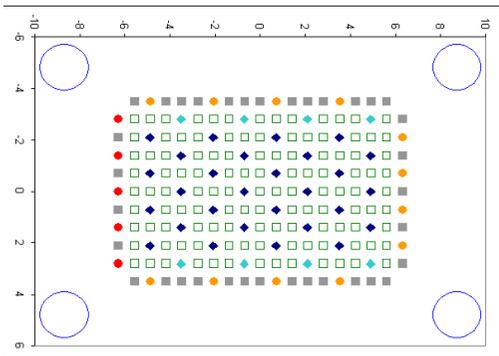


Update on
Lab activities @ LNF

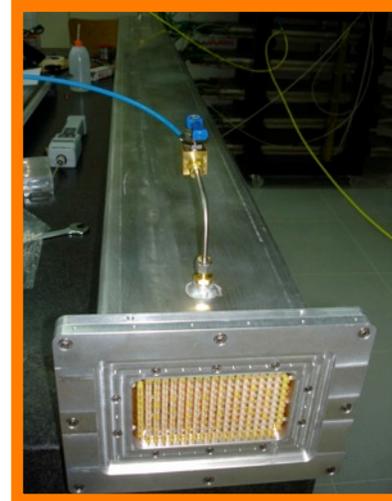
DCH-I Parallel session
1st SuperB Meeting – London, 13 September 2011

G. Finocchiaro - LNF



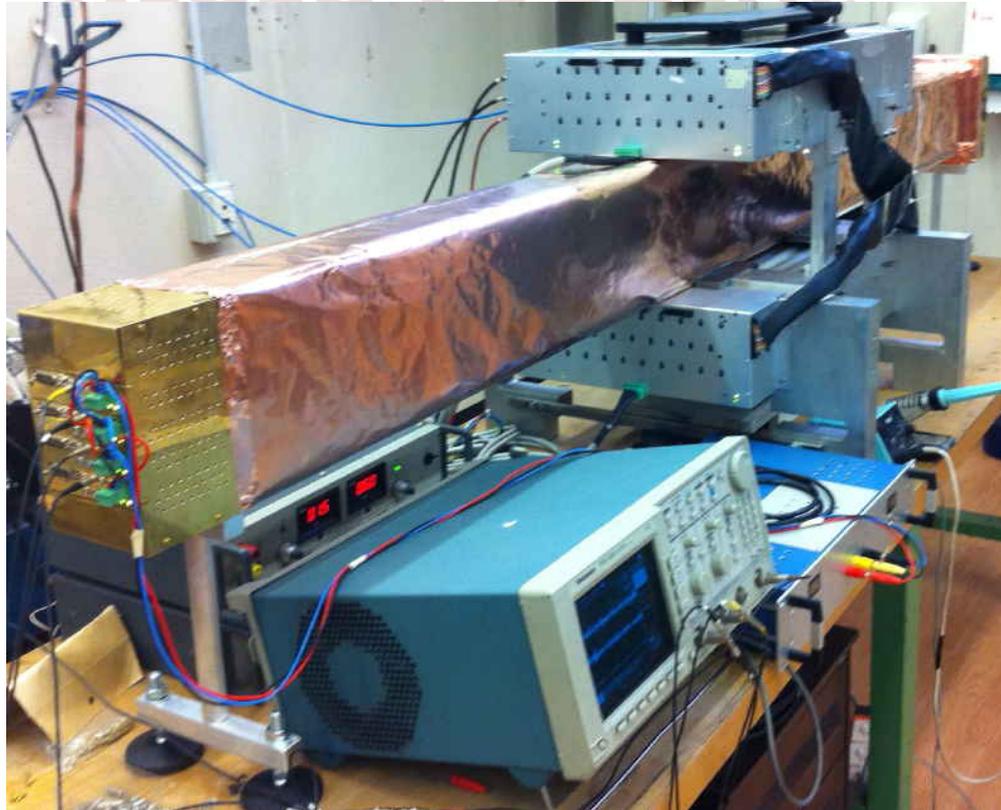
Prototype 2

- Full-length prototype to:
 - study cluster counting under realistic conditions (discrete-cathode cells, L=2.5m)
 - serve as a test bench for the final FEE
 - test implementation of 1st level DCH trigger Track Segment Finding
 - Read-out boards provide independent analog output for the trigger system



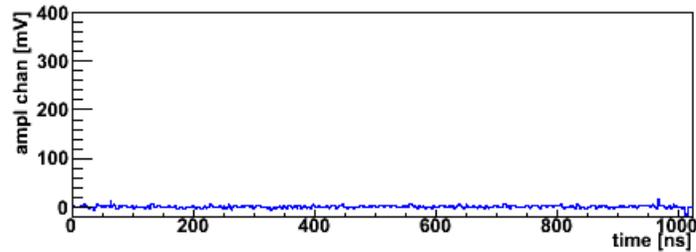
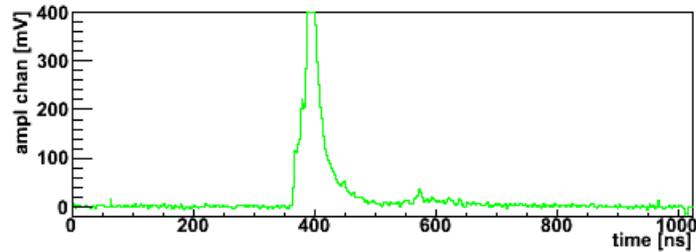
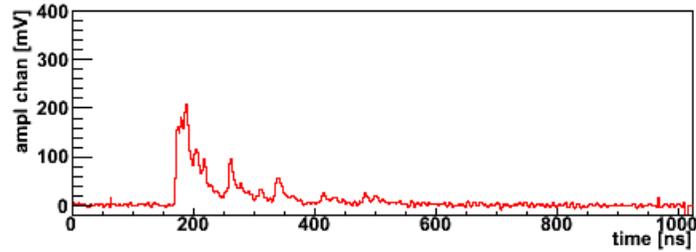
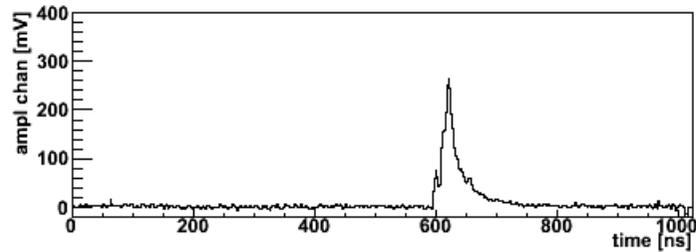
- 28 square cells (1.4cm side, Rfs=3:1), on 8 staggered layers (3-4-3-4-3-4-3-4 cells)

Proto2 Status



- All HV distribution and read-out boards commissioned
- Inserted inside the tracking telescope
- Still only 4 channels read-out at the moment, with DRS4 evaluation board

