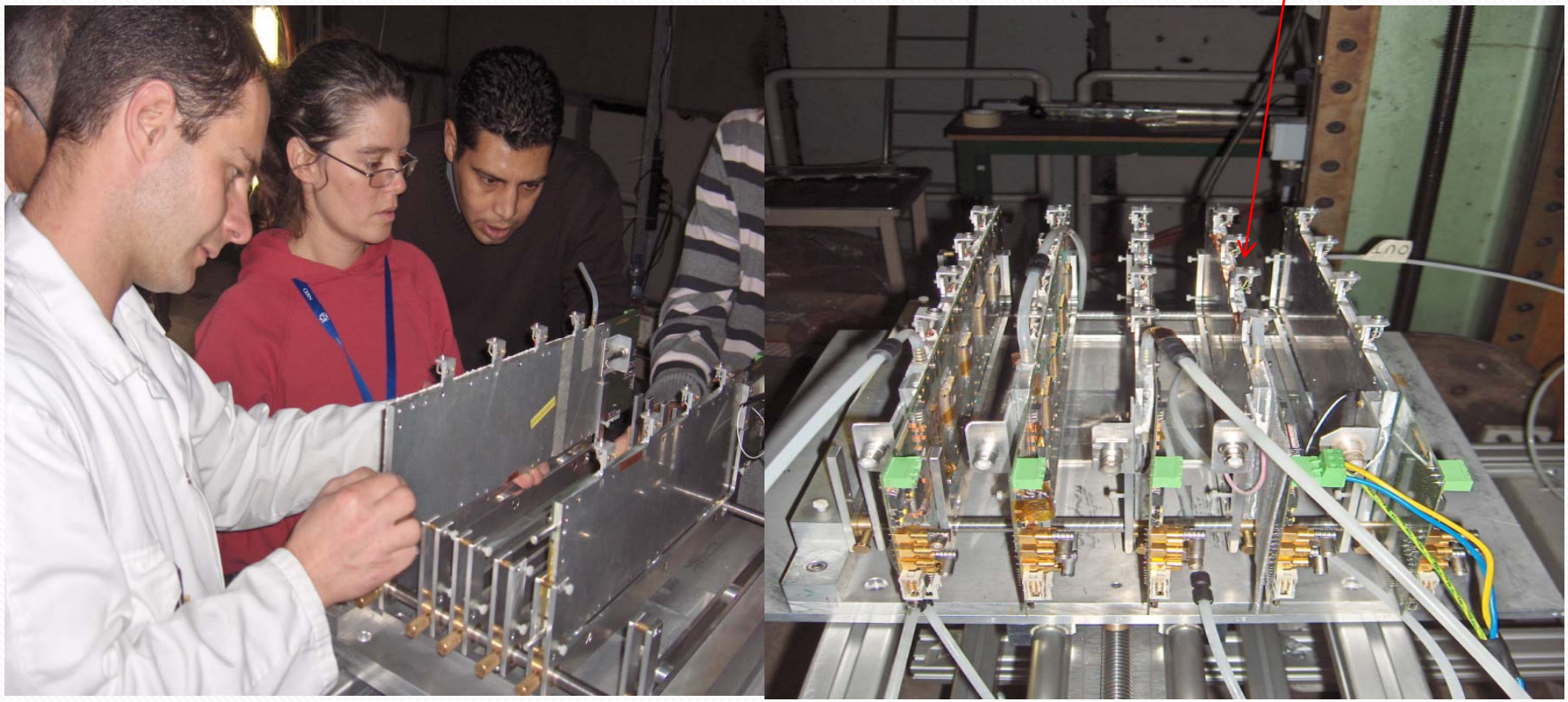
Noise Study of the GRPC Detector

1- Time Correlation and Efficiency of GRPC

2- Study of Noise Distribution for Different Runs

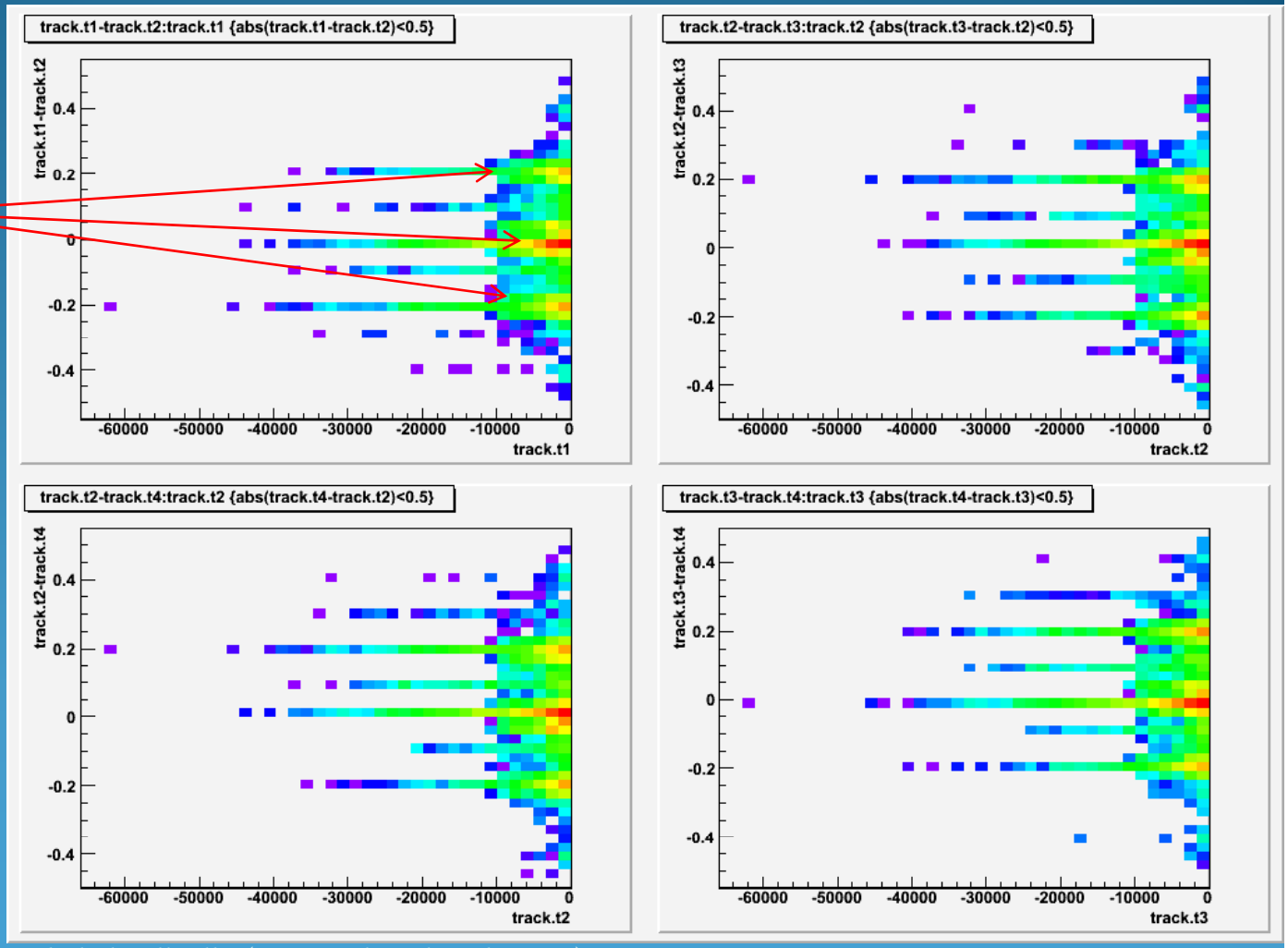
The TestBeam

- July-August 2008: 4 RPC 32×8 cm2
- November 2008: 5 RPC 32×8 cm2 (with one multi-gap RPC)



