Stave6 Local Flatness

Shuaiyan

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First Method for selecting data

Eliminate the points with rms larger than 15 um. These points are neither used for calculating the plane or distance.

Divide 98*220 pixel area into 5*5 & 3*5 pixel areas. In each small area, find the median height which will be used for calculating plane. The maximum number of points for calculating plane is 880.

All small areas contribute median heights except for module 1 since 24 areas have fewer than five rms<15 um points.

Below is the fitting results for each module.(even numbered slides)

The blank area in the distance plot indicates the point either having a rms>15 or below the stave surface. Three blue dots indicate the points used for calculating plane.

Negative distance plot gives the location where the plane is below the stave surface.

Second Method for selecting data

Use the built in function “Lowpassfilter” to eliminate the noise height. The filtered data is used.

Divide 98*220 pixel area into 5*5 & 3*5 pixel areas. In each small area, neglect the points with a difference larger than 40um compared to averaged value, then use the averaged value to represent the height for this area.

If the available points in any area is fewer than 30% , the entire area will be rejected.

The rejected areas for each module is around 25.

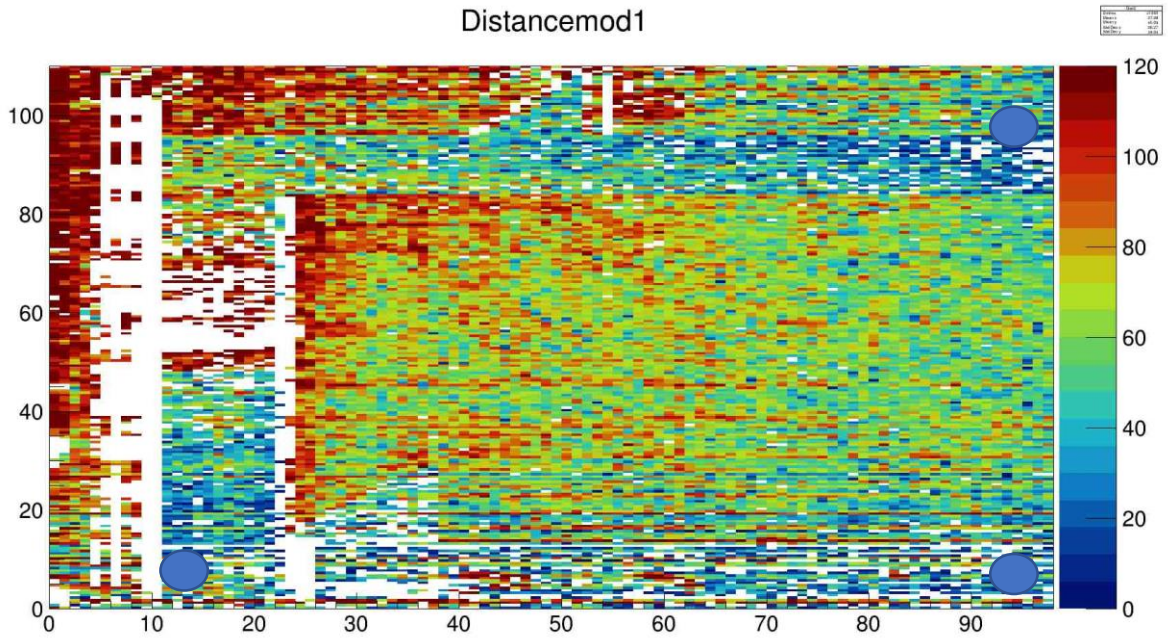
The maximum number of points for calculating plane is 880.

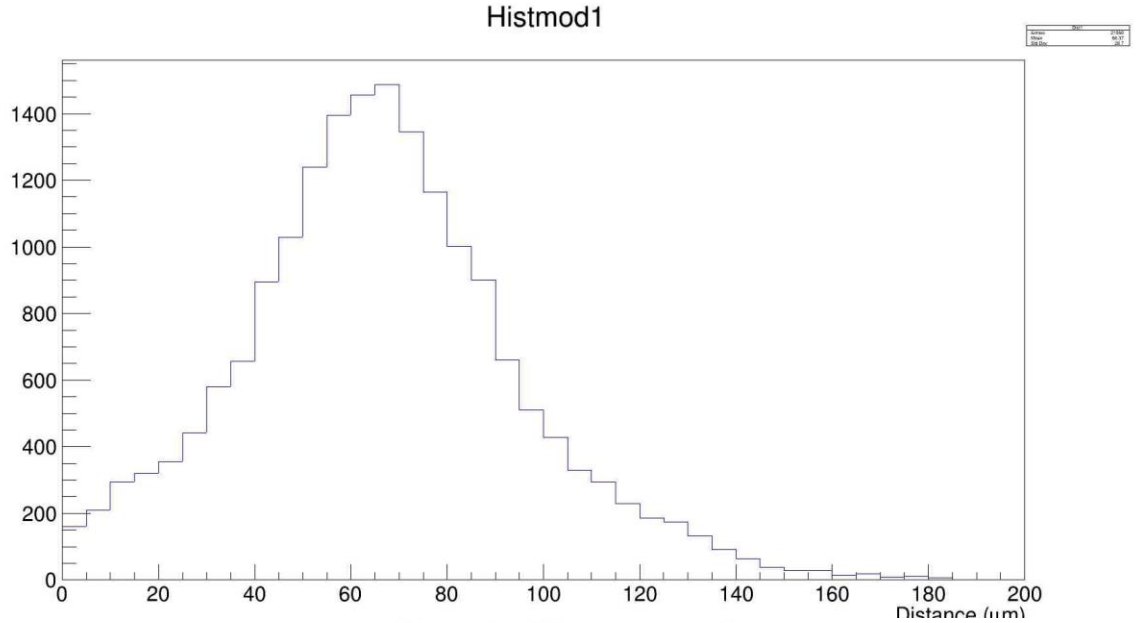
The neglected points and rejected areas are not used for calculating the plane, but they are still used for calculating distance.

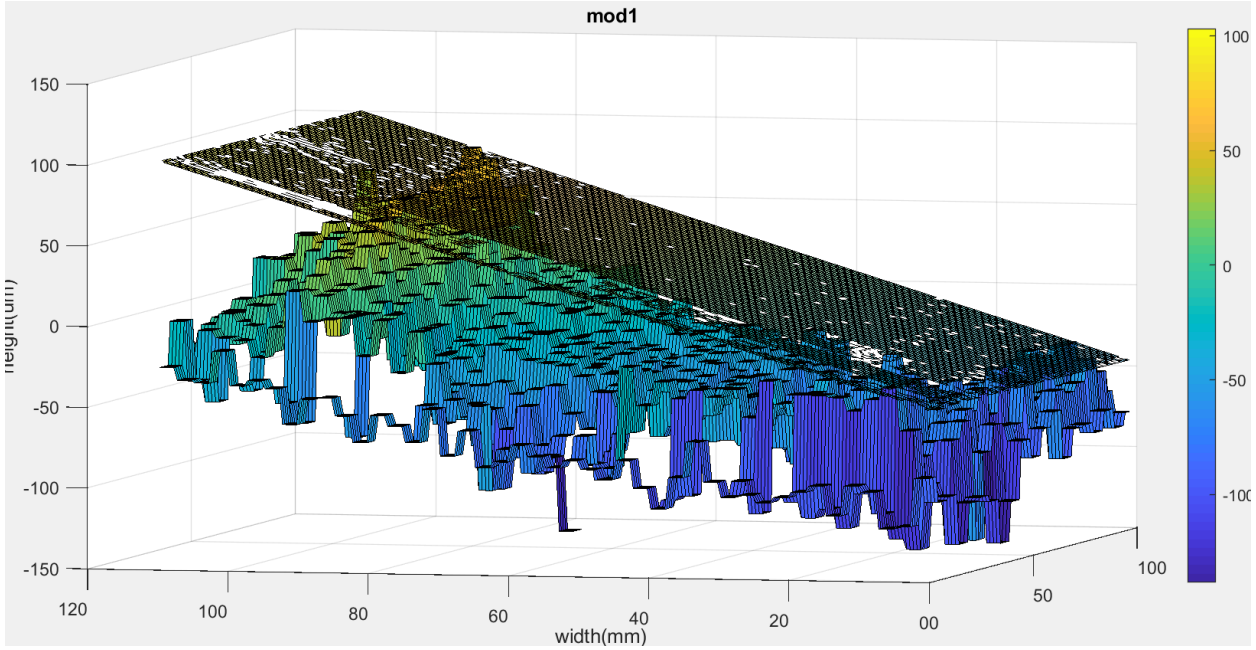
Below is the fitting results for each module.(odd numbered slides)

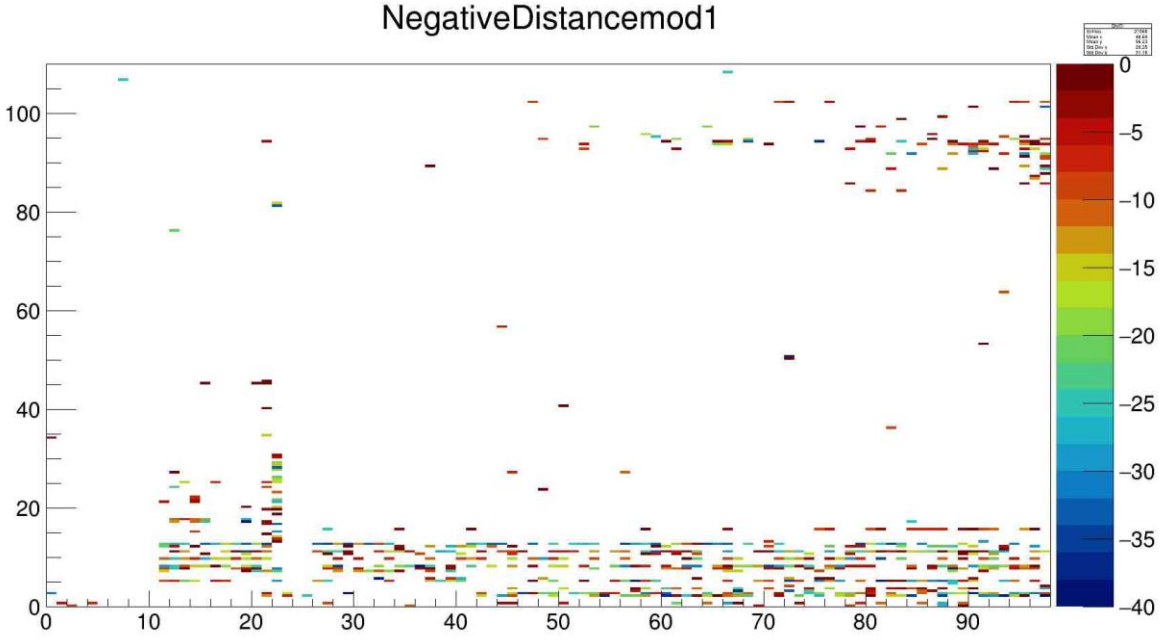
The blank area in the distance plot indicates the points below the stave surface. Three blue dots indicate the points used for calculating plane.

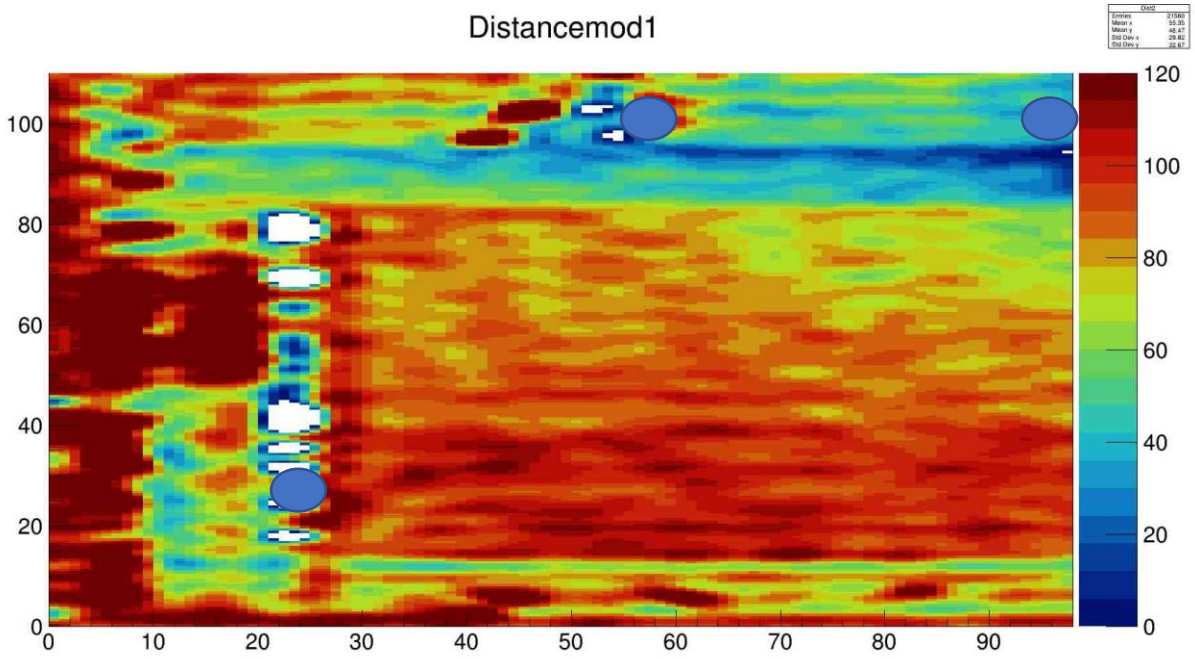
Negative distance plot gives the location where the plane is below the stave surface.

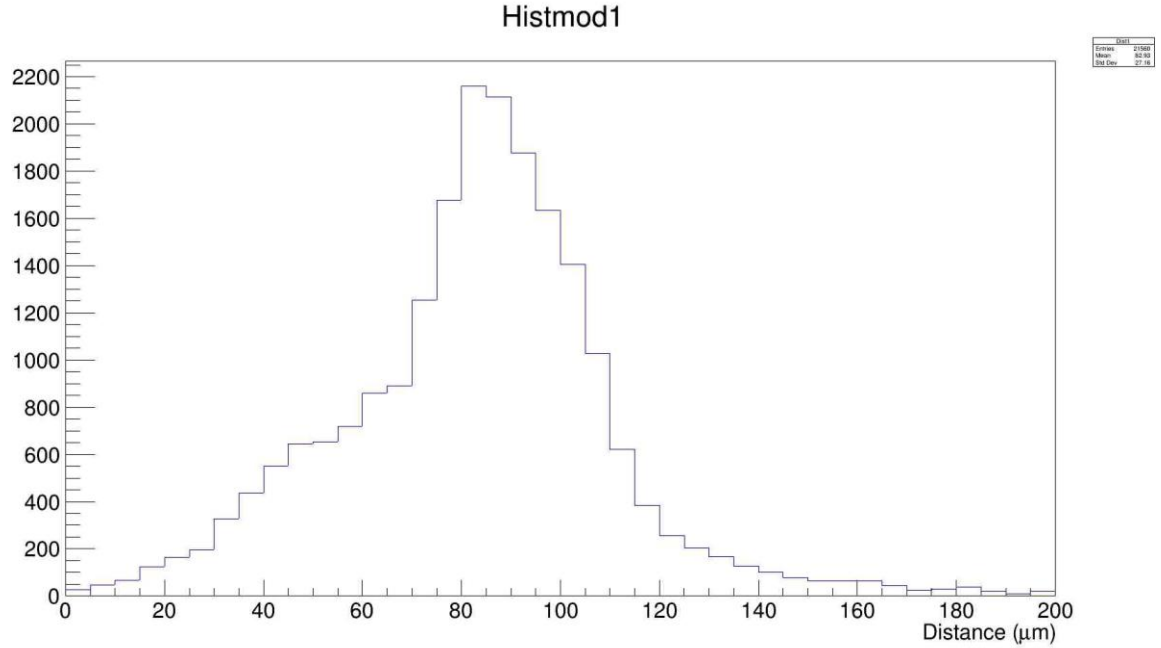

Distancemod1
0
10
20
30
40
50
60
70
80
90
100
120
100
80
60
40
20
0

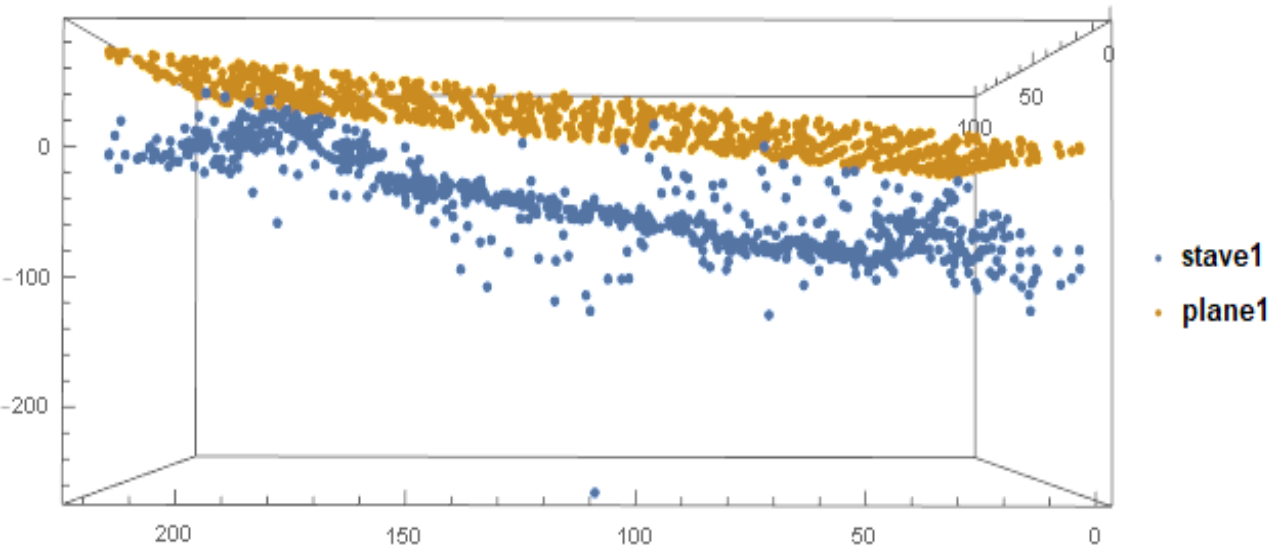

Histmod1
0
20
40
60
80
100
120
140
160
180
200
Distance (um)
1400
1200
1000
800
600
400
200
0

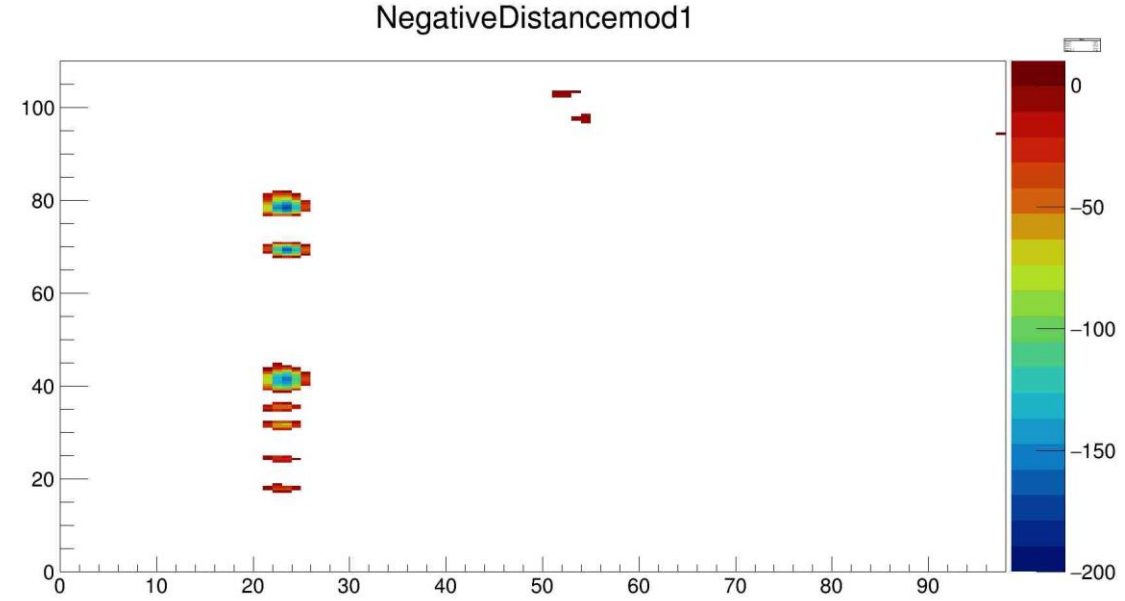

mod1
150
100
50
0
-50
-100
-150
120
100
80
60
40
20
00
width(mm)
50
100
50
0
-50
-100

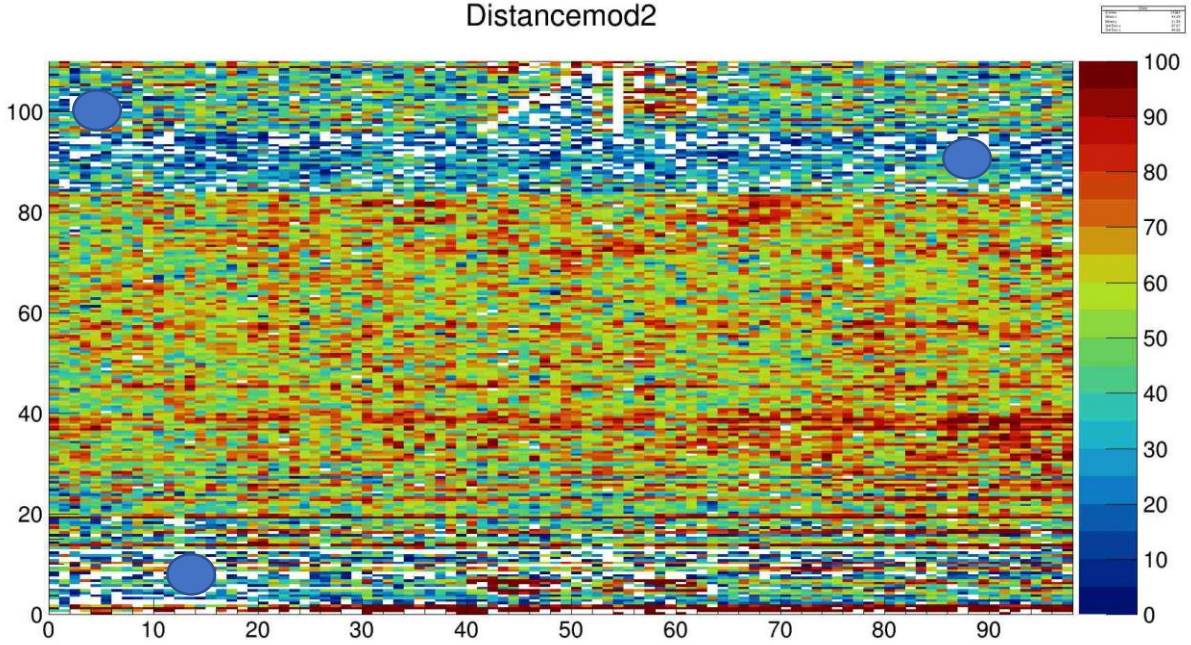

NegativeDistancemod1
0
10
20
30
40
50
60
70
80
90
100
80
60
40
20
0
0
-5
-10
-15
-20
-25
-30
-35
-40

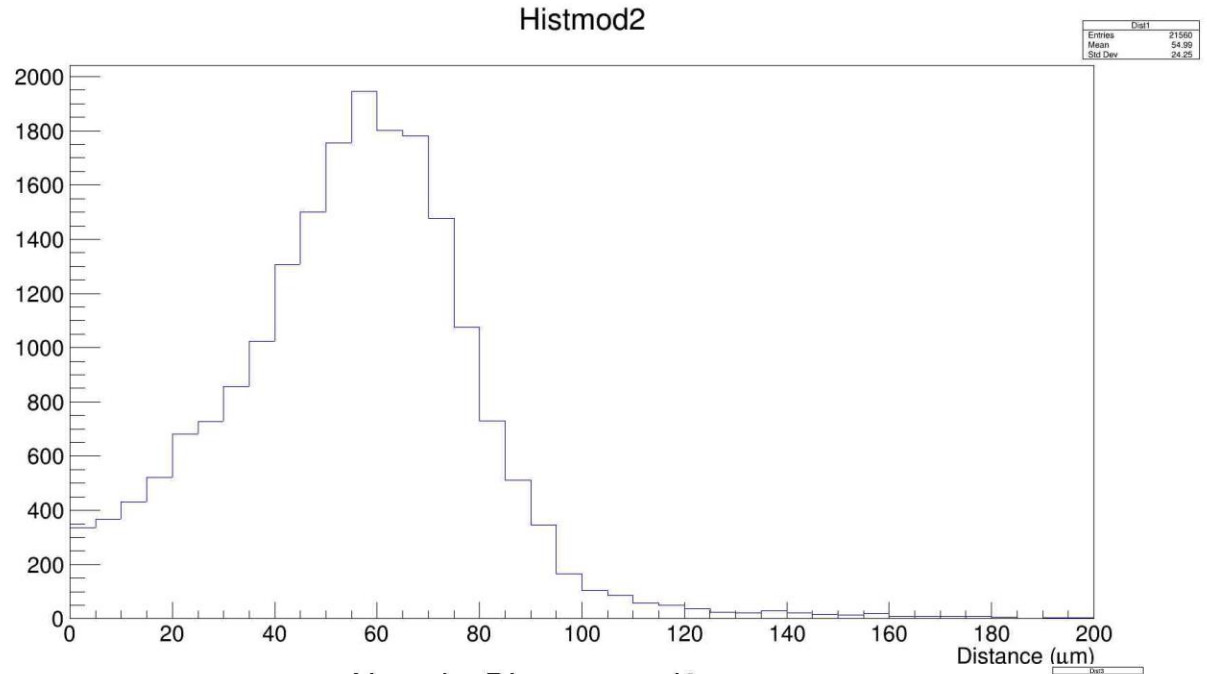

Distancemod1
0
10
20
30
40
50
60
70
80
90
100
120

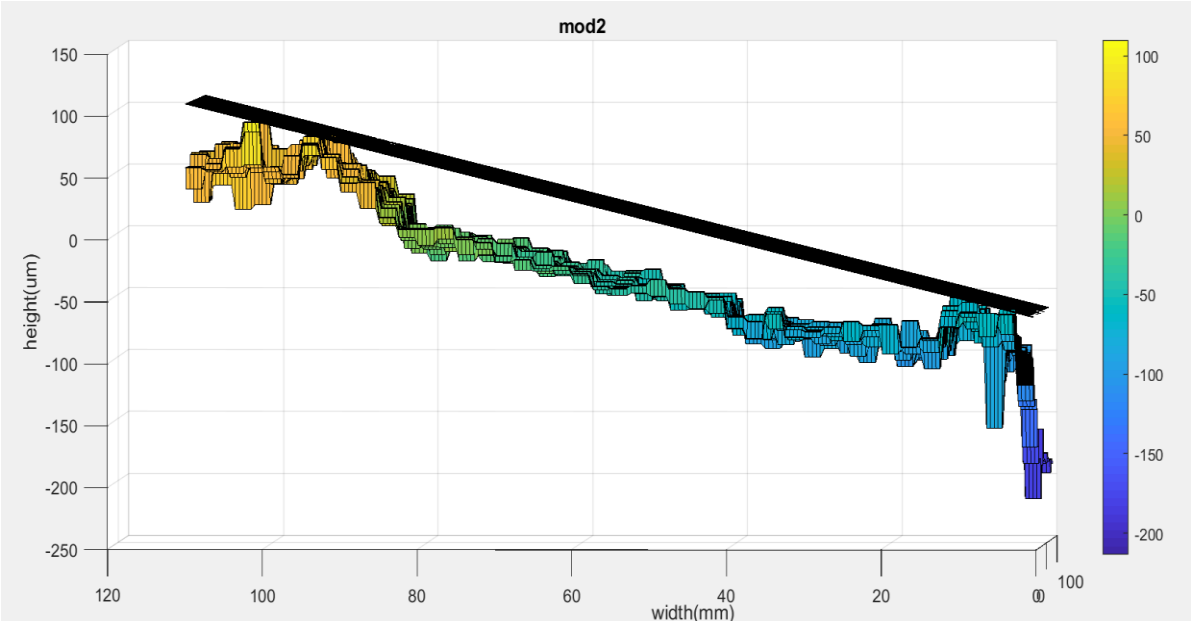

Histmod1
0
20
40
60
80
100
120
140
160
180
200
Distance (μm)

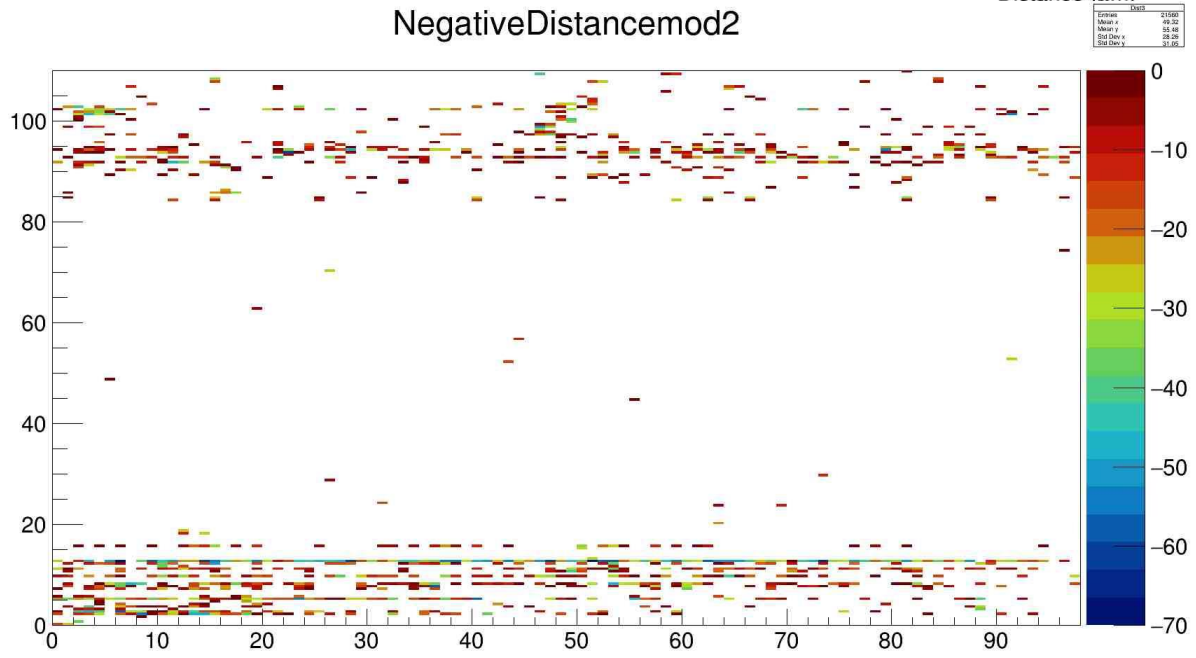

stave1
plane1
200
150
100
50
0
-100
-200


NegativeDistancemod1
0
10
20
30
40
50
60
70
80
90
100
-50
-100
-150
-200

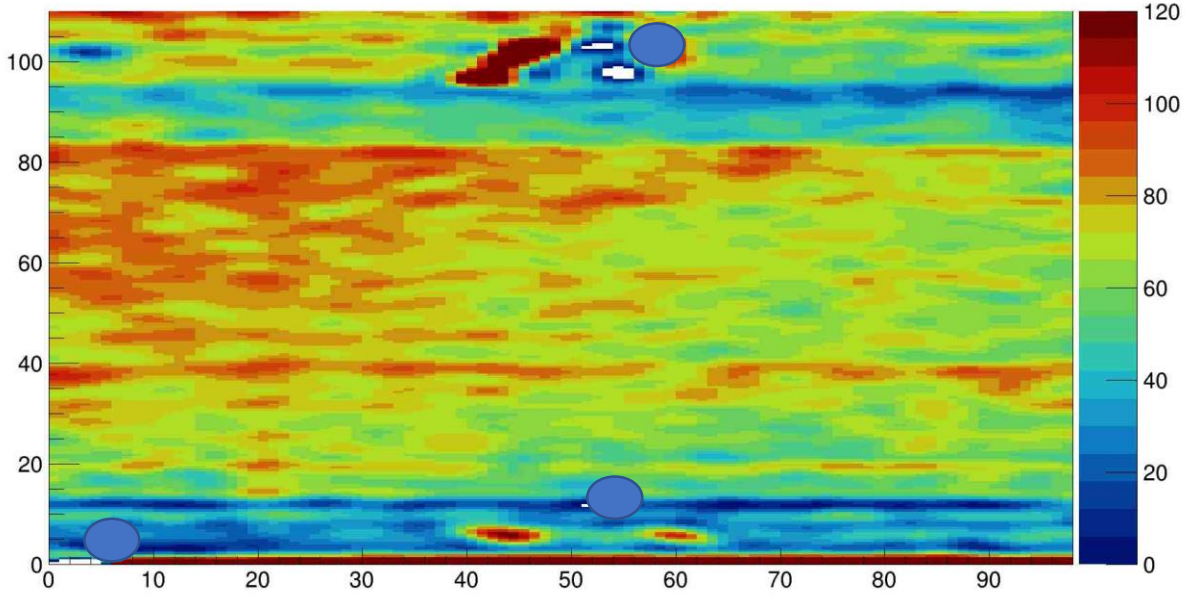

Distancemod2


Histmod2
Distance (µm)

