

The Hodoscopes

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visiting at



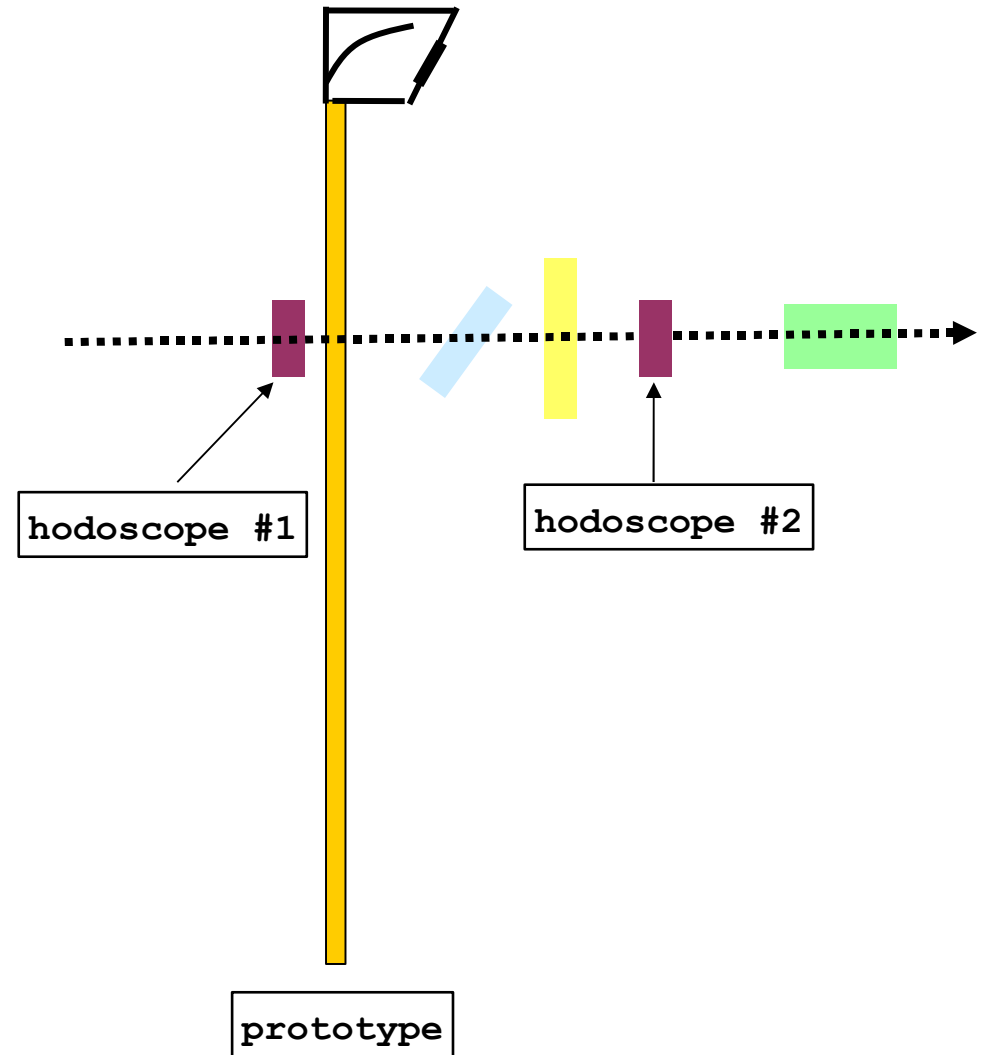
STANFORD LINEAR ACCELERATOR CENTER

Outline

- Role of the hodoscopes in the beam tests
- The 1st hodoscope
 - Pb glass cuts
 - Single finger cuts
 - Pedestal cuts
- The second hodoscope
 - Pb glass cuts
 - Pedestal cuts
 - Finger cuts
 - Correlated cuts
- Conclusions

The DIRC prototype beamtests

- The old hodoscope is located prior to the prototype in the beamline to facilitate steering
- The second hodoscope was added July 2006 to perhaps help eliminate background



The First Hodoscope



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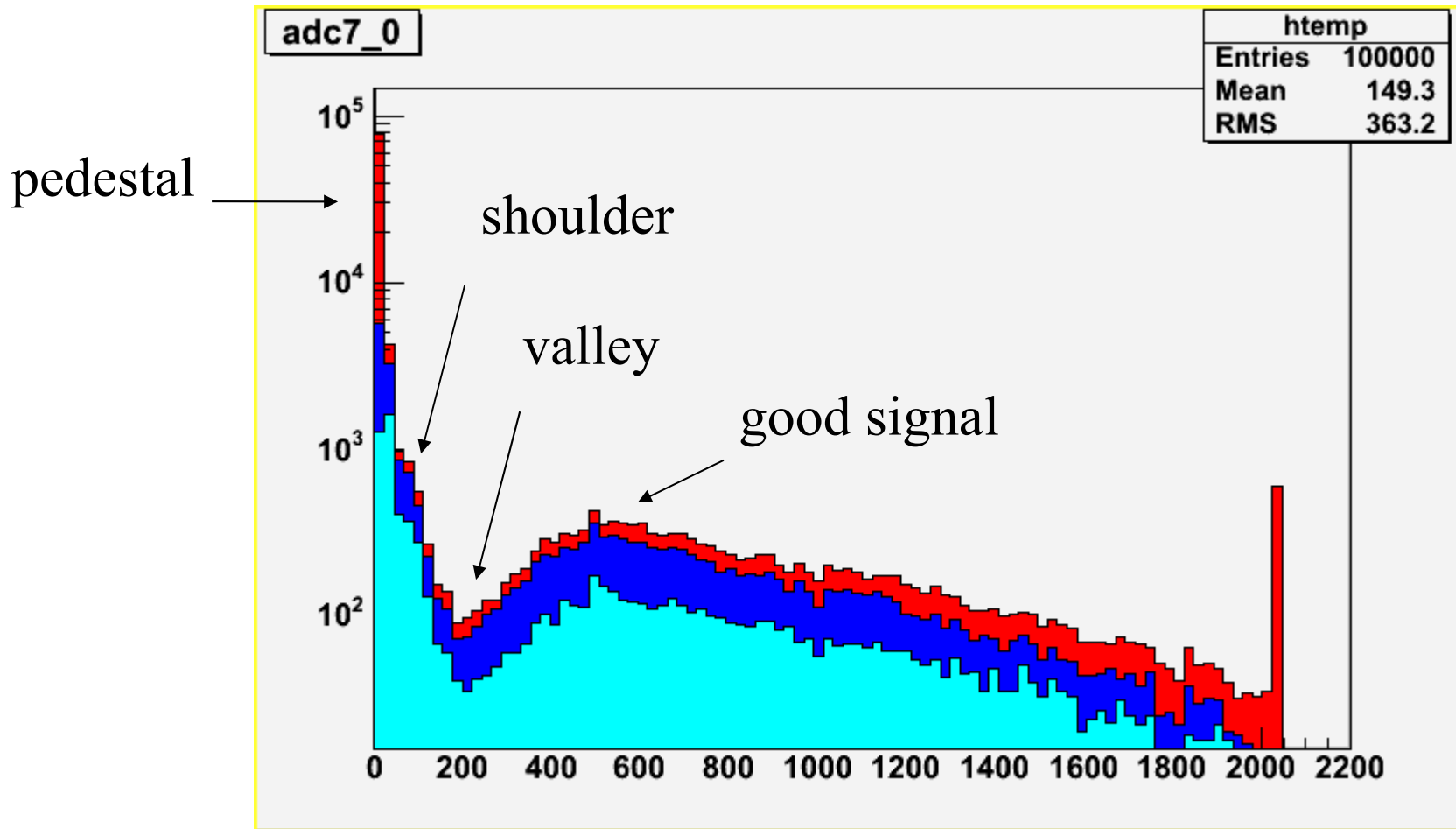
The hodoscopes, September 2006

The 1st Hodoscope

- 16 horizontal and 16 vertical fingers
- Fibers are 2mm by 2mm square and wrapped in foil
- Foil creates gaps $\sim 133\mu\text{m}$ between horizontal fibers, and $\sim 200\mu\text{m}$ between the vertical ones
- Read out via two MaPMTs