Sample waveforms

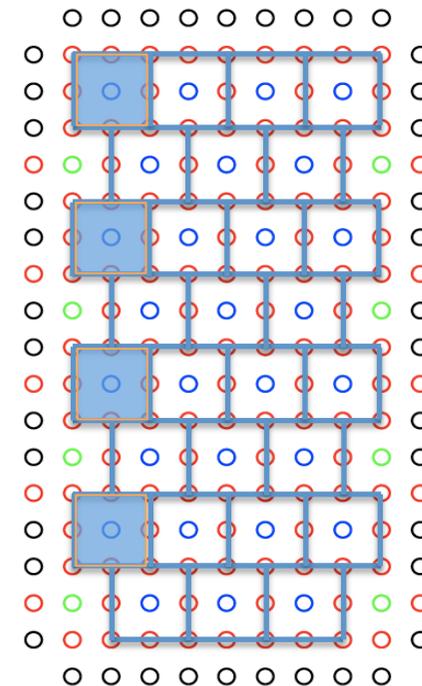


90%He-10% iC_4H_{10}

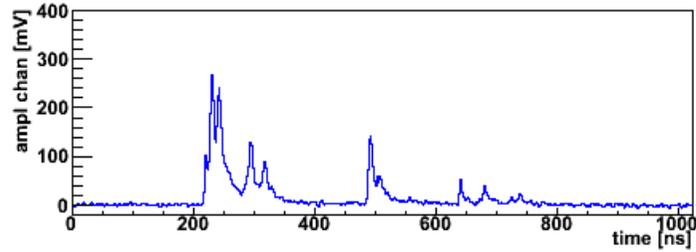
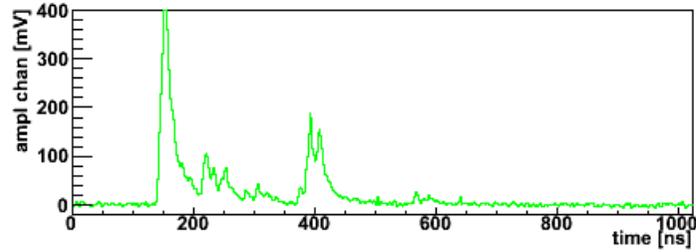
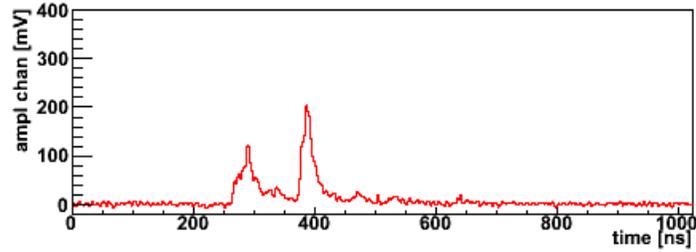
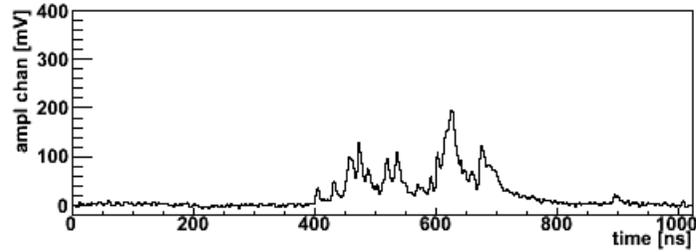
HV=1775V

Run "A"

"#1 cells"



Sample waveforms

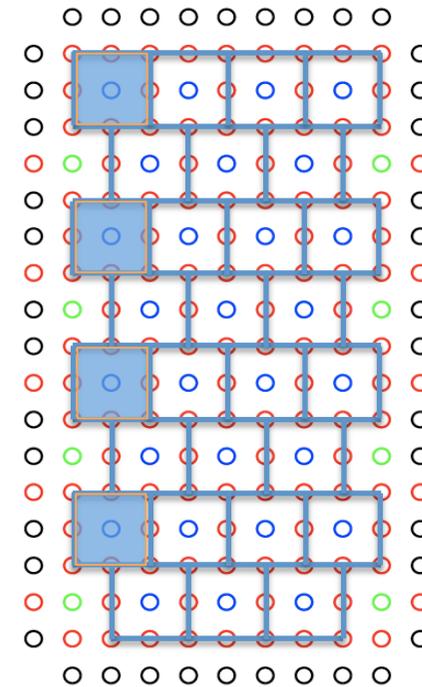


90%He-10%iC₄H₁₀

HV=1775V

Run "A"

"#1 cells"

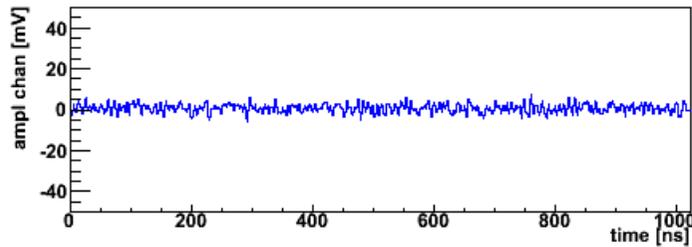
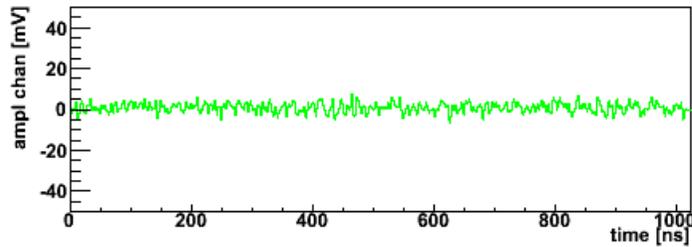
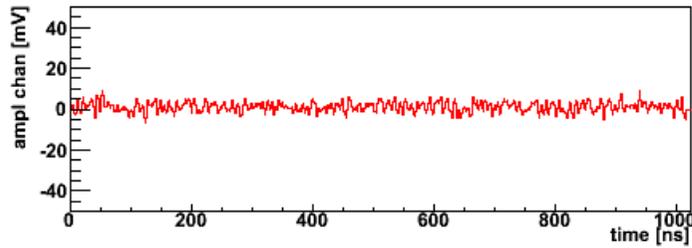
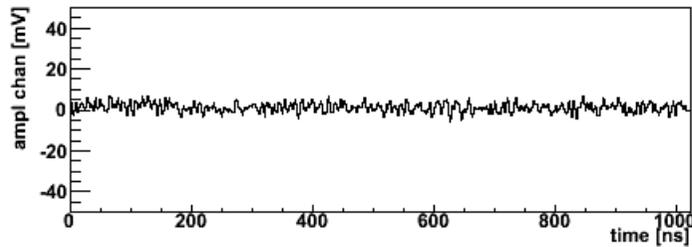


Sample waveforms – noise level

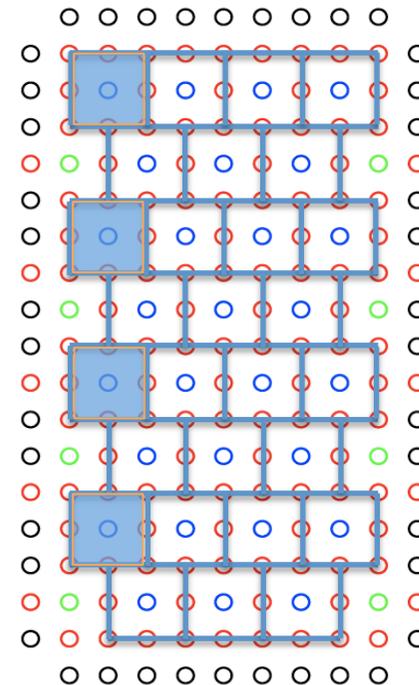
90%He-10% iC_4H_{10}

HV=1775V

Run "A"