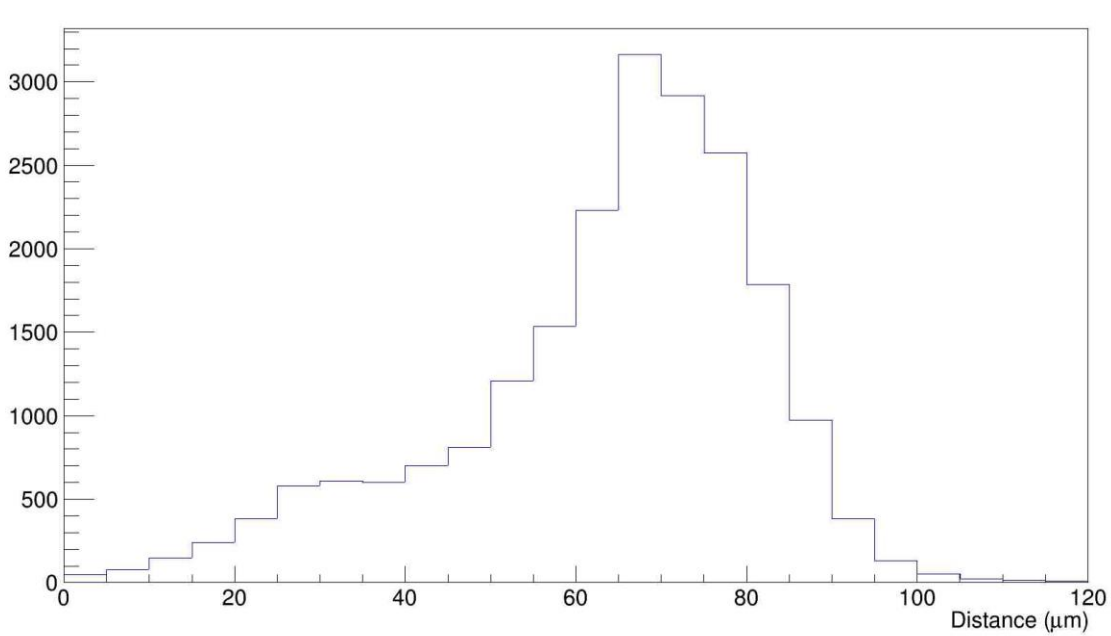

mod2
height(um)
width(mm)

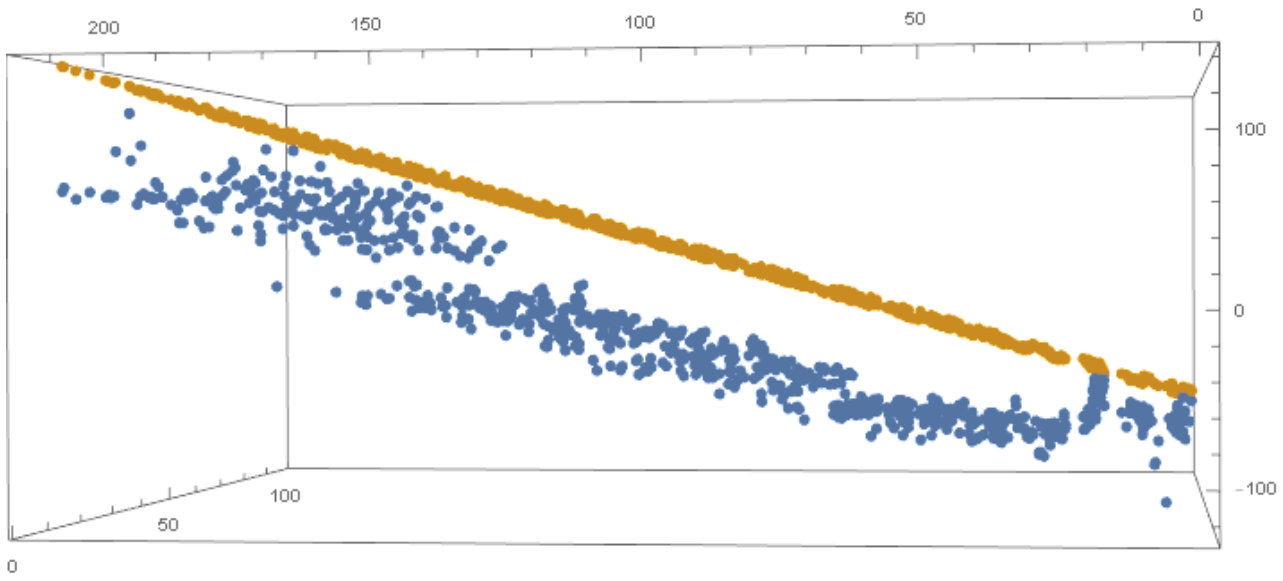

NegativeDistancemod2

Distancemod2

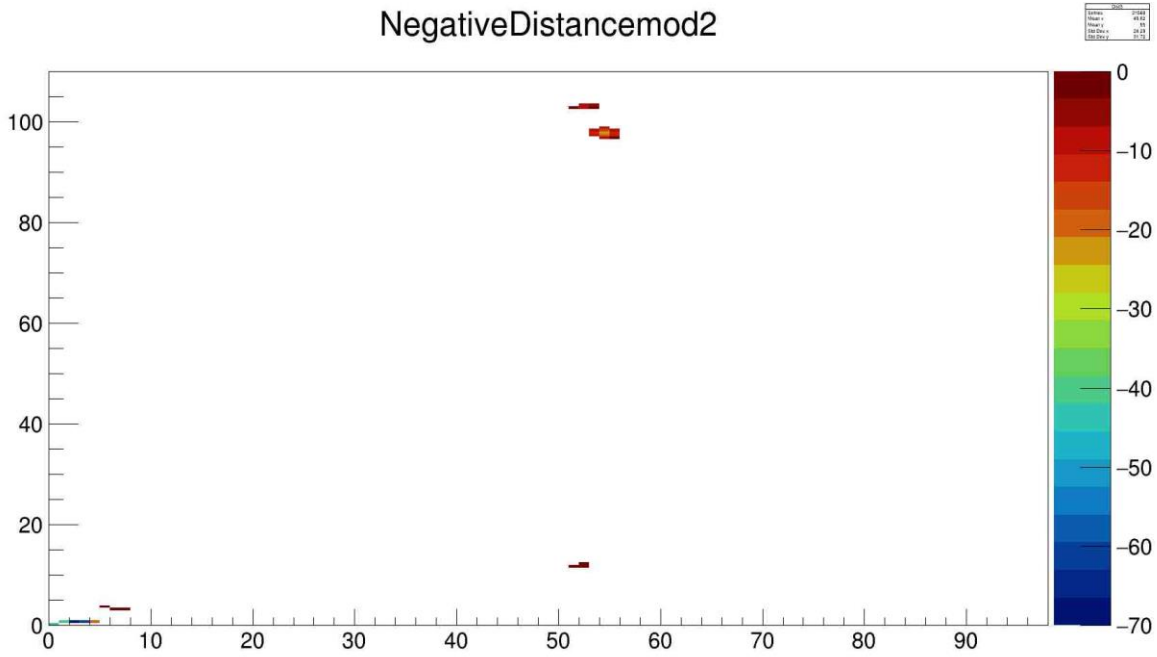


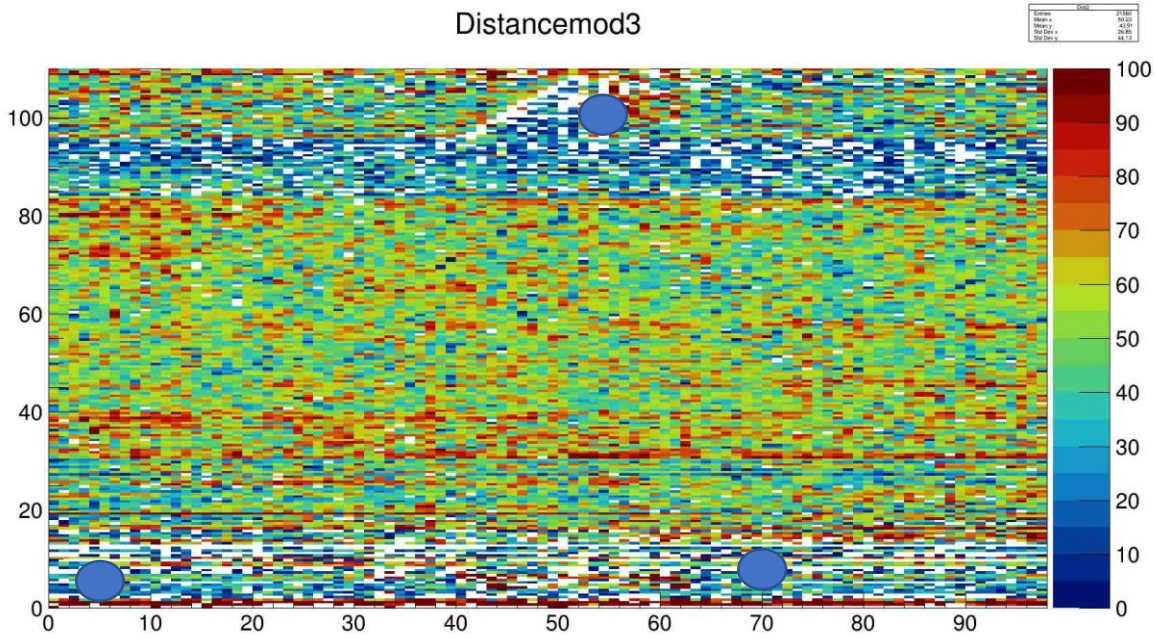
Histmod2

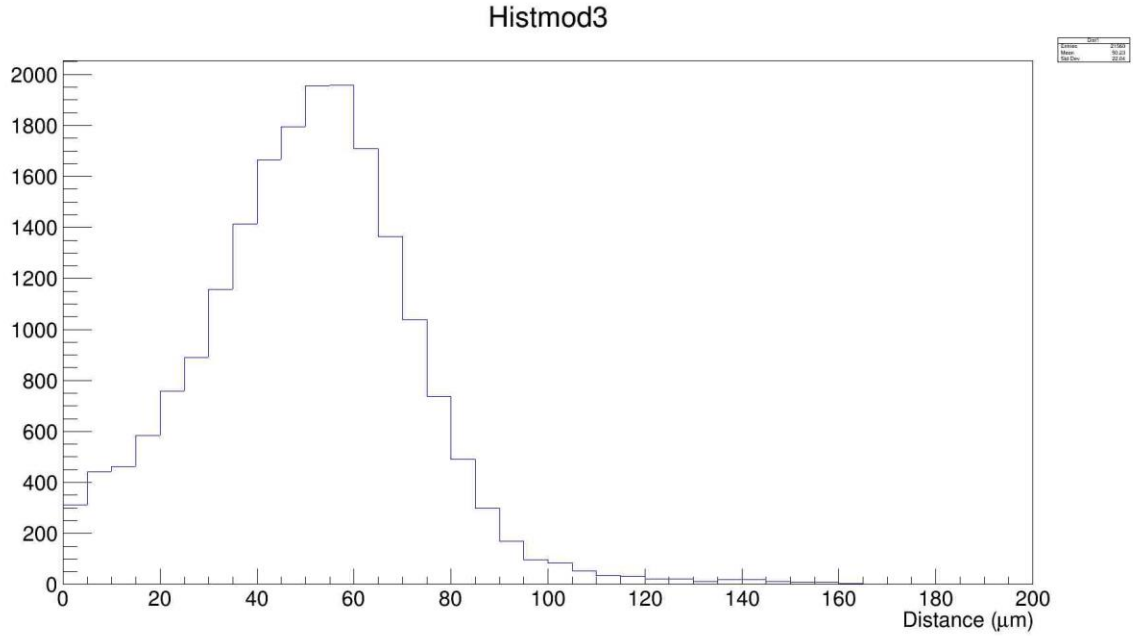


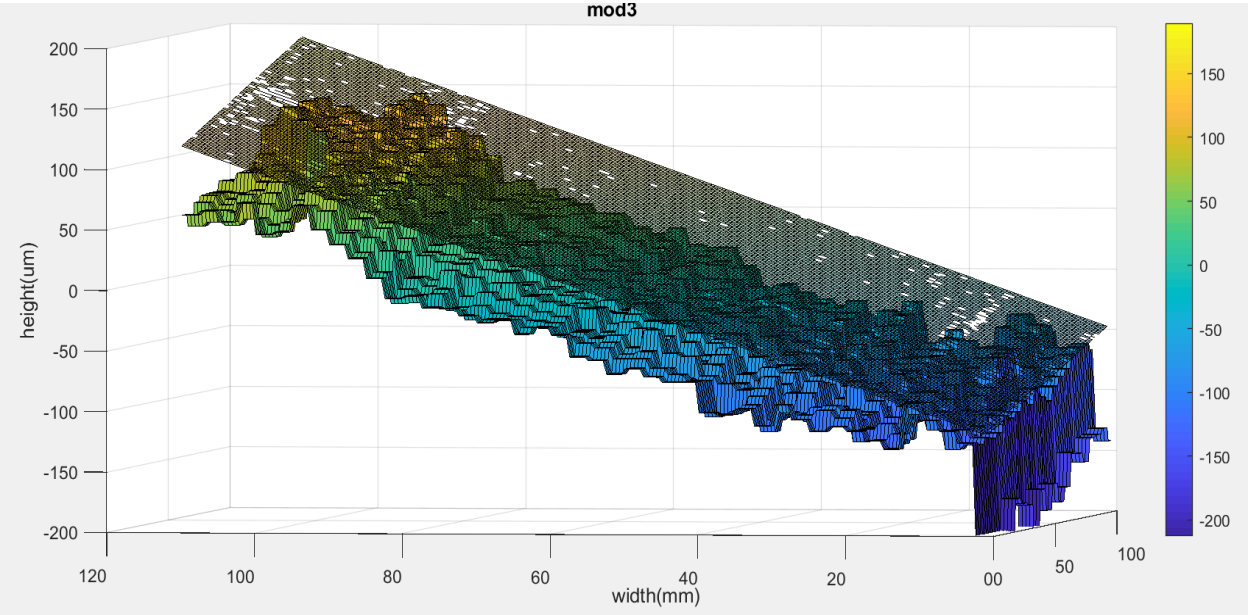


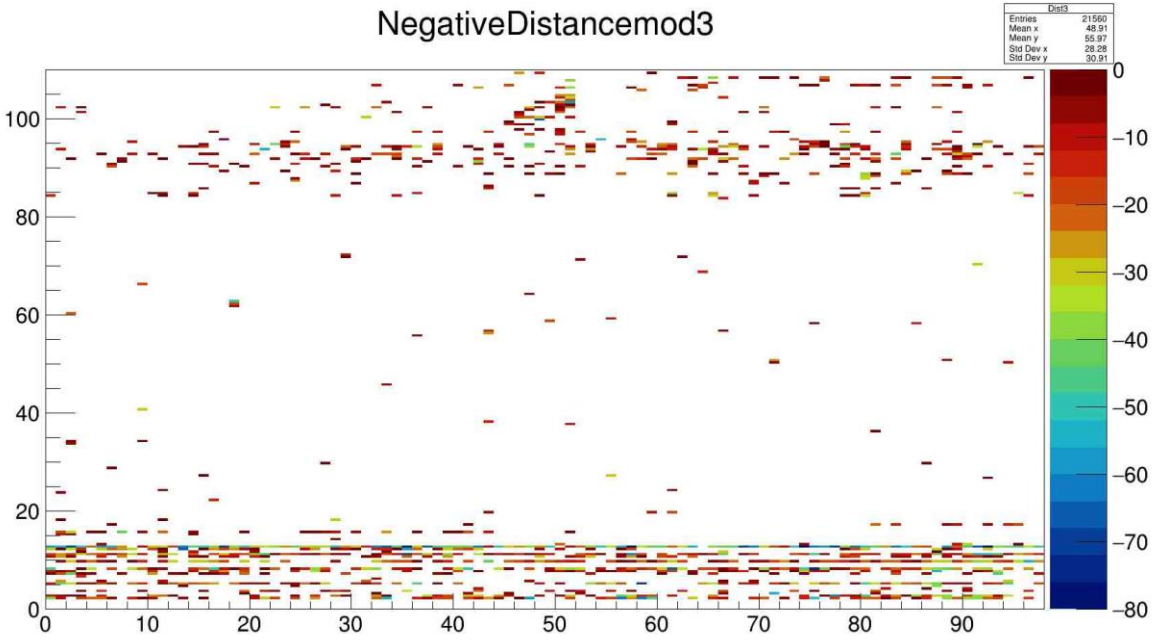
NegativeDistancemod2

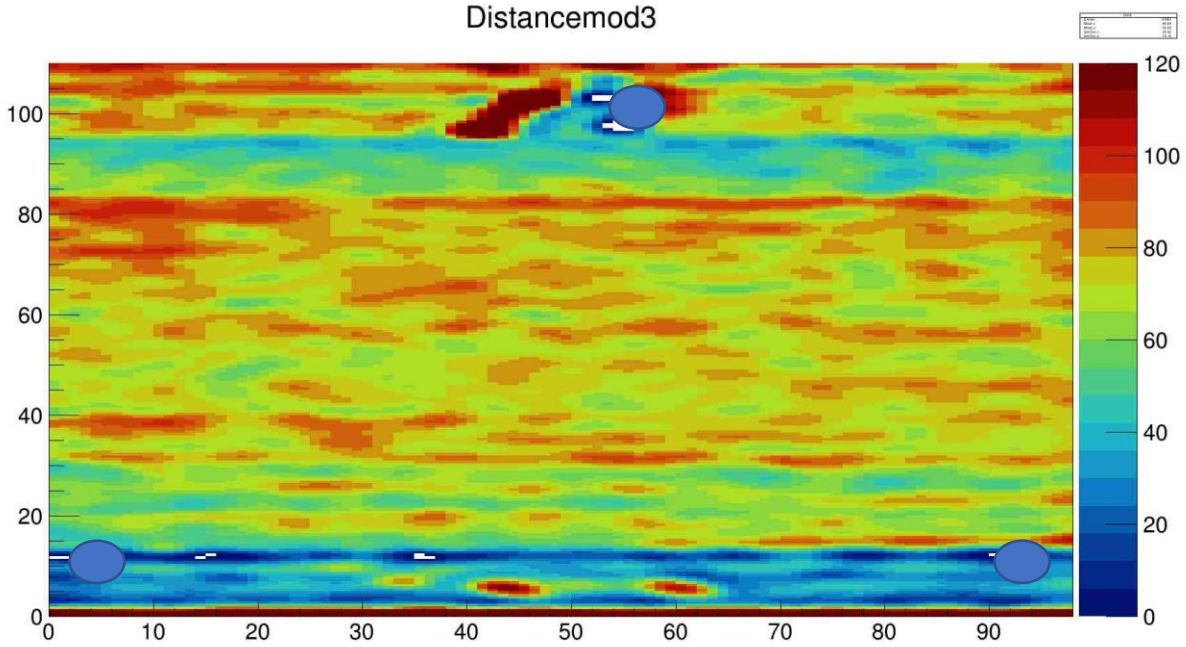


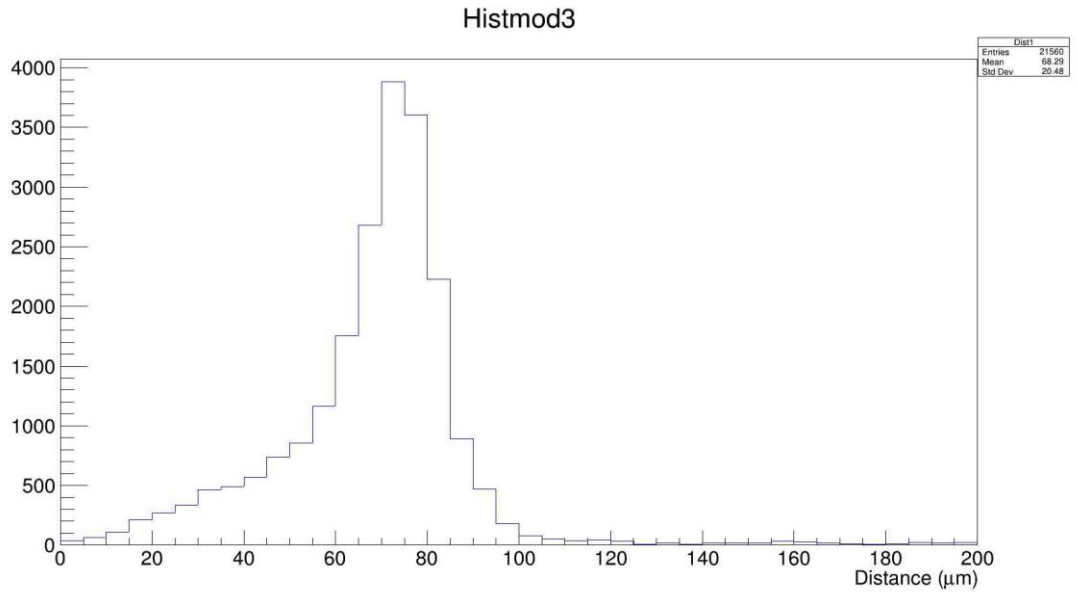

Distancemod3

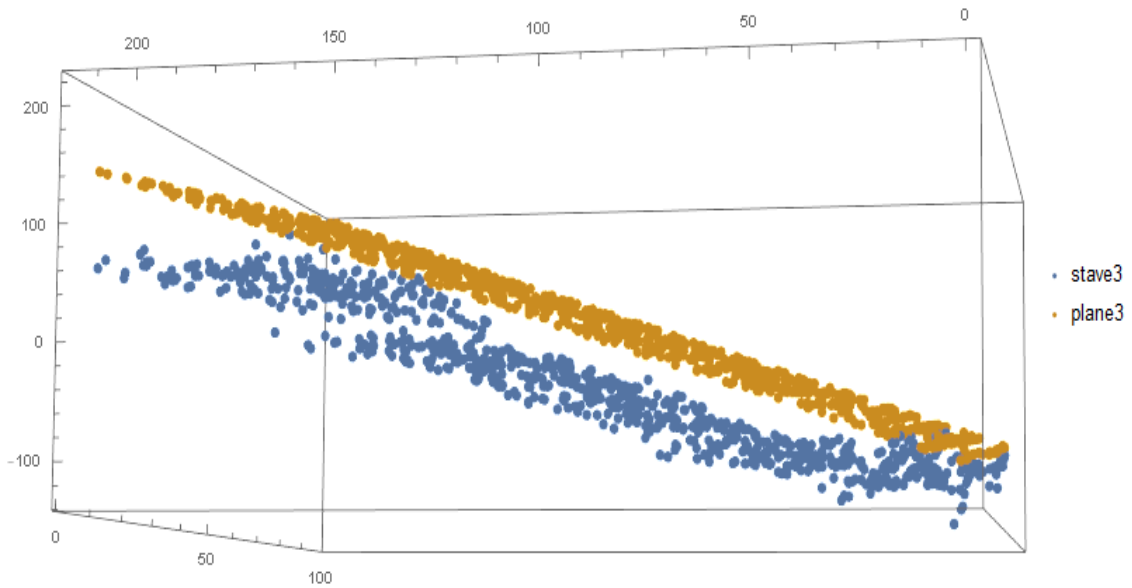

Histmod3
Distance (µm)

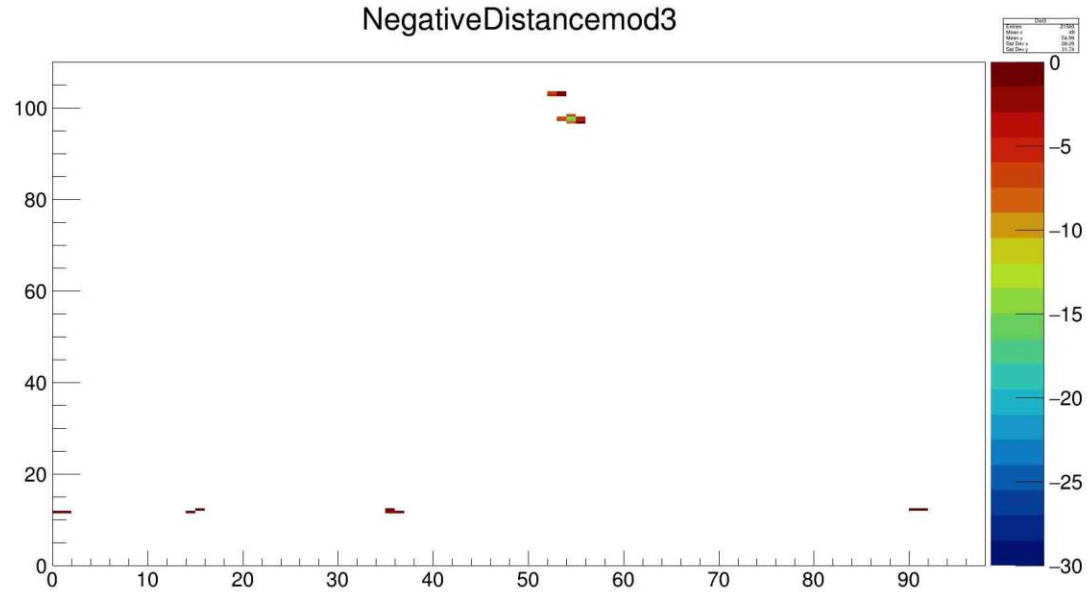

mod3
height(um)
width(mm)

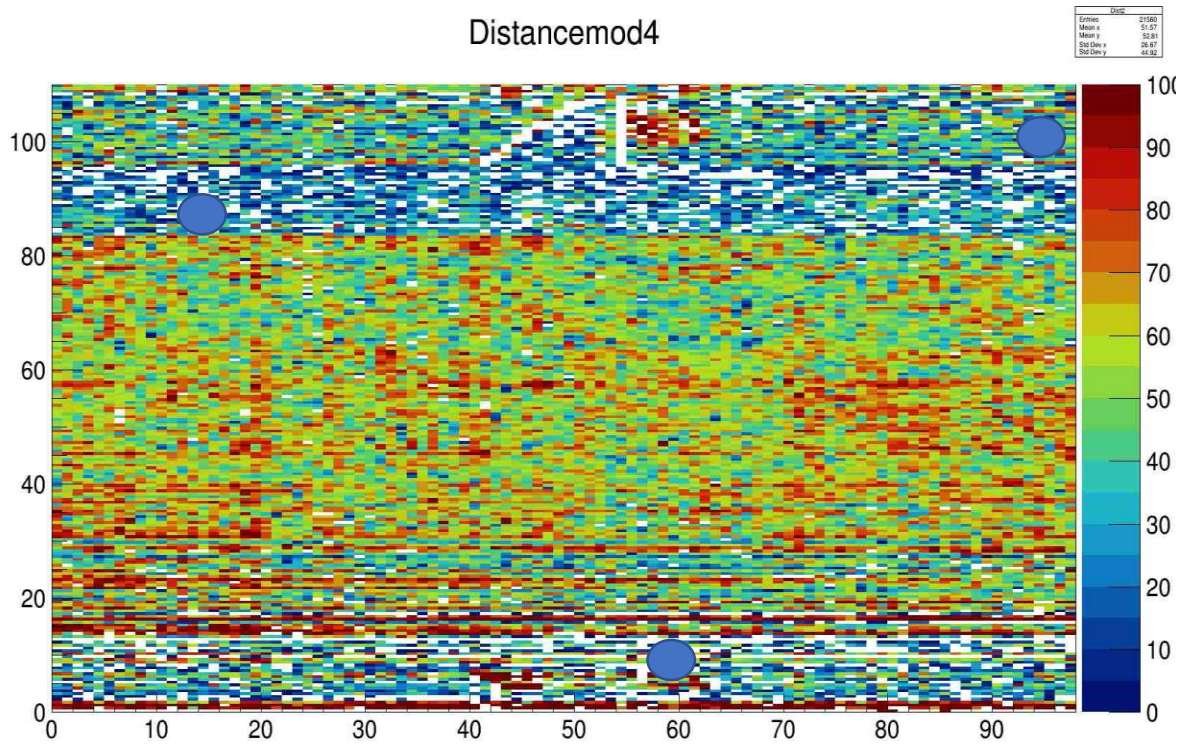

NegativeDistancemod3

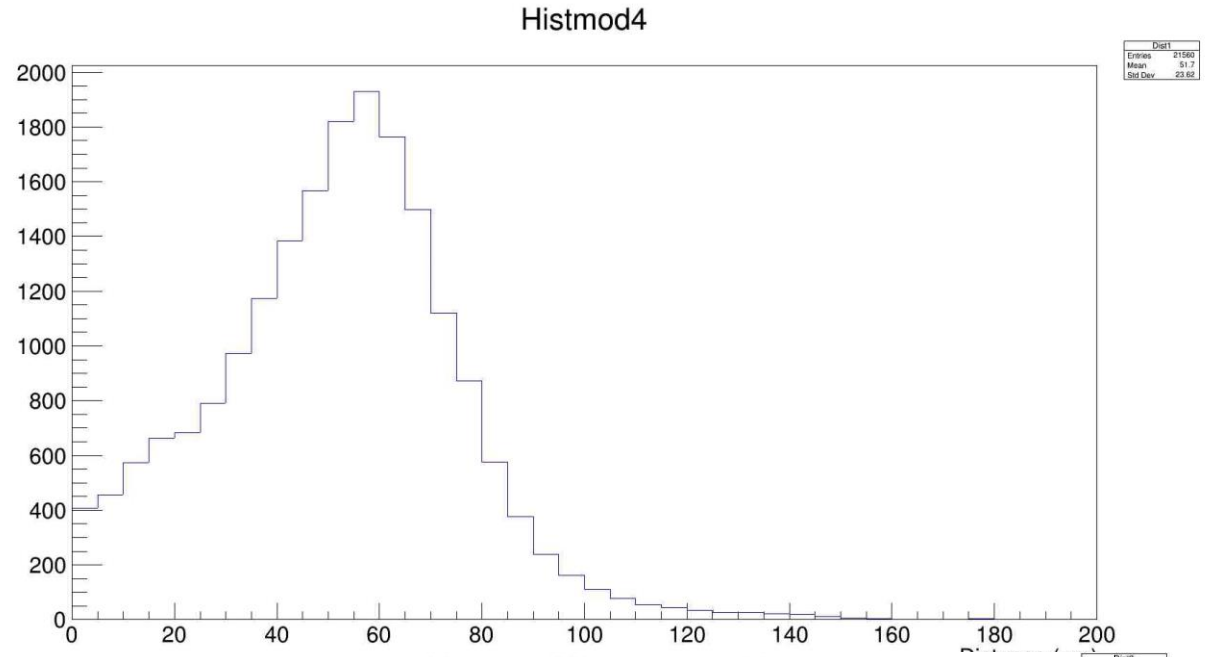

Distancemod3
0
10
20
30
40
50
60
70
80
90
100
120
100
80
60
40
20
0

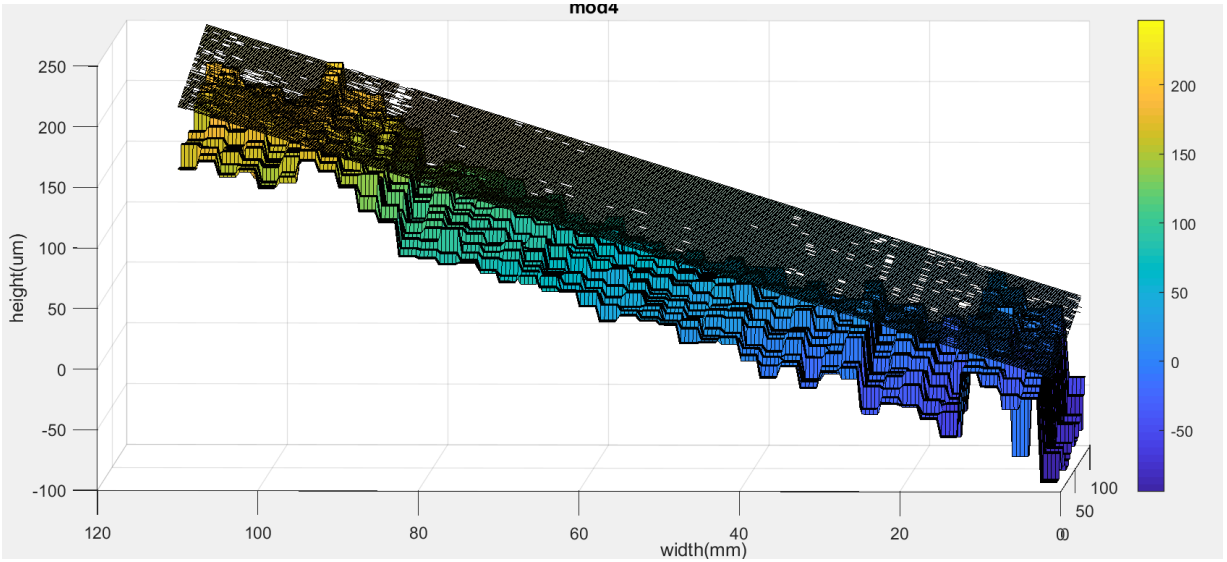

Histmod3
Dist1
Entries 21560
Mean 68.29
Std Dev 20.48
0
500
1000
1500
2000
2500
3000
3500
4000
0
20
40
60
80
100
120
140
160
180
200
Distance (μm)

