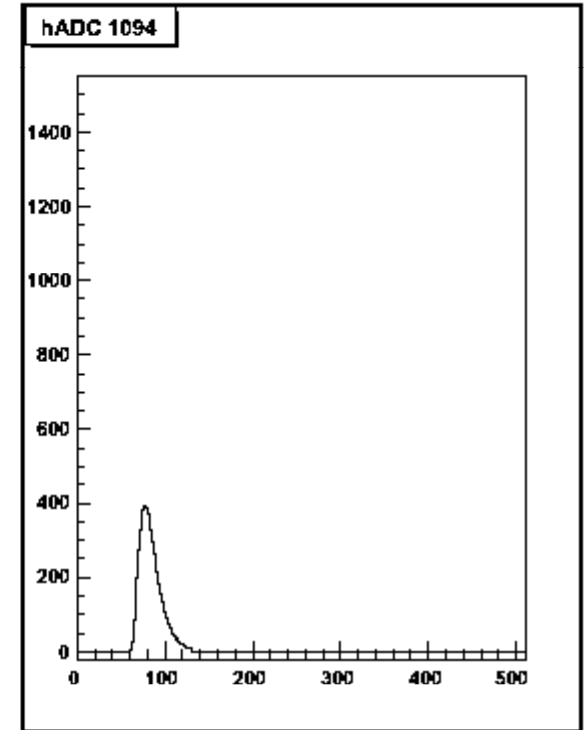
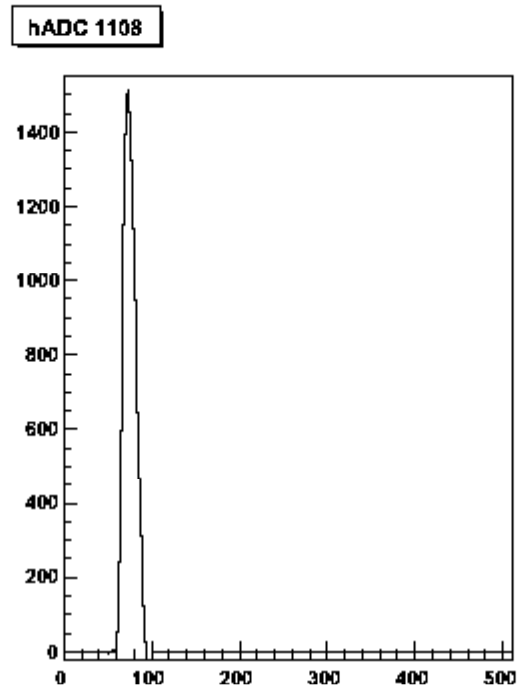
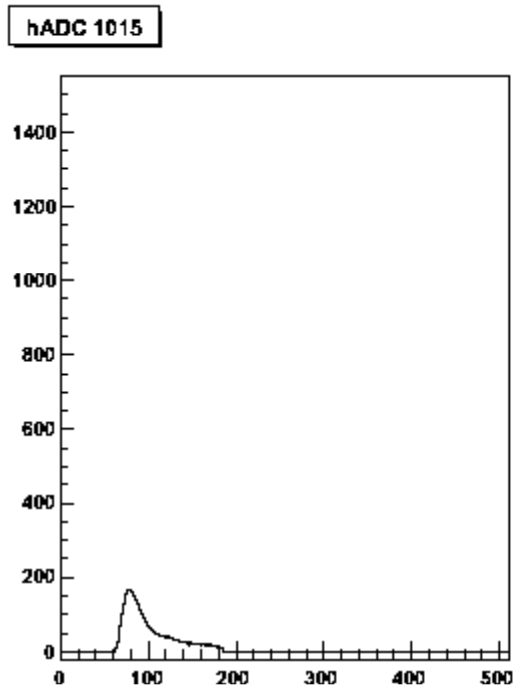