"#1 cells"

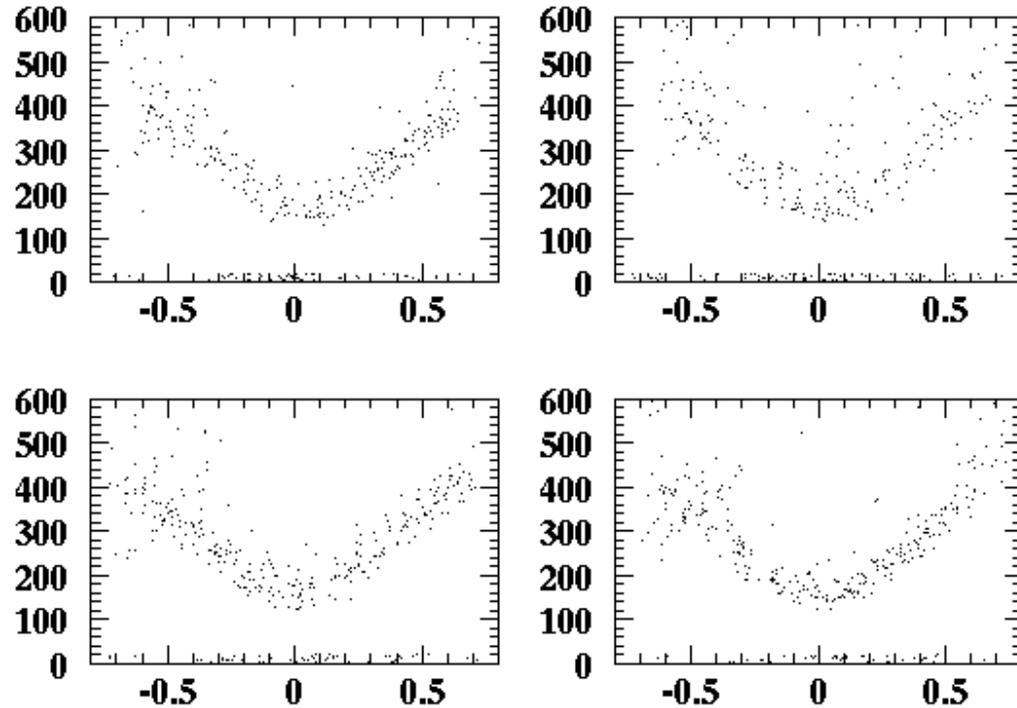


Preliminary space-time relations

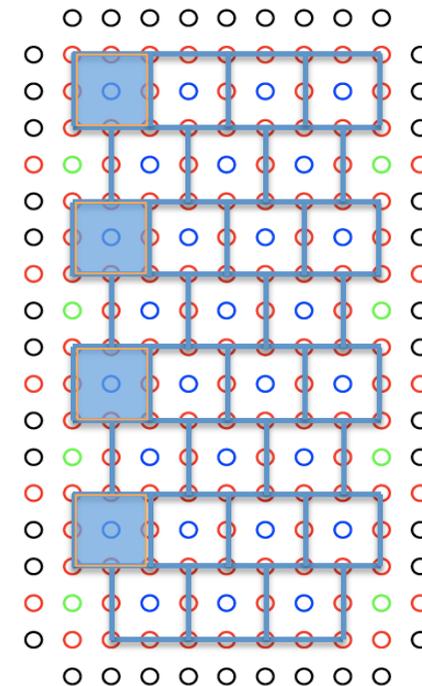
90%He-10% iC_4H_{10}

HV=1775V

Run "A"



"#1 cells"



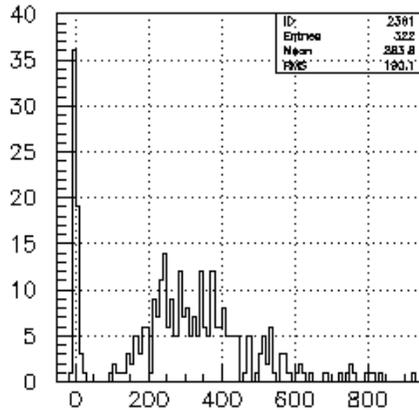
- 5.5mV threshold to determine the time of the 1st electron

Integrated amplitude

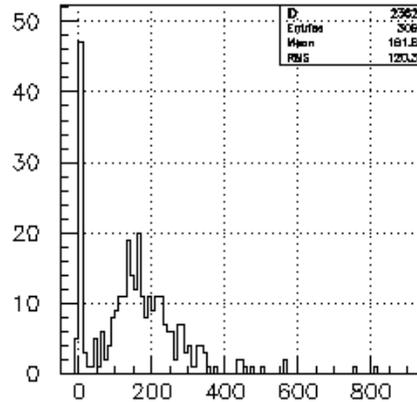
90%He-10% iC_4H_{10}

HV=1775V

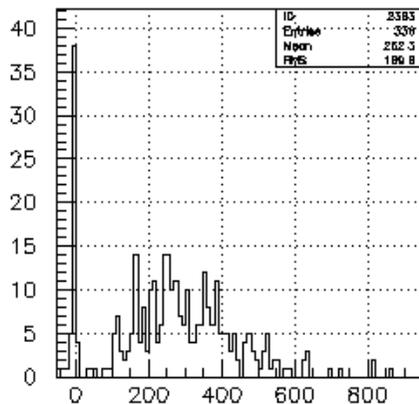
Run "A"



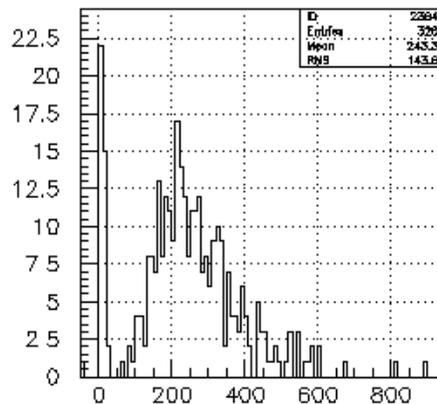
amplitude on cell



amplitude on cell

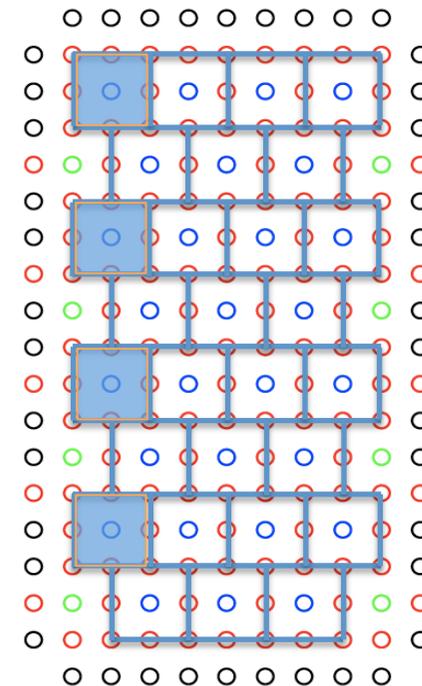


amplitude on cell



amplitude on cell

"#1 cells"

