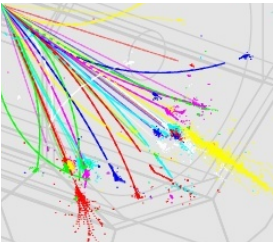
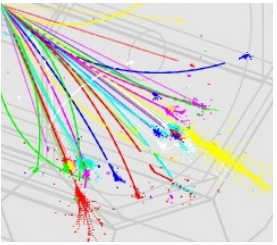


CALICE Meeting

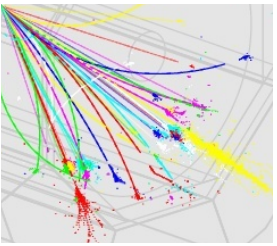
RAL 17.05.2007

M. Stanitzki



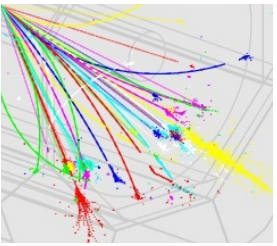
Bit's and Pieces

- Working with Vanilla
- Landau fitting of Energy distribution (Summary)
- Hit clustering



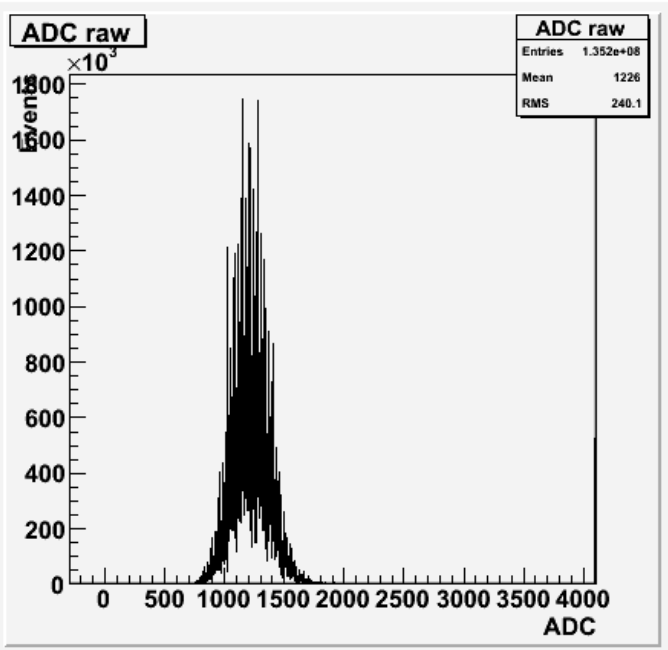
The Vanilla Program

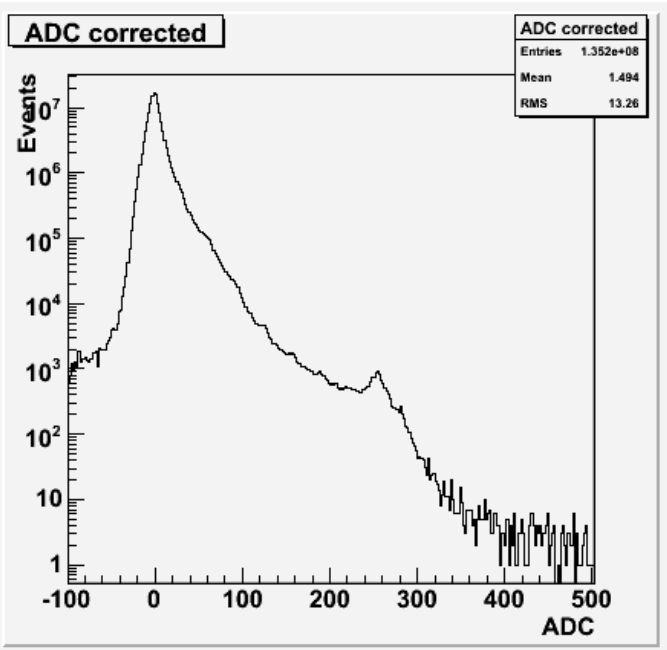
- MAPS sensor provided by Renato
  - Device to test our setup
- DAQ is based on the OPTODAQ
  - Virtex II-Pro
  - Gigabit Ethernet
- C-GUI for data taking
- Tests with ^{55}Fe source
- Encountered lot of difficulties
- The setup kept Konstantin, Giulio, Andy and myself quite busy



