




DHCAL Test Beam Results using Full Train Reconstruction

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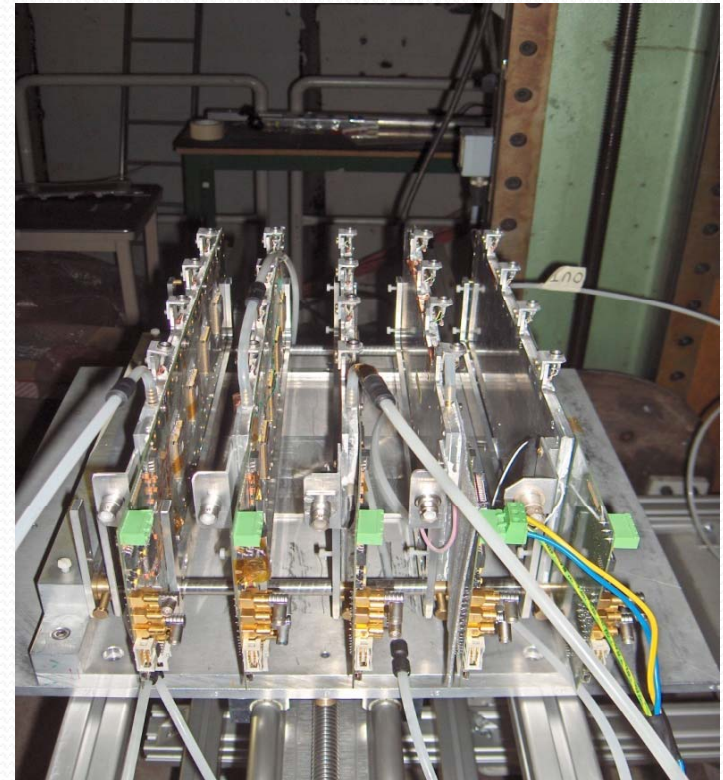
- 
- The Test Beam
 - Efficiency study
 - Time cuts for tracks reconstruction
 - Tracks reconstruction without position cuts
 - Tracks reconstruction with position cuts
 - Efficiency map
 - Conclusion

The TestBeam

- TestBeam at CERN (PS)
 - July-August 2008: 4 RPC 32×8 cm²
 - November 2008: 5 RPC 32×8 cm² (with one multi-gap RPC)
- RPC: 4 Asics
Asic: 64 Channels

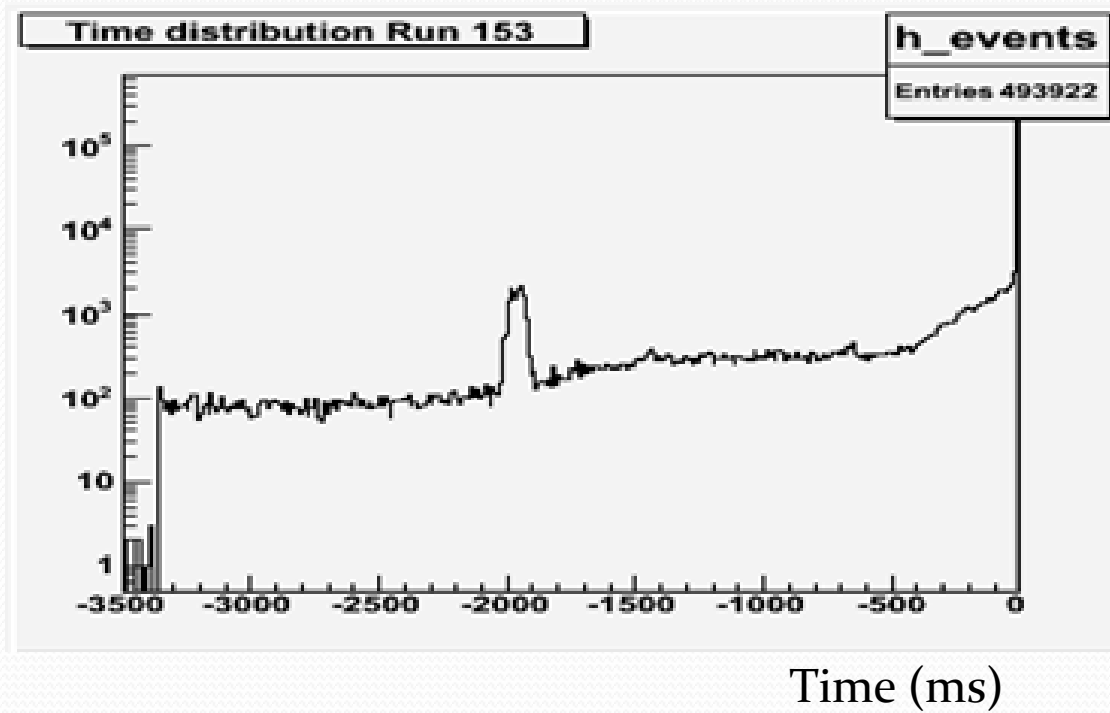


2 Scintillators: Trigger
→ Read recorded events



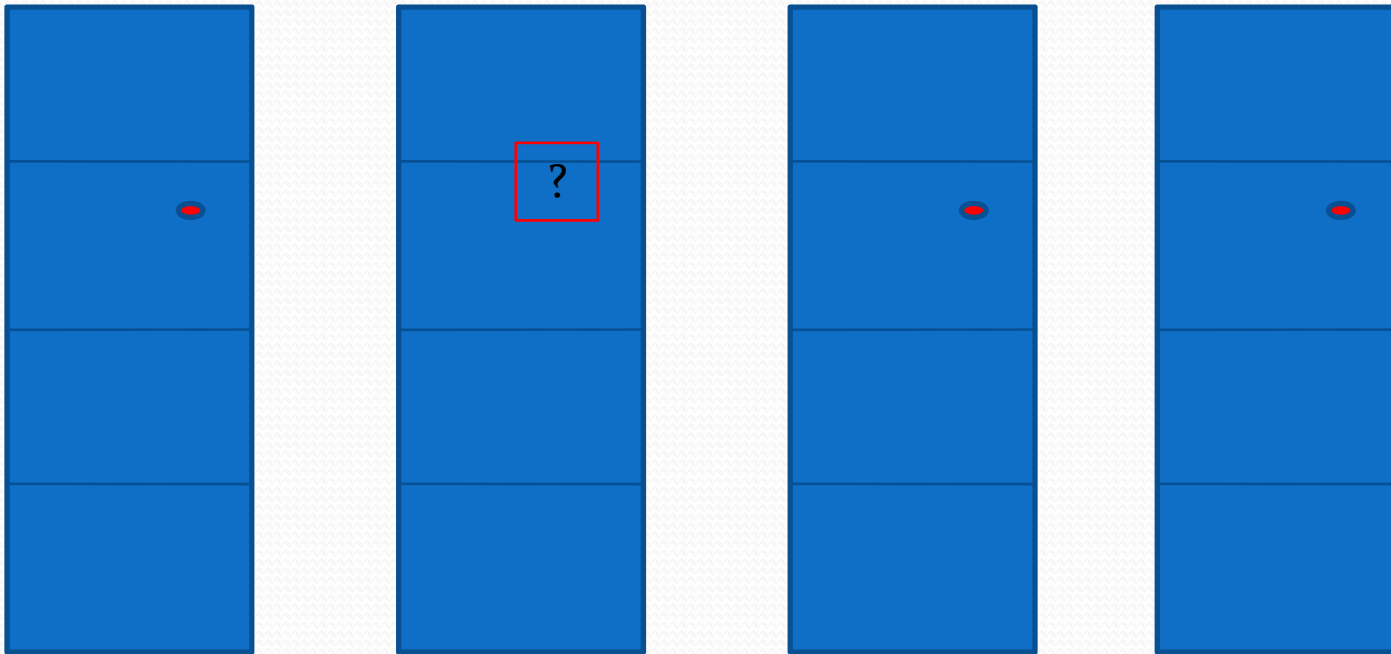
The TestBeam

Full Train Time Distribution (all events)



