RPC Timing Results with Final Receivers

Gianpaolo Carlino

INFN Napoli

The Napoli RPC Group:

M.Alviggi, V. Canale, M. Caprio, G.C., R. de Asmundis, M. Della Pietra, D. Della Volpe, P.Iengo, S.Patricelli, L.Romano, G. Sekhniaidze

Outline

- Napoli Test Station
- Efficiency and Multiplicity Measurements
- RPC Time Distributions with Final Receivers
- Comparison between Standard and Wired OR Strip Readout as a function of threshold
- Conclusions

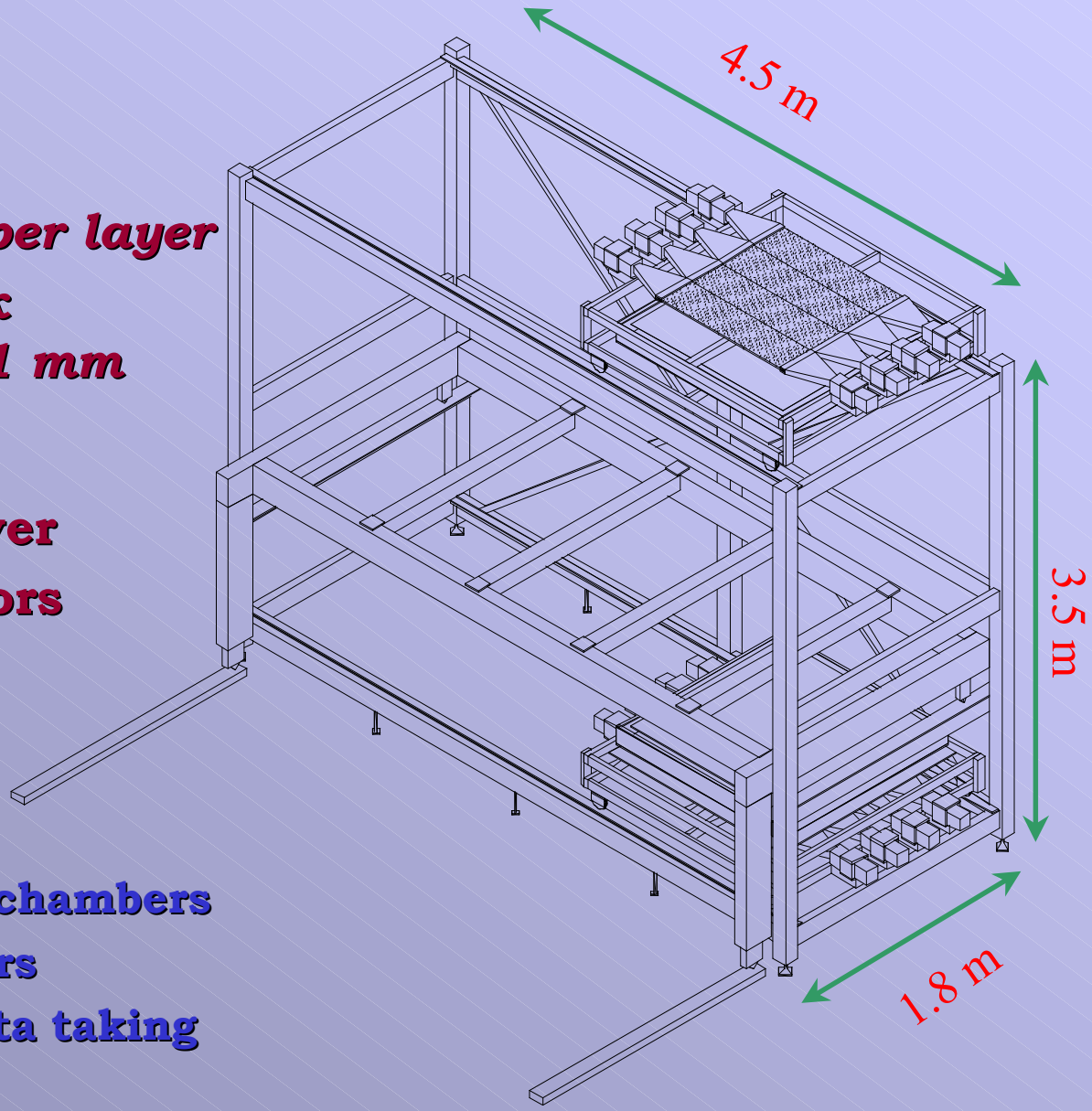
The Test Station

Tracking system

- ***2 Drift chambers***
- ***2 x and 2 y plane per layer***
- ***Resolution in track reconstruction σ ~1 mm***

Trigger

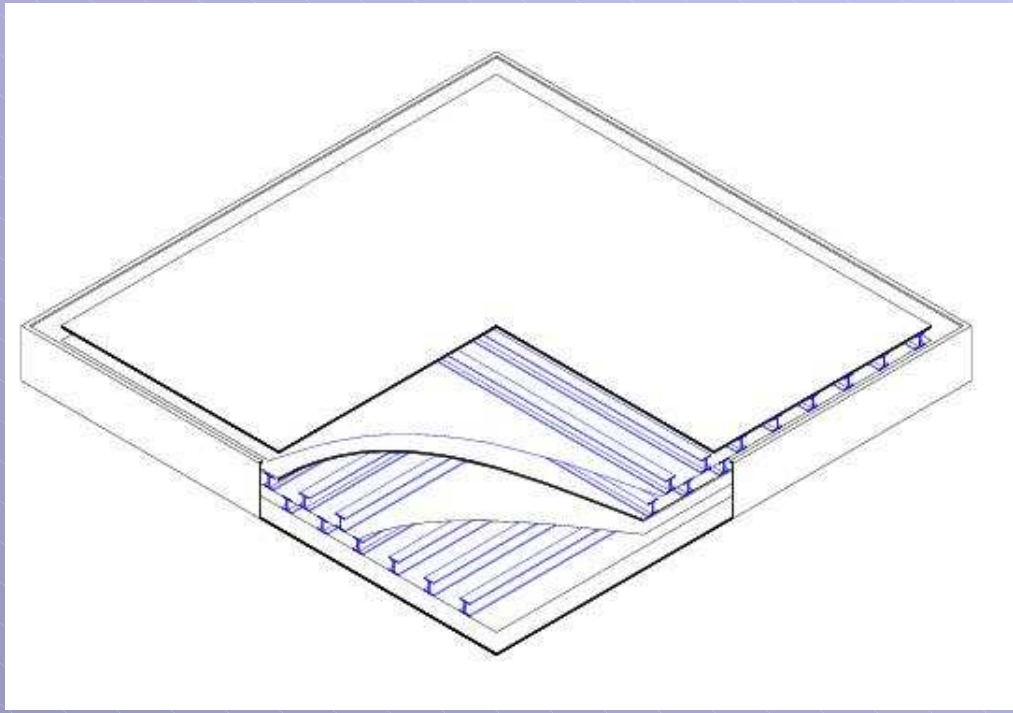
- **TOP & BOTTOM layer**
- **2 x 1 m^2 scintillators**



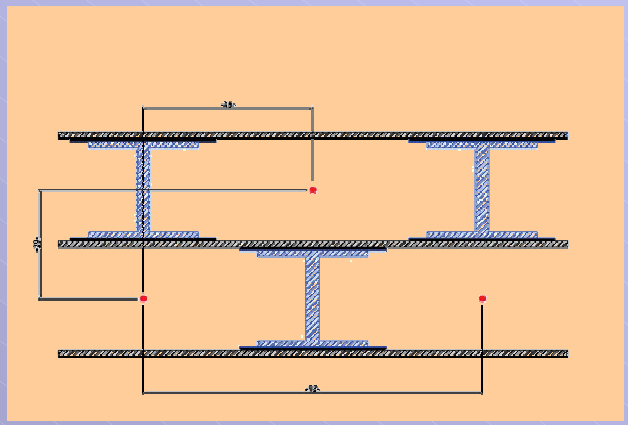
The 2 modules housing scintillators & tracking chambers are moved by step motors automatically during data taking

The Drift chambers

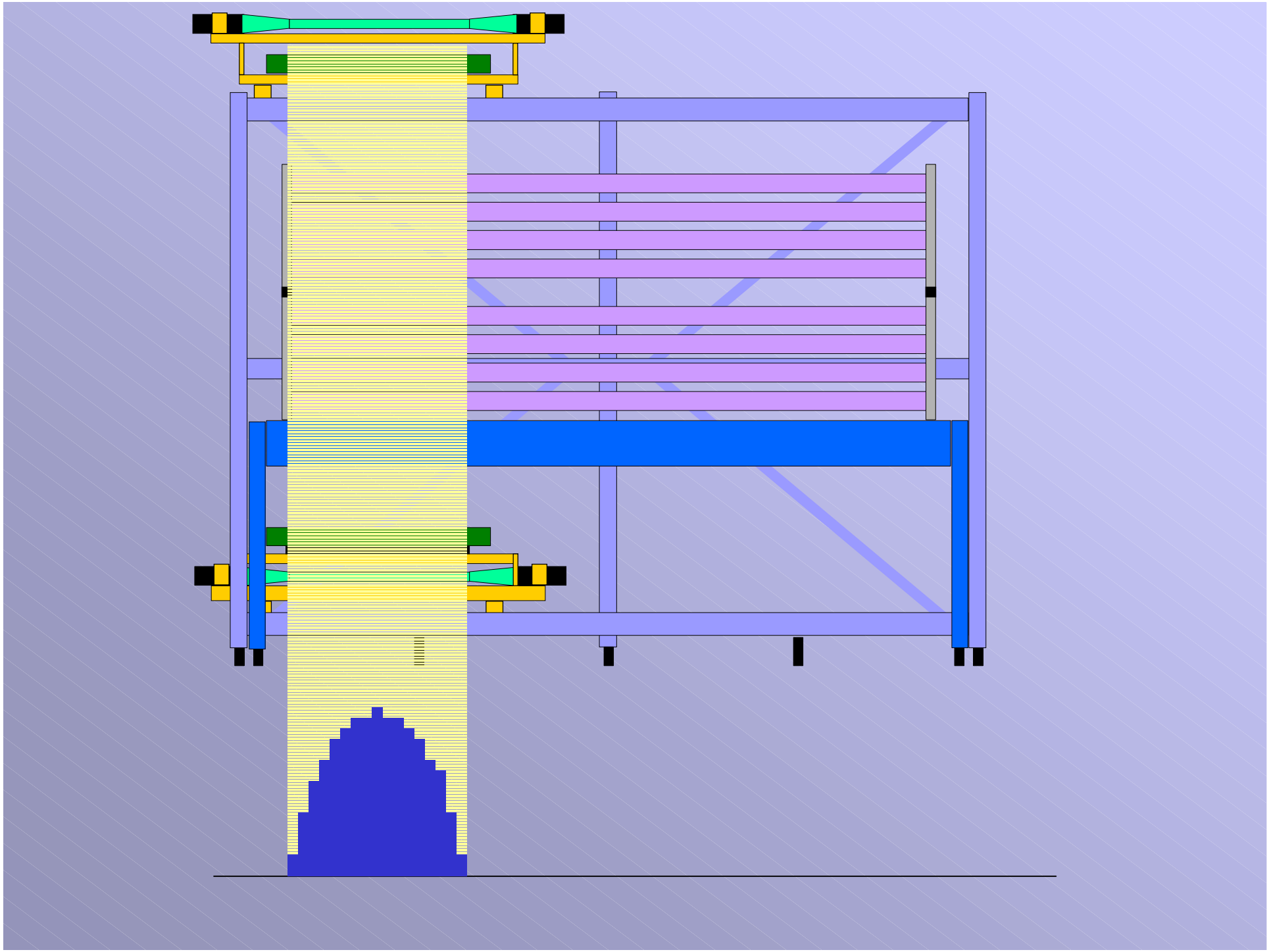
Each chambers has 2 X layers and 2 Y layers

