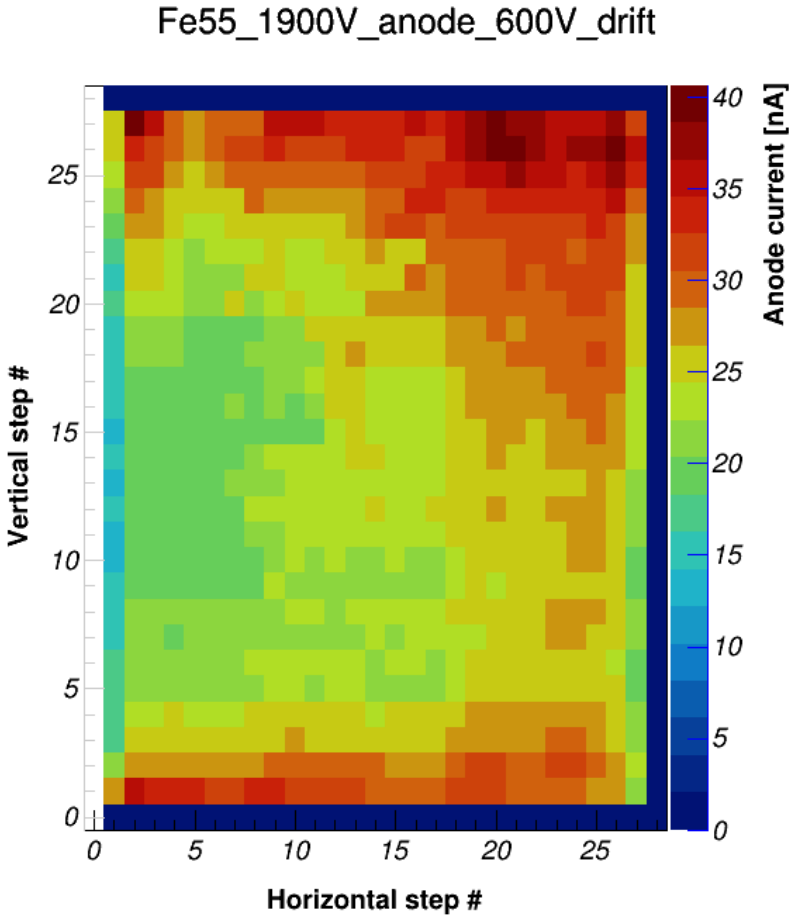
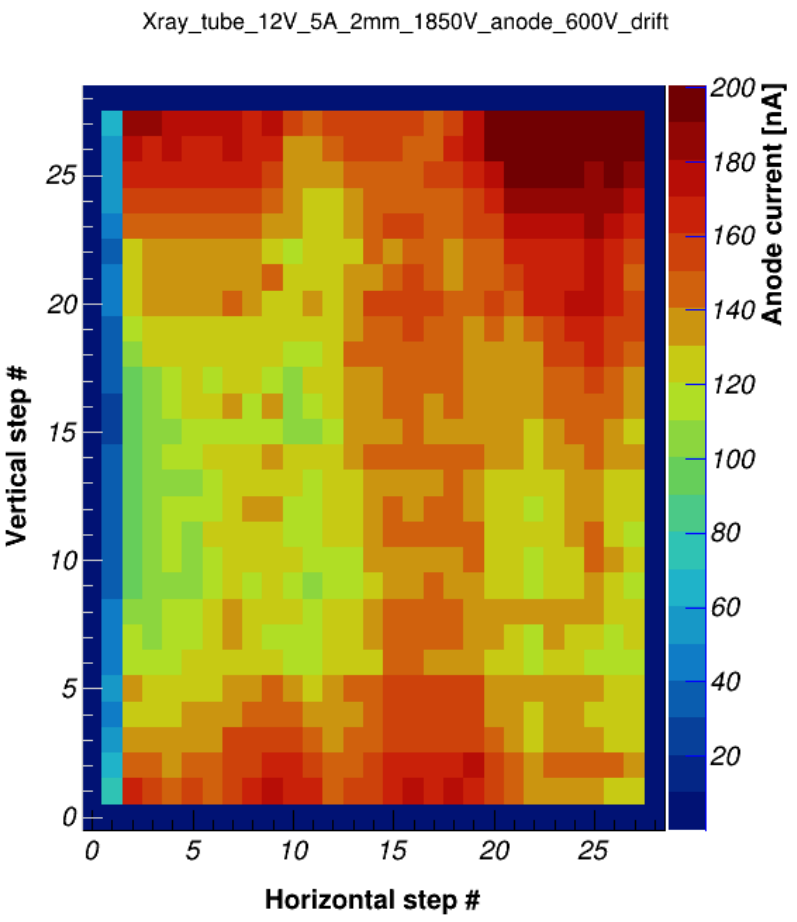
TRD-2D 2D uniformity tests

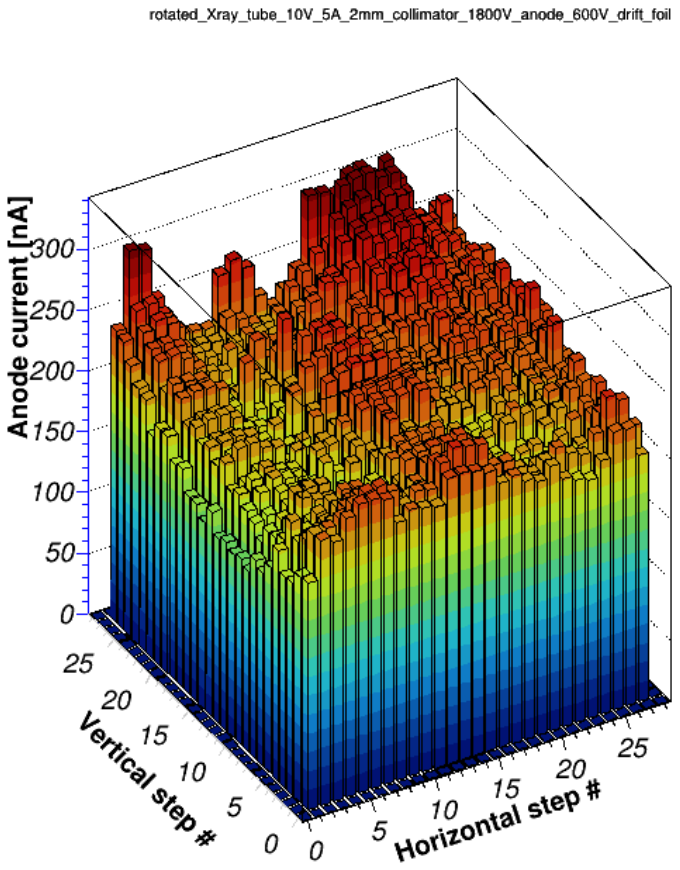
- Wires are horizontal in all 2D plots
- DoF: U_{Anode}, ^{55}Fe vs X-ray tube, voltage and current on x-Ray tube, detector orientation, gas flow rate, collimator size.