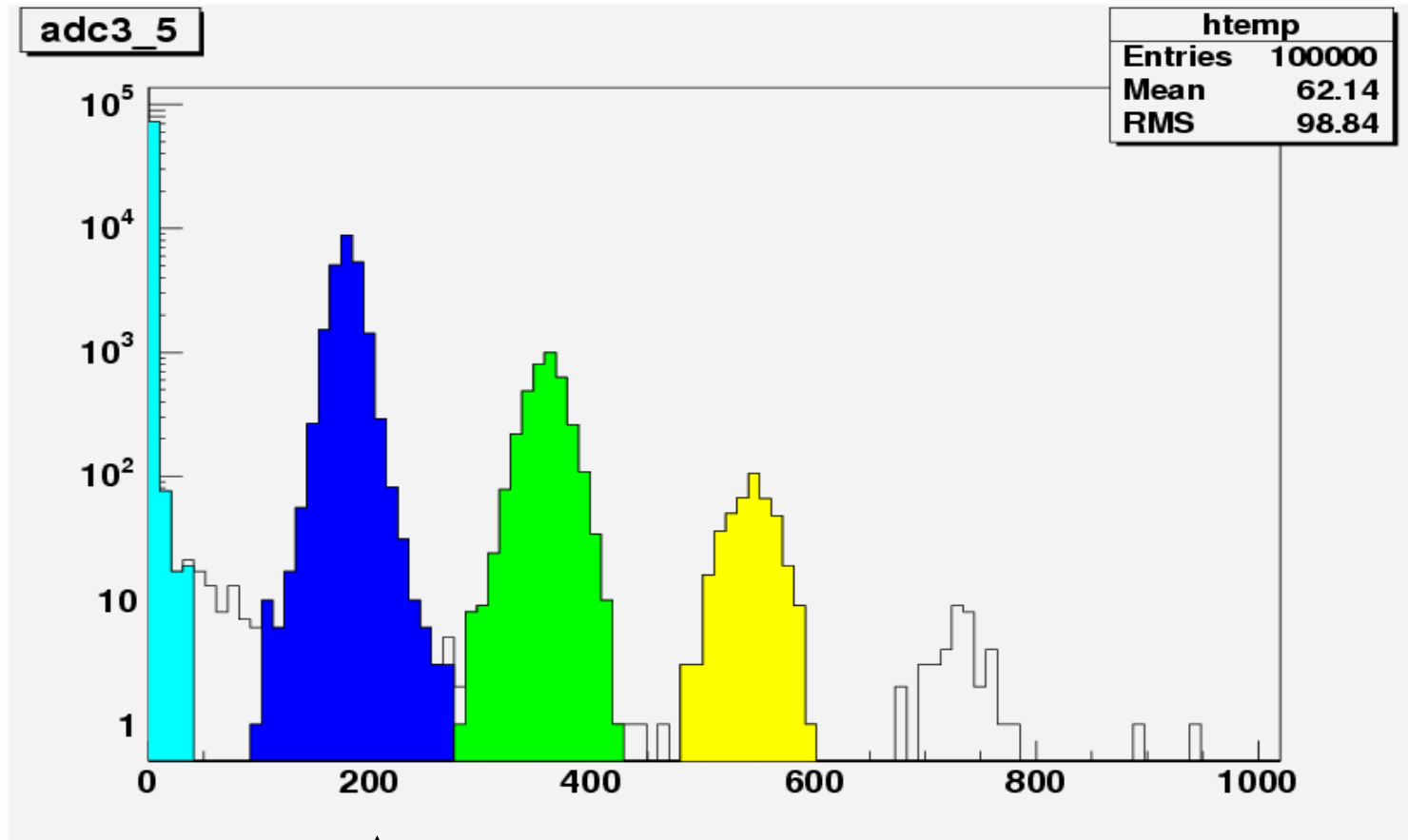


A Typical Hodoscope ADC distribution



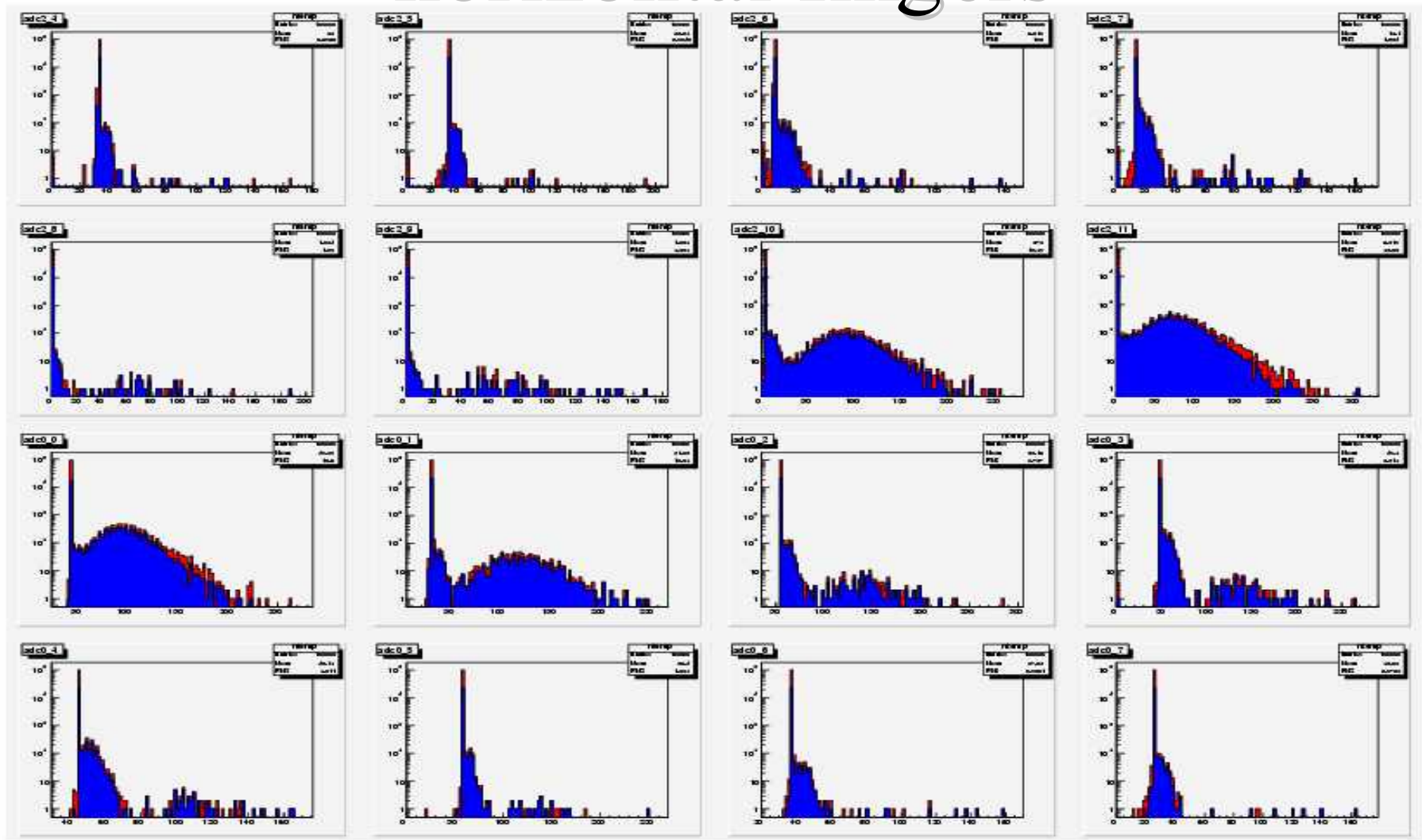
Red is the uncut signal, Blue is the signal after applying a cut, Light Blue is a second cut

The Pb glass counter



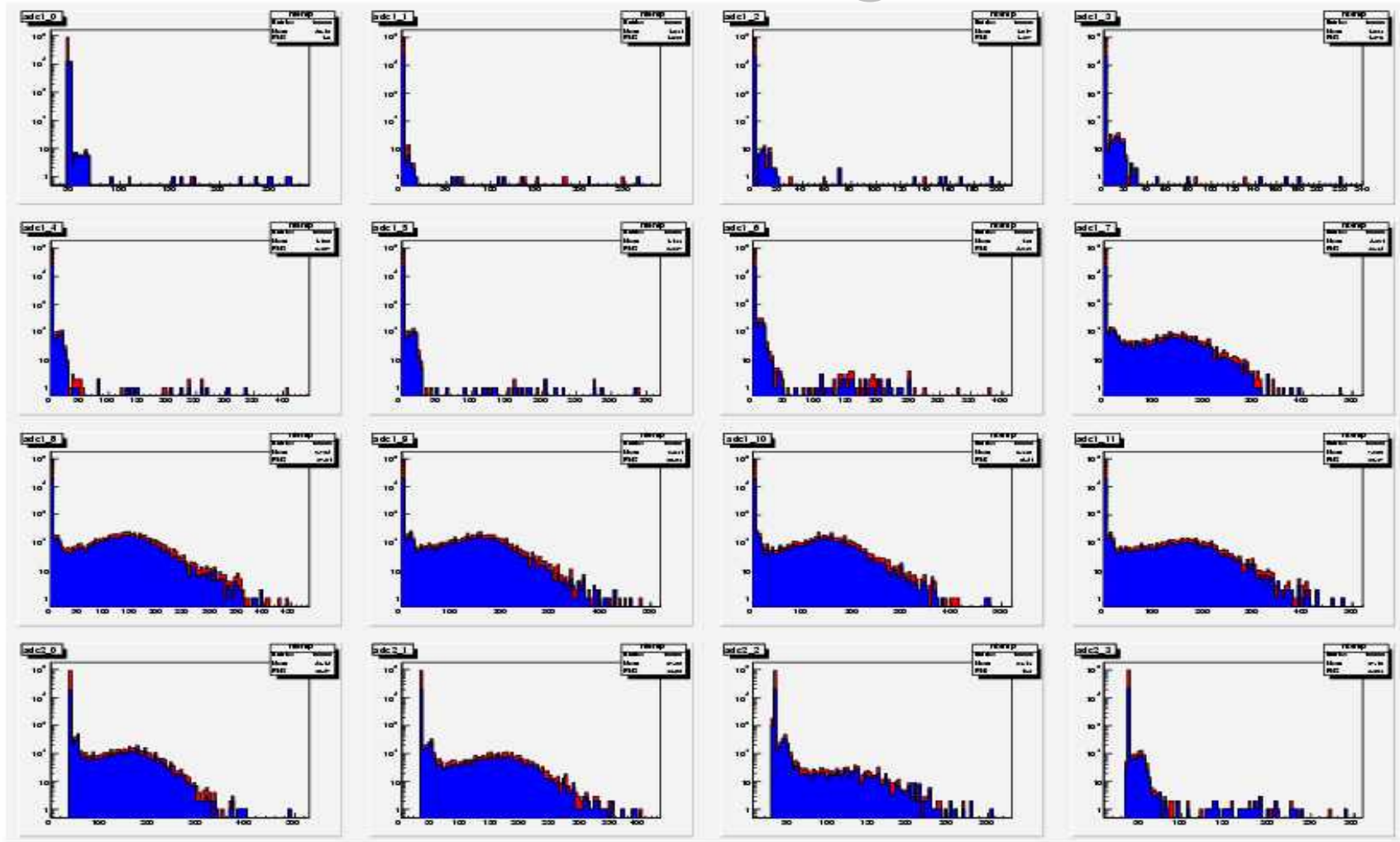
The first cut was based on one hit in the Pb glass counter.

1st hodoscope: Pb glass cut on horizontal fingers



Not much change visible...

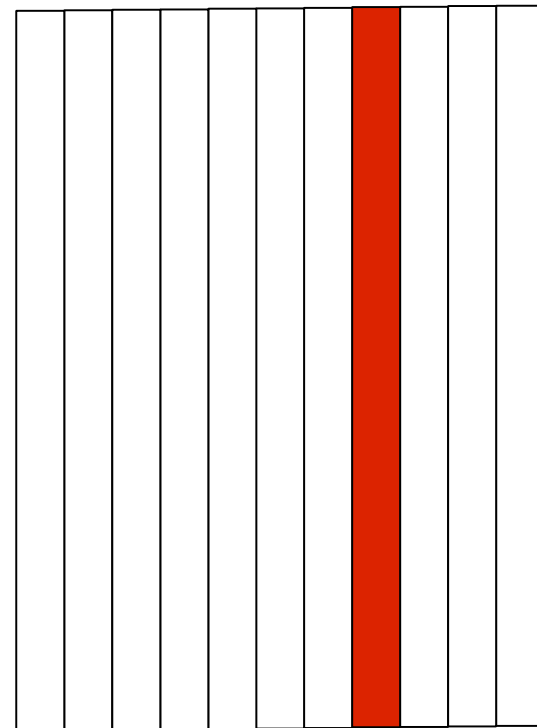
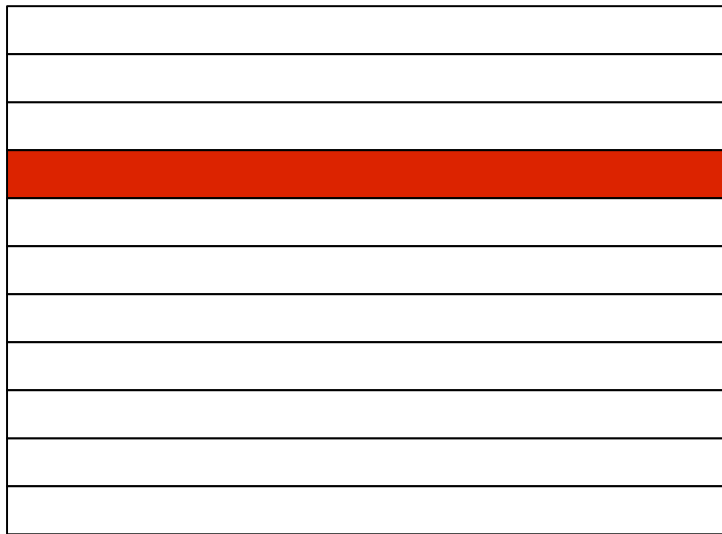
1st hodoscope: Pb glass cut on vertical fingers



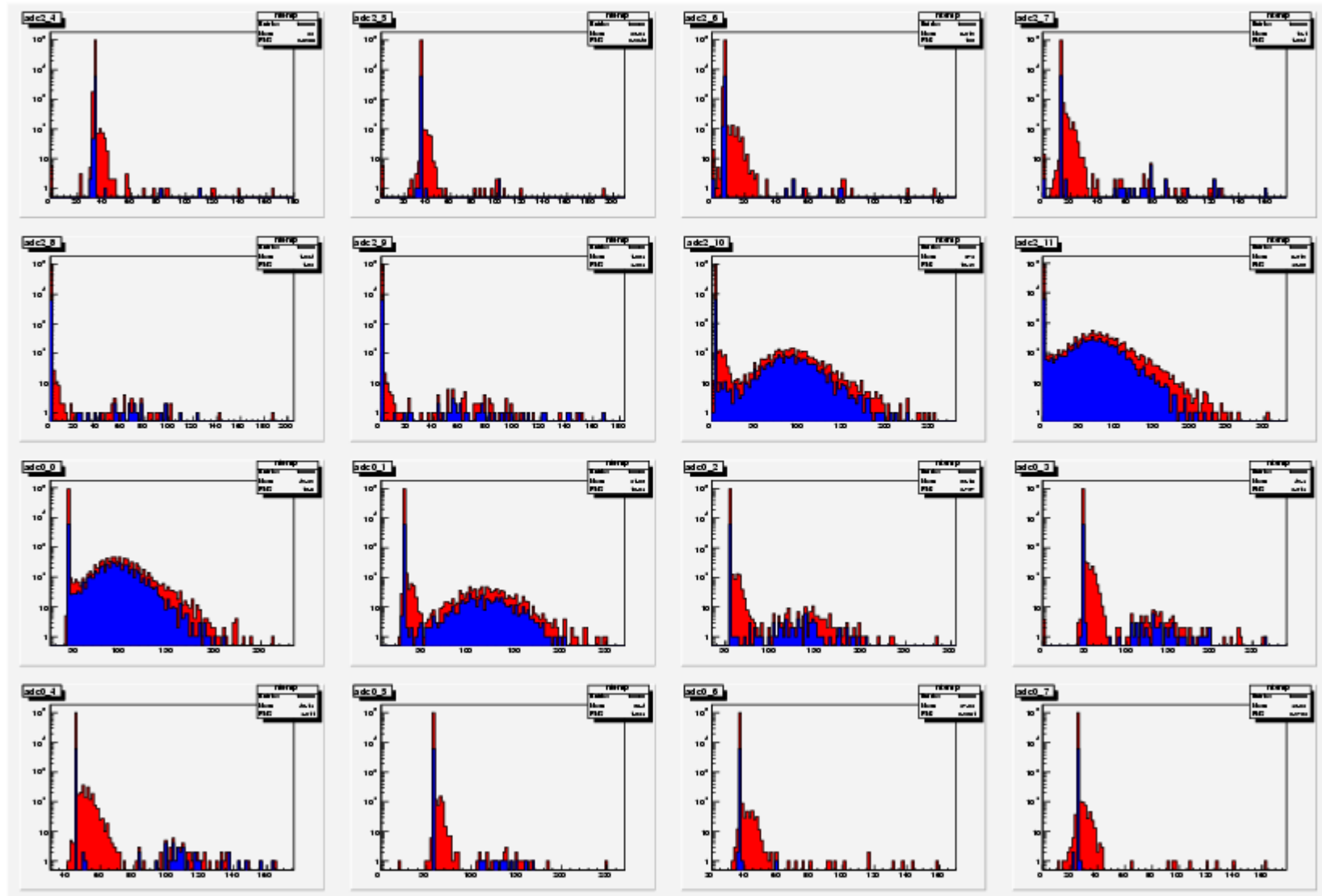
Not much change visible...