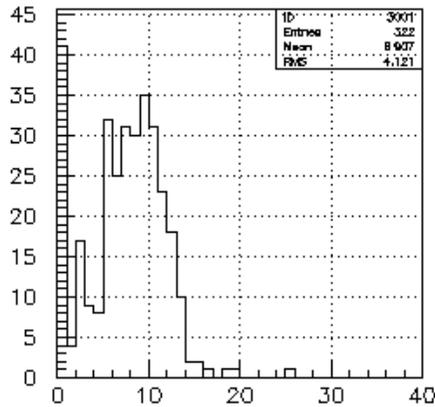


Clusters from “threshold algorithm”

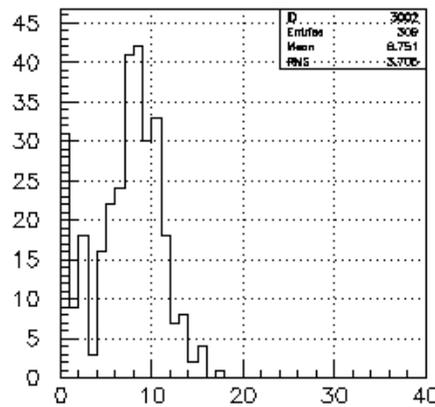
90%He-10% iC_4H_{10}

HV=1775V

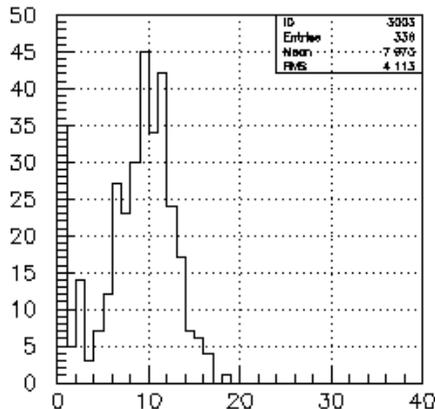
Run “A”



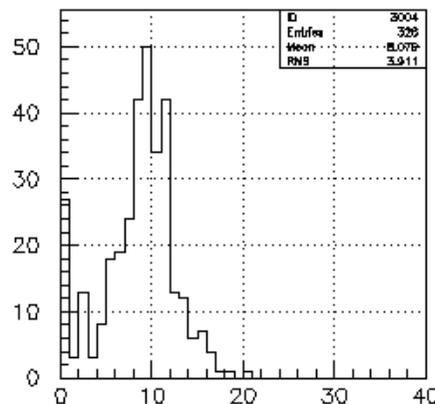
nclus ch1



nclus ch2

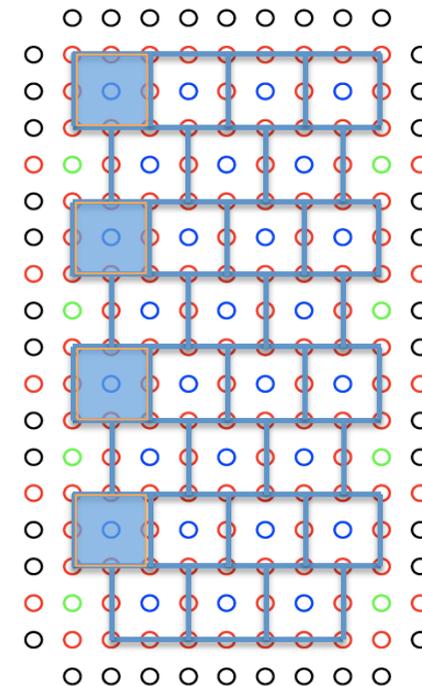


nclus ch3



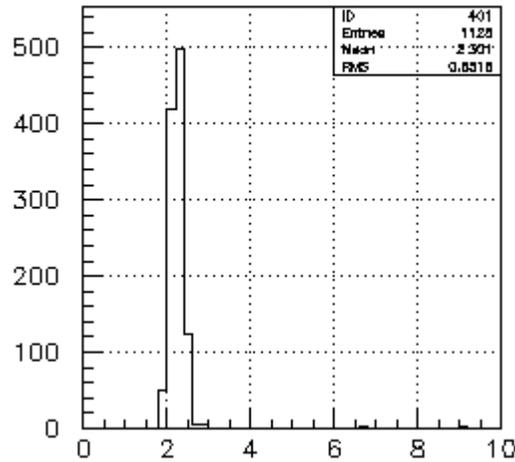
nclus ch4

“#1 cells”

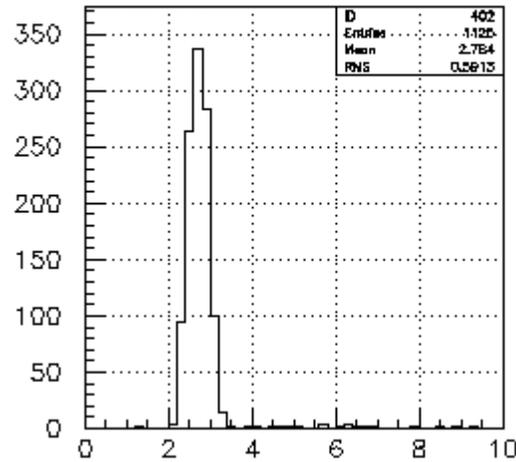


The "cut variable"

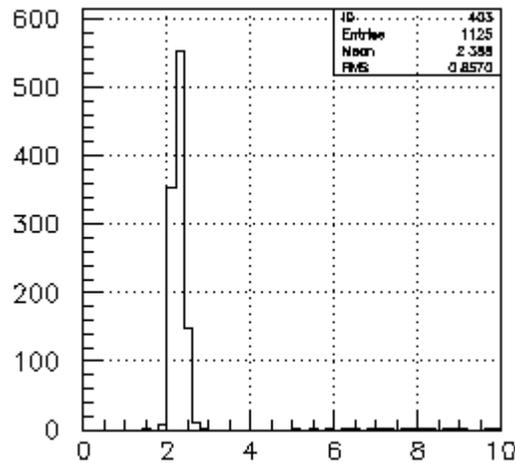
1 1 6 . . . C 0 1 1 1 1 0 1 1 6 . . .



