Test-beam May 2010: First analysis results

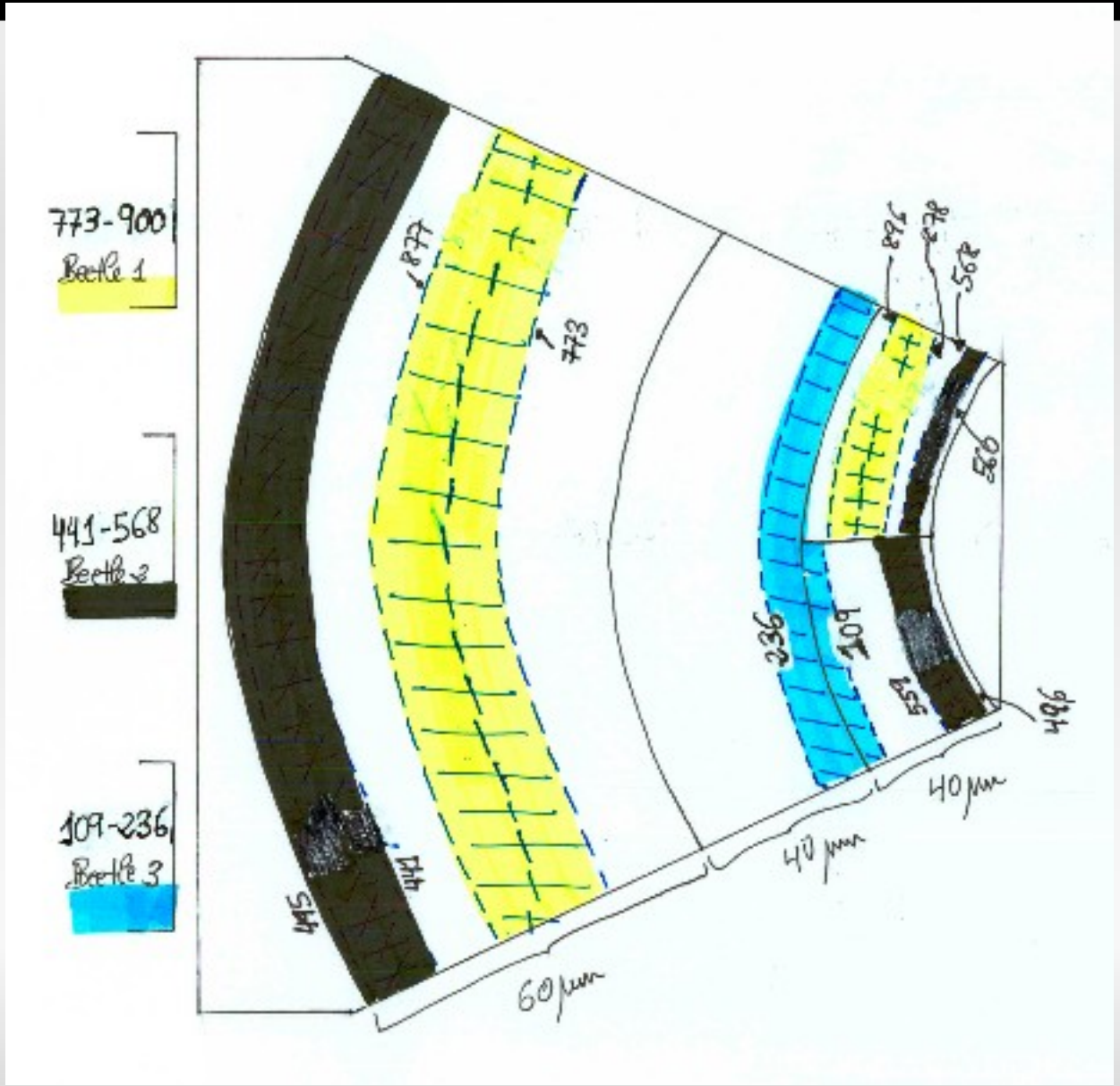
DUT: PR01

Telescope: Timepix

Overview

- Run data: PR01Run002, before the shut down
- Sensor at 7.6º
- Beam spot over region 3 (Beetle 3)
- No time alignment available yet

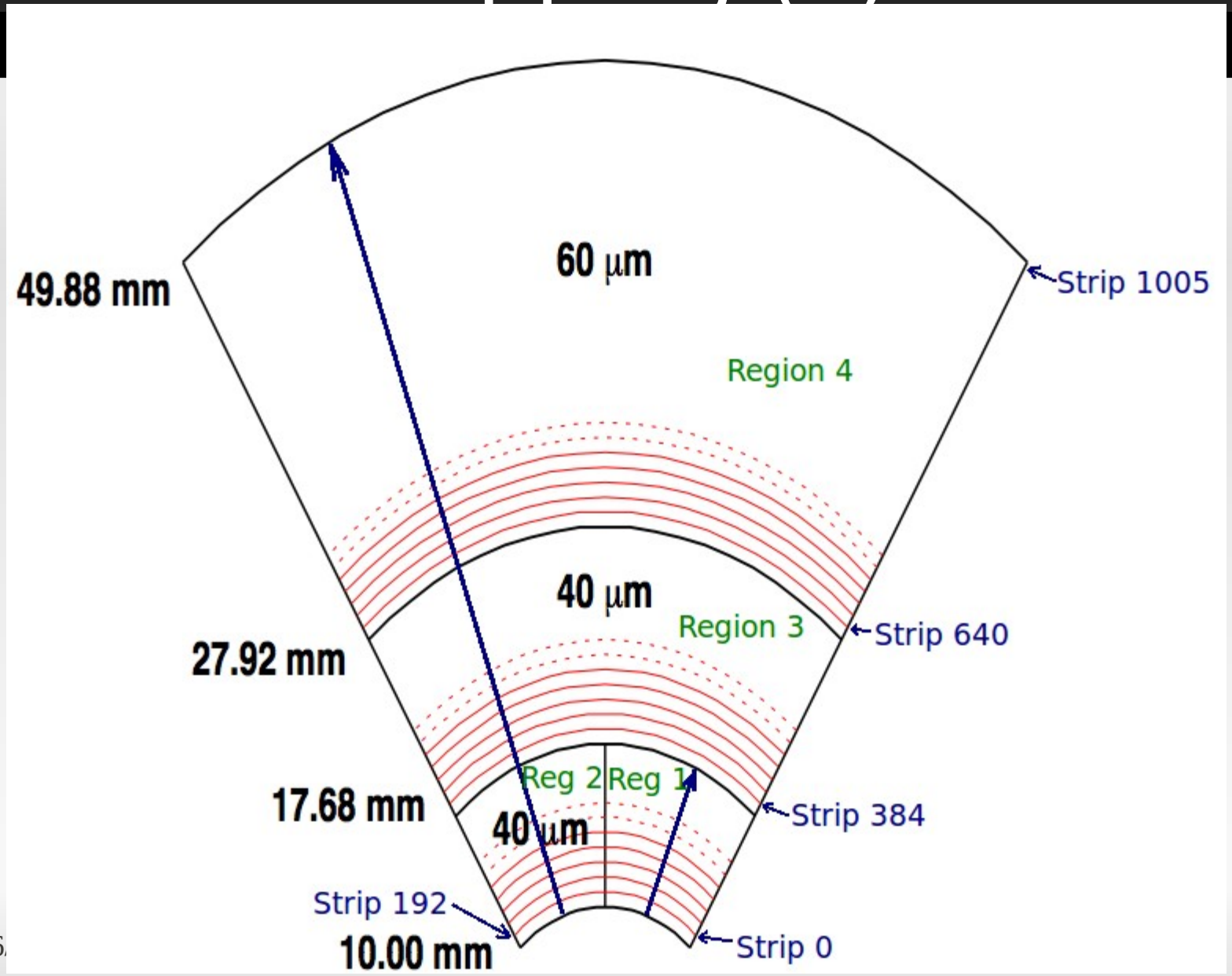
Instrumented sensor



Mapping (I)

- The goal is to present the data according to a “reasonable” strip naming (ex. Strip 0 is the shortest, and 1006 is the longest)
- Strip numbering in the previous slide was done according to routing lines, that is, forced by the bonding. In addition, information about not bonded strips are related to routing lines naming
- Recorded data are organized according to Tell1 channel
- … so my first task was to build a class, which could be integrated into Vetra software, to perform this mapping.
- Using the previous mapping class I built to more which returns the radius and the noise for each strip.