1st hodoscope: single finger cuts

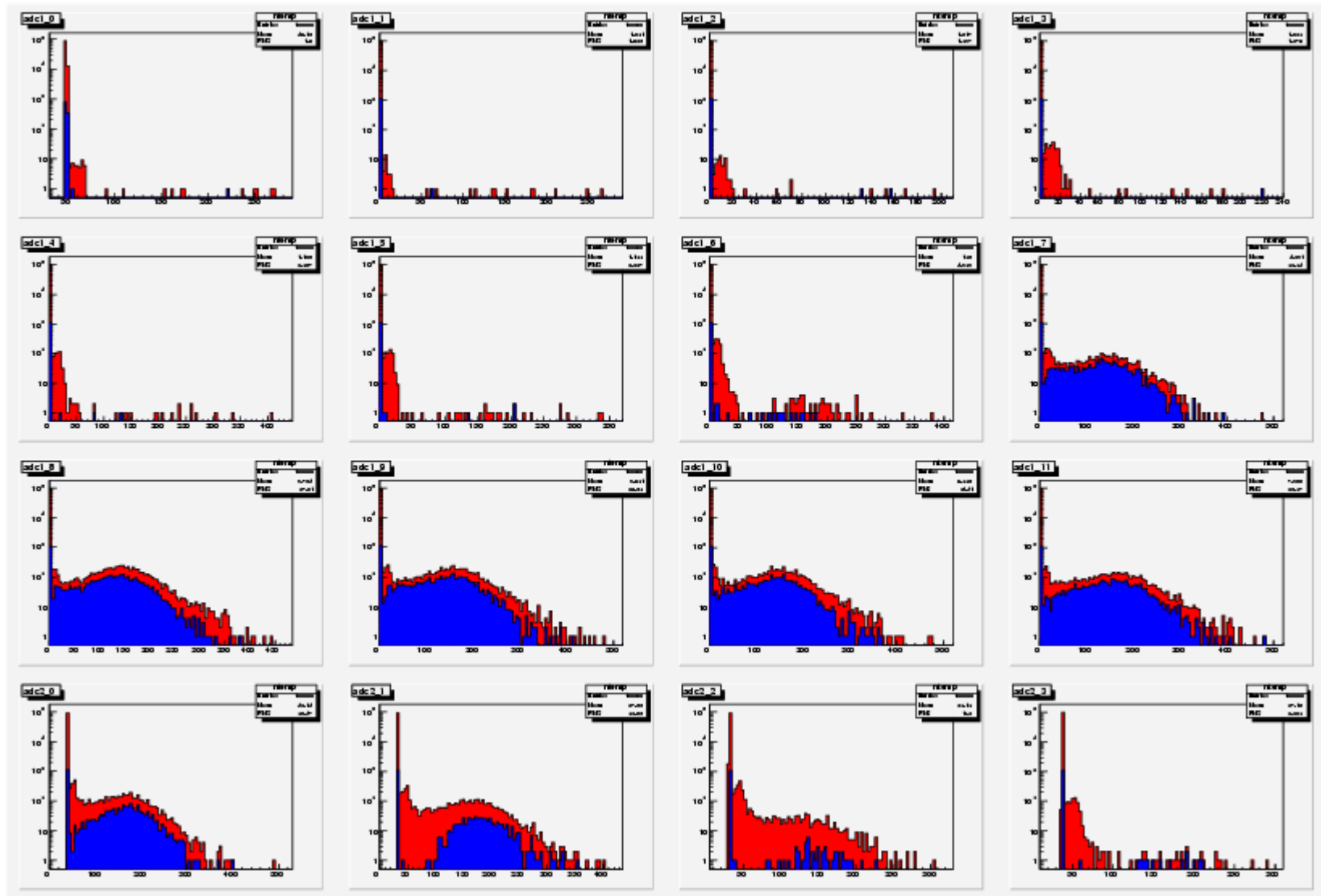
- Cuts accomplished by requiring that the other 15 fingers have signals below the pedestal values we have assigned to each finger using Pilas laser



1st hodoscope: single finger horizontal cuts



1st hodoscope: single finger vertical cuts



1st hodoscope: single finger cuts

- Eliminated the shoulders in the plots which are believed to be background since they appear in the outer fingers as well.
- Nevertheless, a thorough examination of shoulder events in the prototype still needs to be done.



The Second Hodoscope



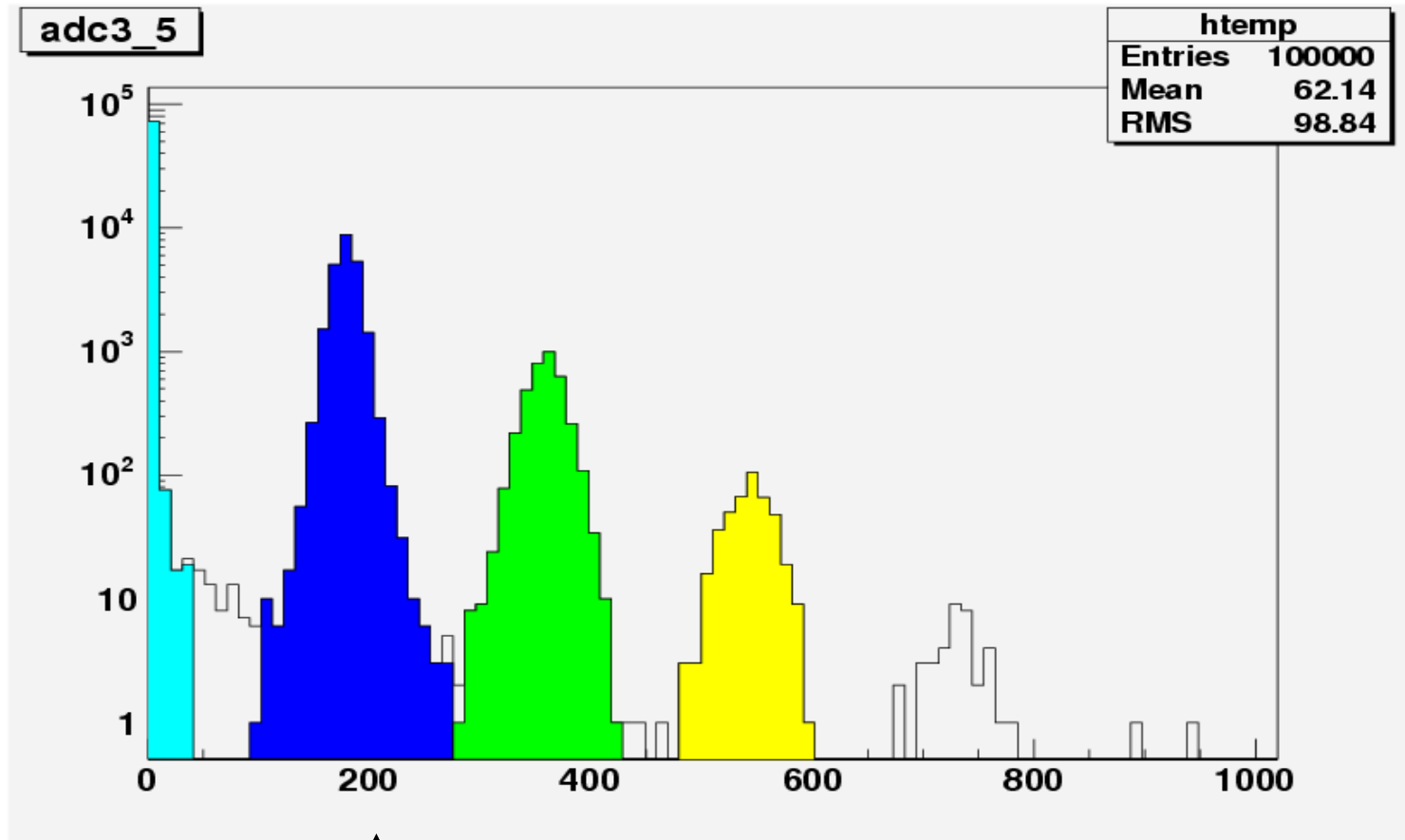
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The hodoscopes, September 2006

The 2nd Hodoscope

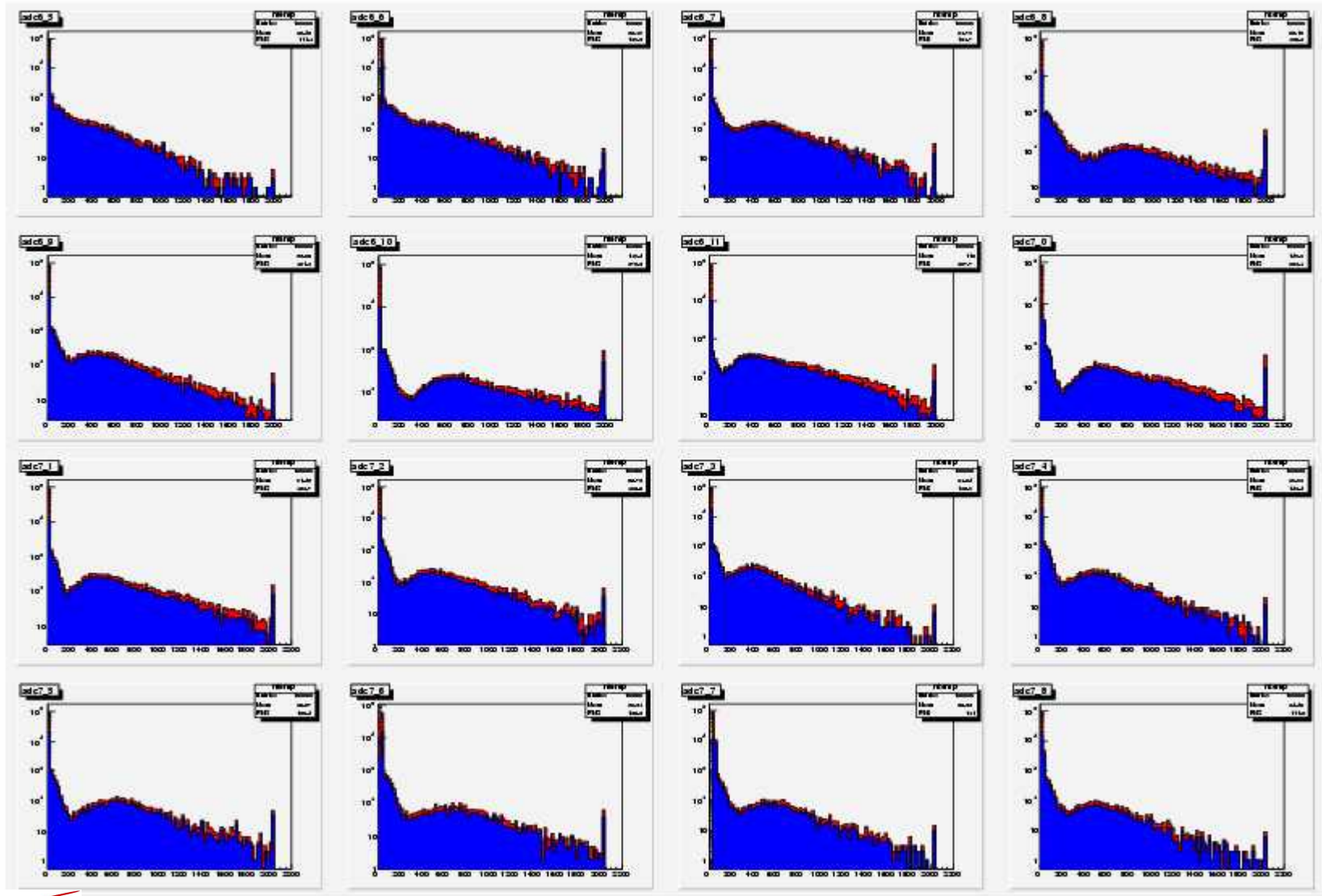
- 16 horizontal and 16 vertical fingers
- Fibers are 2mm by 2mm square and wrapped in foil
- Foil creates gaps $\sim 77\mu\text{m}$ between horizontal fibers, and $\sim 64\mu\text{m}$ between the vertical ones
- Read out via single Hamamatsu
8X8 H-8500 MaPMT