^{55}Fe Results

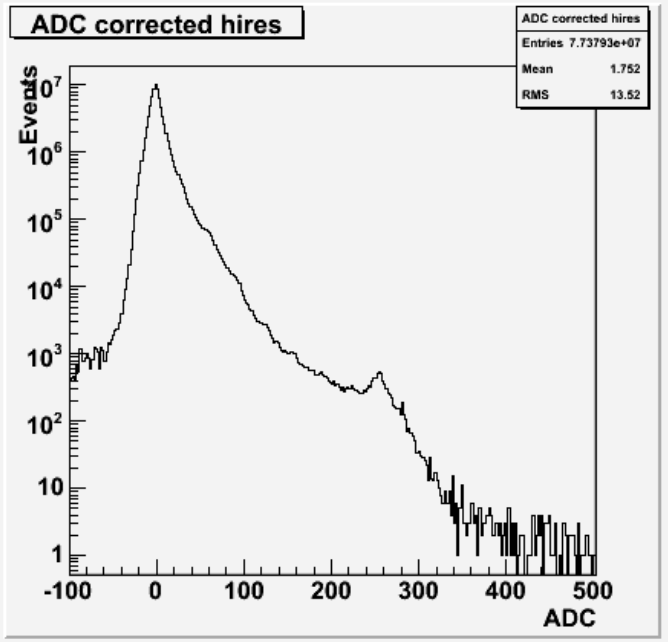
RAW Data

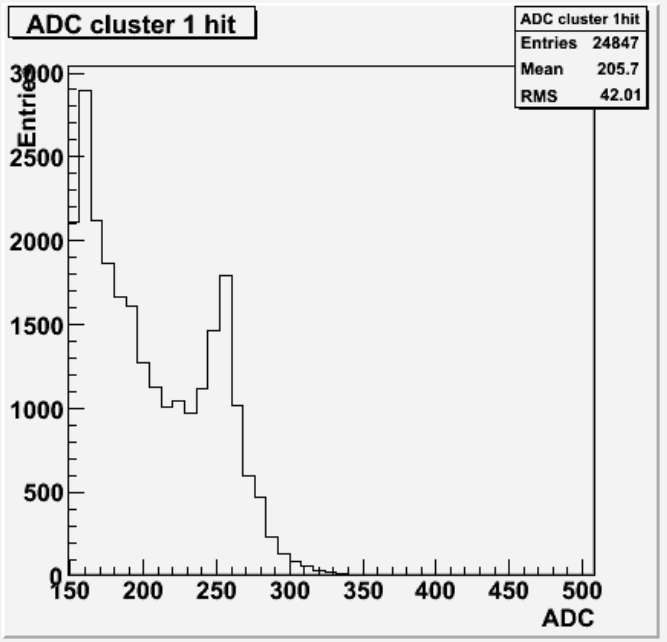




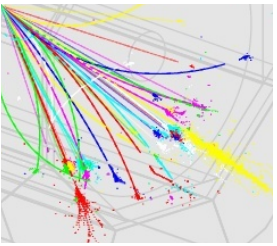
Fixed pattern removed