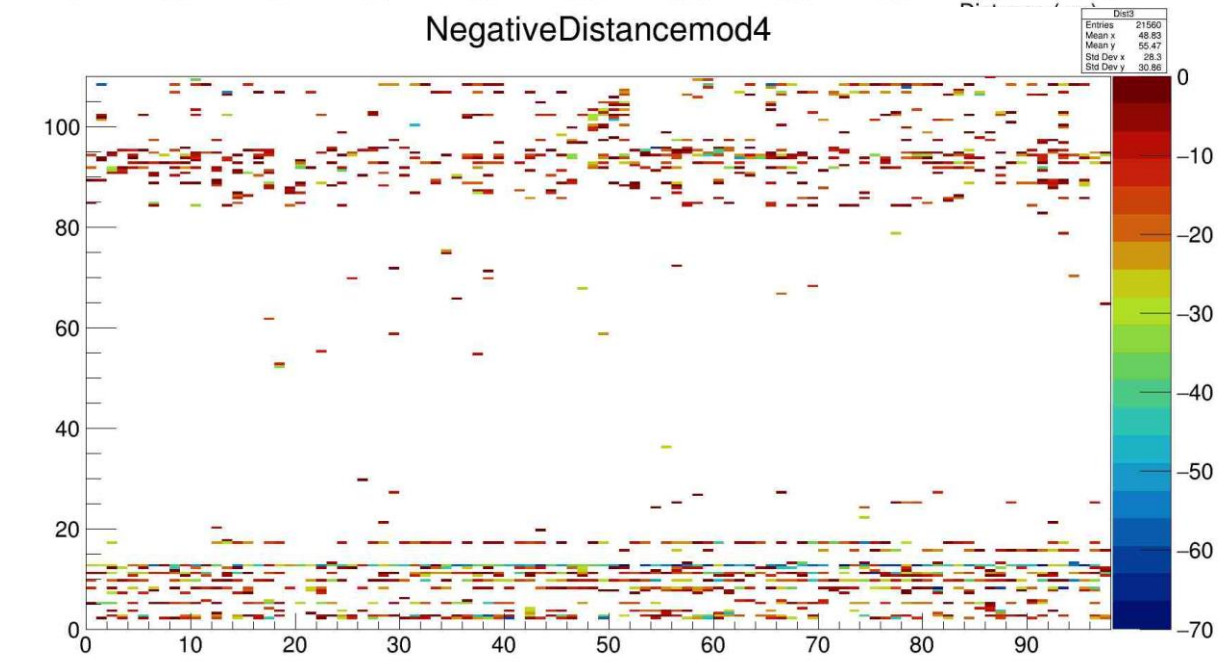

200
150
100
50
0
200
100
0
−100
0
50
100
stave3
plane3


NegativeDistancemod3
0
10
20
30
40
50
60
70
80
90
100
80
60
40
20
0
0
−5
−10
−15
−20
−25
−30

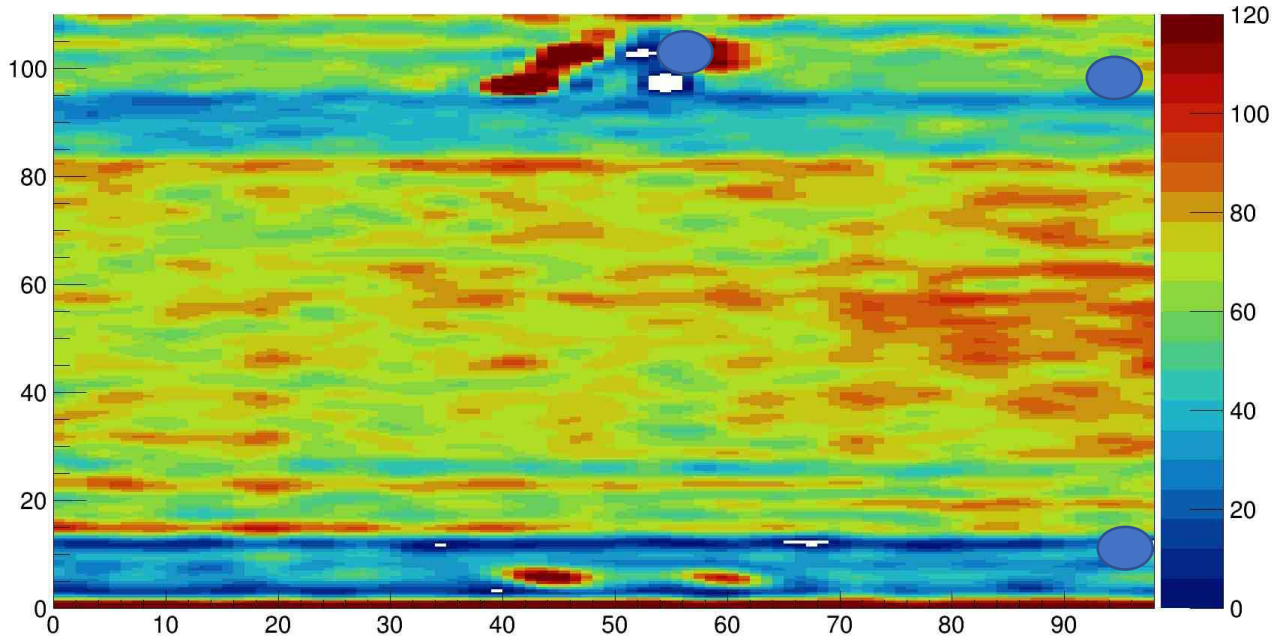

Distancemod4
Dist2
Entries 21560
Mean x 51.57
Mean y 52.81
Std Dev x 25.67
Std Dev y 44.92


Histmod4
Dist1
Entries 21560
Mean 51.7
Std Dev 23.62

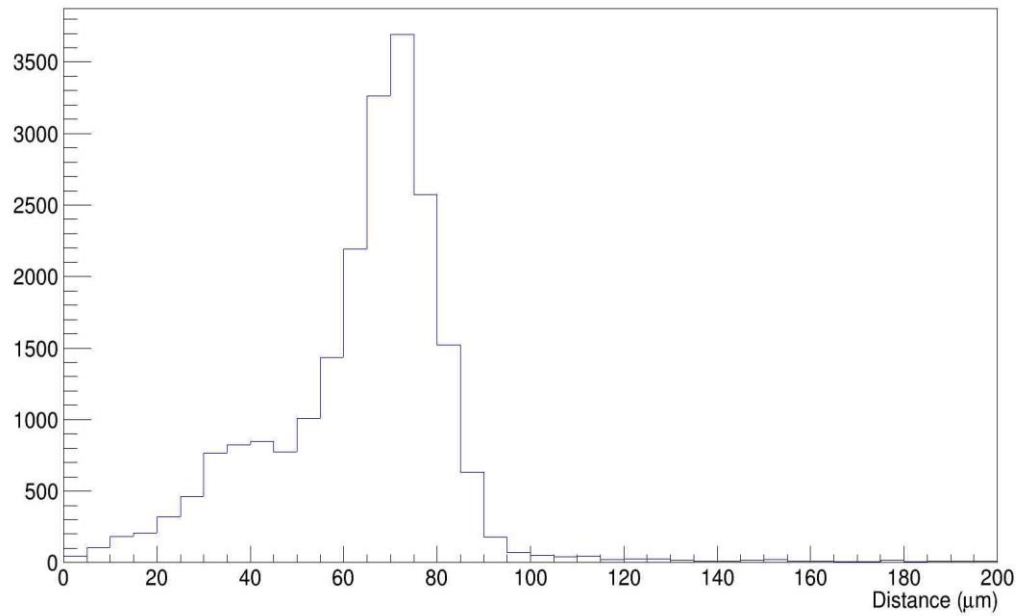

mod4
height(um)
width(mm)

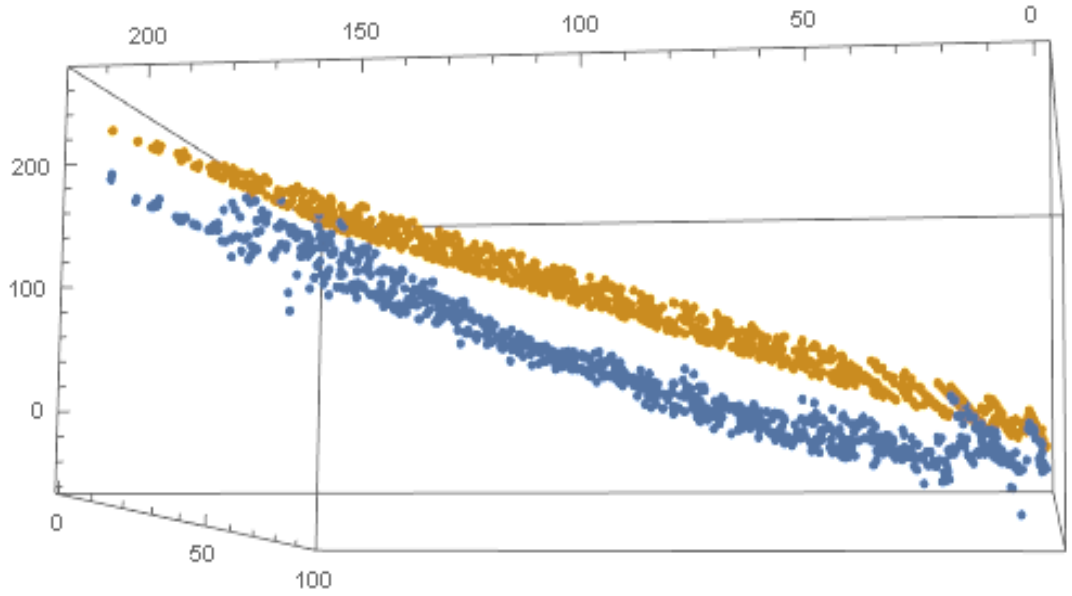

NegativeDistancemod4
Dist3
Entries 21560
Mean x 48.83
Mean y 55.47
Std Dev x 28.3
Std Dev y 30.86

Distancemod4

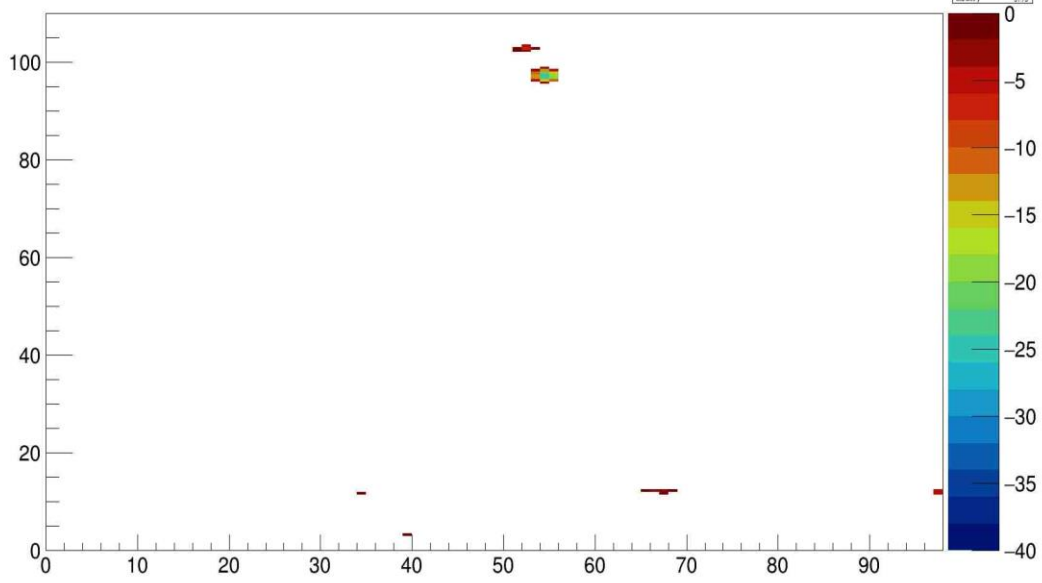


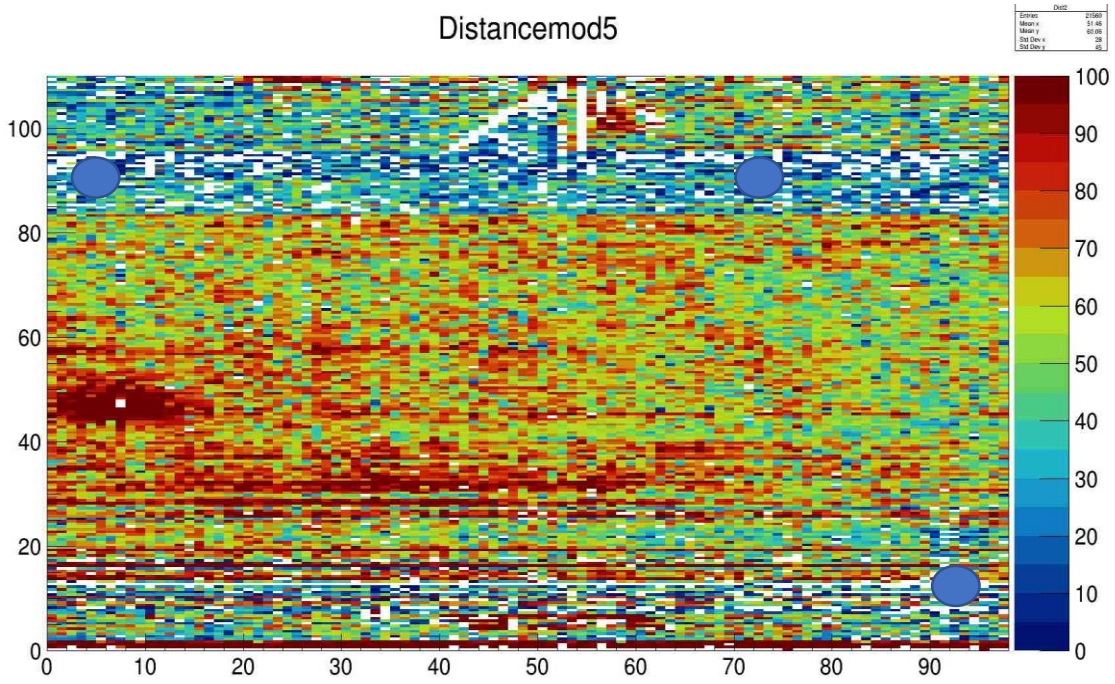
Histmod4

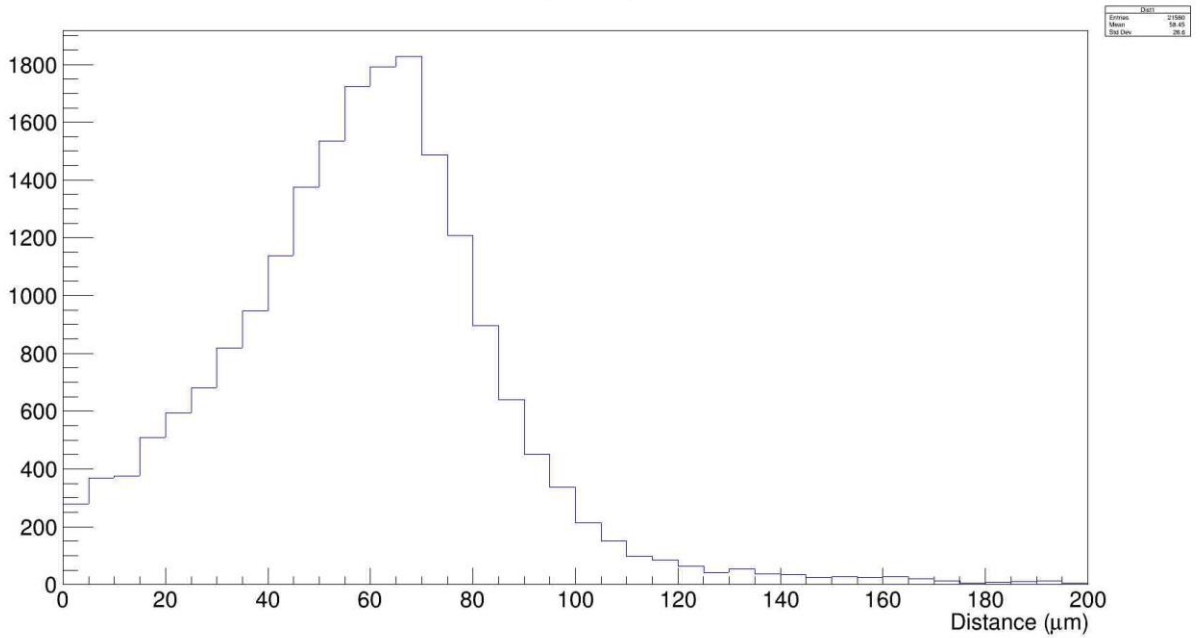


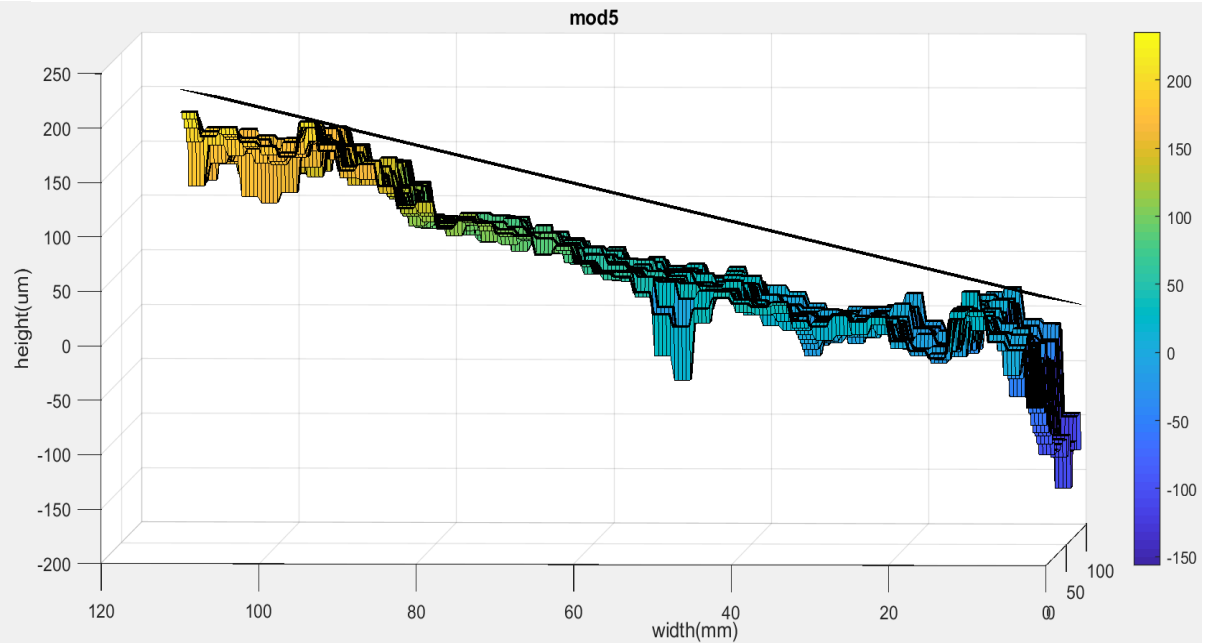


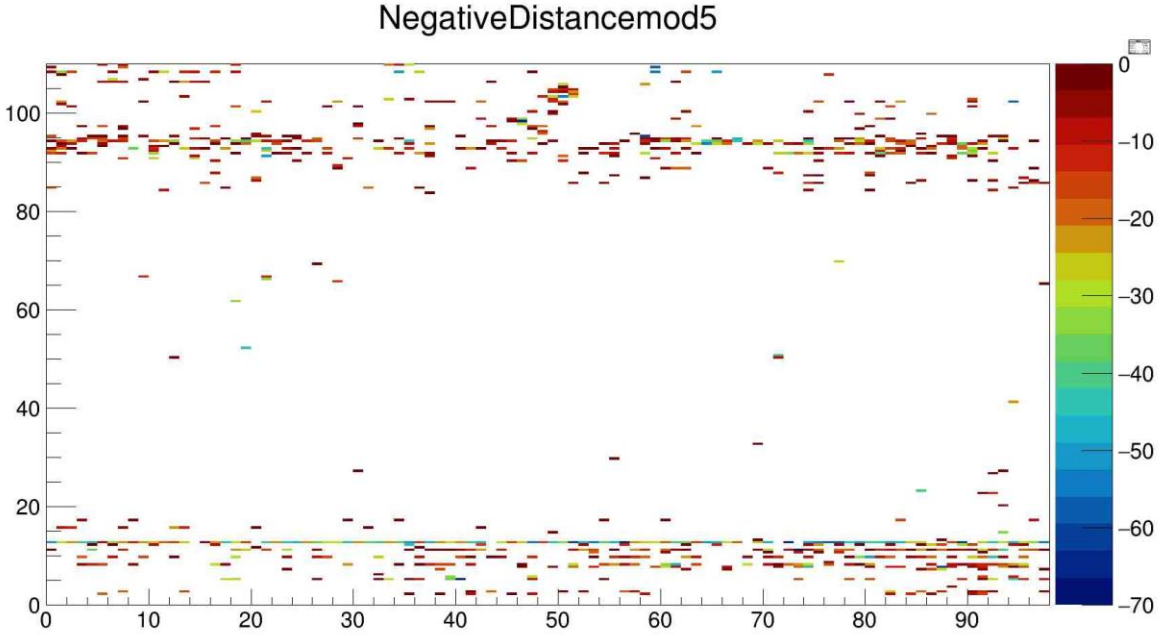
NegativeDistancemod4

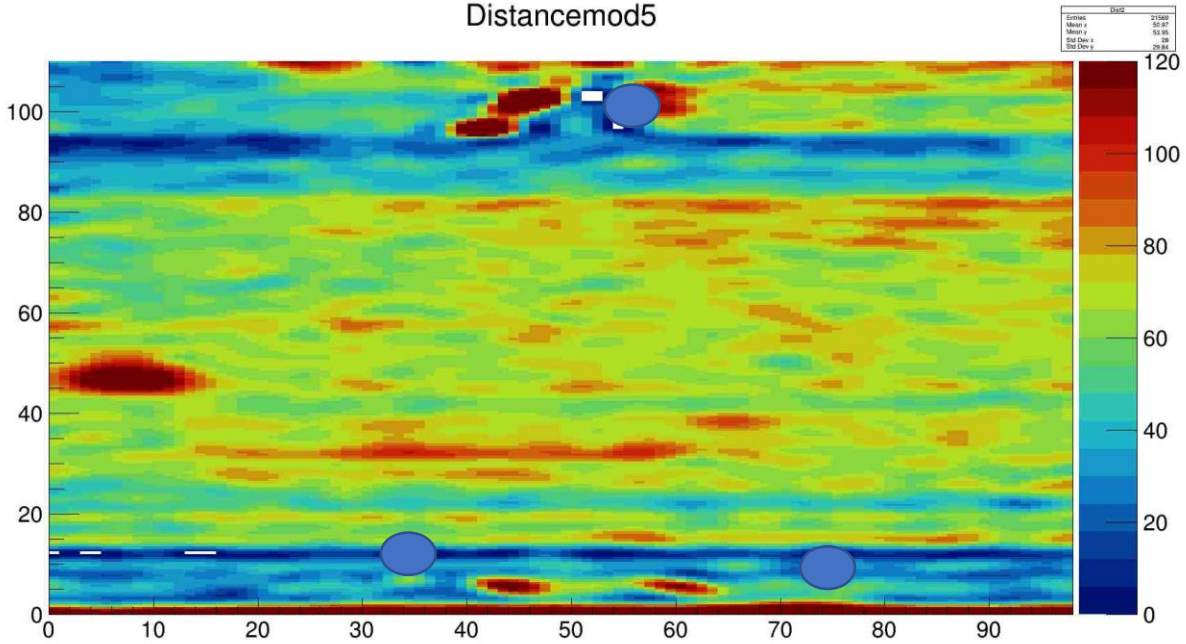


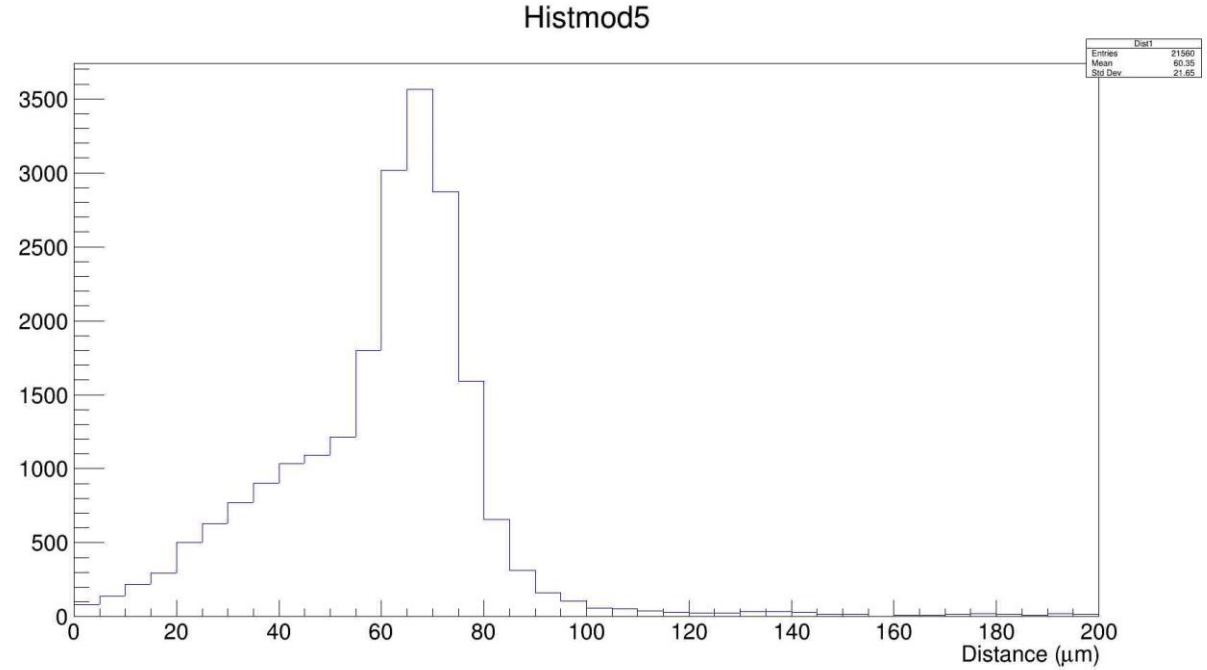

Distancemod5

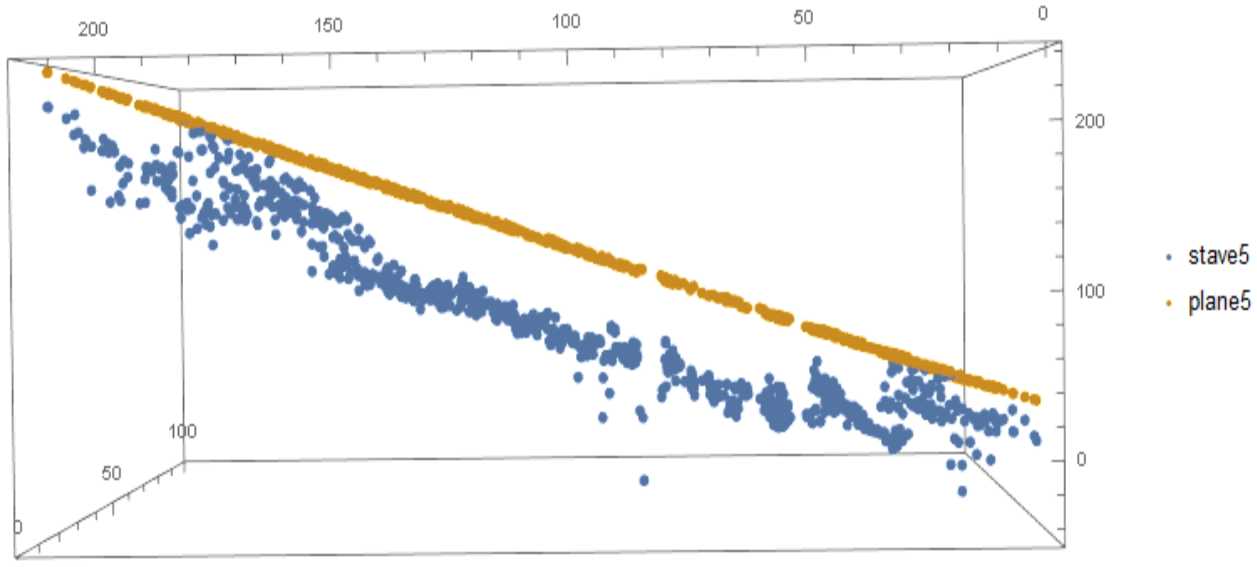

Histmod5
Distance (µm)

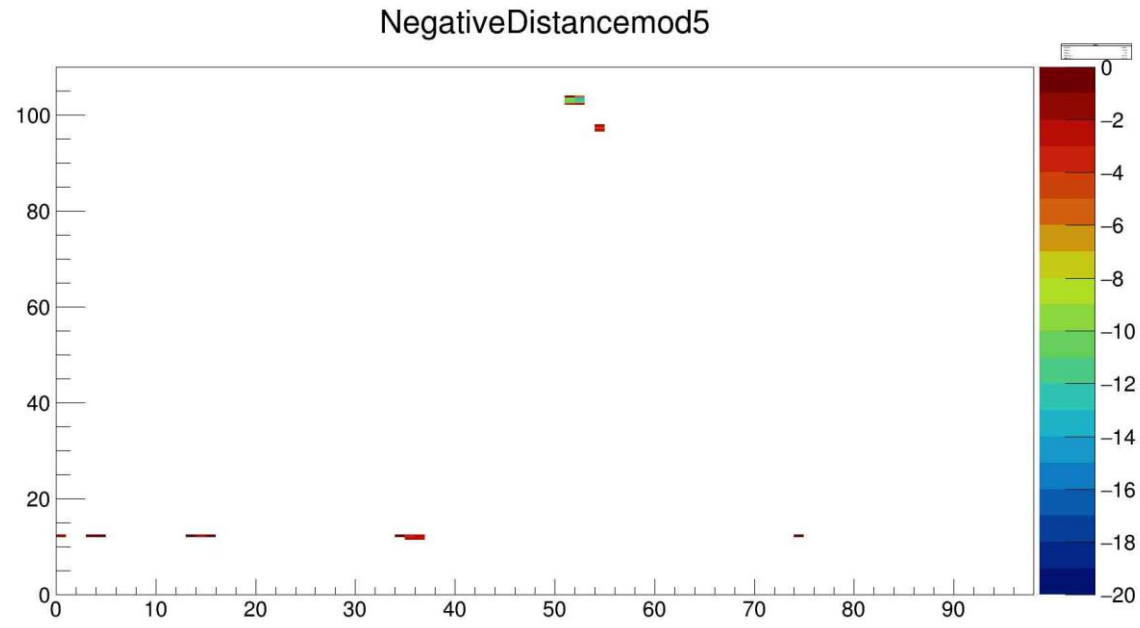

mod5
height(um)
width(mm)