The Pb glass counter

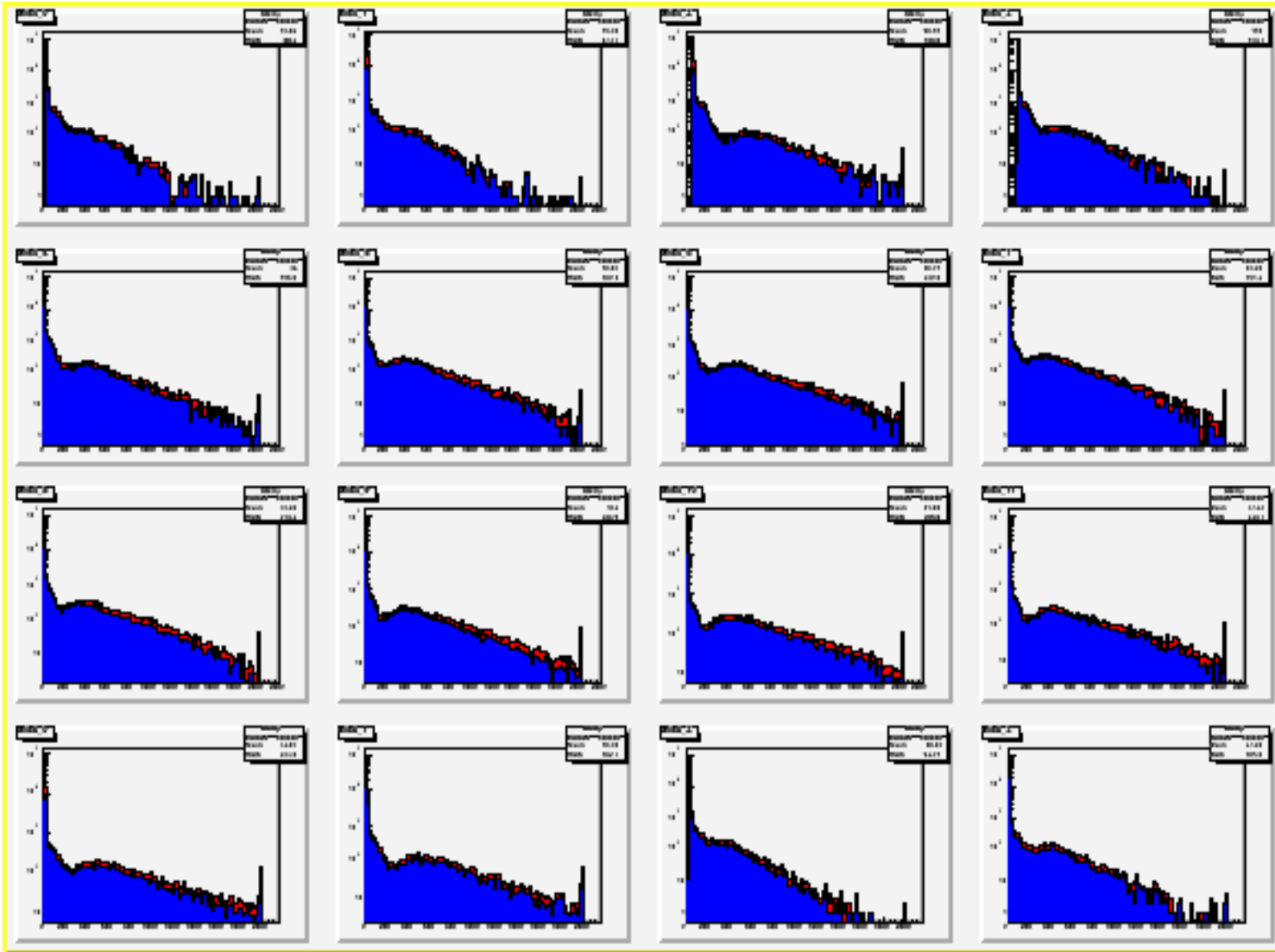


Again the first cut was based on one hit in the Pb glass counter.

2nd hodoscope: Pb glass horizontal cuts

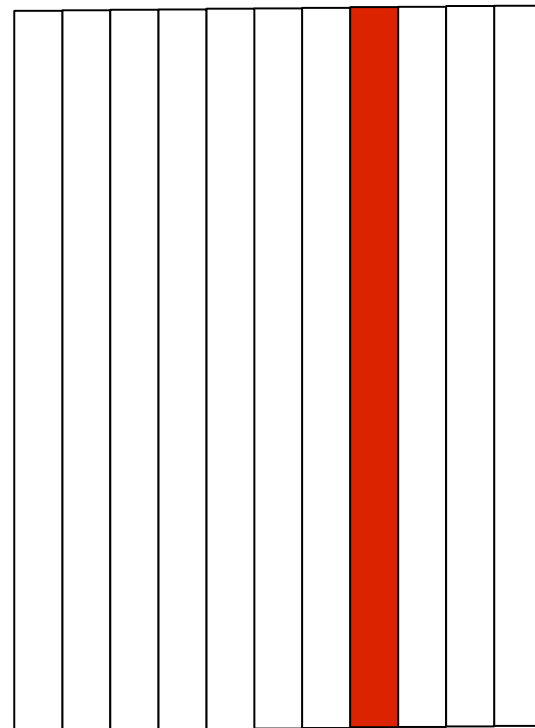
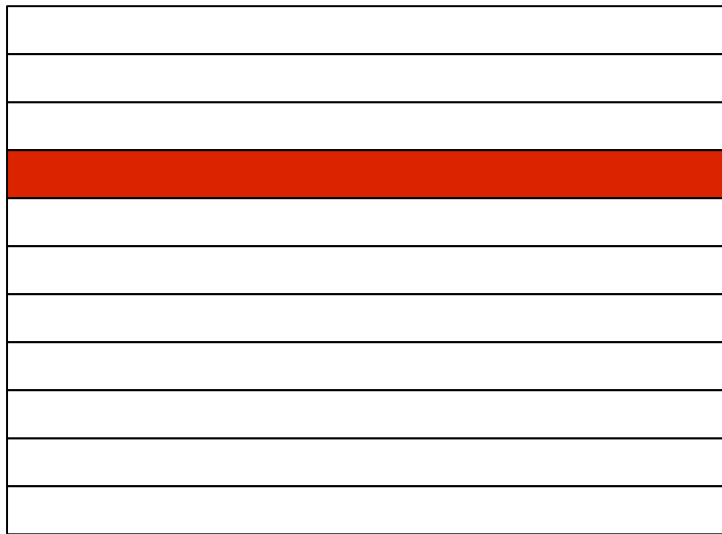


2nd hodoscope: Pb glass vertical cuts



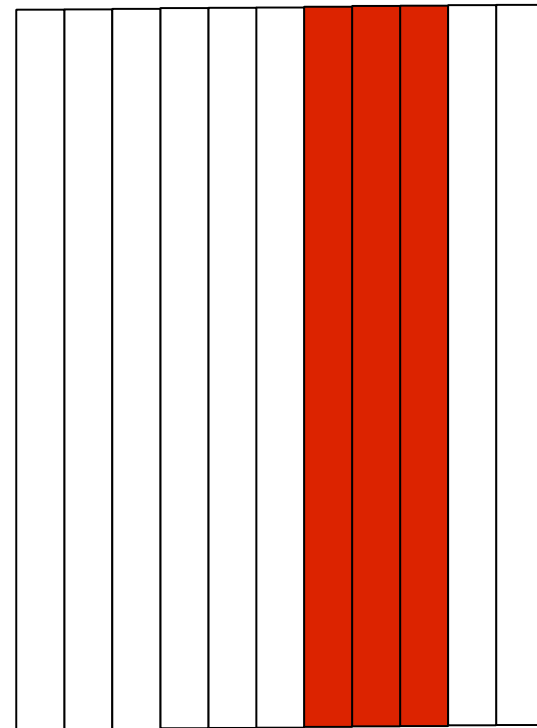
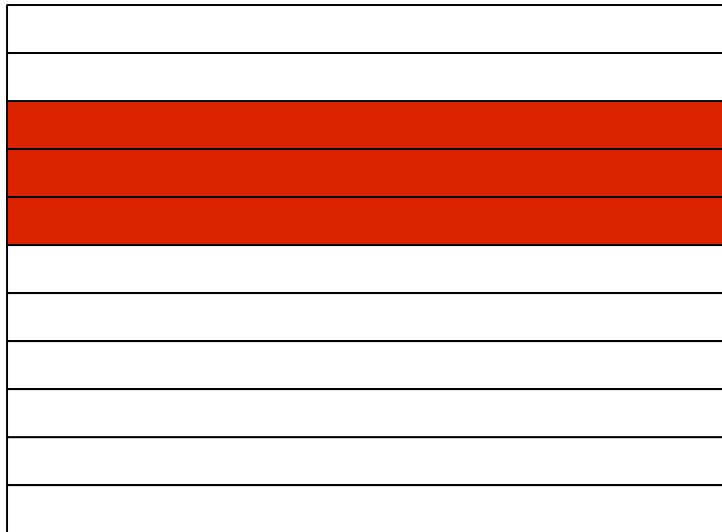
2nd hodoscope: finger cuts

- Cuts accomplished by requiring that the other 15 fingers have signals below the pedestal values we have assigned to each finger eliminated all of the signal above the pedestals



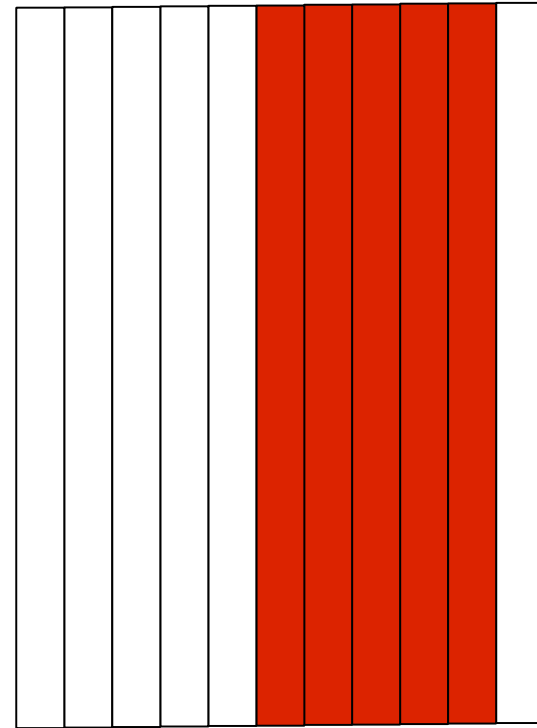
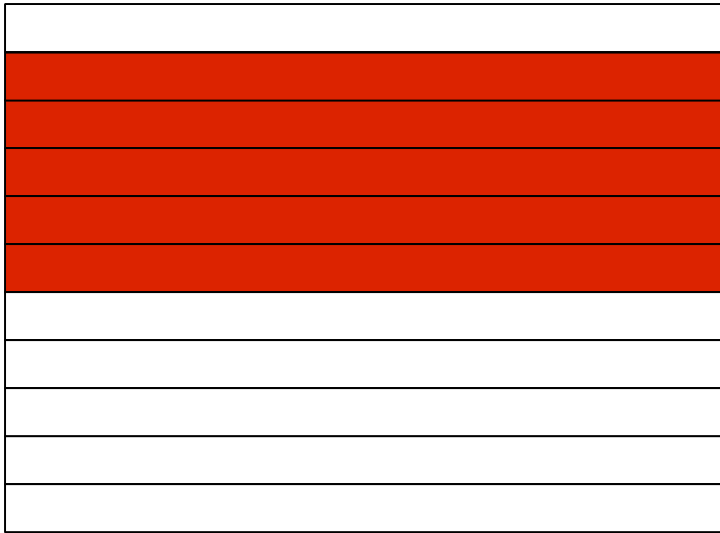
2nd hodoscope: 3 finger cuts