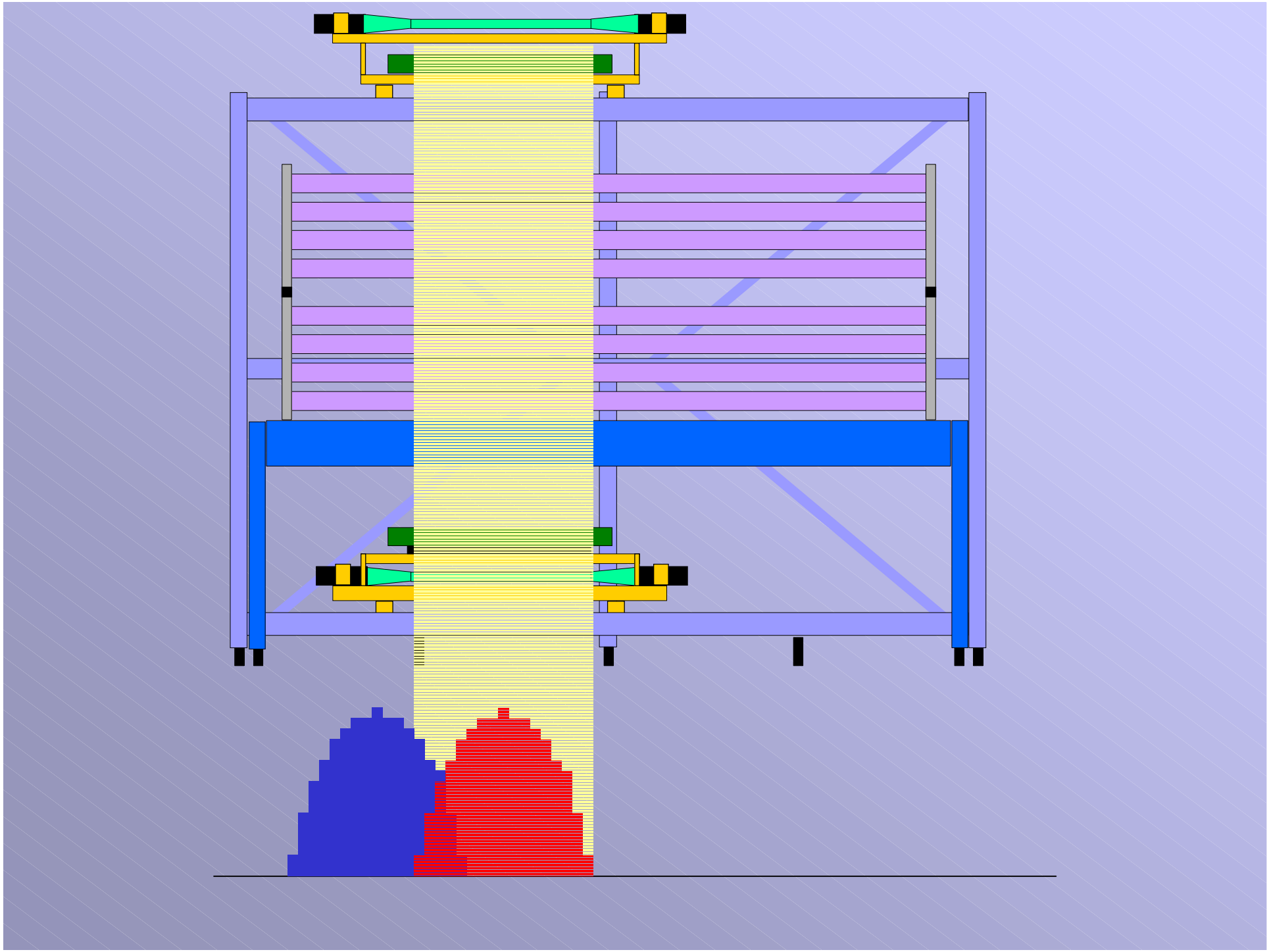


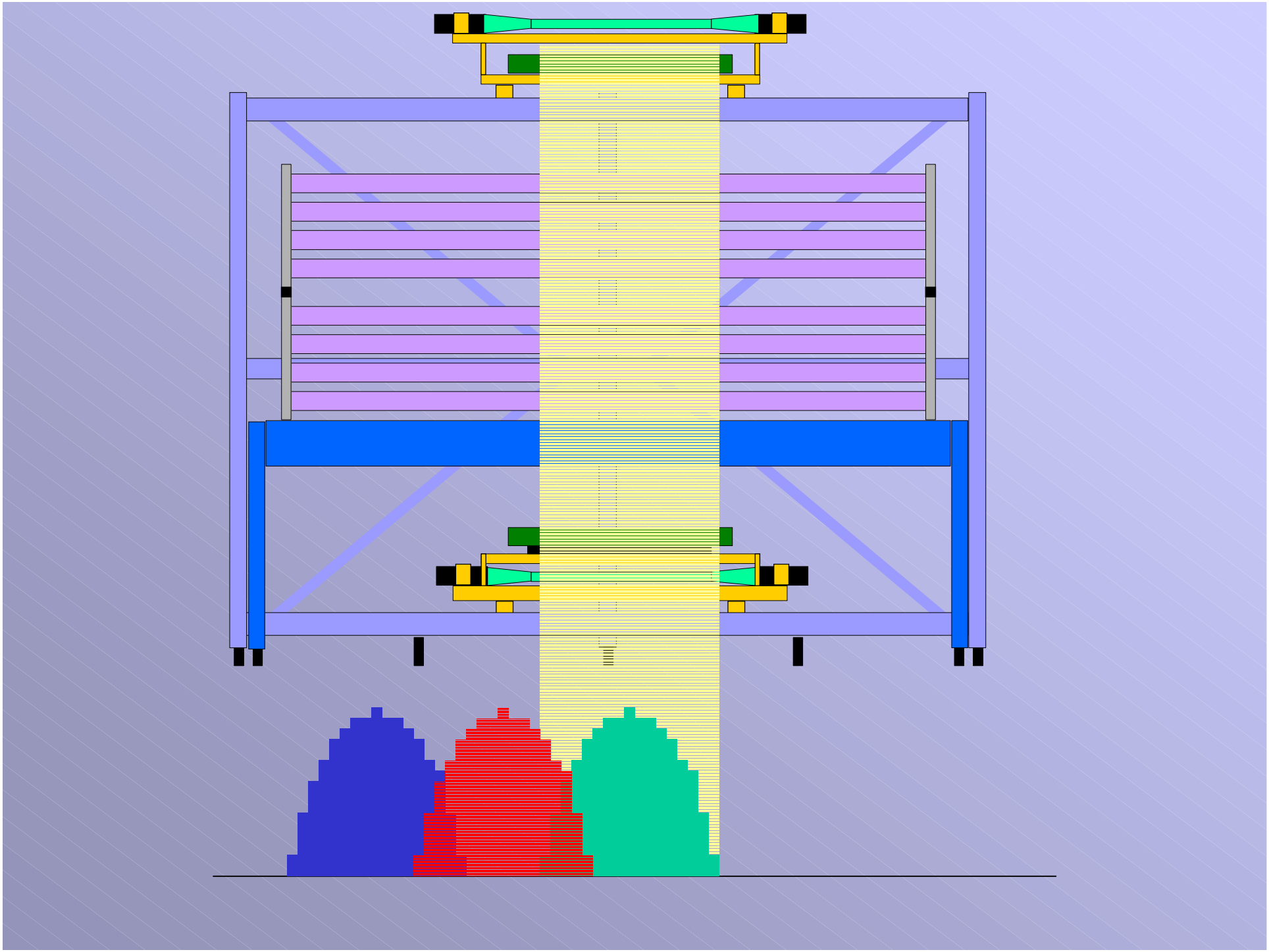
To disentangle the left-right ambiguity, each layer is staggered respect to the other one on the same view