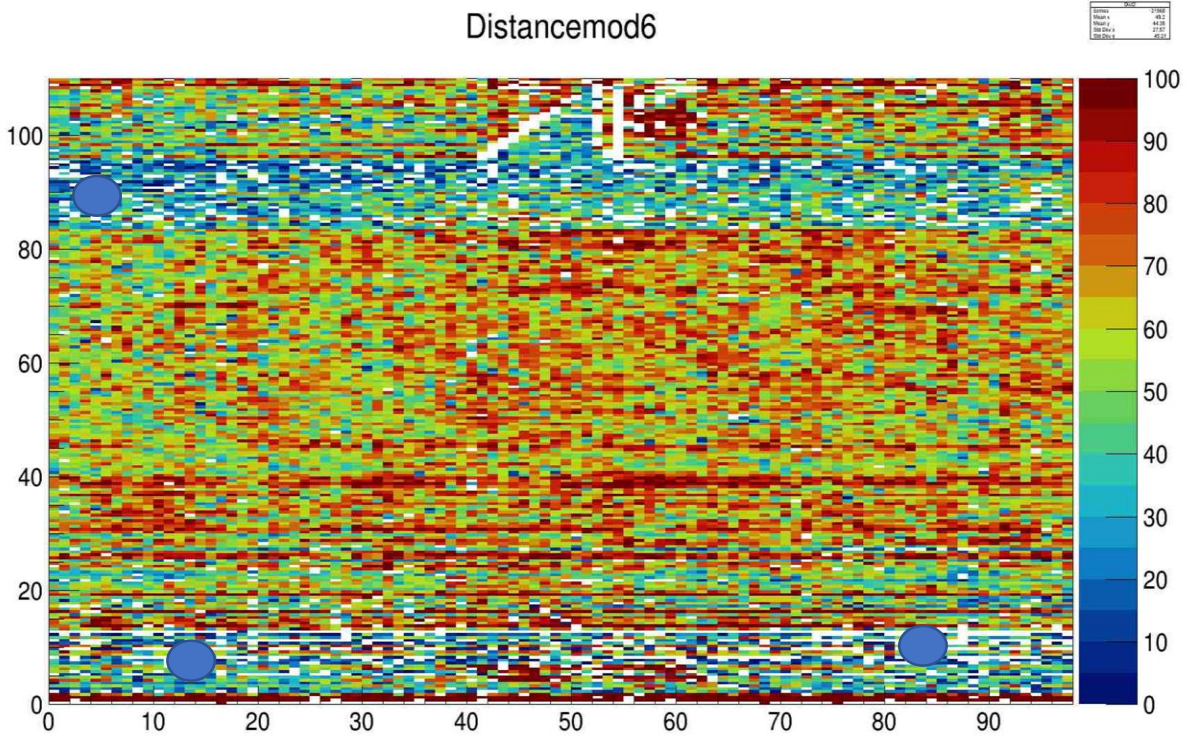

NegativeDistancemod5

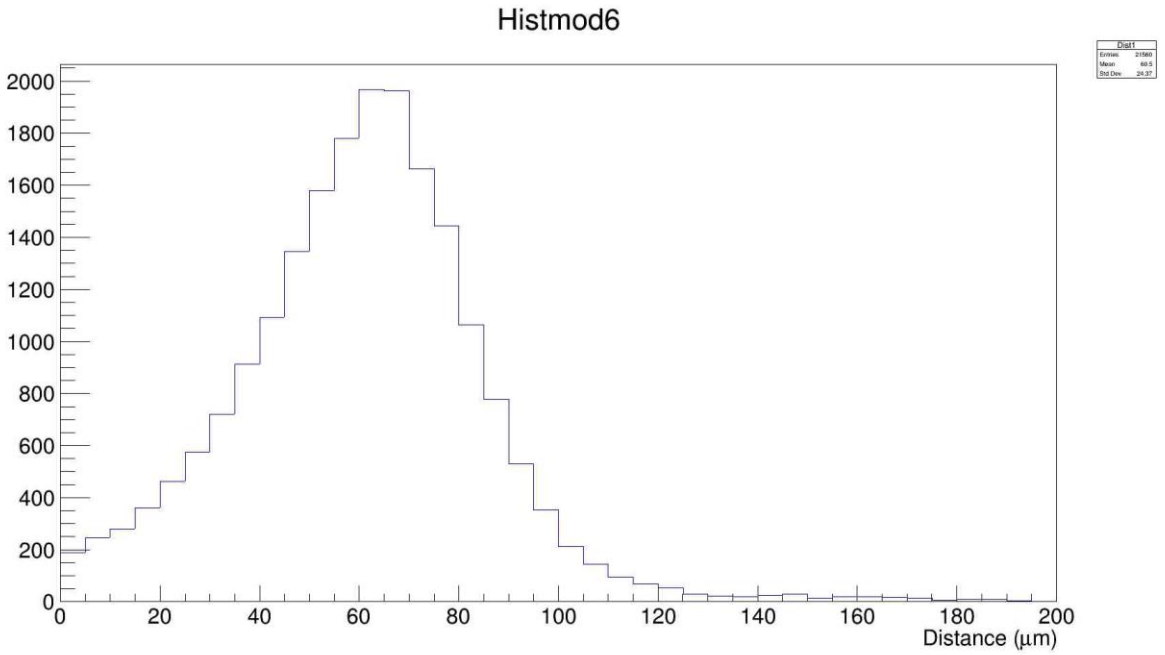

Distancemod5
Entries 21560
Mean x 50.97
Mean y 53.95
Std Dev x 28
Std Dev y 29.84
0 10 20 30 40 50 60 70 80 90
0 20 40 60 80 100
0 20 40 60 80 100 120

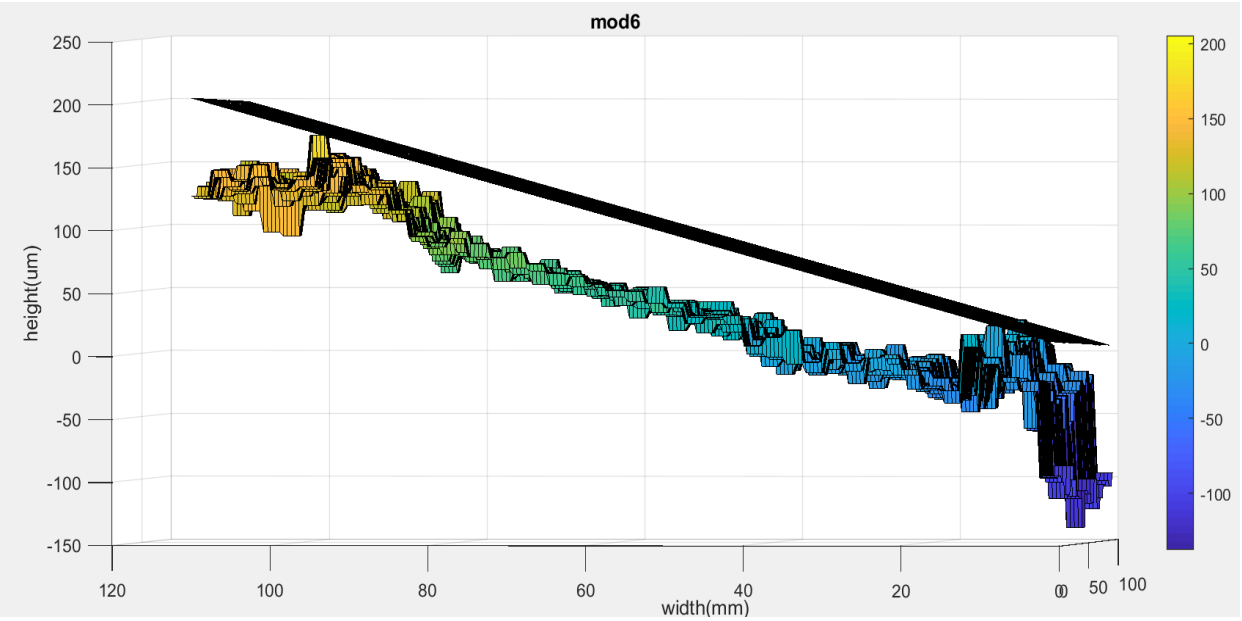

Histmod5
Dist1
Entries 21560
Mean 60.35
Std Dev 21.65
0 500 1000 1500 2000 2500 3000 3500
0 20 40 60 80 100 120 140 160 180 200
Distance (μm)

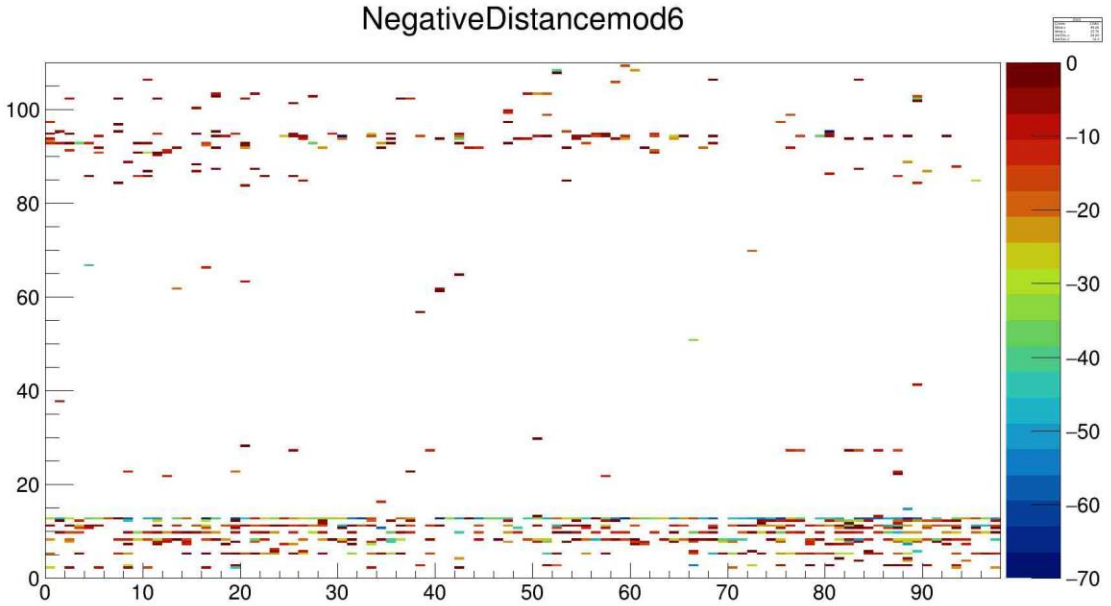

200 150 100 50 0
200
100
0
100
50
0
stave5
plane5

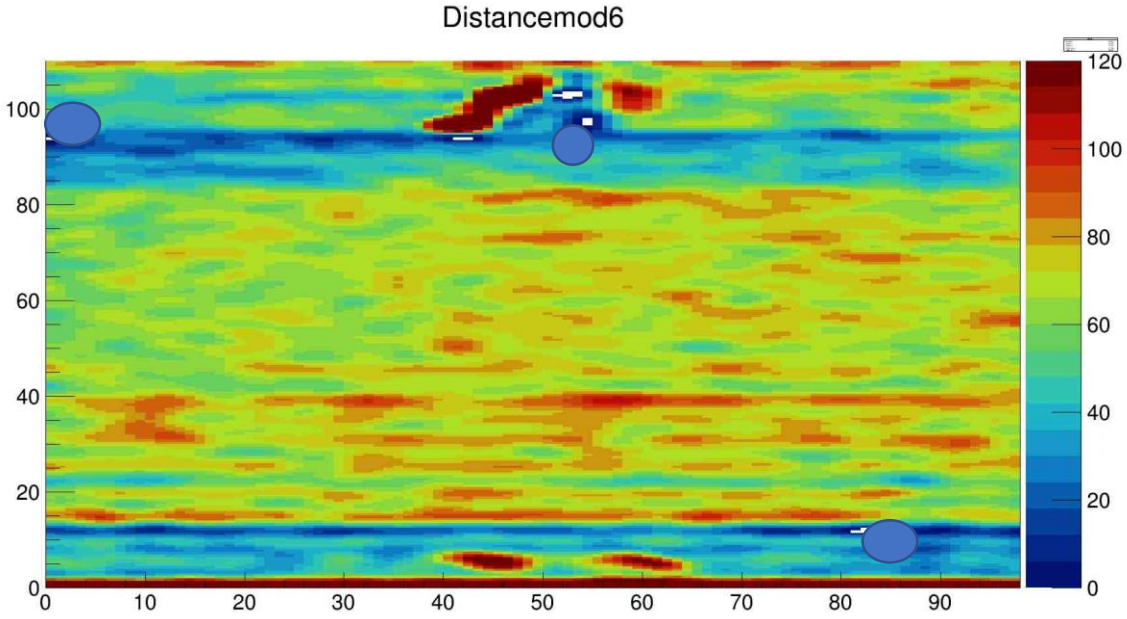

NegativeDistancemod5
0 10 20 30 40 50 60 70 80 90
0 20 40 60 80 100
0 −2 −4 −6 −8 −10 −12 −14 −16 −18 −20

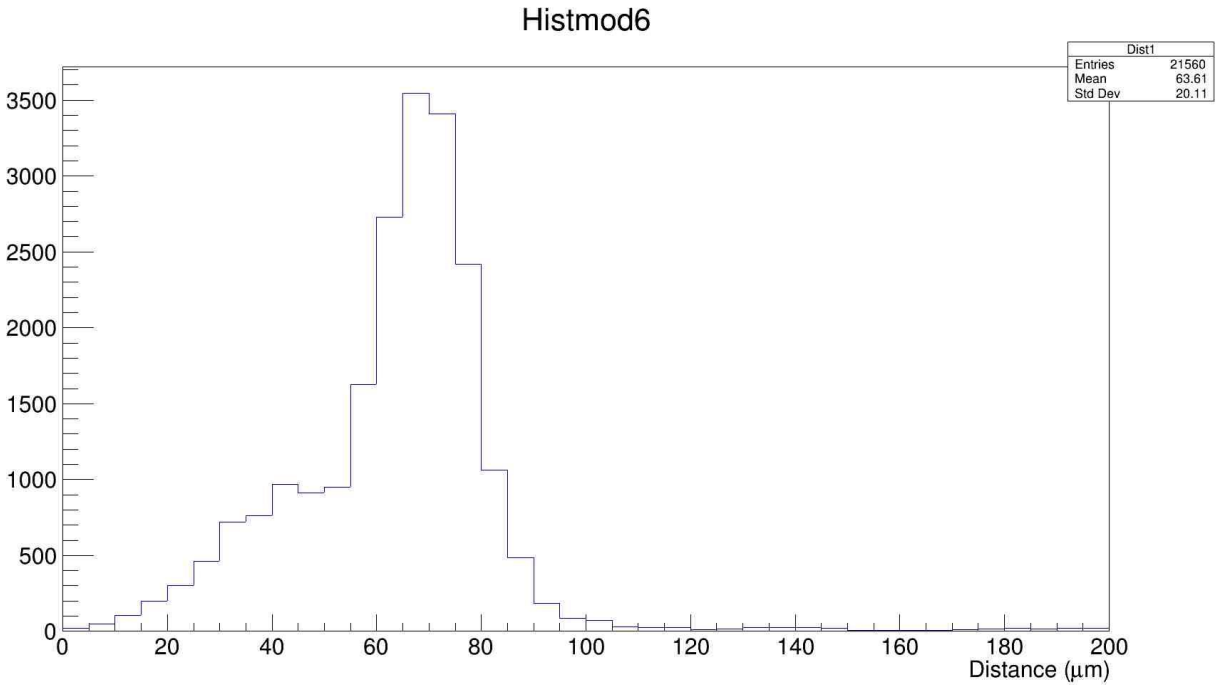

Distancemod6

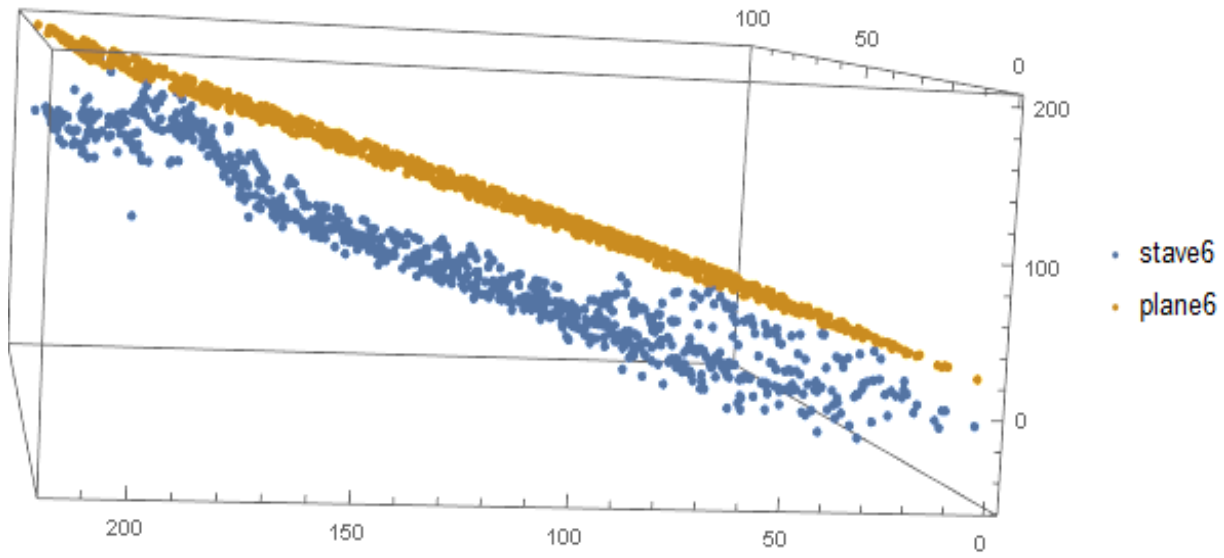

Histmod6
Distance (µm)

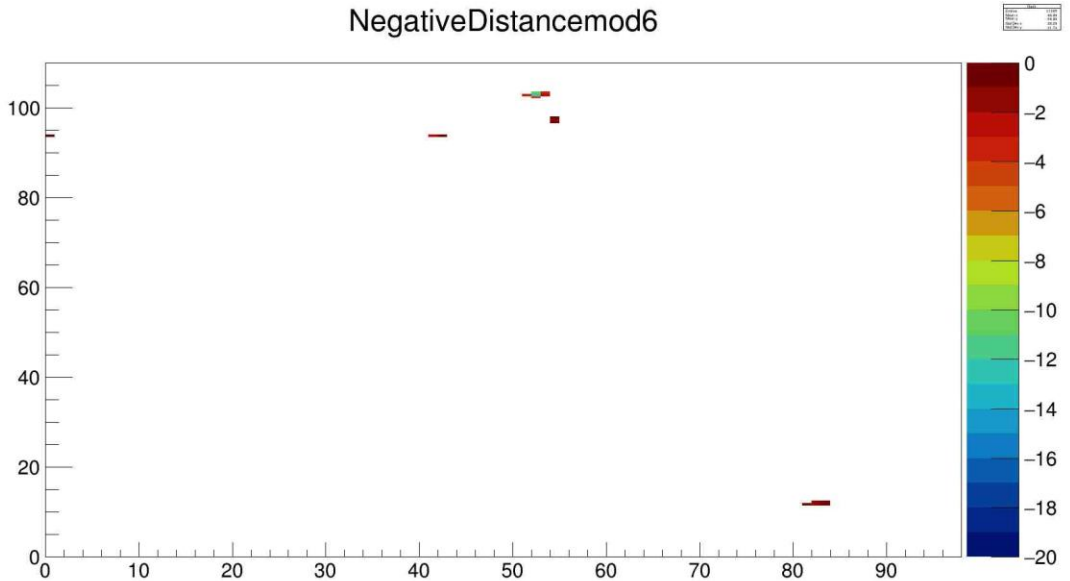

mod6
height(um)
width(mm)

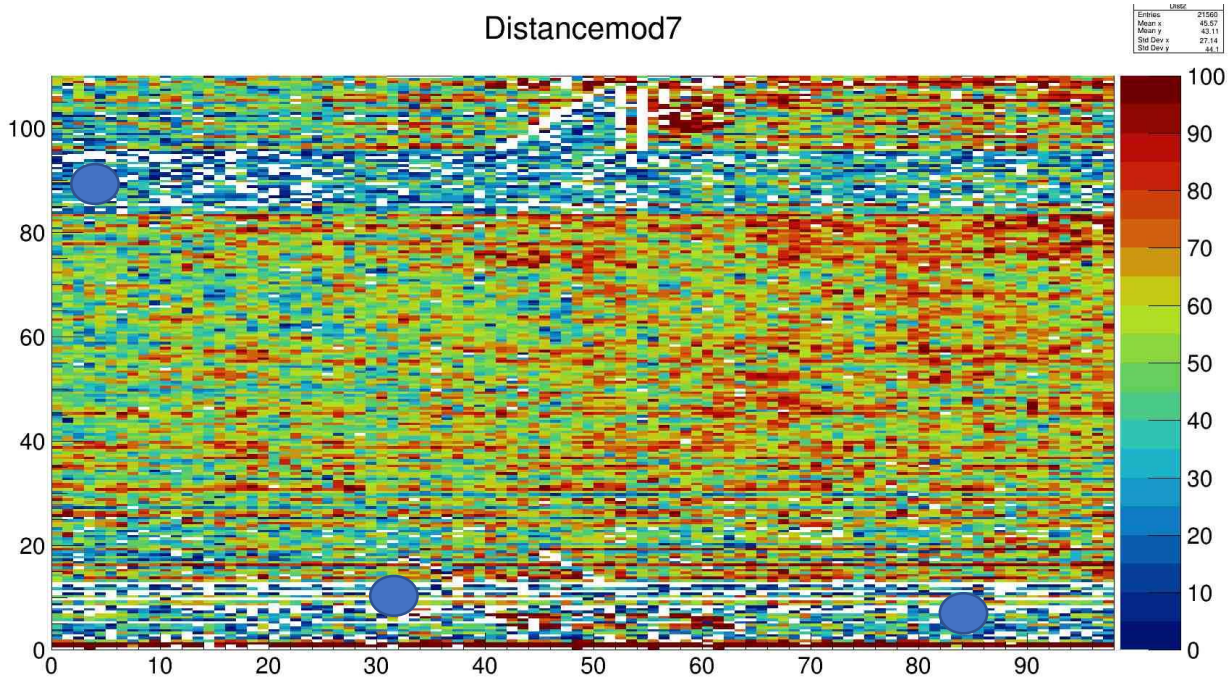

NegativeDistancemod6

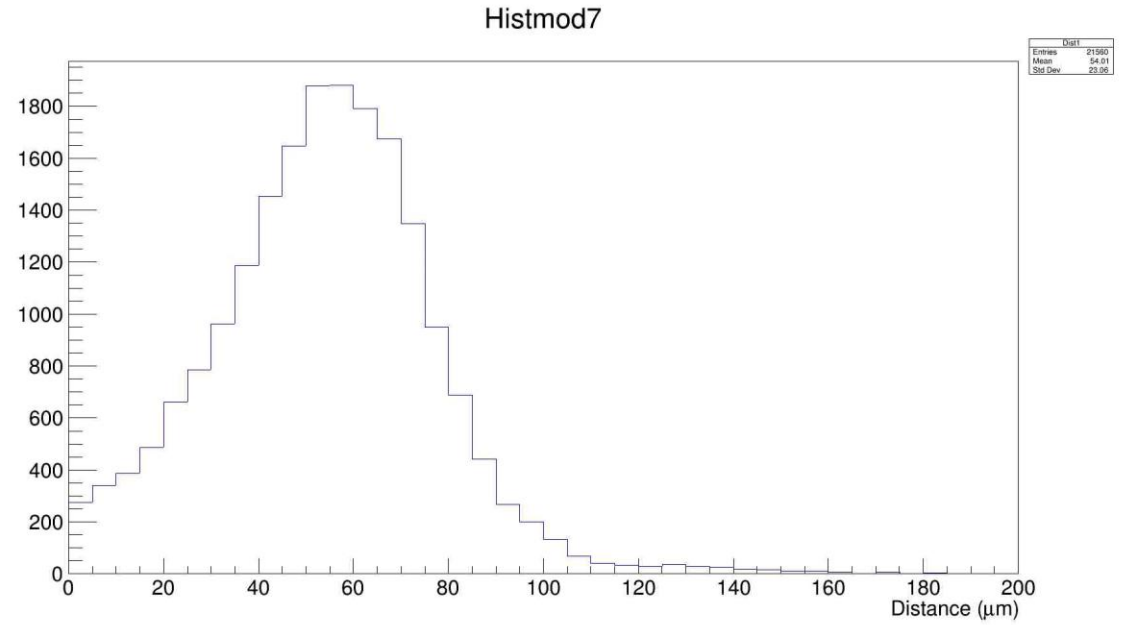

Distancemod6

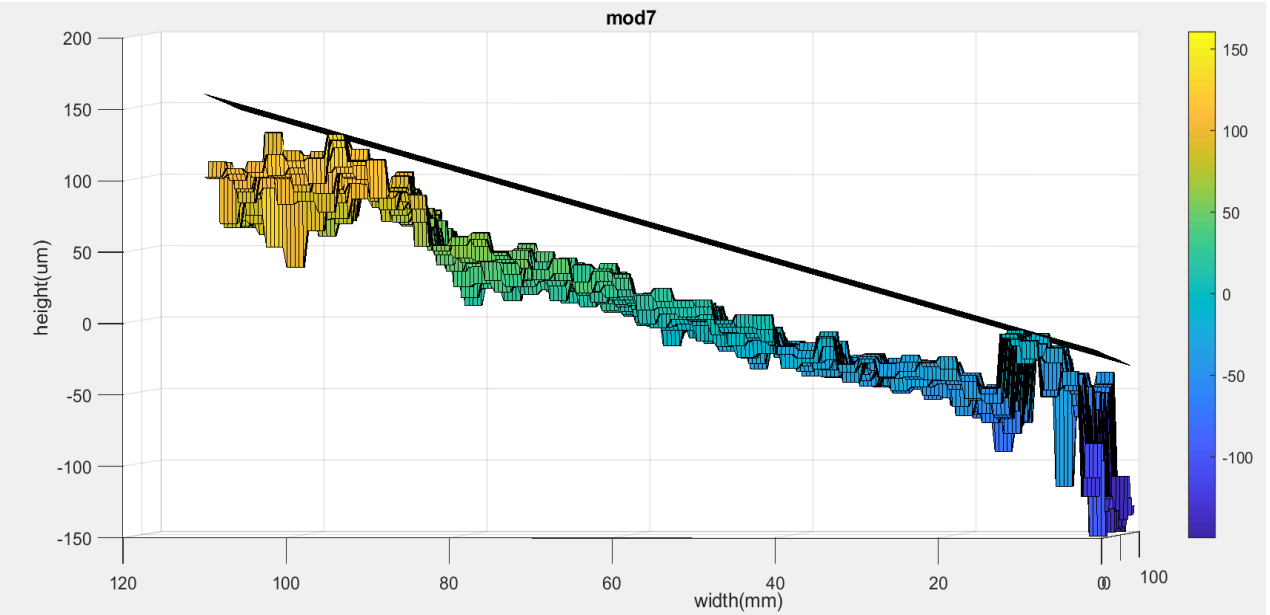

Histmod6
Dist1
Entries 21560
Mean 63.61
Std Dev 20.11
Distance (μm)

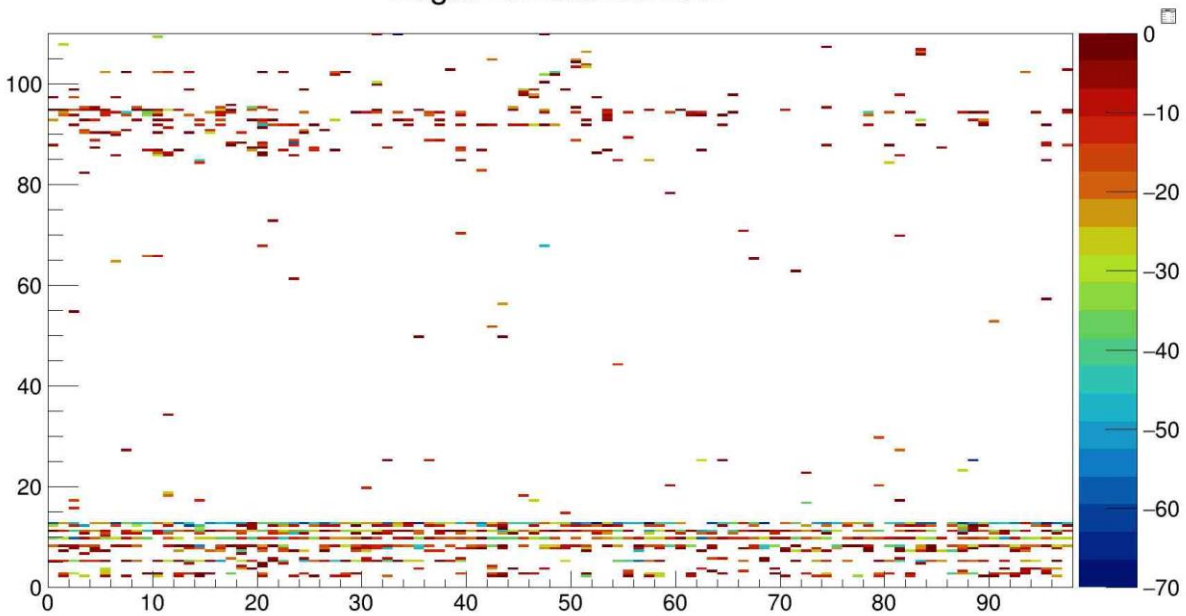

stave6
plane6


NegativeDistancemod6

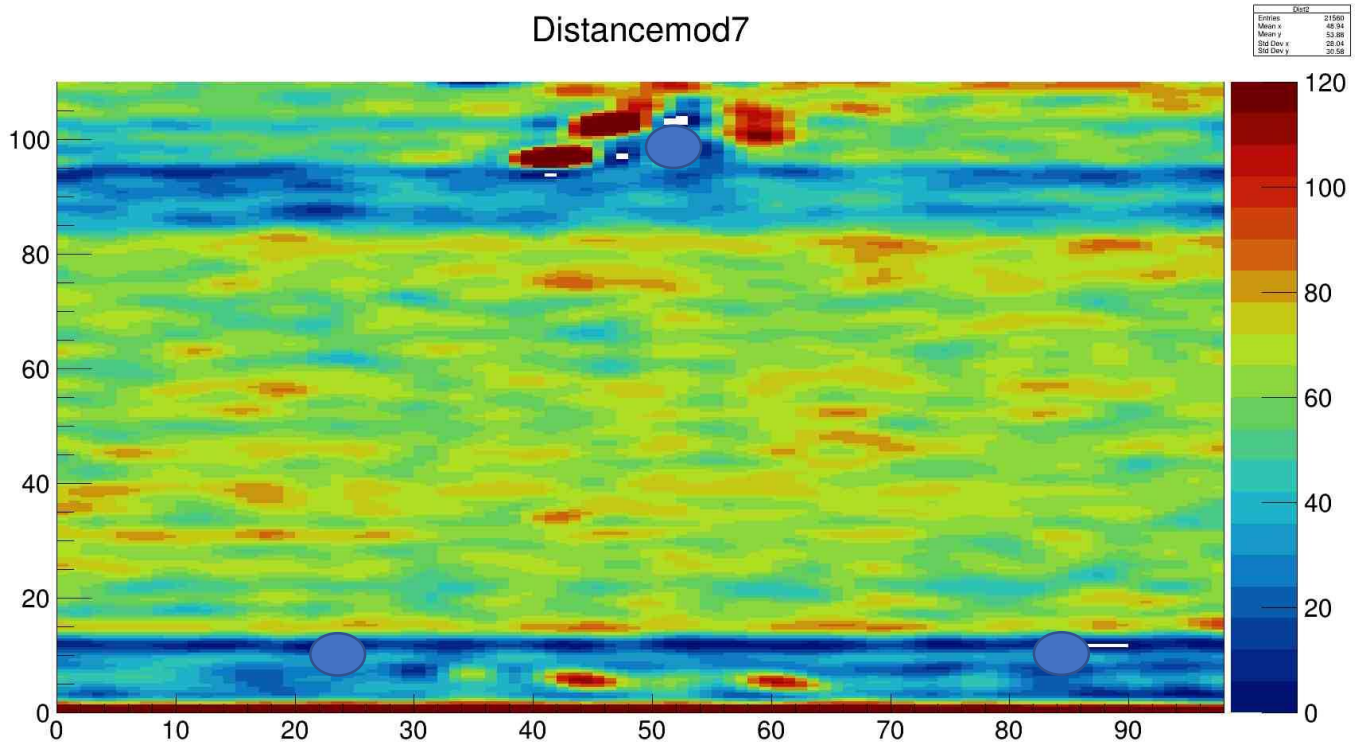

Distancemod7


Histmod7
Distance (µm)

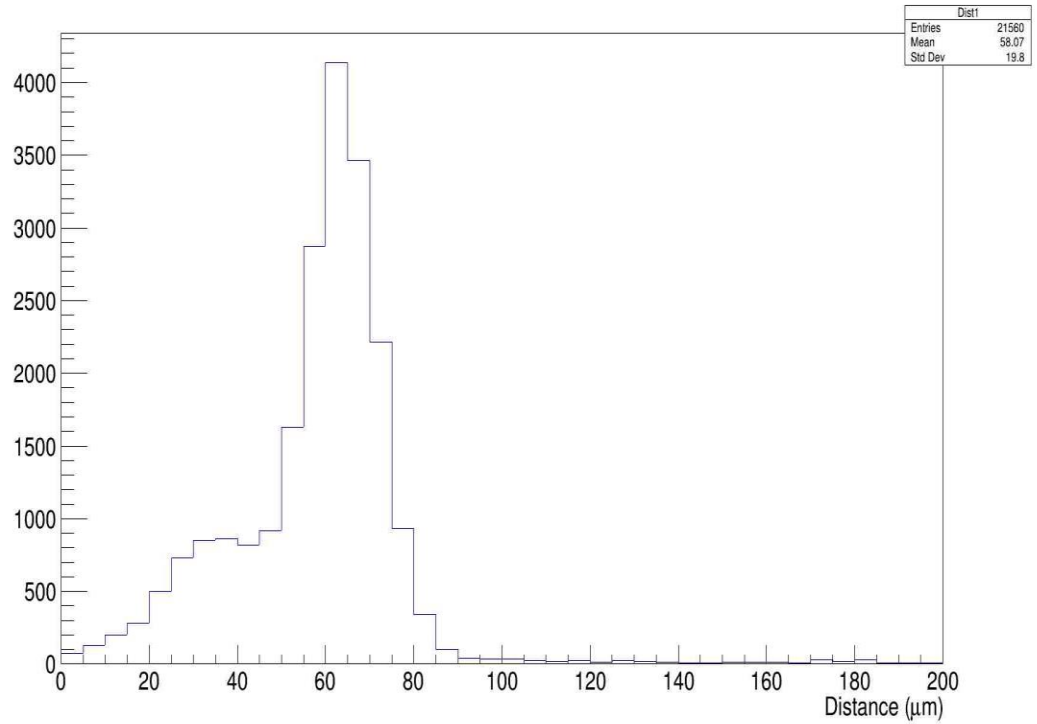

mod7
height(um)
width(mm)