- Cuts eliminating constraints on a finger's two nearest neighbors (3 finger cuts) achieved similar results

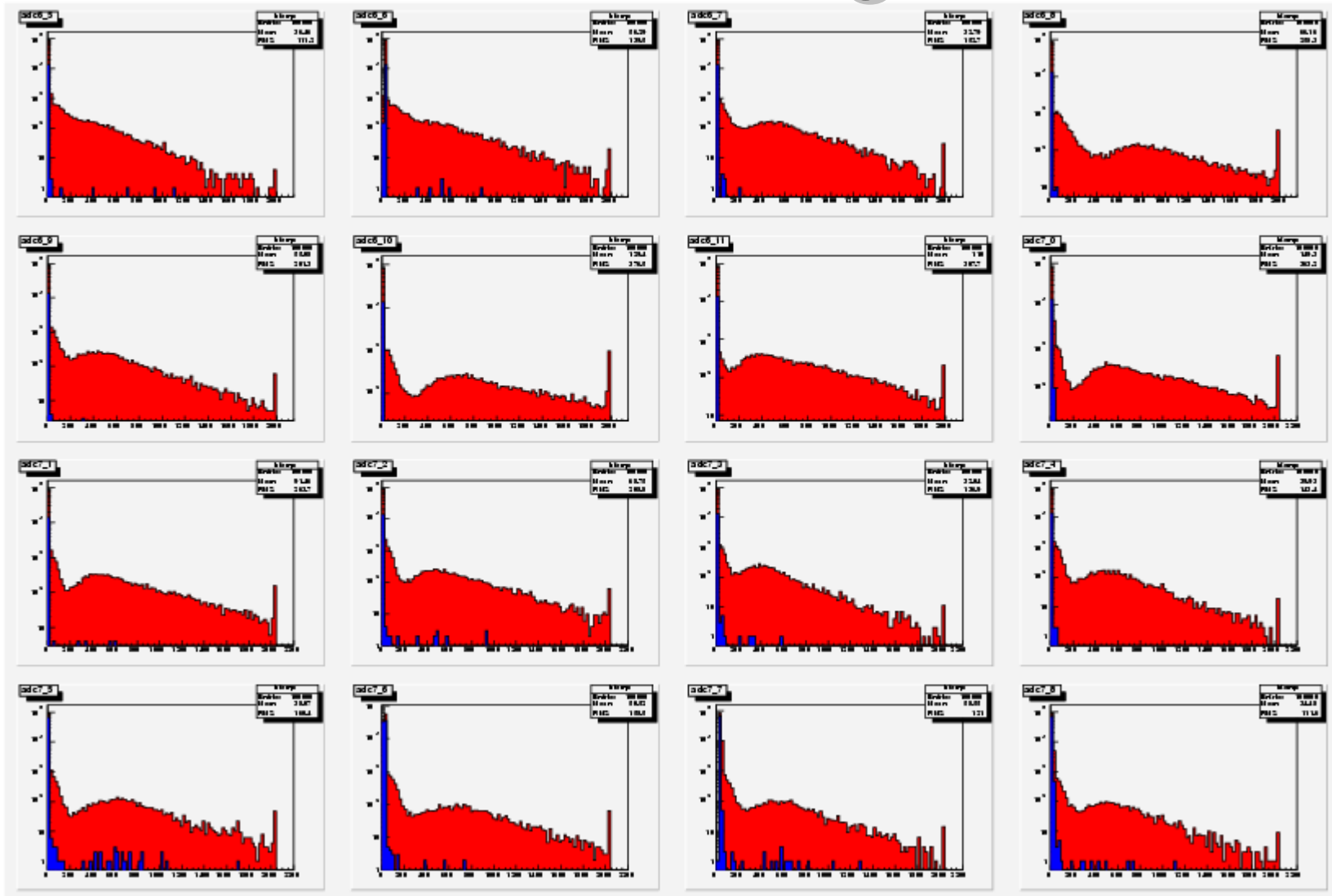


2nd hodoscope: 5 finger cuts

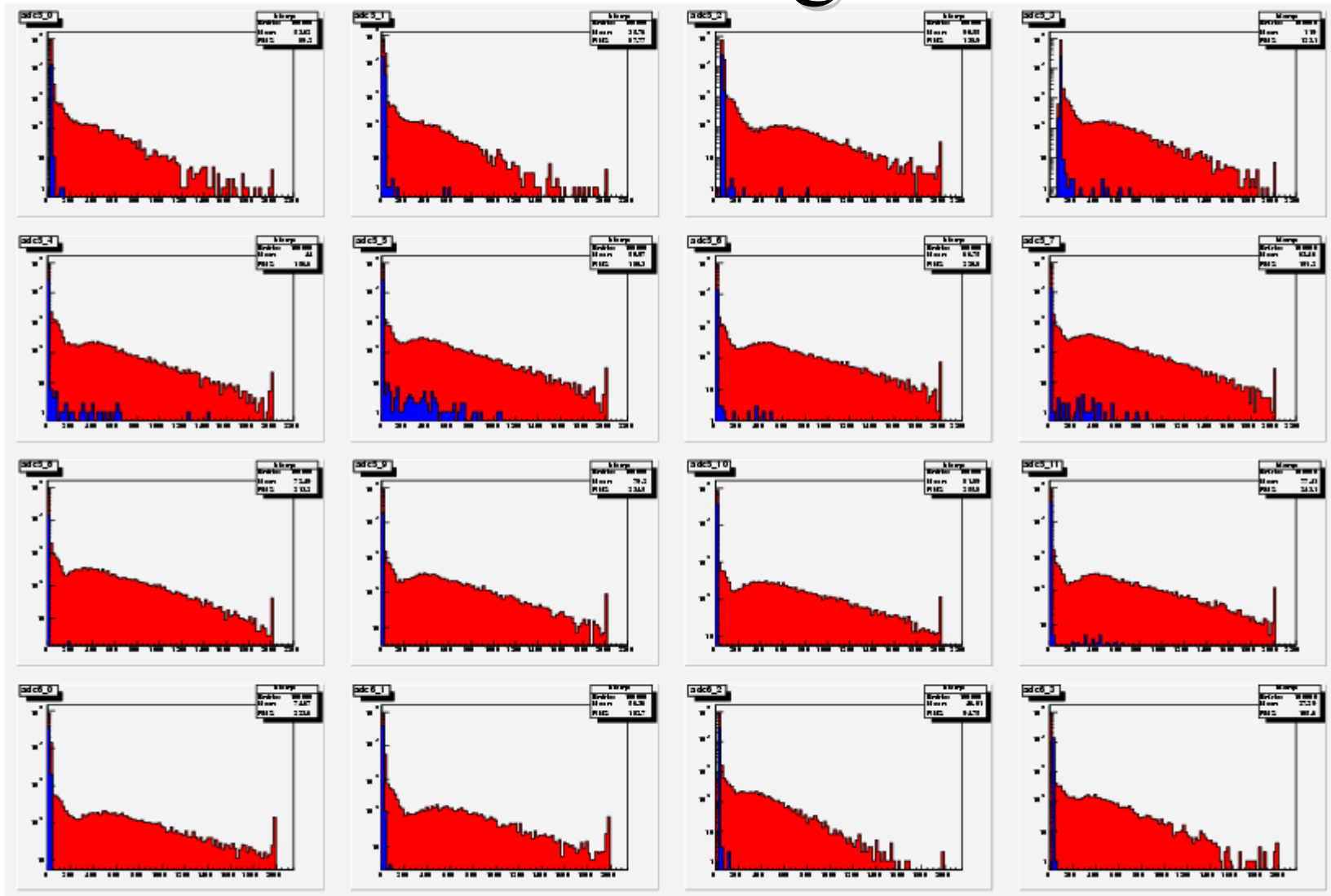
- Finally eliminating constraints on a finger's next-nearest neighbor as well (5 finger cuts) let some signal through



2nd hodoscope: horizontal 5 finger cuts



2nd hodoscope: vertical 5 finger cuts

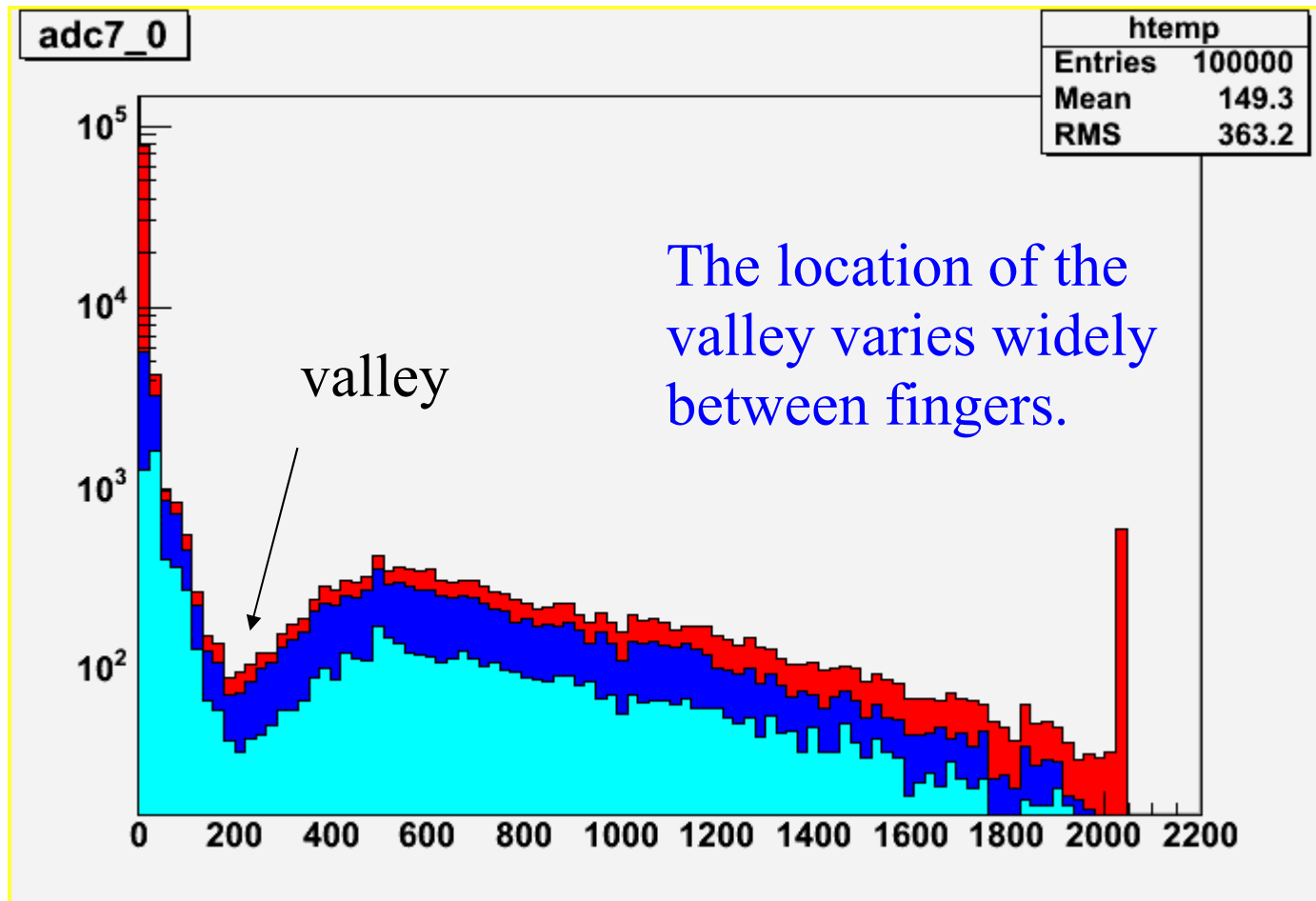


2nd hodoscope: pedestal finger cuts

- From these plots it was concluded that the signal in the second hodoscope was too spread out to get meaningful results from pedestal finger cuts like in the first hodoscope
- Higher pedestals where the next idea...