Time difference between hits in Asics

Peaks at 0 & ±200 ns



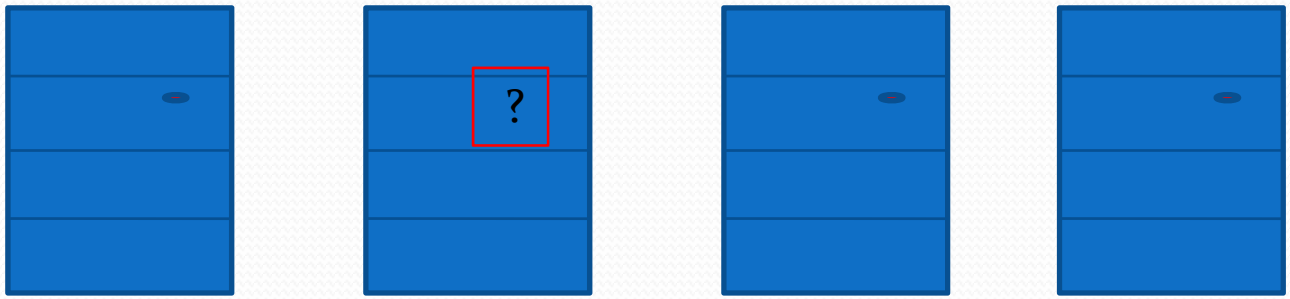
Study of the efficiency

Time selection & position selection

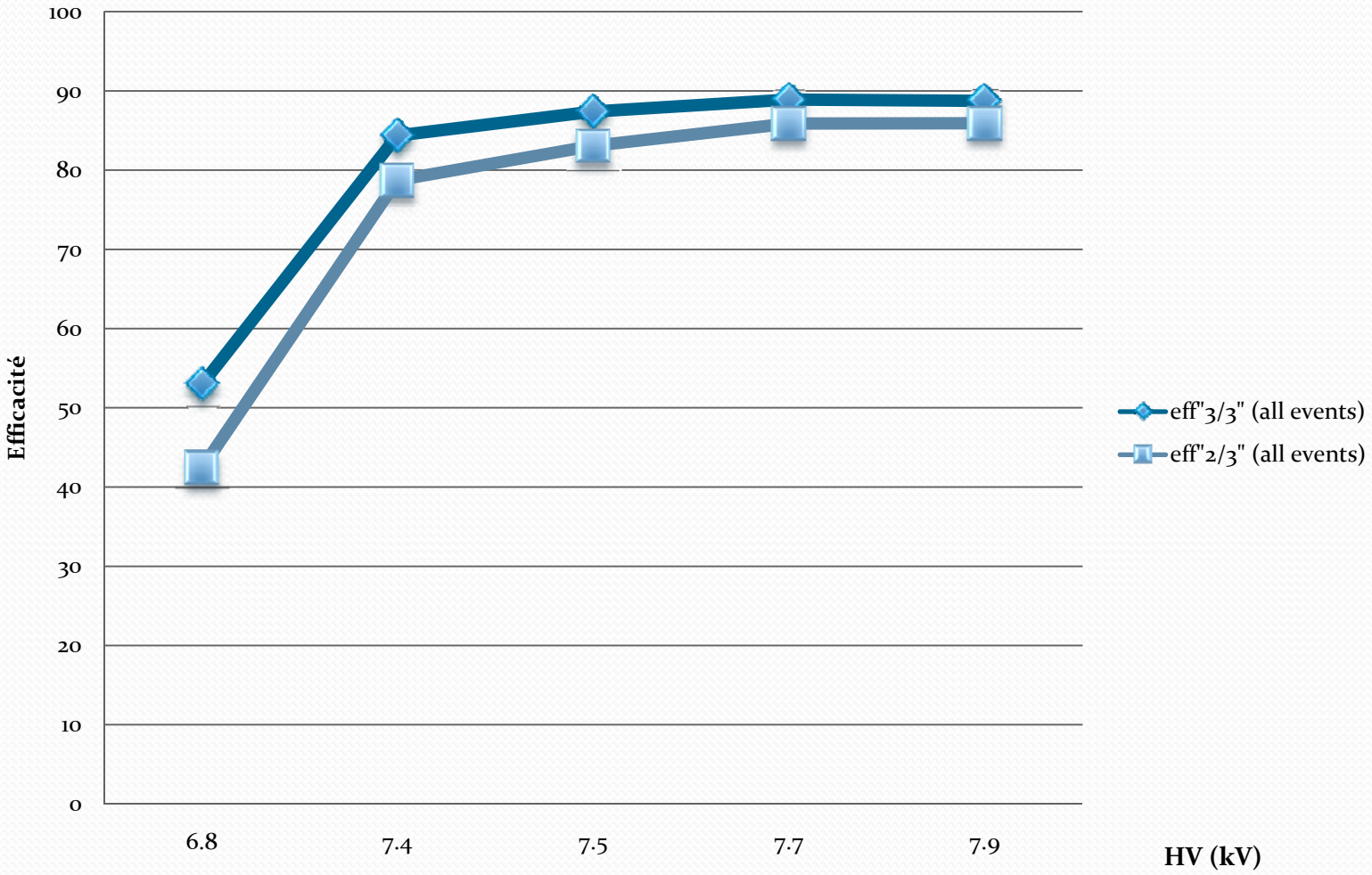
1. Time difference between hits < 300 ns
2. Reconstruction of tracks with projection on the next layer

