RD51 mm tracker & SRS/APV readout using mmDAQ/Recomm

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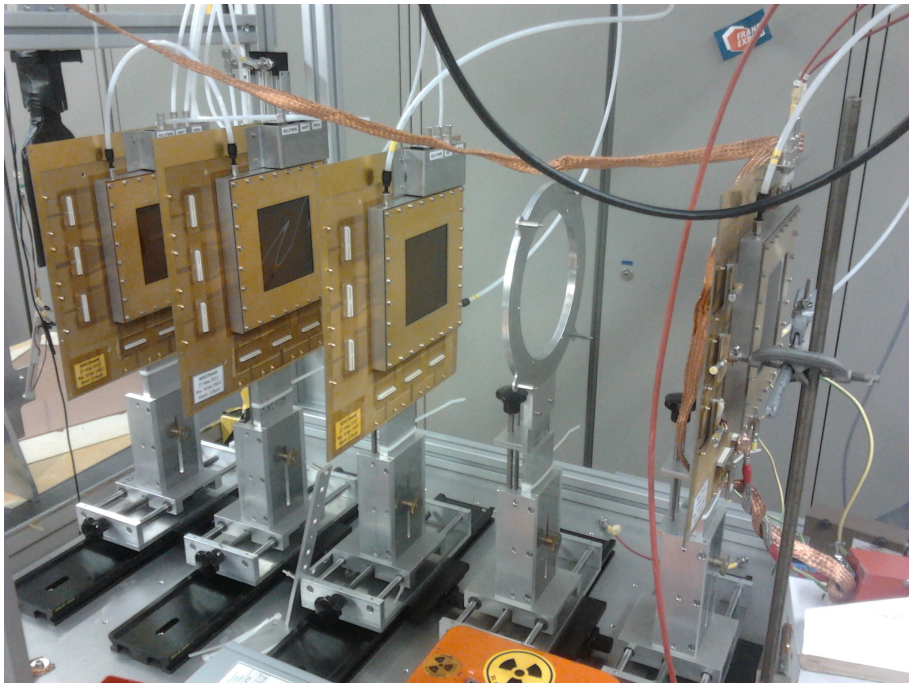
Contents

Contents

- Consists of 6 detectors ($RD51Tmmi, i = 2, 3, \cdots, 7$)
- 6 Resistive XY MicroMeGaS'
- 2 resistivities tested
  1. $1M\Omega/\square$
  2. $100k\Omega/\square$
- Mounted on an aluminum support structure



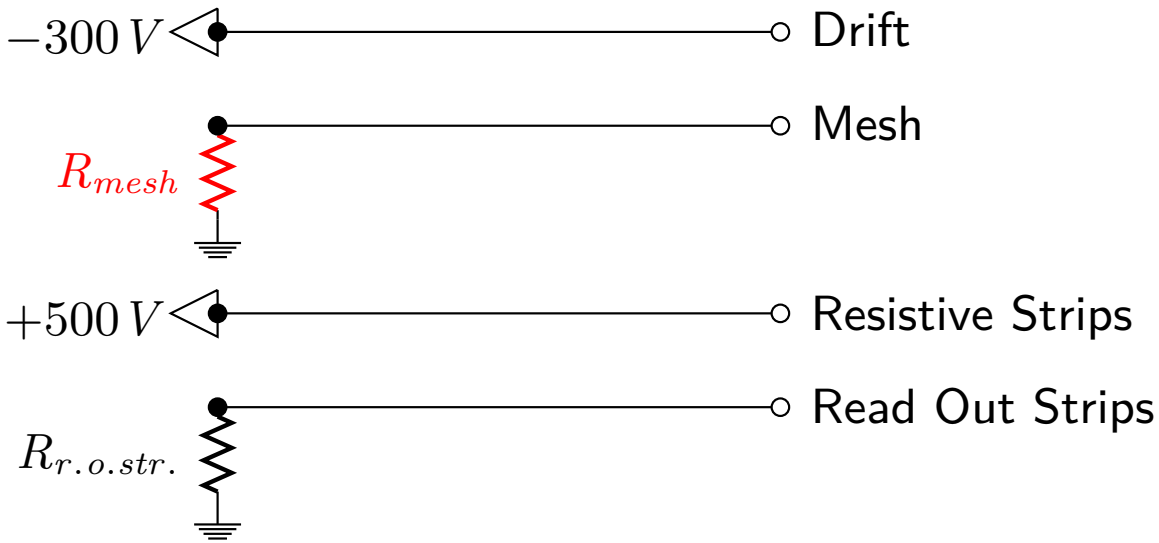
Cut Strips and Low Resistivity Strips

- June's Test Beam→mm4[1]:Leakage current between resistive and readout strips
- Couldn't be located in the lab→Set-up with strips disconnected
- **Problem**:readout strips not well isolated from the resistive strips
- **Guidance:**mesh + readout strips to ground during leakage current test.
- Low resistivity Strips for mm7 $(100k\Omega/\square)$