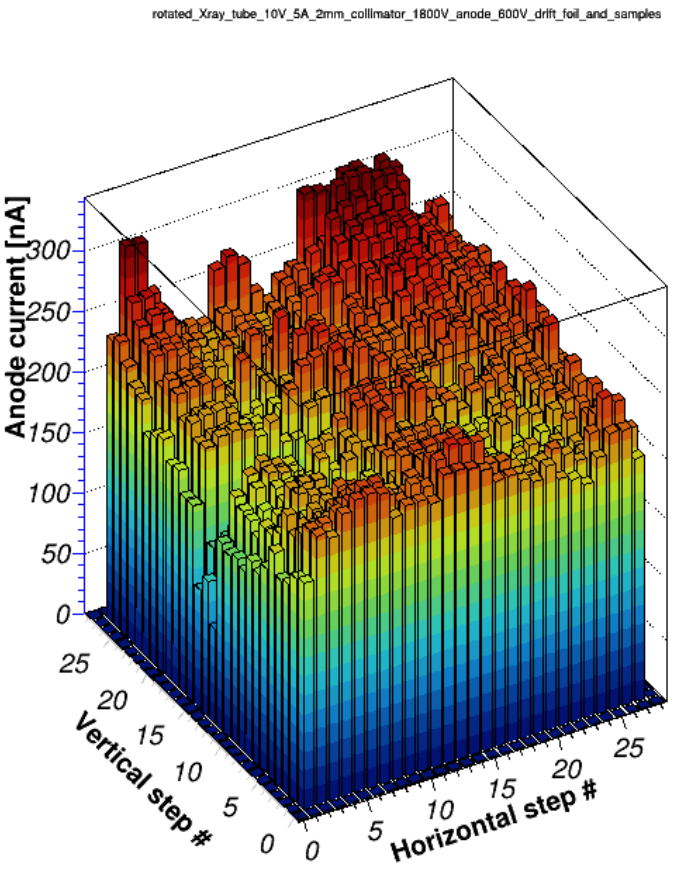
Fe^{55} vs X-ray tube



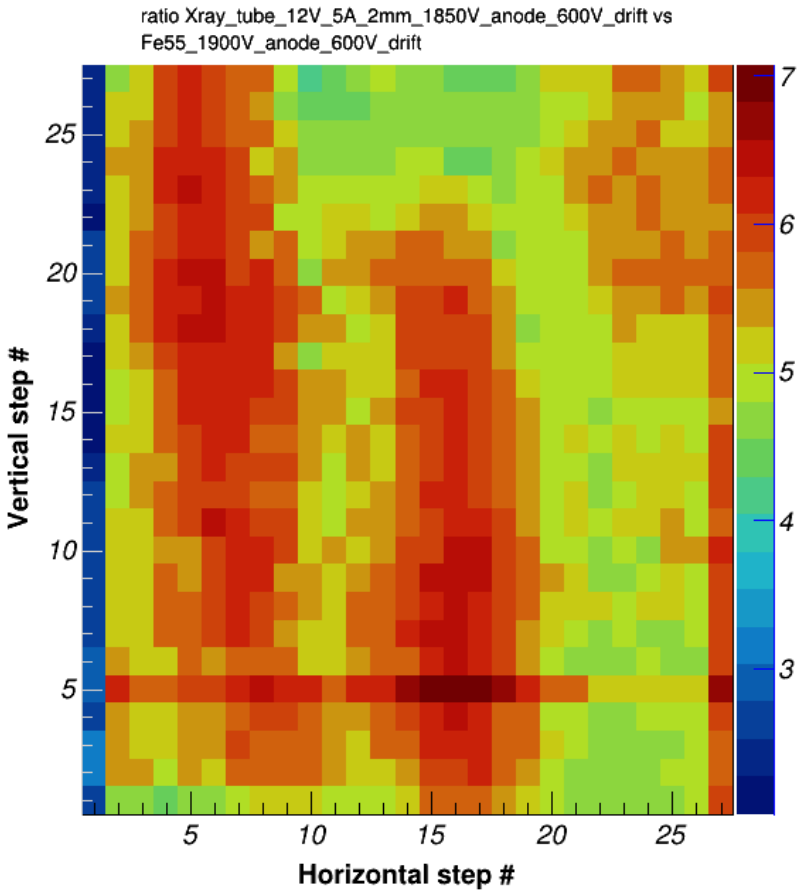


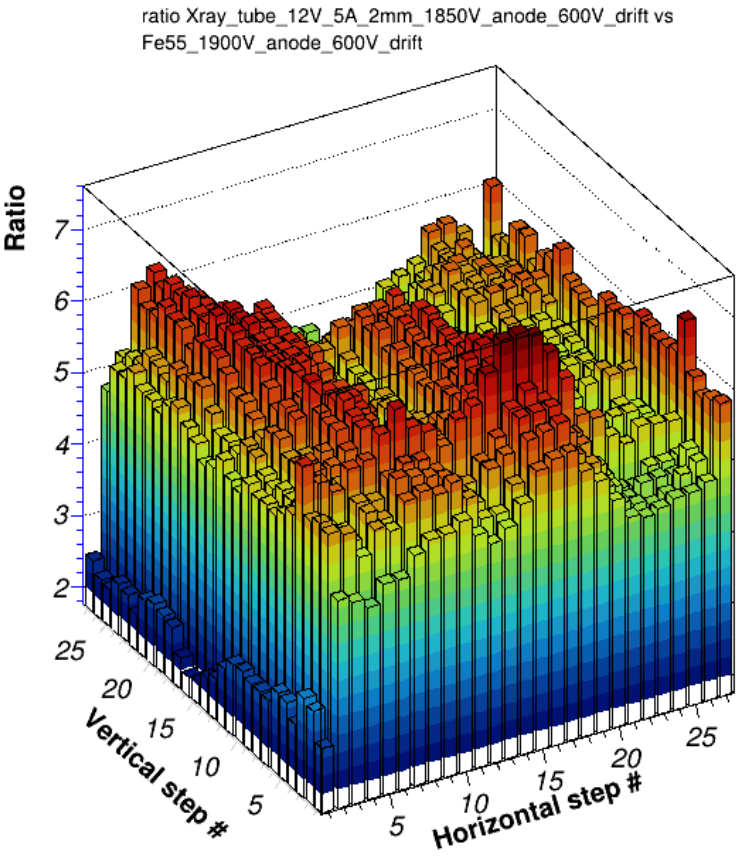
Fe^{55} vs X-ray tube



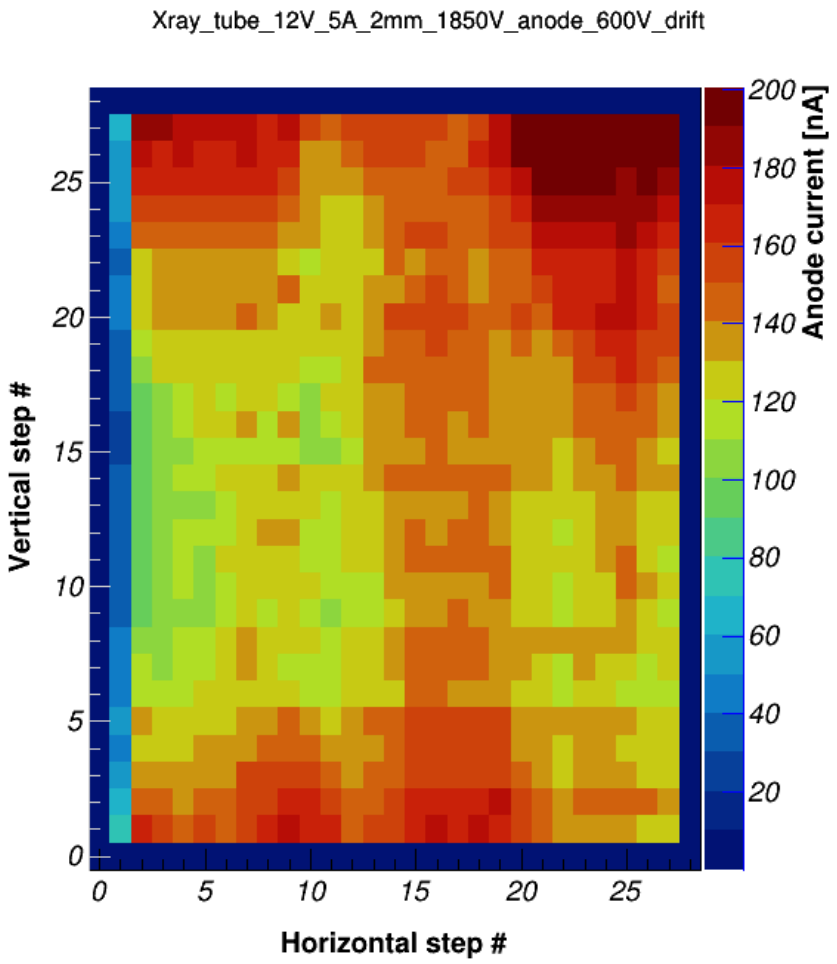


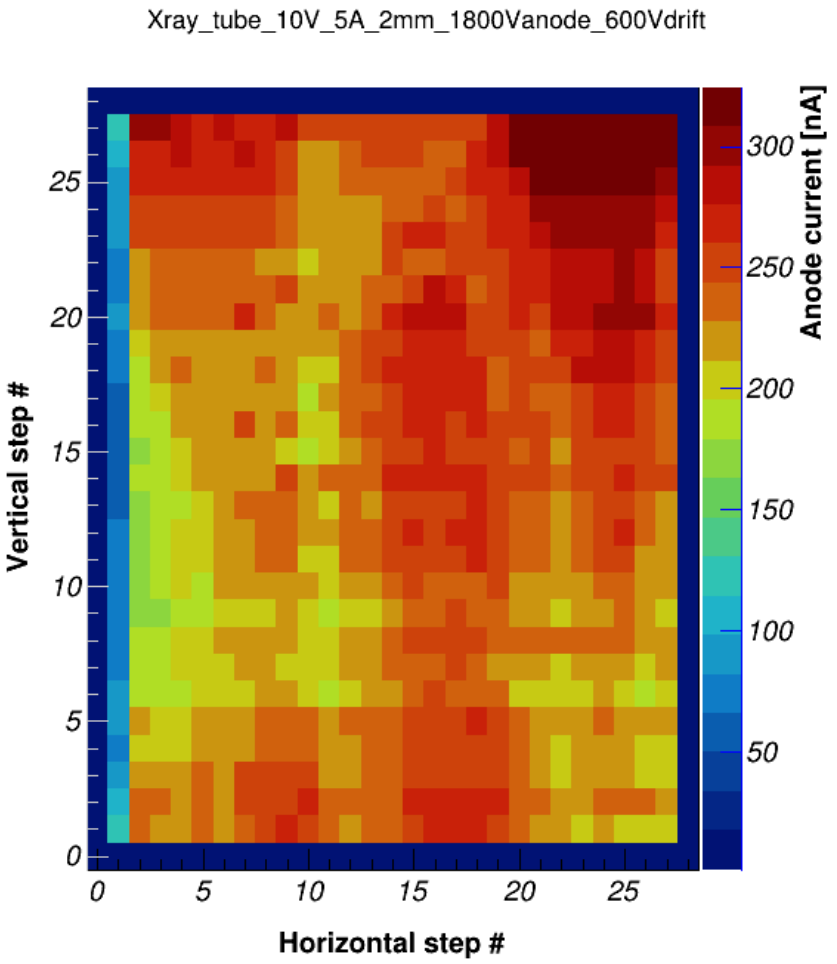
X-ray / Fe^{55}