➢Two Methods used to calculate the efficiency

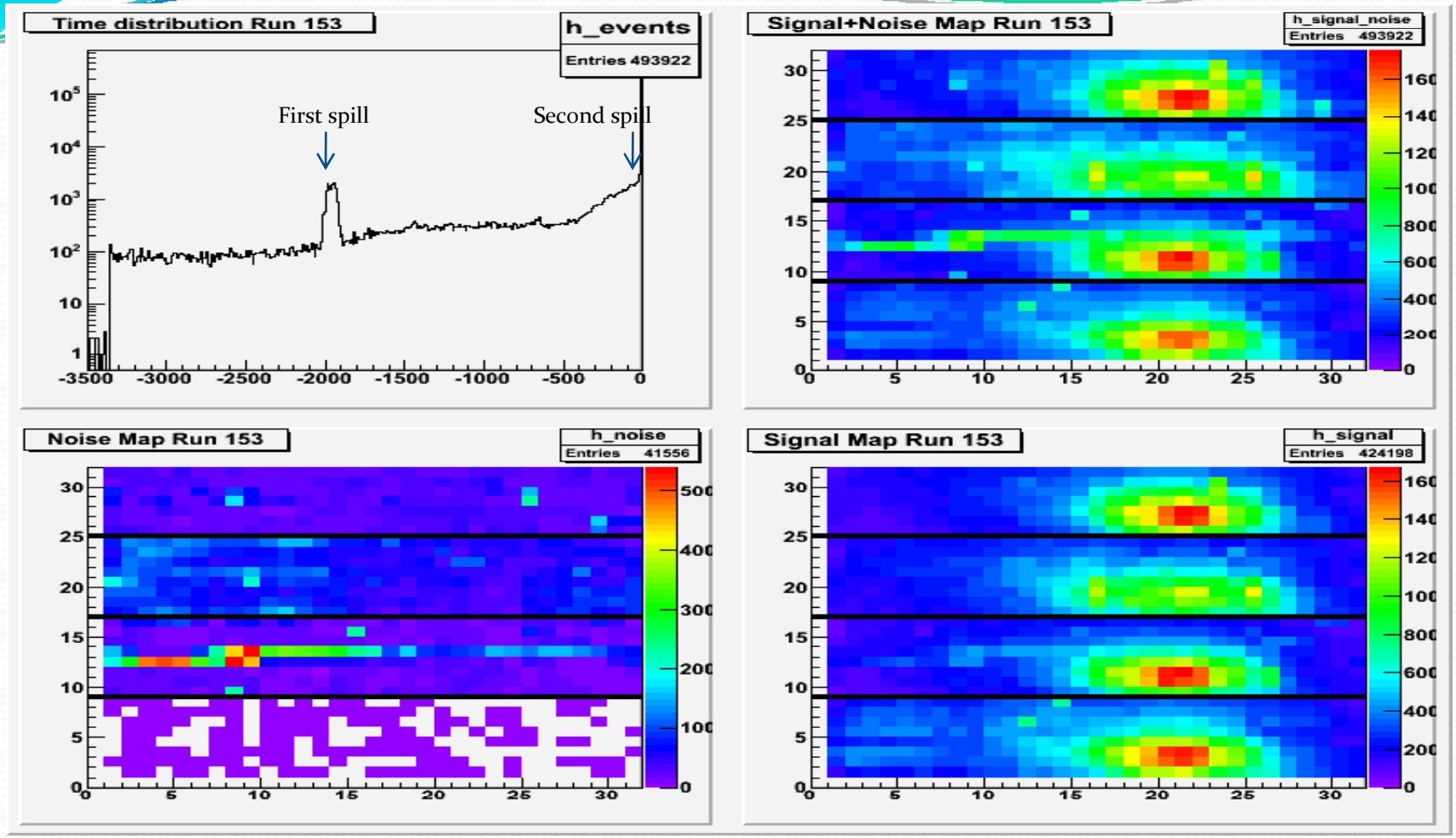
1. Select tracks with 3 hits and search the fourth in the other layers
2. Select tracks with at least hits and search the fourth in the other layers