Mapping (II)

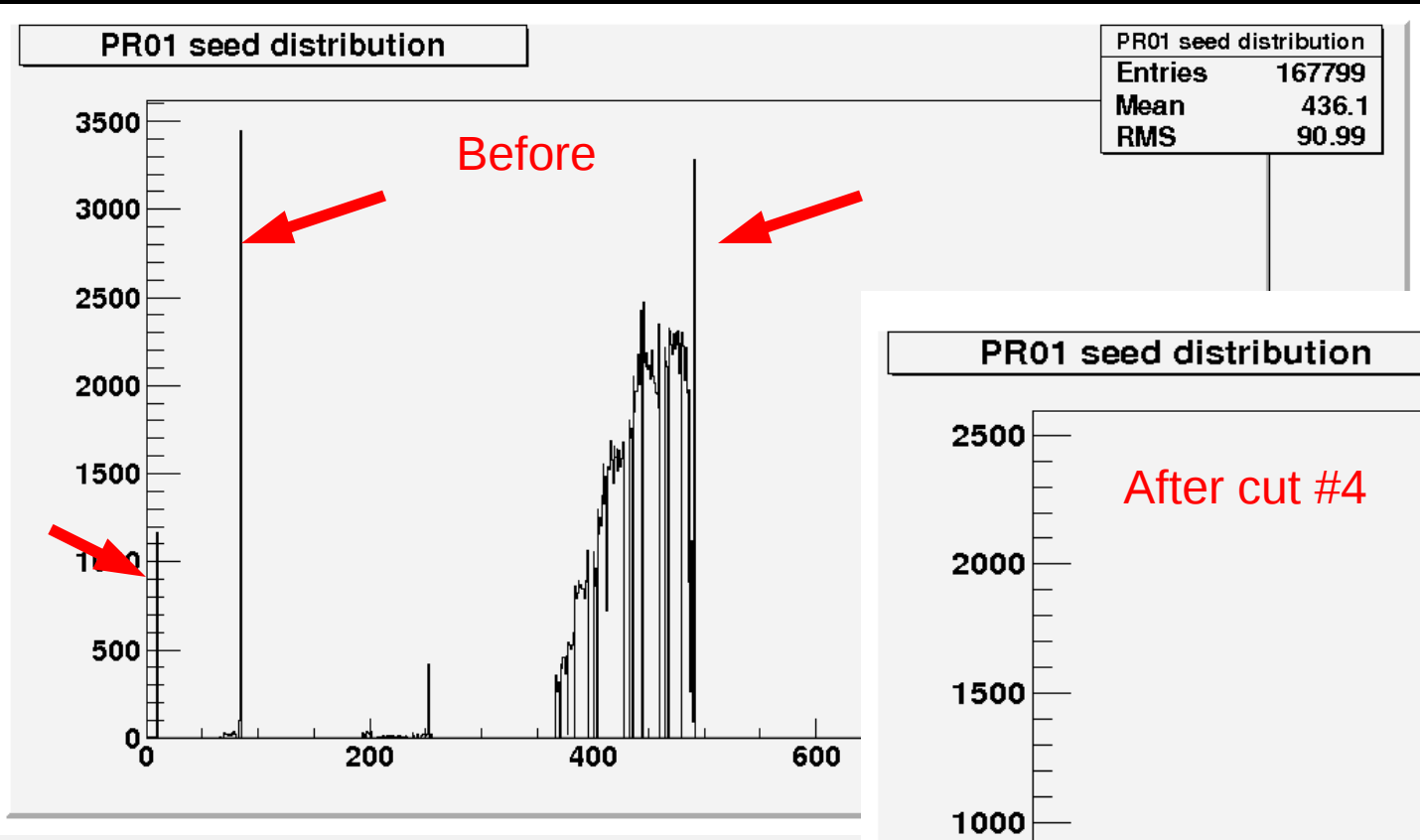

49.88 mm
60 μm
Strip 1005
Region 4
40 μm
Region 3
Strip 640
27.92 mm
17.68 mm
Reg 2
Reg 1
40 μm
Strip 384
Strip 192
10.00 mm
Strip 0

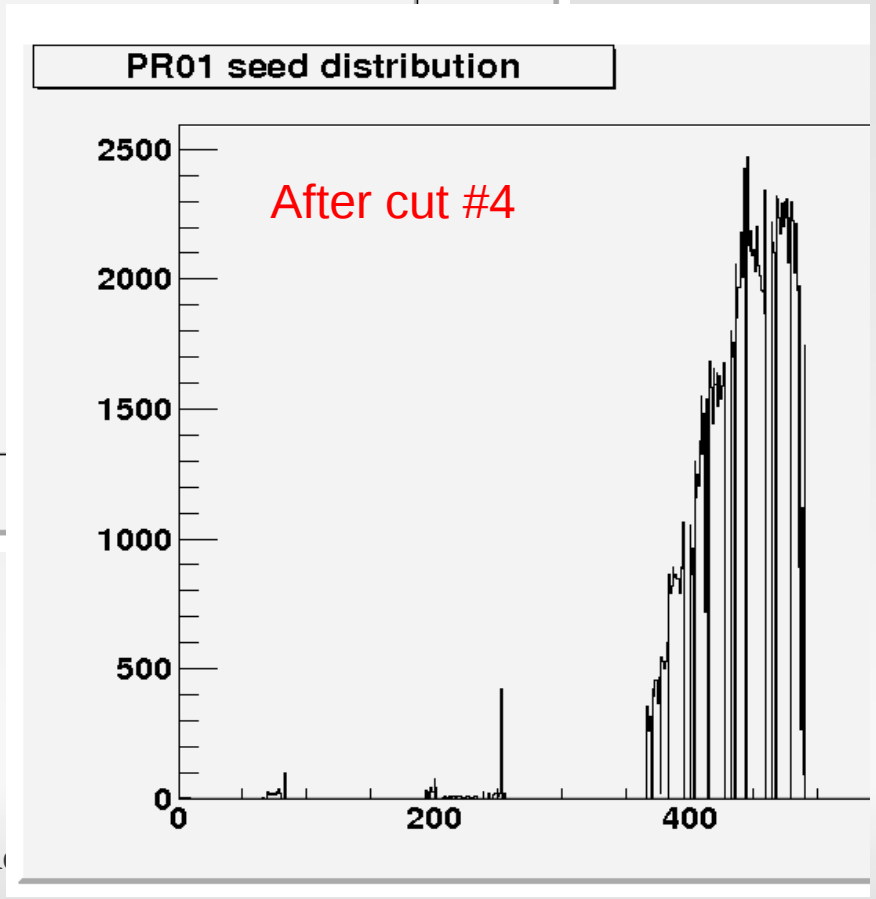
Cuts (I)

Before the analysis, we applied several cuts to reject those hits in which we don't trust for any reason:

1. We reject those frames of data where the number of triggers in the TDC mismatch the number of triggers in the TELL1 (here we loss a 9.4% of the triggers)
2. We reject the strips included in the additional list of non bonded strips (in total we got 338 bonded strips)
3. We reject those TELL1 channels affected by cross talk (the first 3 channels in each link) (around 10% of the bonded strips)
4. We reject some strips which, after a preliminary analysis, we saw that they got an unusual and unexplainable amount of hits (strips 9, 84 and 491)

Cuts (II)


PR01 seed distribution
PR01 seed distribution
Entries 167799
Mean 436.1
RMS 90.99
Before
3500
3000
2500
2000
1500
500
0
0
200
400
600