ratio Xray_tube_12V_5A_2mm_1850V_anode_600V_drift vs
Fe55_1900V_anode_600V_drift
Vertical step #
Horizontal step #
5
10
15
20
25
3
4
5
6
7

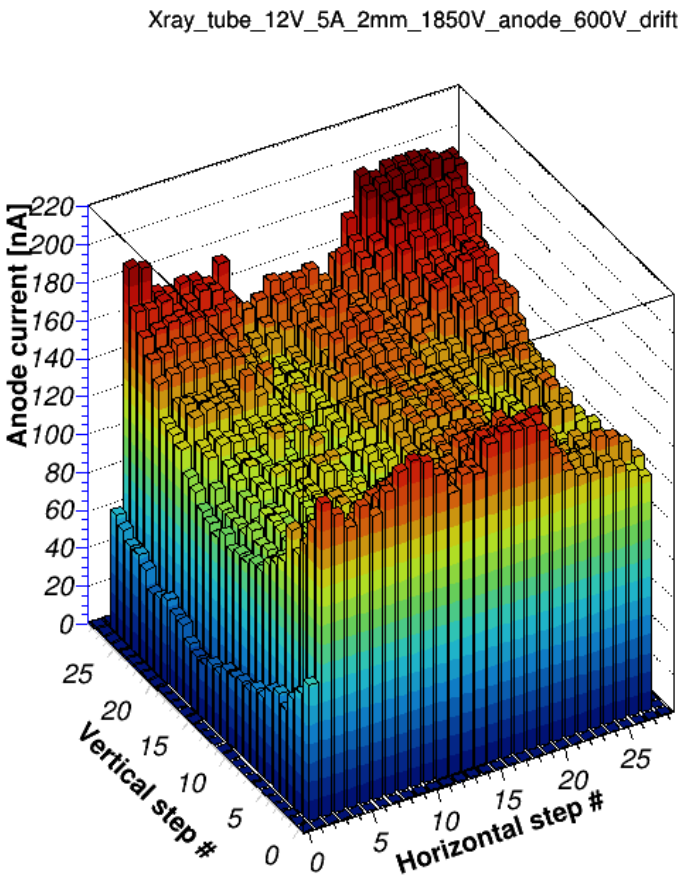

ratio Xray_tube_12V_5A_2mm_1850V_anode_600V_drift vs
Fe55_1900V_anode_600V_drift
Ratio
Vertical step #
Horizontal step #
2
3
4
5
6
7