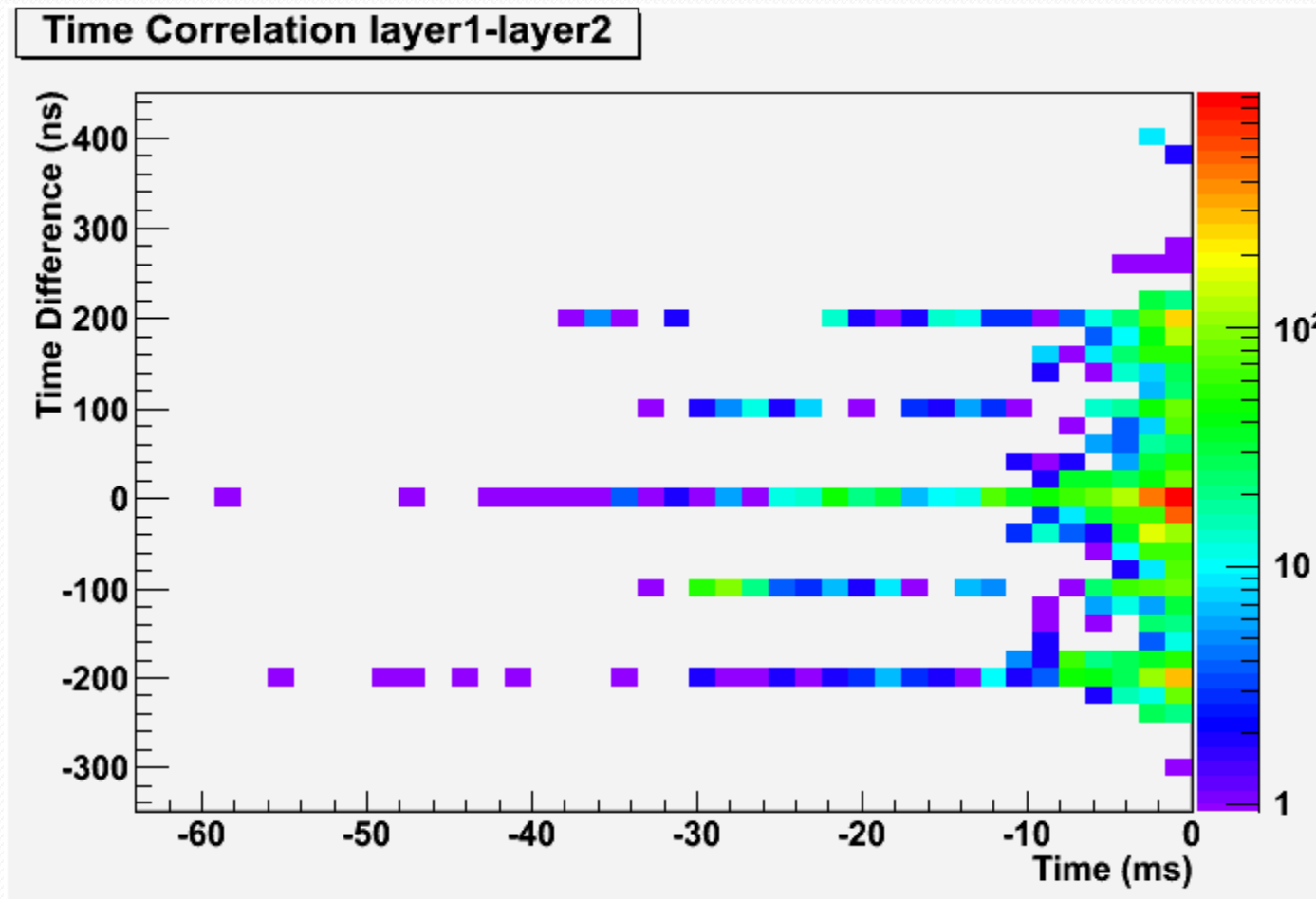
Efficiency Study

Efficiency = Probability to find a track reconstructed on 3 layers in the 4th layer



Time Cuts

Time Correlation between hits in Asics

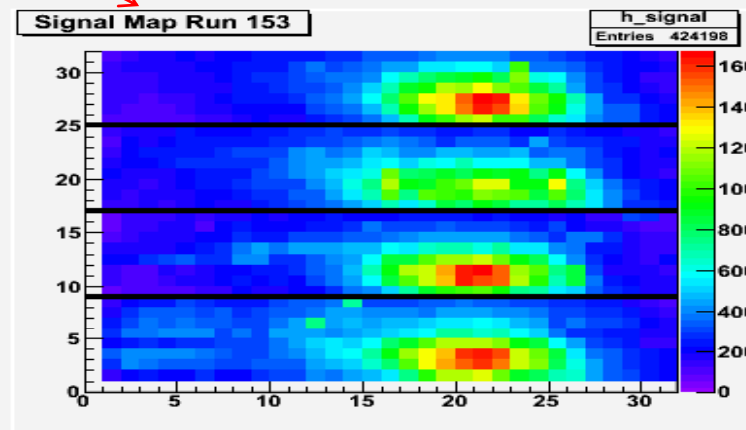
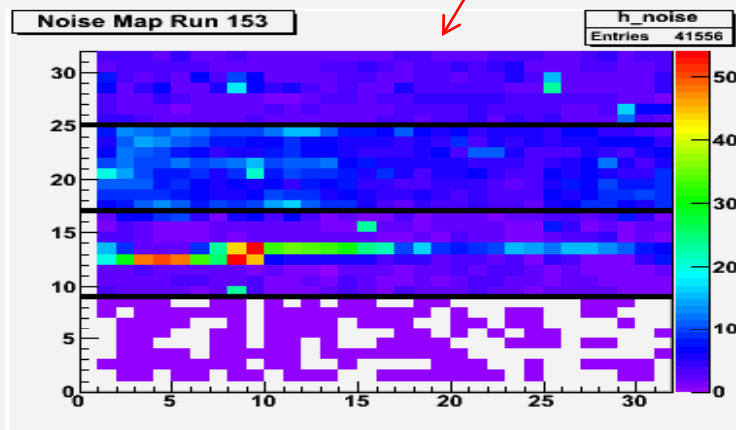
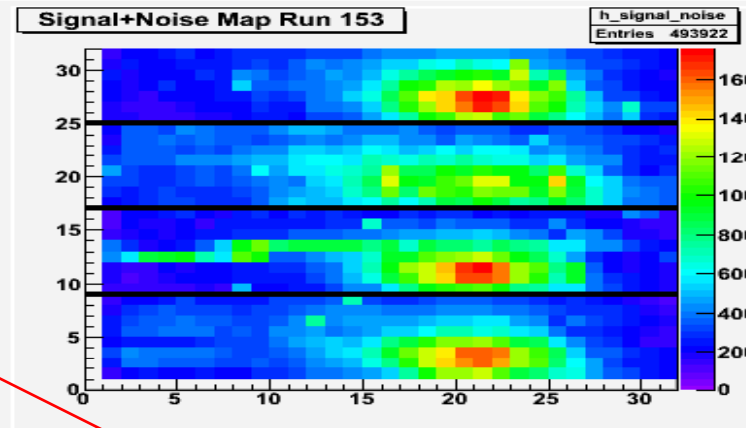
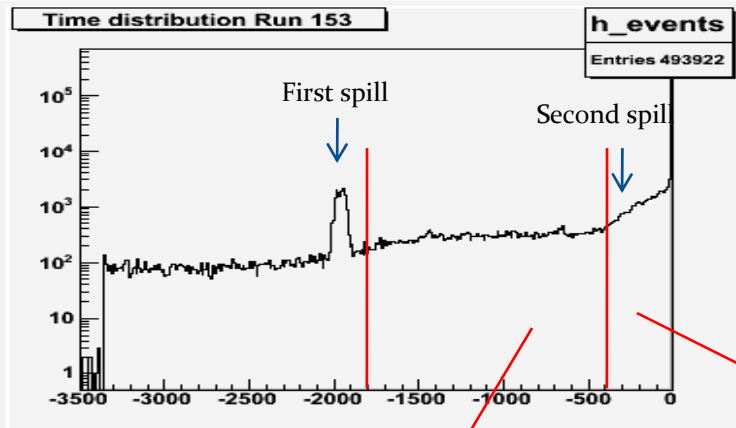


Time Cuts

RUN 153: cut at -400 ms (spill length)