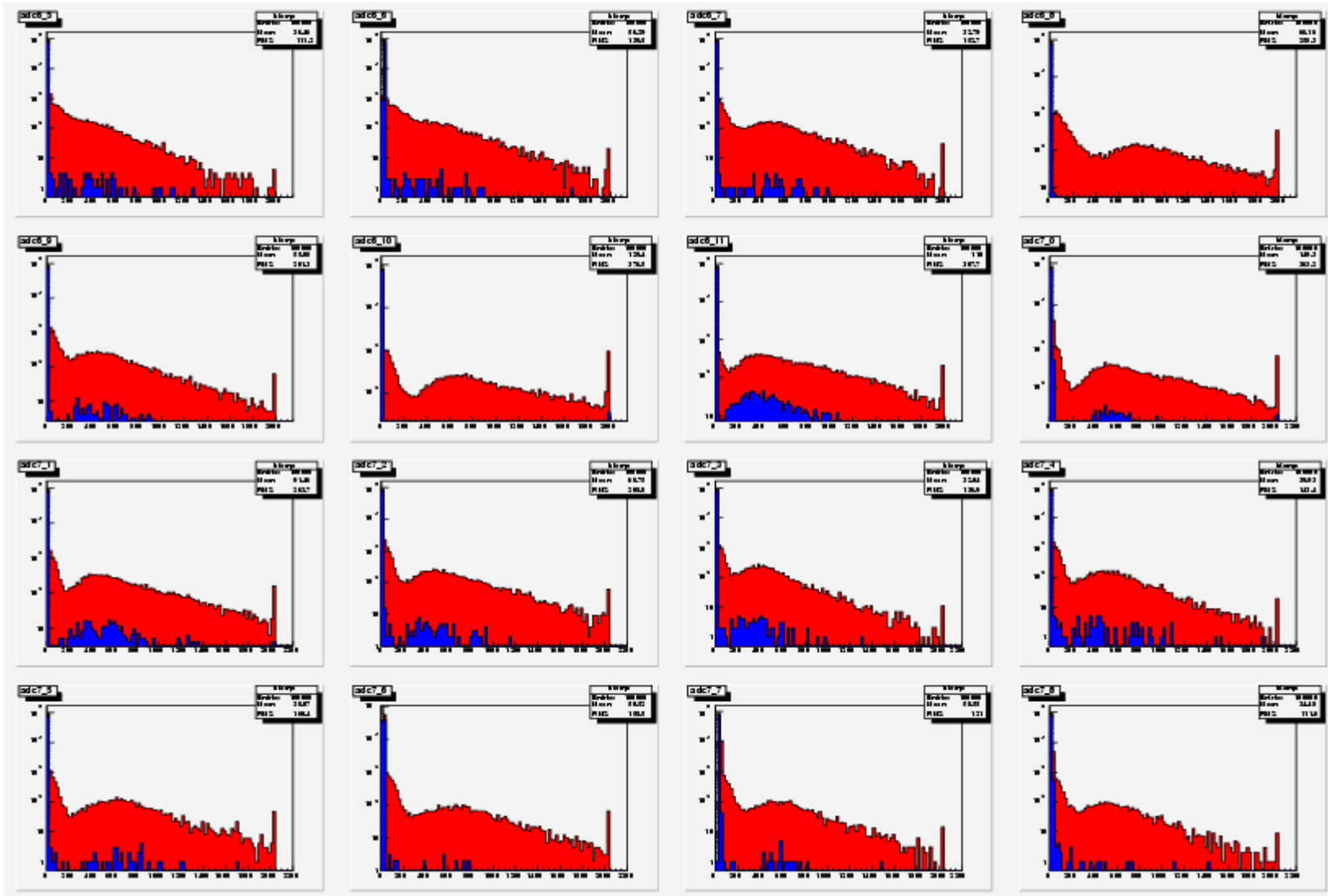


The 2nd Hodoscope – Valley cuts

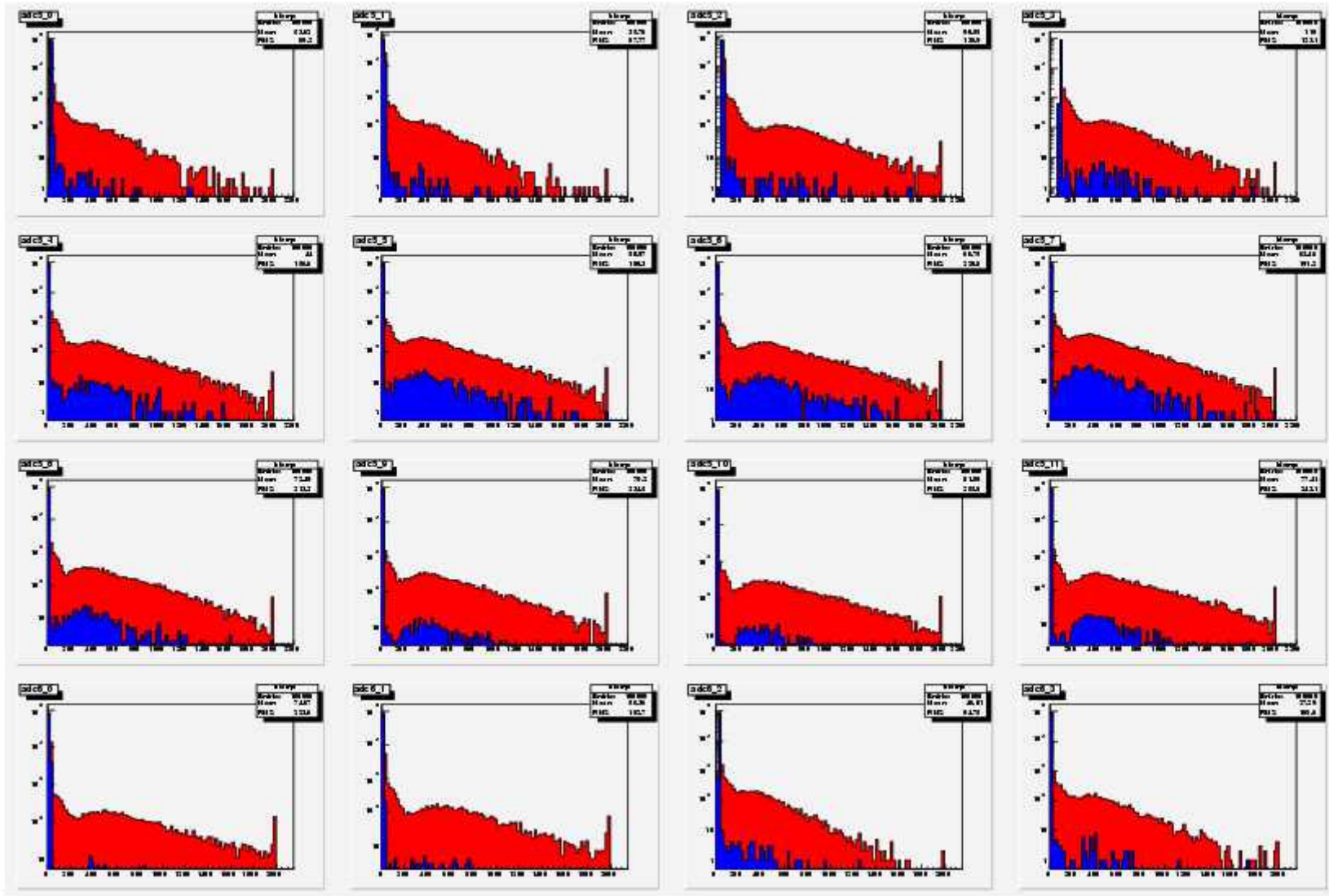


Red is the uncut signal, Blue is the signal after applying a cut, Light Blue is a second cut

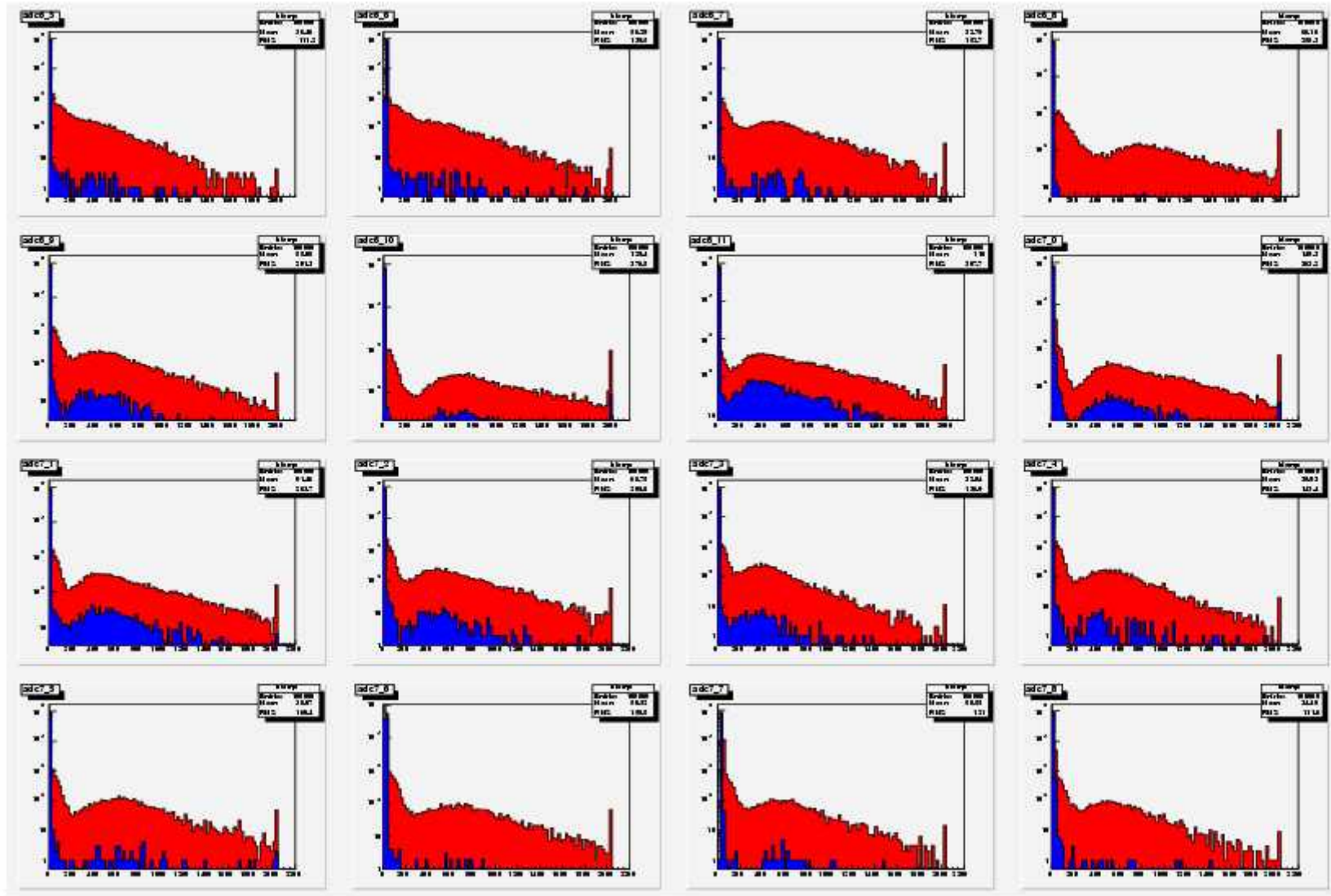
2nd hodoscope: horizontal 1 finger valley cuts