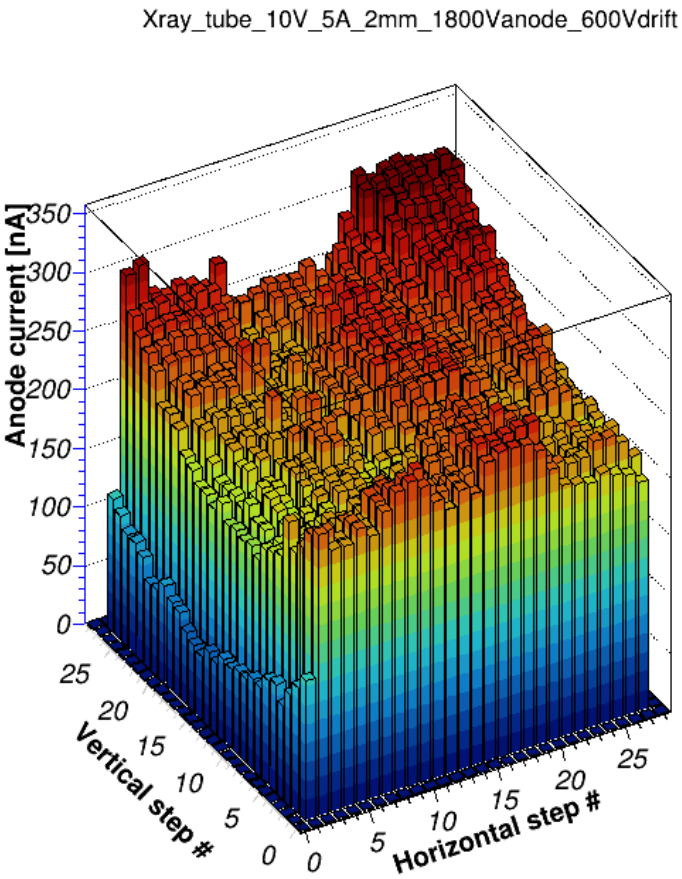
X-ray @ 12V 5A, U_A = 1850V vs X-ray @ 10V 5A, U_A = 1800V



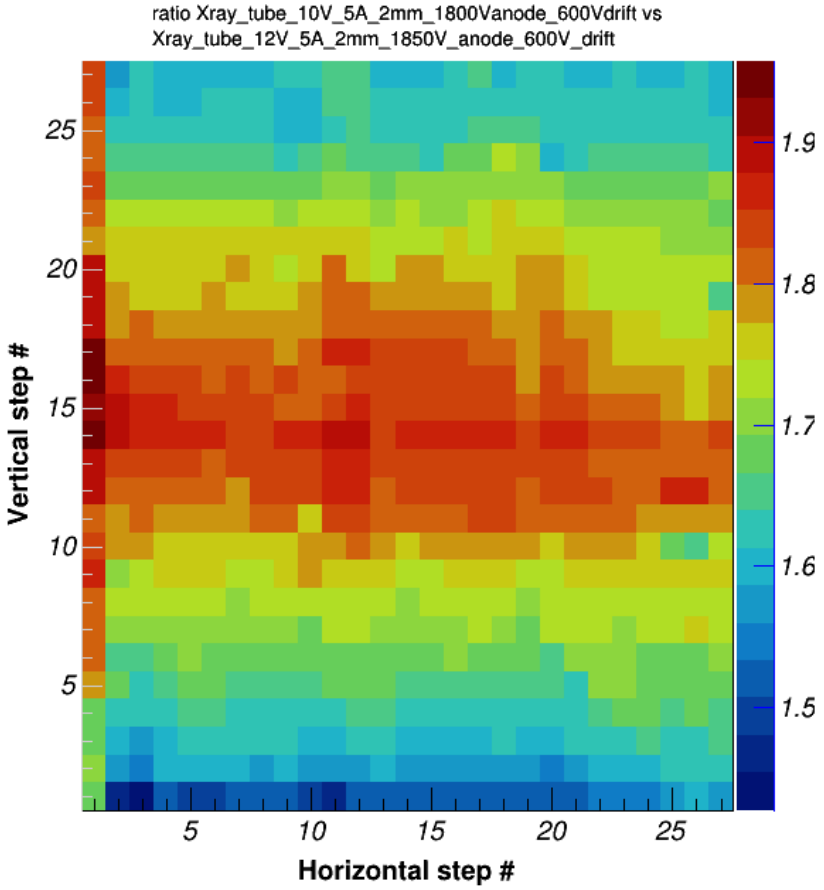


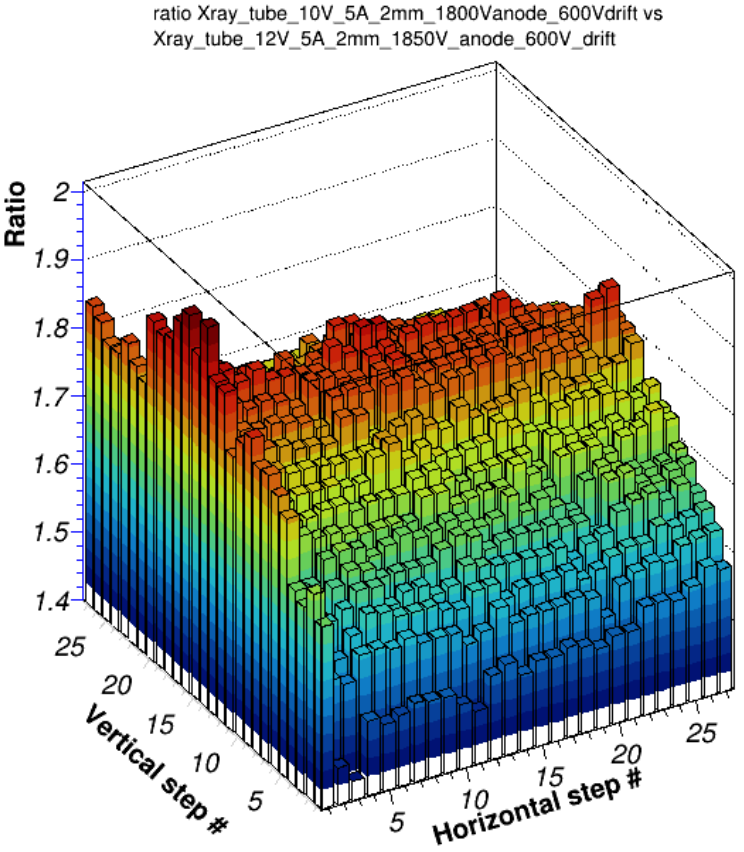
X-ray @ 12V 5A, U_A = 1850V vs X-ray @ 10V 5A, U_A = 1800V