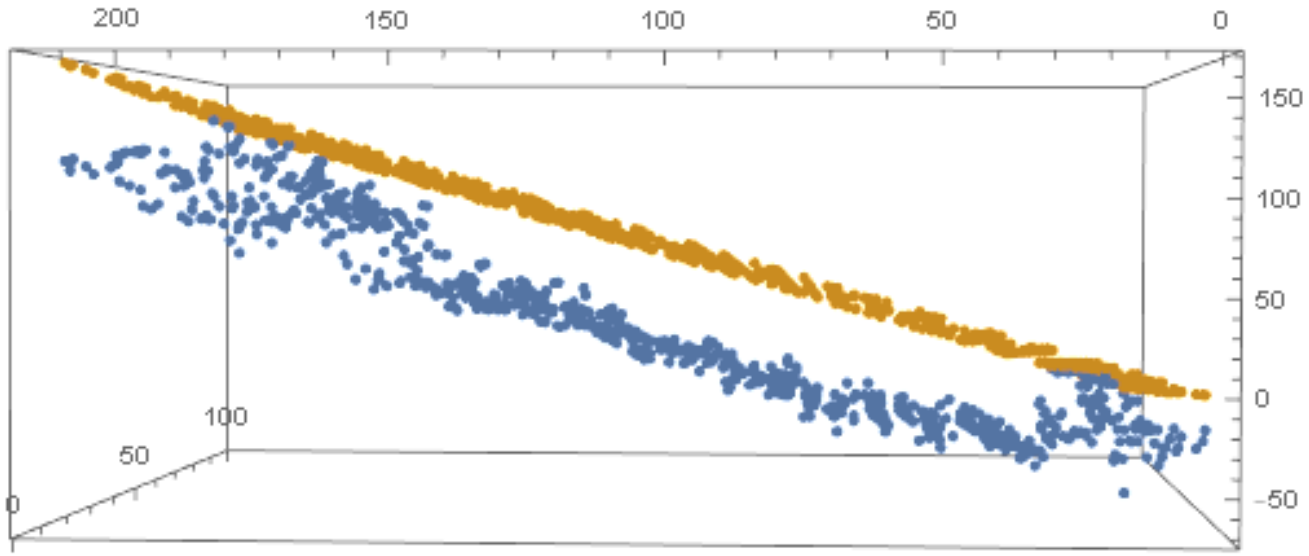

NegativeDistancemod7

Distancemod7

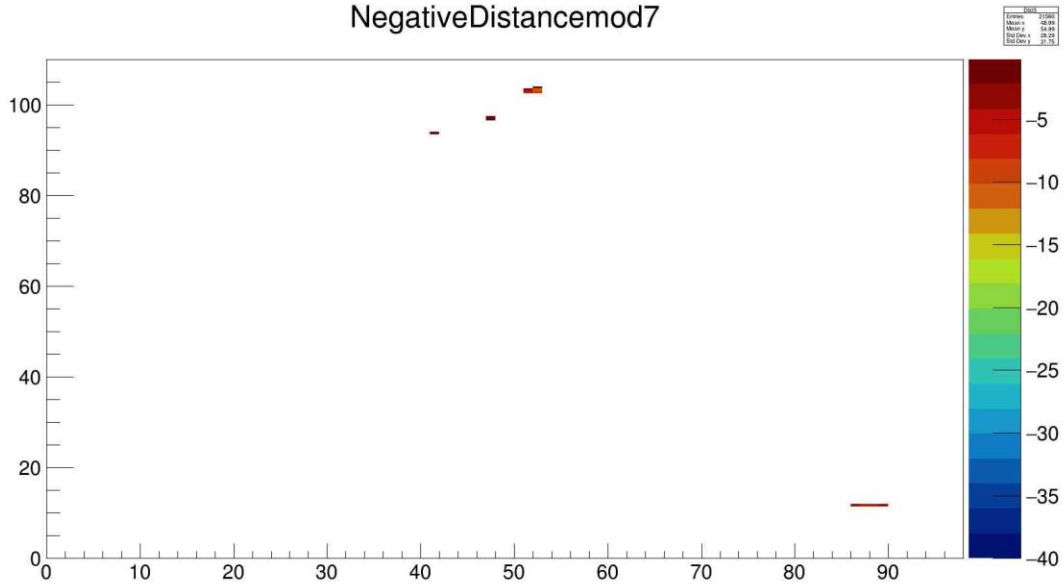


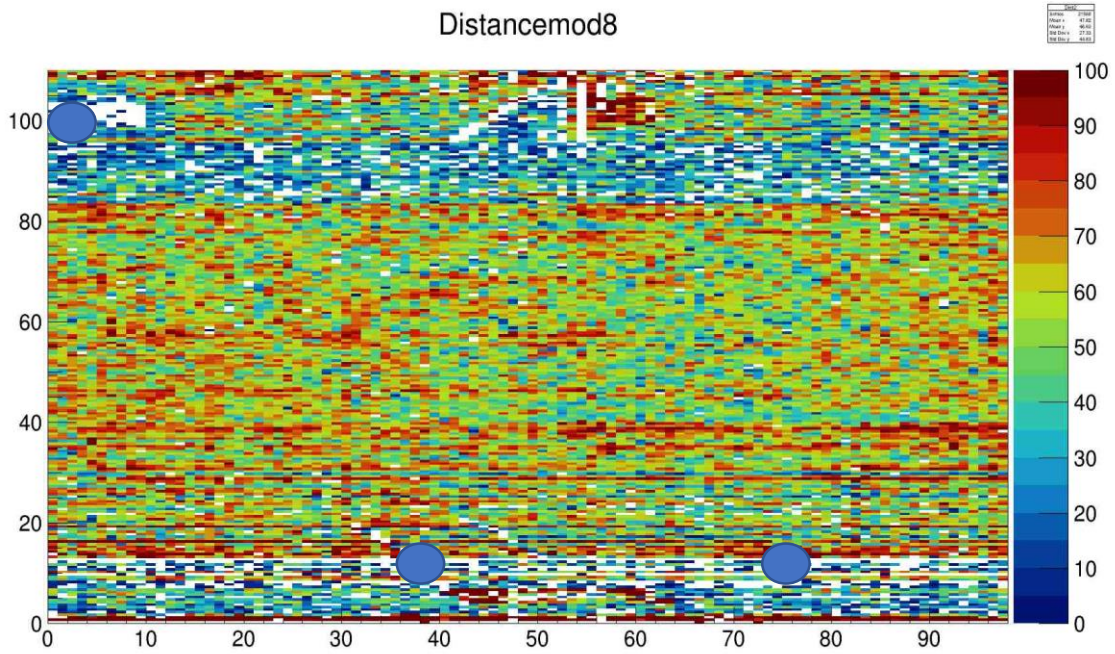
Histmod7

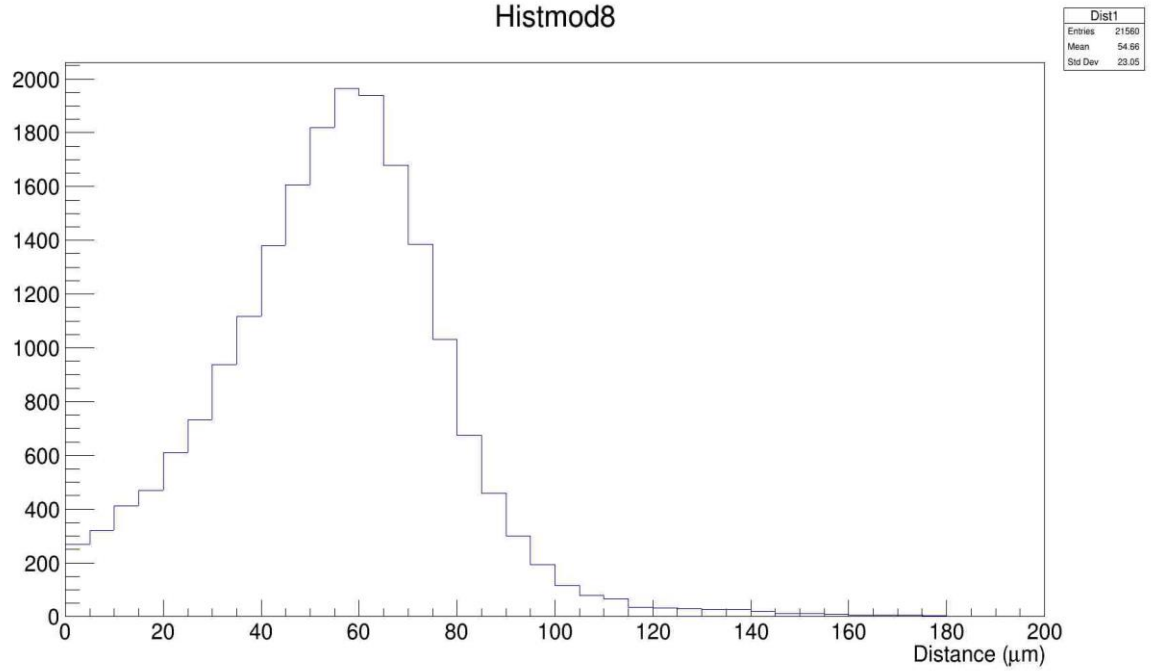


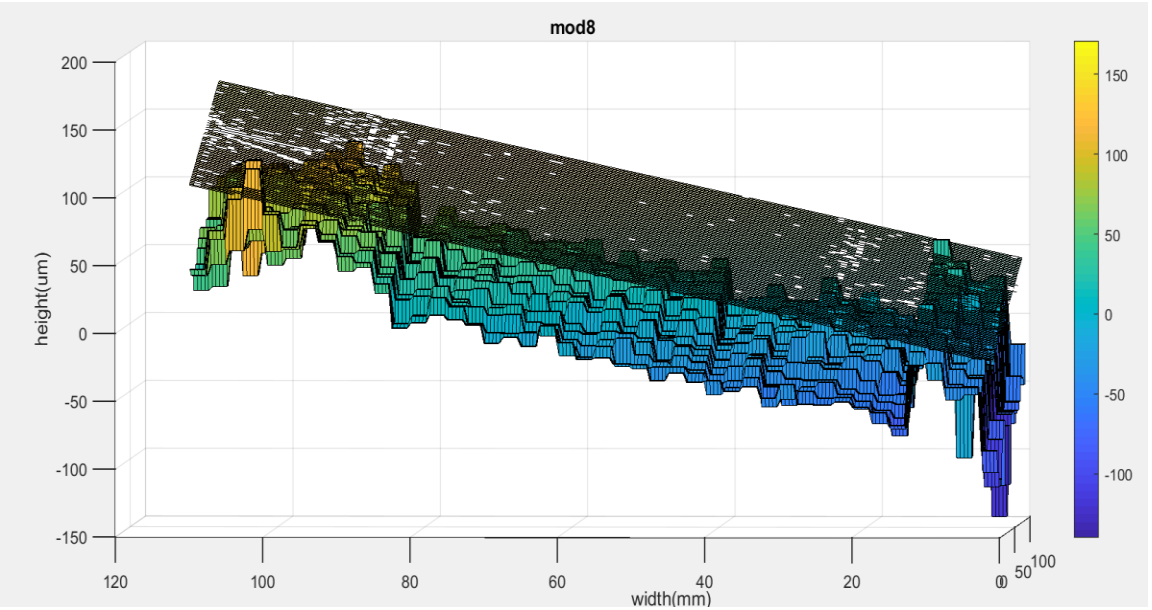


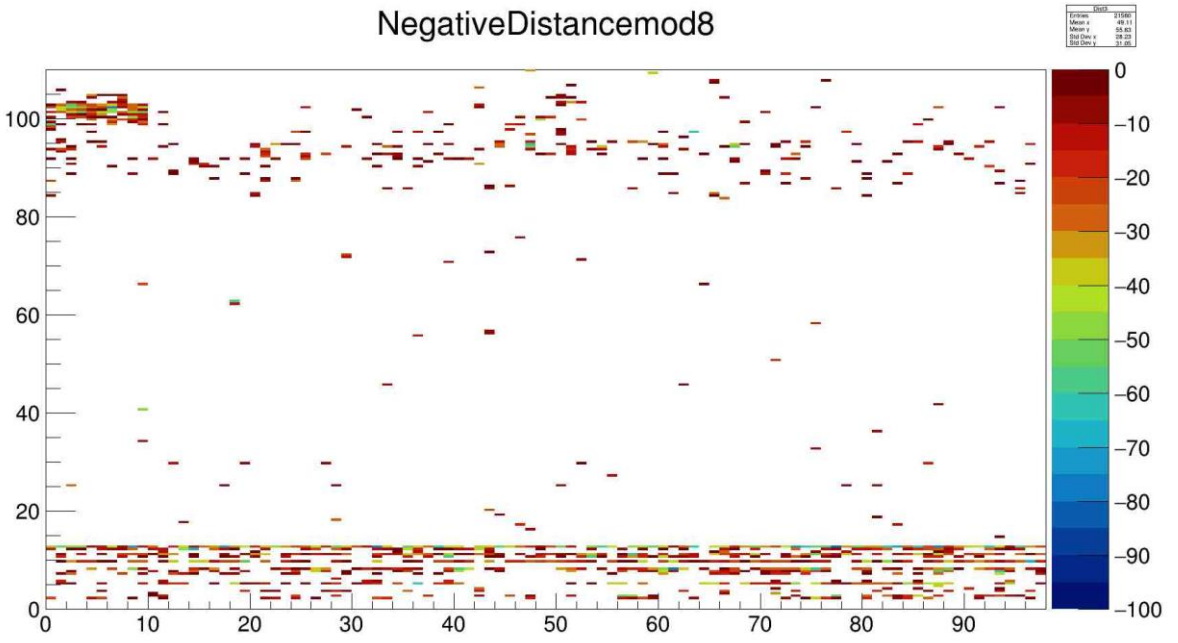
NegativeDistancemod7

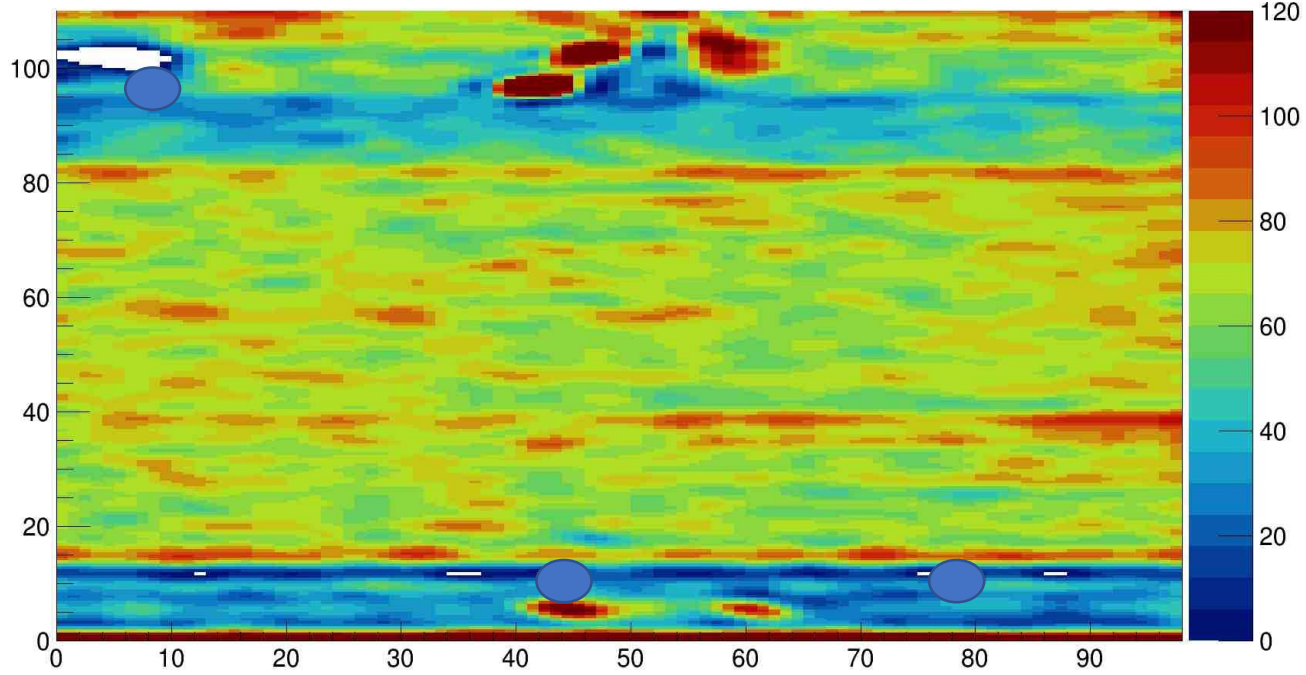


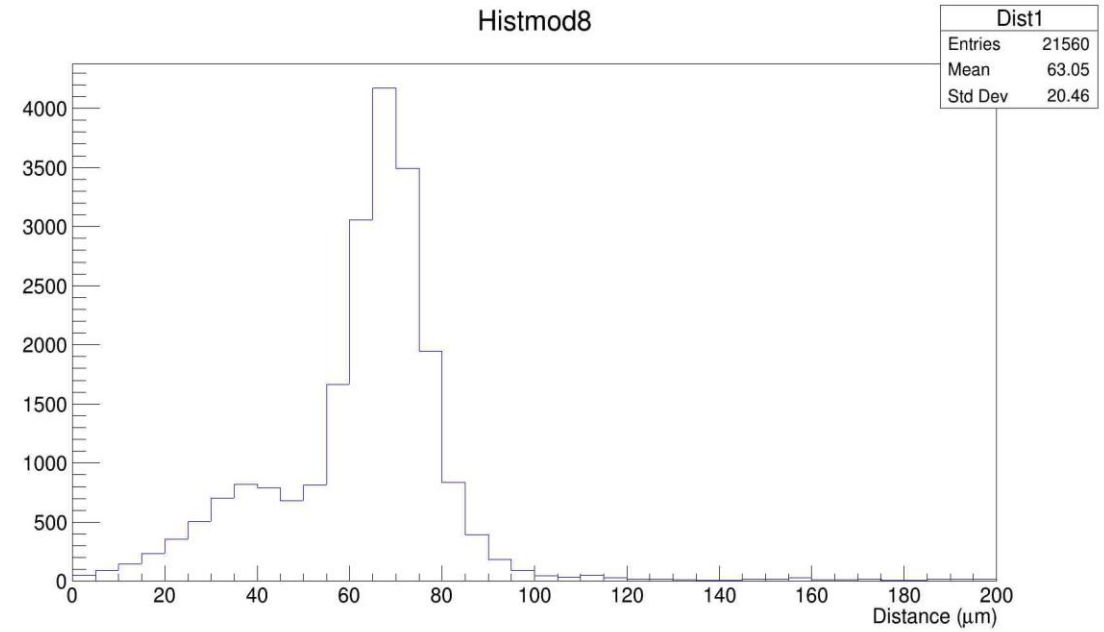

Distancemod8

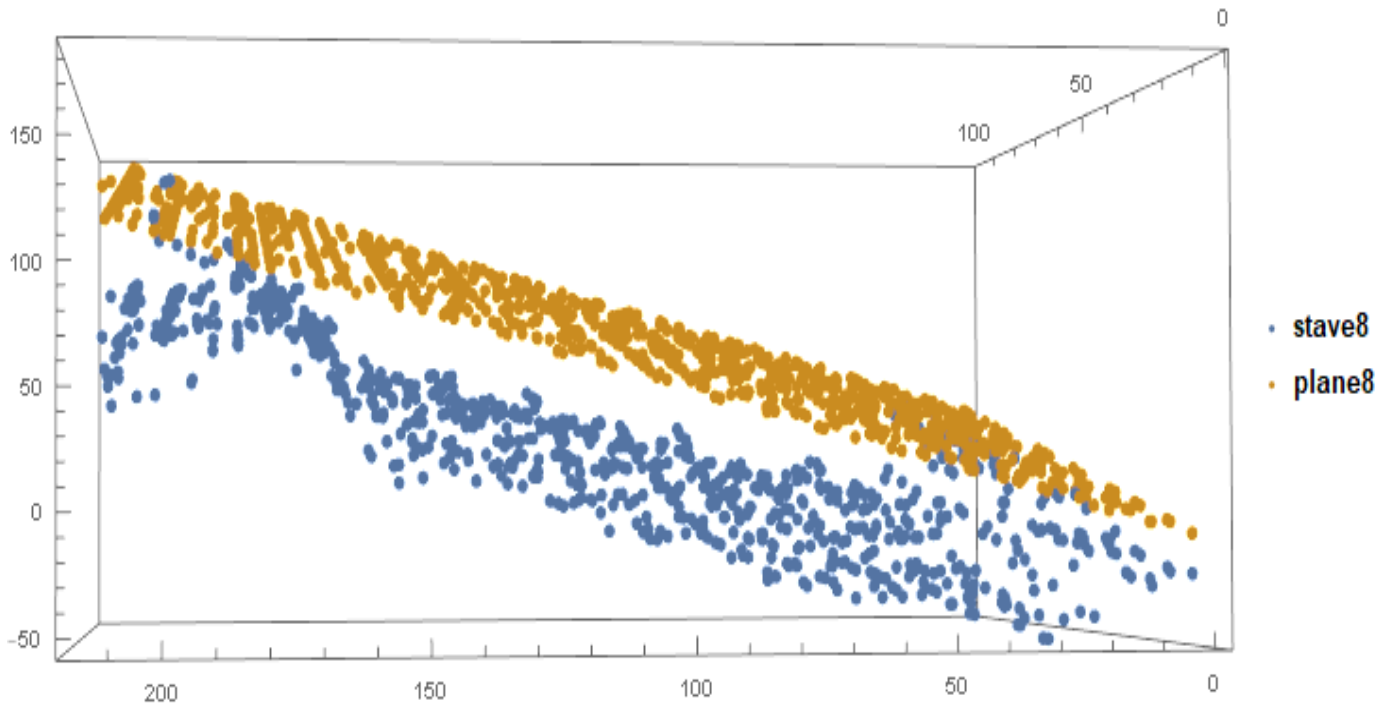

Histmod8
Dist1
Entries 21560
Mean 54.66
Std Dev 23.05
Distance (μm)

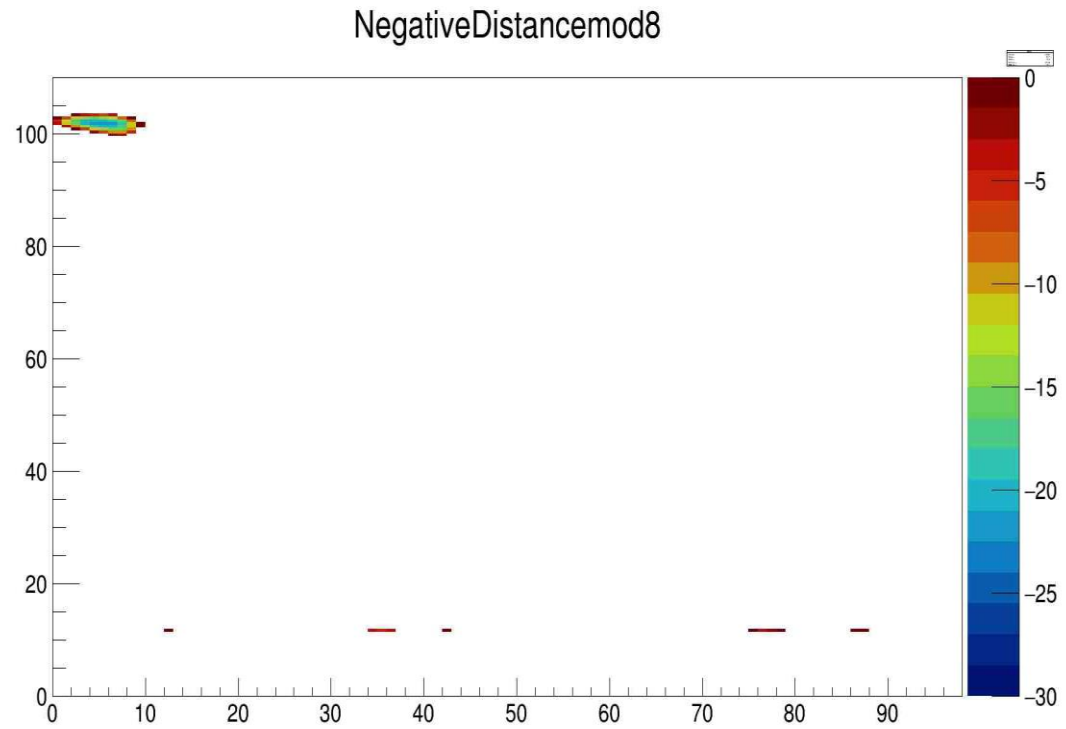

mod8
height(um)
width(mm)

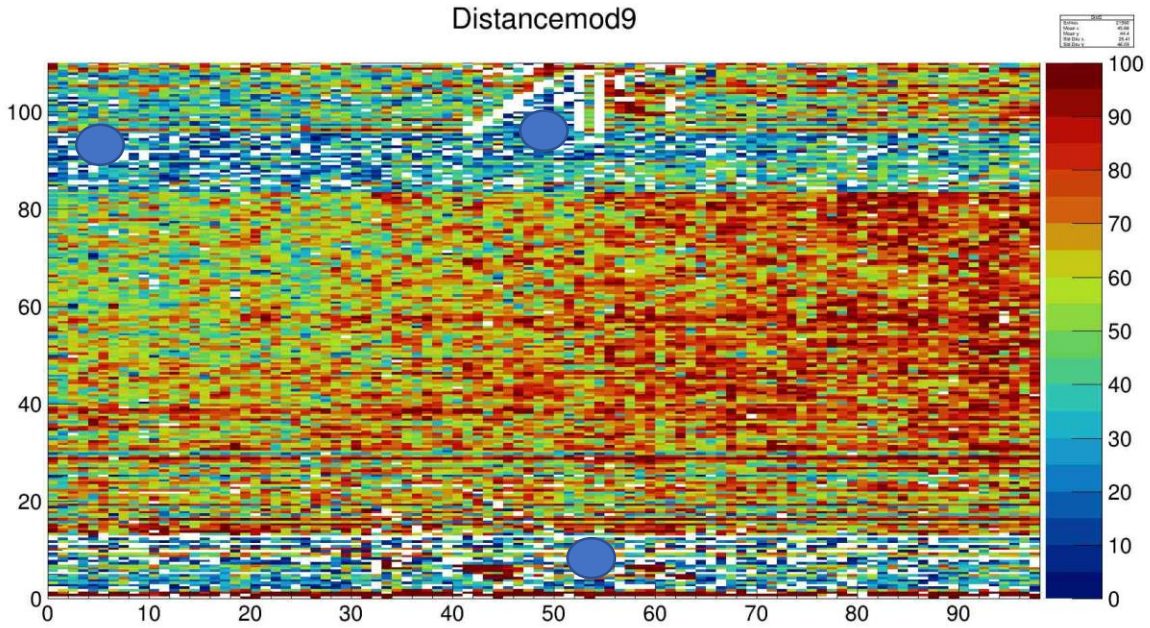

NegativeDistancemod8

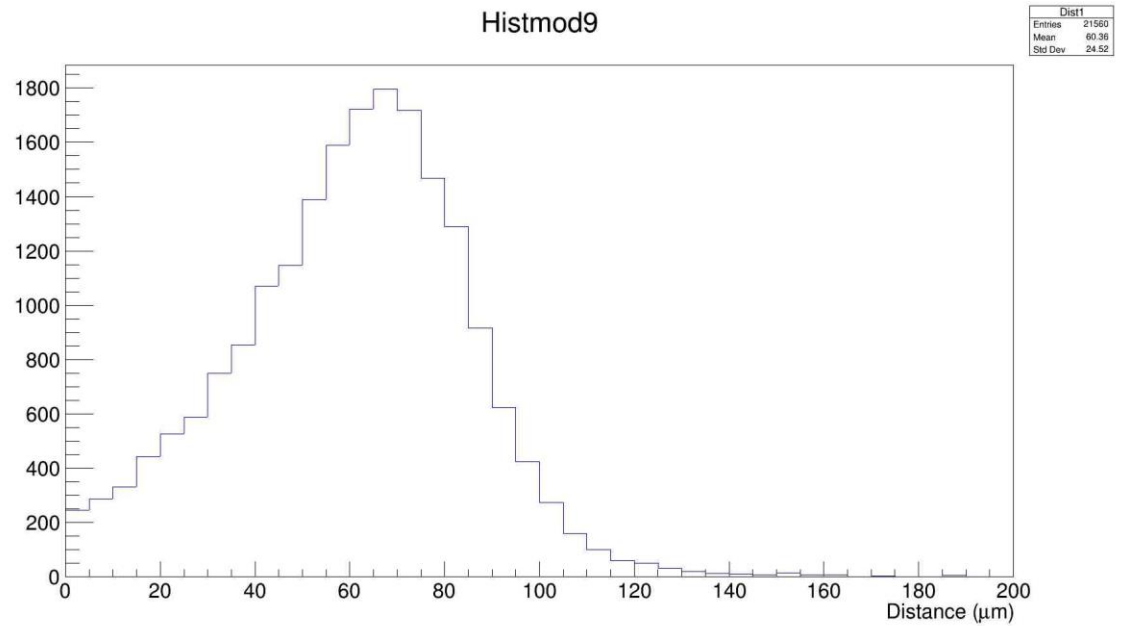


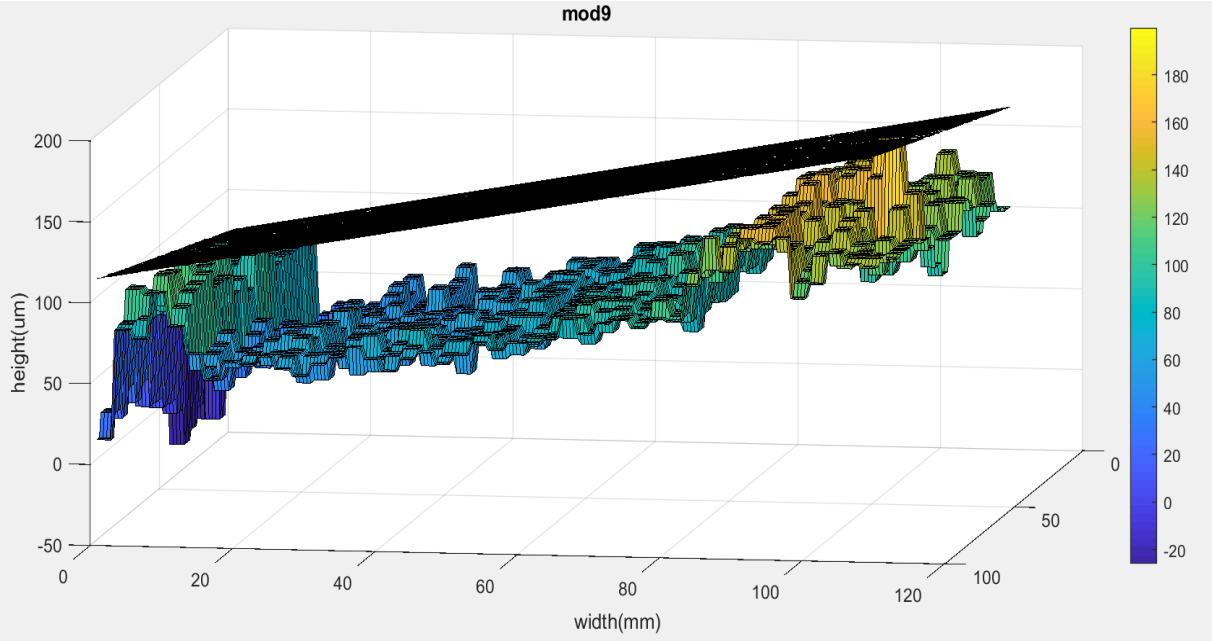

Histmod8
Dist1
Entries 21560
Mean 63.05
Std Dev 20.46
Distance (μm)