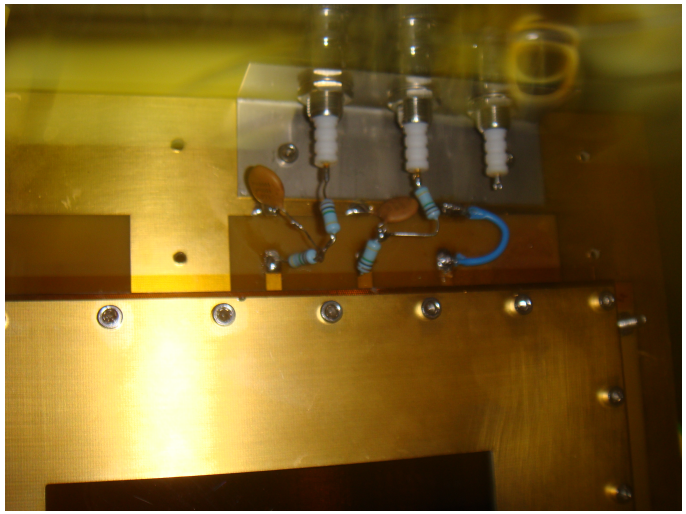
[1] not only

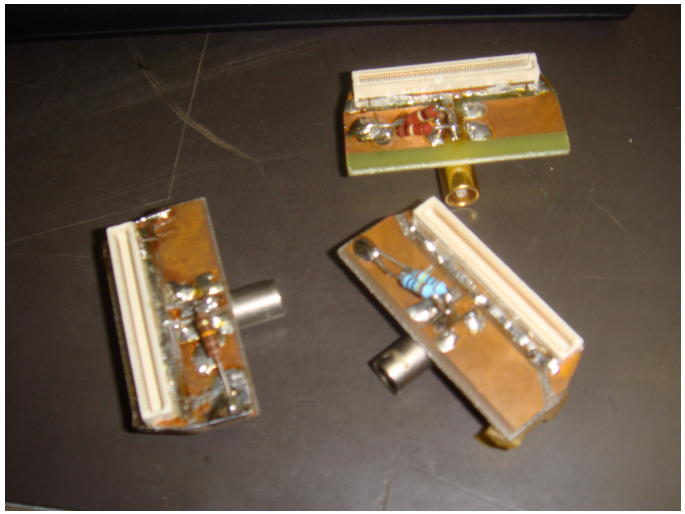
Contents

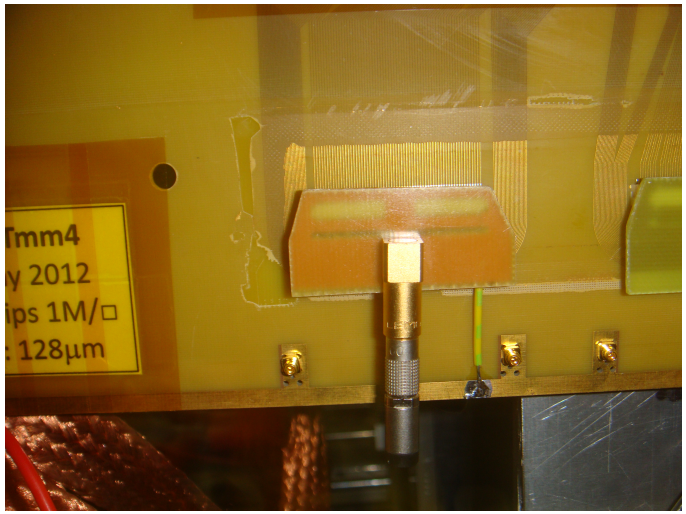
- Iron peak @$5.9\ keV\ (\sim 200e^{-})$
- MIPs' peak @$\sim \frac{1}{4} Iron\ peak (\sim 50e^{-})$
- Problem:Need for the best possible Signal/Noise optimization
- Solution:Best possible grounding, shielding, mesh grounding
- Guidance:Direct Grounding, zero-Ω terimation on unused readout strips and proper R_{mesh} (100Ω)

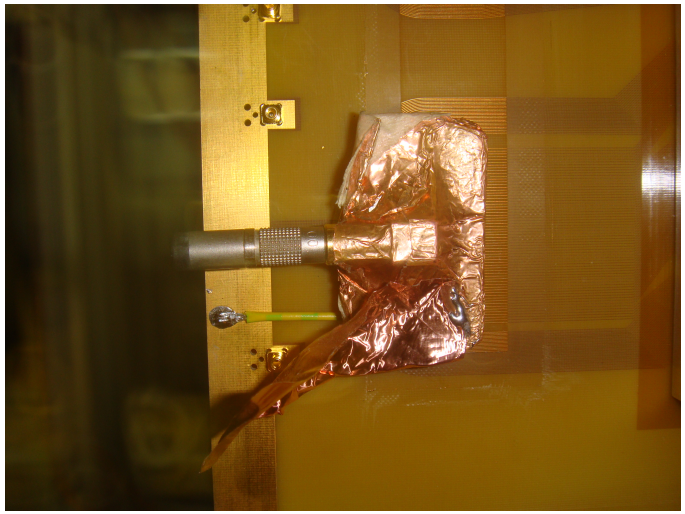


Singal/Noise Ratio optimization









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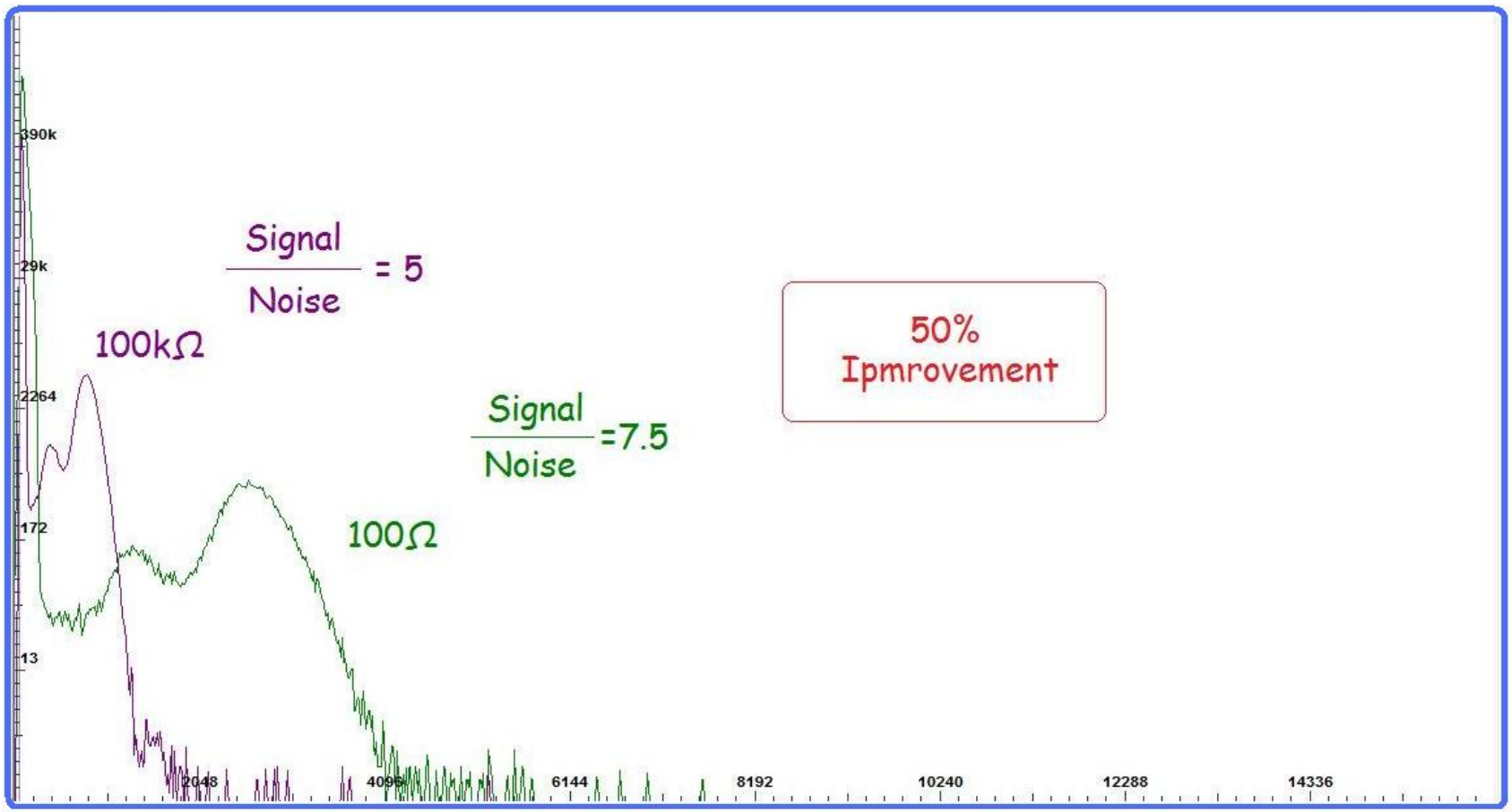
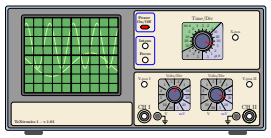
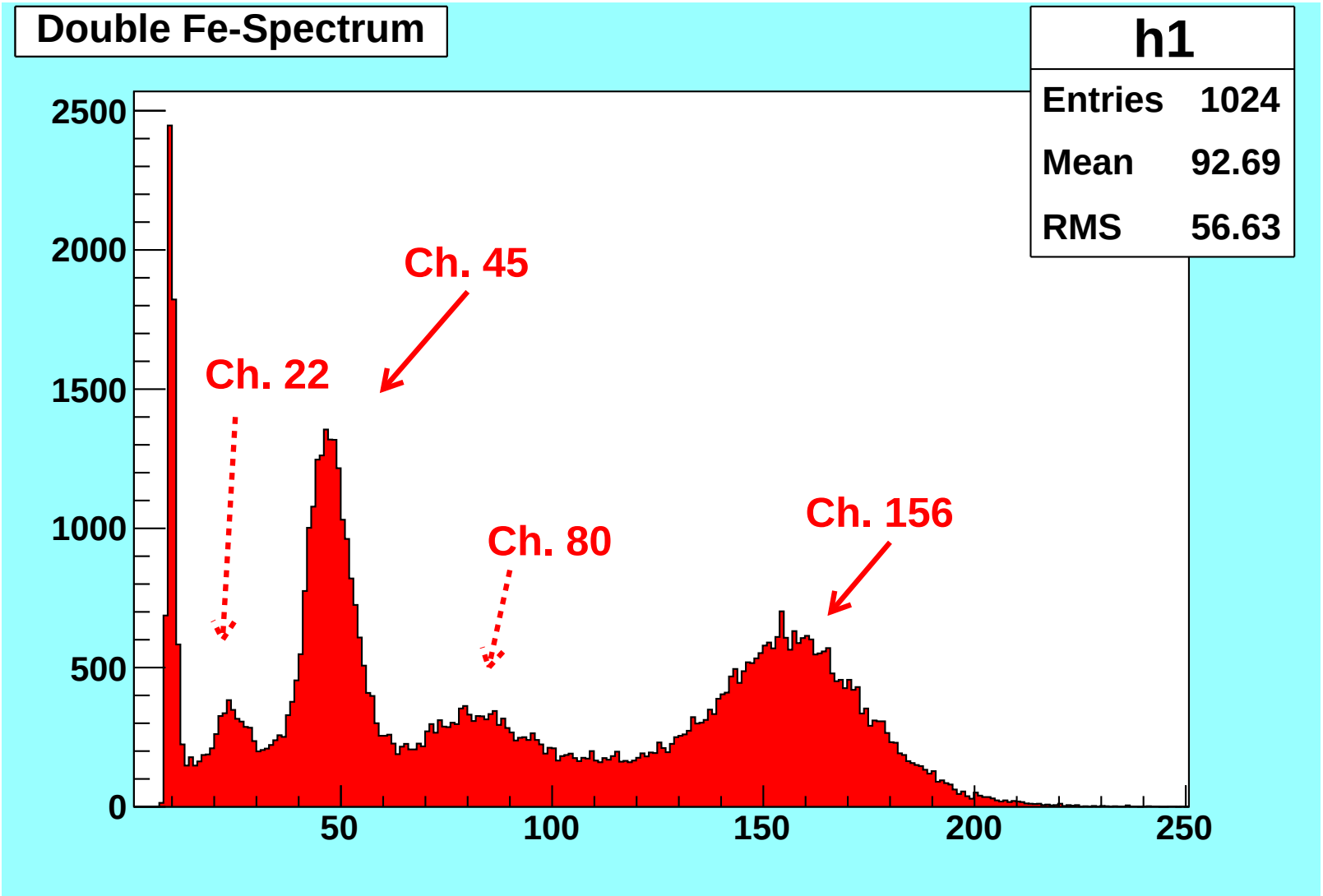