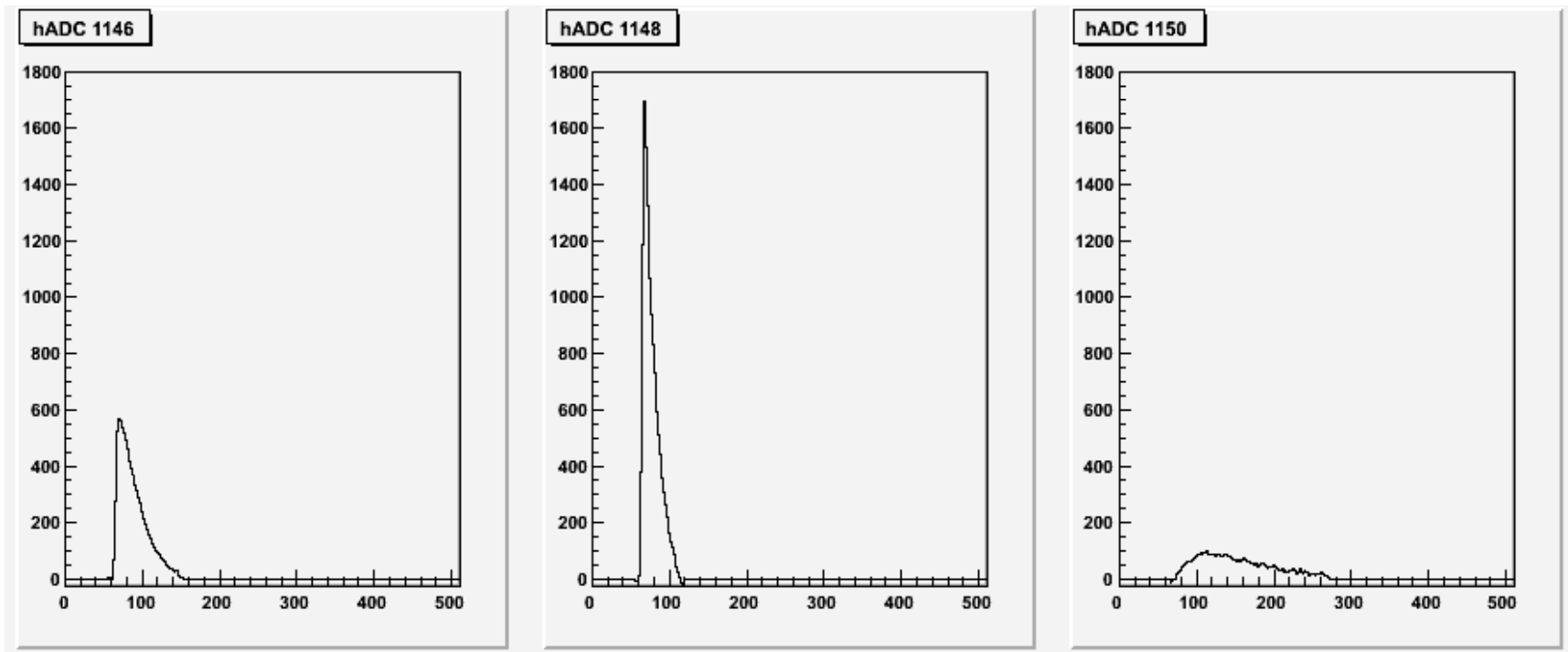
hPRF	
Entries	33160
Mean	0.02139
Mean y	0.3583
RMS	2.429
RMS y	0.3321
χ^2 / ndf	568.9 / 0
p1	6.539 : 4.512
p2	10.36 : 4.44
p4	0.15 : 0.09