Fixed pattern removed + pixel selection

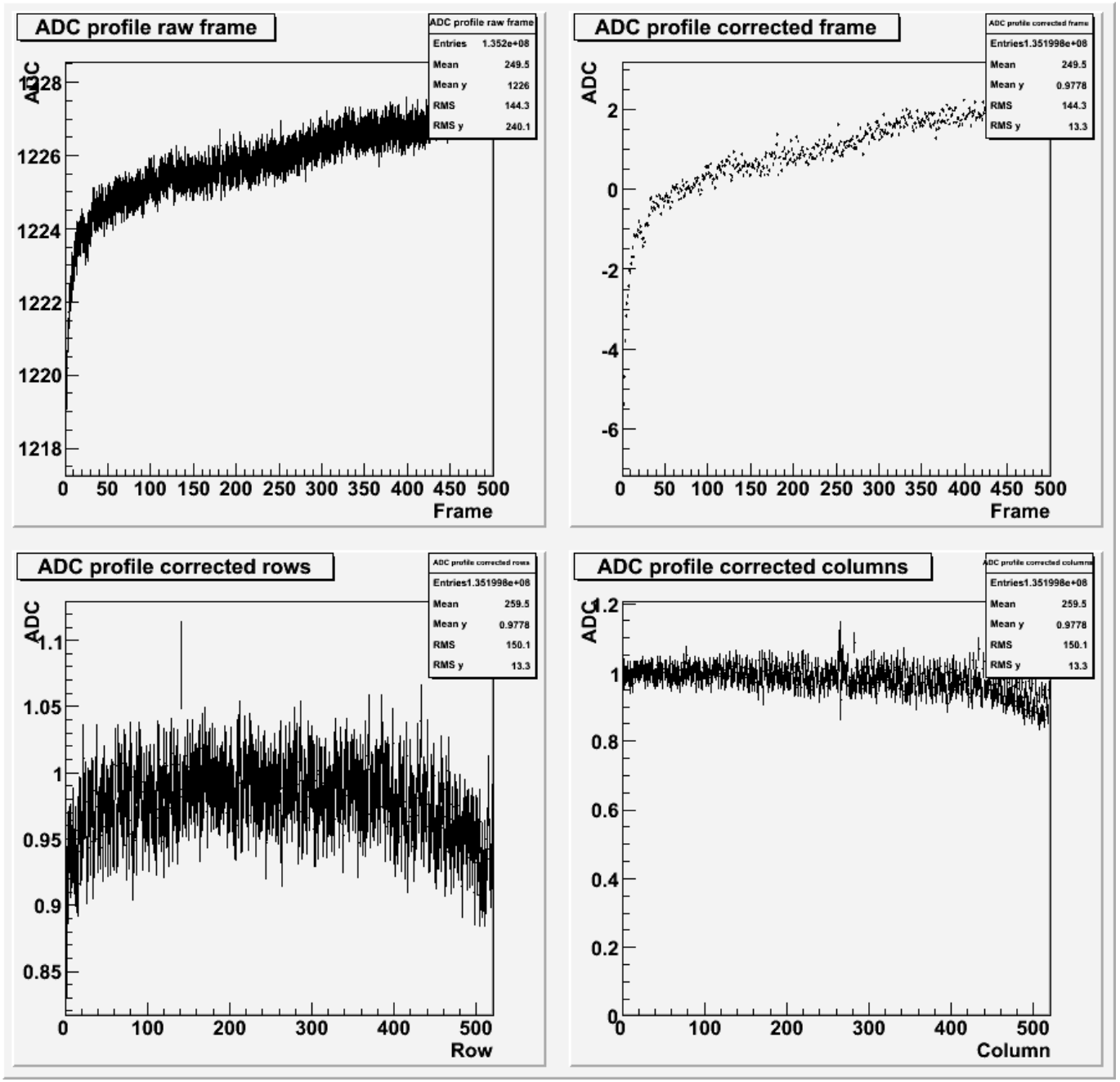


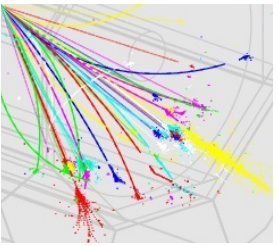


+ Clustering



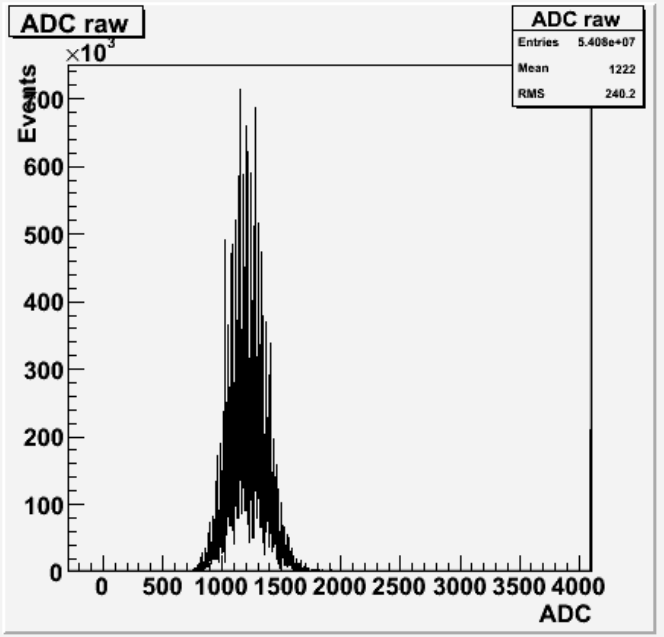
^{55}Fe Results (II)