- Achieving lowest possible noise→Iron-55 Spectrum
- When source is located right above the readout strips
  2 signals on the scope

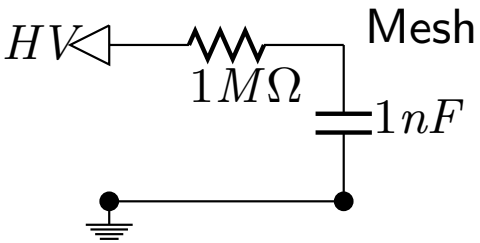


- Fe and Ar :Ar signal is not clear...
- Just to check: move source from center
- Expected behaviour
  - Lower Rate(fewer $x-rays$ will reach the read out plane)
  - Same Pulse Height(Energy released cannot differ)
- Observed behaviour
  - Lower Rate(Not a surprise)
  - Lower Pulse Height
- We definitely(let alone desperately) need an MCA spectrum...

Proper low filter



- Our low-pass filter



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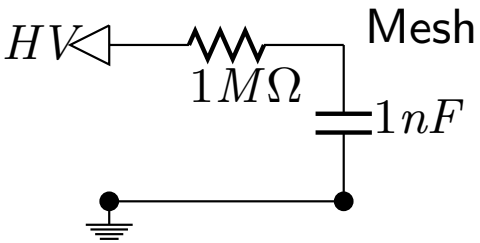
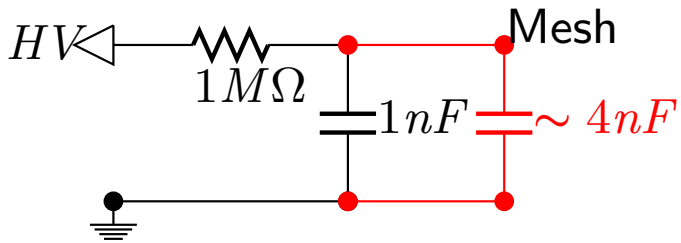
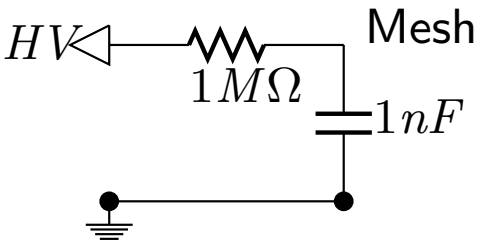
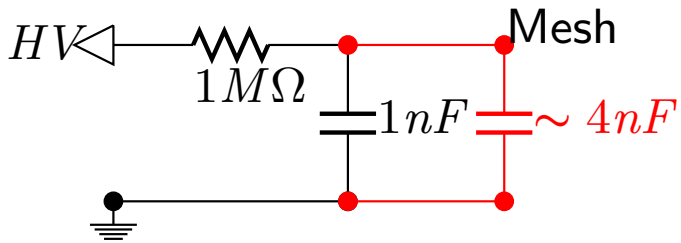


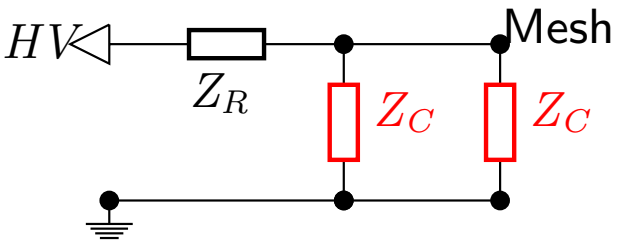


- Our low-pass filter



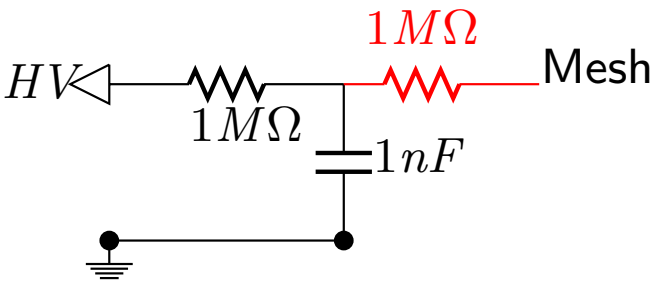


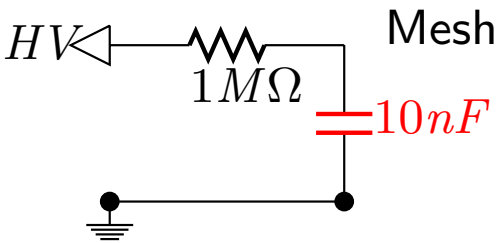
- In frequency domain



- $Z_C = 1/j\omega C$
- Impedance Missmatch
- Reflections between complex impedences

- Solution: $\begin{cases} R-C-R\ Filter \\ R-C\ Filter\ (C \gg C_{mesh}) \end{cases}$