PR01 seed distribution
After cut #4
2500
2000
1500
1000
500
0
0
200
400

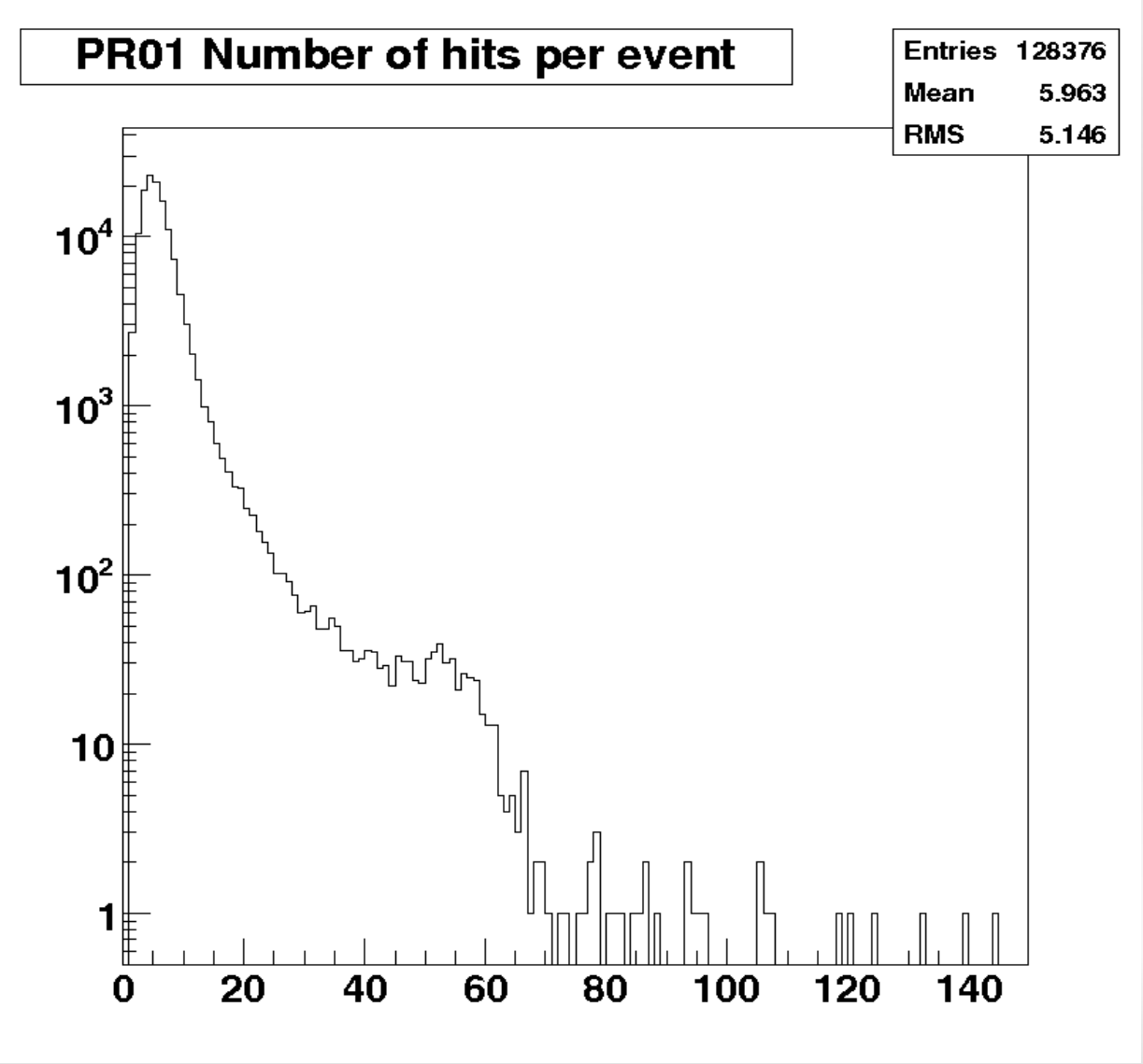
Cuts (III)

5.We reject those triggers in which none of the hits has an ADC value greater than the seed threshold (loss 1% of triggers). Currently we choose as seed threshold cut 8 times the noise of the strip, and as low threshold cut(*) 4 times the noise

6.We reject those triggers where the number of hits is “enormous” (the maximum allowed number of hits per trigger is currently 20) (loss 2% of triggers)

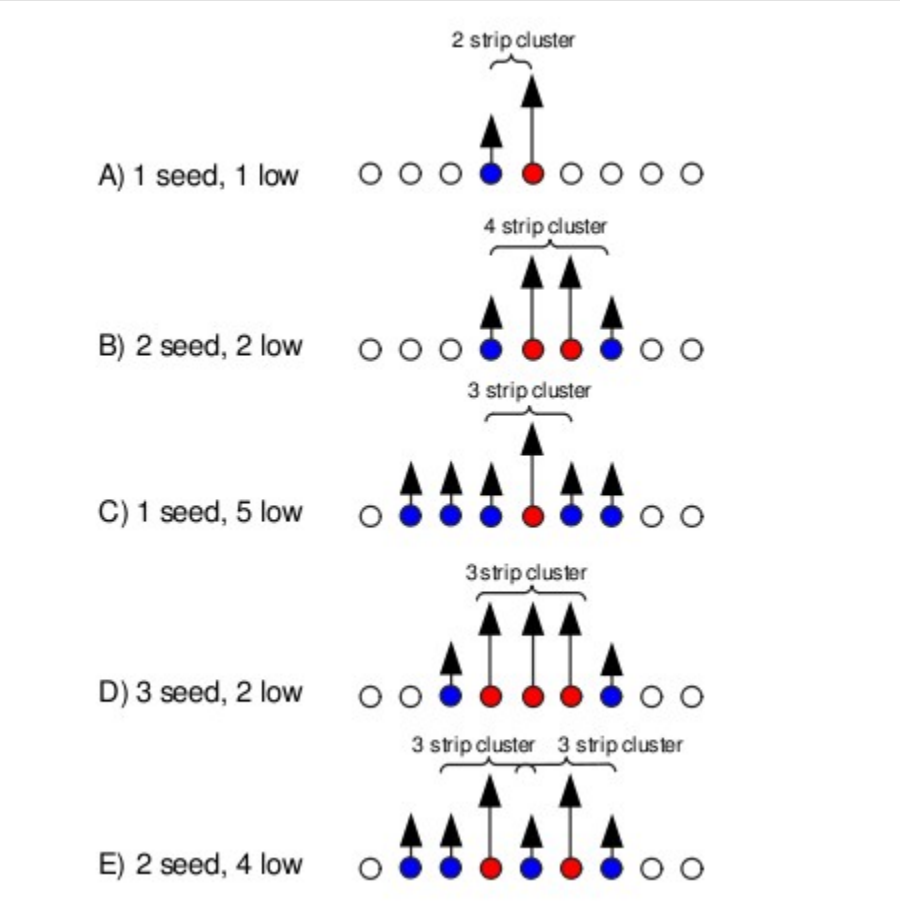
(*) Low threshold cut: the cut to be exceeded to belong to a cluster as neighbor strip

Cuts (IV)


PR01 Number of hits per event
Entries 128376
Mean 5.963
RMS 5.146
10^4
10^3
10^2
10
1
0
20
40
60
80
100
120
140

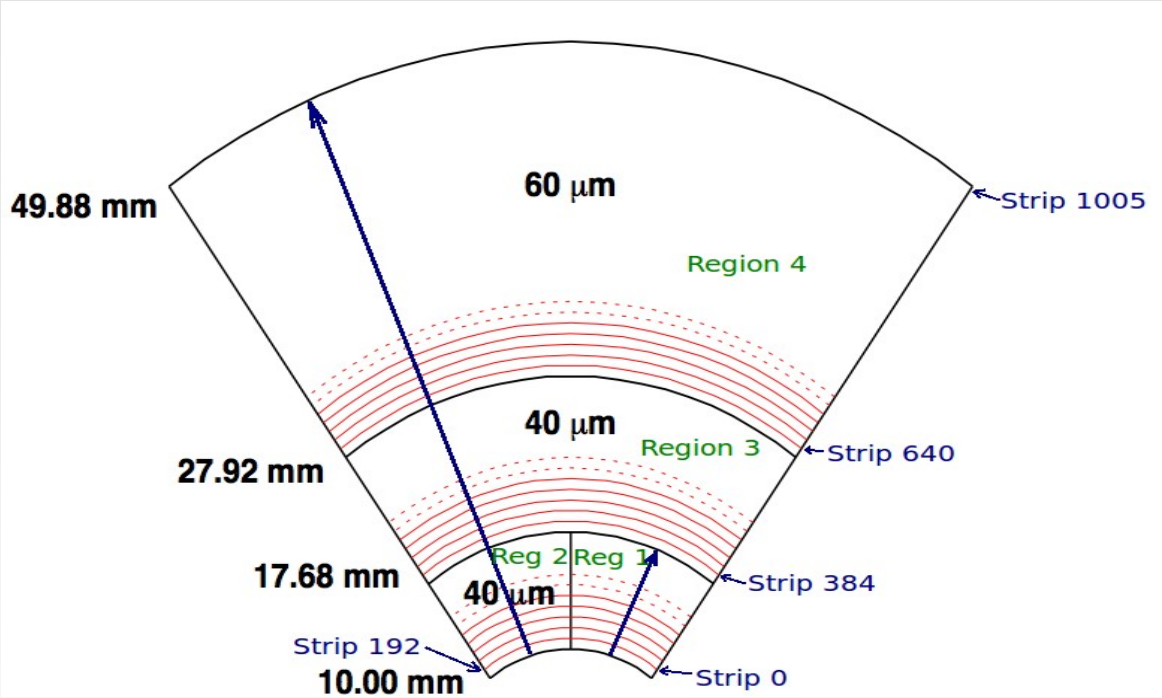
Clustering (I)

The same clustering algorithm which which is described in Velo's internal note was implemented here:
http://eckstein.home.cern.ch/eckstein/Work/velo_st_clusterization.pdf