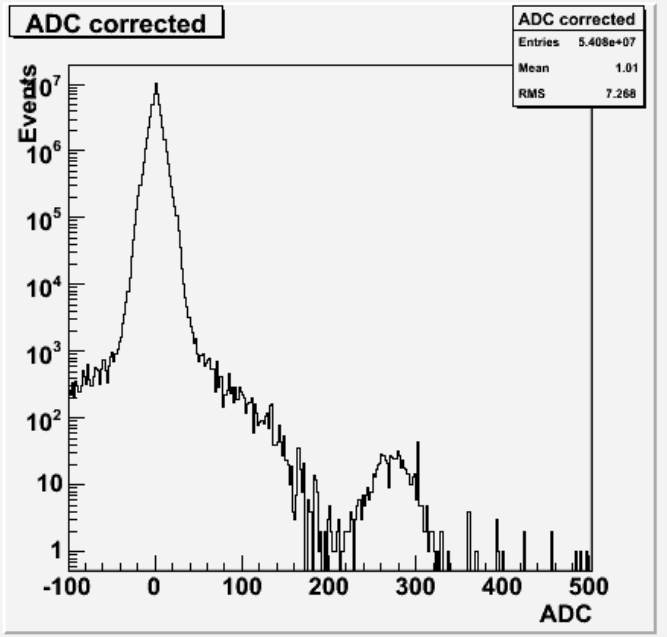




Noise Only

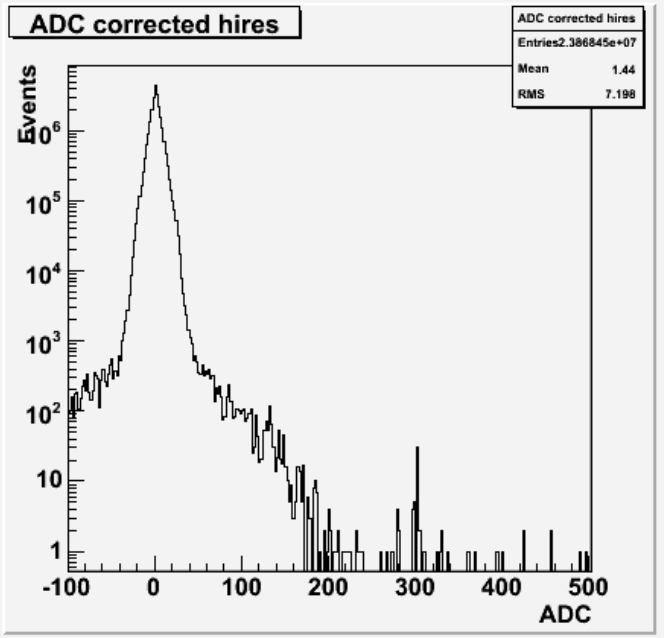
RAW Data

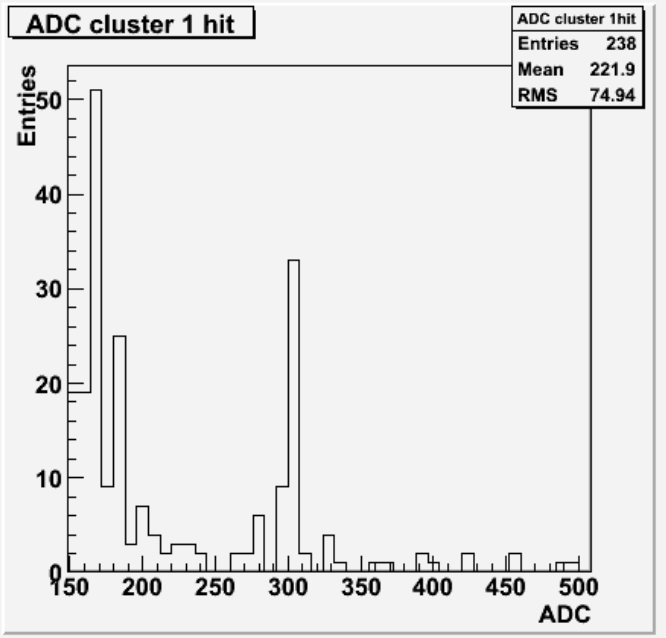




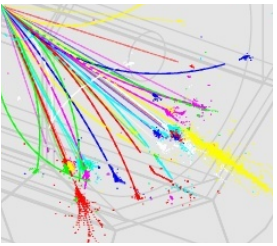
Fixed pattern removed

Fixed pattern removed + pixel selection



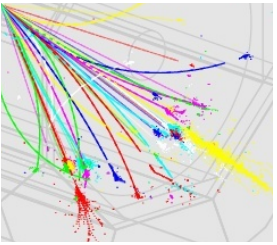


+ Clustering



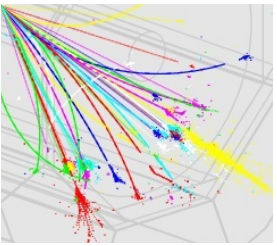
Vanilla Summary

- Useful exercise, we've learnt a lot
- Test the RAL Setup
- Testing Analysis Ideas
- Fighting with the DAQ
  - Buffering is essential
  - All kind of problems even with Gigabit Ethernet
- Finding ^{55}Fe is not as simple as expected
  - Cross-checked everything with a LCFI CCD
- We can calibrate the Vanilla now ..



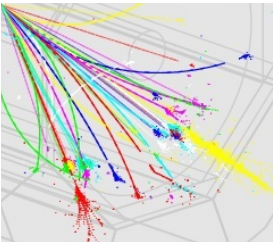
Fitting Hits

- Triggered by Paul
  - could you extract number of double hits out of the distribution ?
- Basic Idea
  - Look for two peaks
- Does not work, all smeared together
- So try fitting model ...