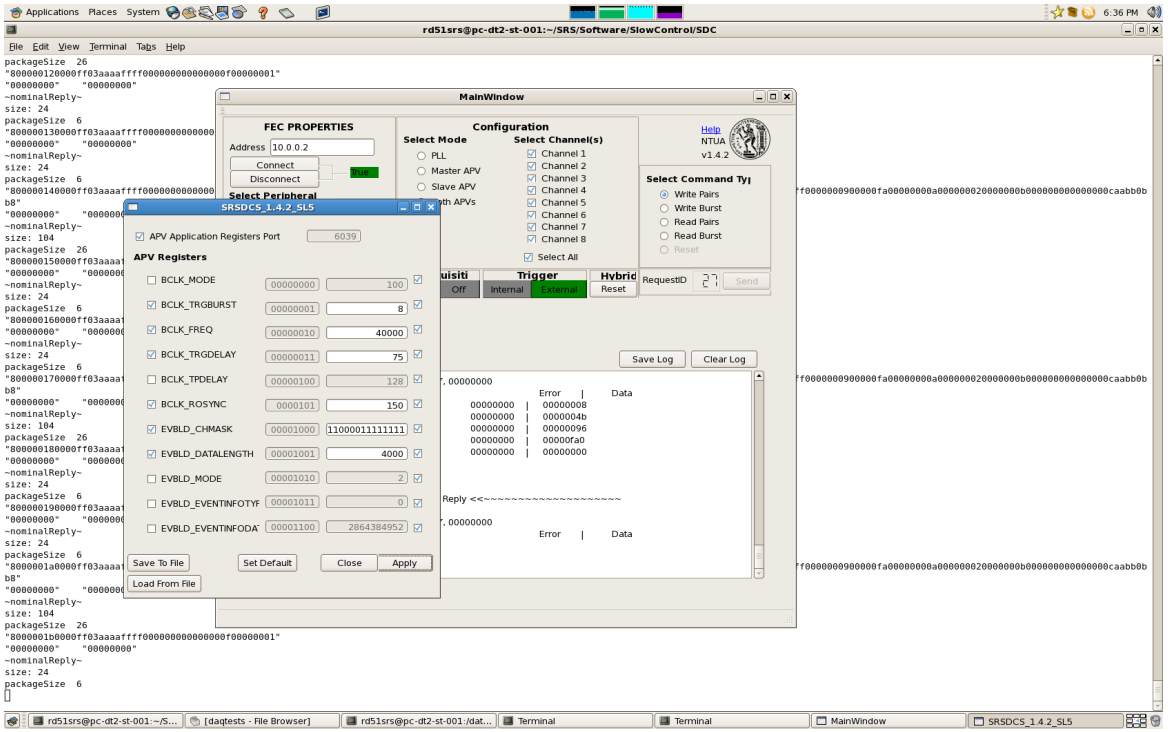


- Could be worse due to propably sharp oscillations
- Could be better due to slower collection

Contents

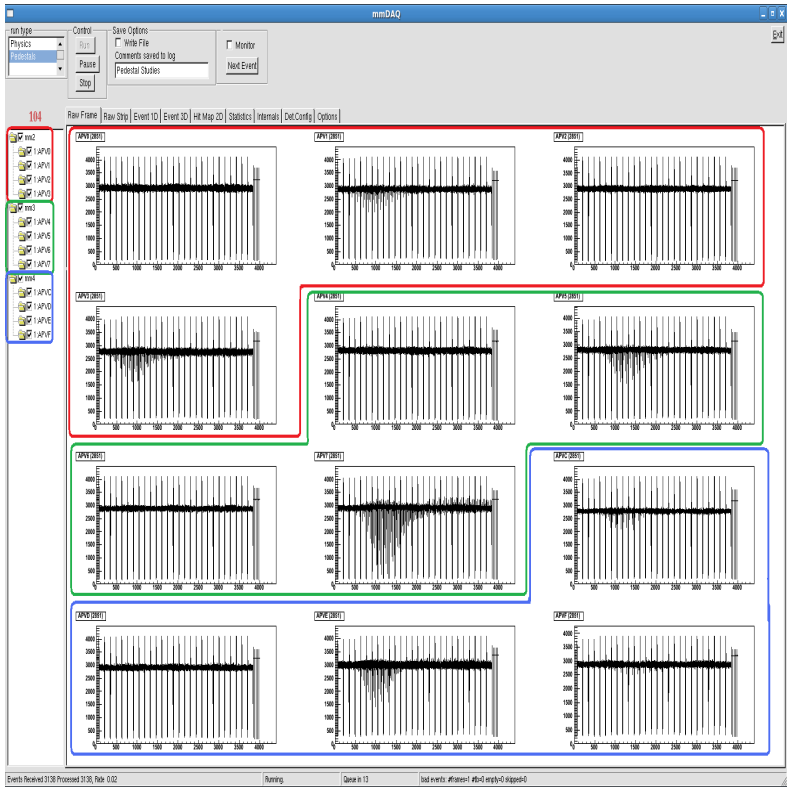
Configuration

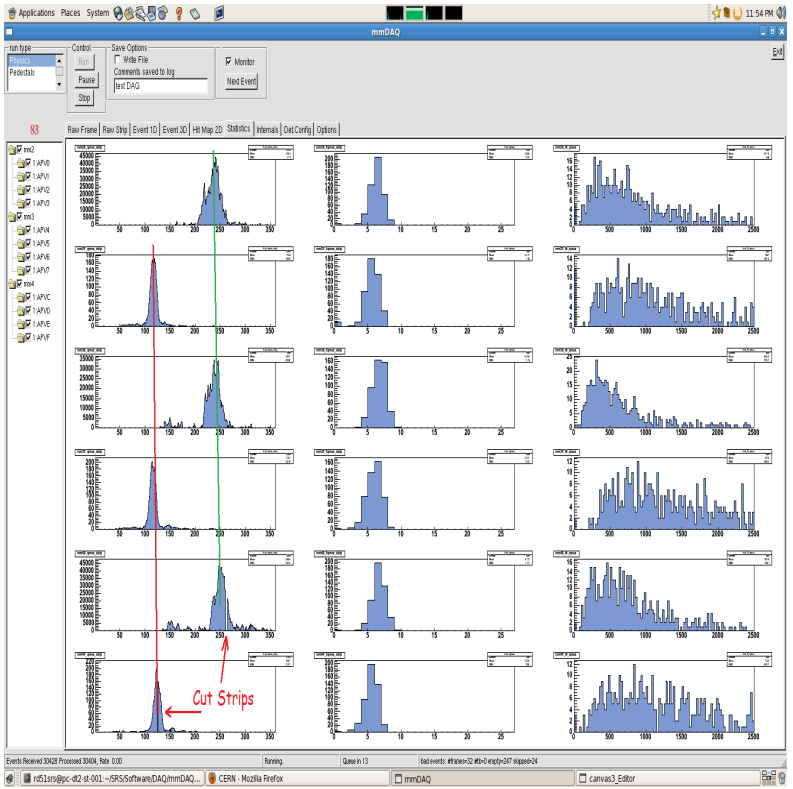
- Slow Control, SRS by
  - Marcin Byszewski(CERN)
  - George Iakovidis(NTUA)
  - KonstantinosKarakostas(NTUA)
  - Konstantinos Ntekas(NTUA)
- Easy to use interface
- Confusion in Binary or Hexadecimal channel id input



Data Acquisition

- Data Acquisition, mmdaq
- Easy to use interface
- On line monitoring
- I love it!