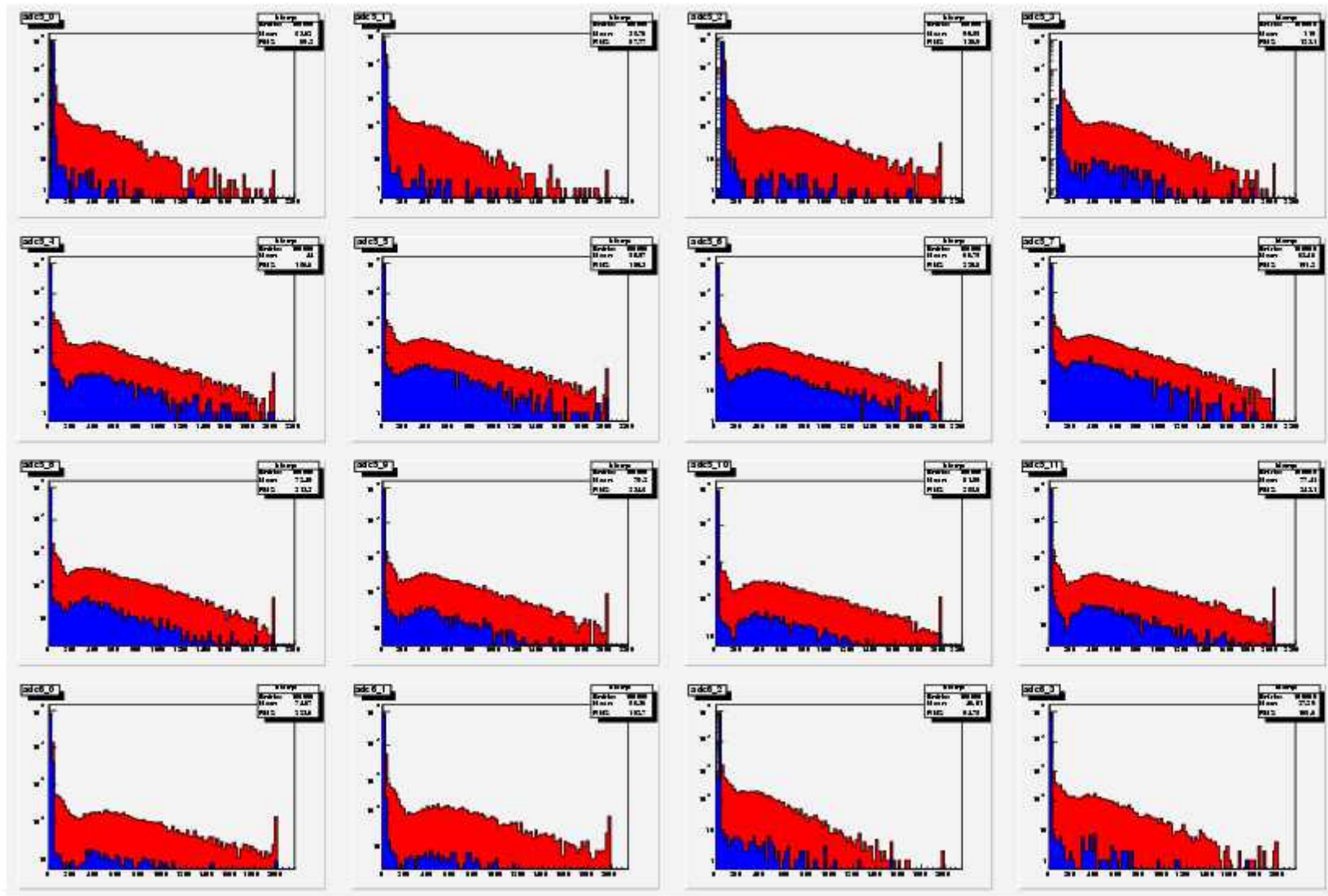
2nd hodoscope: vertical 1 finger valley cuts



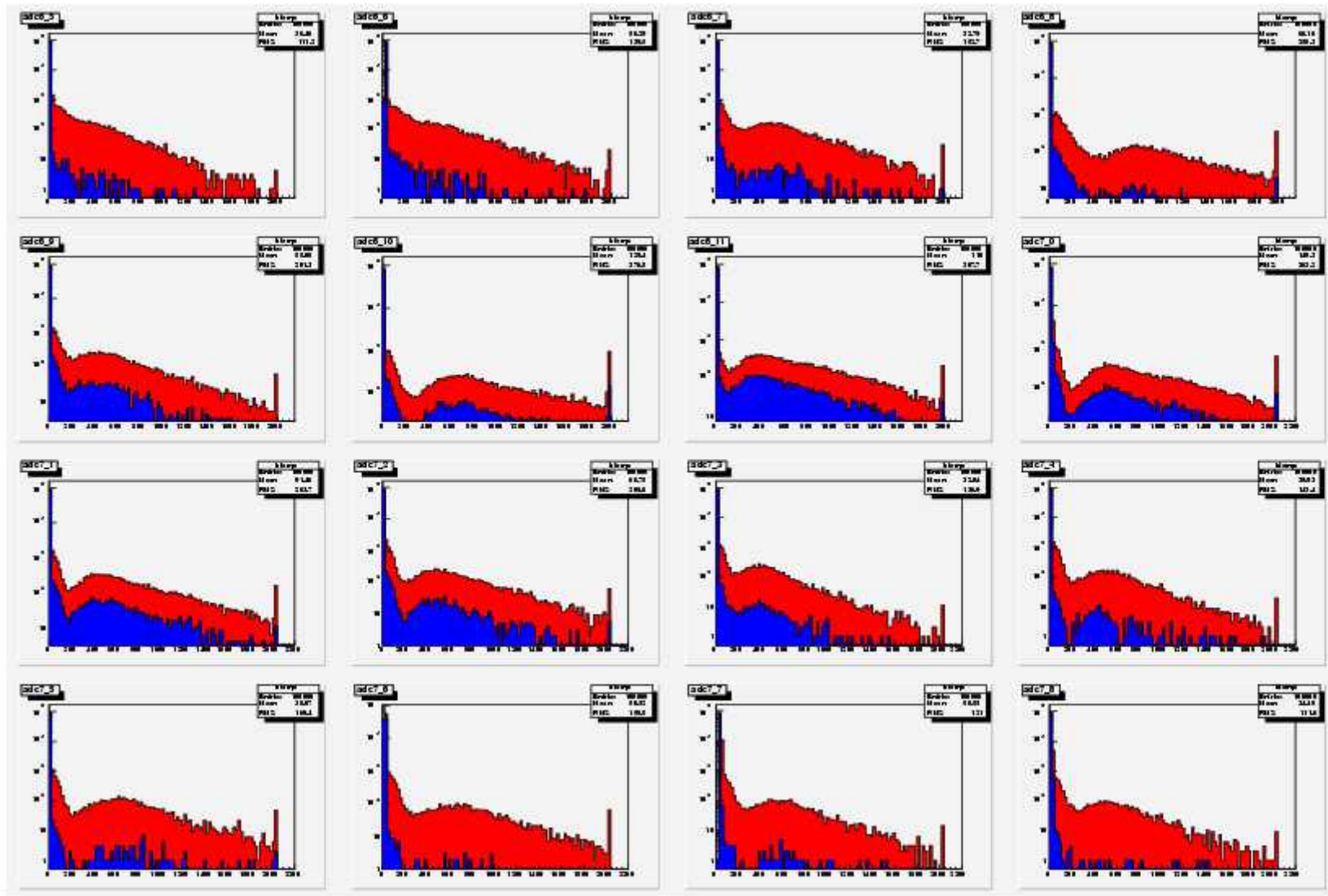
2nd hodoscope: horizontal 3 finger valley cuts



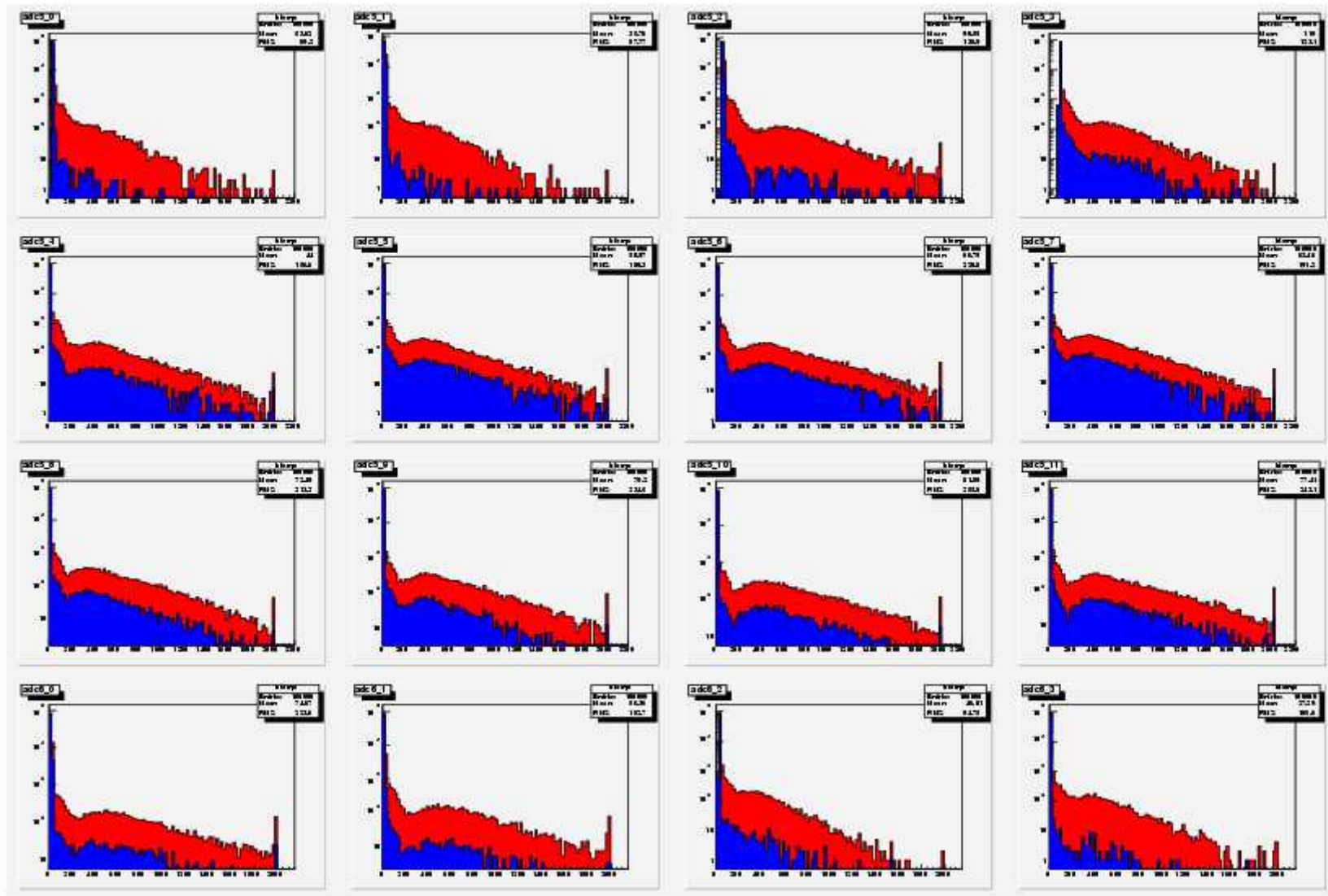
2nd hodoscope: vertical 3 finger valley cuts