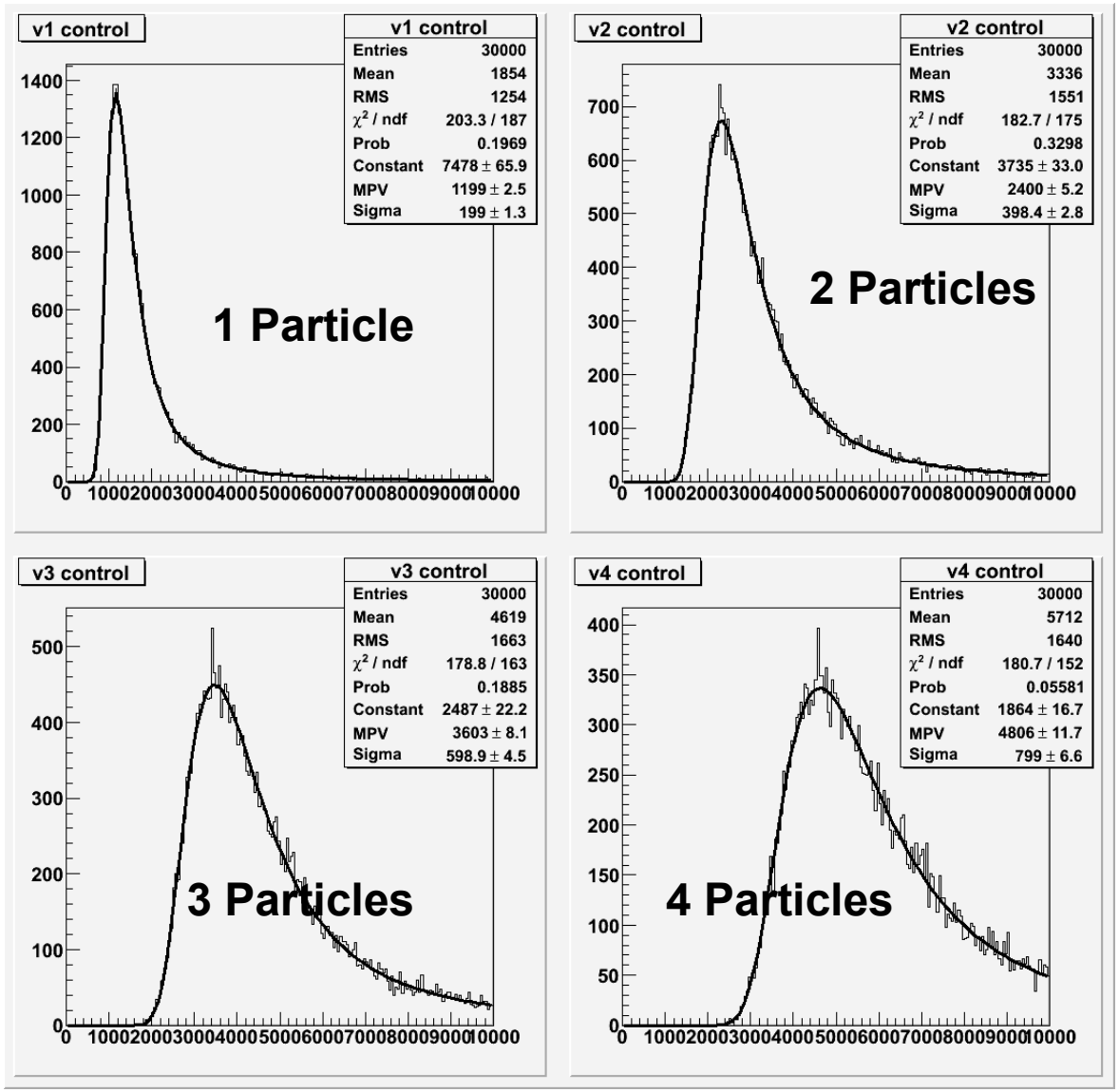
Multiple Landaus

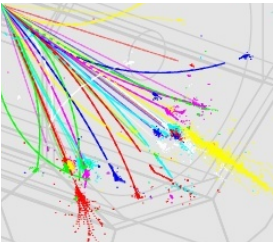
- Idea 2 particles
  - $N_{electrons1} + N_{electrons2}$
  - Sum is again Landau distributed
  - Assumption Sum of two Landaus is Landau with 2xMPV +2 x sigma
  - Tested in Root implementation (good enough)
  - No rigid mathematical proof