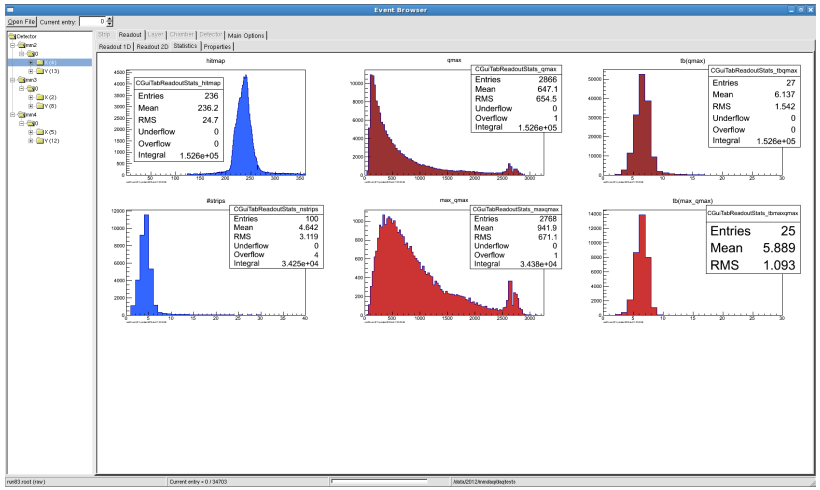


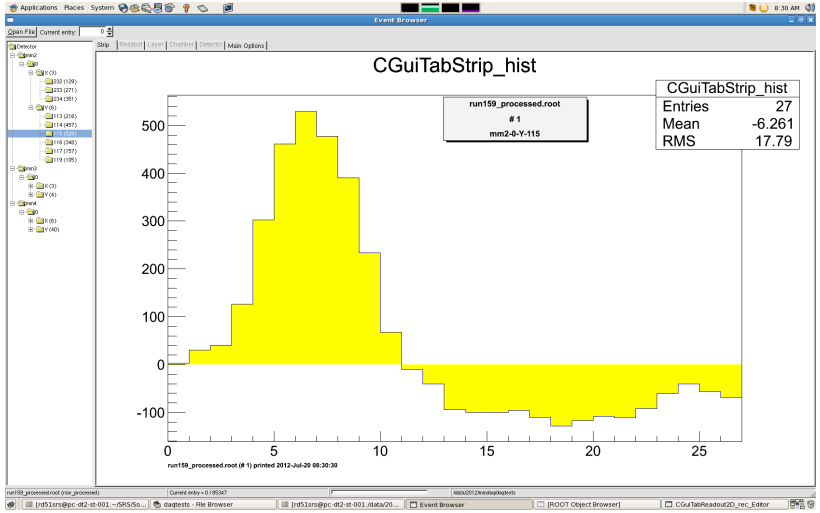


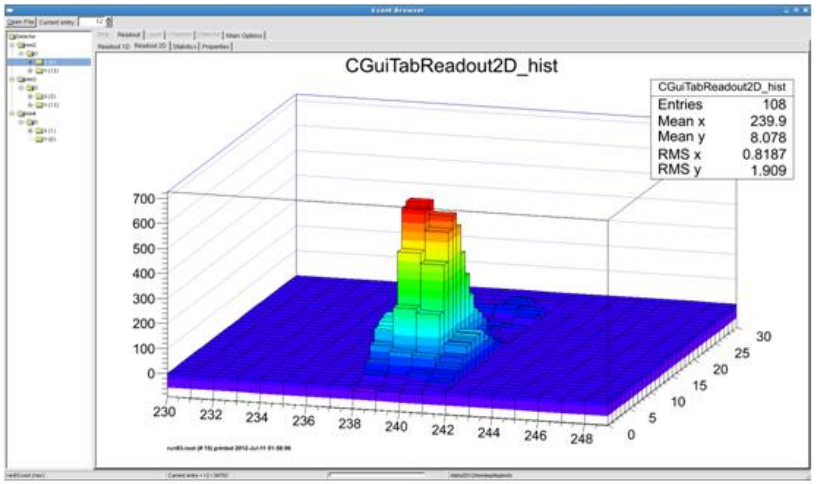
- Preliminary[2] Analysis, Event Browser
- Extremely user friendly
- Strip by Strip results
- Scope in a PC
- See inside each read-out plane
- Seperately check each detector
- I adore it!