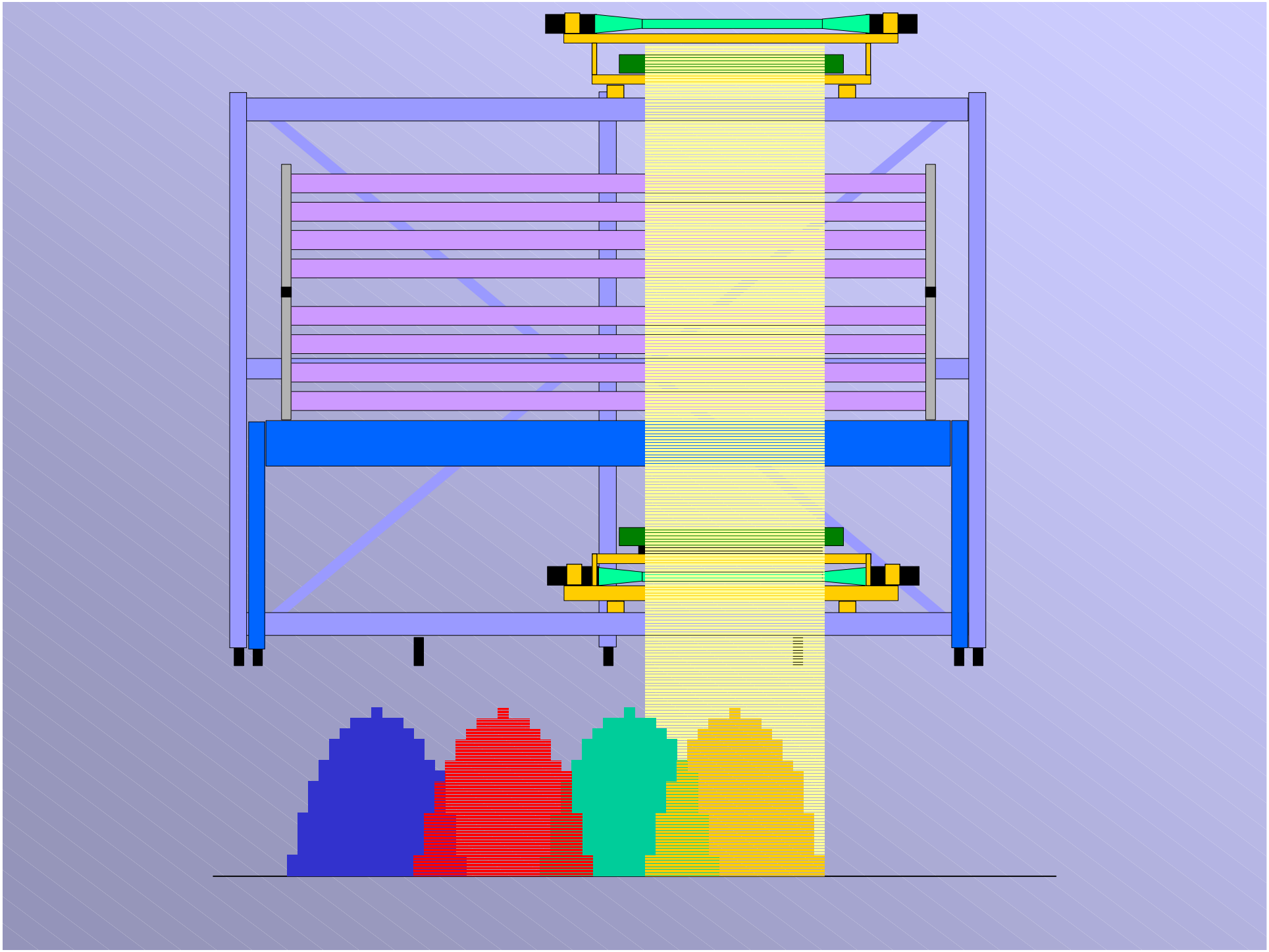


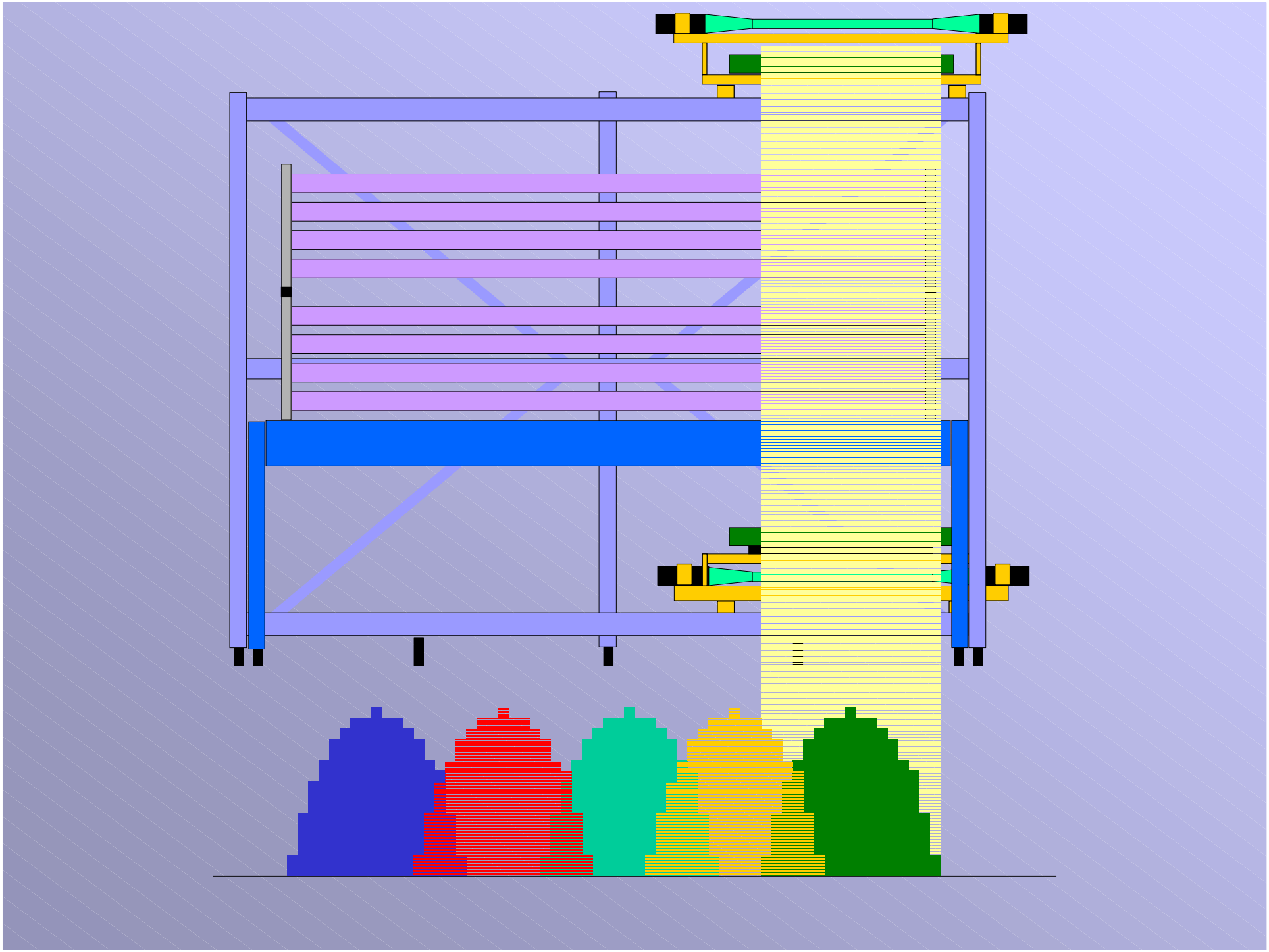
Golden Event:
Fully Reconstructed Tracks with 1 hit per layer
(50% Selection Efficiency)

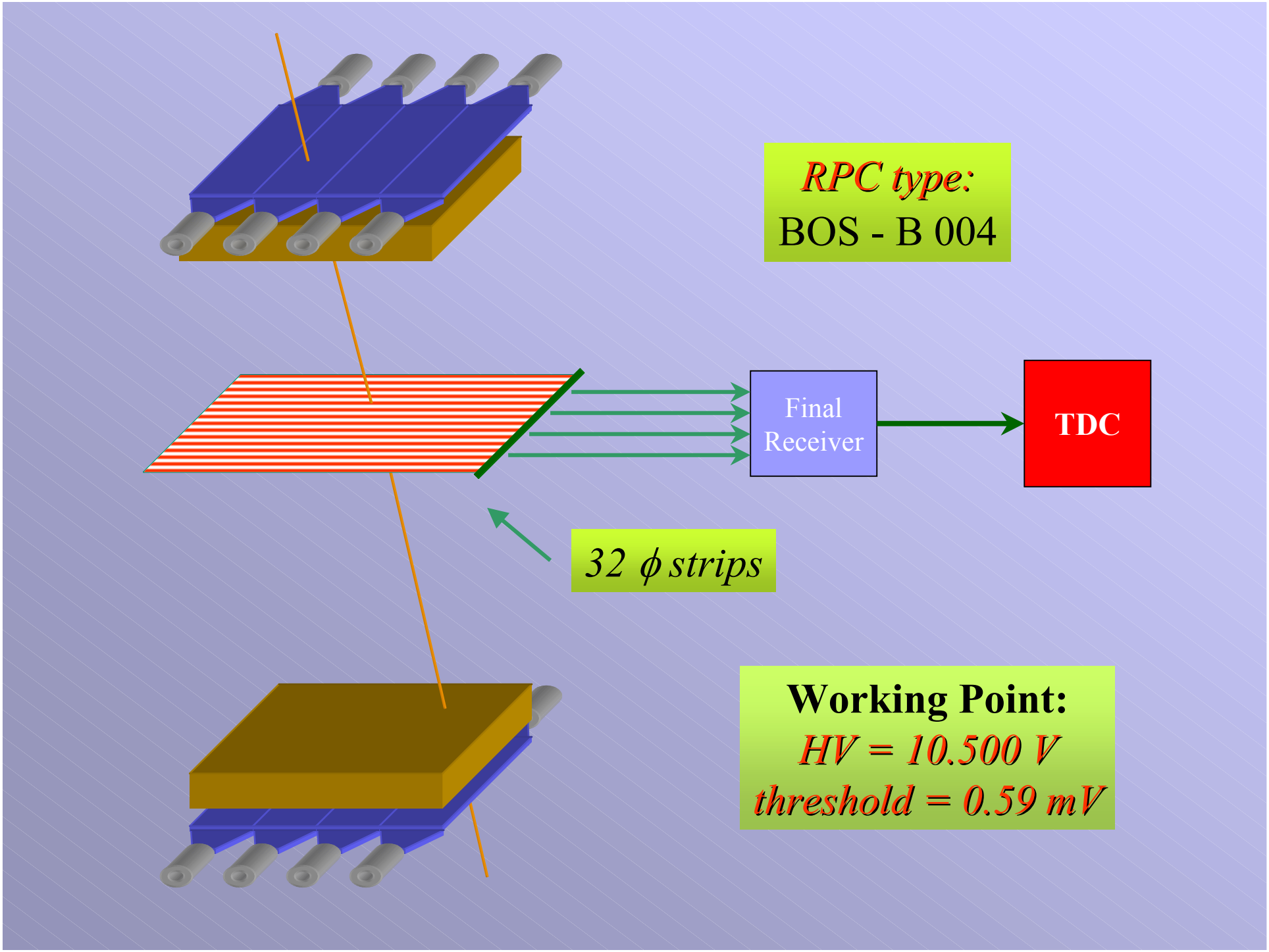


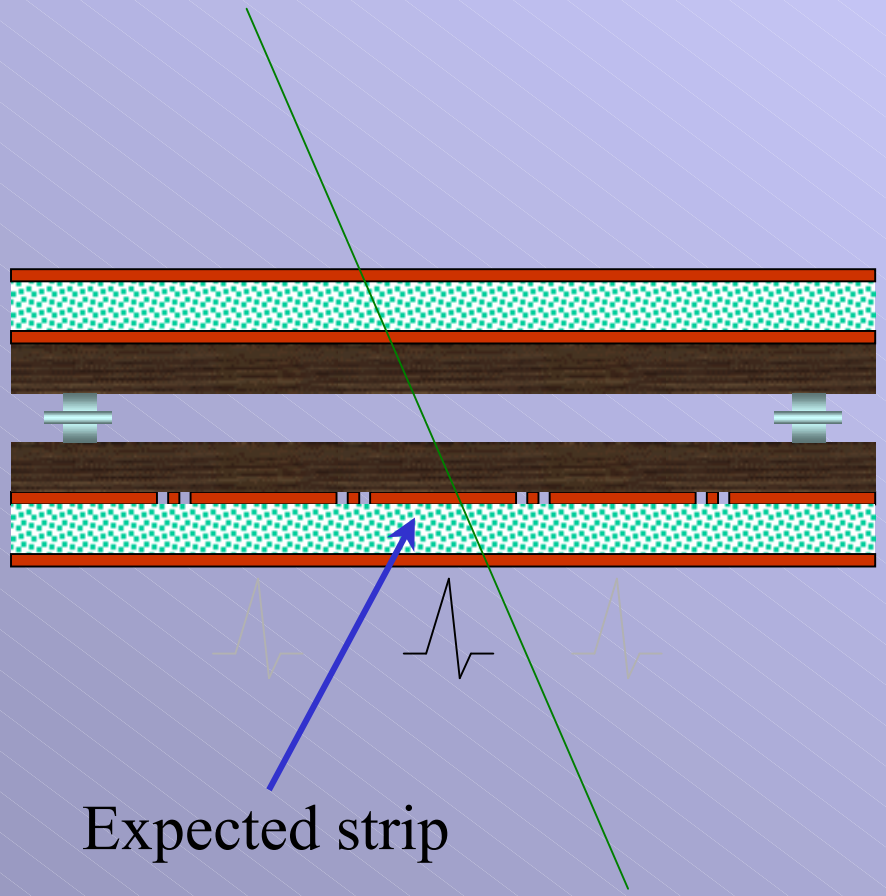









RPC type:
BOS - B 004
Final
Receiver
TDC
32 ϕ strips
Working Point:
HV = 10.500 V
threshold = 0.59 mV



Some Definitions:

Physical Strip:

Fired Strip corresponding to the Expected Strip

Physical Cluster:

Cluster with the Physical Strip

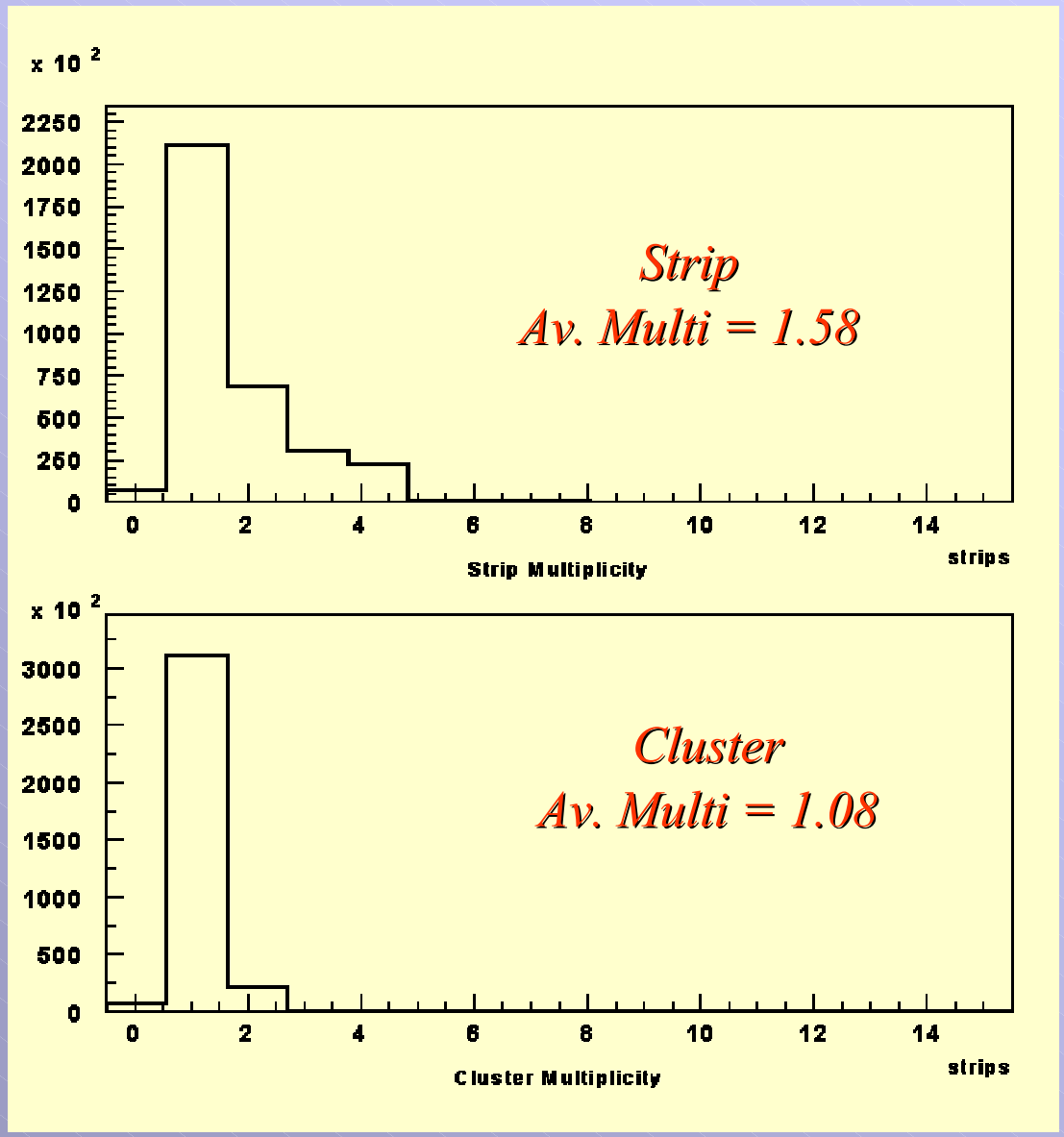
Expected Strip:

Strip given by the Impact Point of the Track on the RPC surface

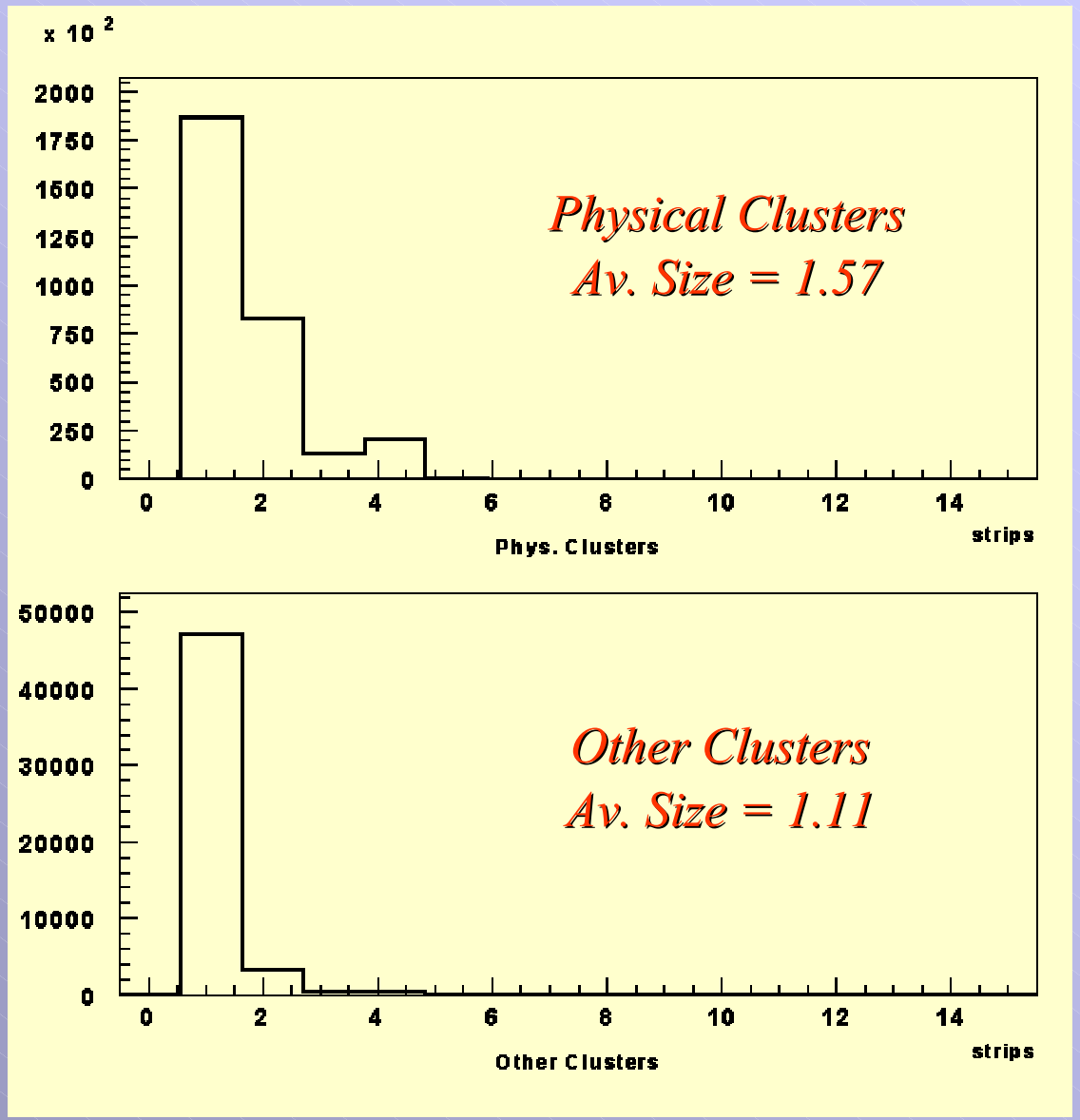
Efficiency:

Event with a Physical Strip

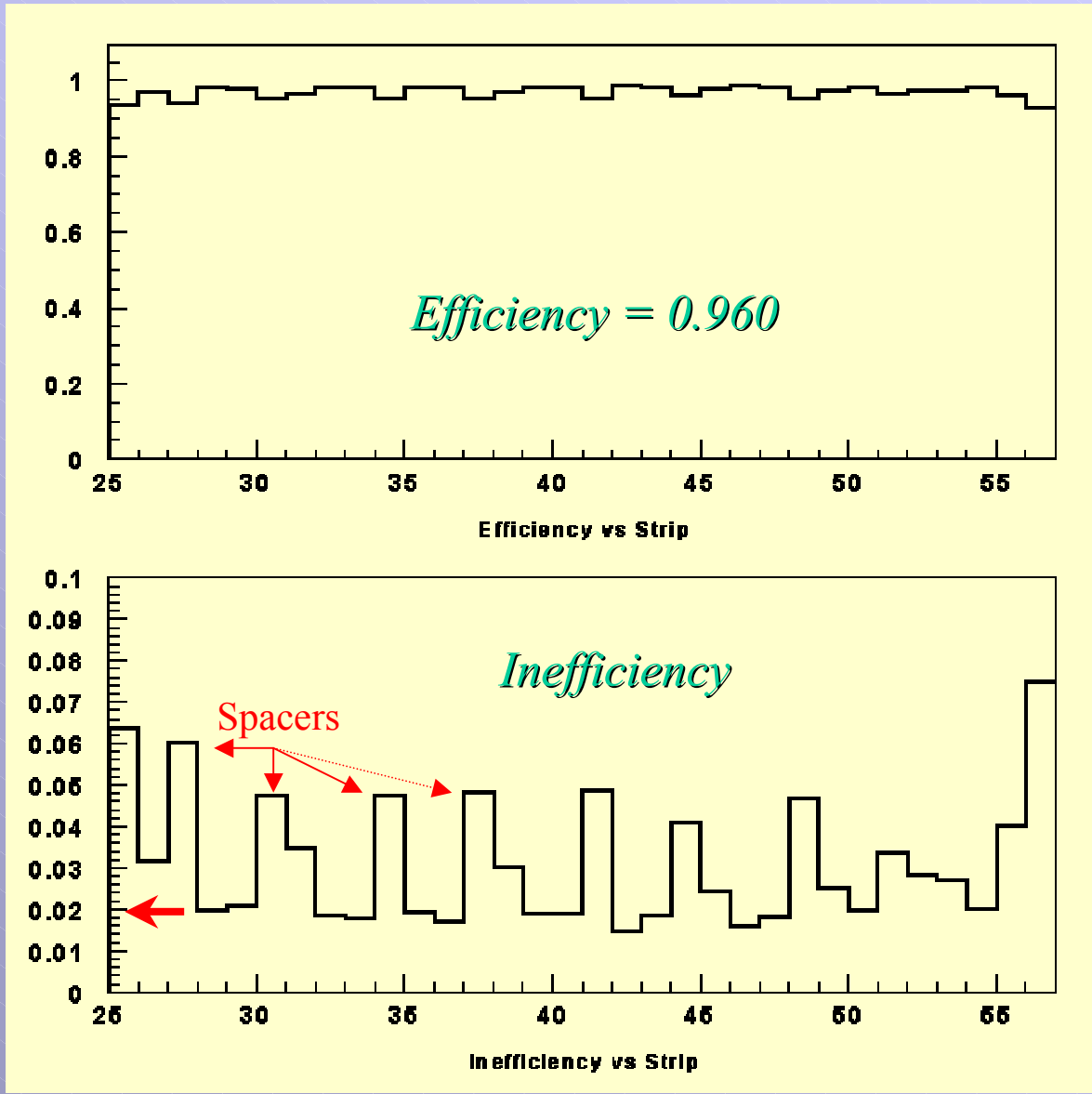
RPC Multiplicity for Strips and Clusters