Test plots

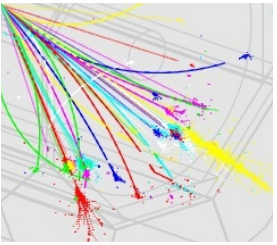
Landau with
- MPV=1200
- σ=200



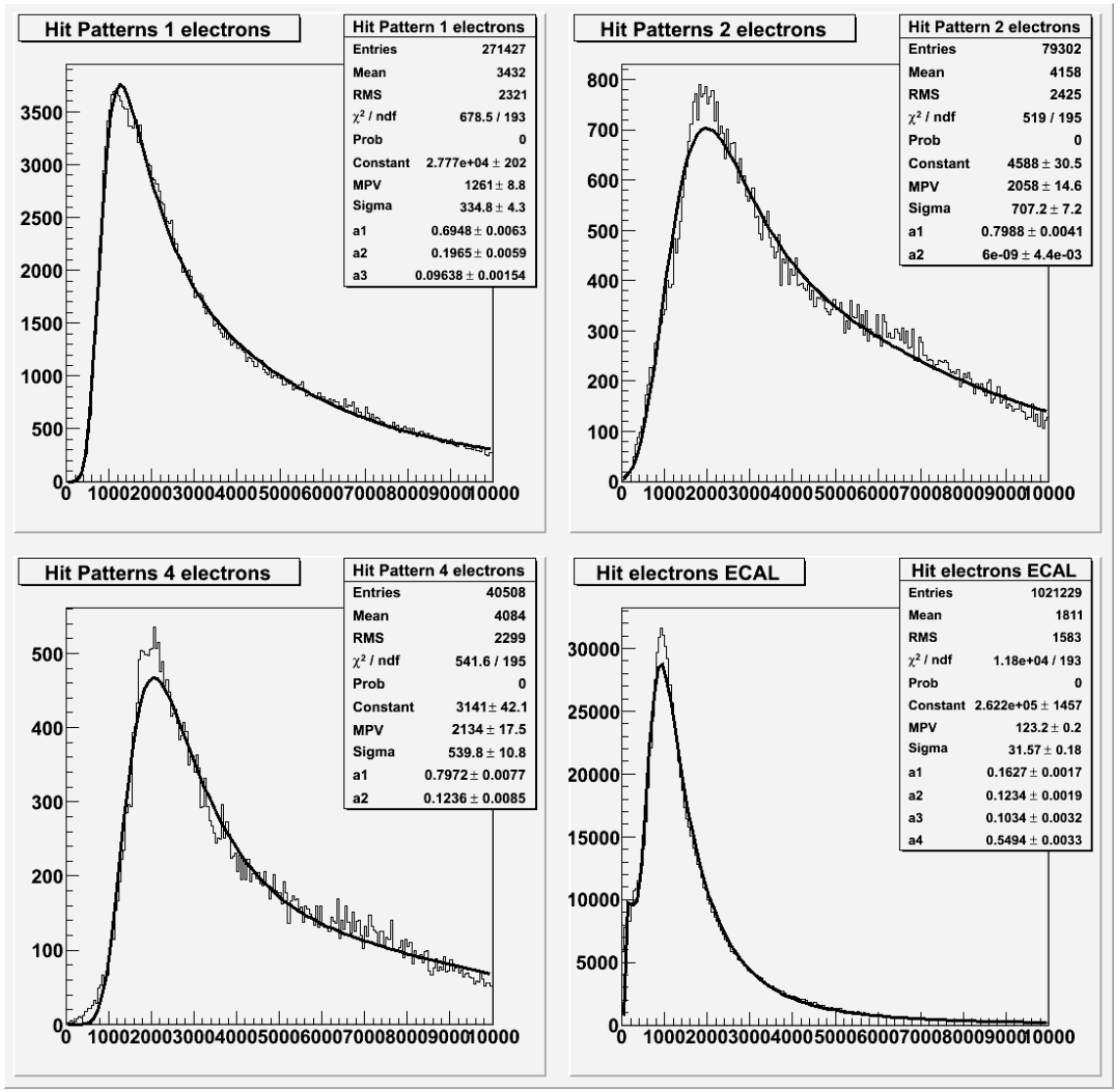


Test Cases

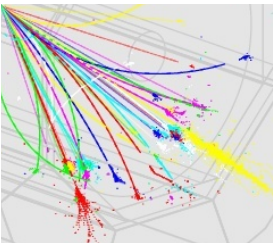
- Hit Pattern 1 (2 cells right next to each other)
- Hit Pattern 2 (2 cells corner on corner)
- Hit Pattern 4 (2 cells with one empty cell in between)
- All electrons from all hits



Results

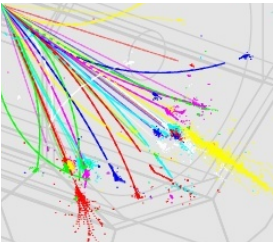


- Terms are a1*Landau(MPV,σ) + a2*Landau(2*MPV,2*σ)+ 1-a2-a1)*Landau(n*MPV,n*σ)
- Mostly using even Terms, 1,2,4,8,16
- MPV approx 1300 electrons per Hit (From Giulio)



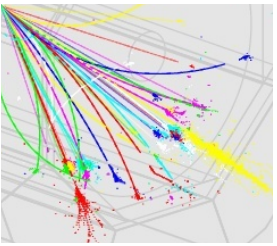
Results

- For Hit pattern 1 (2 Cells)
  - 70 % Single Hit
  - 20 % 2 Hits
  - 10 % 4 Hits
- For Hit Pattern 2 (2 Cells)
  - 80 % 2 Hits
  - 20 % 6 Hits
- For Hit Pattern 4
  - 80 % 2 Hits
  - 12 % 4 Hits
  - 8 % 8 Hits
- For all electrons (123*8 ~ 1000 This is the maximum)
  - 16 % 1/8 Hit
  - 12 % ¼ Hit
  - 10 % ½ Hit
  - 55 % 1 Hit
  - 7 % 2 Hits