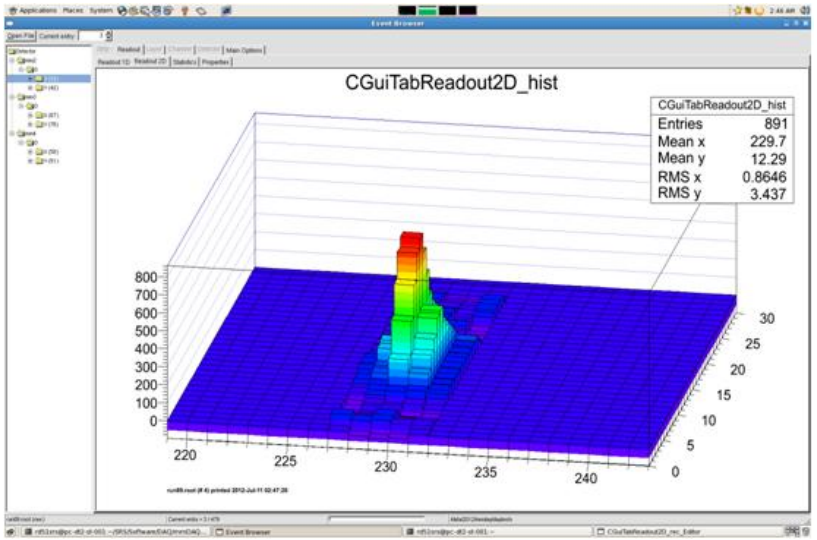
[2] not only

Preliminary Results





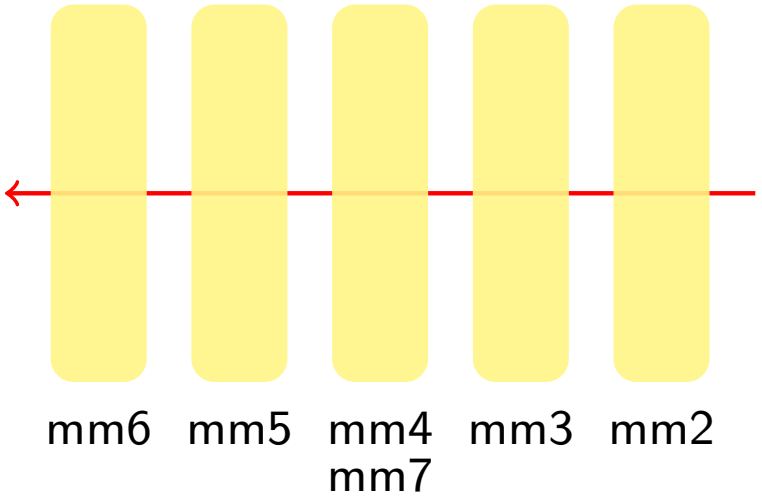


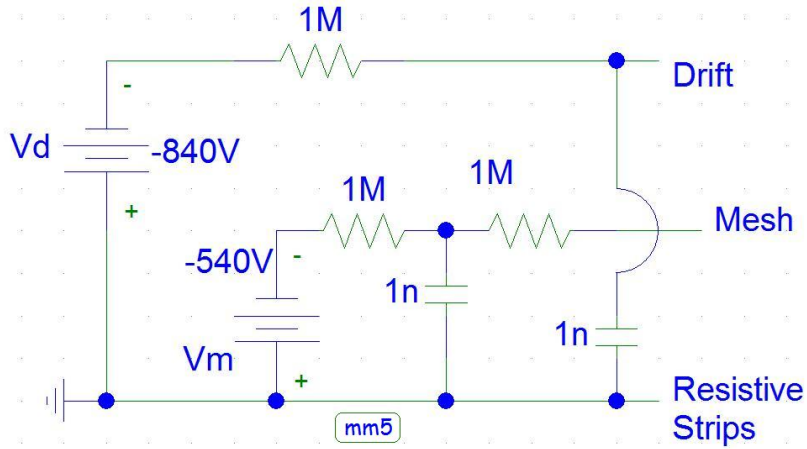


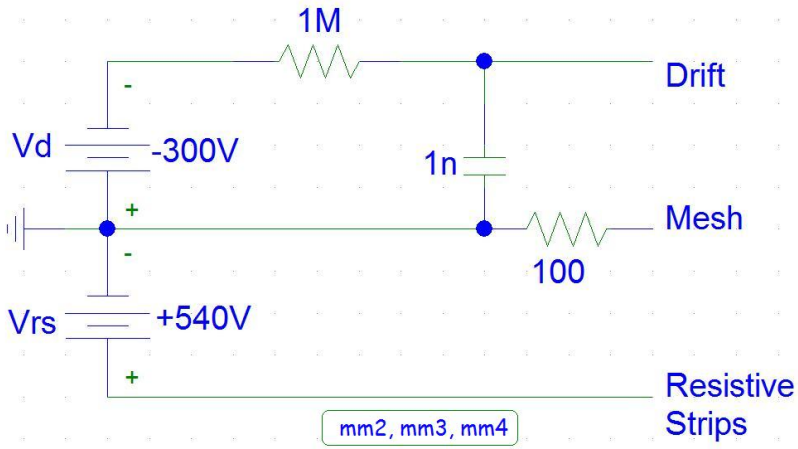
- Data Analysis for mm, mmdaq
- Easy to use
- Strip by Strip results
- Clusterisation
- Analyse each read-out plane
- Seperately analyse each detector
- Option for tracking