All Events

Layer 4
Layer 3
Layer 2
Layer 1

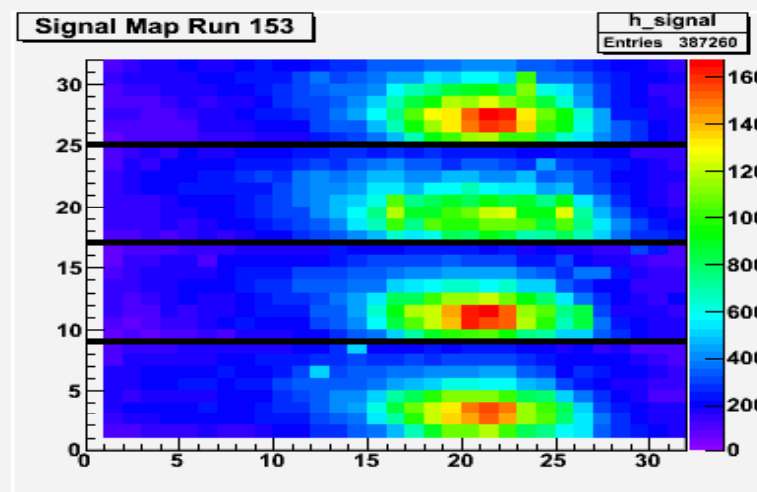
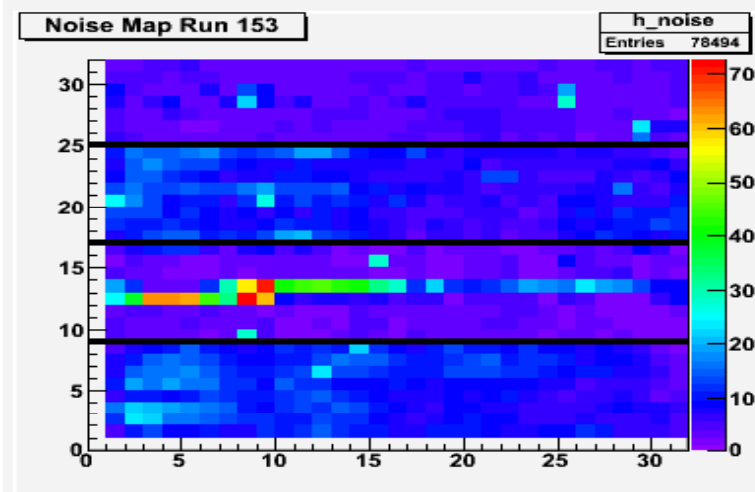
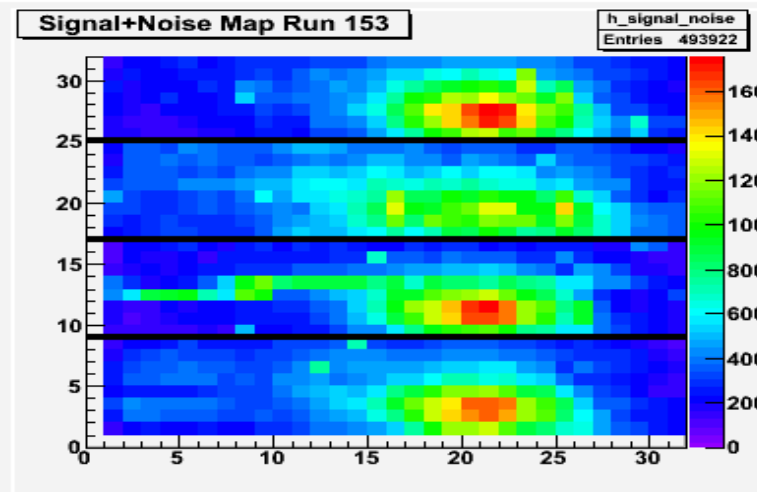
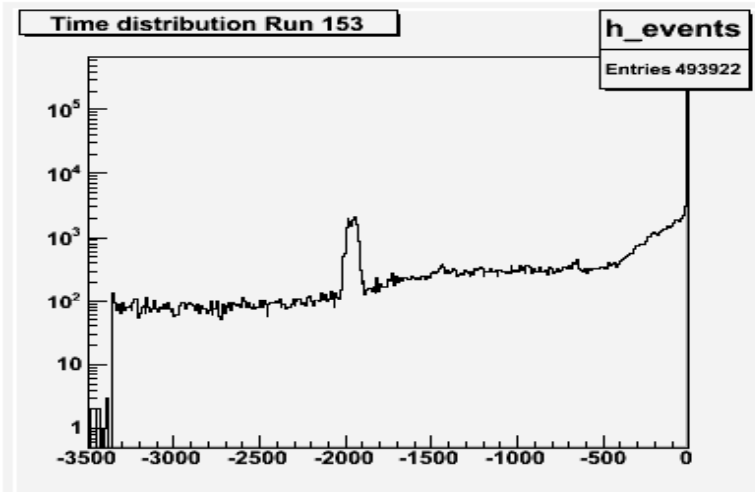


Noise

Signal

Time Cuts

Cut at -50 ms

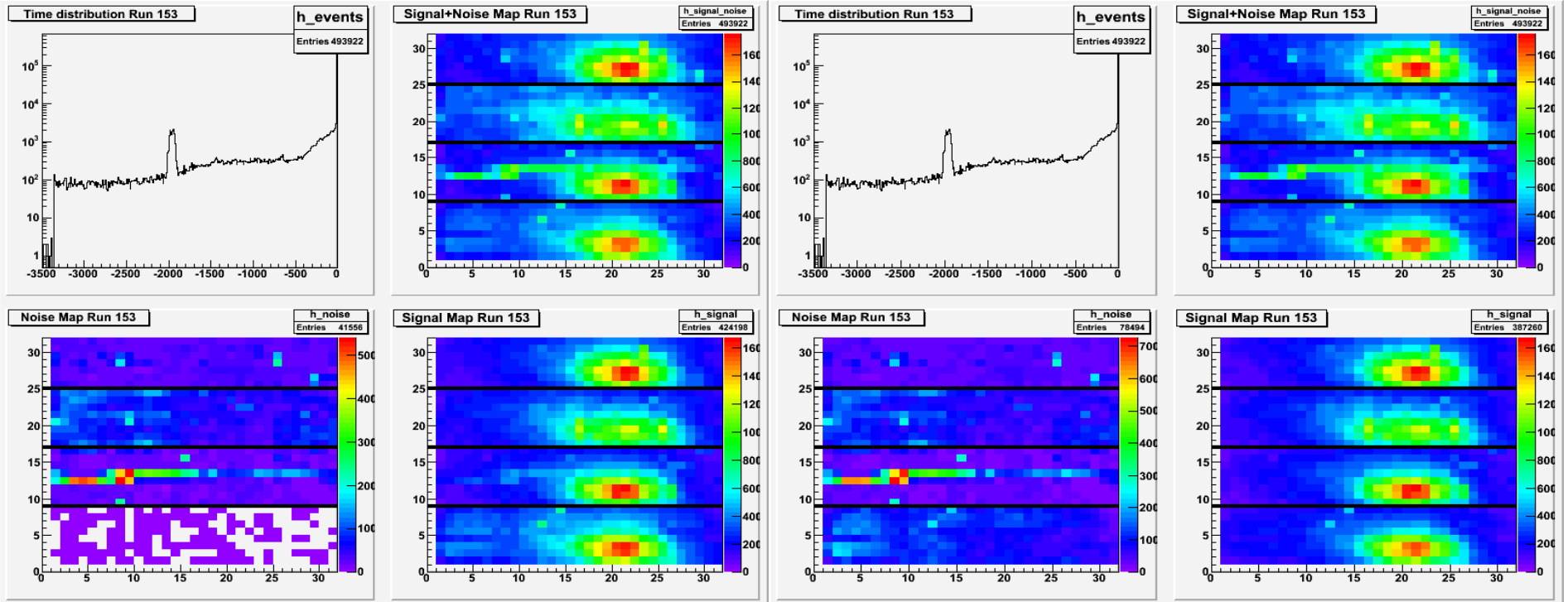


Layer 4
Layer 3
Layer 2
Layer 1

Time Cuts

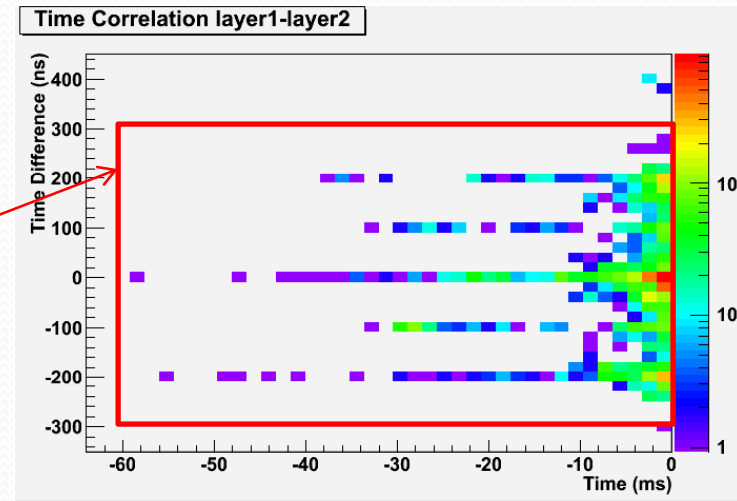
cut at -400 ms

cut at -50 ms

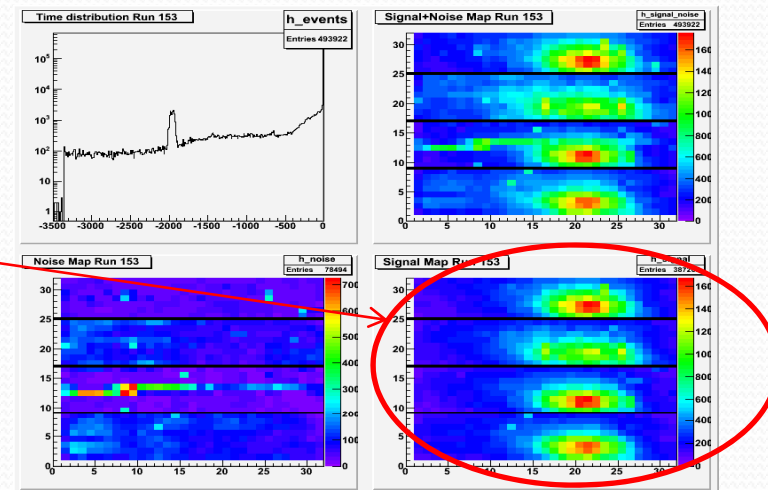


Time Cuts

□ $\Delta t < 300$ ns.