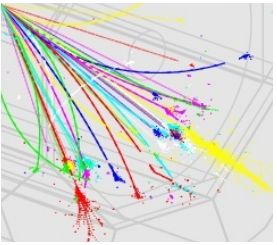
Outlook

- This needs some work and testing
- But is a way to answer some questions

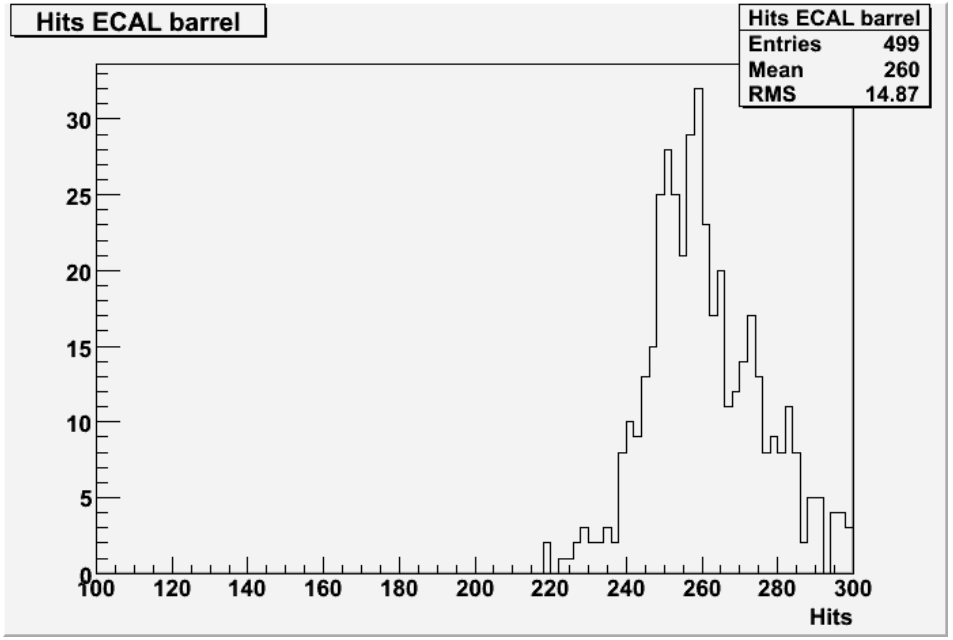


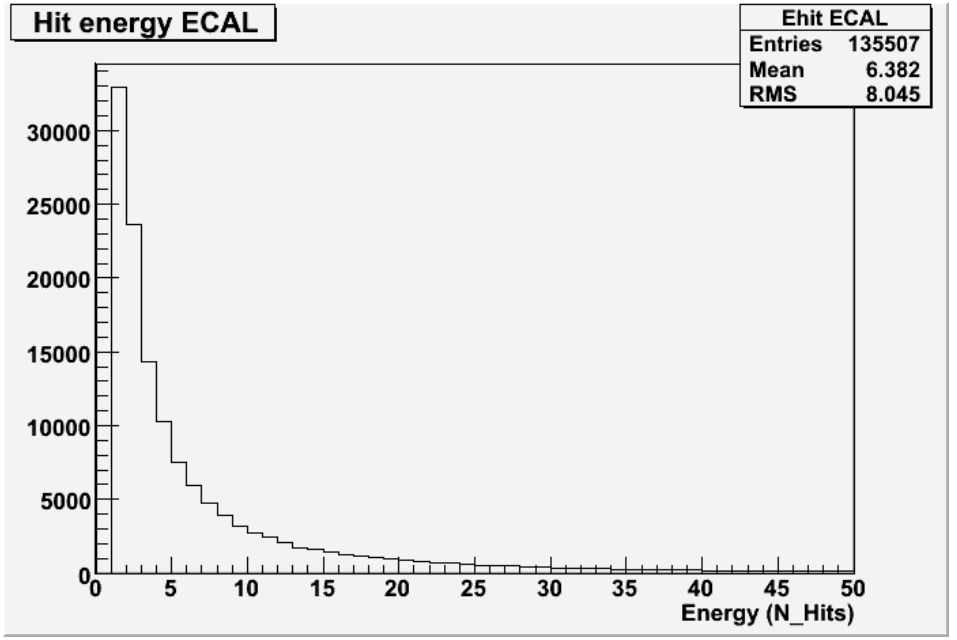
Hit Clustering

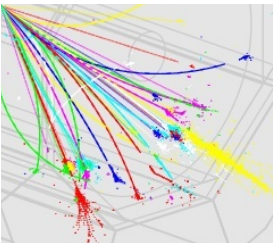
- IDEA for Pandora
- Cluster MAPS hits into 5x5 mm Hits with energy $=n_{Hits}$
- Same Idea as Anne-Marie's Clustering, but
- I need **SimCalorimeter** Hits, so I write out **SimCalorimeter** Hits
- Beta Version is running an being tested



Test with 20 GeV e^-







PandoraPFA 1.01

- Is running at RAL
- Does better than previous devel version
- Works with 50x50 microns MAPS
- Resolution:
  - 35 %/sqrt(E)
- Analog
  - 30 %/sqrt(E)