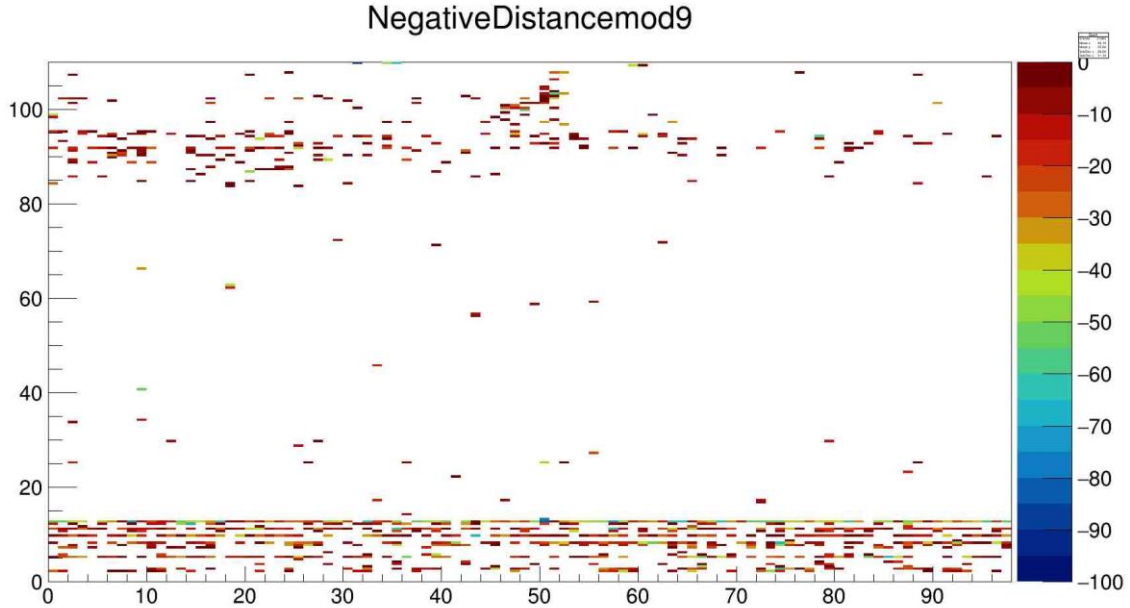

stave8
plane8

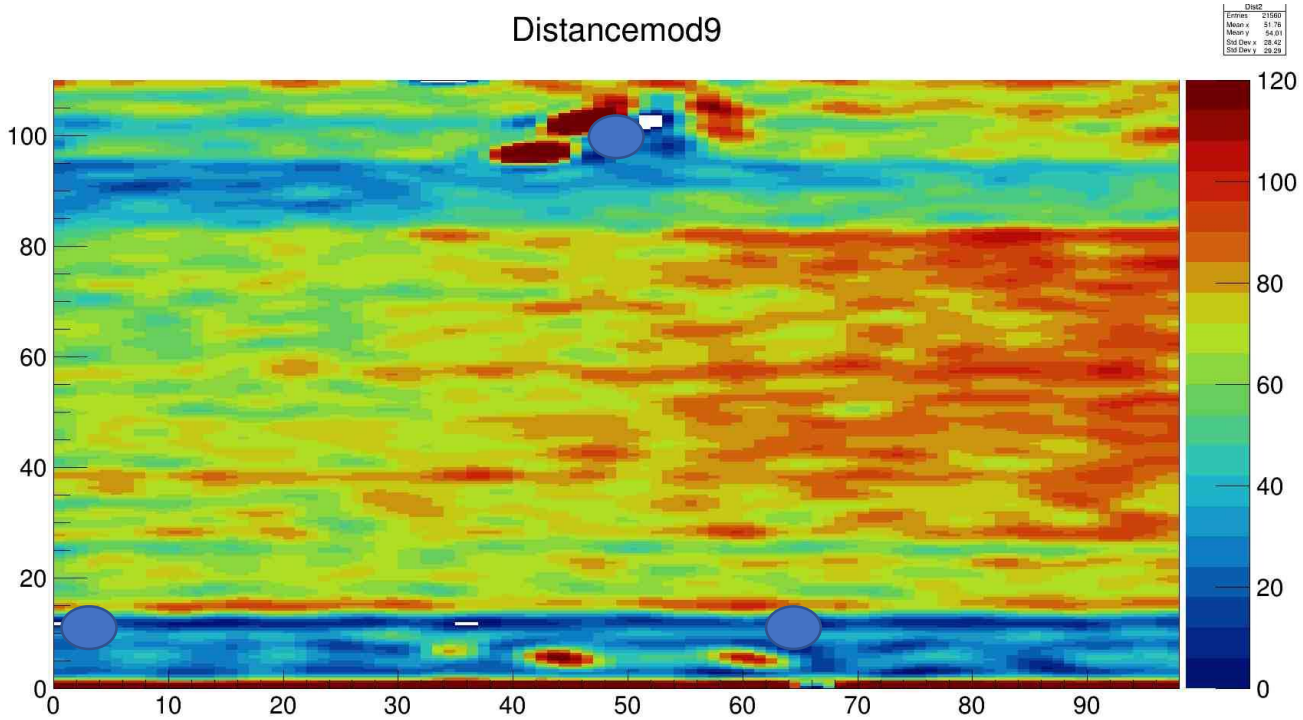

NegativeDistancemod8

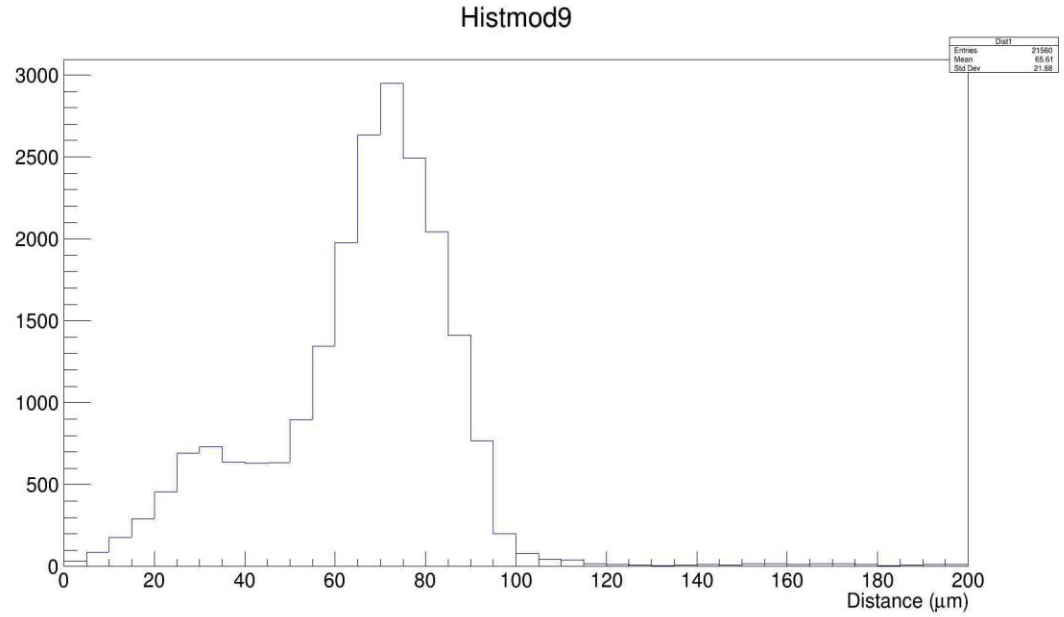

Distancemod9

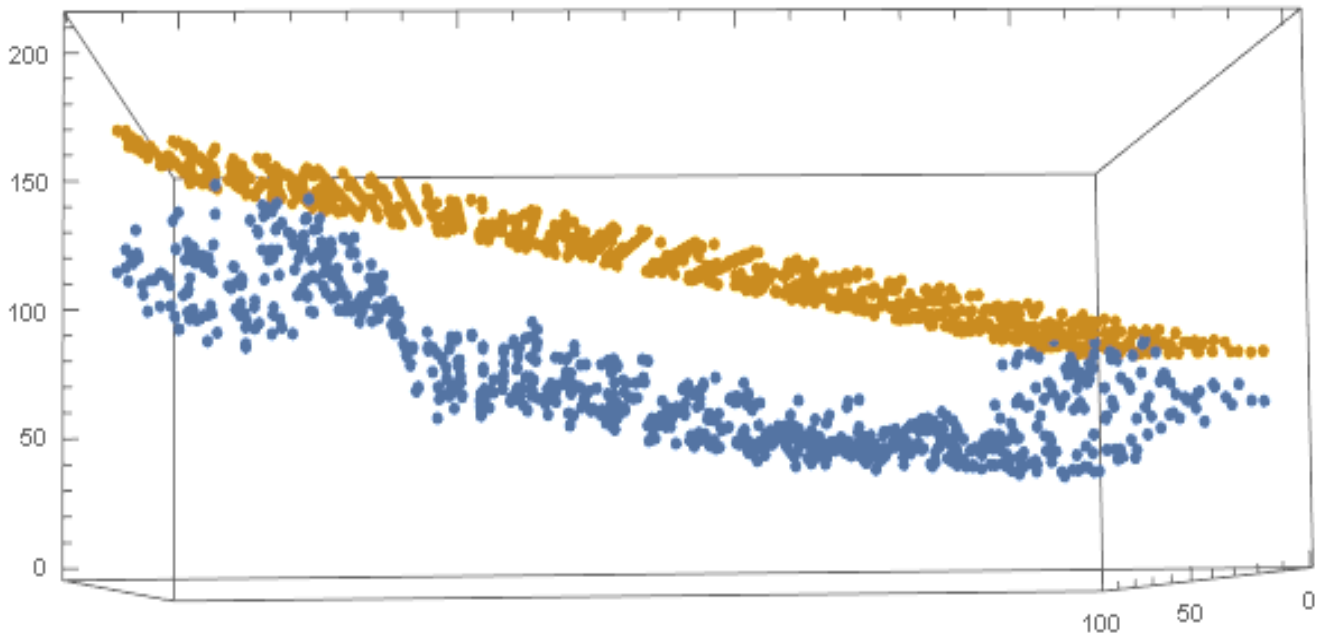

Histmod9
Dist1
Entries 21560
Mean 60.36
Std Dev 24.52
Distance (µm)

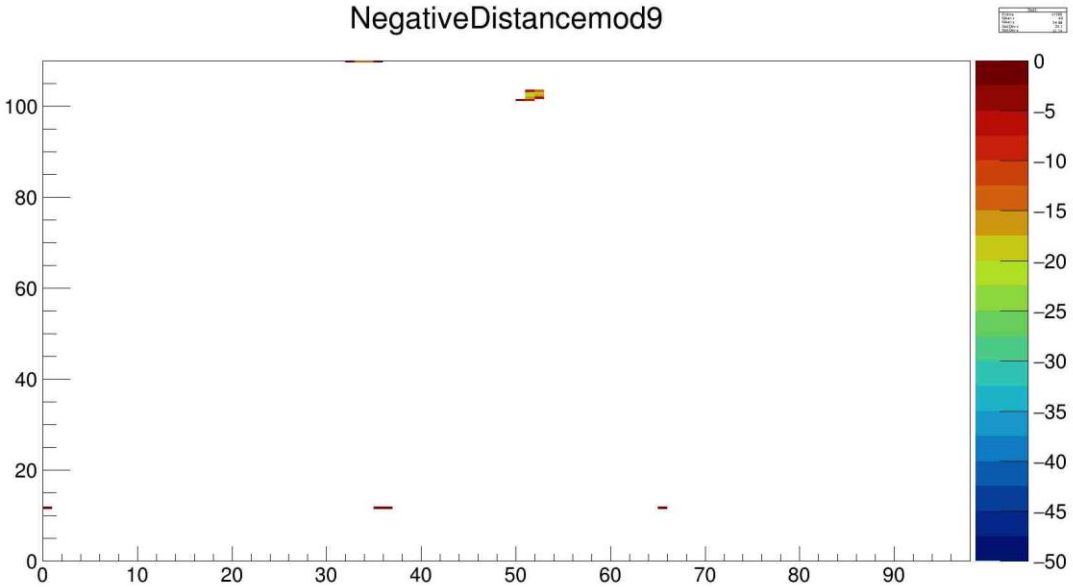

mod9
height(um)
width(mm)

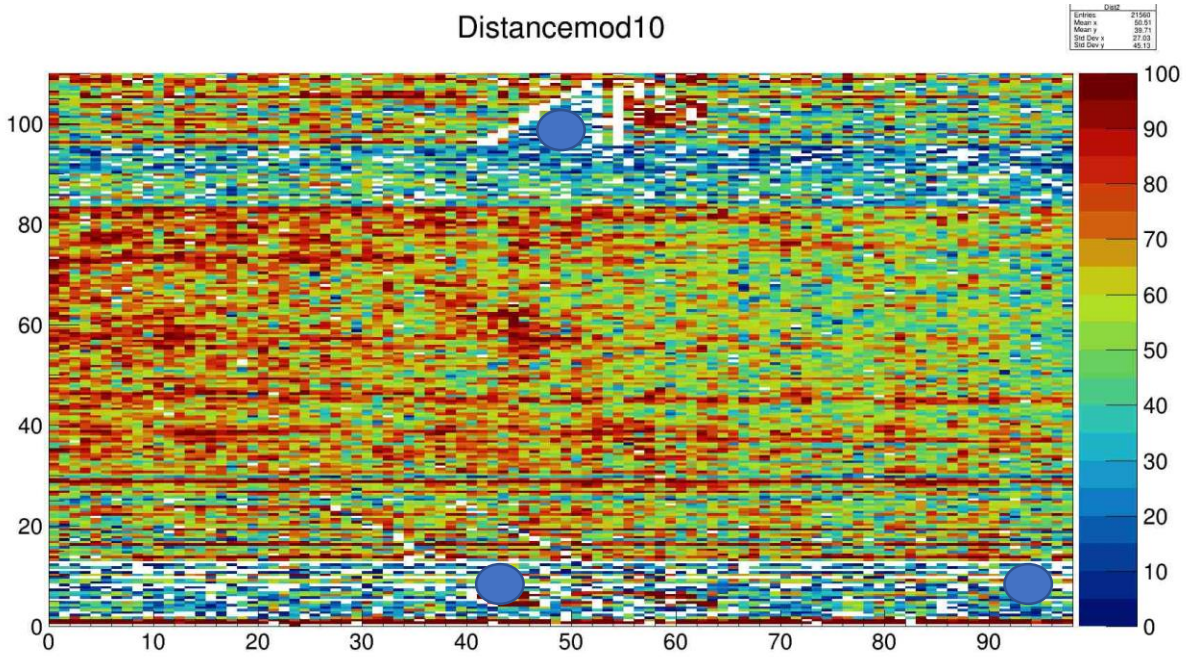

NegativeDistancemod9

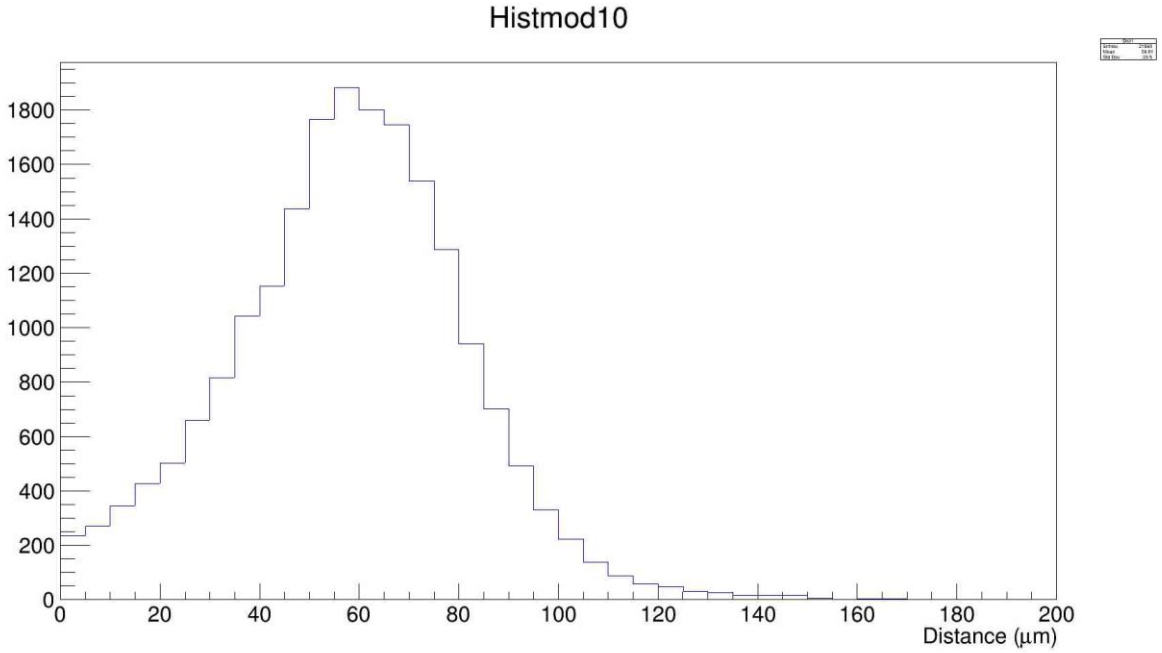

Distancemod9
Dist2
Entries 21560
Mean x 51.76
Mean y 54.01
Std Dev x 28.42
Std Dev y 29.29
0 10 20 30 40 50 60 70 80 90
0 20 40 60 80 100
0 20 40 60 80 100 120

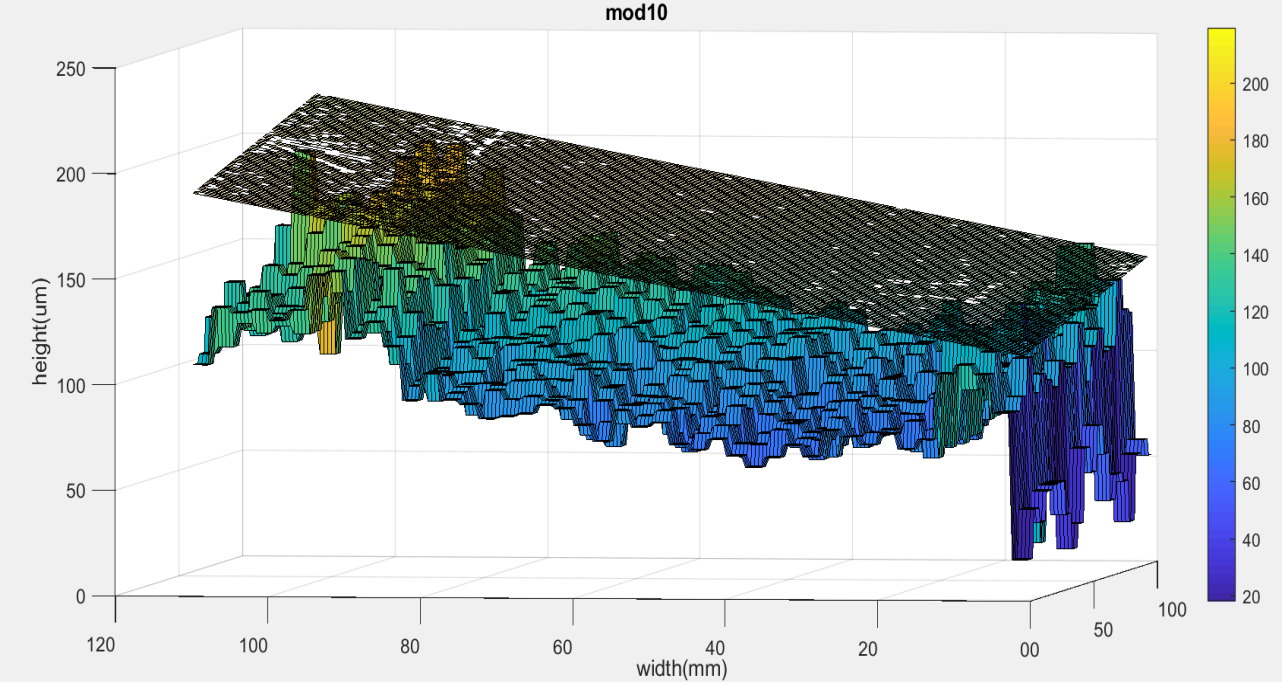

Histmod9
Dist1
Entries 21560
Mean 65.61
Std Dev 21.88
0 500 1000 1500 2000 2500 3000
0 20 40 60 80 100 120 140 160 180 200
Distance (µm)

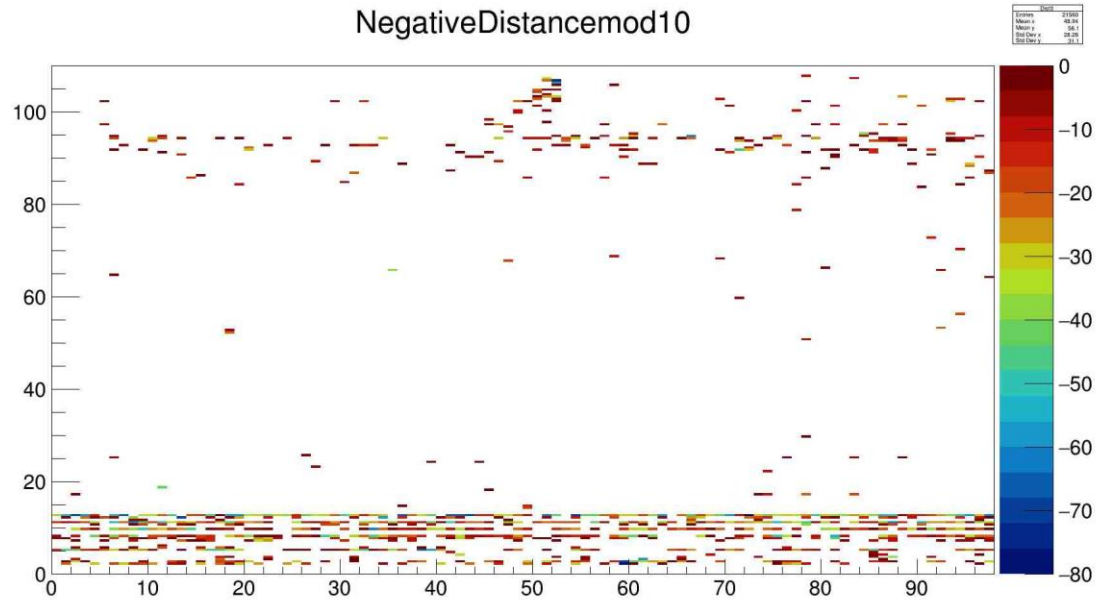

0 50 100 150 200
0 50 100

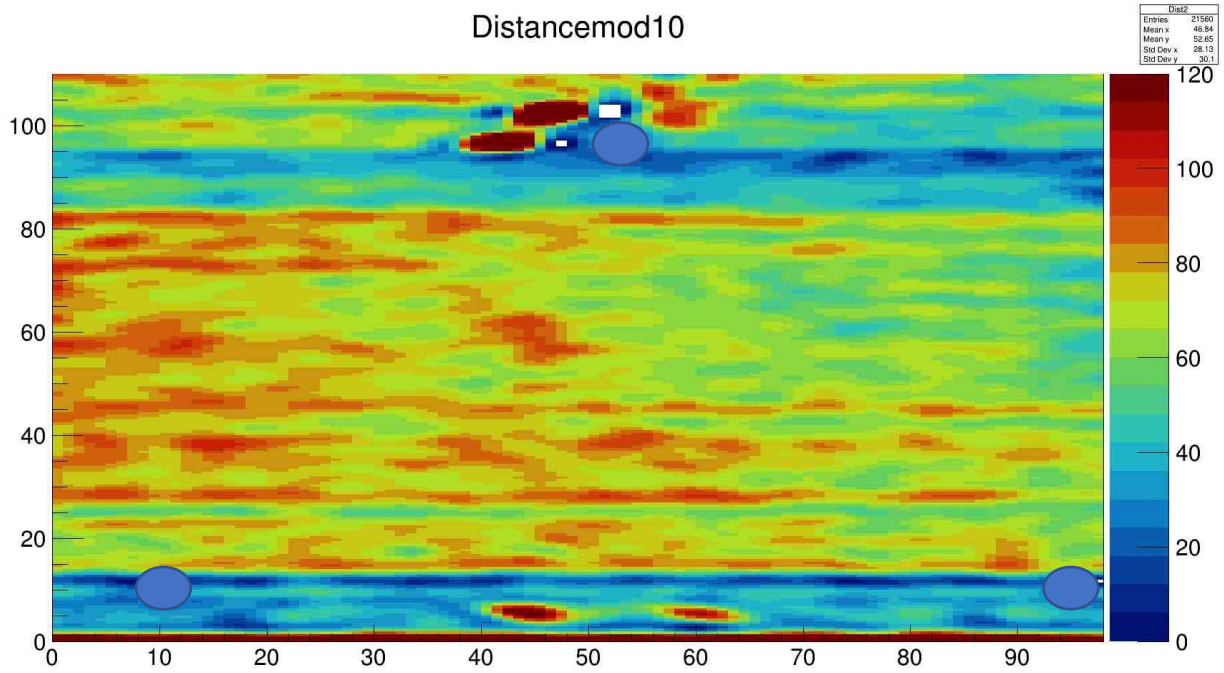

NegativeDistancemod9
0 10 20 30 40 50 60 70 80 90
0 20 40 60 80 100
0 −5 −10 −15 −20 −25 −30 −35 −40 −45 −50

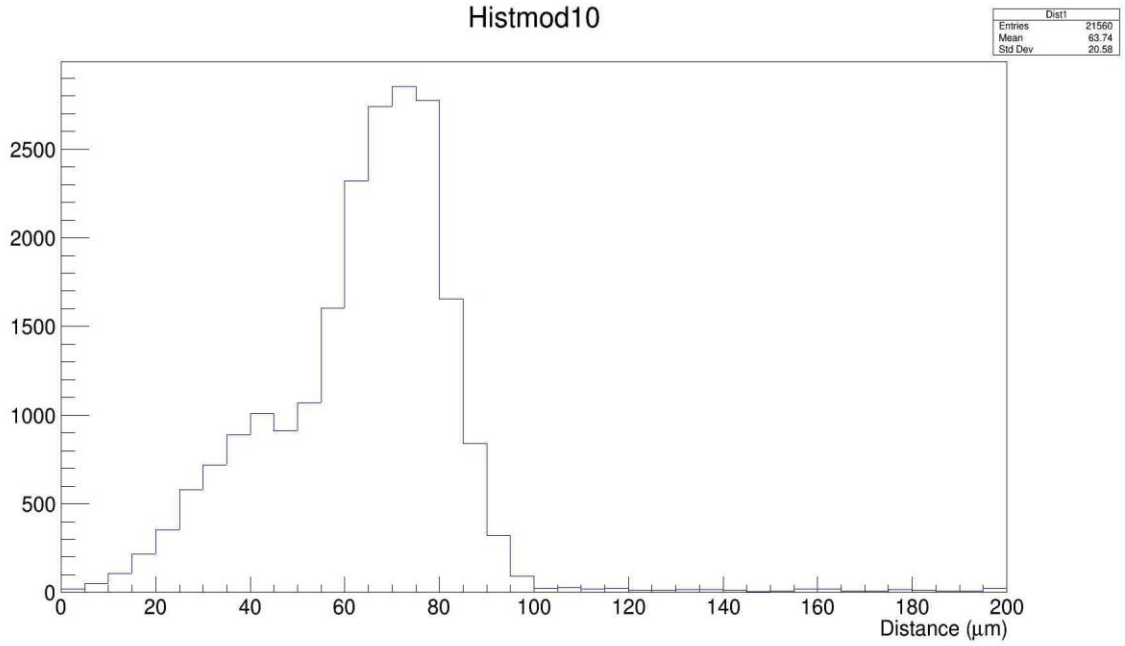

Distancemod10

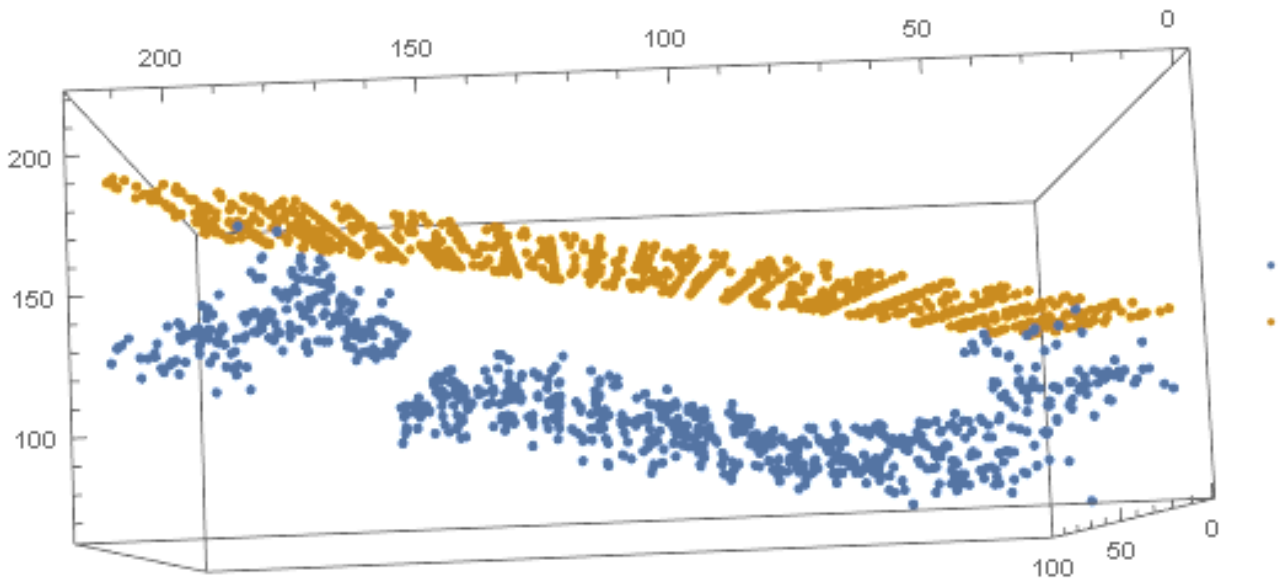

Histmod10
Distance (µm)

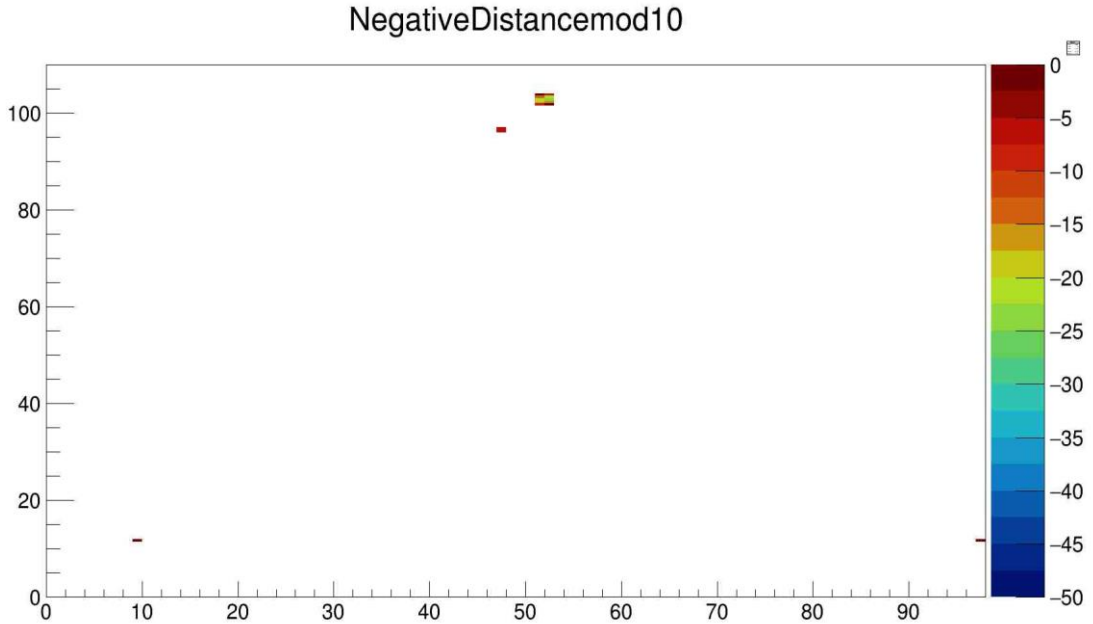

mod10
height(um)
width(mm)