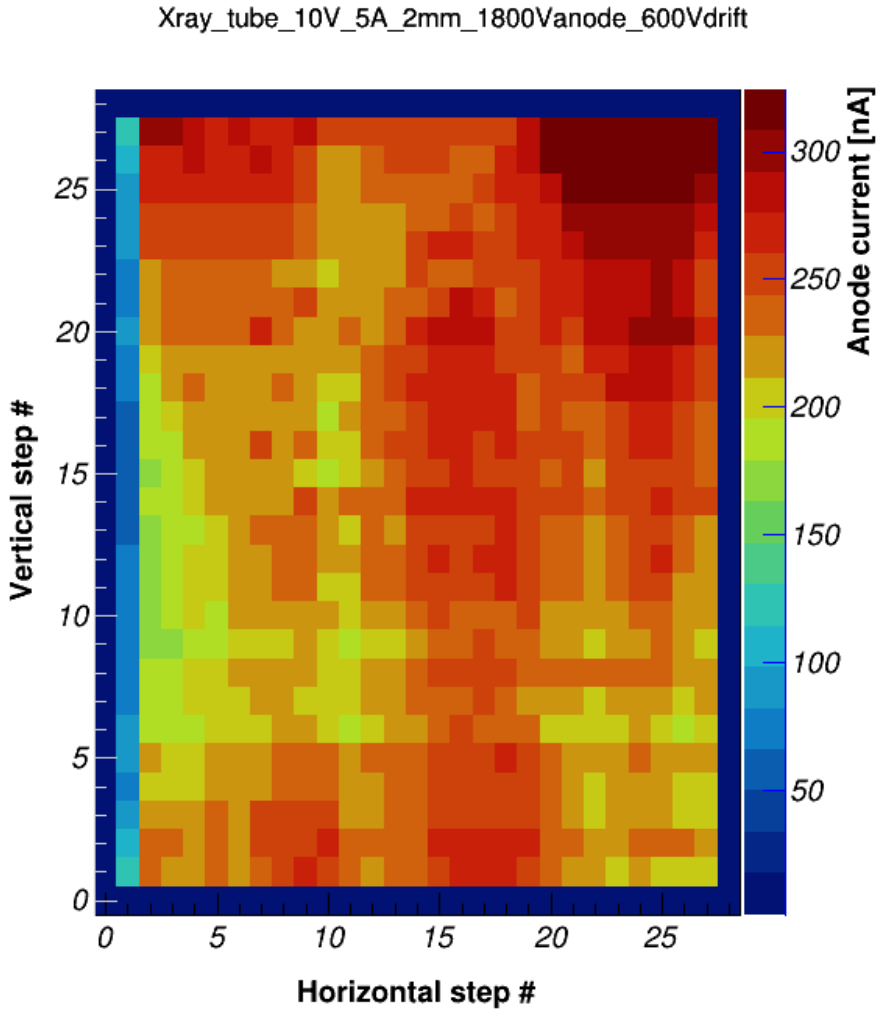


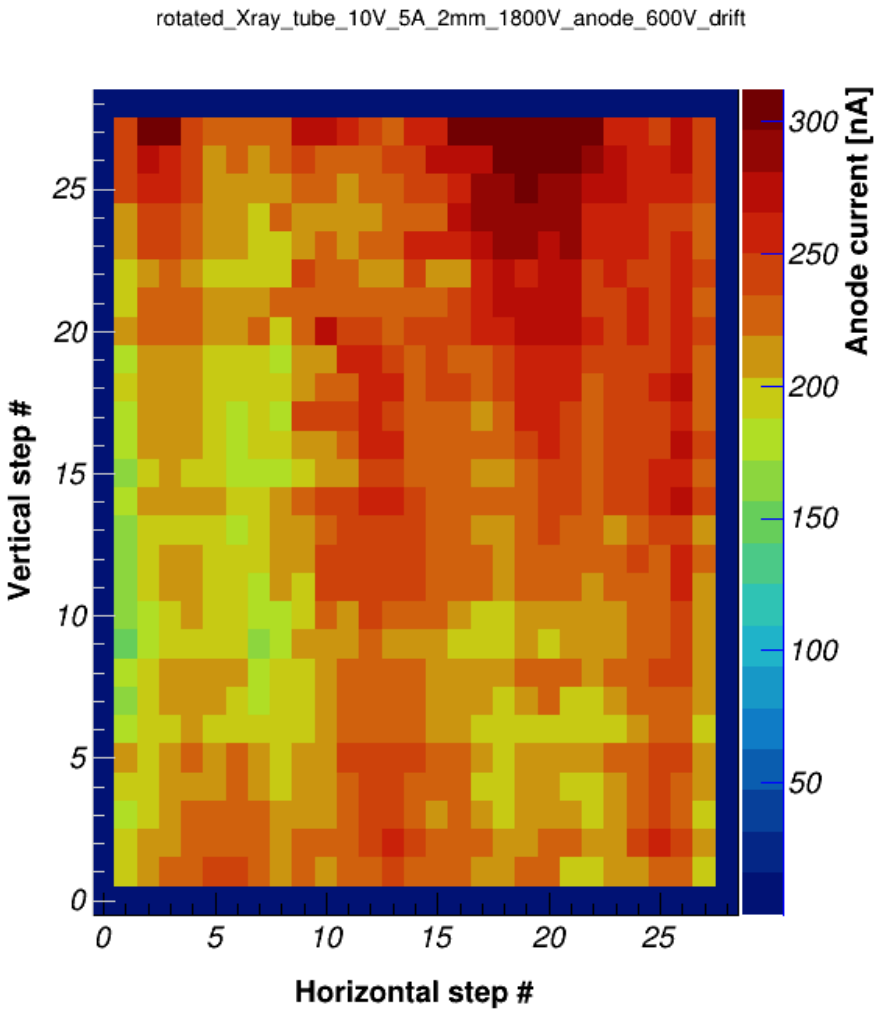
X-ray @ 10V 5A, U_A = 1800V / X-ray @ 12V 5A, U_A = 1850V