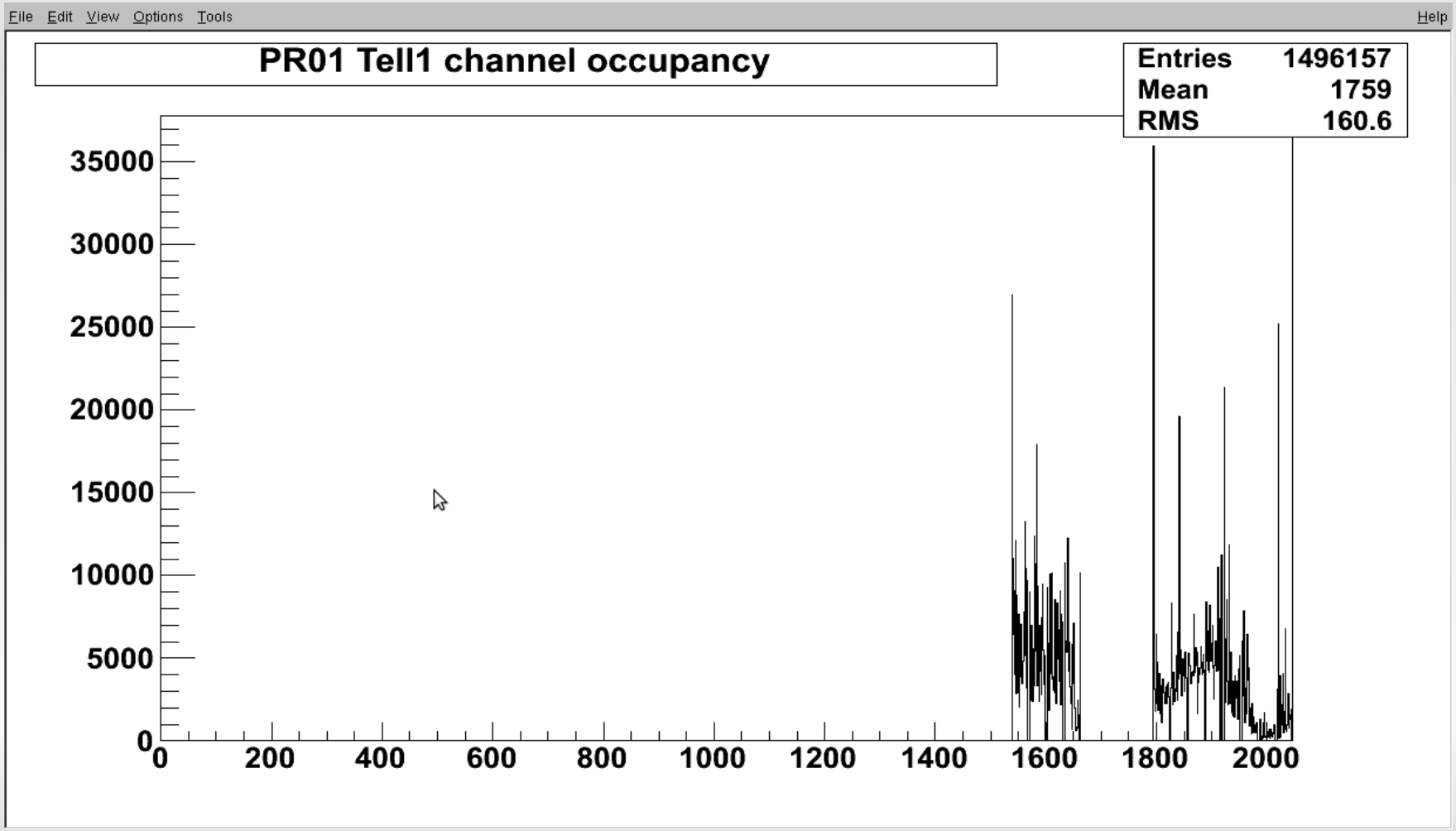
Clustering (II)

As an additional consideration, the code also take into account that the first strip in region 3 can belong to a cluster with the last strip of region 1 or with the last strip in region 2