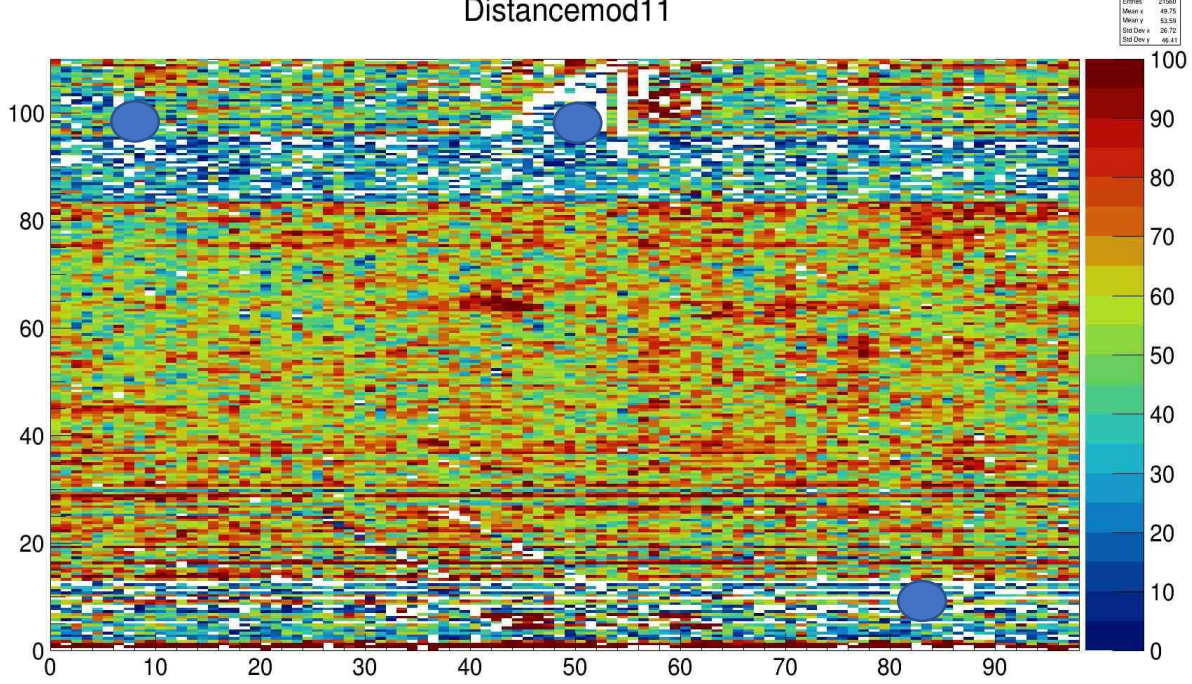

NegativeDistancemod10

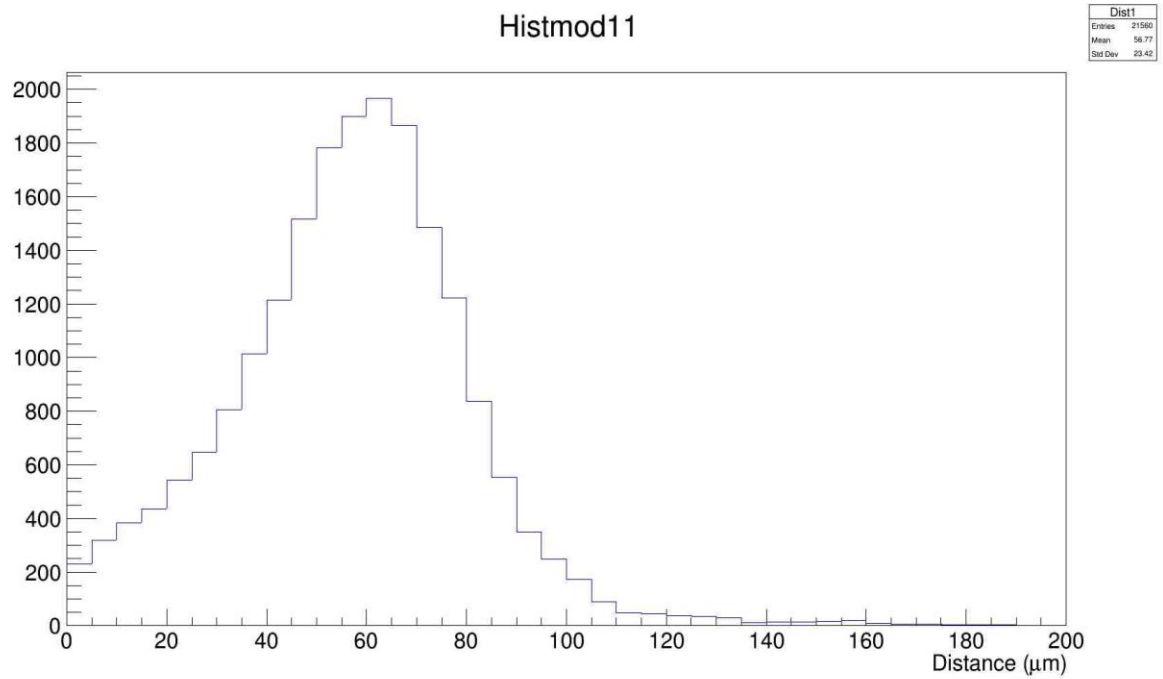

Distancemod10
Dist2
Entries 21560
Mean x 46.84
Mean y 52.65
Std Dev x 28.13
Std Dev y 30.1
0 10 20 30 40 50 60 70 80 90
0 20 40 60 80 100
0 20 40 60 80 100 120

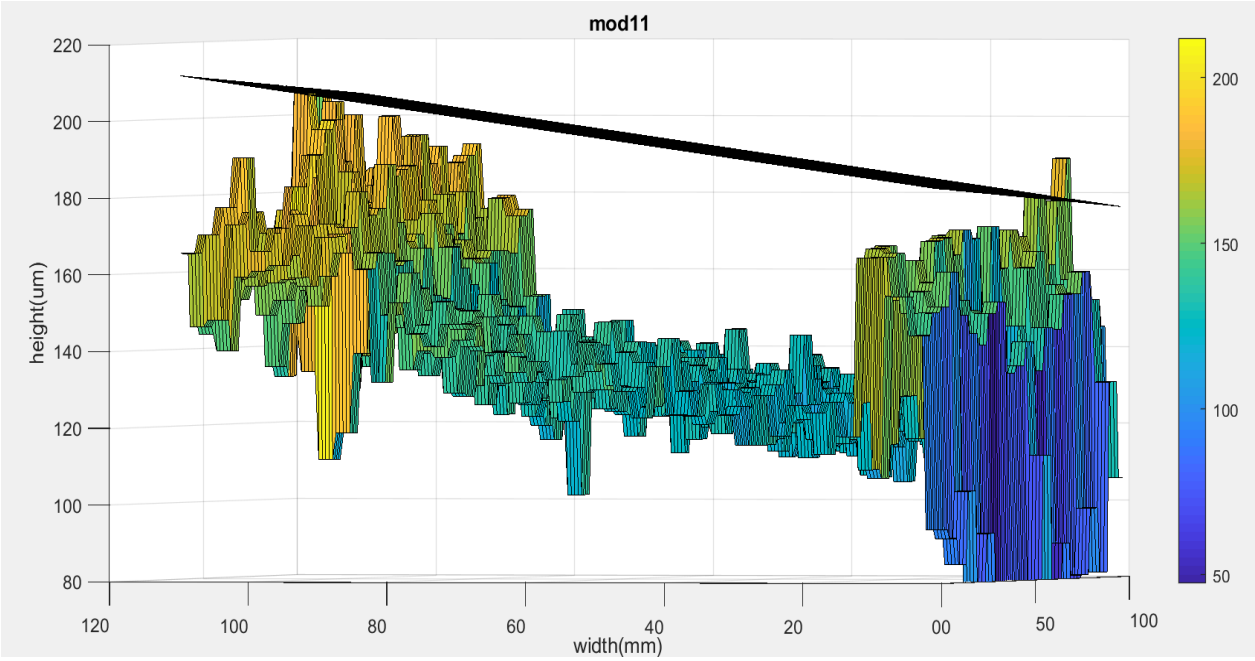

Histmod10
Dist1
Entries 21560
Mean 63.74
Std Dev 20.58
0 500 1000 1500 2000 2500
0 20 40 60 80 100 120 140 160 180 200
Distance (µm)

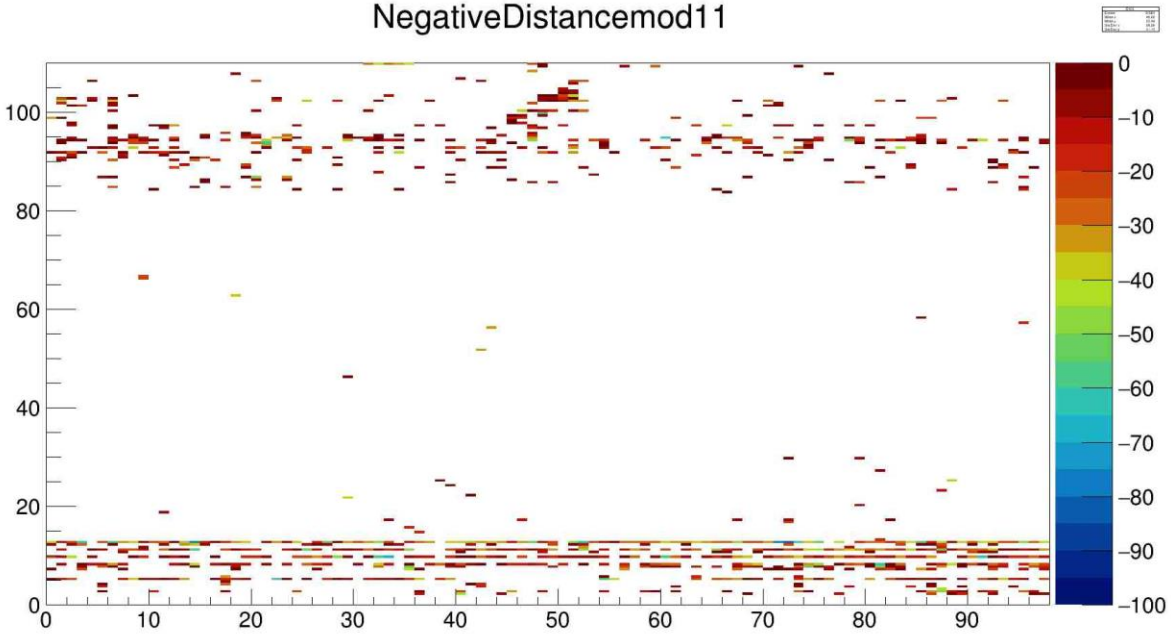

200 150 100 50 0
200
150
100
0 50 100

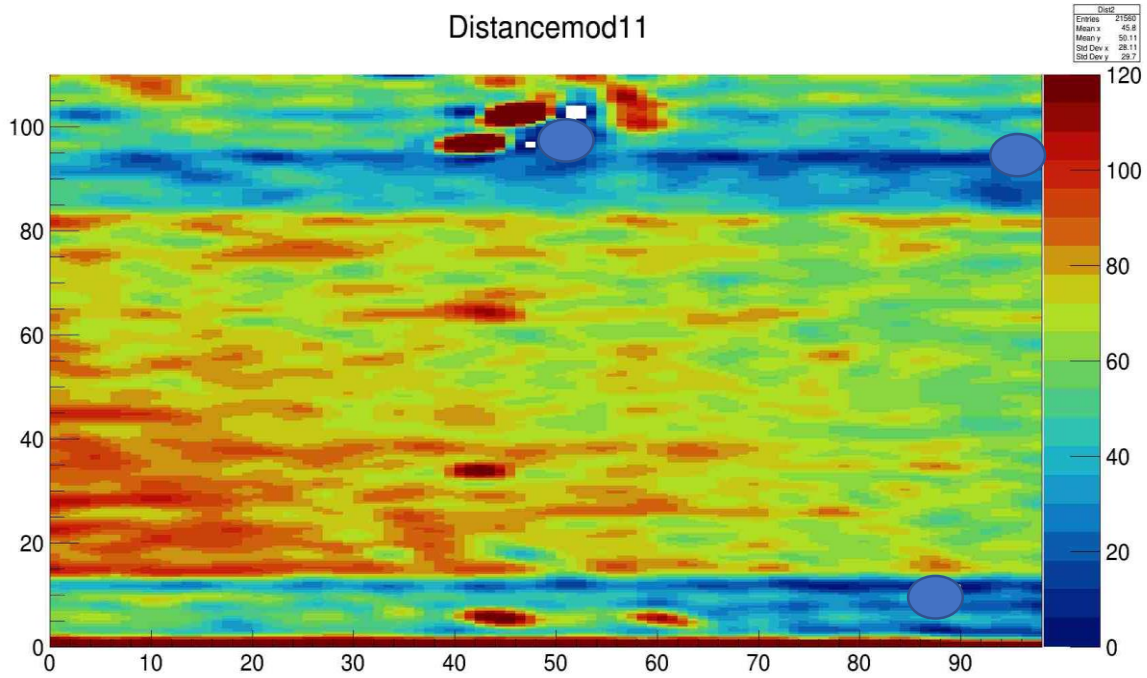

NegativeDistancemod10
0 10 20 30 40 50 60 70 80 90 100
0 20 40 60 80 100
0 -5 -10 -15 -20 -25 -30 -35 -40 -45 -50

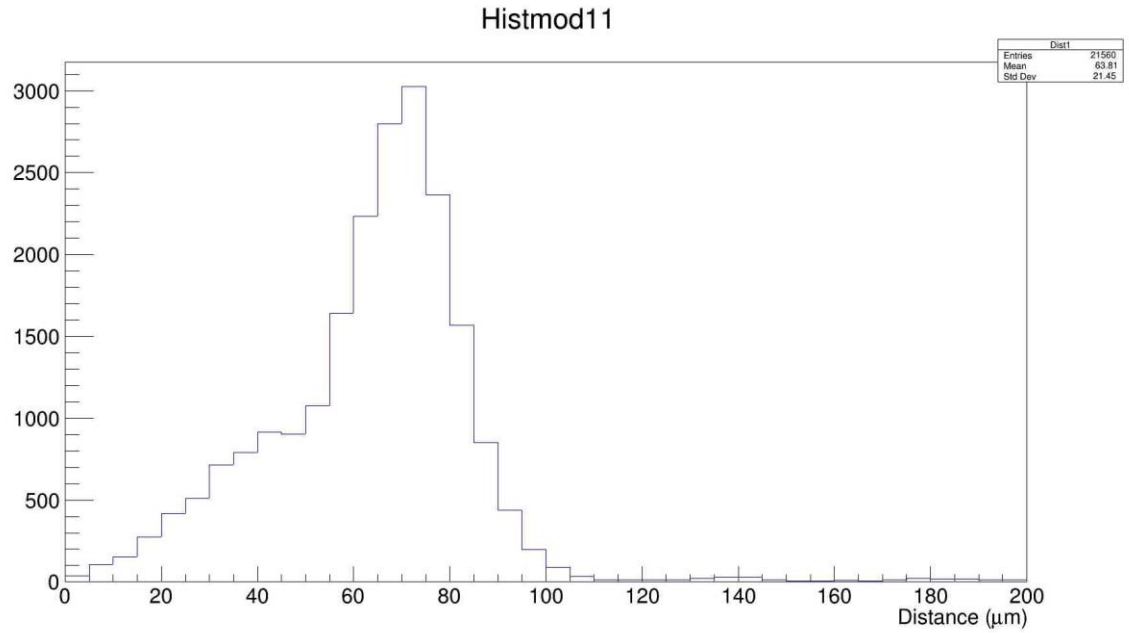

Distancemod11

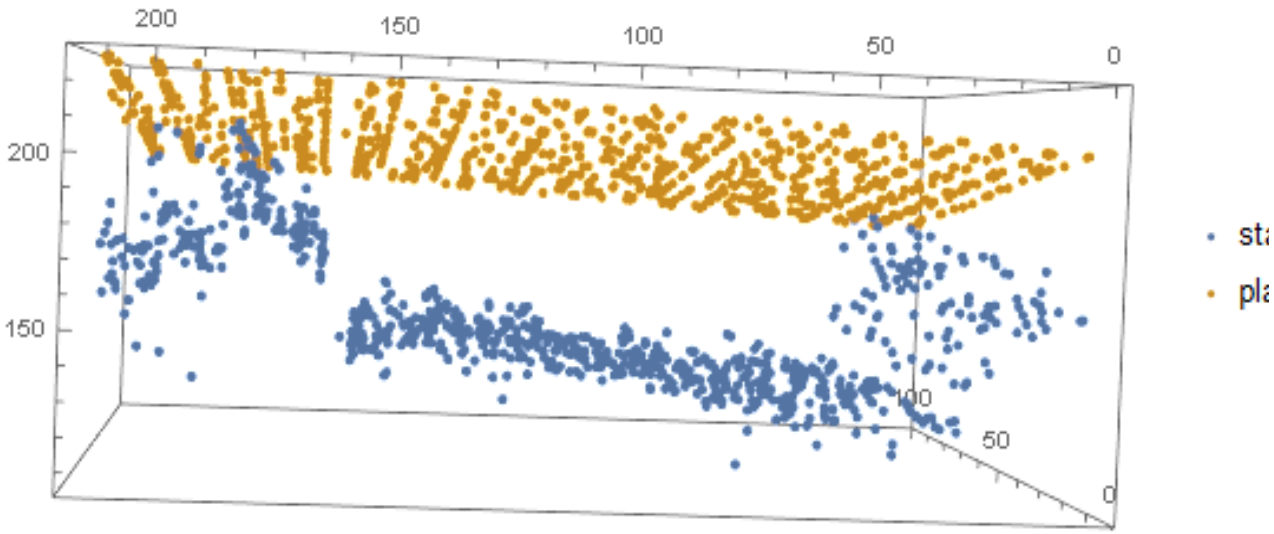

Histmod11
Dist1
Distance (µm)

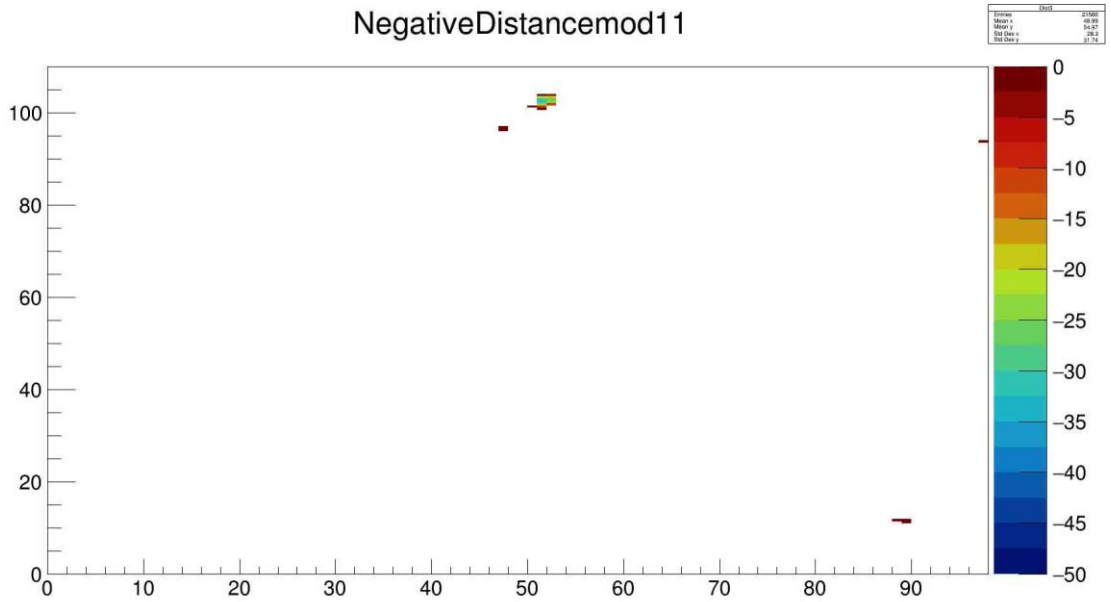

mod11
height(um)
width(mm)

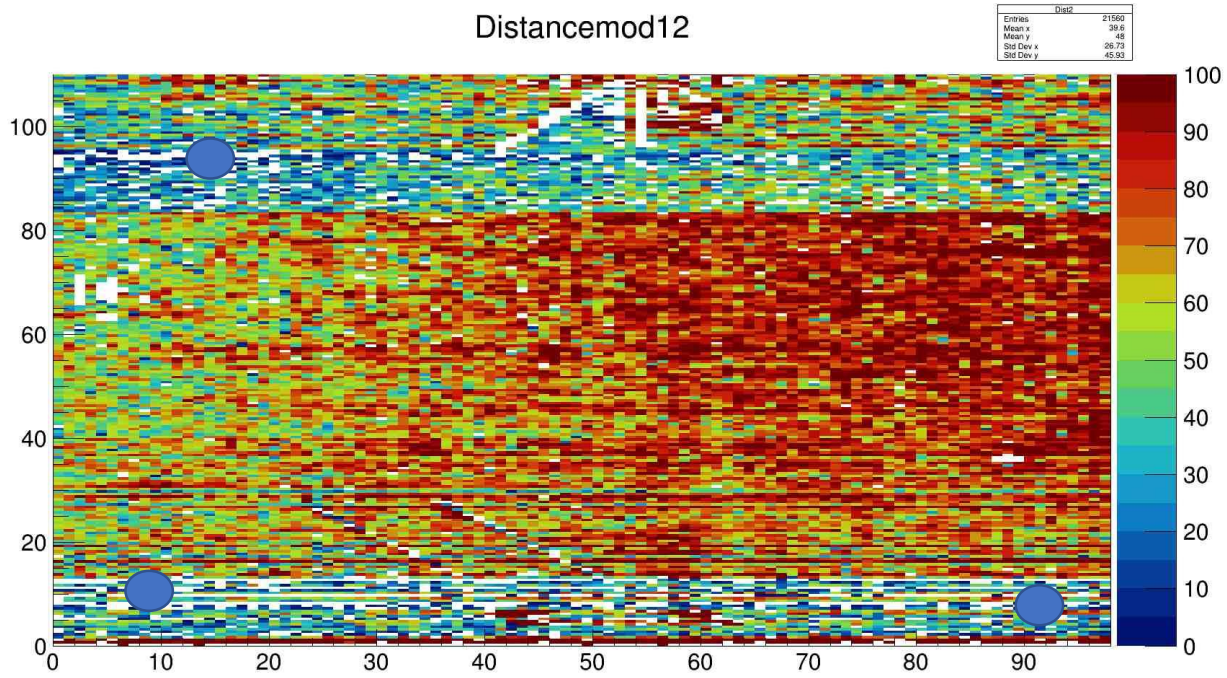

NegativeDistancemod11

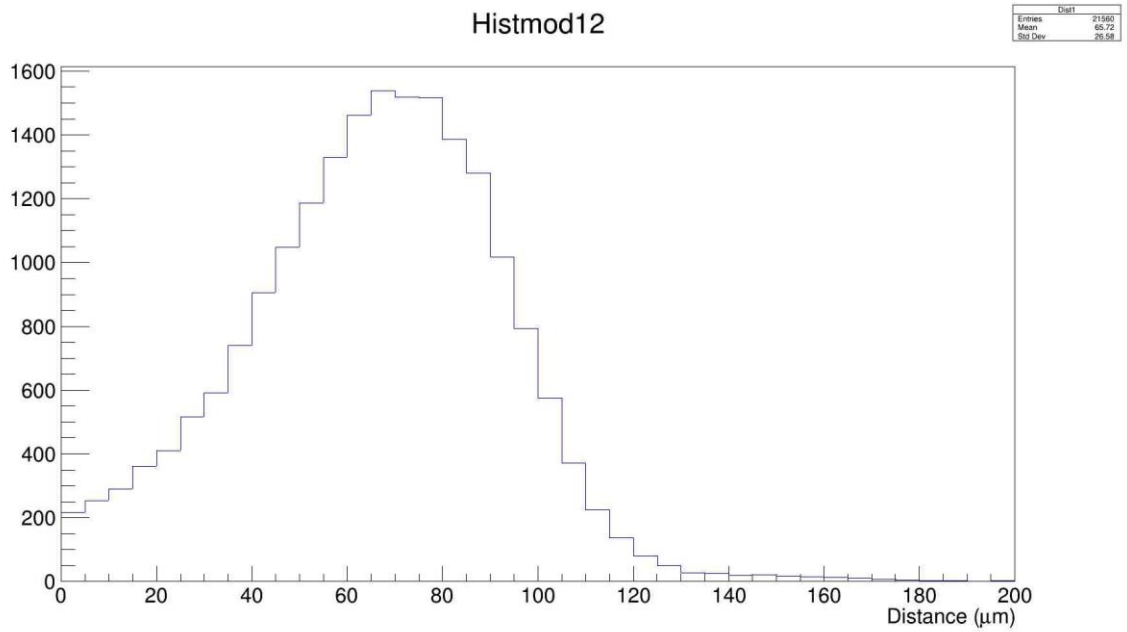

Distancemod11
Dist2
Entries 21560
Mean x 45.8
Mean y 50.11
Std Dev x 28.11
Std Dev y 29.7
0 10 20 30 40 50 60 70 80 90
0 20 40 60 80 100
0 20 40 60 80 100 120

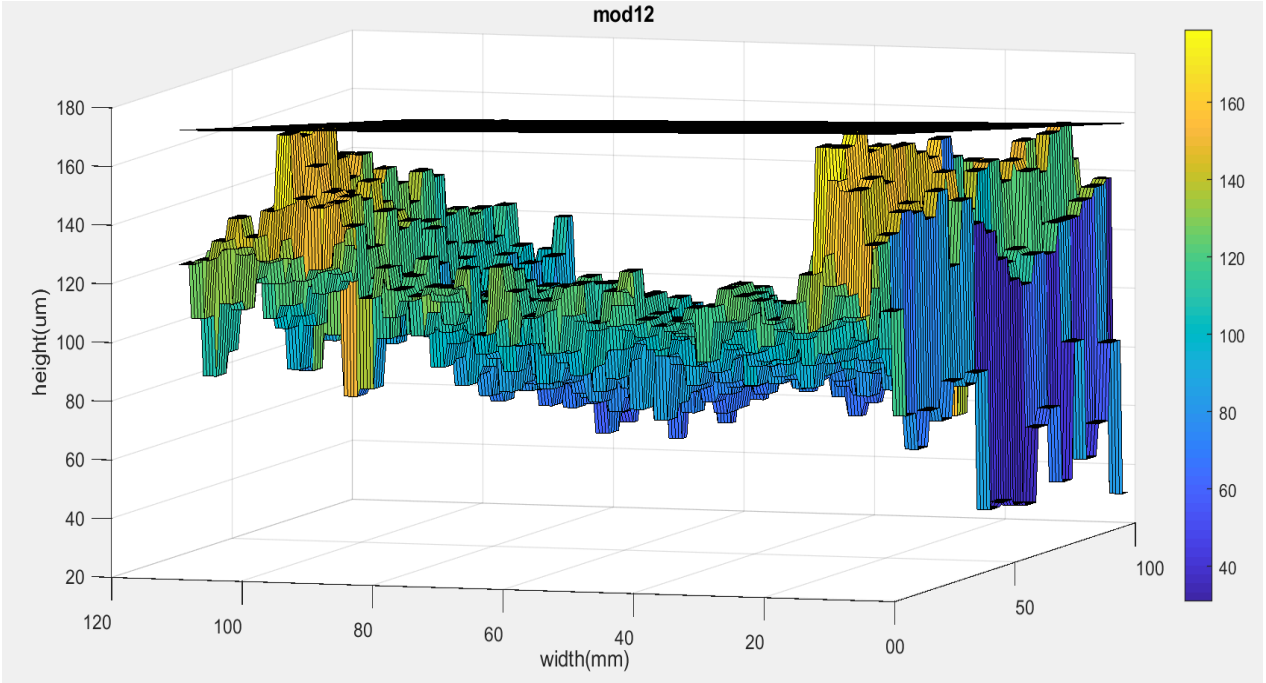

Histmod11
Dist1
Entries 21560
Mean 63.81
Std Dev 21.45
0 500 1000 1500 2000 2500 3000
0 20 40 60 80 100 120 140 160 180 200
Distance (µm)

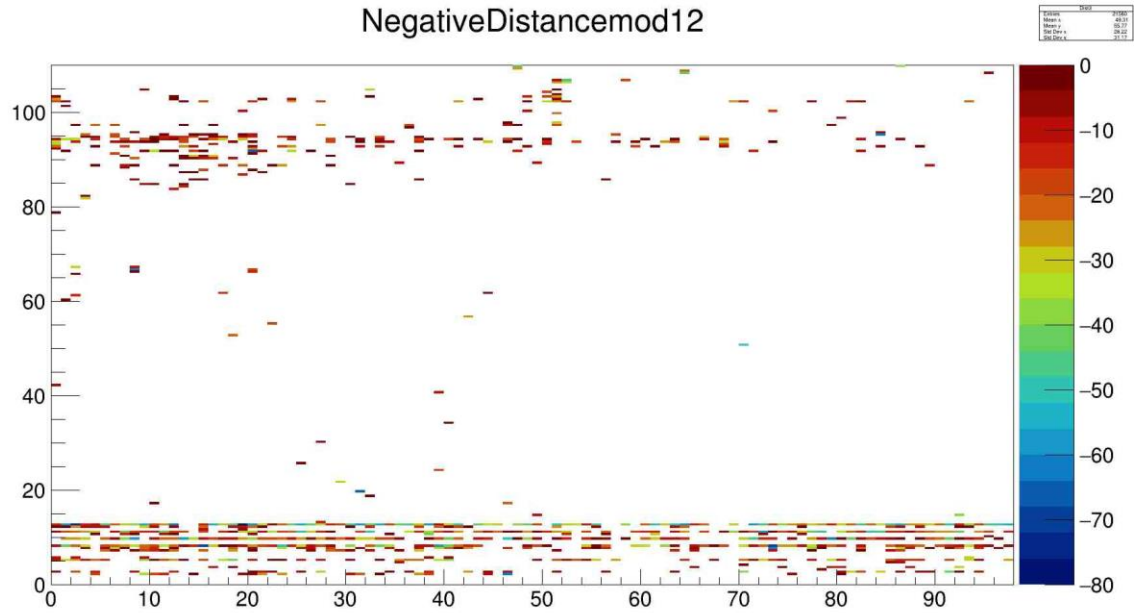

200 150 100 50 0
200
150
100 50 0
sta
pla


NegativeDistancemod11
0 10 20 30 40 50 60 70 80 90
0 20 40 60 80 100
0 −5 −10 −15 −20 −25 −30 −35 −40 −45 −50

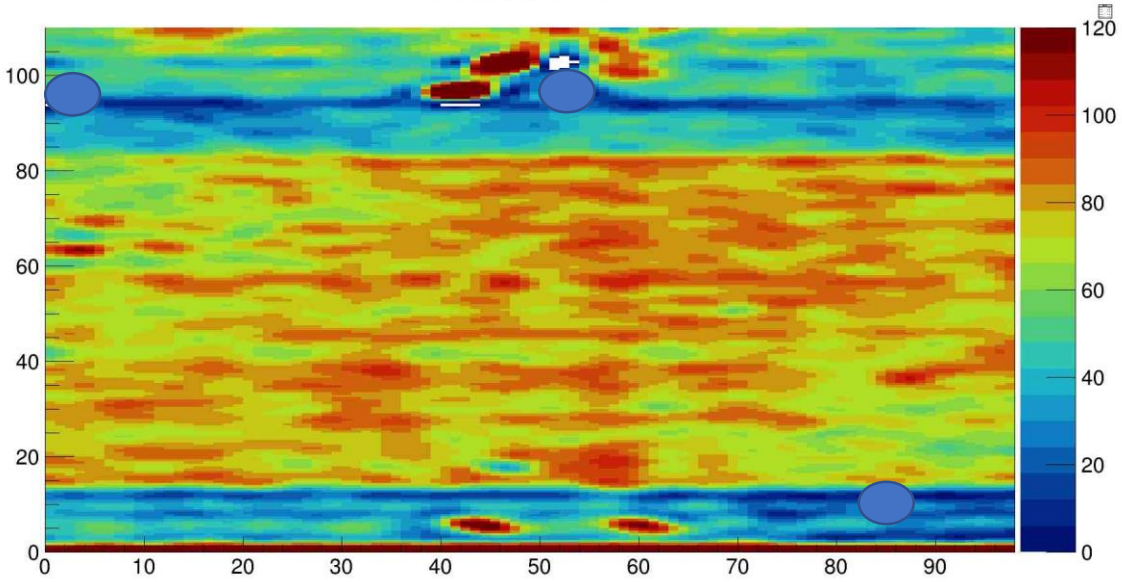

Distancemod12
Dist2
Entries 21560
Mean x 39.6
Mean y 48
Std Dev x 26.79
Std Dev y 45.93


Histmod12
Dist1
Entries 21560
Mean 65.72
Std Dev 26.58
Distance (µm)