Cluster Sizes



RPC Efficiency as a function of Strips

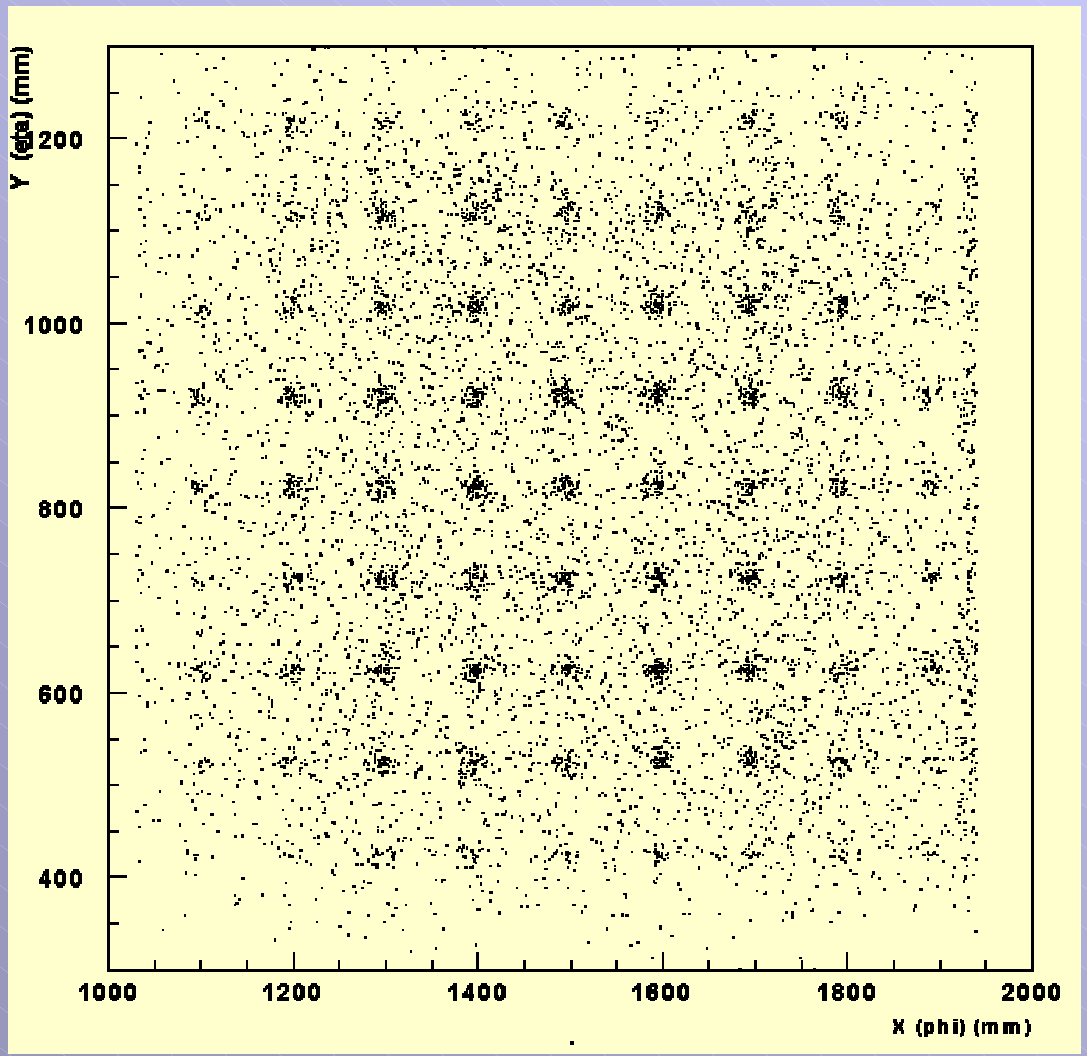


In the definition of the efficiency we use a tolerance of ± 5 mm

Improved alignment is under study

Tracks Impact Points of the RPC Surface for Inefficient Events:

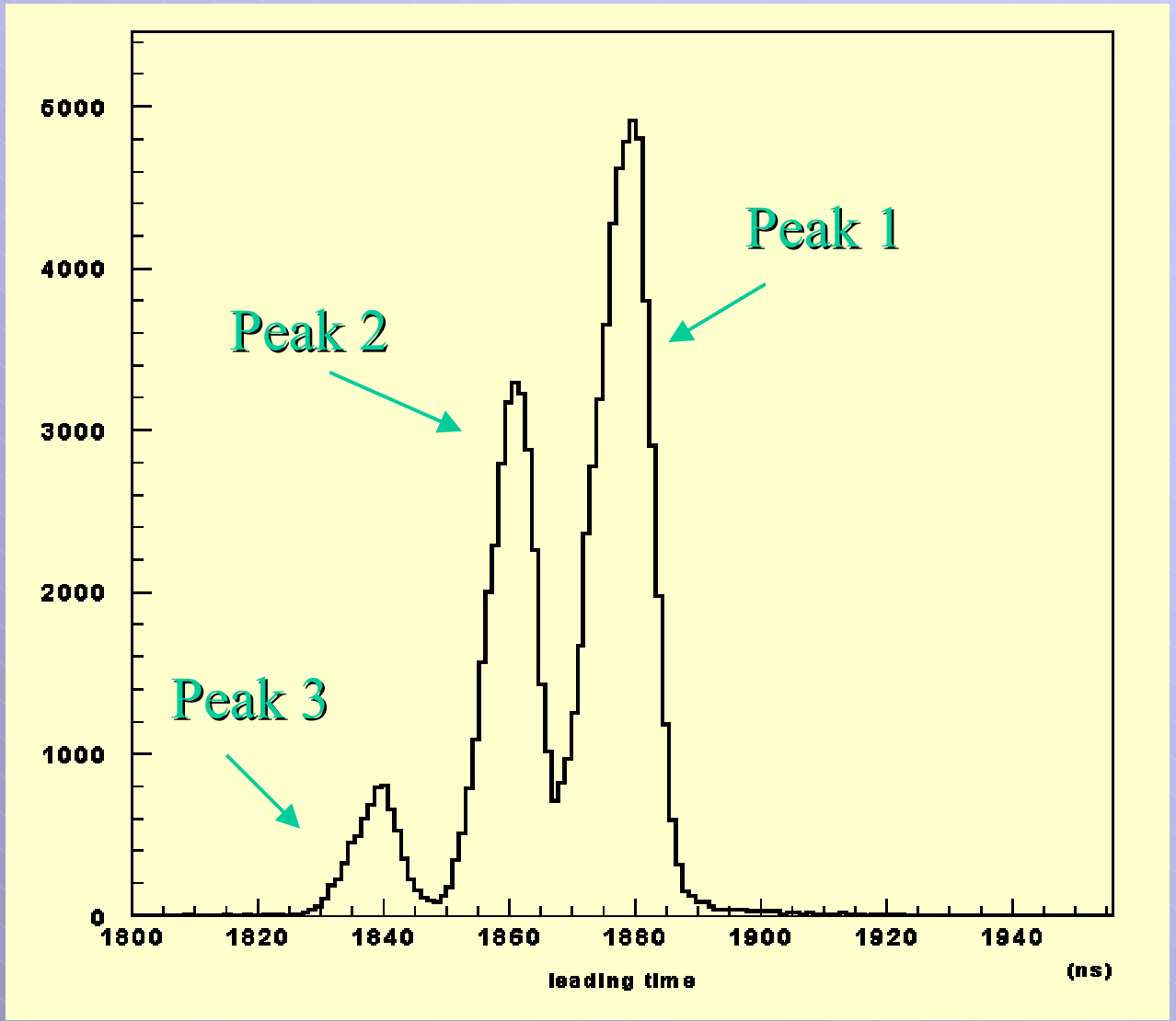
Spacers



RPC Times Distribution

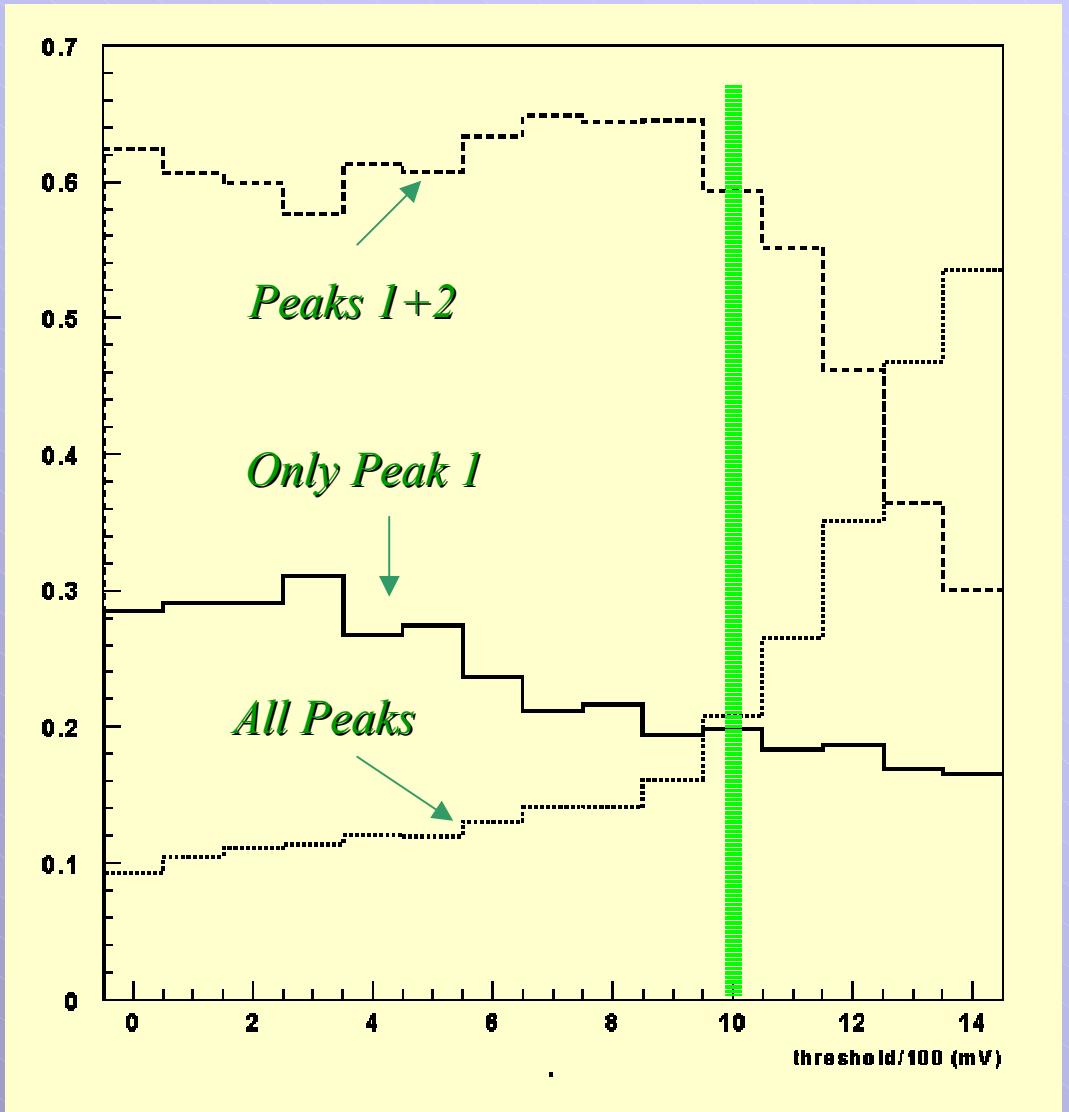
Multi-hit TDC

More than one Pulse could be recorded for each Strip



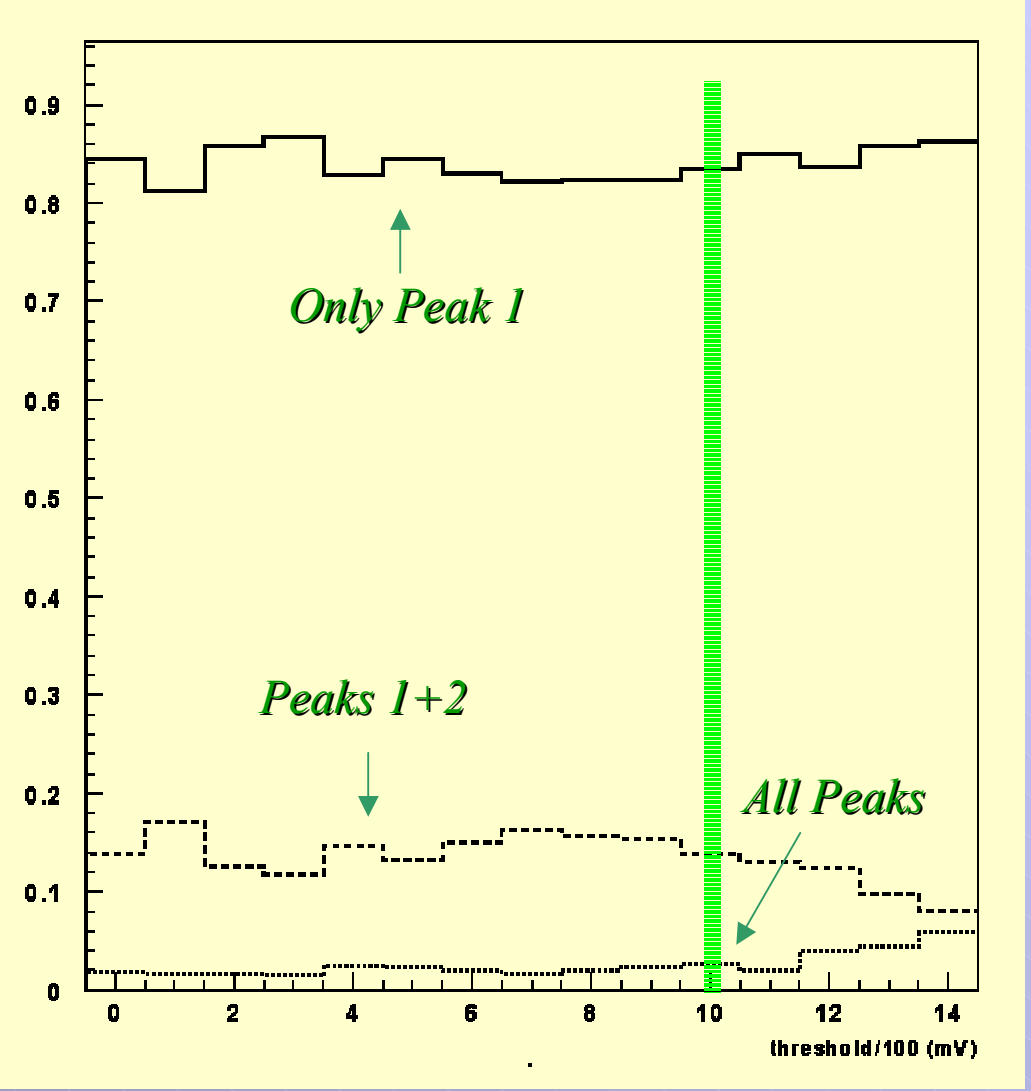
- RPC Time -
Percentage of Peaks presence as a function of the threshold

Physical Strip ONLY !!