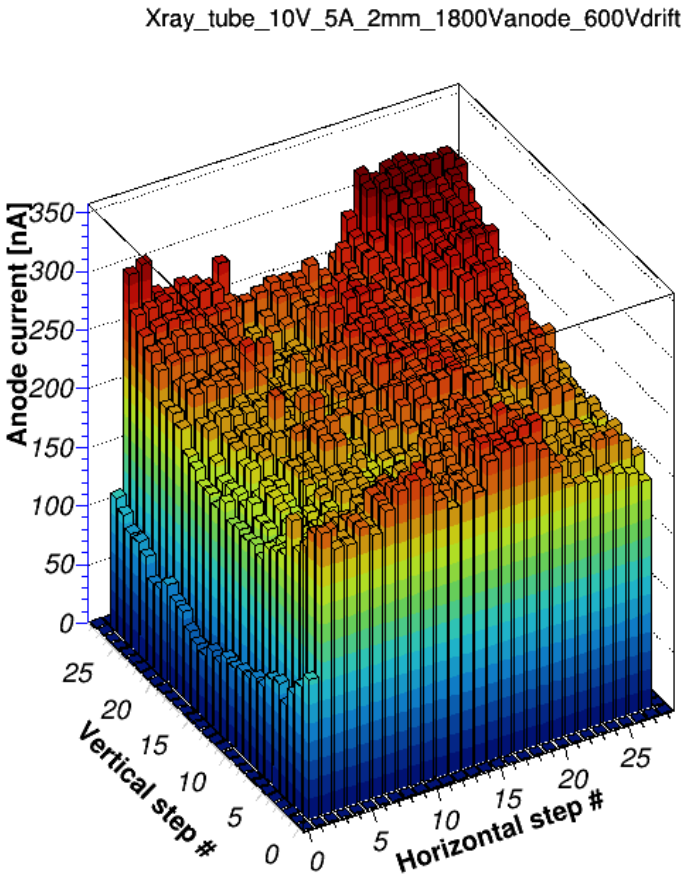


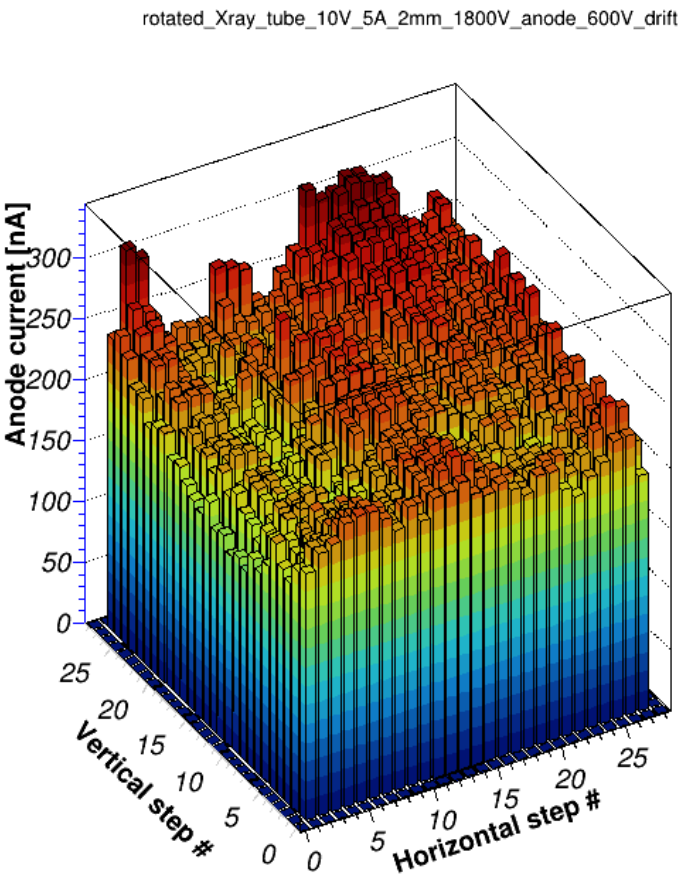
X-ray @ 10V 5A, U_A = 1800V horizontal vs vertical wires



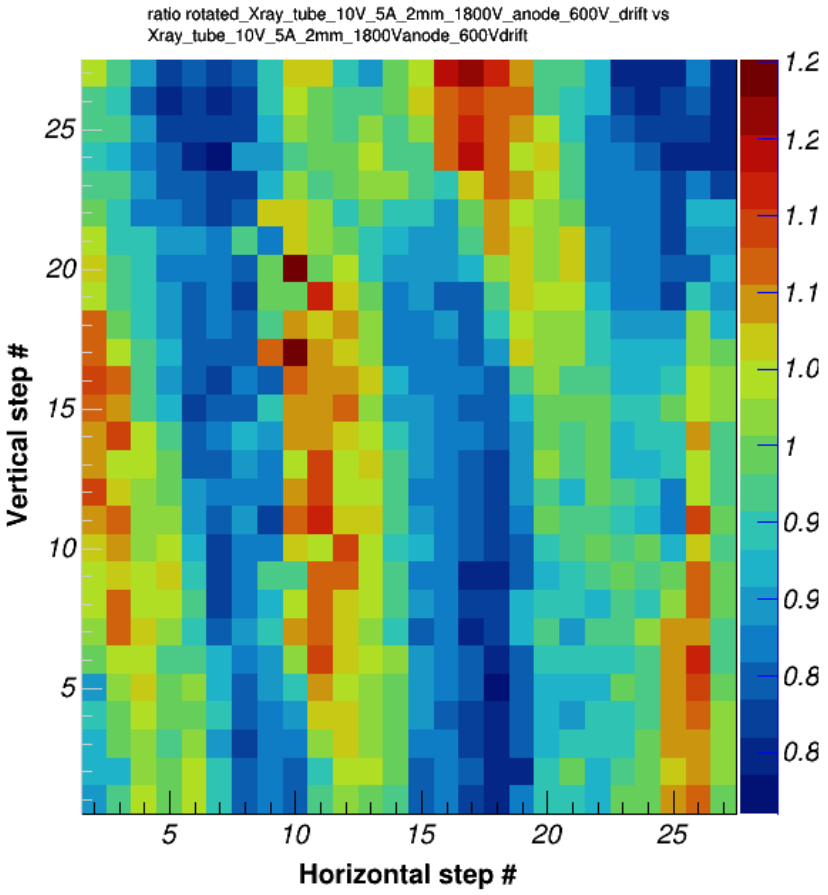


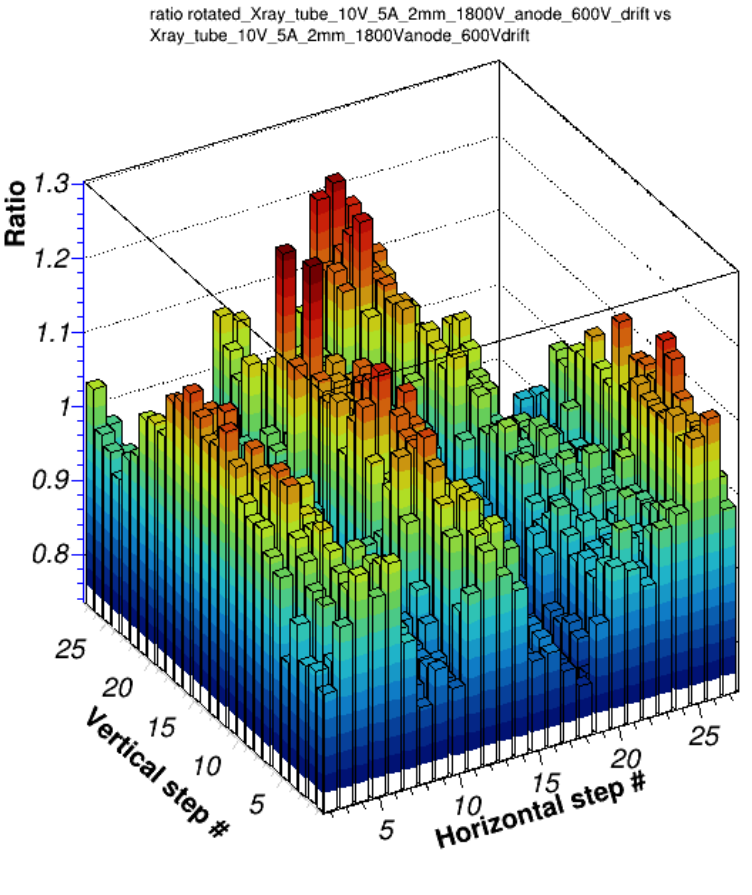
X-ray @ 10V 5A, U_A = 1800V horizontal vs vertical wires