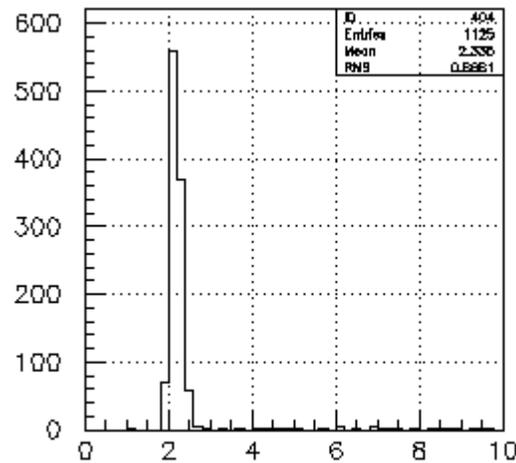
rms cut ch1



rms cut ch2



rms cut ch3



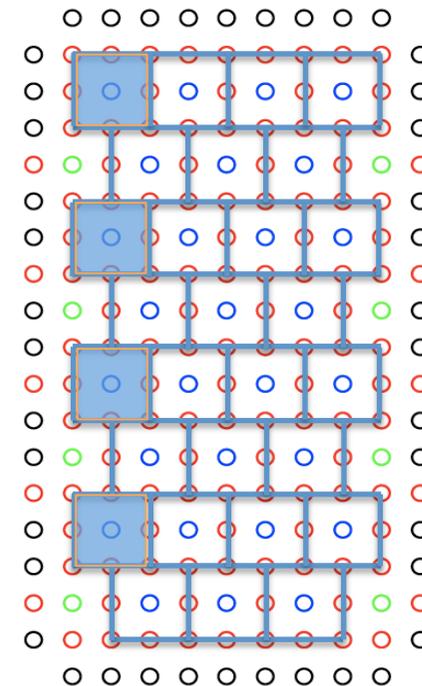
rms cut ch4

90%He-10% i C₄H₁₀

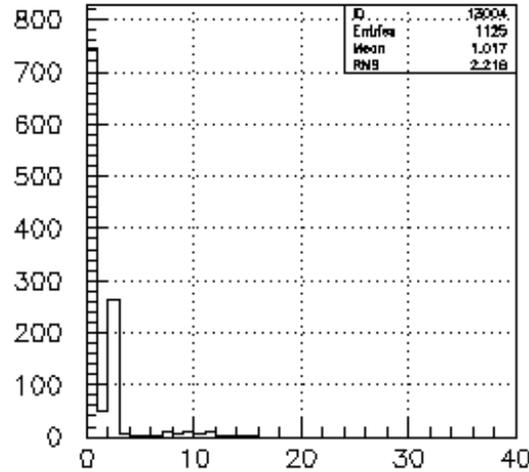
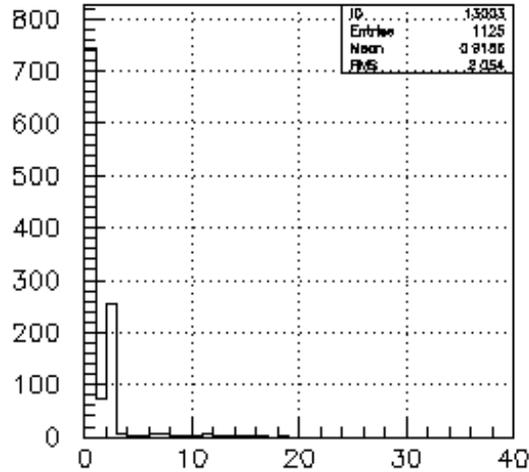
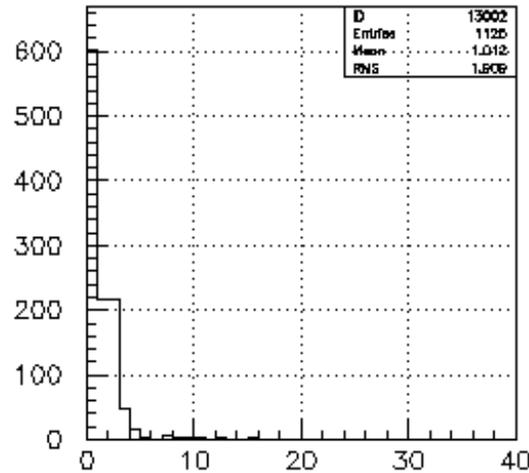
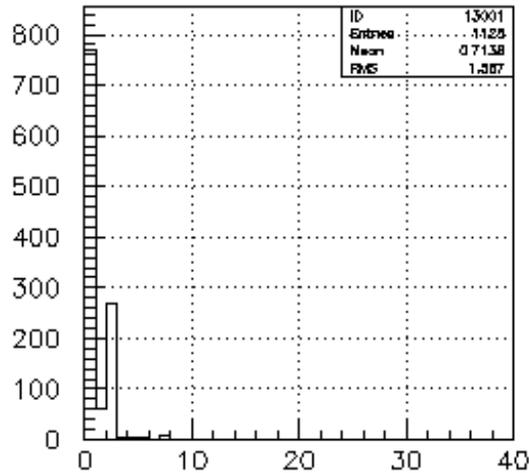
HV=1775V

Run "A"

"#1 cells"

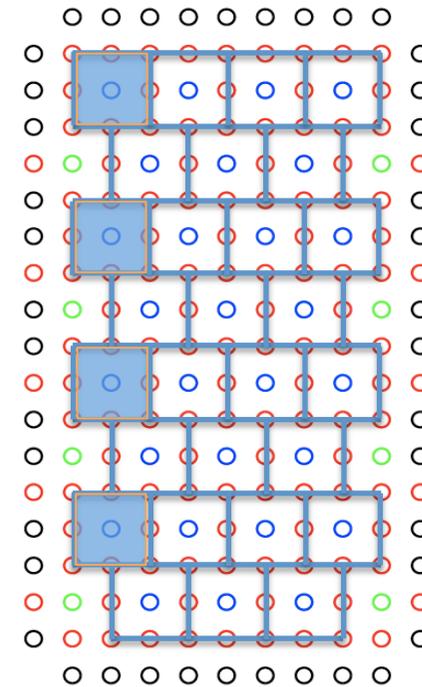


Spurious clusters



90%He-10% iC_4H_{10}
 HV=1775V
 Run "A"

"#1 cells"



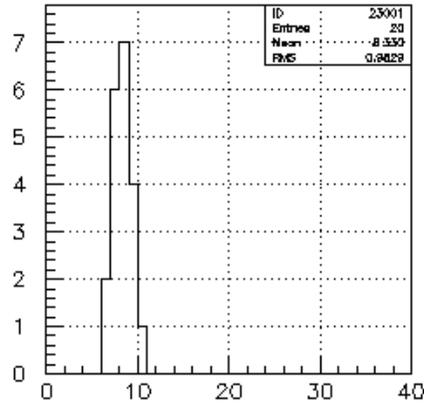
- Clusters found when track $|DOCA| > 3\text{cm}$
 - proto2 cells $\in [-2.8, +2.8]\text{ cm}$