$\Gamma = 7 \text{ mm}$
 $\delta = 10 \text{ mm}$

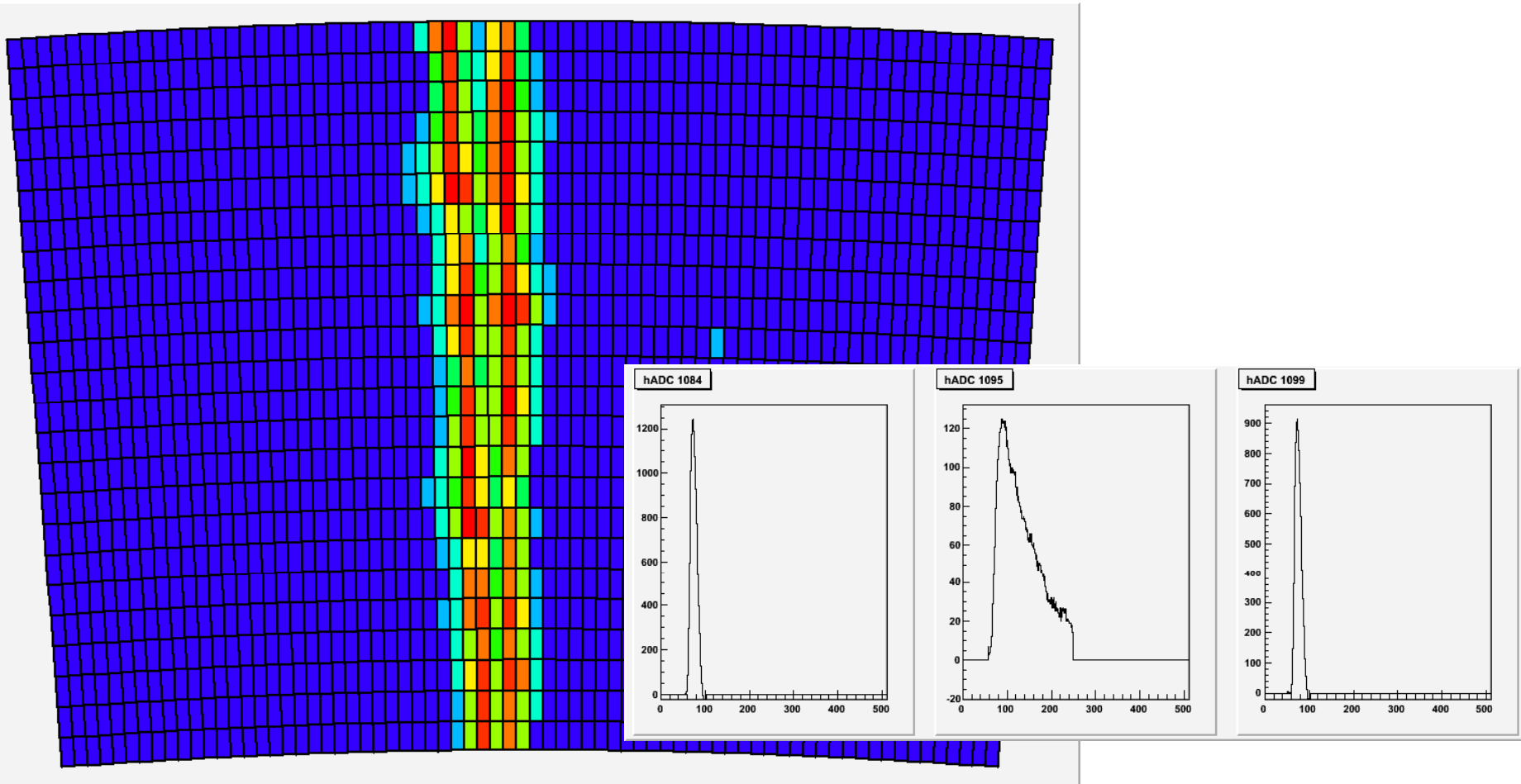
Electronics

- Very good results obtained with long shaping
- r.m.s. pedestals 3.5-4.5 (shaping) \rightarrow 9.5-12 (by-pass)