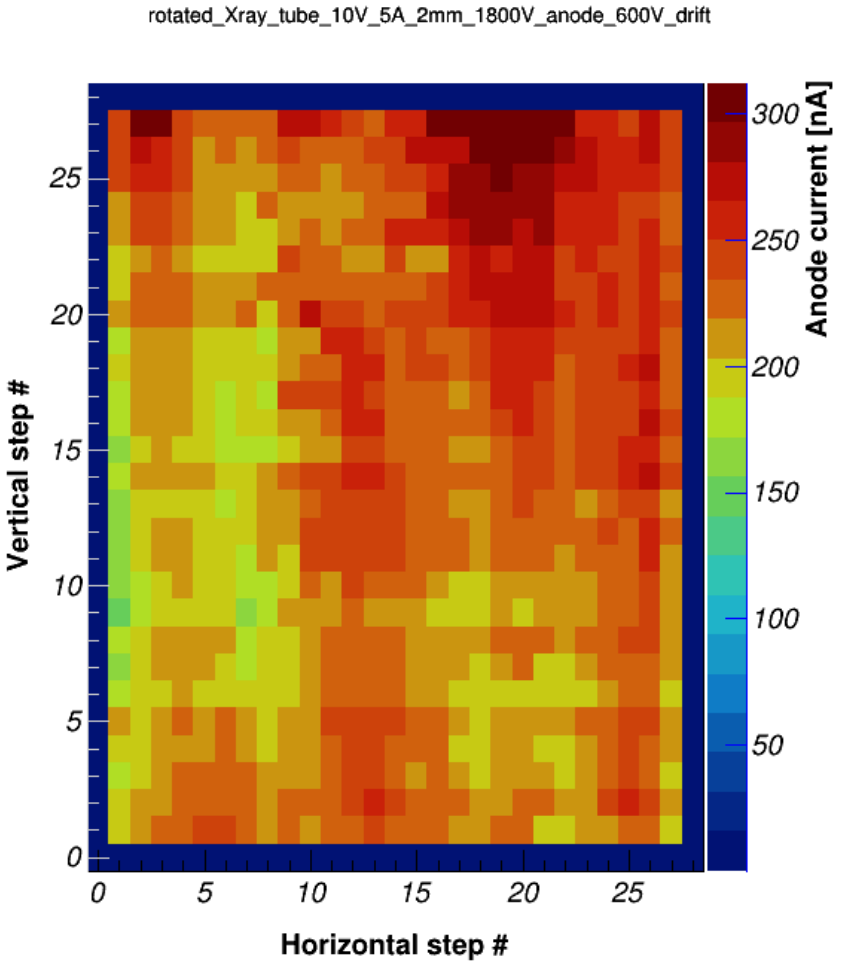


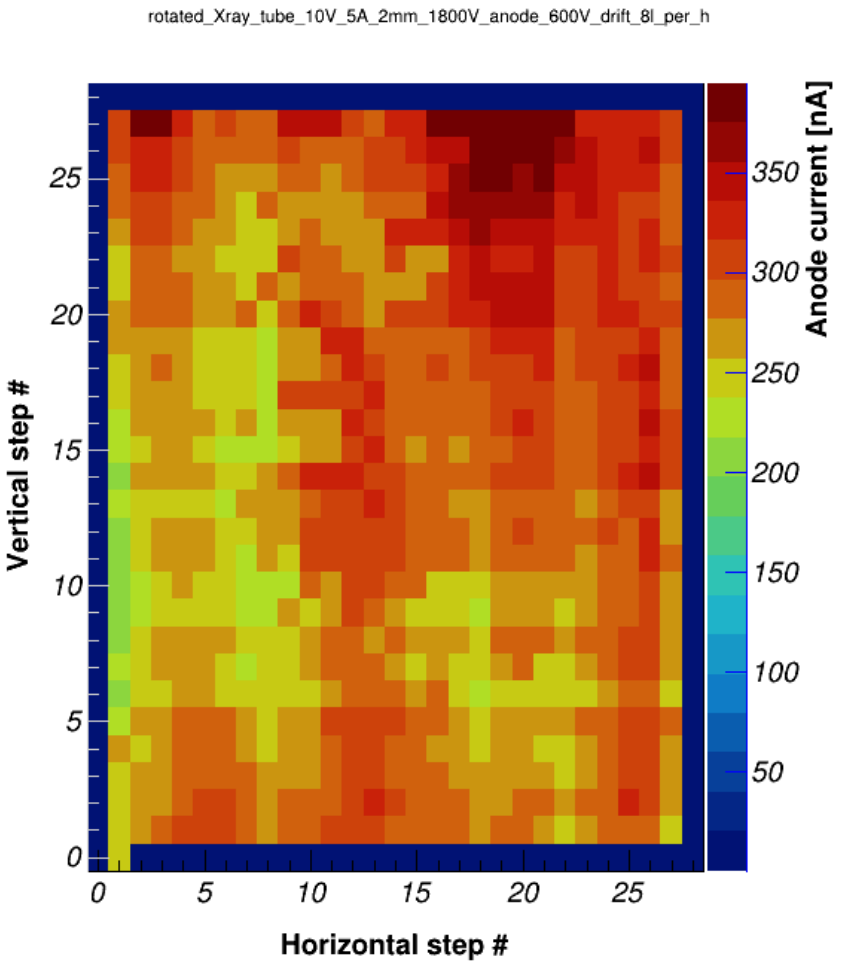
Vertical / horizontal



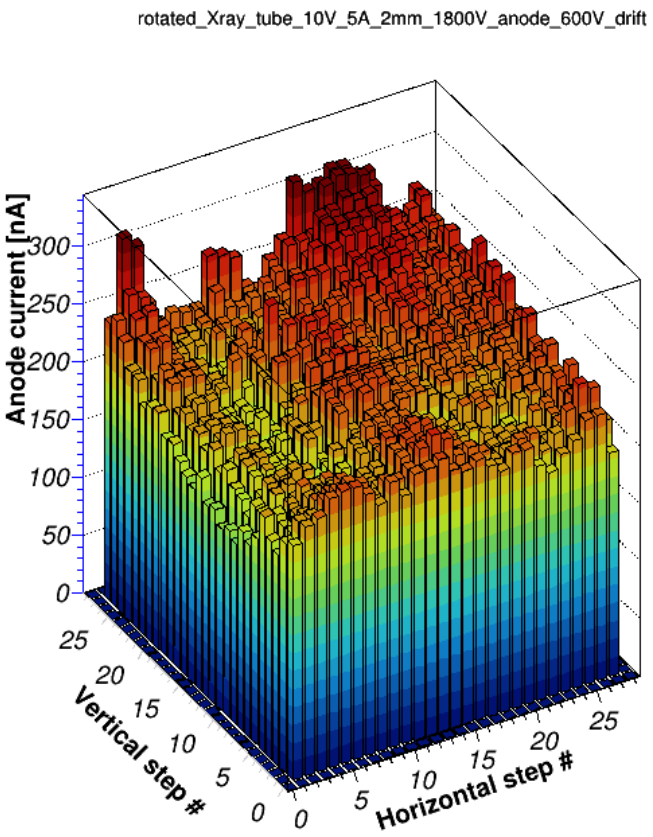


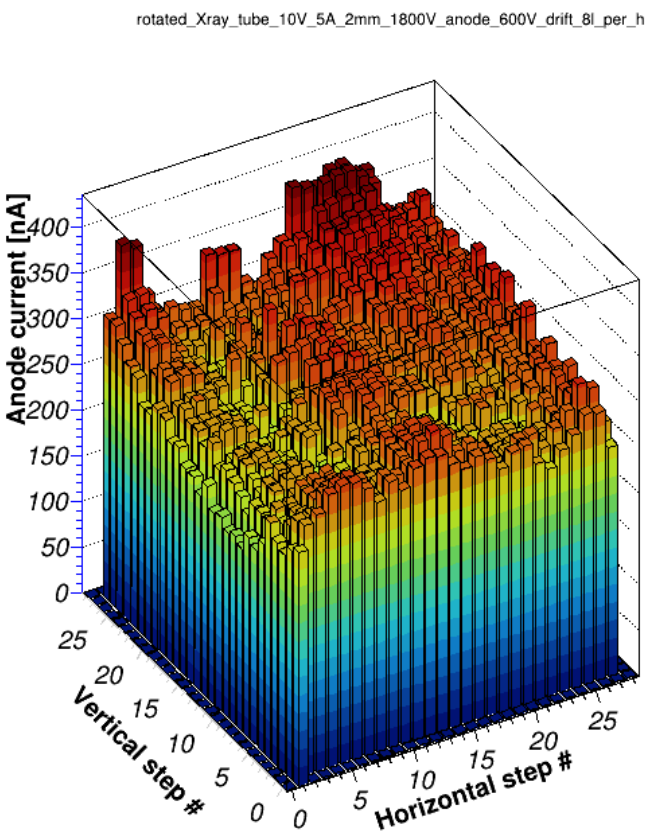
5.5 l/h – 8 l/h


rotated_Xray_tube_10V_5A_2mm_1800V_anode_600V_drift
Vertical step #
Horizontal step #
Anode current [nA]
0
5
10
15
20
25