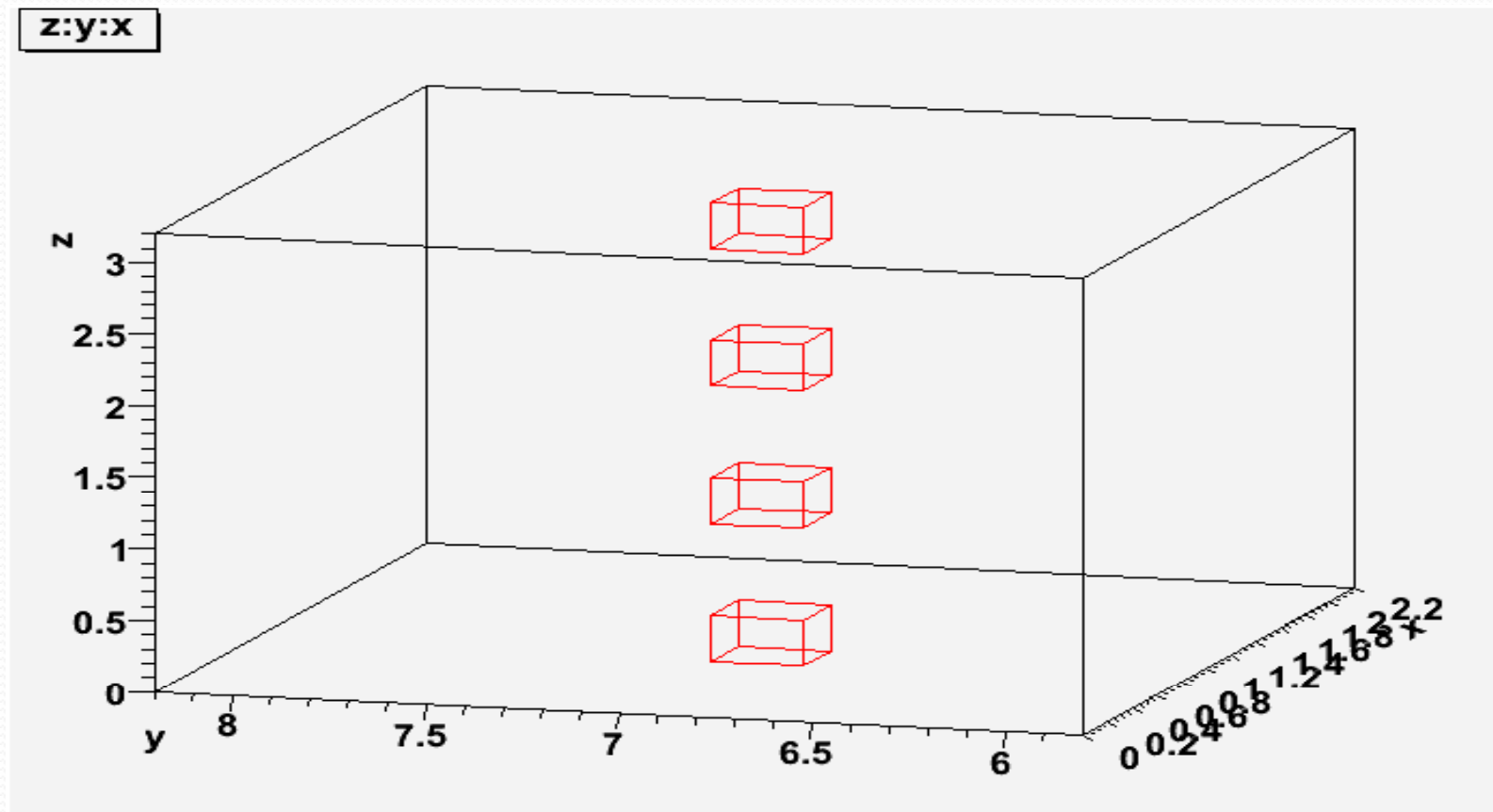


□ $t > -50$ ms.



Tracks Reconstruction without position cuts

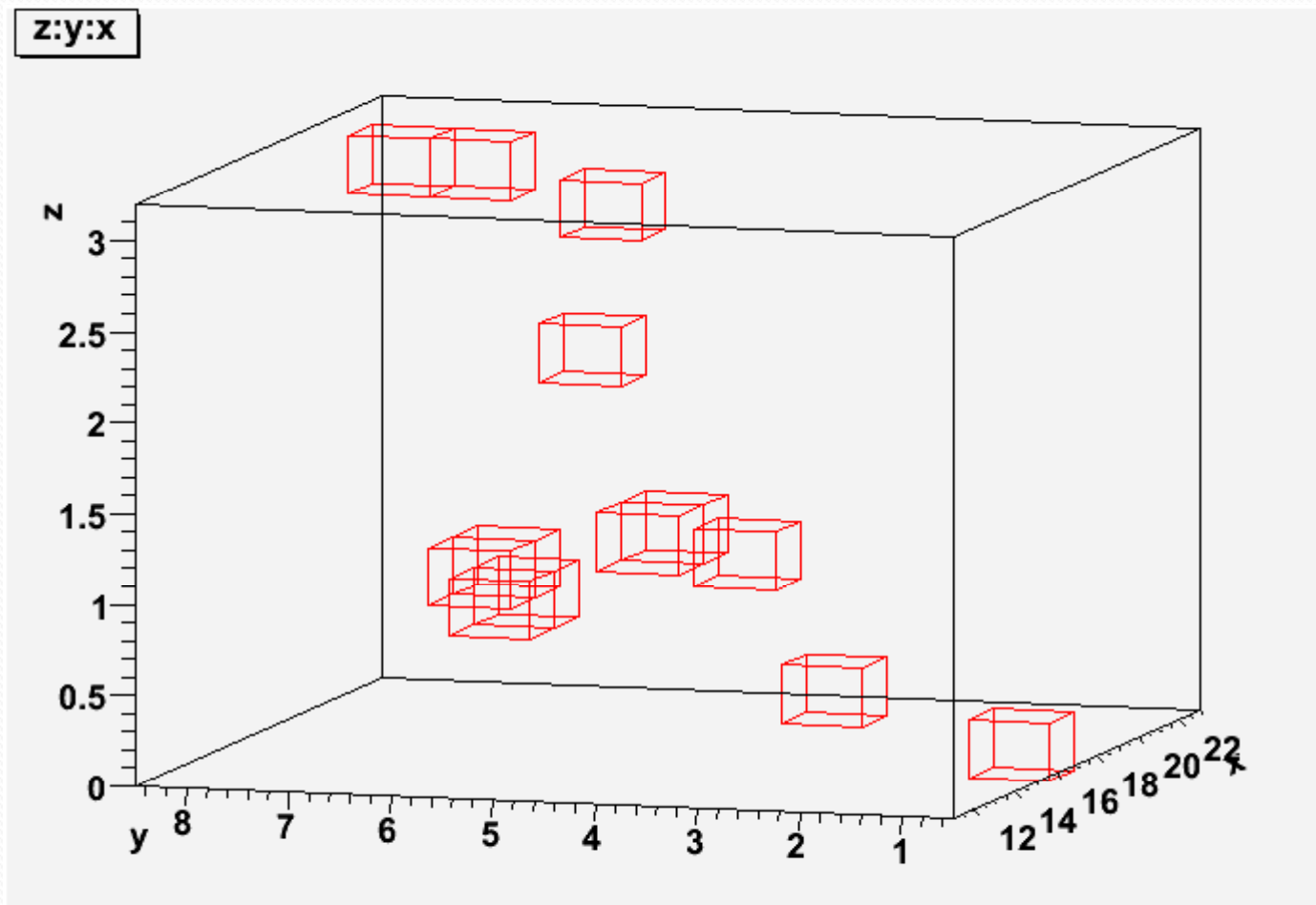
- Select Hits with time cuts to separate events in the train