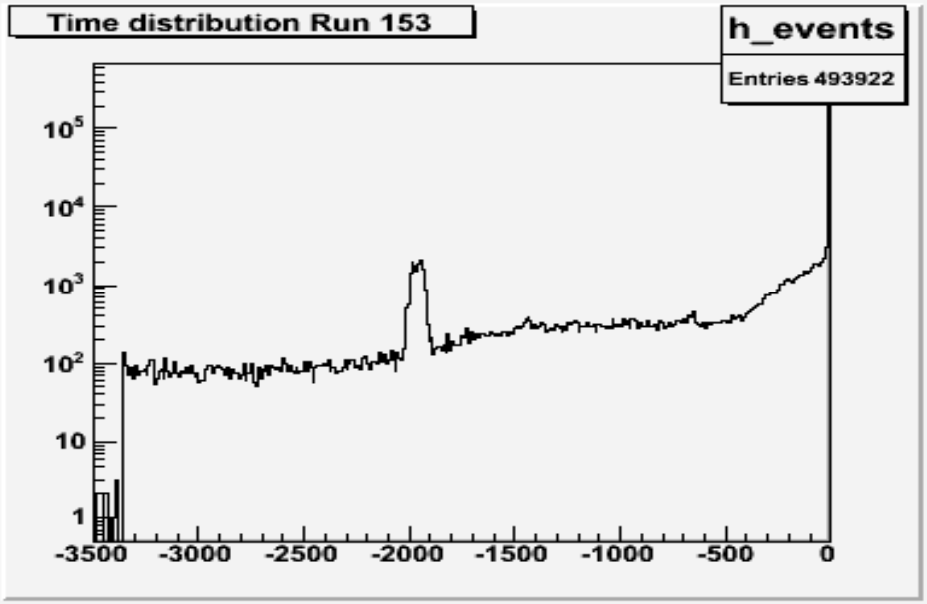
Efficiency vs HV

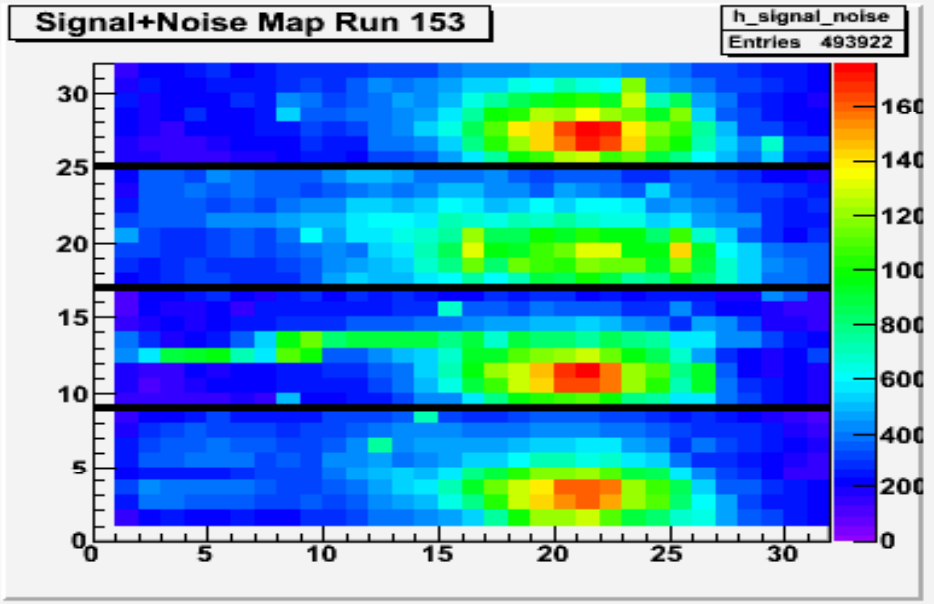


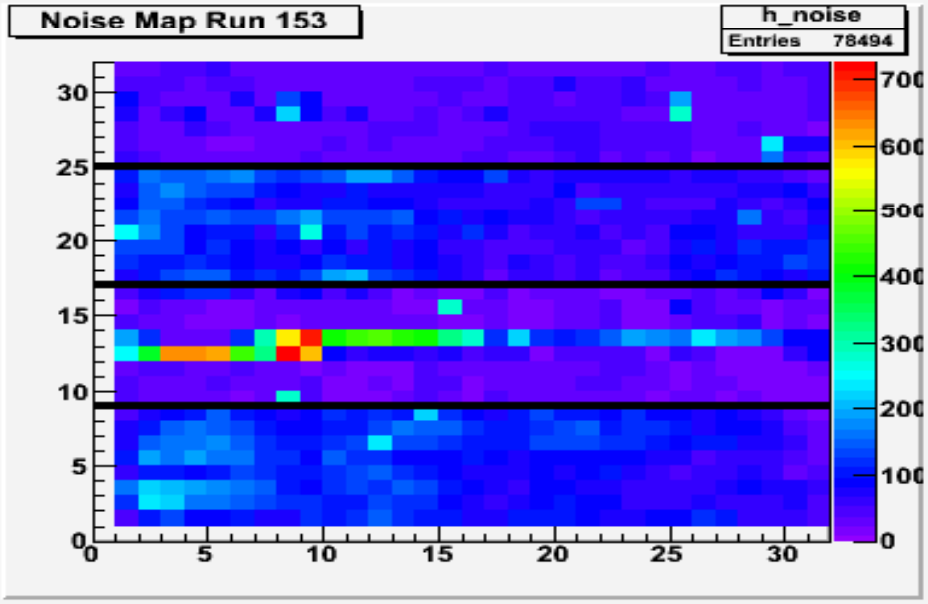
RUN 153: cut at -400 ms

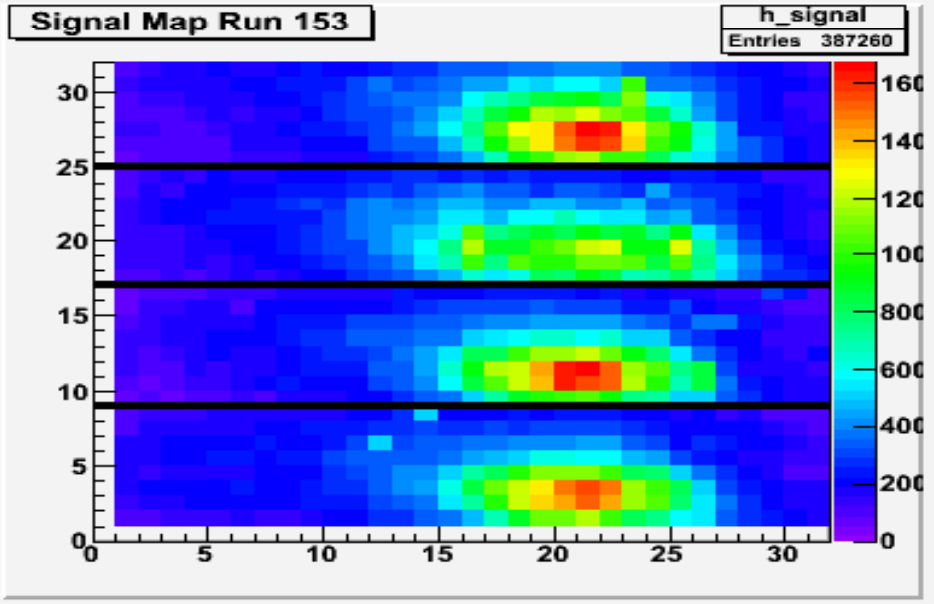


- Number of all hits ~ 493000
- Noise (between the two spills) ~ 41000
- Signal >-400 ms ~ 424000 → 86%