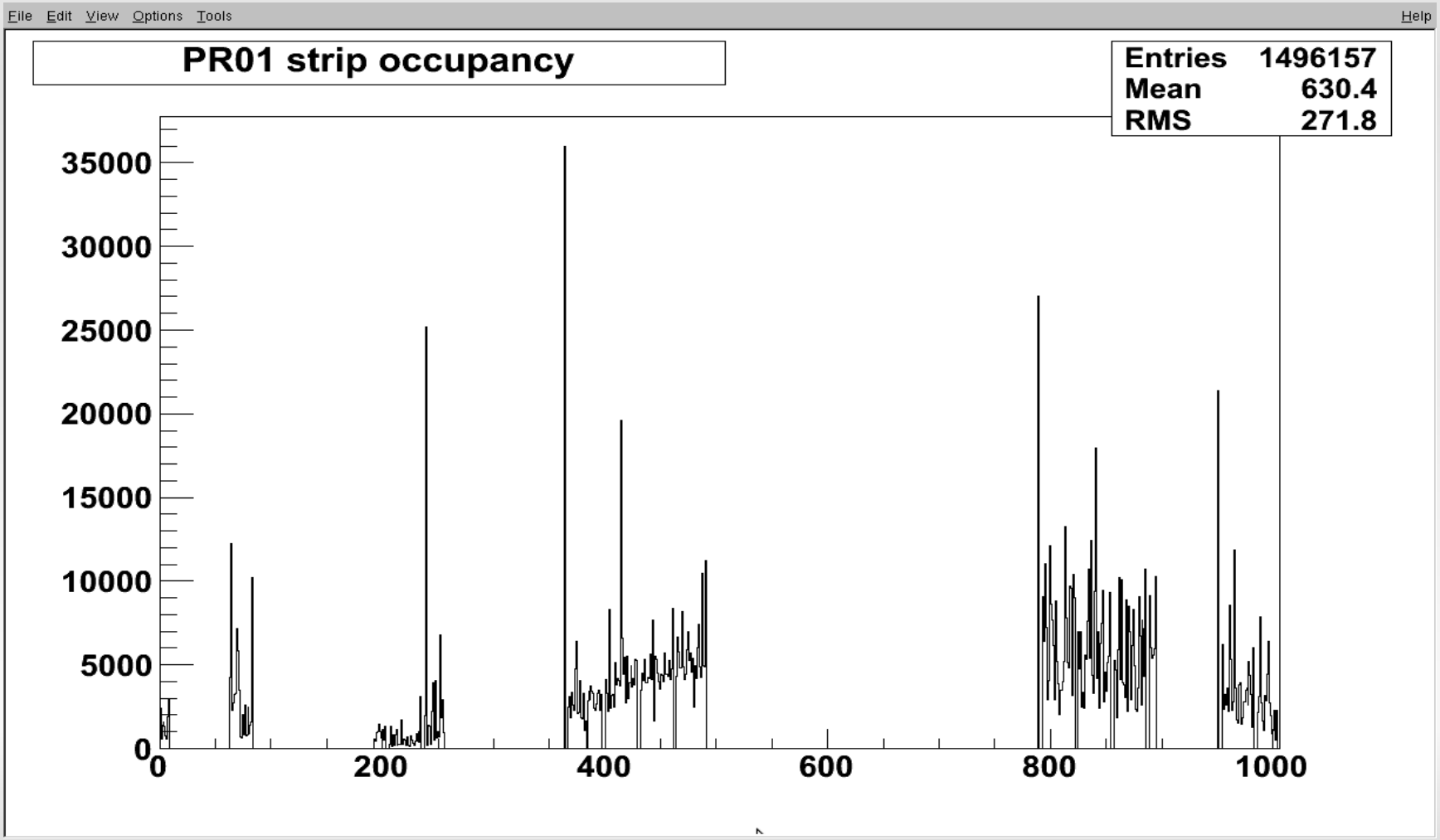
Results: TELL1 occupancy

Data: PR01Run002
Seed Threshold = 8
Low Threshold = 4



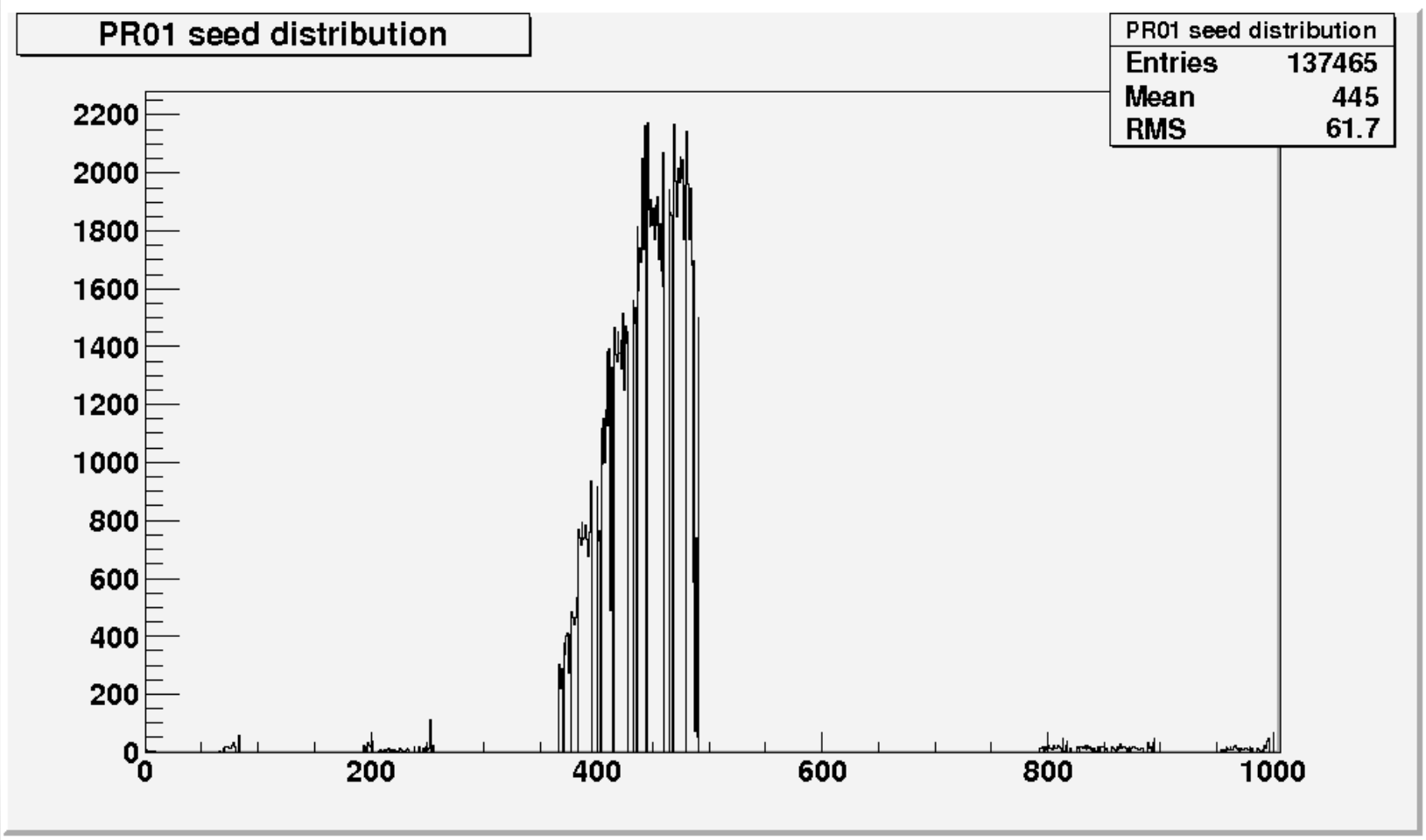
Results: strip occupancy

Data: PR01Run002
Seed Threshold = 8
Low Threshold = 4



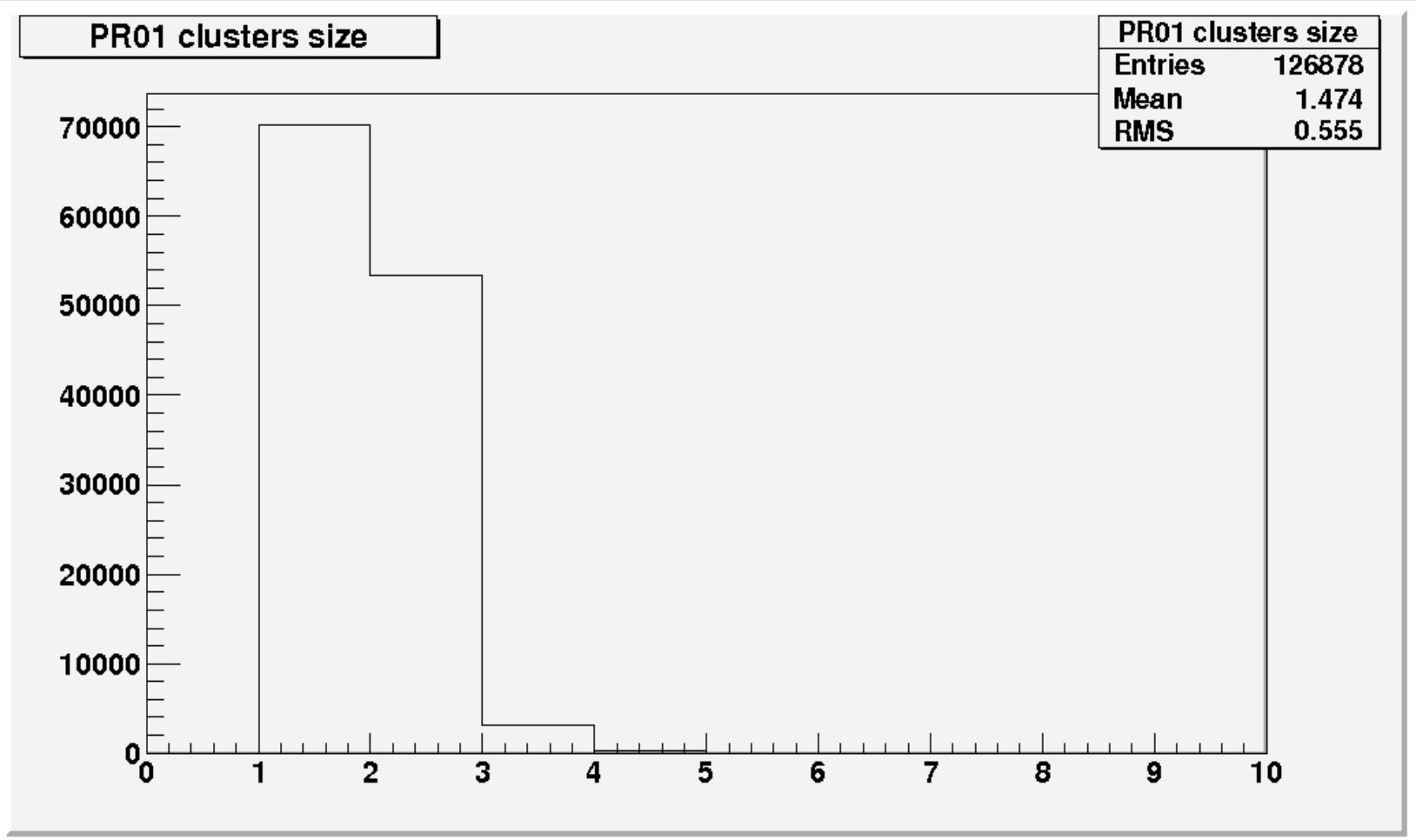
Results: Seed distribution

Data: PR01Run002
Seed Threshold = 8