Clusters: simulating 10-cell tracks

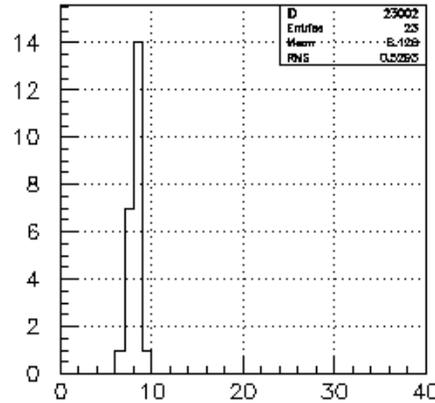
90%He-10%iC₄H₁₀

HV=1775V

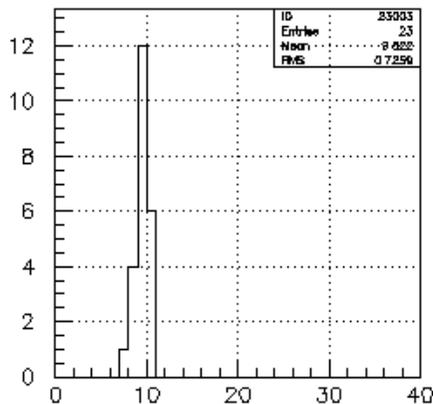
Run "A"



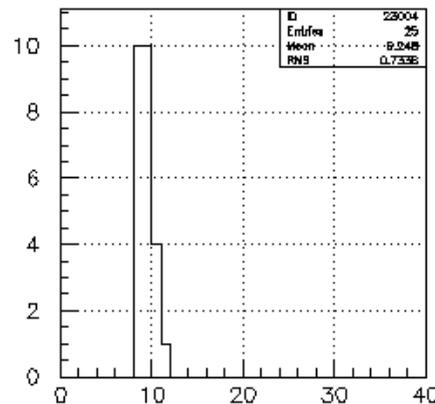
nclus anal aver



nclus anal aver

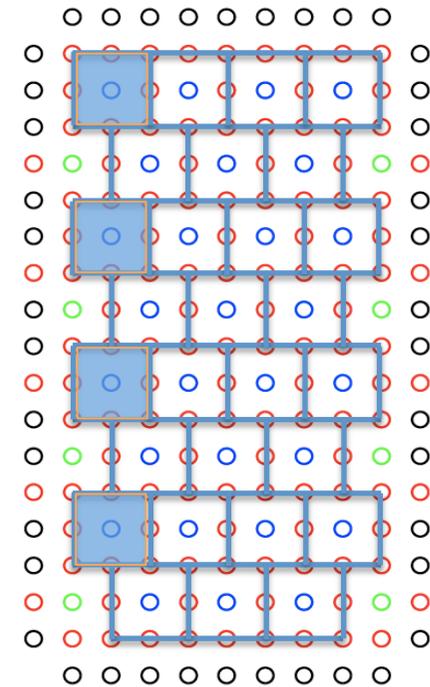


nclus anal aver

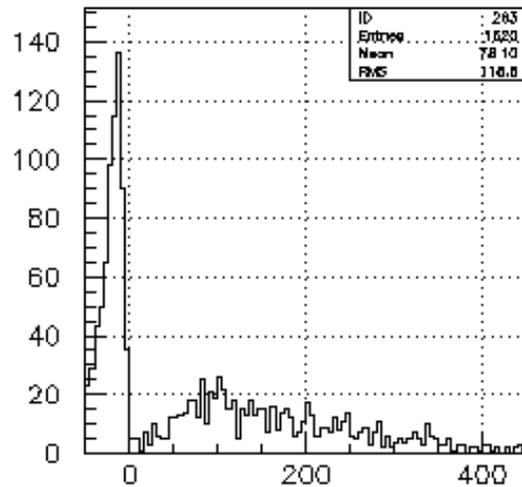


nclus anal aver

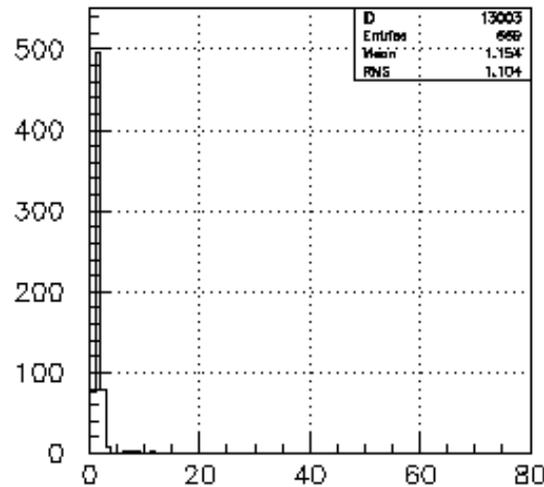
"#1 cells"