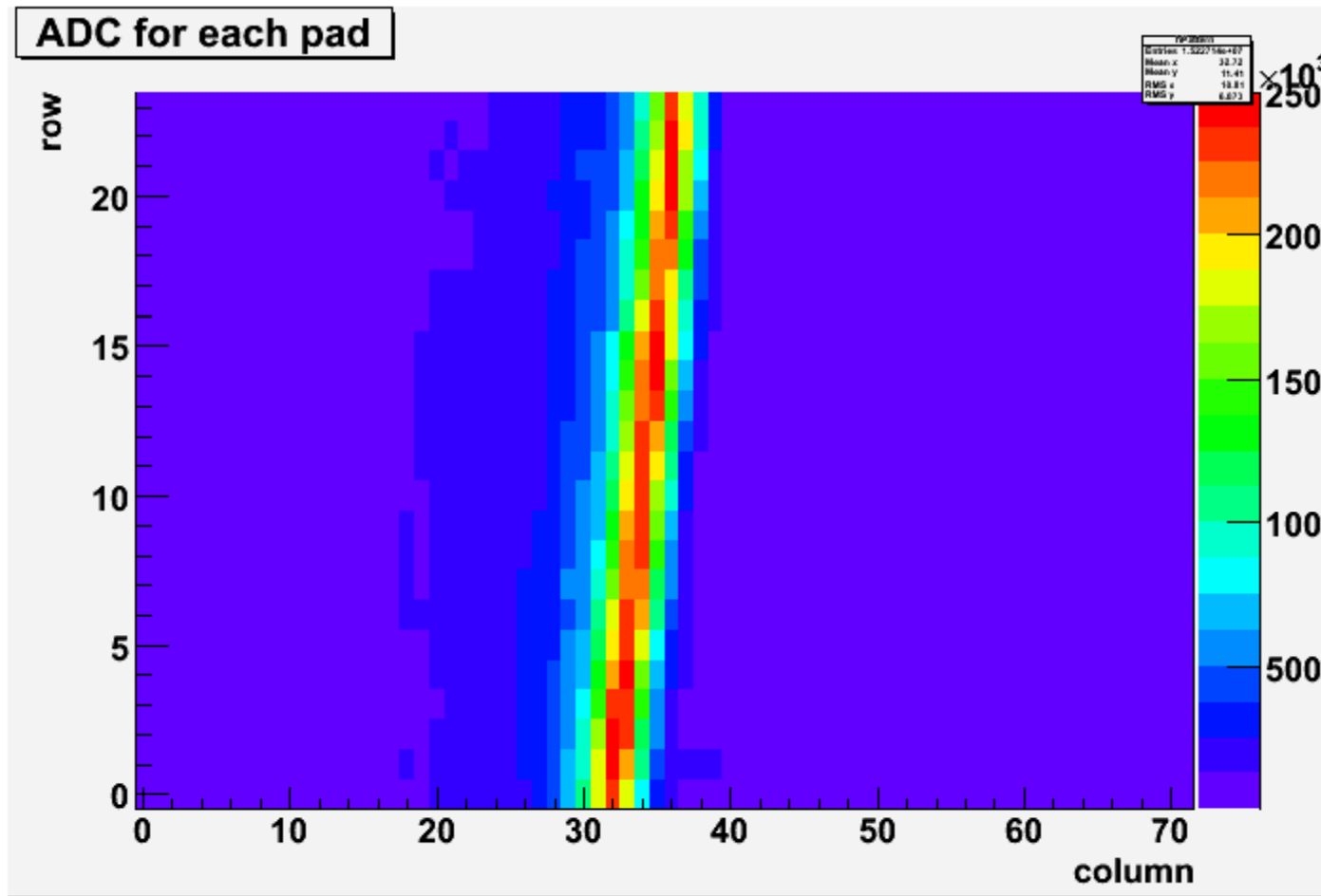




2-track separation



Large amount of data taken at $\phi = 0^\circ, 5^\circ, 10^\circ$ and 15°



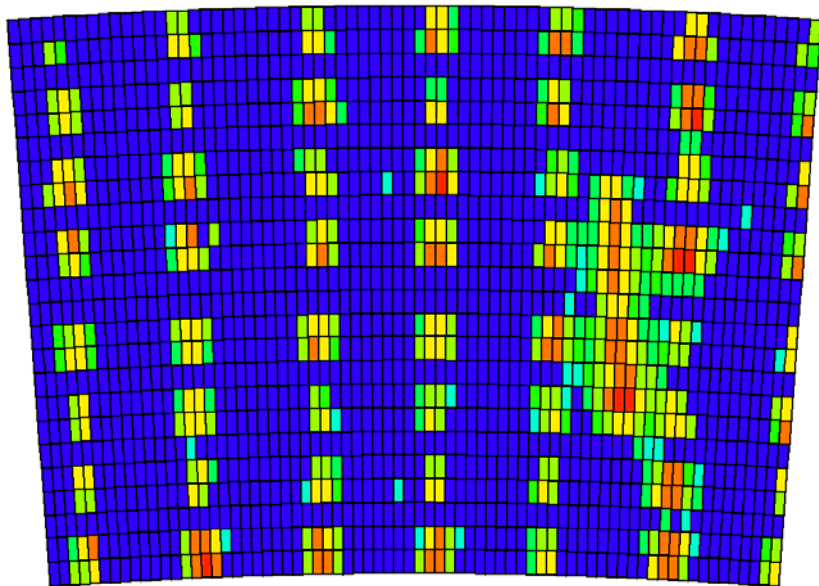
Laser run (see P. Conley's talk)

Took data at various laser energies, various z positions, disconnecting part of the termination plate or one of the dummies, shooting the beam at maximum rate and high gain, etc...

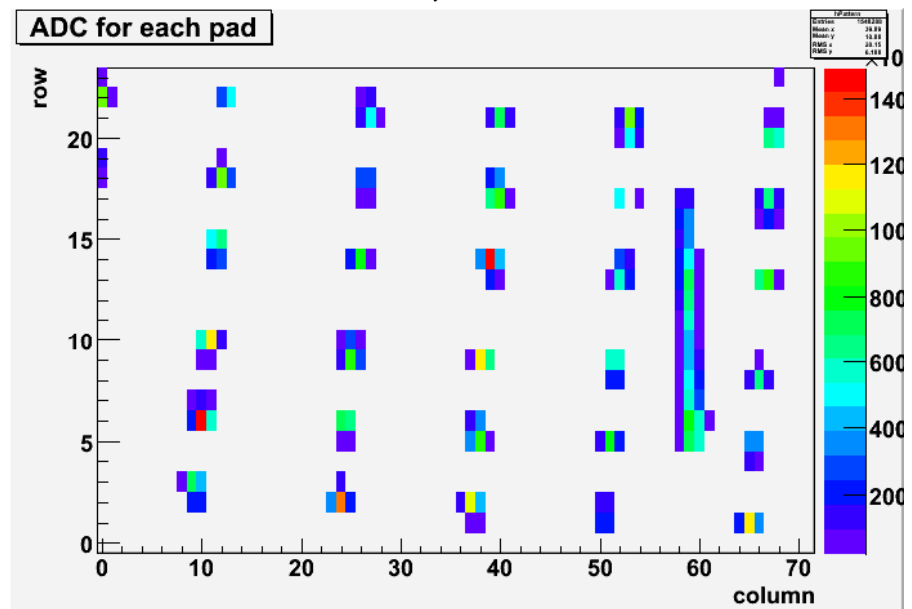
However the laser power supply seems to like low magnetic fields... see Patrick's talk

Ready to take more data early July if moving table and longer laser cables ready.

B=0, z=5 cm



B=1T, z=5 cm



Forthcoming tests

- Laser early July?? (depends on DESY)
- RD51 @ CERN October 22 and following days: high energy muons and hadrons in the Goliath magnet, using the testbox. Small z only but possibility to scan all beam positions, assess homogeneity.
- 5T test (power pulsing, charge collection, with SINR, Kolkotta)
- 7 modules in 2010 (well in progress, wafer received)