Low Threshold = 4



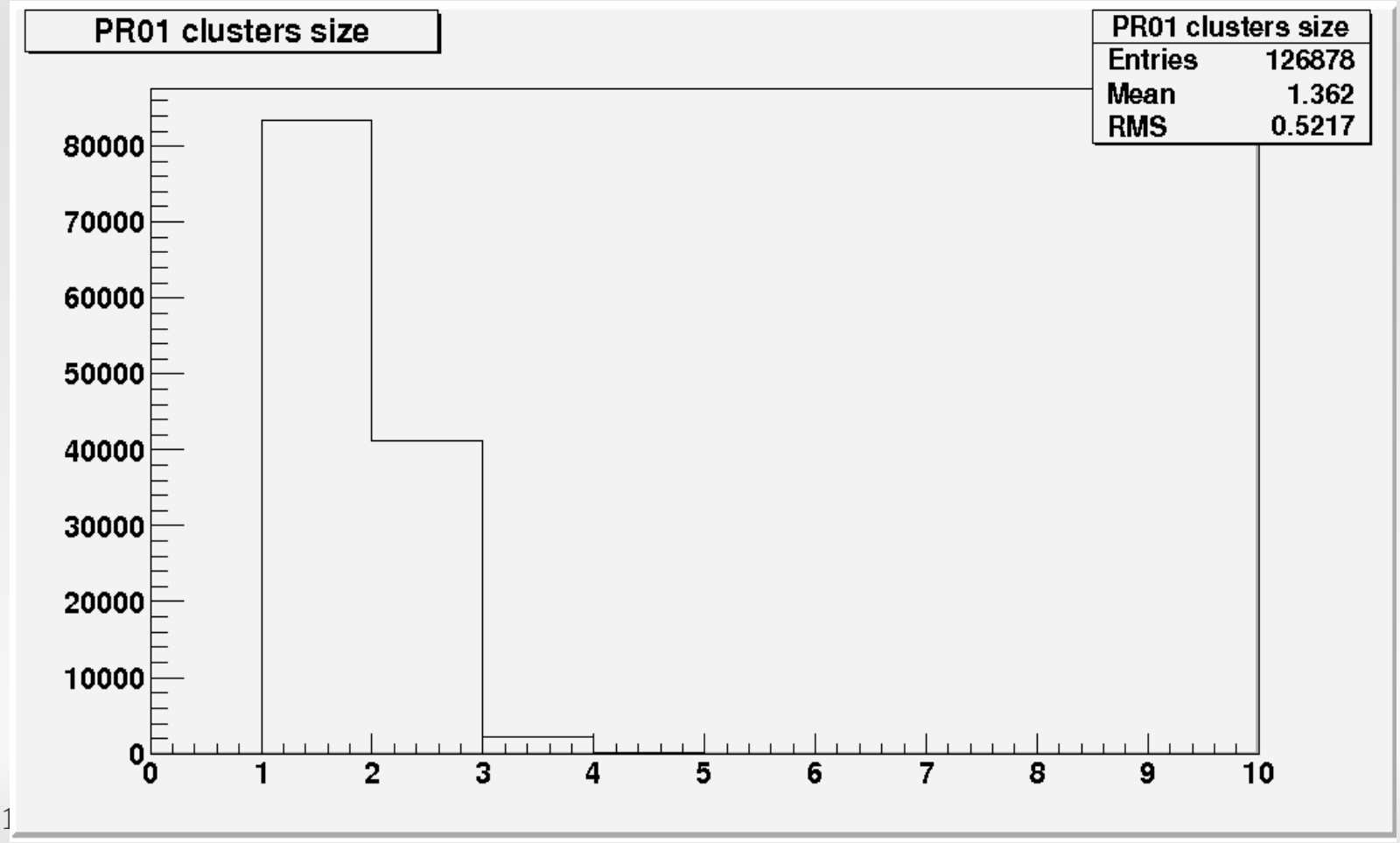
Results: Cluster size (I)

Data: PR01Run002
Seed Threshold = 8
Low Threshold = 3



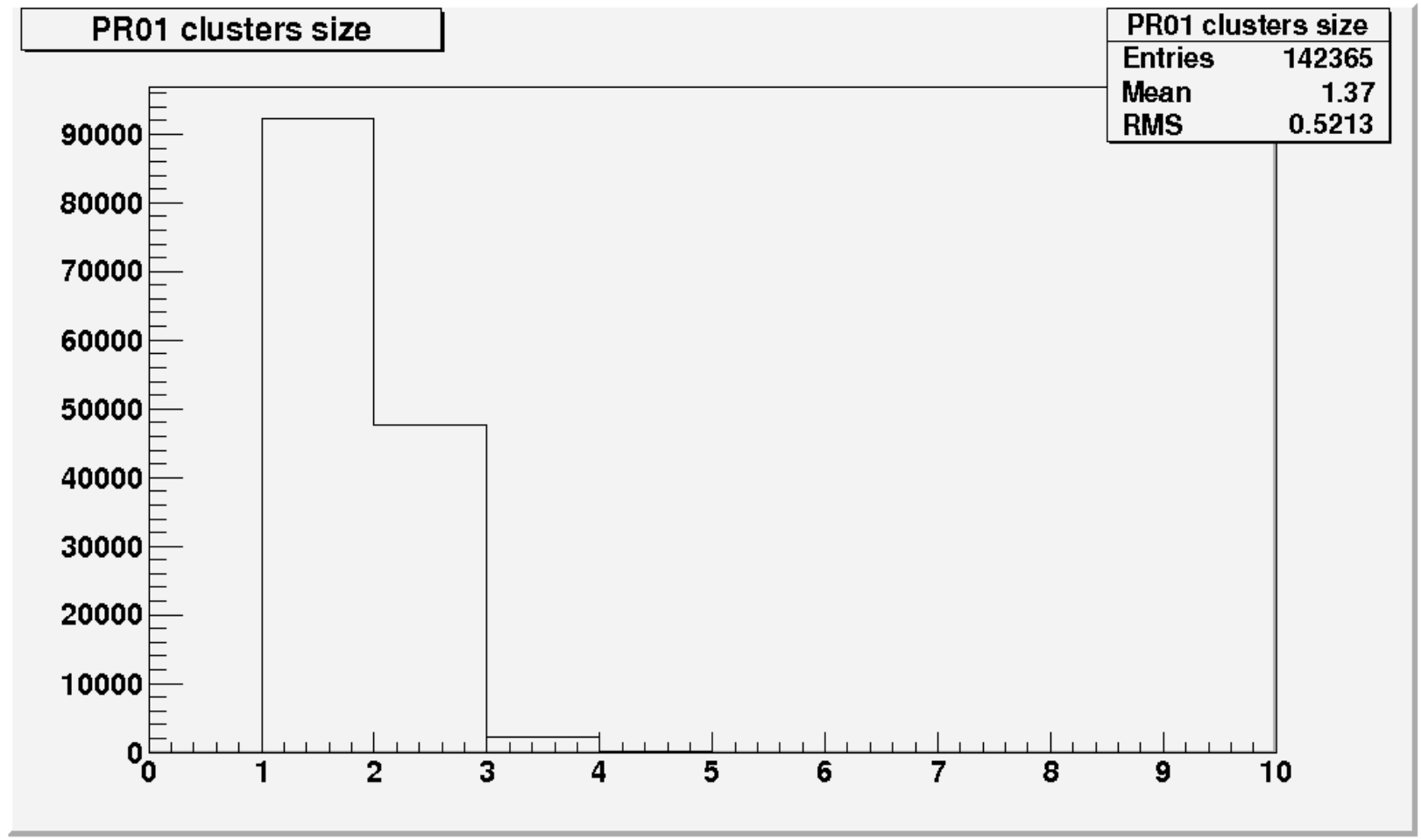
Results: Cluster size (II)

Data: PR01Run002
Seed Threshold = 8
Low Threshold = 4



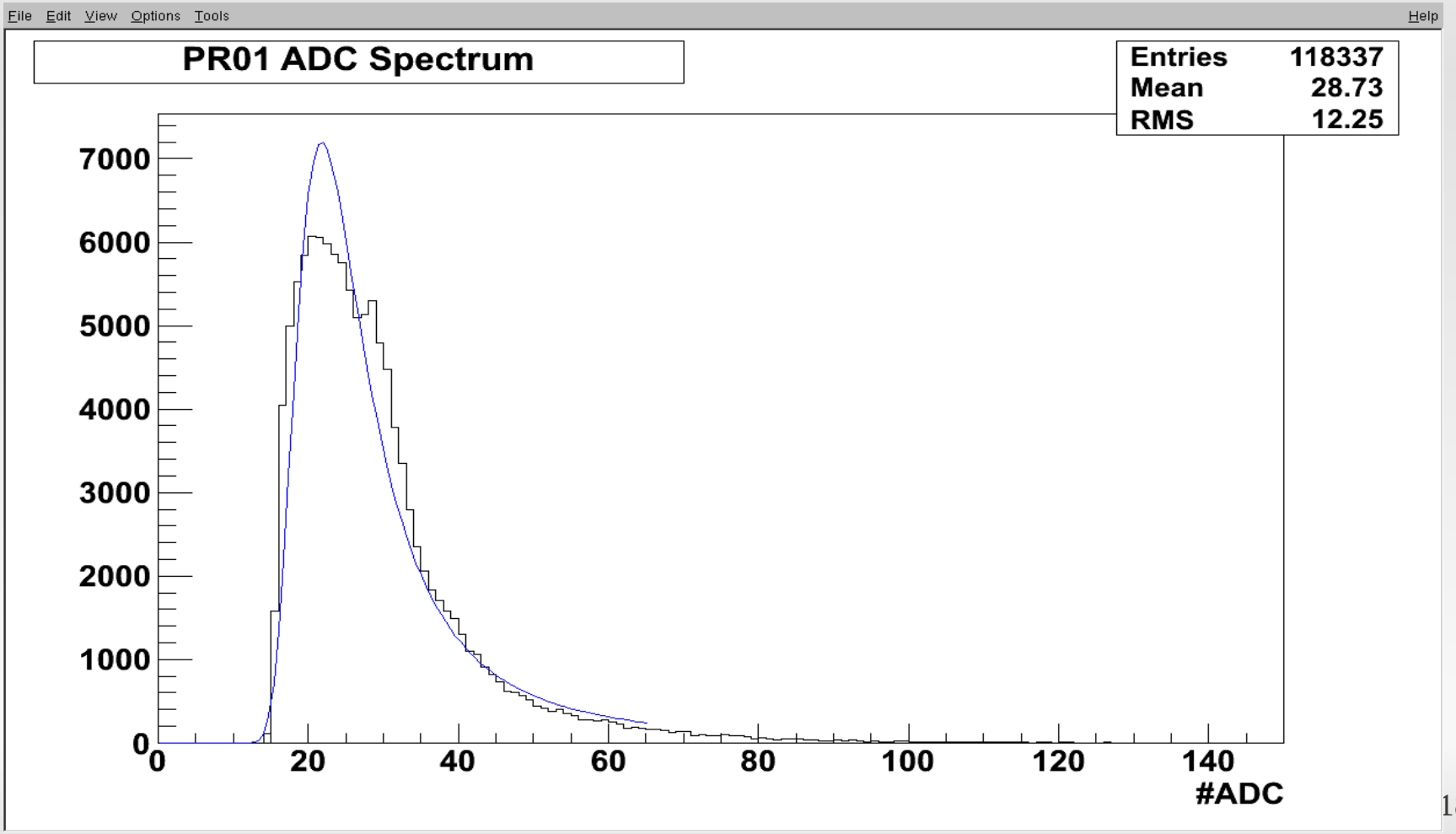
Results: Cluster size (III)