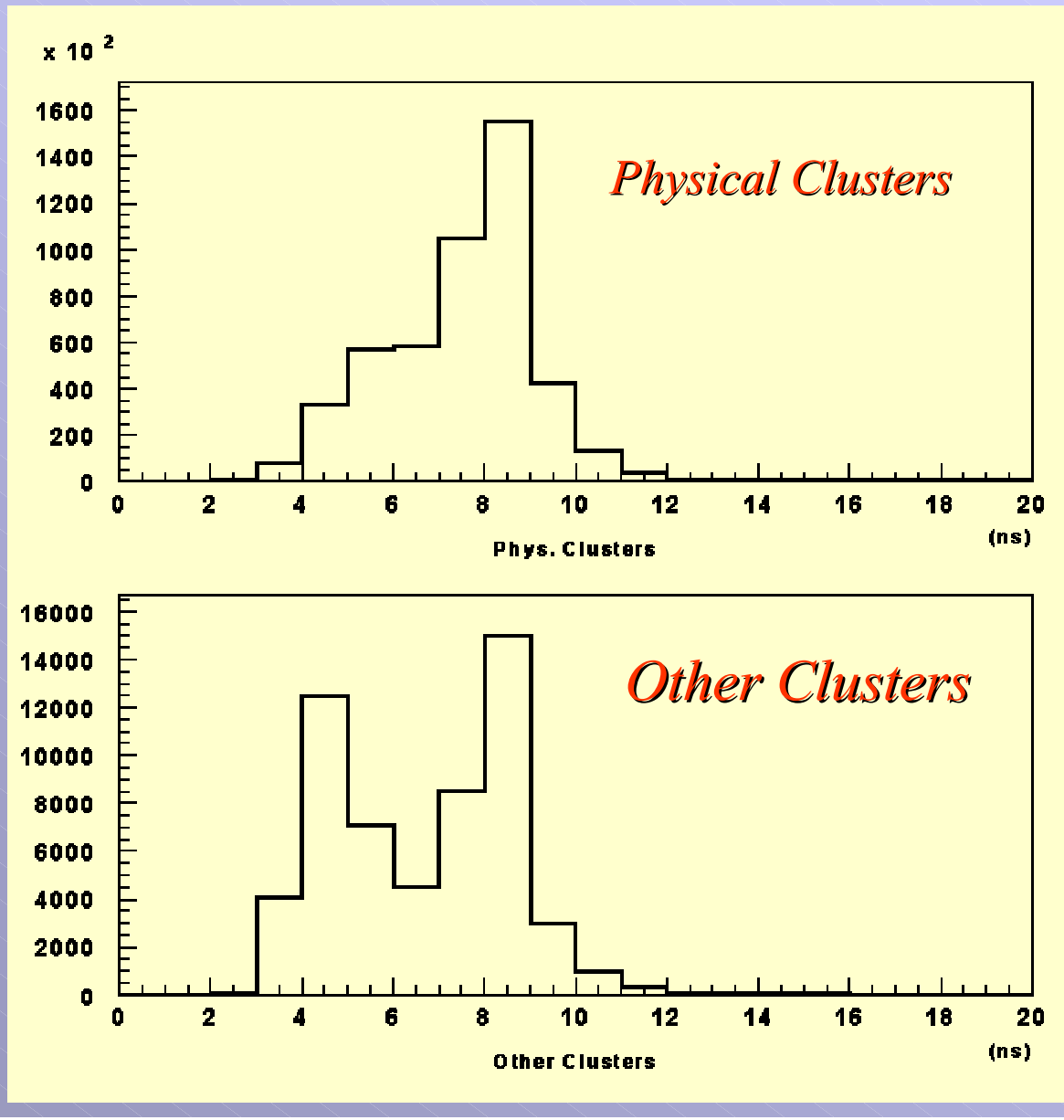
- RPC Time -
Percentage of Peaks presence as a function of the threshold

All other Strips in the Physical Cluster



RPC Times Pulse widths

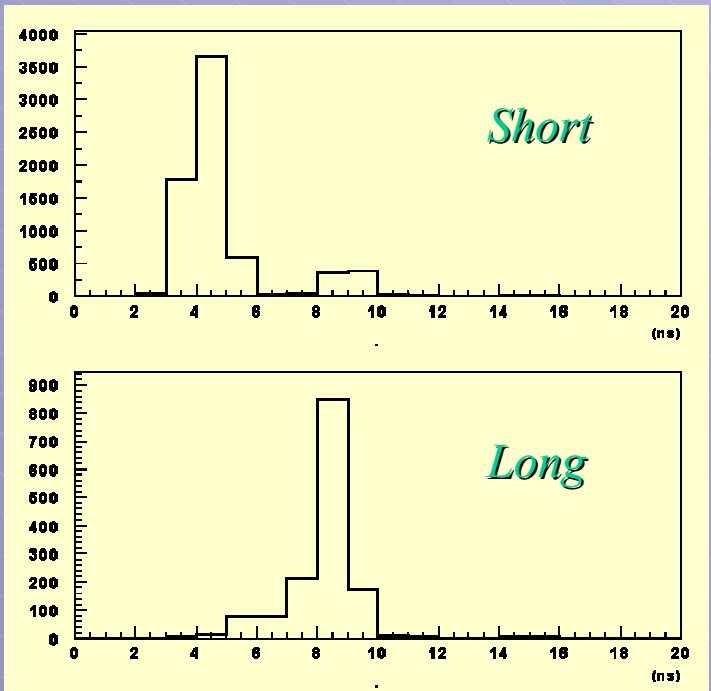
- Peak 1 -

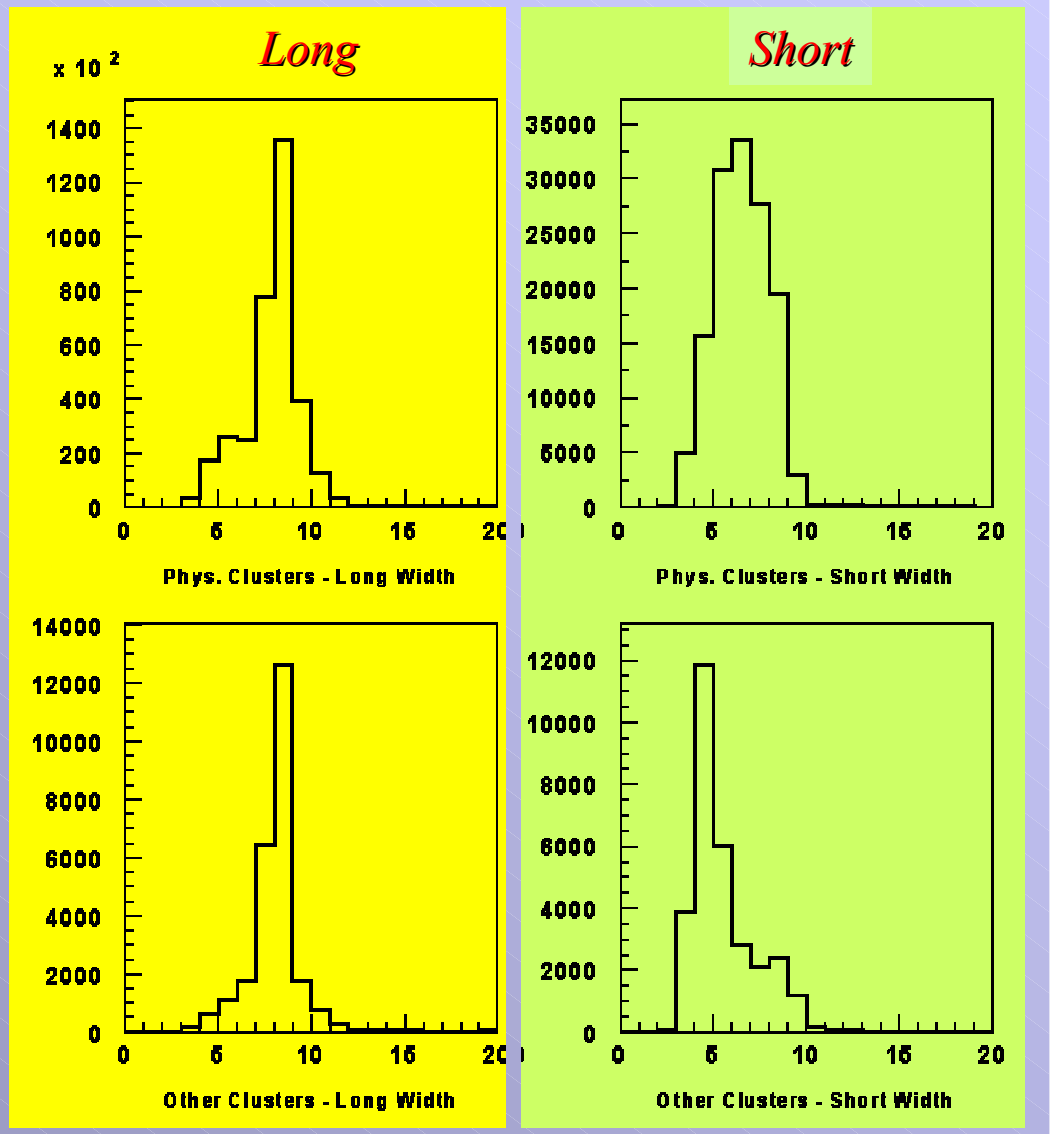


Pulse Width Distributions

Average pulse width is about 8 ns.
Some channels show shorter pulses.
Let's divide strips in two categories:
Long and Short Pulse Strips