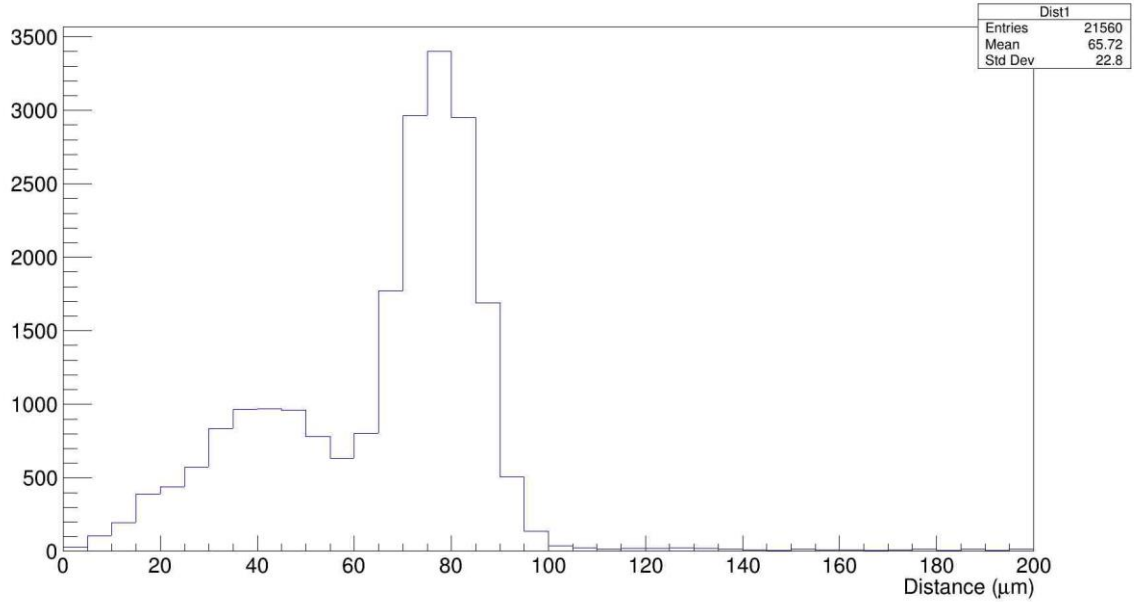

mod12
height(um)
width(mm)

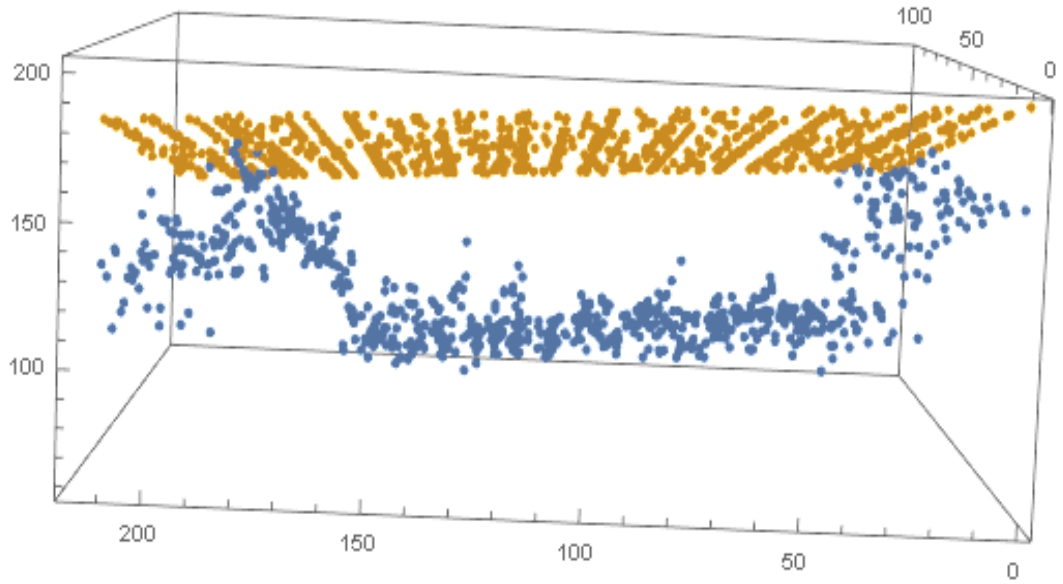

NegativeDistancemod12

Distancemod12

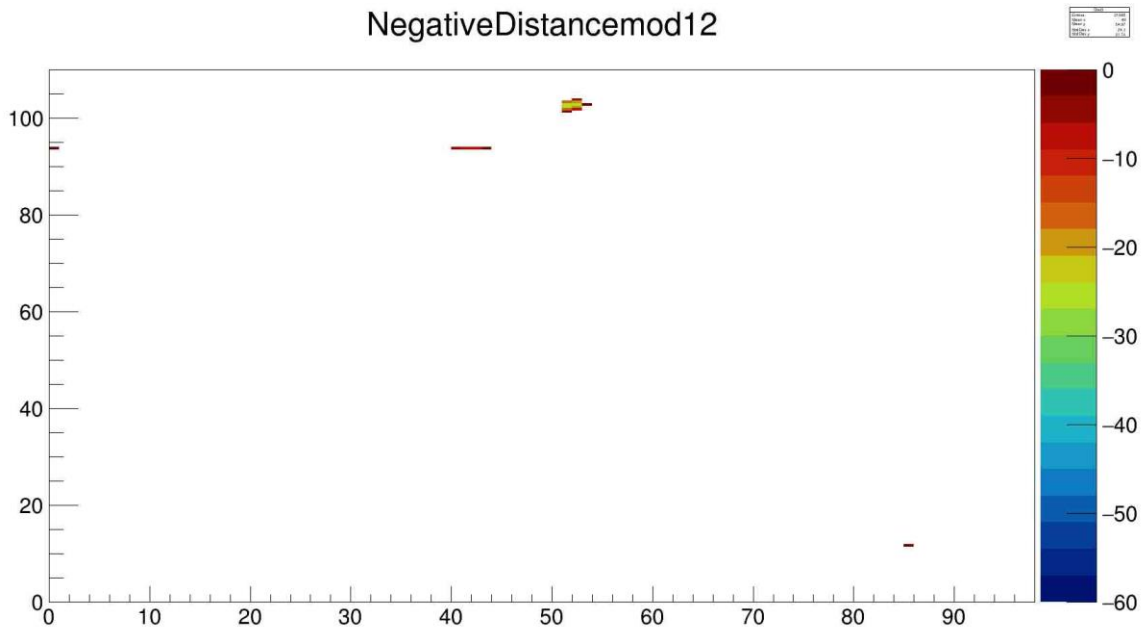


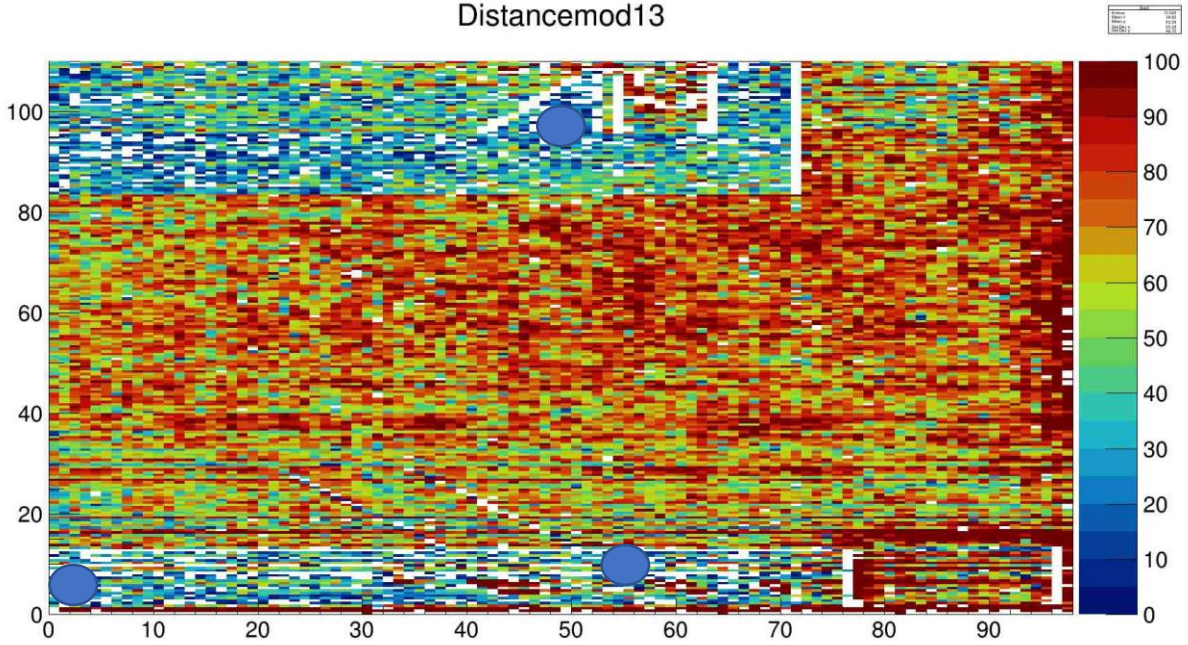
Histmod12

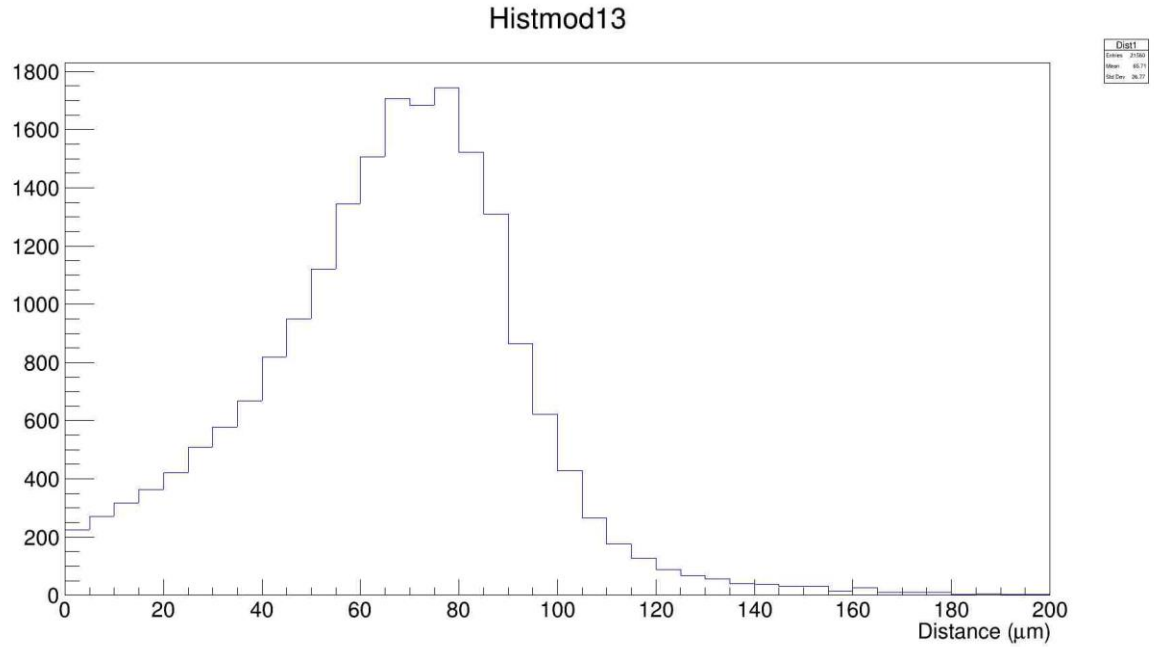


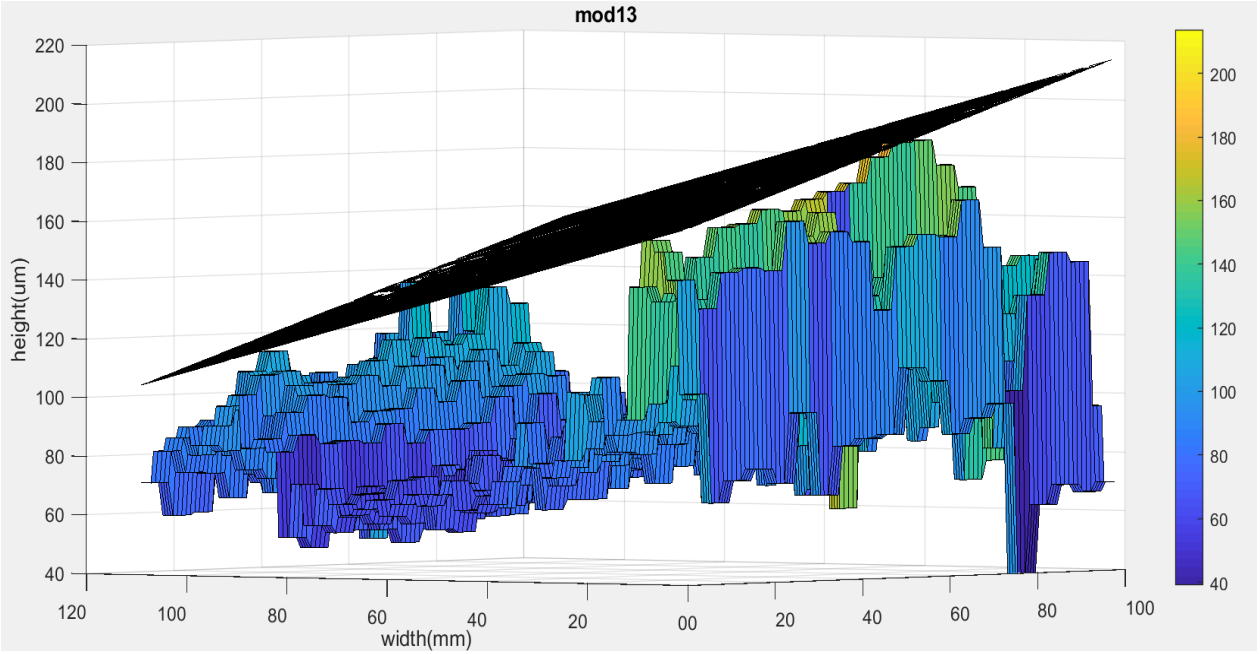


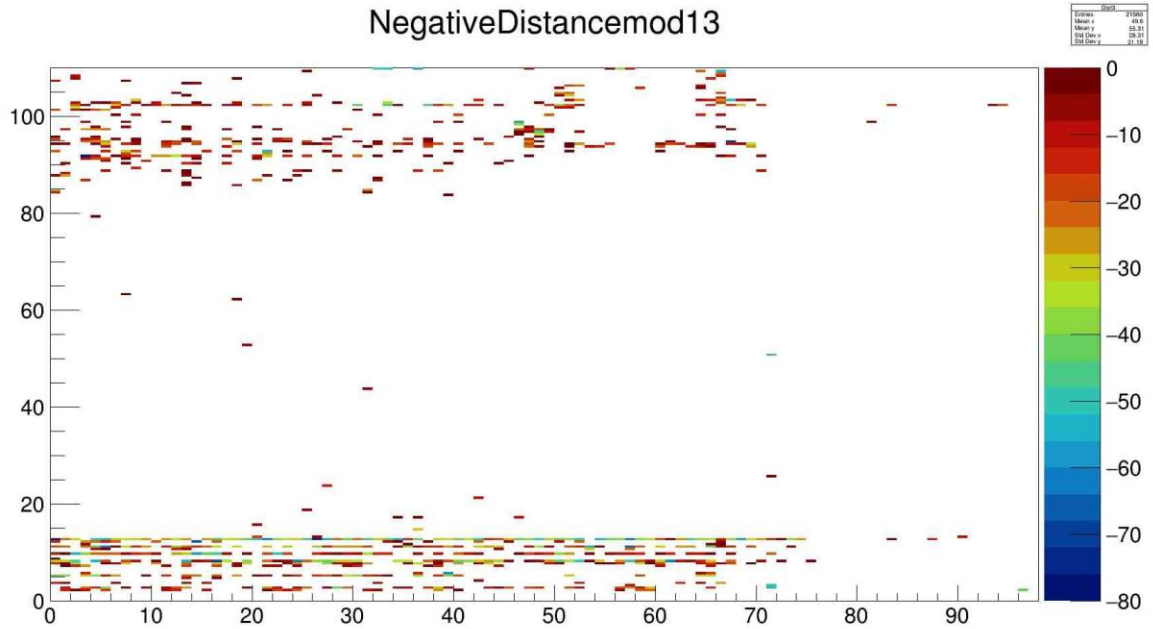
NegativeDistancemod12

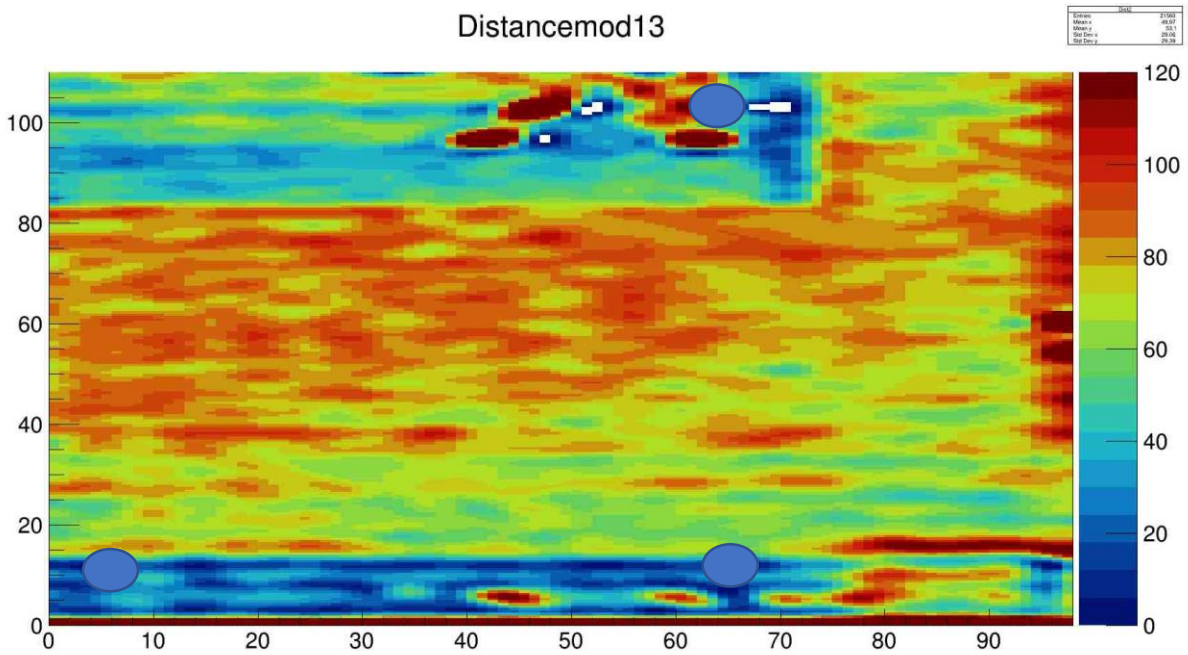


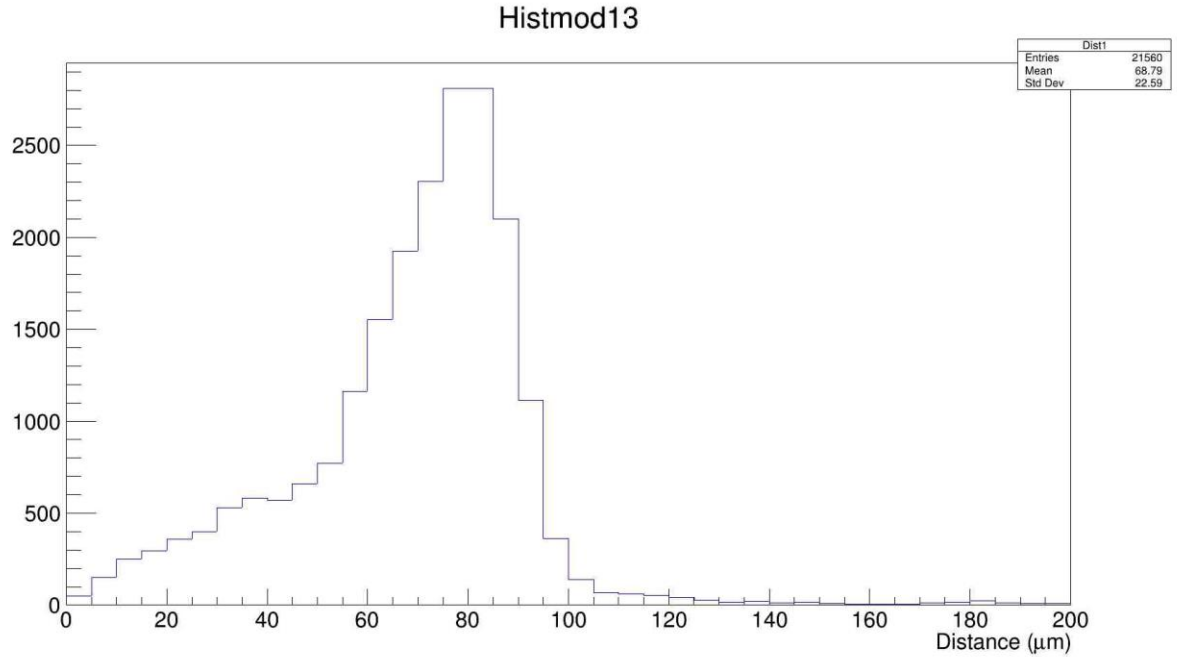

Distancemod13

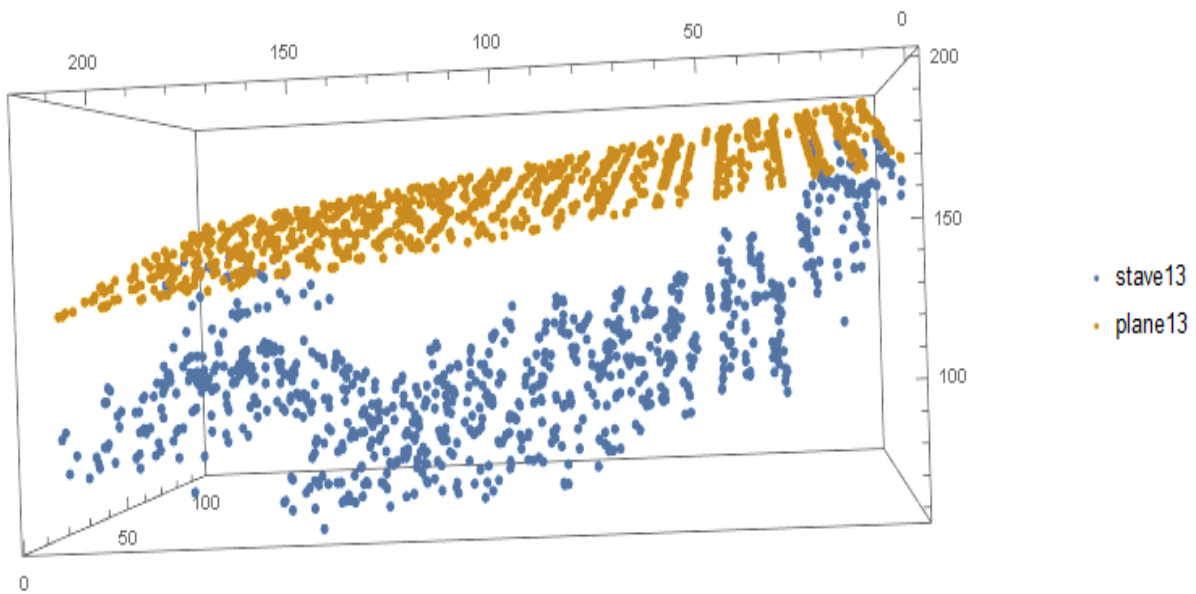

Histmod13
Distance (µm)

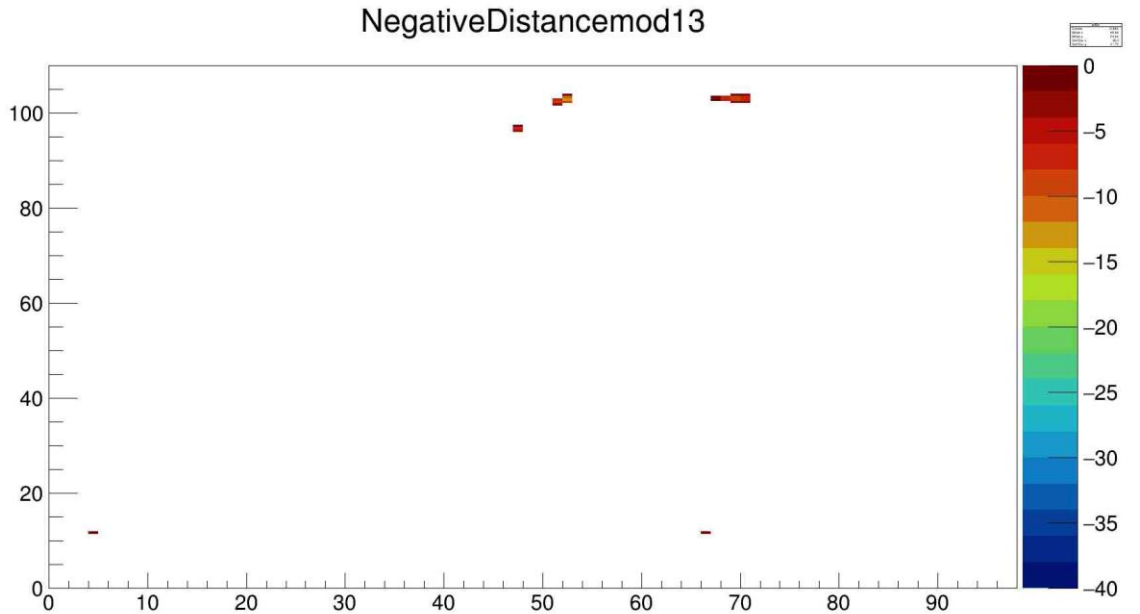

mod13
height(um)
width(mm)


NegativeDistancemod13


Distancemod13
0
10
20
30
40
50
60
70
80
90
100
120

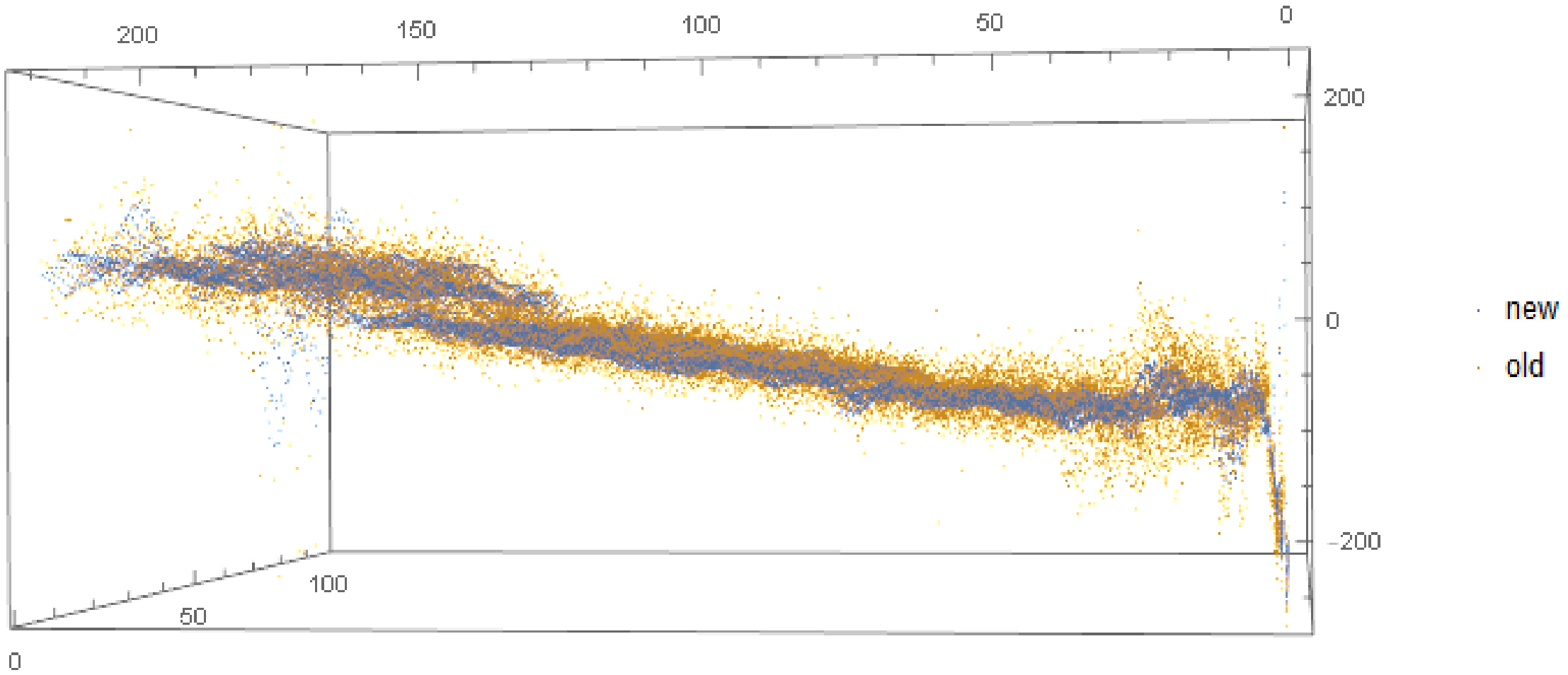

Histmod13
Dist1
Entries 21560
Mean 68.79
Std Dev 22.59
Distance (μm)

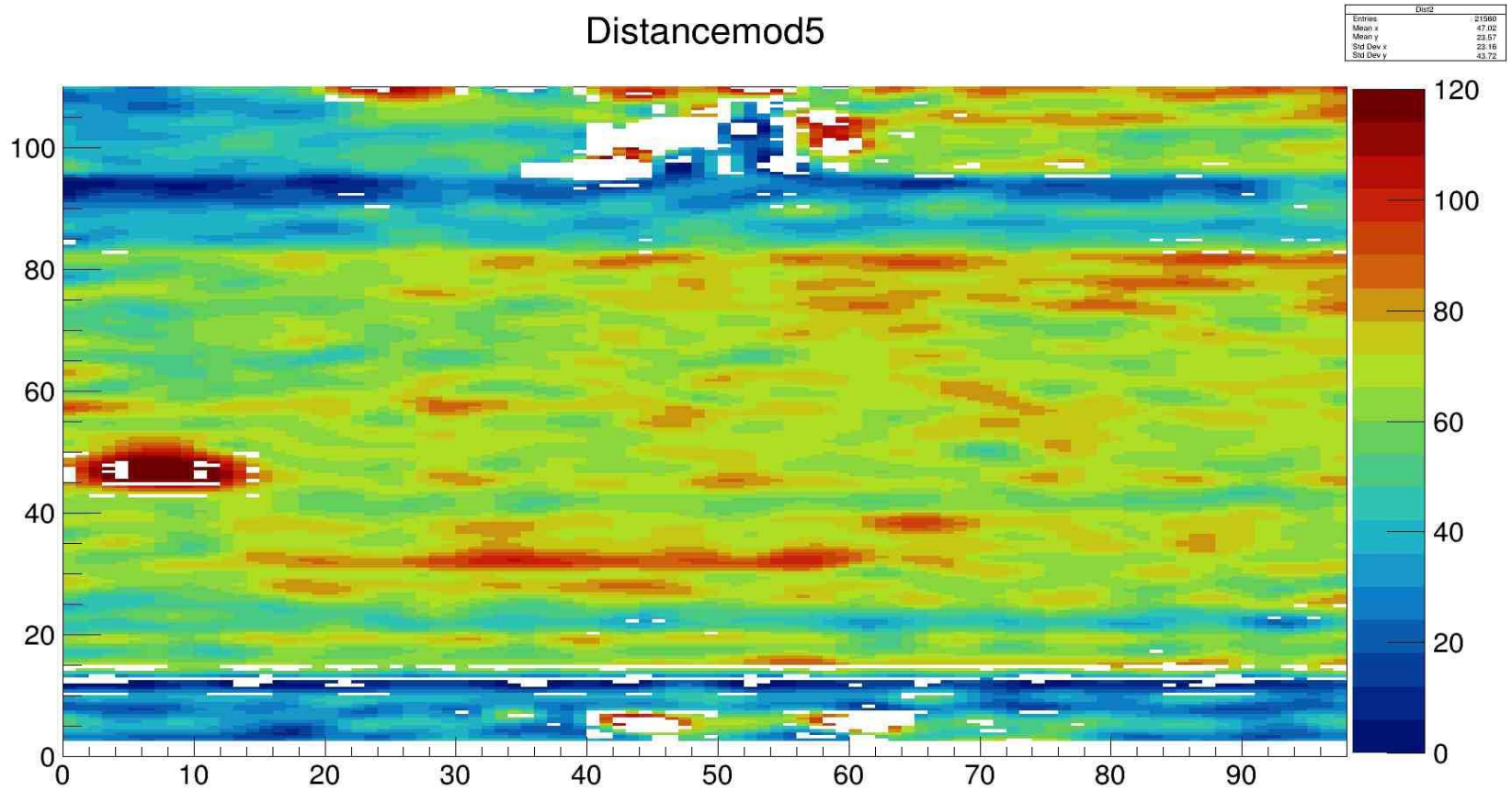

stave13
plane13


NegativeDistancemod13

Back up: Plot of filtered data vs scanned data

Blue dots: filtered data



Back up: Location of the rejected areas (2^{nd} method)

- The rejected areas/points for each module is similar.