Data: PR01Run002
Seed Threshold = 7
Low Threshold = 4

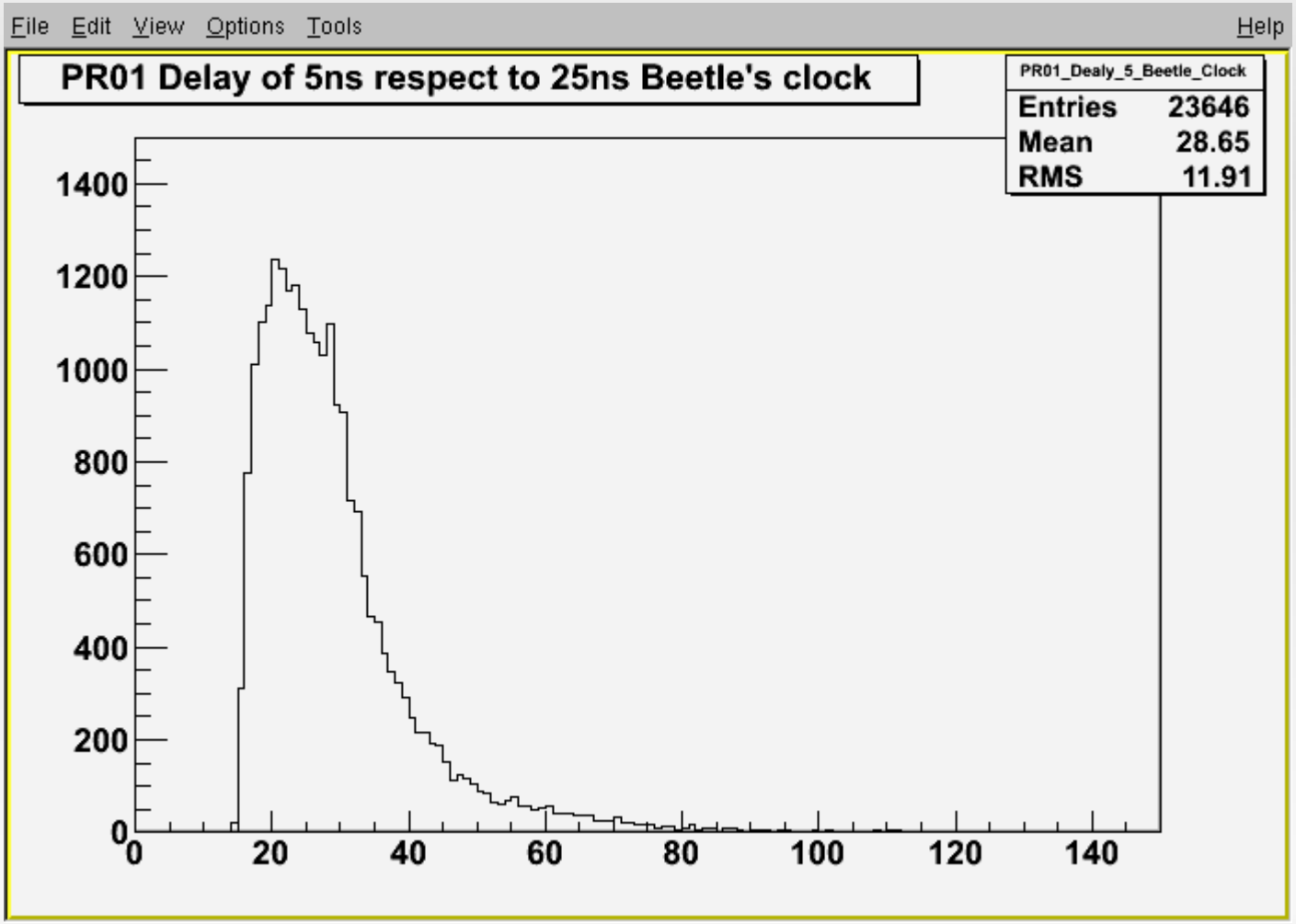


Results: ADC Spectrum

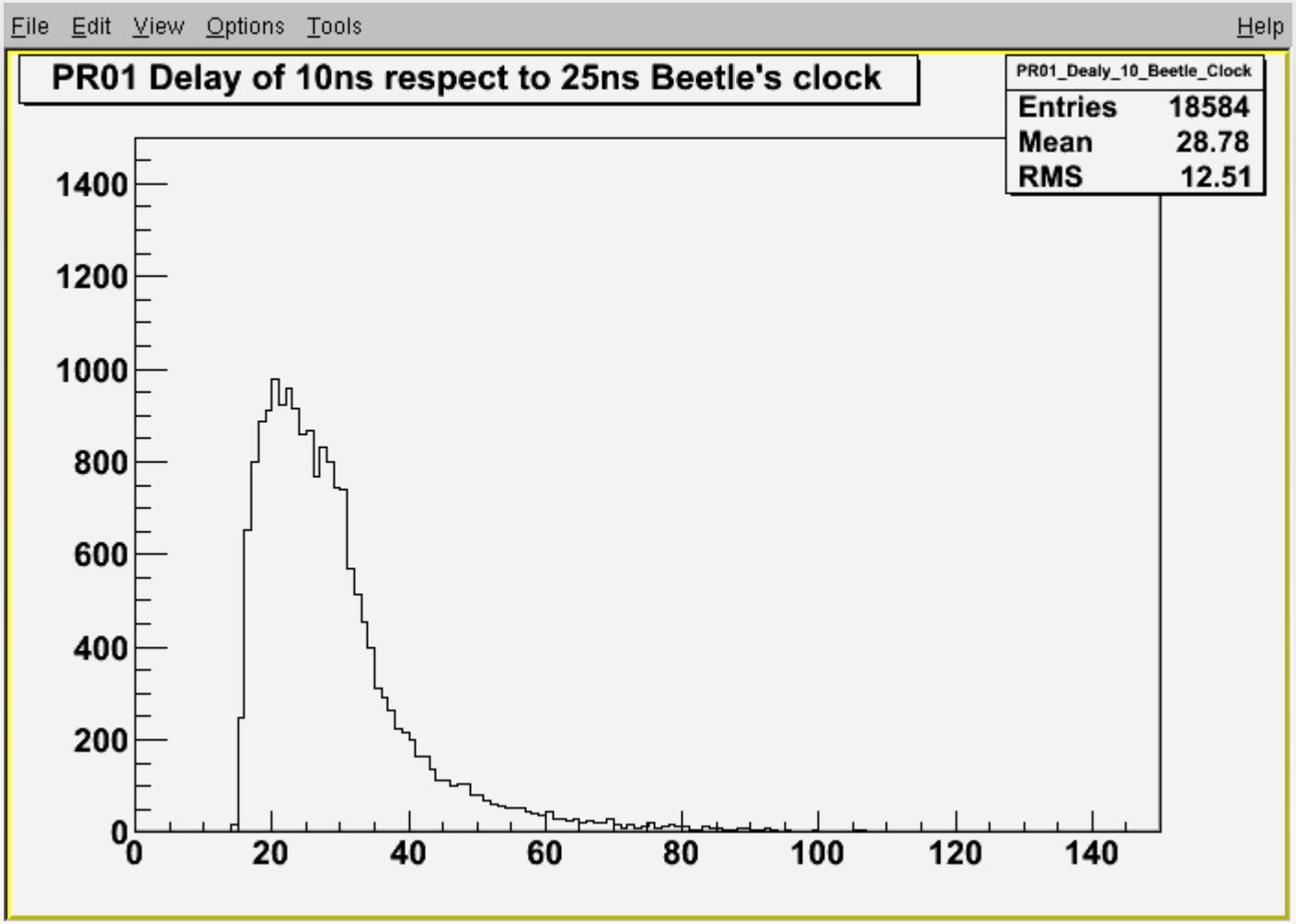
Data: PR01Run002
Seed Threshold = 8
Low Threshold = 4