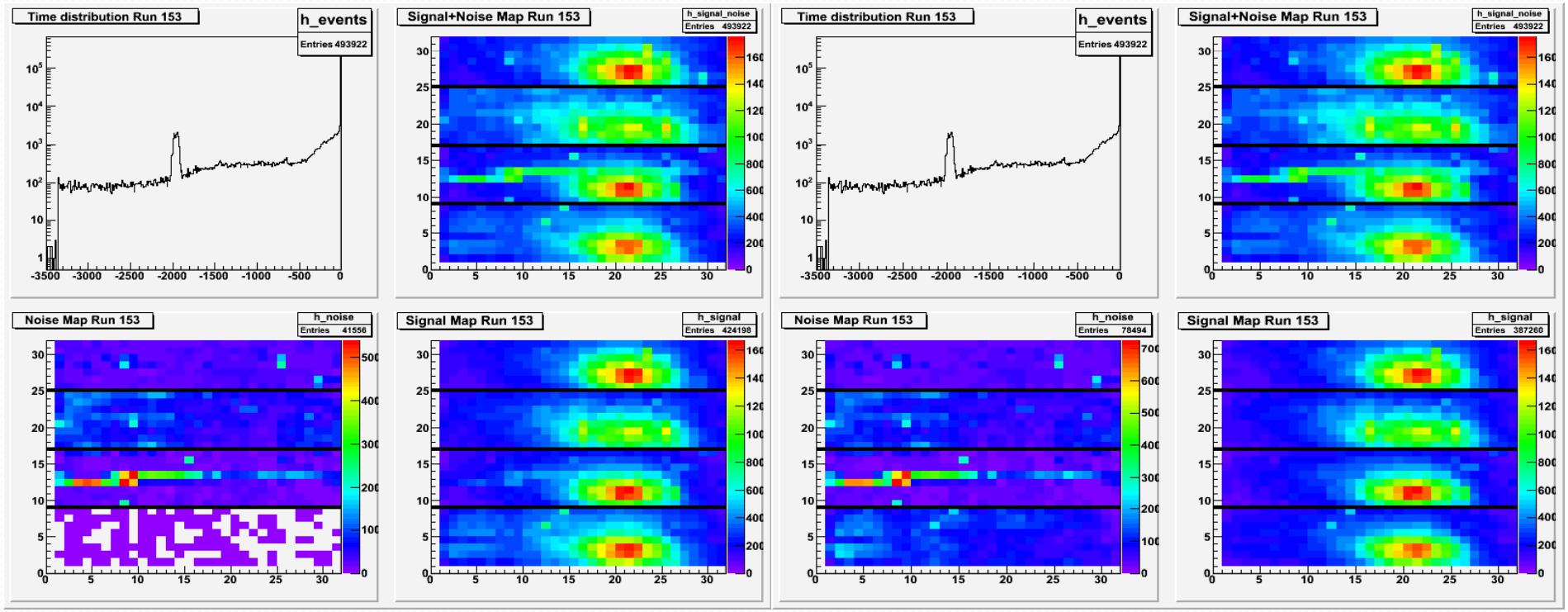

Time distribution Run 153
h_events
Entries 493922


Signal+Noise Map Run 153
h_signal_noise
Entries 493922


Noise Map Run 153
h_noise
Entries 78494


Signal Map Run 153
h_signal
Entries 387260

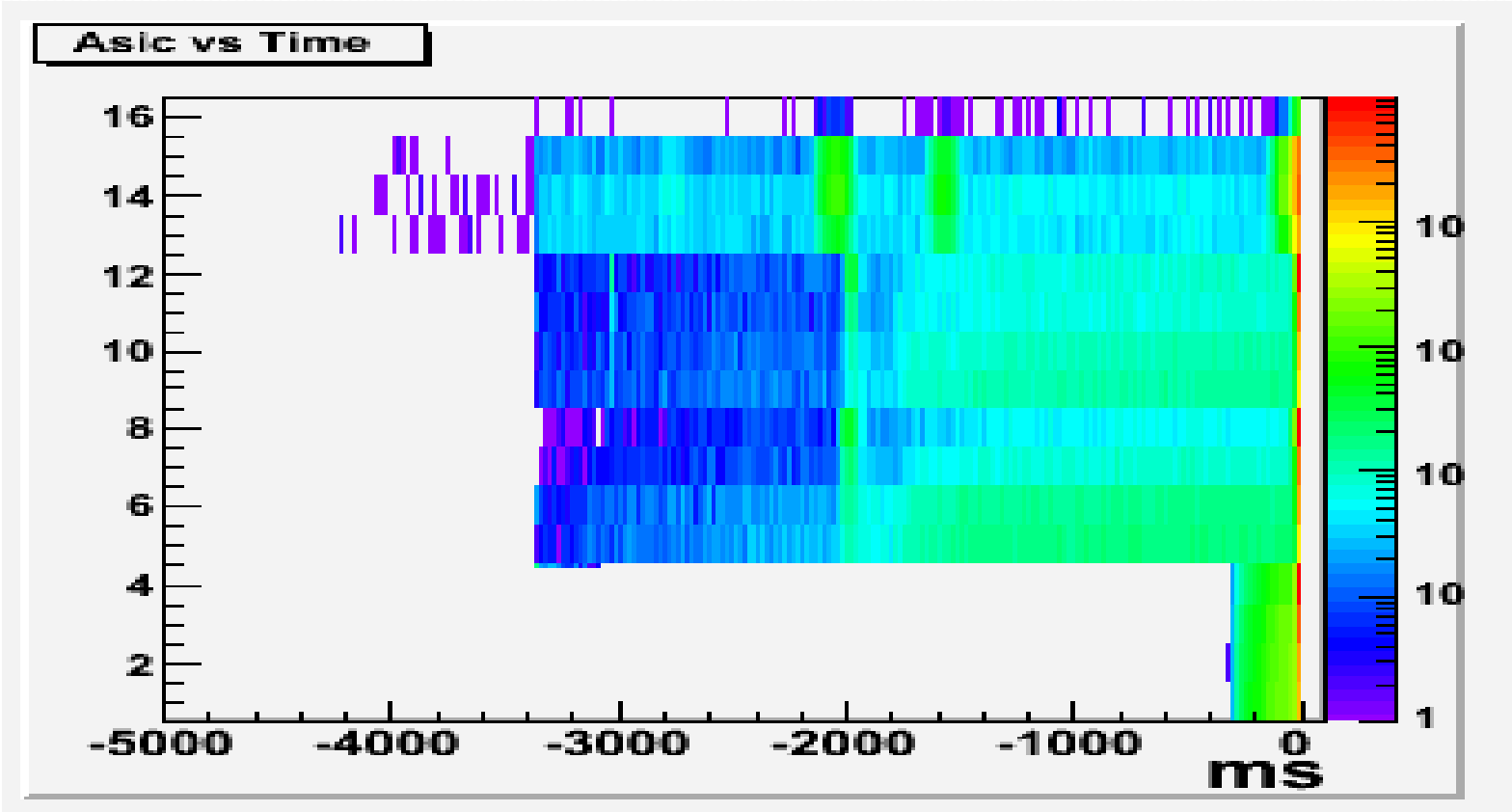
What's the difference????