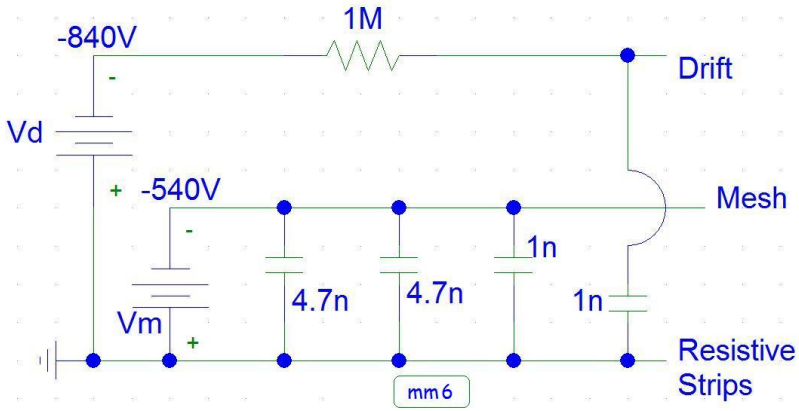
Contents

Tracker Configuration





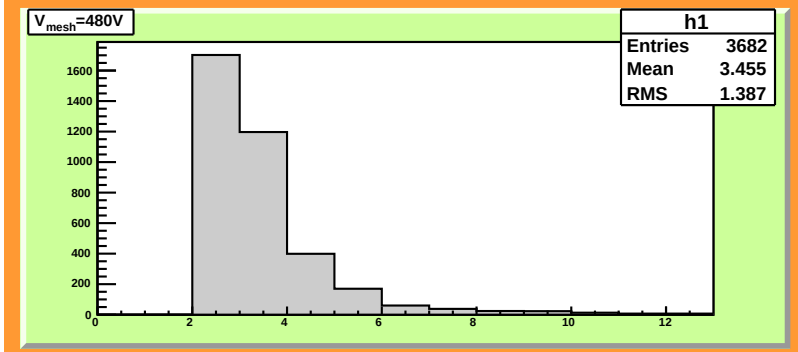


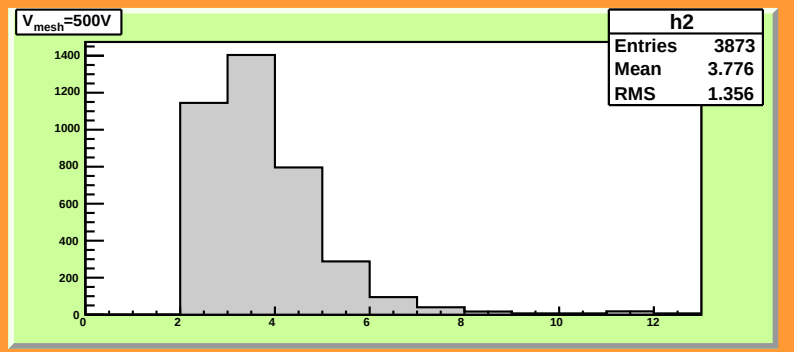


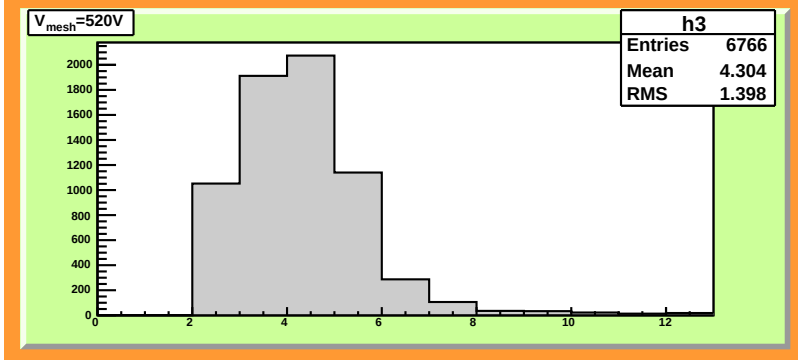
Contents

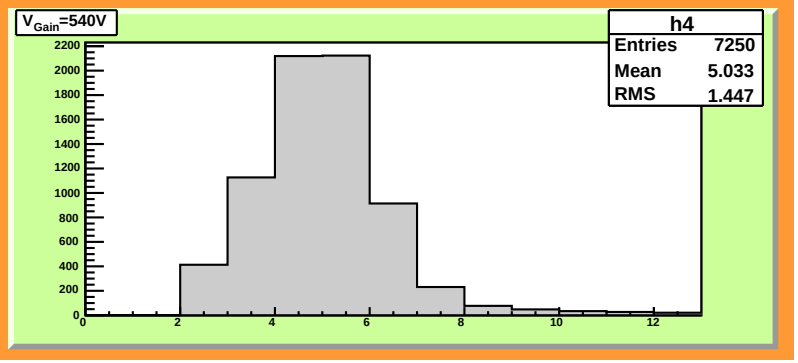
Cluster width for mm7 X-strips

Gain Scan





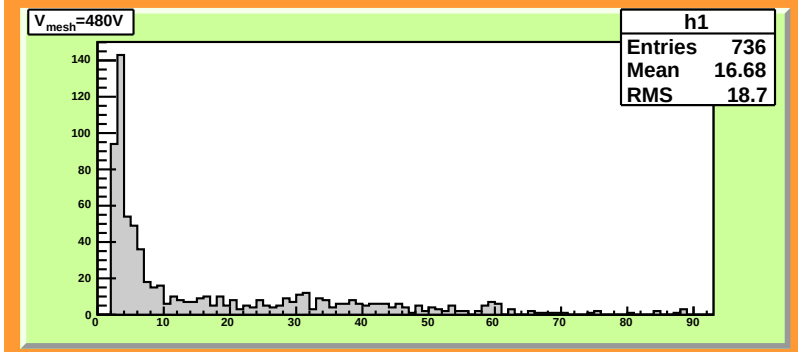


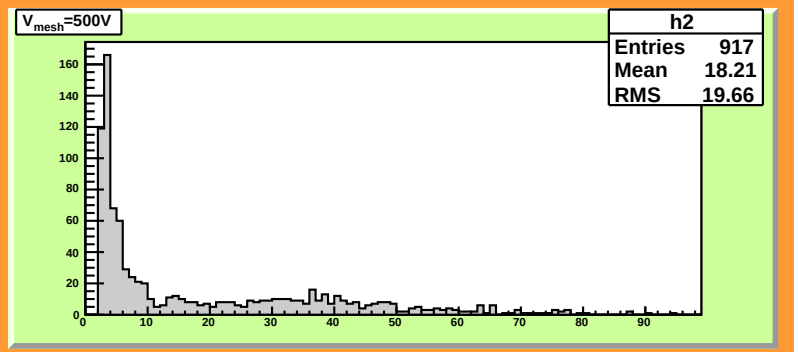


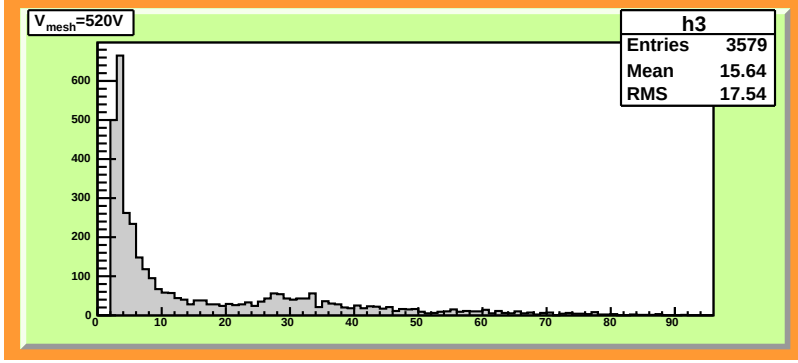
$1M\Omega/\square$ *Vs* $100k\Omega/\square$