What we had on the 17mm-Brass Tube

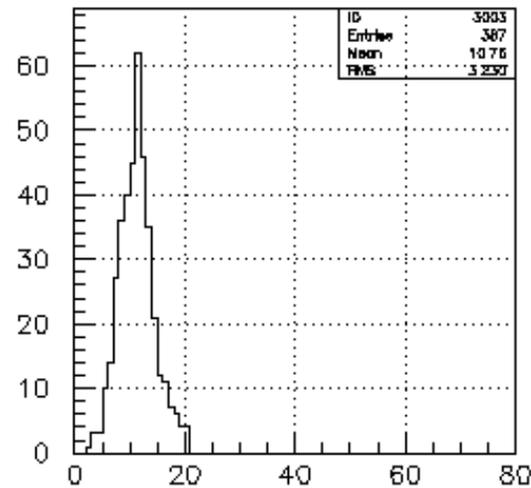


amplitude

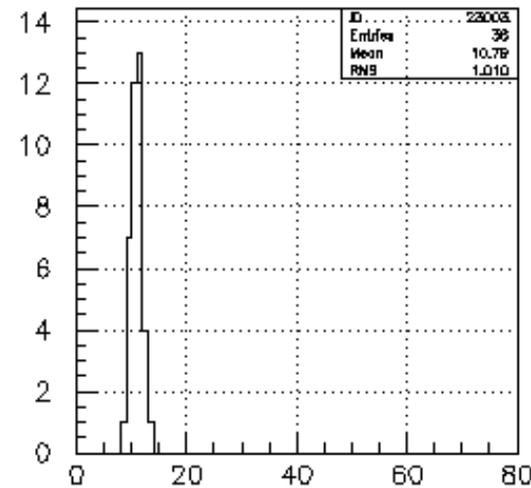


nclus anal back

@ HV=1575V



nclus anal



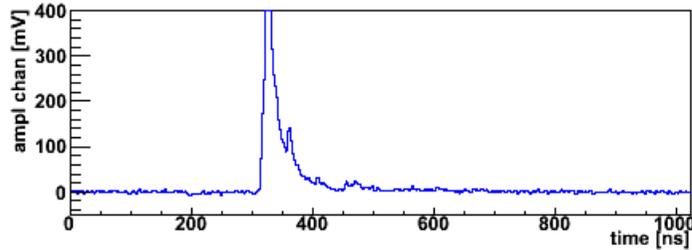
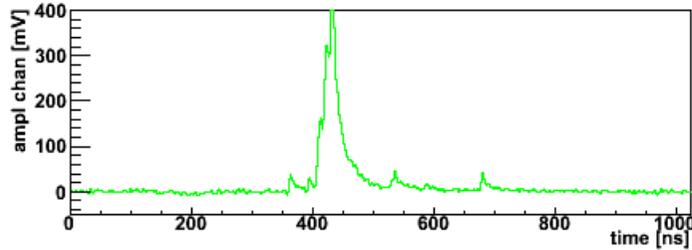
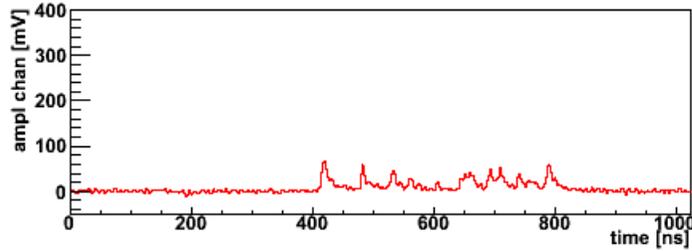
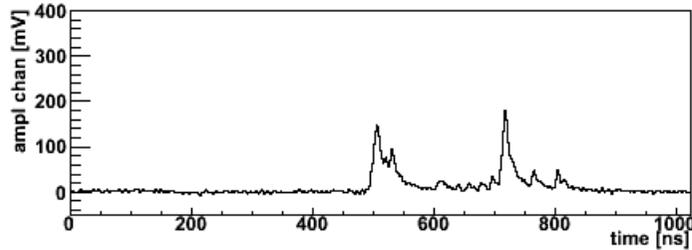
nclus anal aver

Sample waveforms – a different run

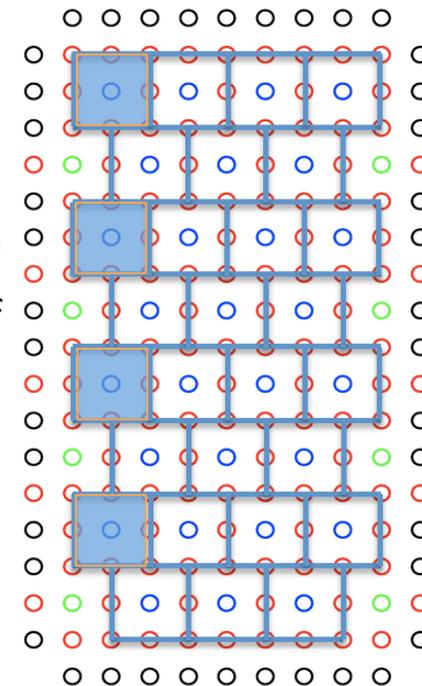
90%He-10%iC₄H₁₀

HV=1775V

Run "B"



"#1 cells"



Amplification of board #2 looks way too low

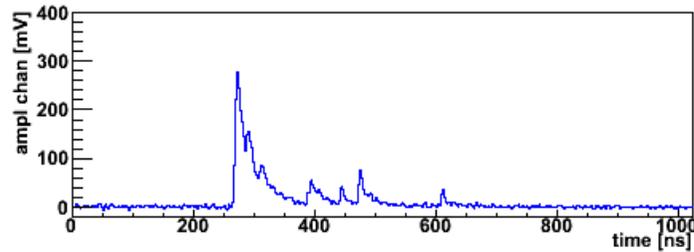
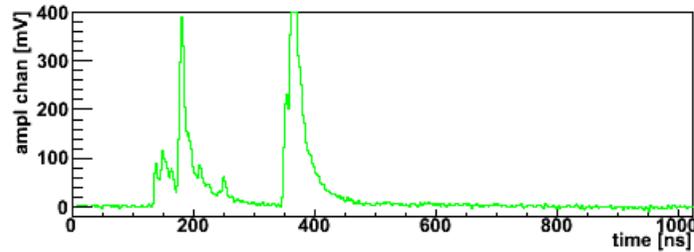
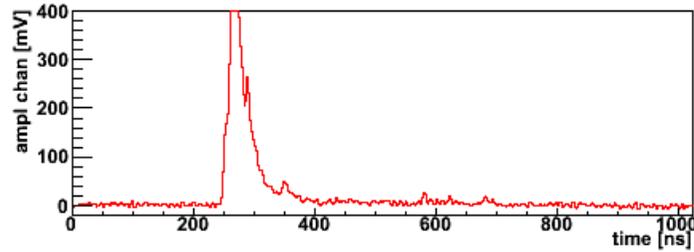
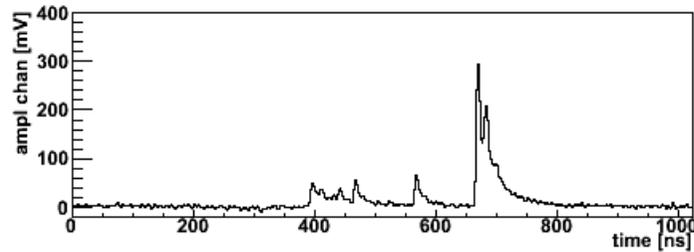
Sample waveforms

2awp16 ma610lw2

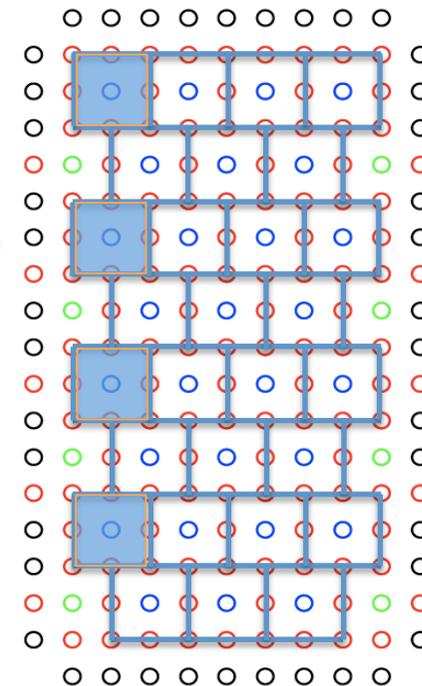
90%He-10%iC₄H₁₀

HV=1775V

Run "B"



"#1 cells"