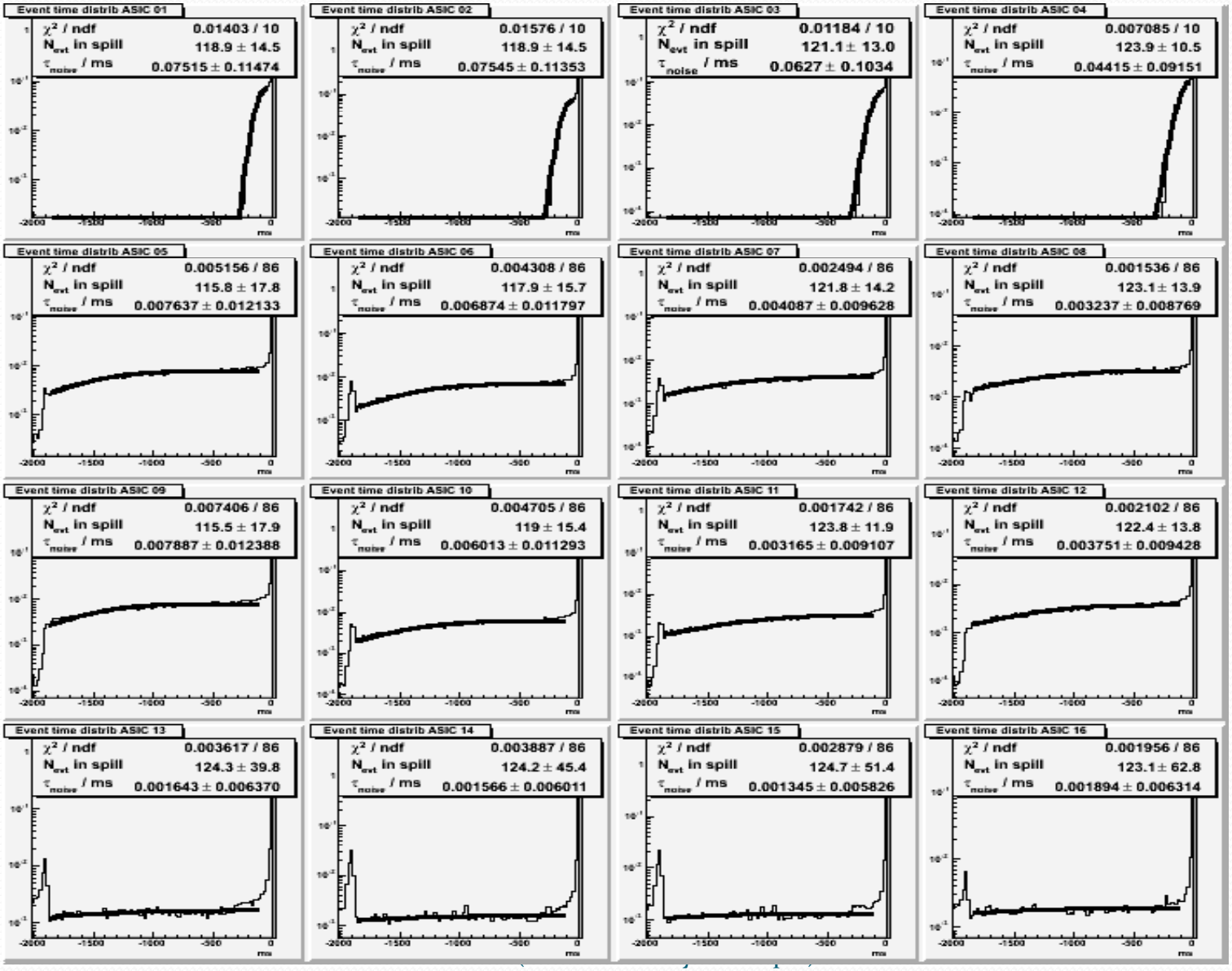


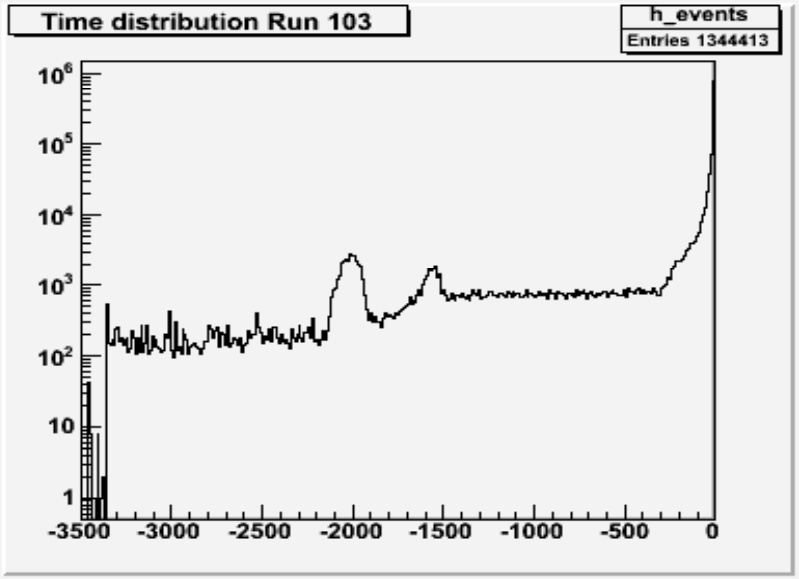
- ❑Number of all hits ~ 493000
- ❑Noise (between the two spills) ~ 41000
- ❑Signal >-400 ms ~ 424000 → 85%