2nd hodoscope: horizontal 5 finger valley cuts

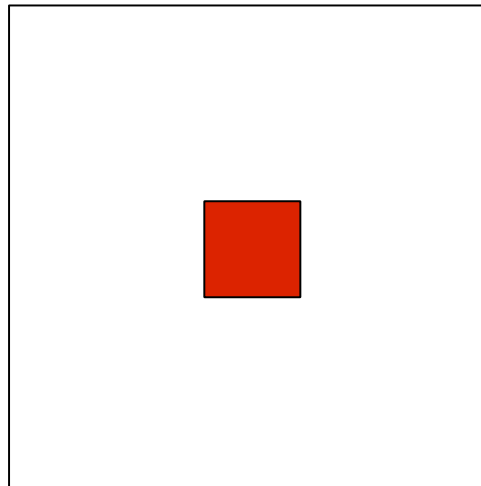


2nd hodoscope: vertical 5 finger valley cuts

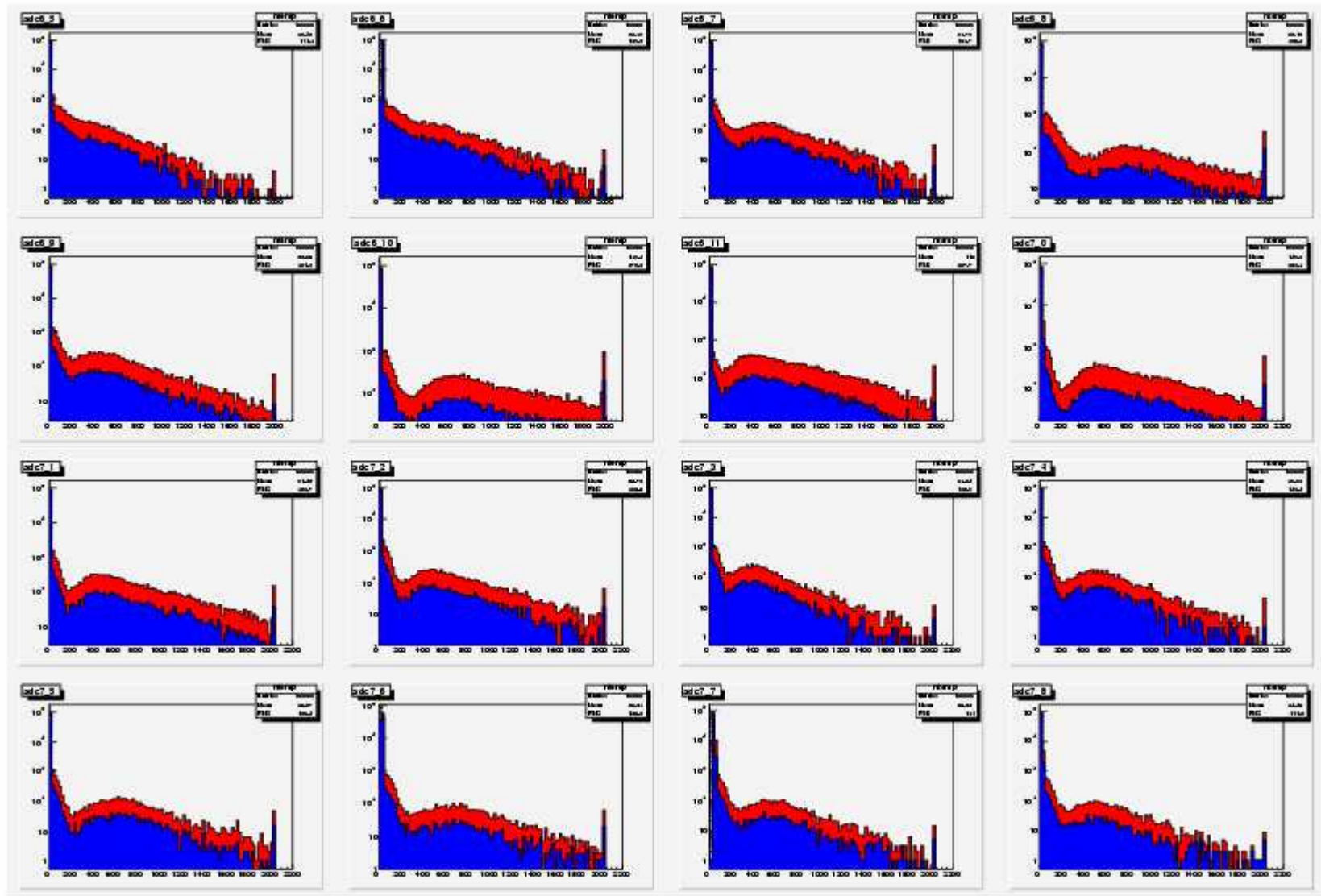


2nd hodoscope: correlated cuts

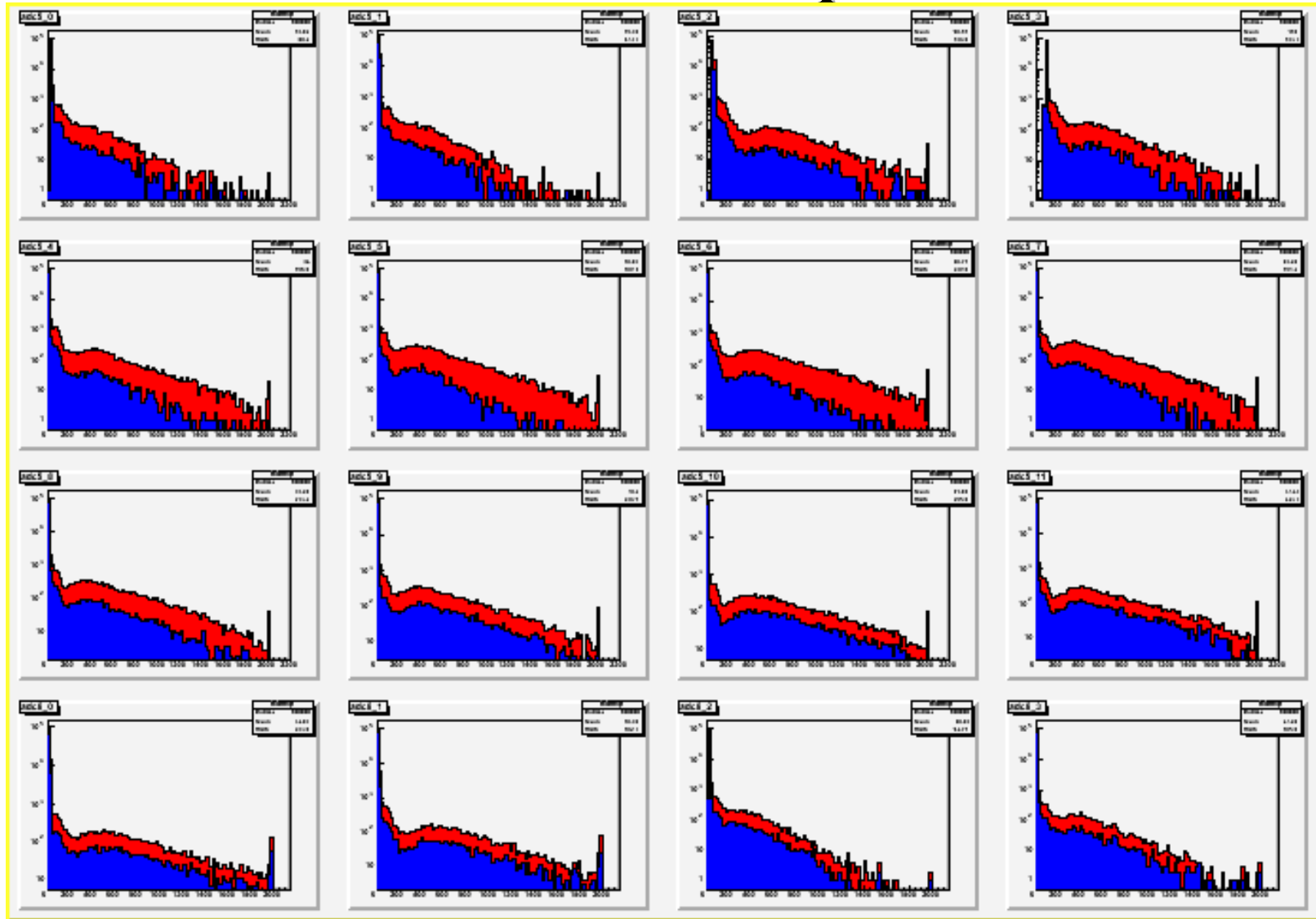
- Cuts accomplished by correlation with a good signal in the first hodoscope
- “good signal” means that one and only one of the central 4 fingers in both the horizontal and vertical directions was hit



2nd hodoscope: horizontal fingers with central hodoscope 1 cut



2nd hodoscope: vertical fingers with central hodoscope 1 cut

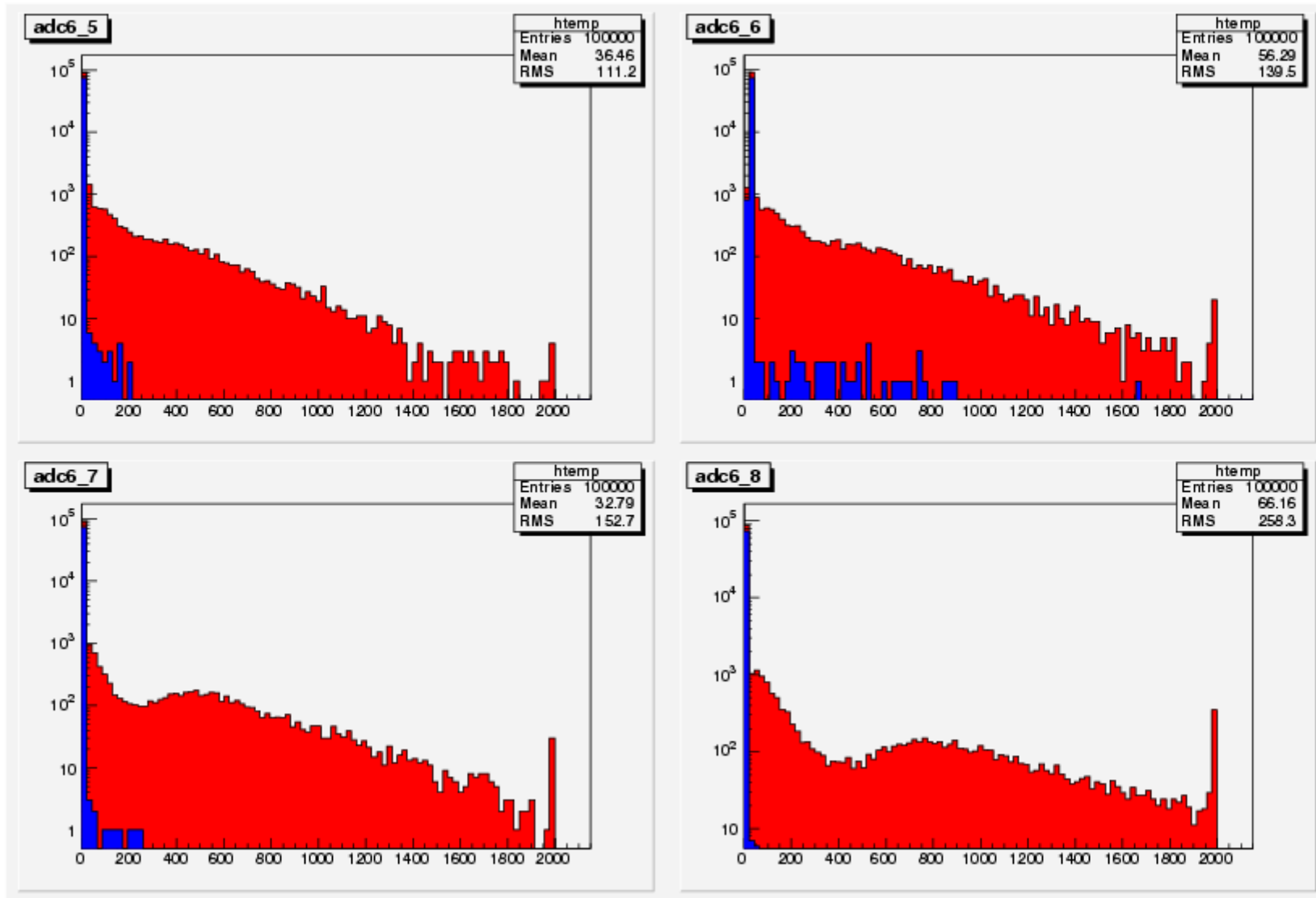


2nd Hodoscope: shoulders

- When a single finger is cut to be above the pedestal or valley, it lowers the overall signal in the other fingers.
- However, using the 1 finger valley cut described earlier gives a clue to the nature of the shoulders...



2nd Hodoscope: shoulders



Conclusions

- The 1st hodoscope is understood well enough to cut out the pedestals and shoulders which correspond to background
 - Still don't understand the genesis of the shoulders
- The 2nd hodoscope is a somewhat messier affair
 - Strict pedestal cuts eliminate the signal
 - Valley cuts & cuts correlated to the signal in the first hodoscope lower the overall signal without cleaning it up



Questions?



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