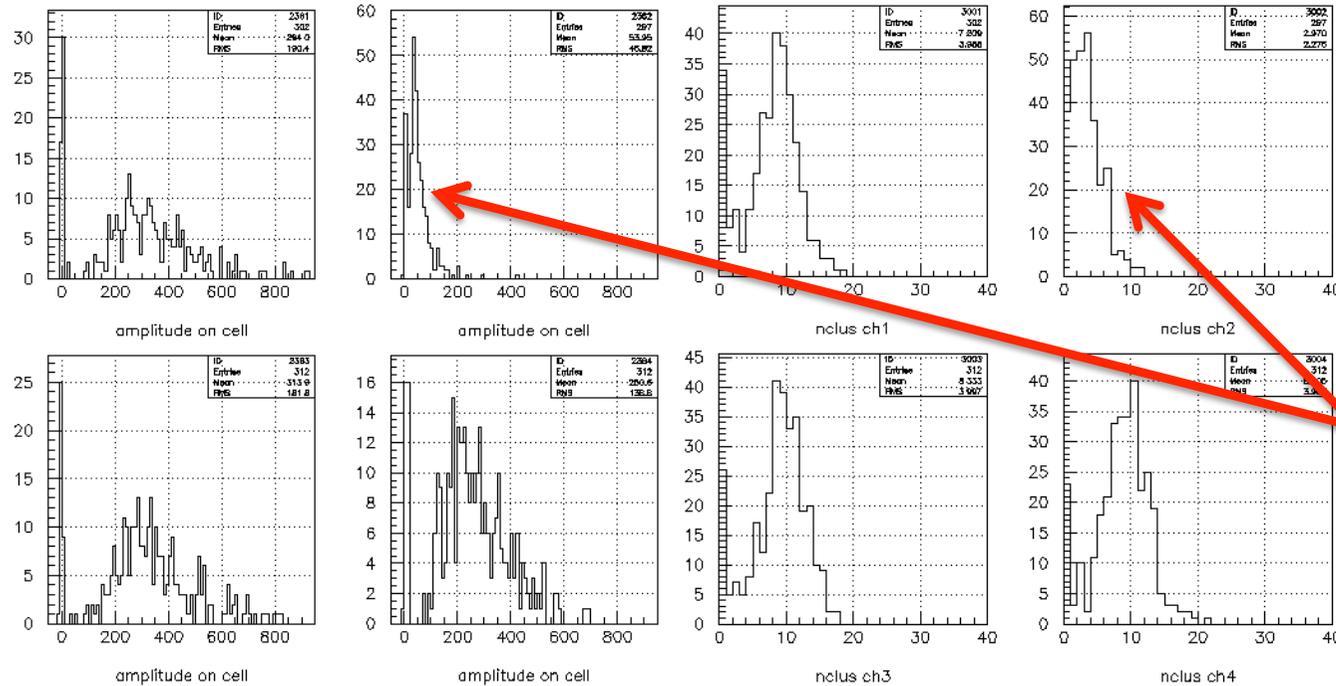


Integrated amplitude, counted clusters

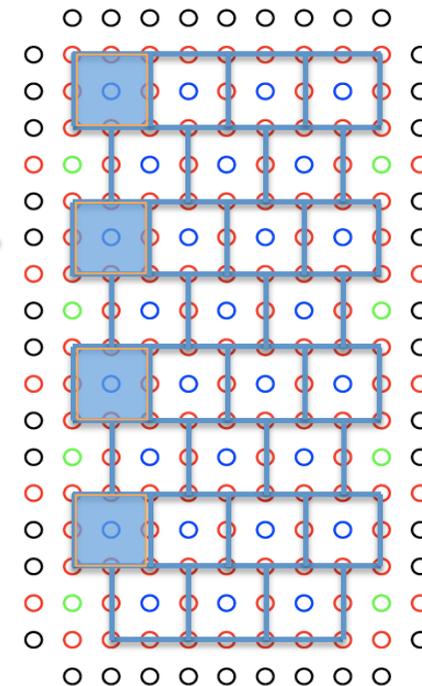
90%He-10%iC₄H₁₀

HV=1775V

Run "B"



"#1 cells"

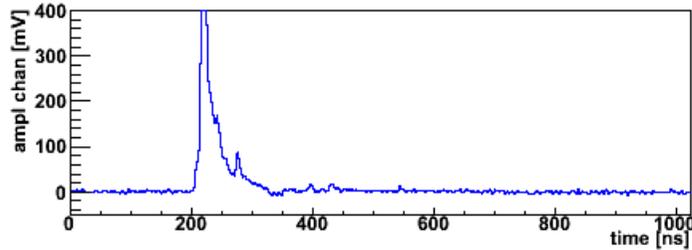
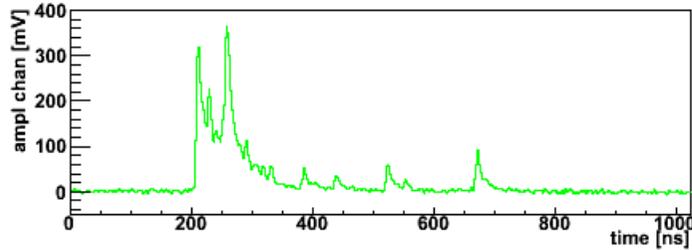
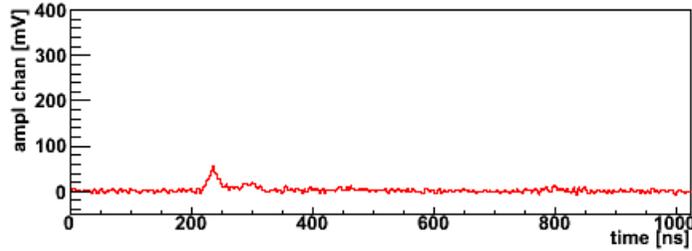
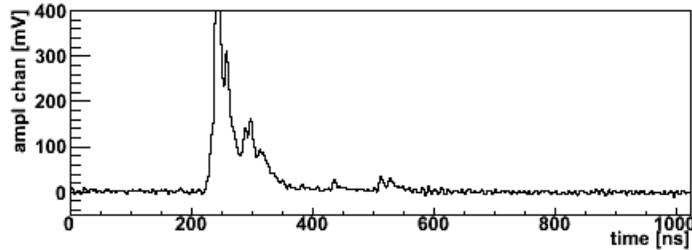


Sample waveforms – 4 different cells

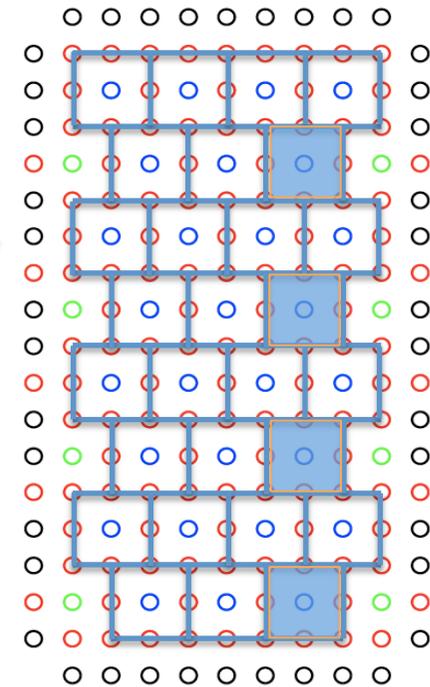
90%He-10% iC_4H_{10}

HV=1775V

Run "C"



"#7 cells"



Summary and Plans

- The commissioning of Prototype 2 is still ongoing
- Encouraging results from first data
 - e.g., noise level not as high as one could fear because of the full scale detector size (2.5m long wires, discrete cathode structure, 28 channels...), and faster preamps
 - roughly, the same (not high) cluster efficiency as in the square tubes
- Next steps
 - Fix problem with board #2
 - Precise alignment of proto2 and external tracker
 - Acquire all the 28 waveforms with CAEN VME module
 - Prepare setup with 2.5m long scintillators as trigger (anticipate increase of usable rate in proto2 by x10)
 - Prepare rotating support for test beam

Test Beam Plans

- One week of beam time at the BTF assigned on Nov 28th – Dec 4th
 - electron gun cathode not delivered to Frascati yet
- Financial request submitted to run a beam test in 2012
 - PSI? CERN? TRIUMF?