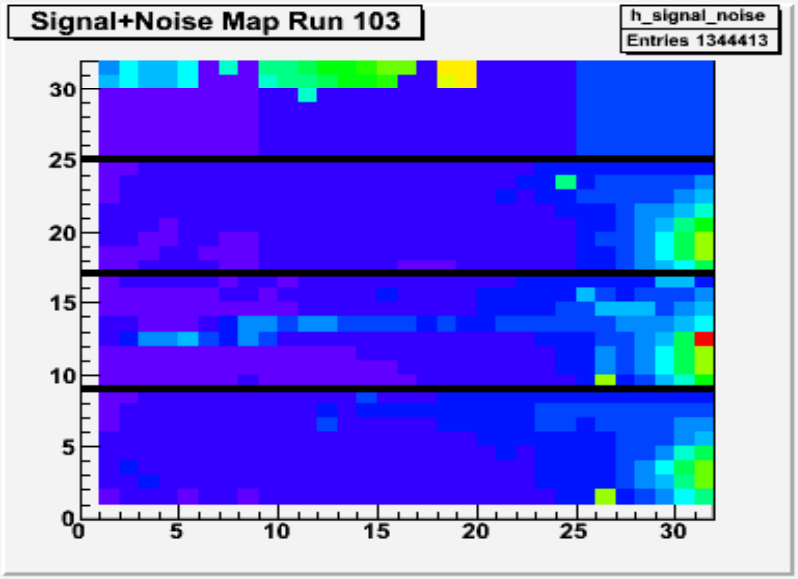
- ❑Number of all hits ~ 493000
- ❑Noise (between the two spills) ~ 78000
- ❑Signal >-50ms ~ 387000 → 78%

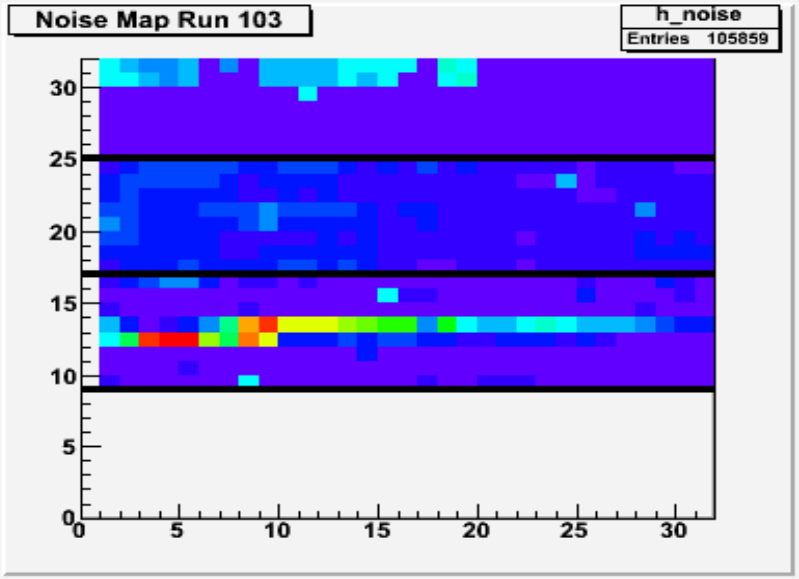
But there is a problem !

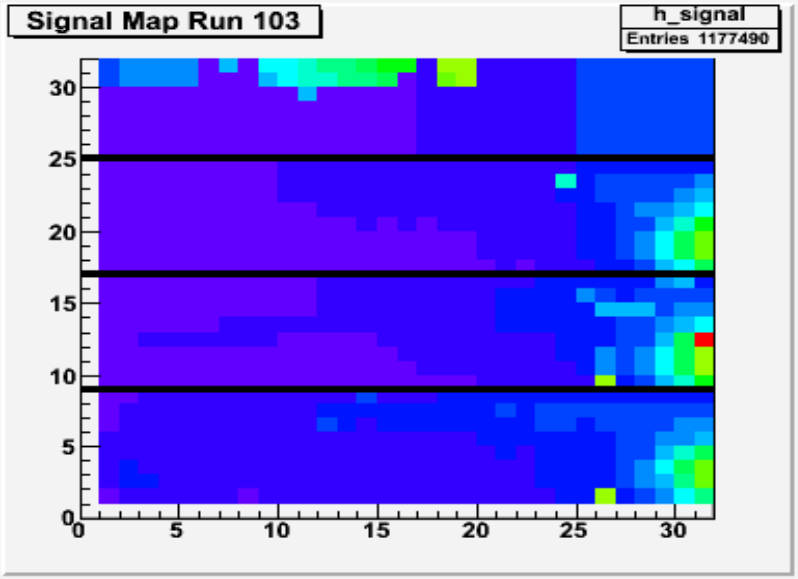



Event time distrib ASIC 01
χ² / ndf 0.01403 / 10
N_evt in spill 118.9 ± 14.5
τ_noise / ms 0.07515 ± 0.11474
Event time distrib ASIC 02
χ² / ndf 0.01576 / 10
N_evt in spill 118.9 ± 14.5
τ_noise / ms 0.07545 ± 0.11353
Event time distrib ASIC 03
χ² / ndf 0.01184 / 10
N_evt in spill 121.1 ± 13.0
τ_noise / ms 0.0627 ± 0.1034
Event time distrib ASIC 04
χ² / ndf 0.007085 / 10
N_evt in spill 123.9 ± 10.5
τ_noise / ms 0.04415 ± 0.09151
Event time distrib ASIC 05
χ² / ndf 0.005156 / 86
N_evt in spill 115.8 ± 17.8
τ_noise / ms 0.007637 ± 0.012133
Event time distrib ASIC 06
χ² / ndf 0.004308 / 86
N_evt in spill 117.9 ± 15.7
τ_noise / ms 0.006874 ± 0.011797
Event time distrib ASIC 07
χ² / ndf 0.002494 / 86
N_evt in spill 121.8 ± 14.2
τ_noise / ms 0.004087 ± 0.009628
Event time distrib ASIC 08
χ² / ndf 0.001536 / 86
N_evt in spill 123.1 ± 13.9
τ_noise / ms 0.003237 ± 0.008769
Event time distrib ASIC 09
χ² / ndf 0.007406 / 86
N_evt in spill 115.5 ± 17.9
τ_noise / ms 0.007887 ± 0.012388
Event time distrib ASIC 10
χ² / ndf 0.004705 / 86
N_evt in spill 119 ± 15.4
τ_noise / ms 0.006013 ± 0.011293
Event time distrib ASIC 11
χ² / ndf 0.001742 / 86
N_evt in spill 123.8 ± 11.9
τ_noise / ms 0.003165 ± 0.009107
Event time distrib ASIC 12
χ² / ndf 0.002102 / 86
N_evt in spill 122.4 ± 13.8
τ_noise / ms 0.003751 ± 0.009428
Event time distrib ASIC 13
χ² / ndf 0.003617 / 86
N_evt in spill 124.3 ± 39.8
τ_noise / ms 0.001643 ± 0.006370
Event time distrib ASIC 14
χ² / ndf 0.003887 / 86
N_evt in spill 124.2 ± 45.4
τ_noise / ms 0.001566 ± 0.006011
Event time distrib ASIC 15
χ² / ndf 0.002879 / 86
N_evt in spill 124.7 ± 51.4
τ_noise / ms 0.001345 ± 0.005826
Event time distrib ASIC 16
χ² / ndf 0.001956 / 86
N_evt in spill 123.1 ± 62.8
τ_noise / ms 0.001894 ± 0.006314