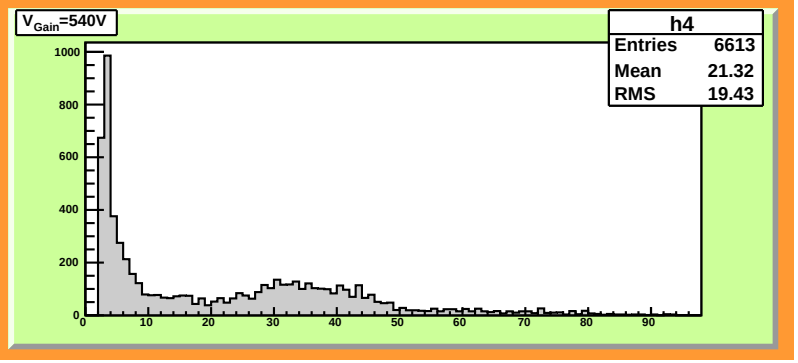
Cluster pwidth for mm7 Y-strips

Gain Scan





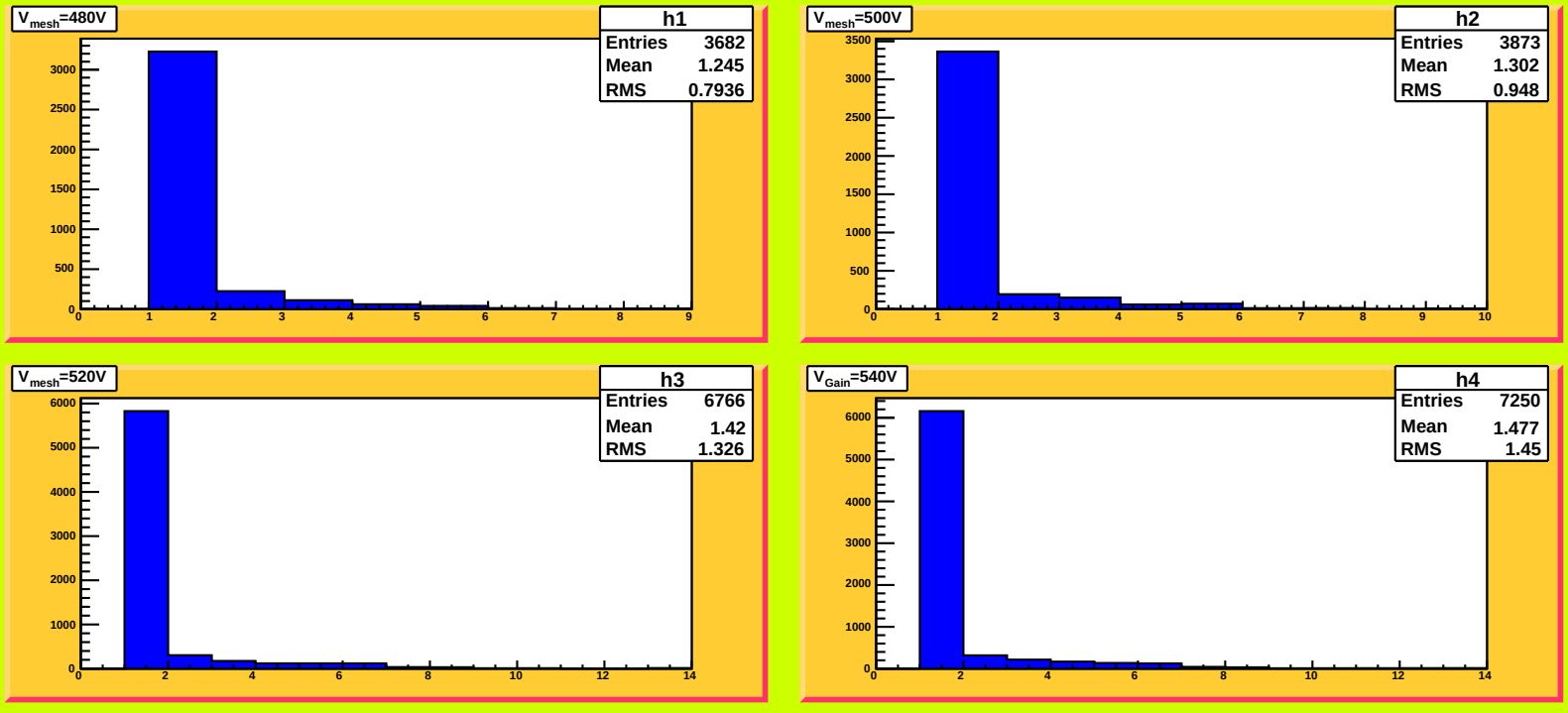




$1M\Omega/\square$ *Vs* $100k\Omega/\square$

Cluster number for mm7 X-strips

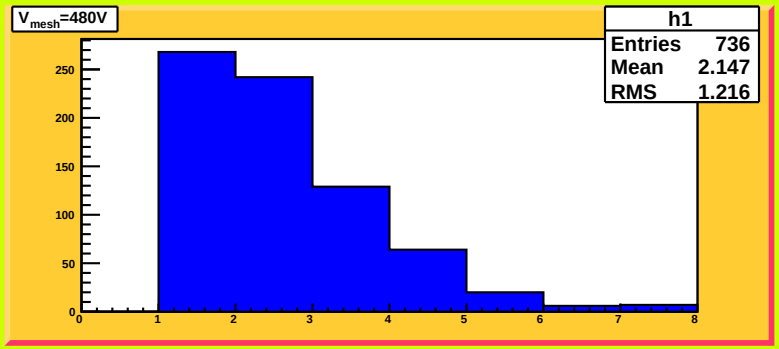
Gain Scan

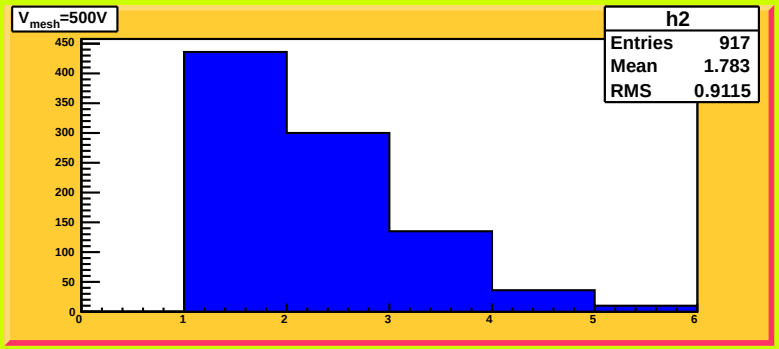


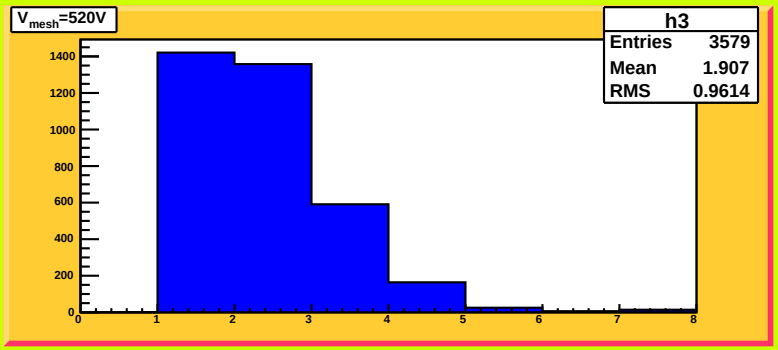
$1M\Omega/\square$ *Vs* $100k\Omega/\square$

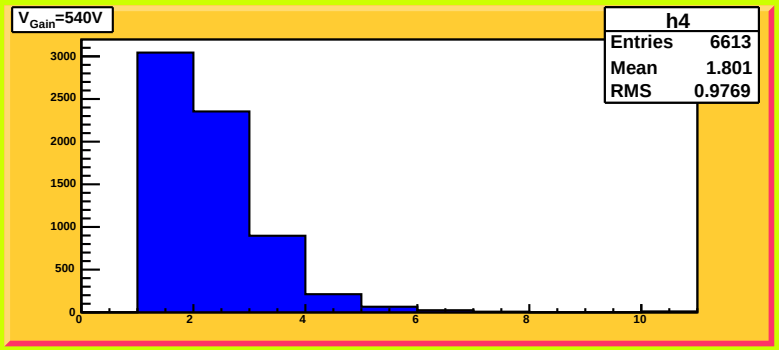
Cluster number for mm7 Y-strips

Gain Scan





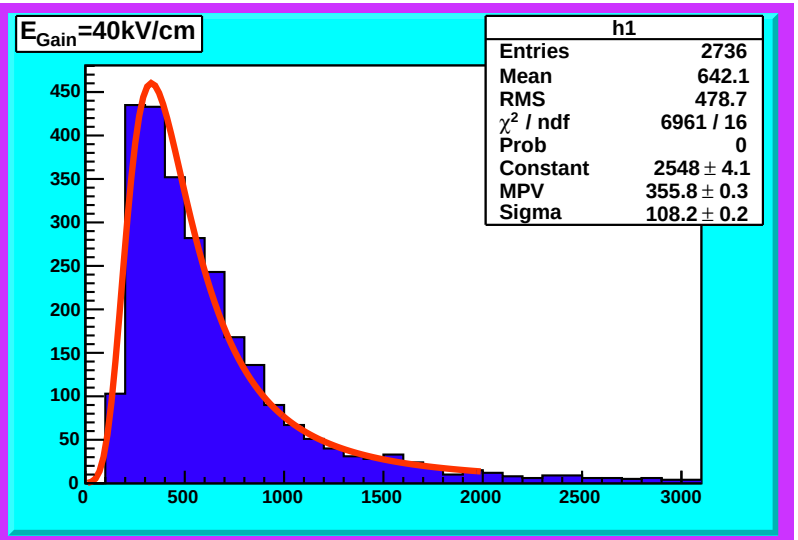


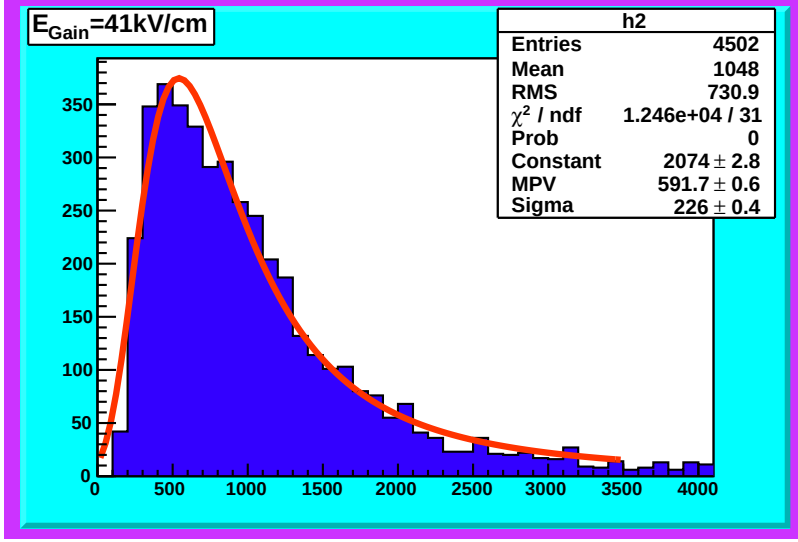


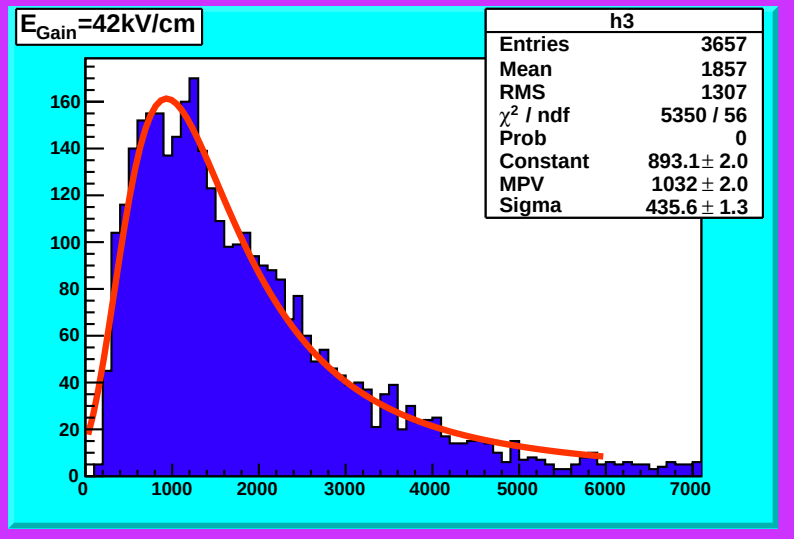
Energy Resolution

Cluster charge for mm2 X-strips

V_{drift}=-300V







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- $100k\Omega/\square \rightarrow$Not quite preffered
- Probably R-C low pass filter is worse than R-C-R
- Tracker corresponds quite well
  - SRS
  - mmdaq
  - Event Browser
  - Recomm
- Option of Tracking
- Already been used by MAMMA group
  - August 2012
  - September 2012
- Tracker is functionable!