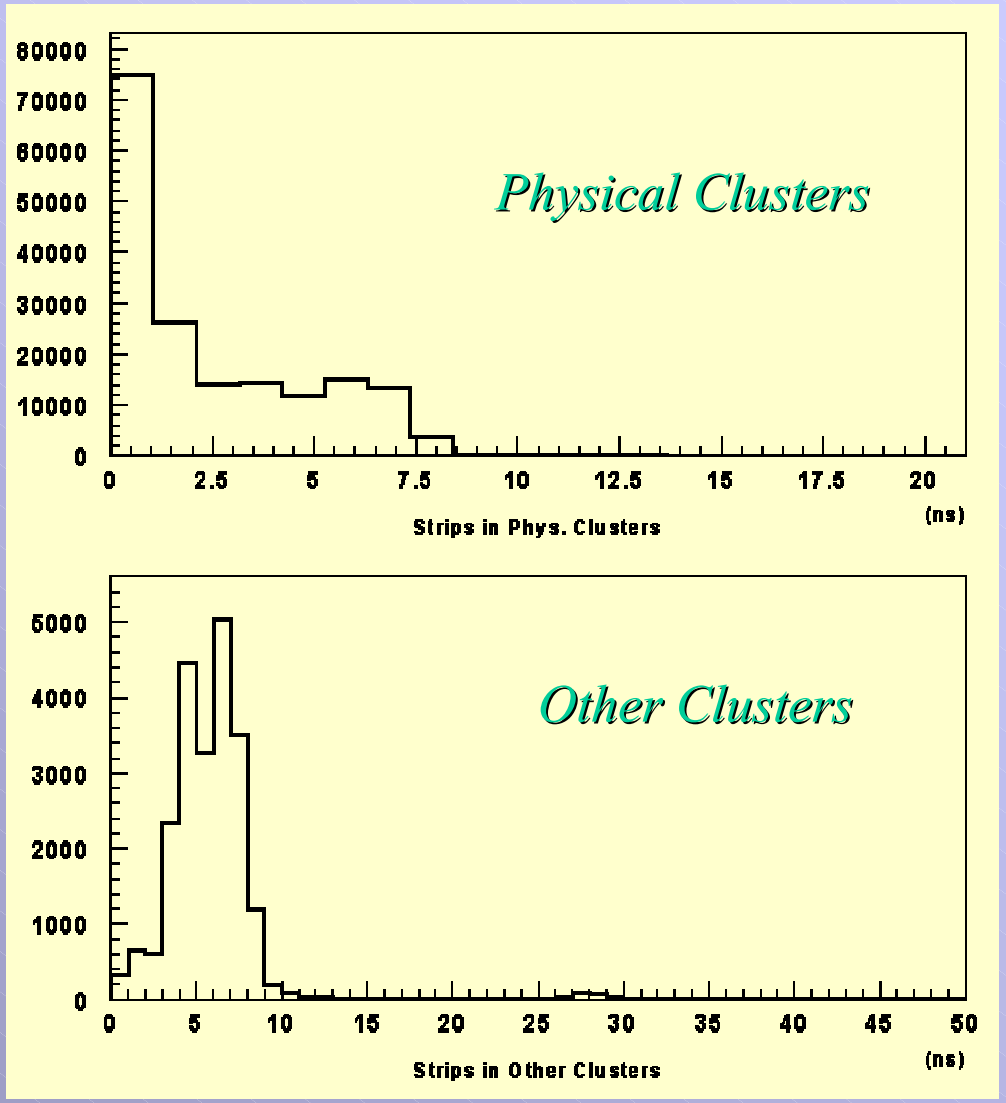
Example of Pulse Widths for 2 Strips





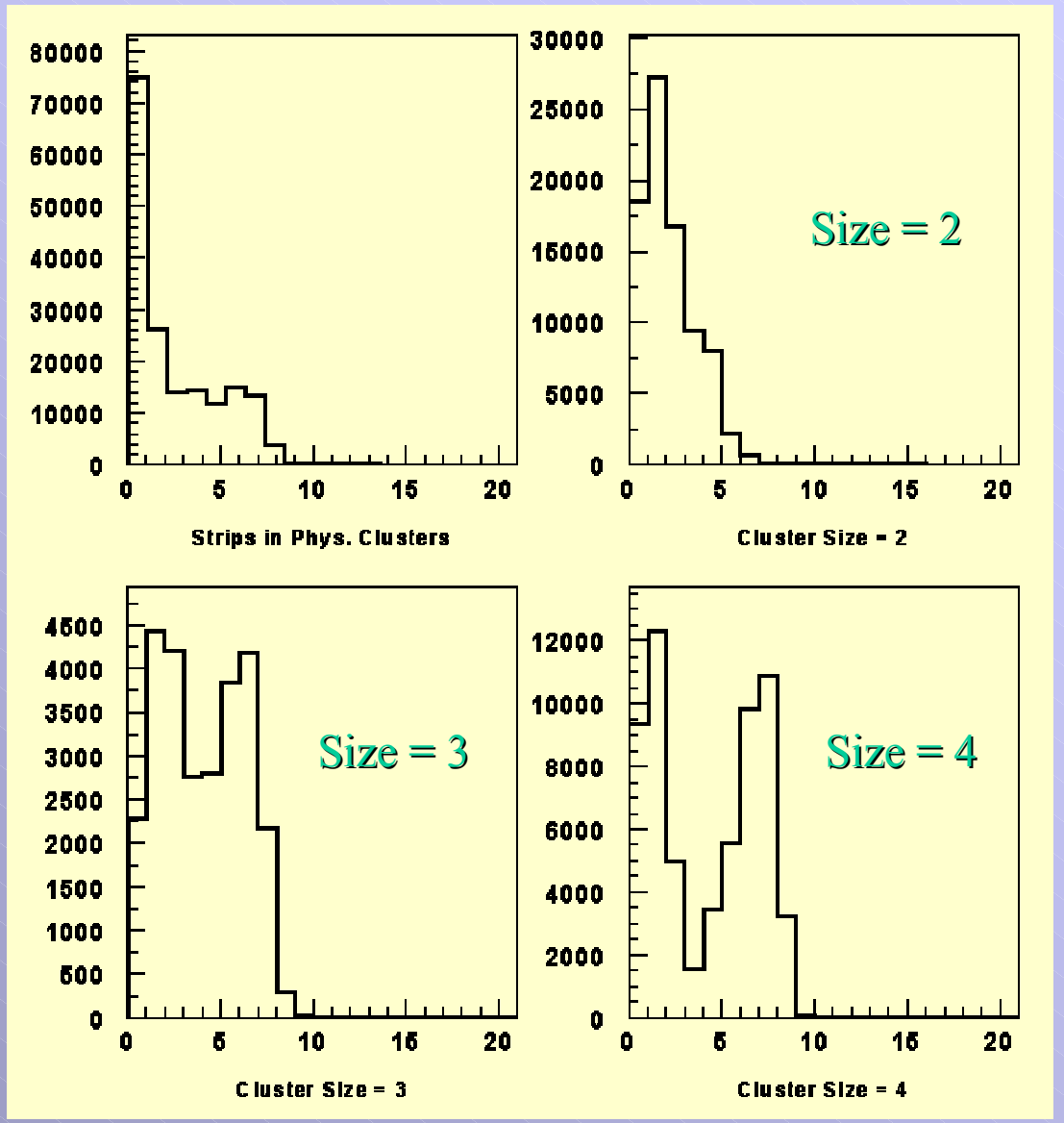
RPC Times - Peak 1

Time Difference between Physical and Other Strips



RPC Times - Peak 1

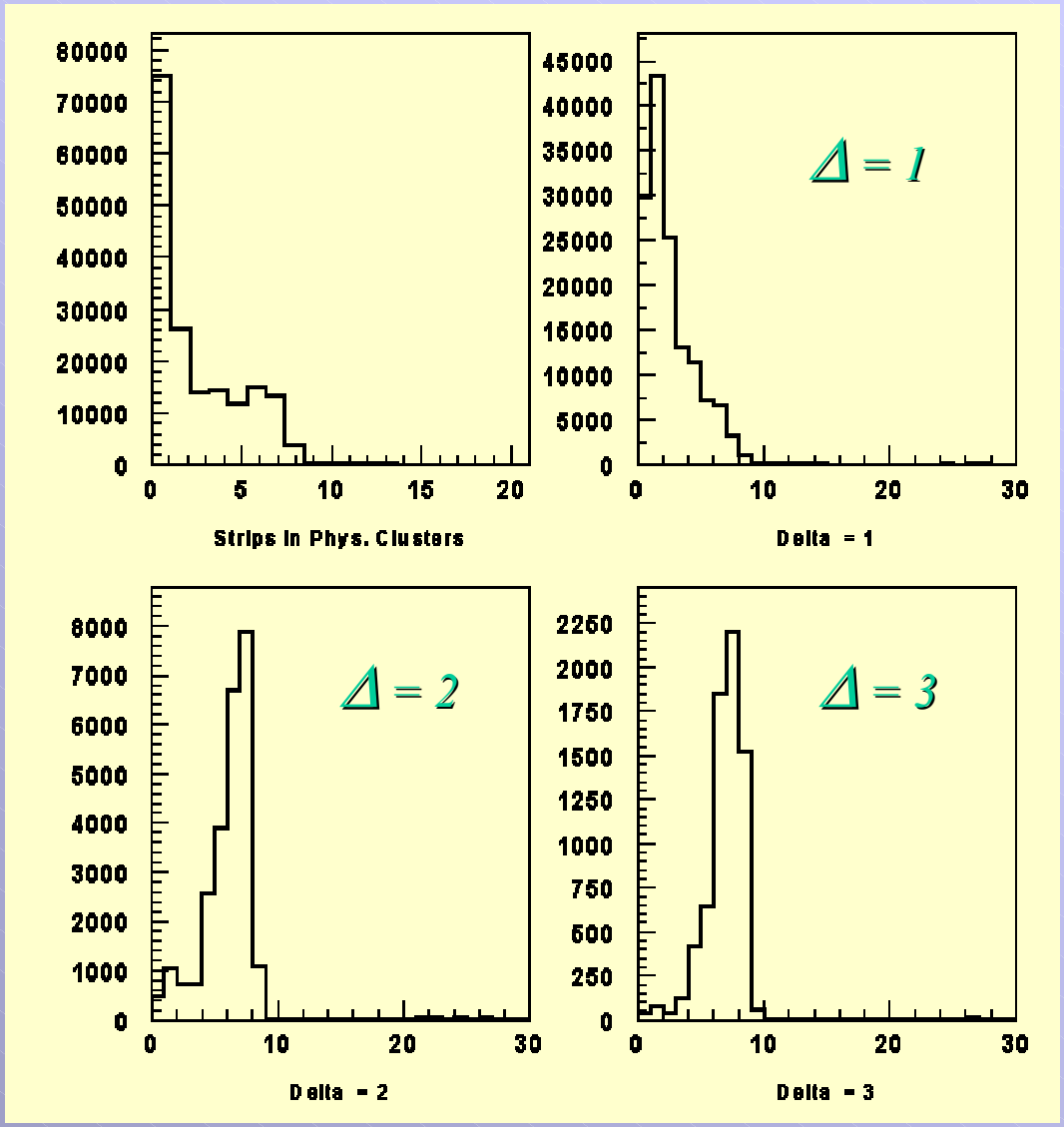
Time Difference between Physical and neighbor Strips as a function of the Cluster Size