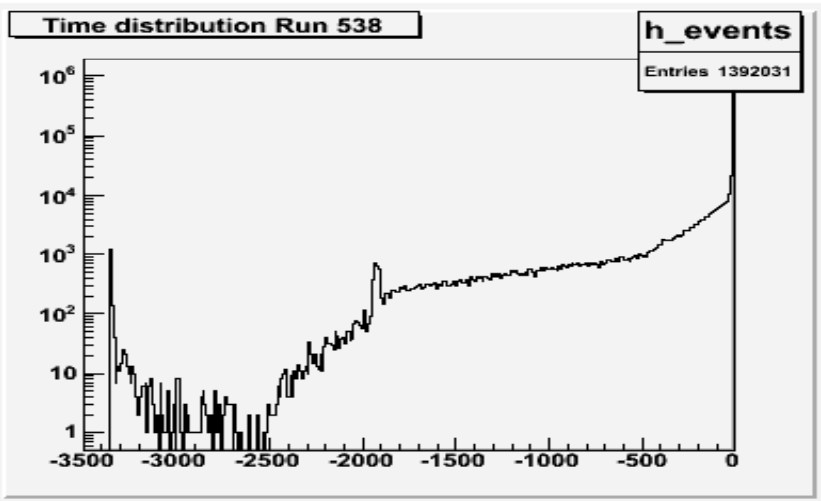

Time distribution Run 103
h_events
Entries 1344413

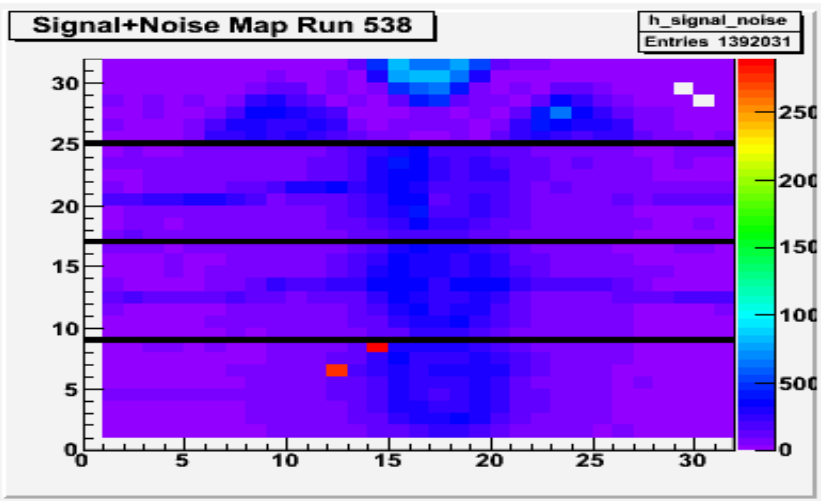

Signal+Noise Map Run 103
h_signal_noise
Entries 1344413

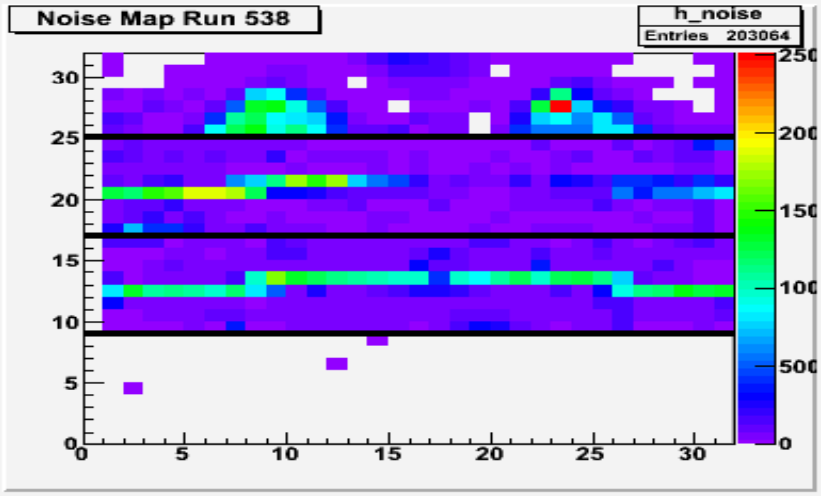

Noise Map Run 103
h_noise
Entries 105859

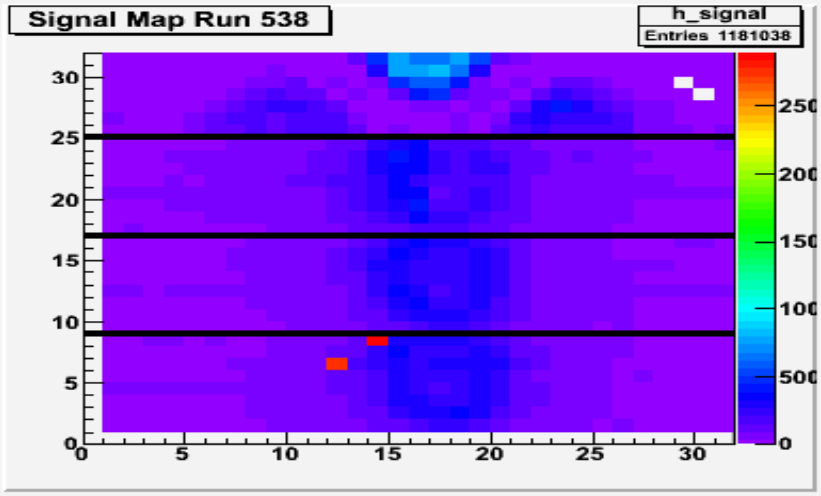

Signal Map Run 103
h_signal
Entries 1177490

The multi-gap chamber
Cut at -50 ms









Conclusion

- Noise distribution shows some problems with fishing line
- Cut at -50 ms gives 78% of events

Next steps:

- Making a map of efficiency
- Reconstruction of tracks and study of multiplicity and alignement problems

Merci pour votre attention
and sorry for my bad english