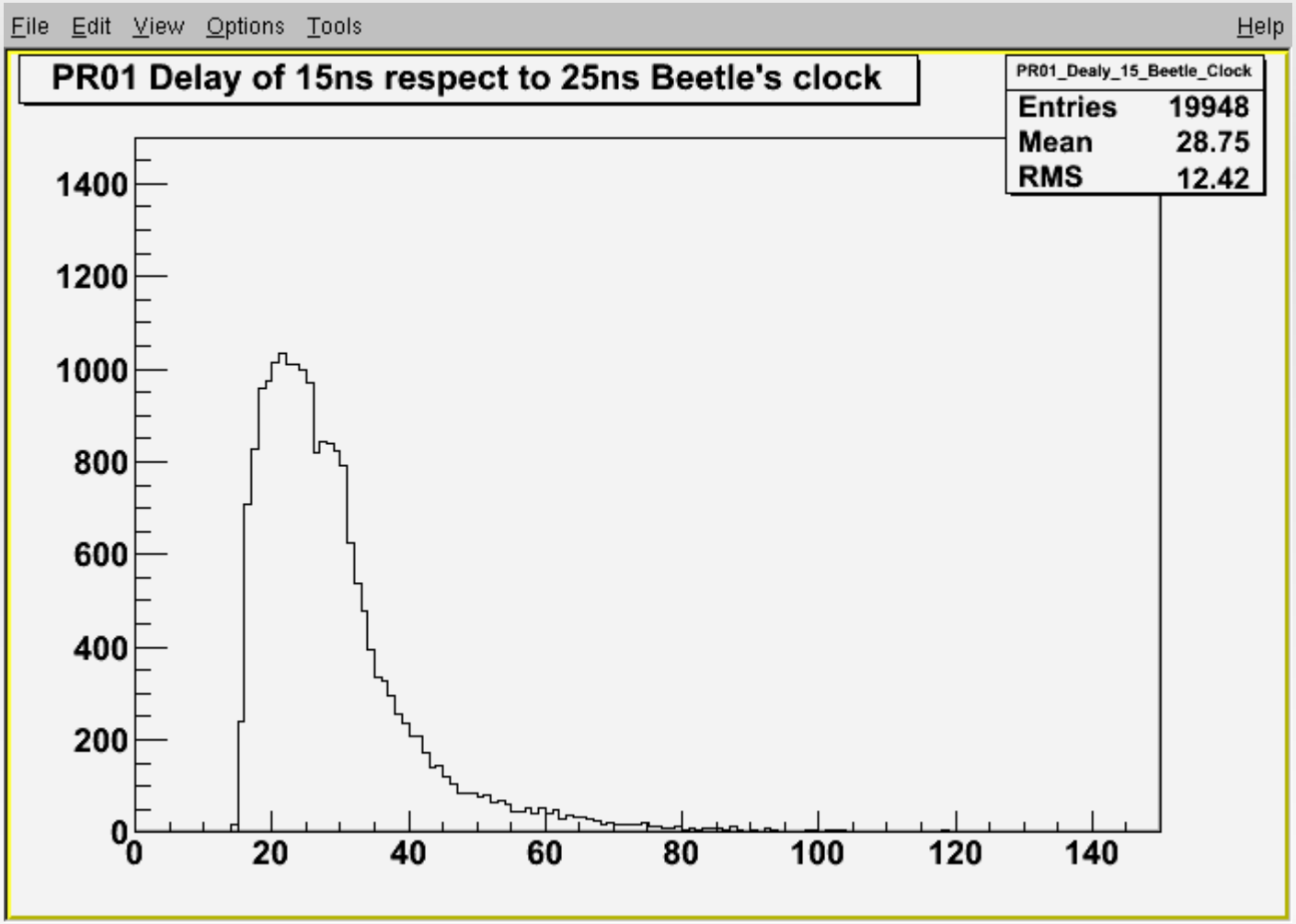
Results: Delay to 25ns clock



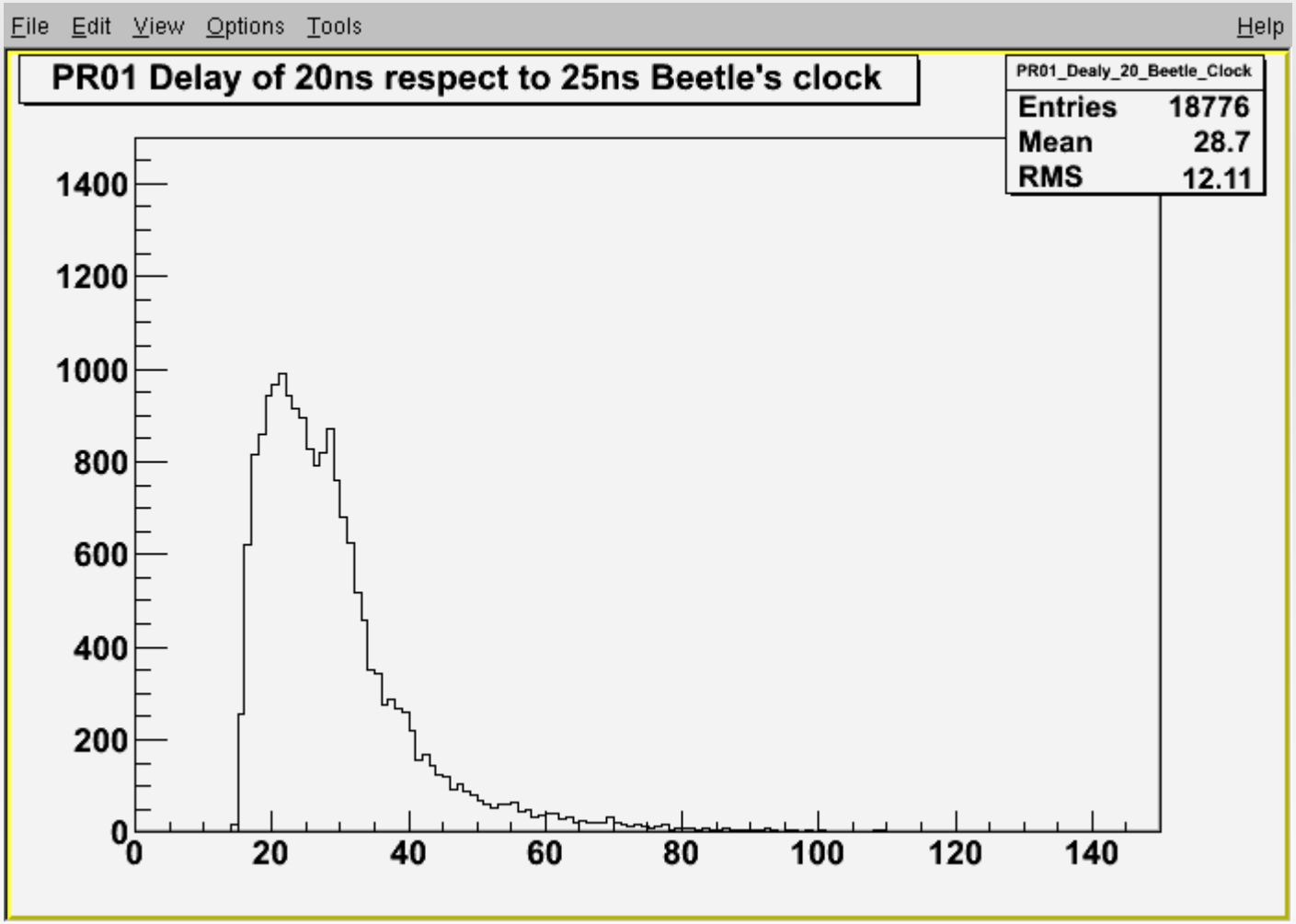
Results: Delay to 25ns clock



Results: Delay to 25ns clock



Results: Delay to 25ns clock



Results: Delay to 25ns clock