Tracks Reconstruction without position cuts

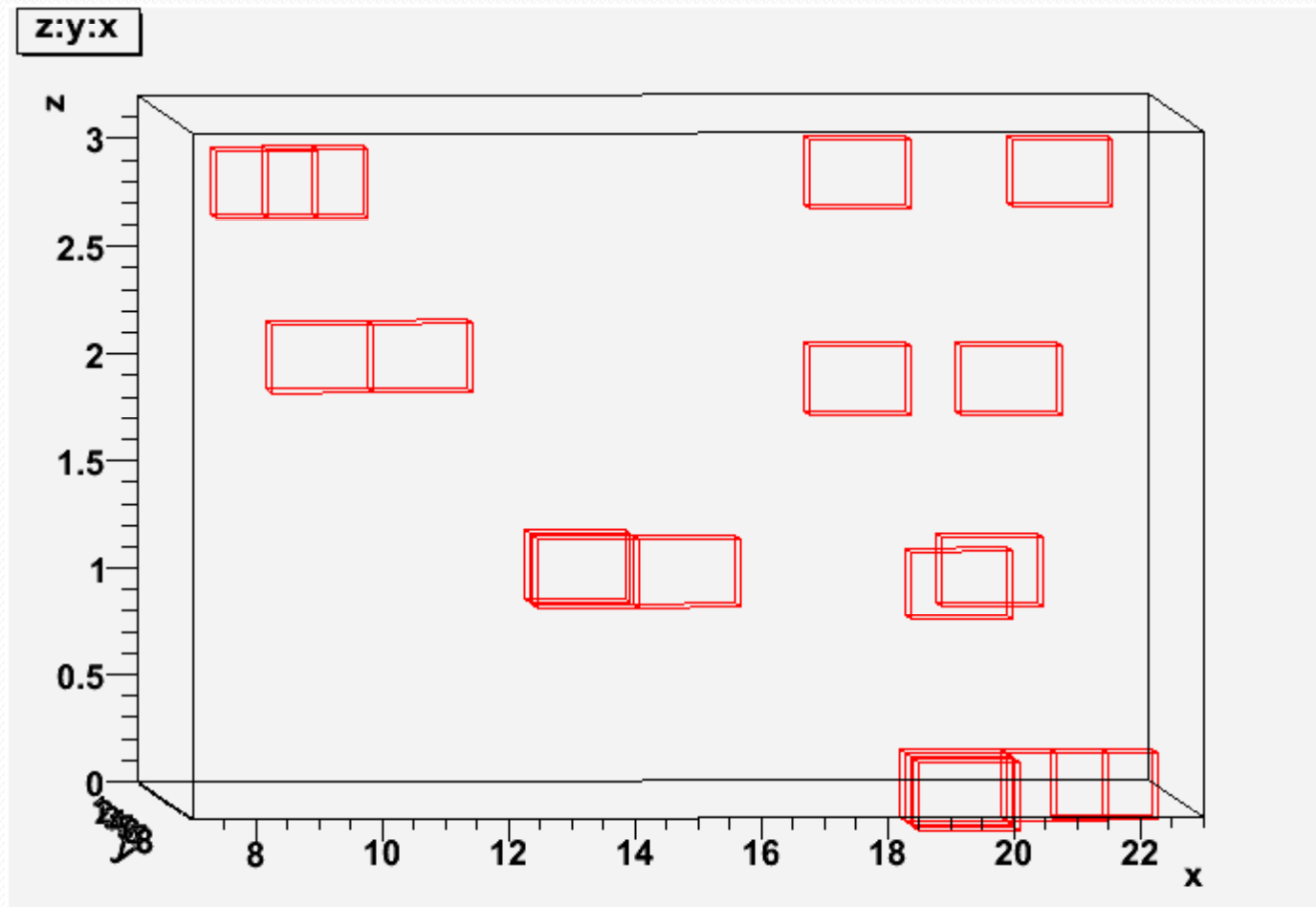
Problem:

1- Inclined Tracks



Tracks Reconstruction without position cuts

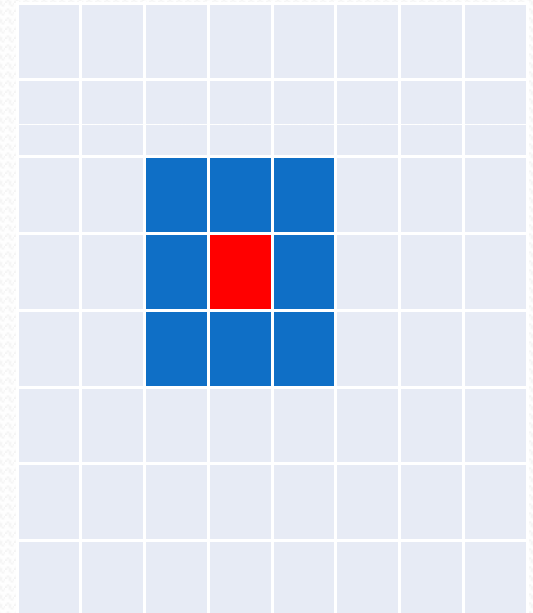
2- Interaction



Tracks Reconstruction with position cuts

Solution:

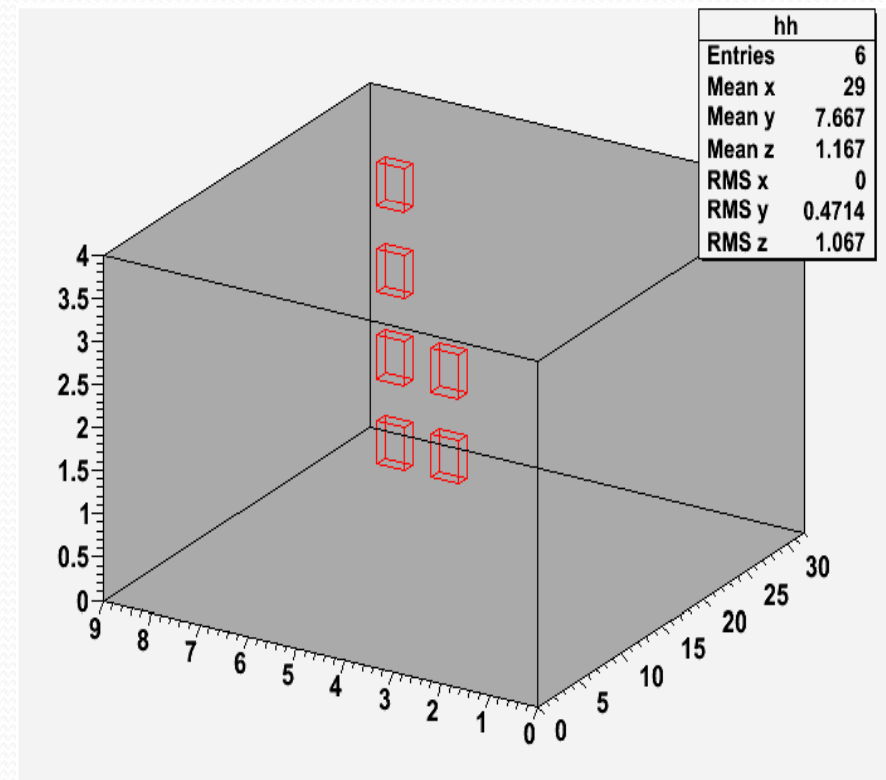
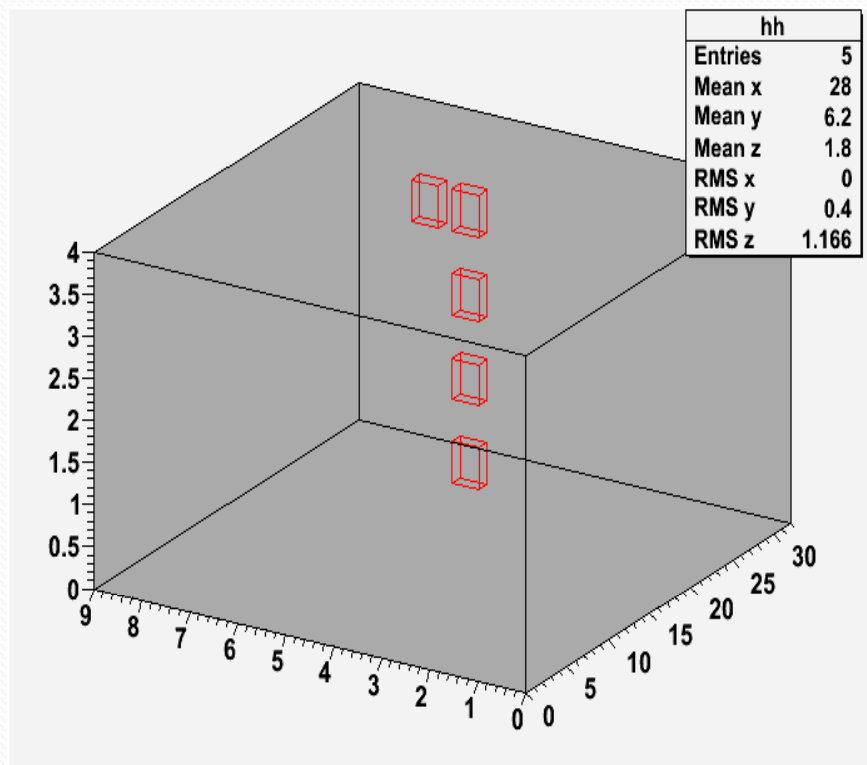
1. Take a first Hit in the first layer.
2. Select hits with time cuts.
3. Select hits with position cuts : ± 1 cm (1 pad) in X and Y.