Only Physical Cluster Strips

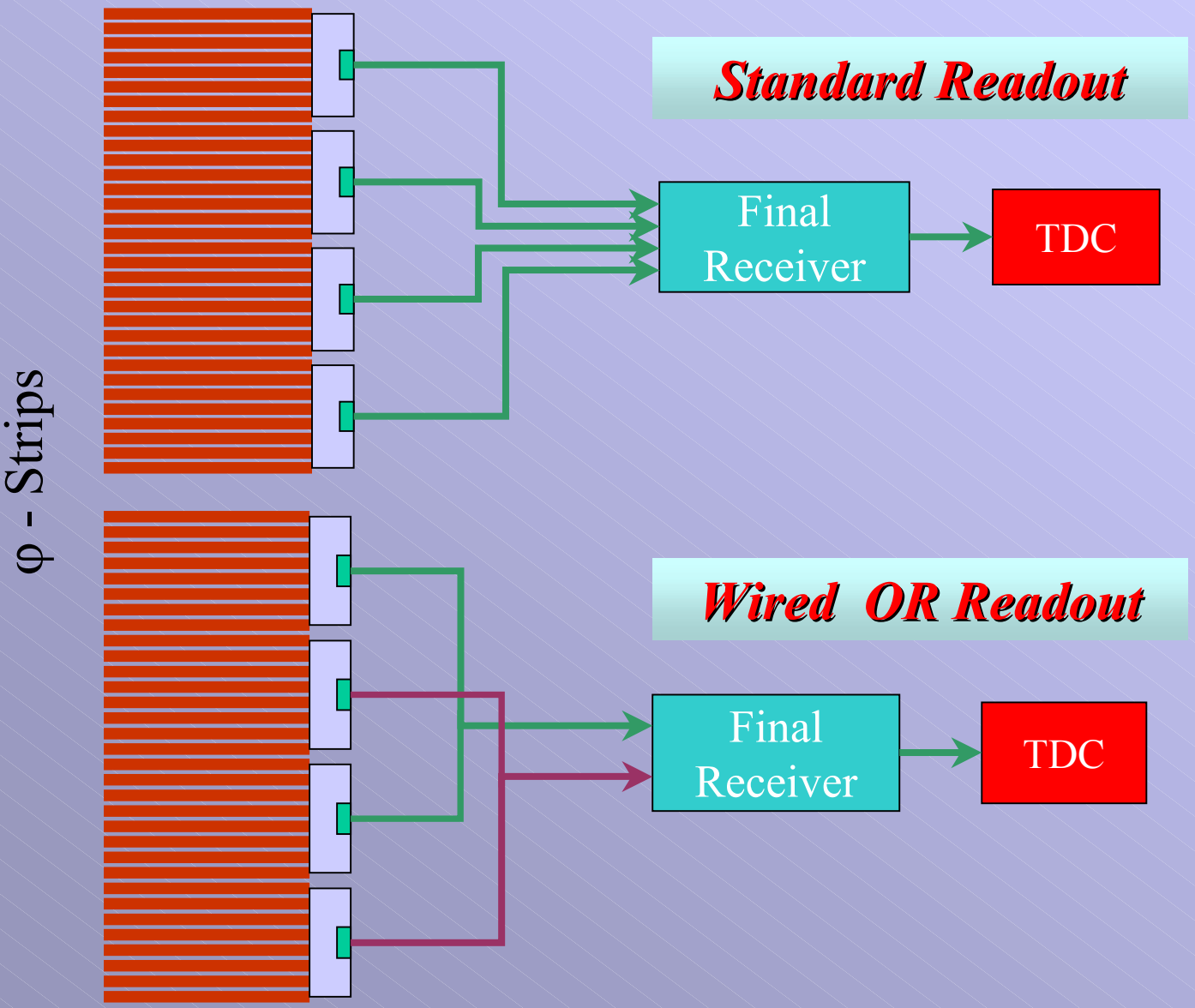
RPC Times - Peak 1

Time Difference between Physical and neighbor Strips as a function of Strip Distance (Δ)

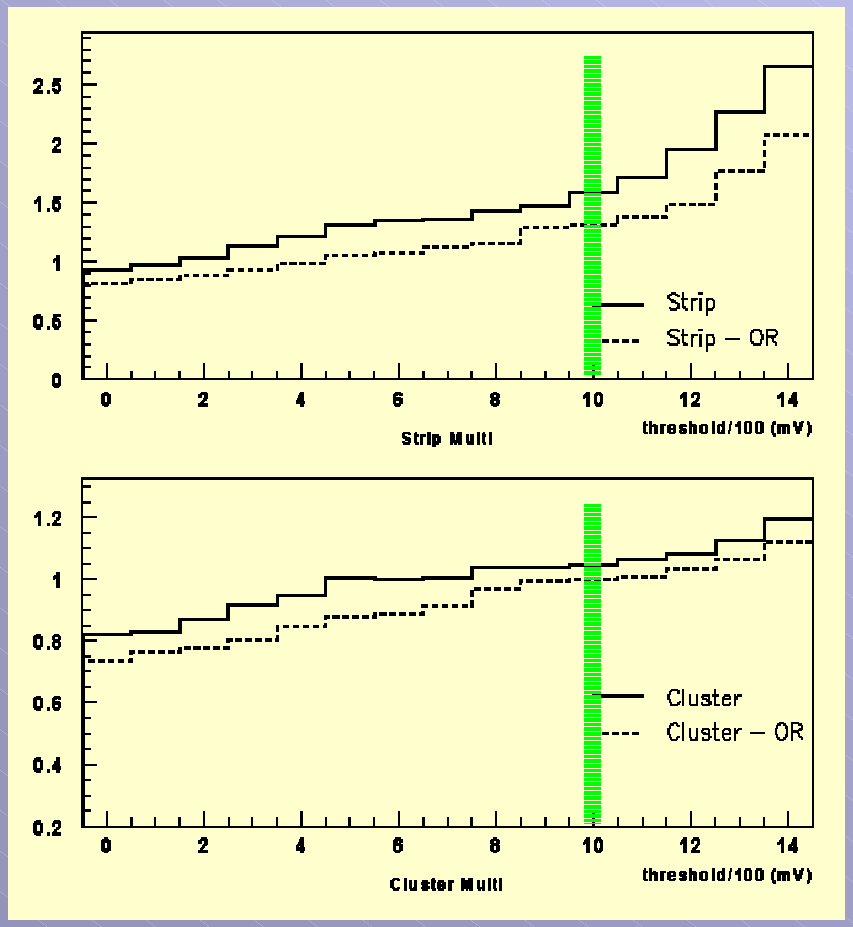


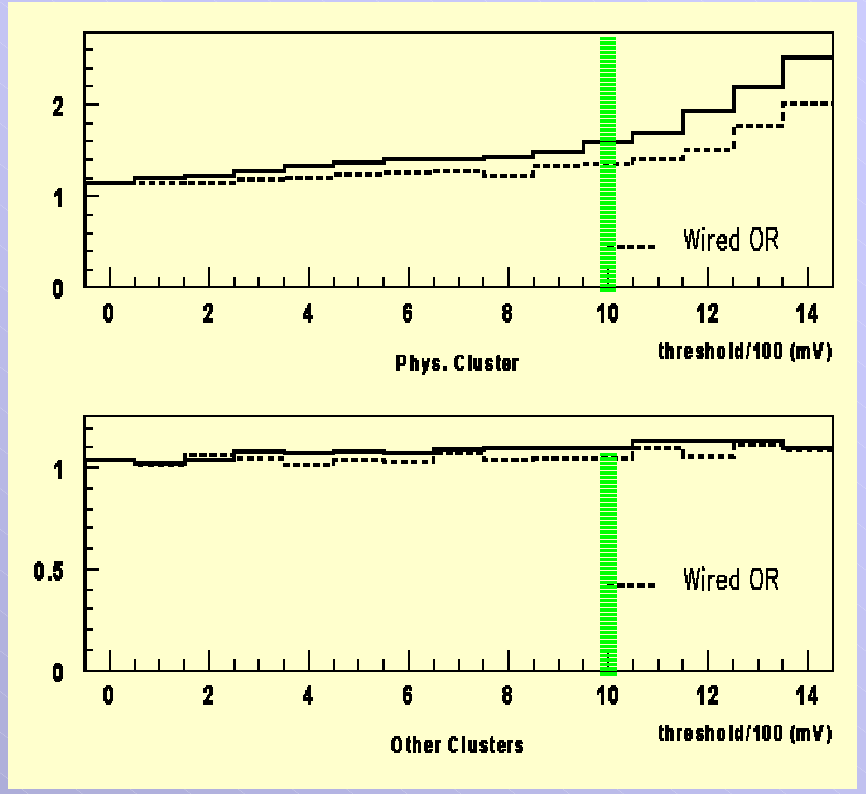
Only Physical Cluster Strips

Comparison between Standard and Wired OR Strip Readouts as a function of Threshold



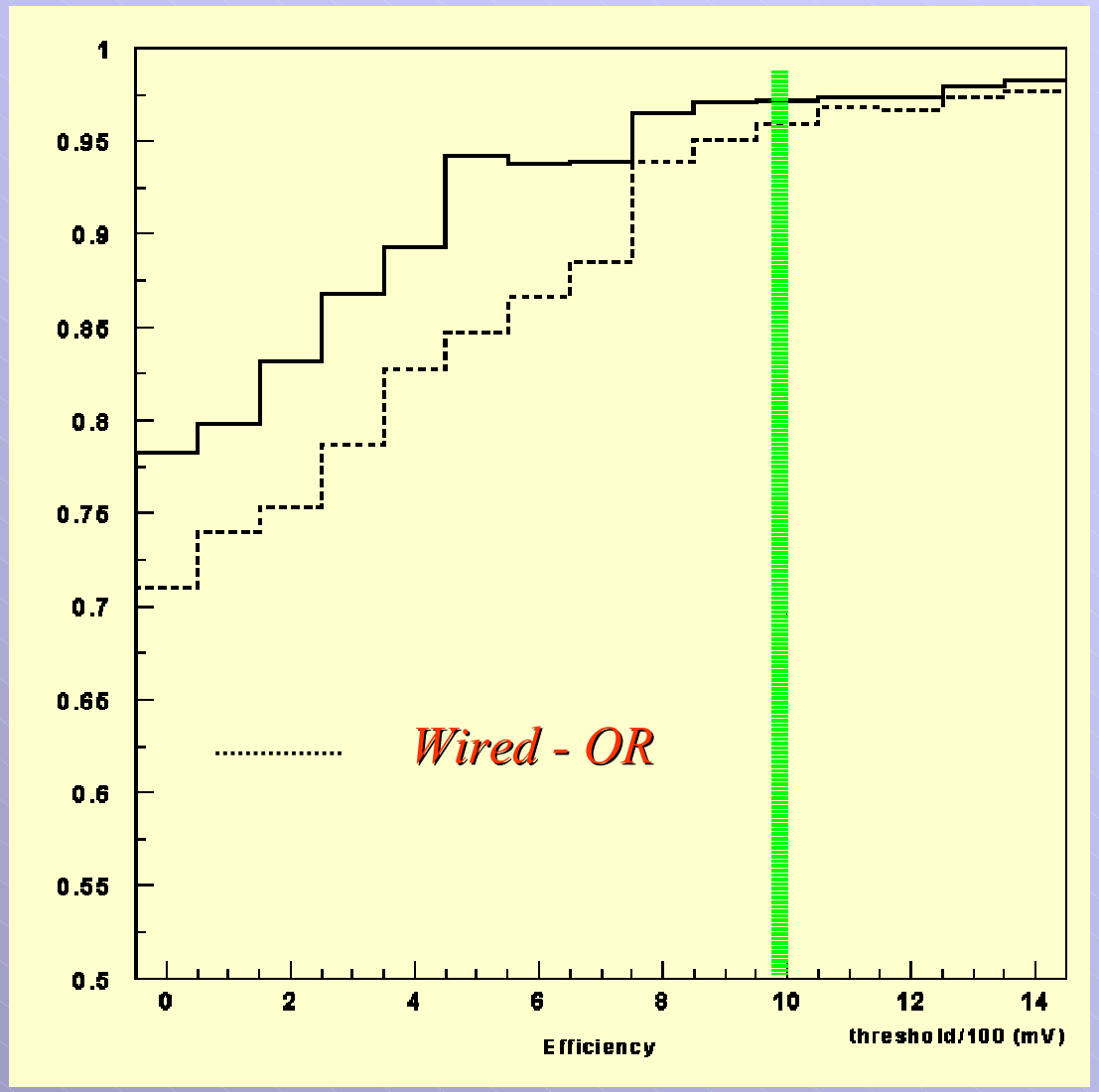
Multiplicities Comparison as a function of the threshold





Cluster Sizes Comparison

Efficiency Comparison with Wired - OR as a function of the threshold



Conclusions

- **The RPC Timing Results with Final Receivers are in agreement with expectations**
- **Our Test Station (Hardware, DAQ, DCS and Off-Line Analysis) is ready for Massive RPC Tests**