→ Remove Inclined Tracks and Interaction Events

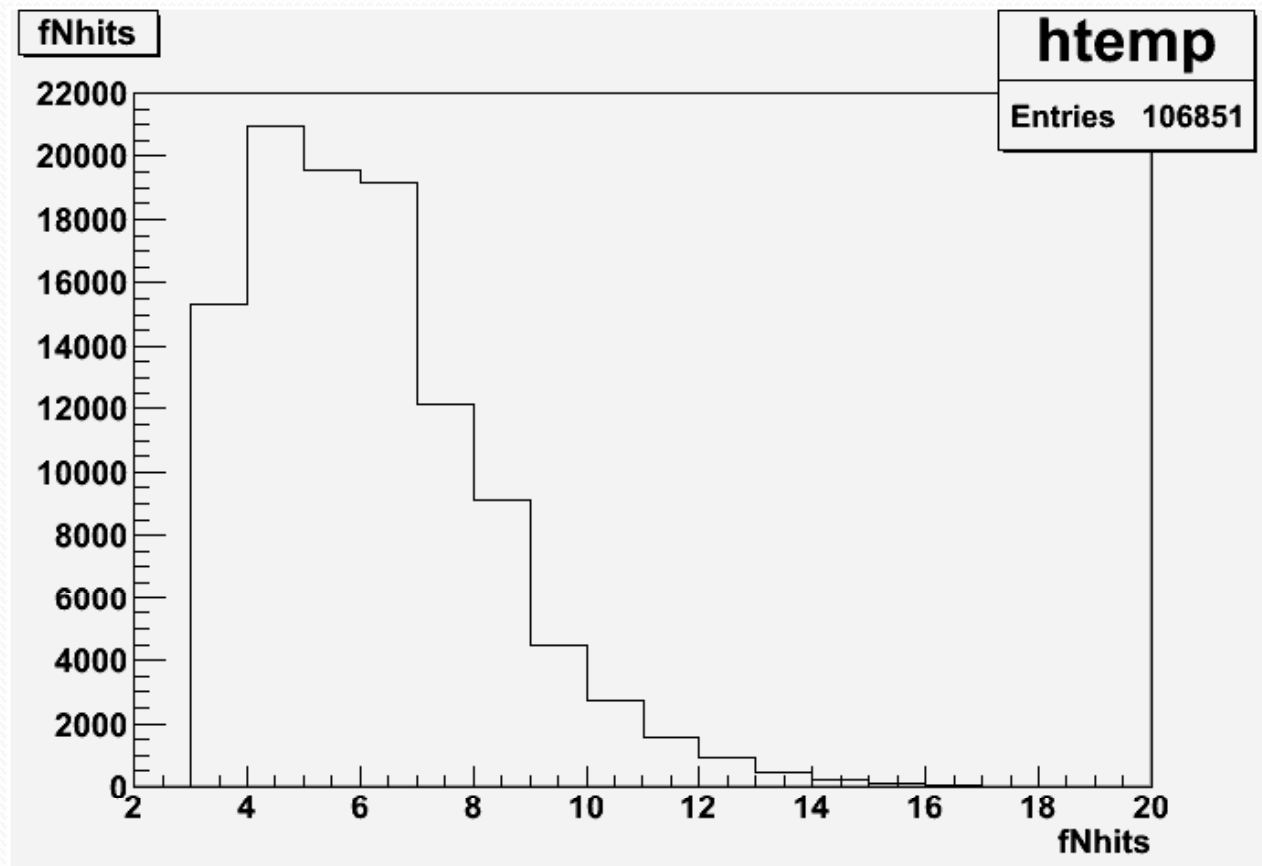
Tracks Reconstruction with position cuts

Result:



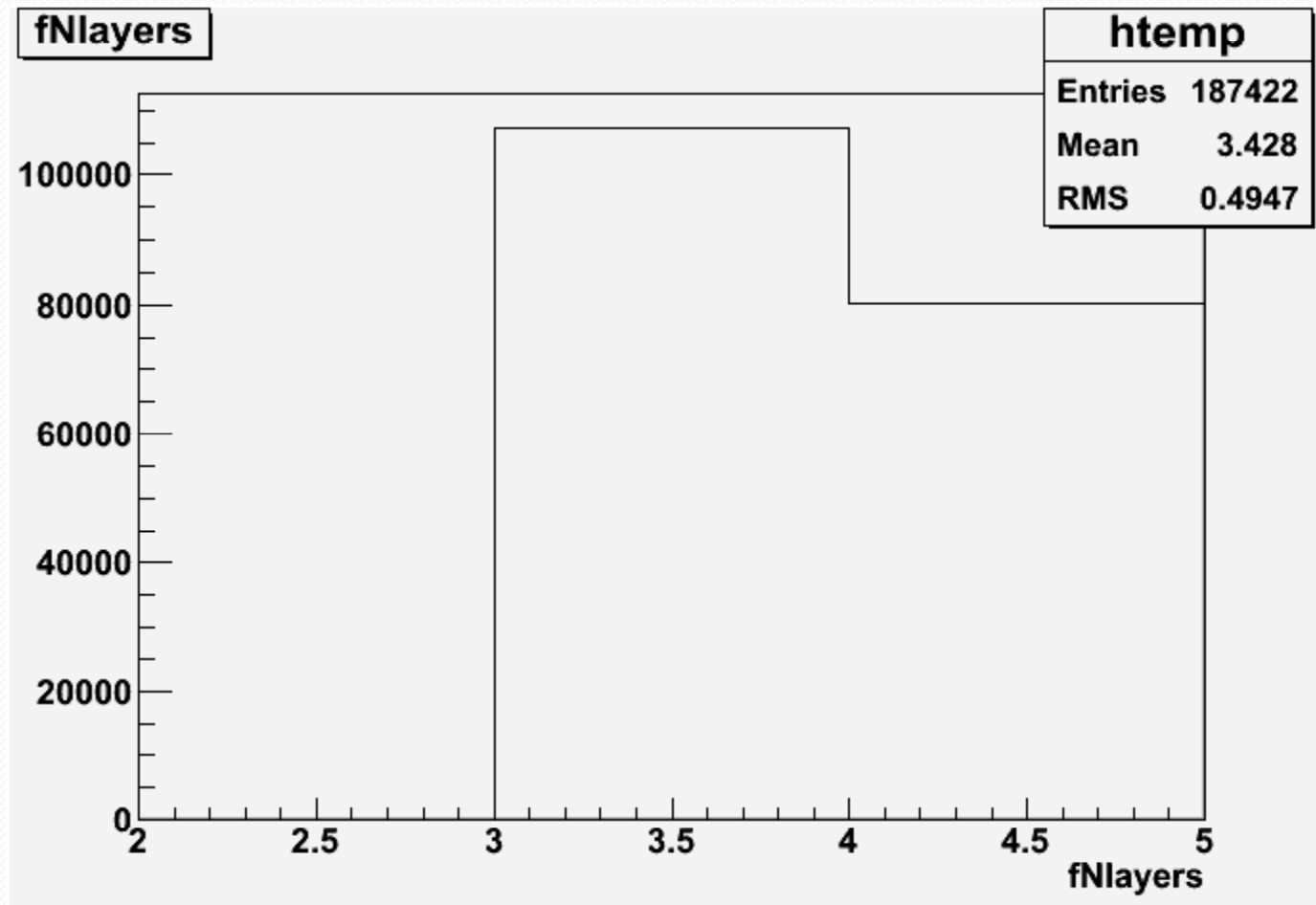
Quality Plots

Number of Hits:



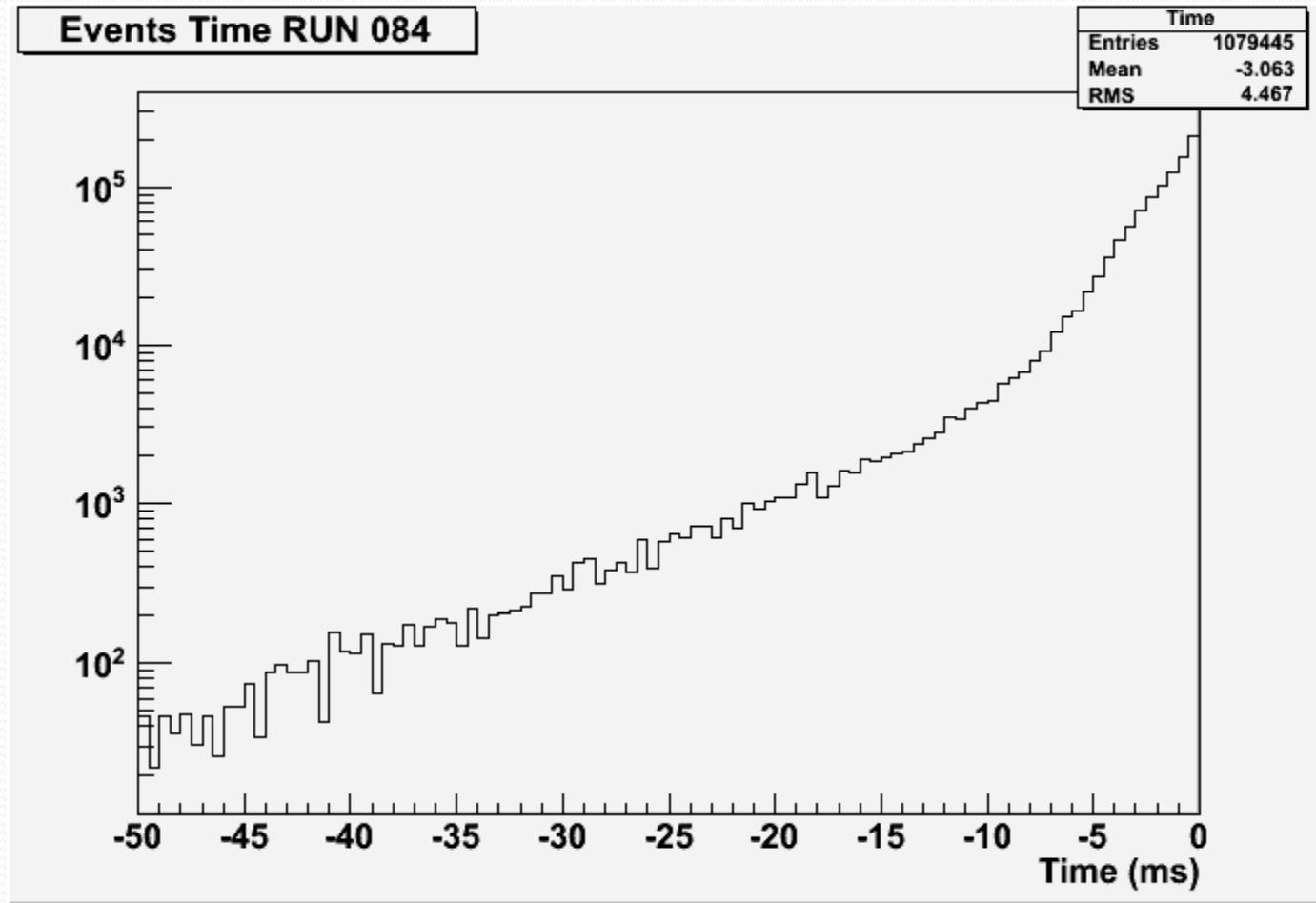
Quality Plots

Number of Track Layers:



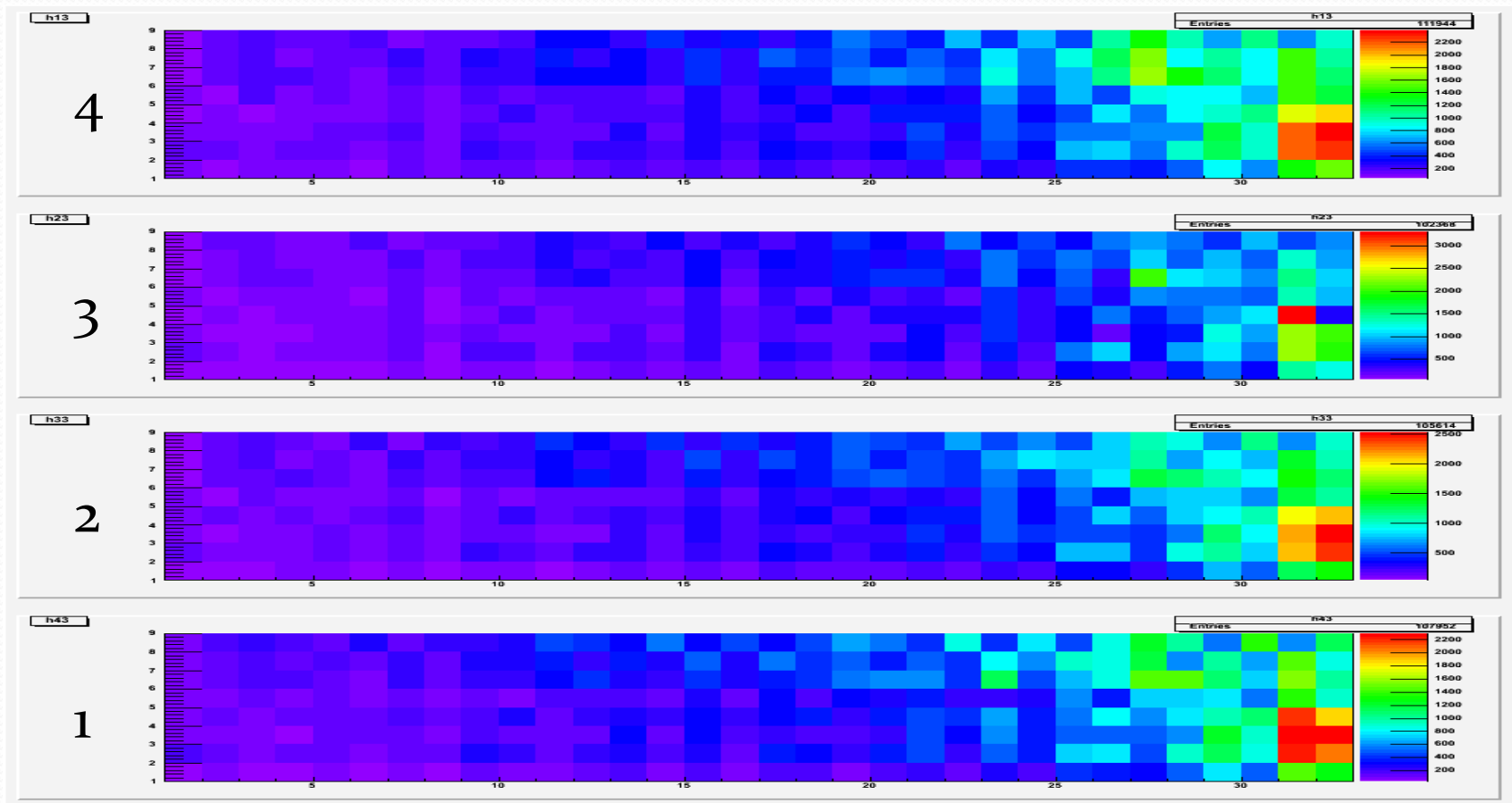
Quality Plots

Hits Time



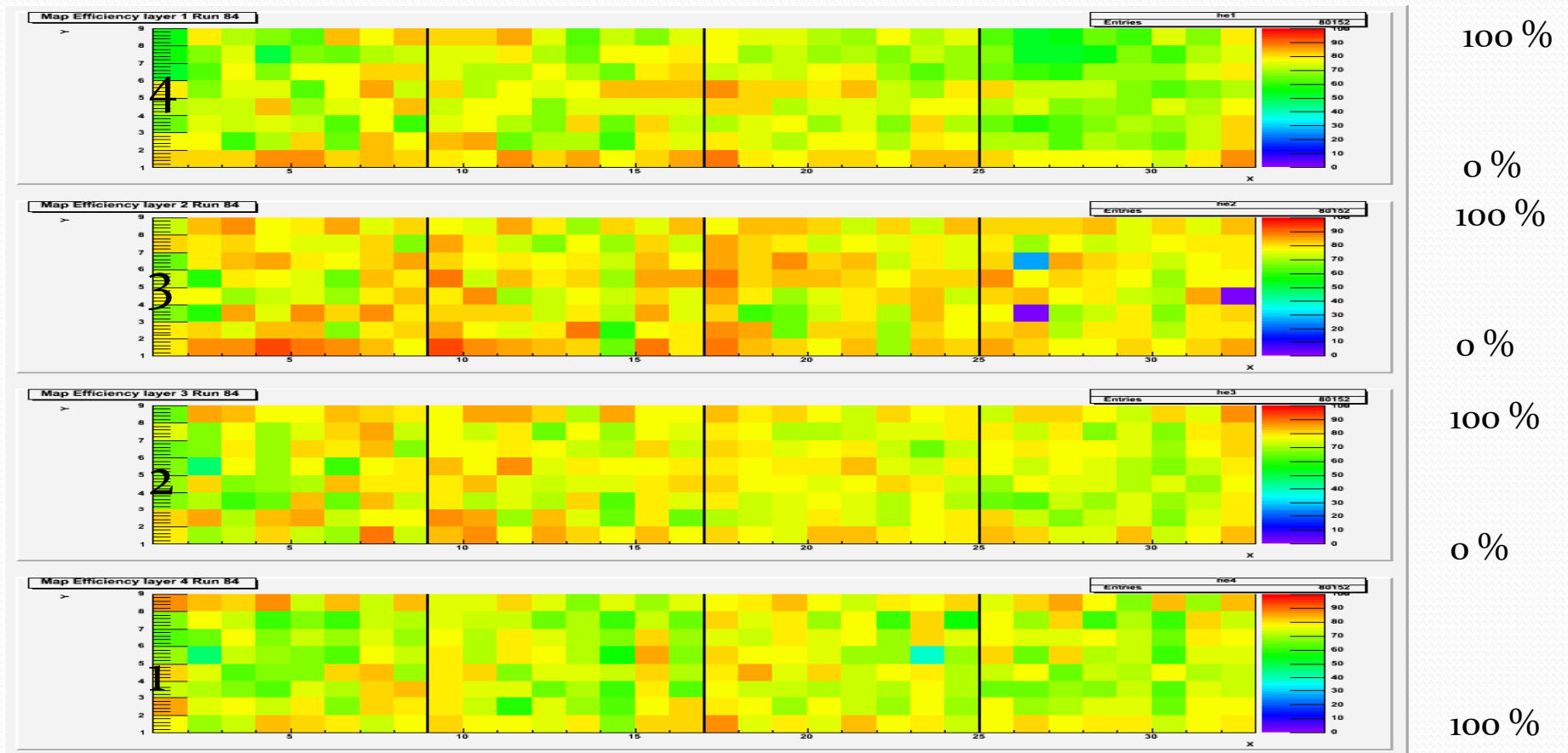
Efficiency Map

RUN084 Beam Profile:

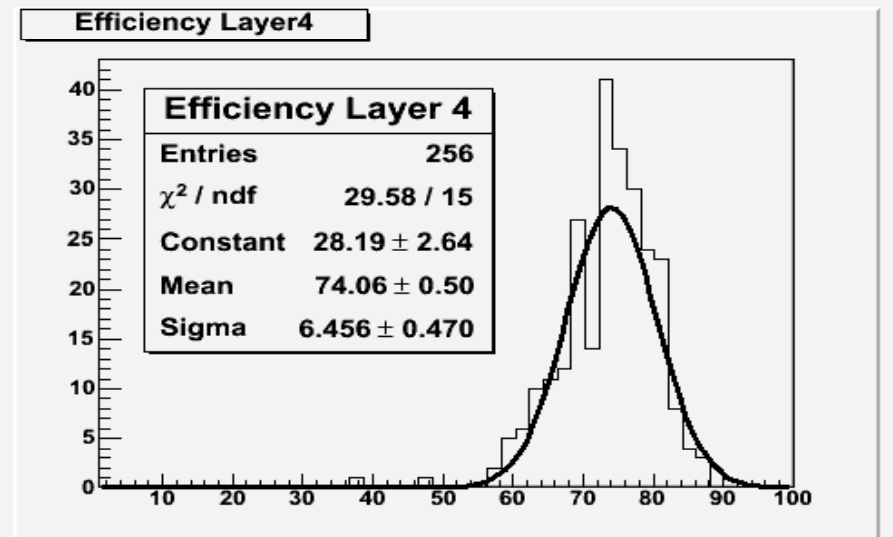
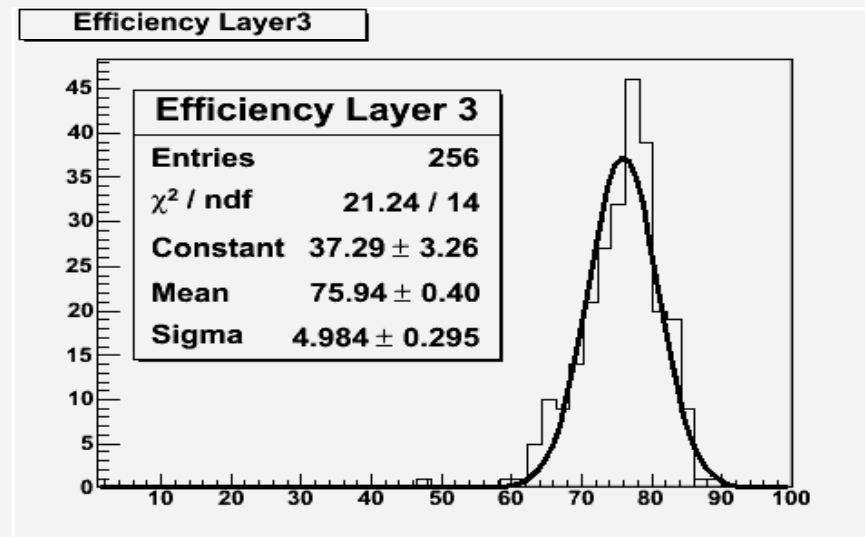
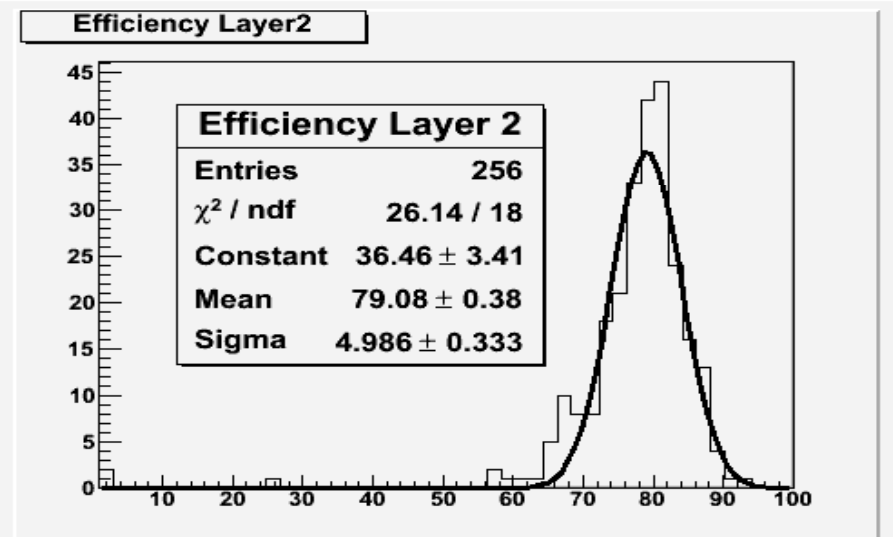
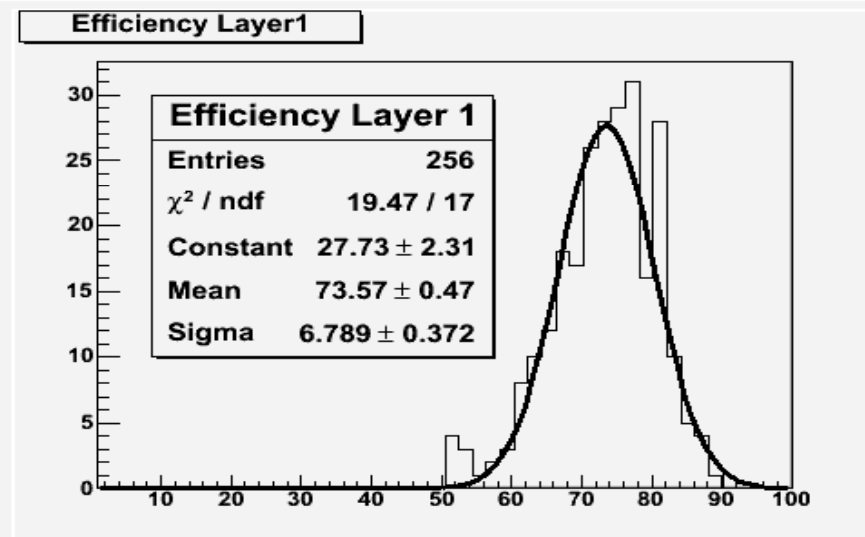


Efficiency Map

RUN084 Efficiency Map:



Efficiency Map



Conclusion

- ❑ All tools for time reconstruction of events
- ❑ Access to full detector history
- ❑ Study of different parameters
(Gaz, HV, Type of particles ..): Full efficiency study