50
100
150
200
250
300

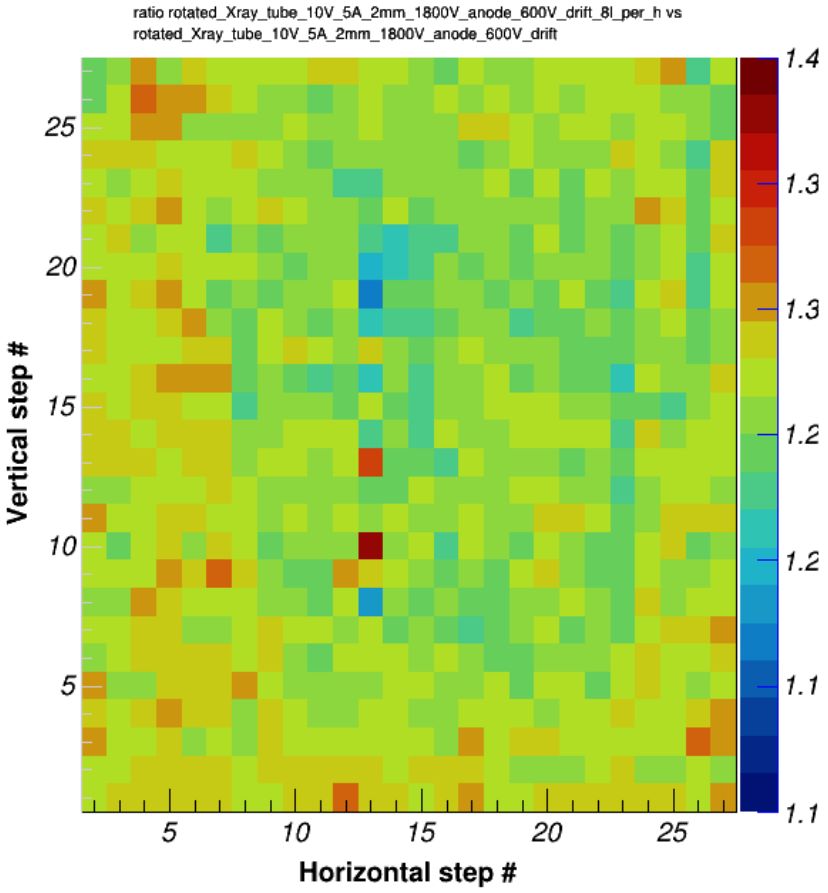

rotated_Xray_tube_10V_5A_2mm_1800V_anode_600V_drift_8l_per_h
Vertical step #
Horizontal step #
Anode current [nA]
0
5
10
15
20
25
50
100
150
200
250
300
350

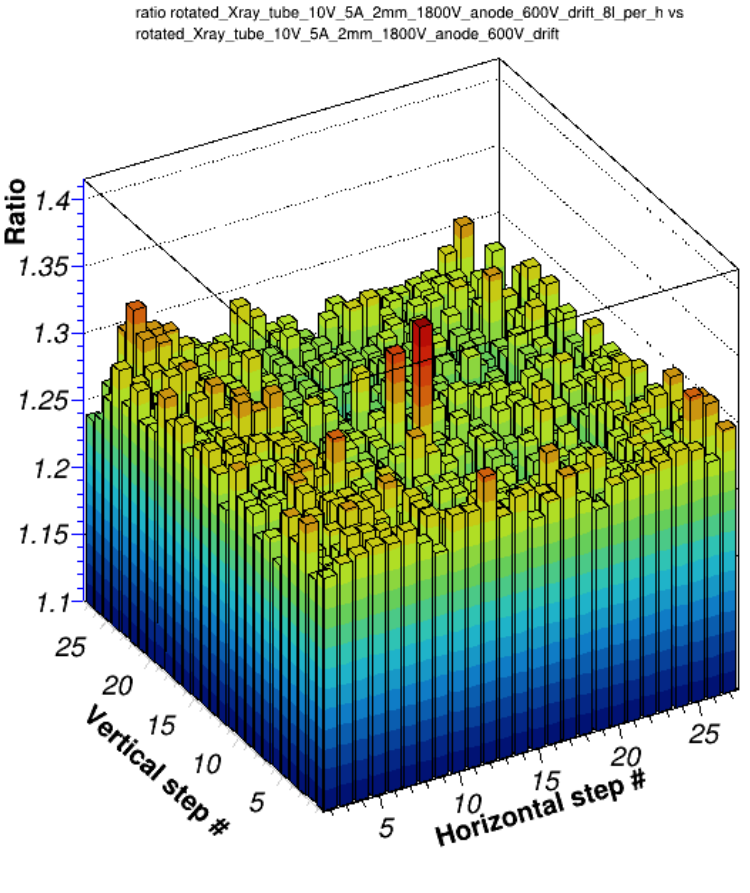
5.5 l/h – 8 l/h


rotated_Xray_tube_10V_5A_2mm_1800V_anode_600V_drift
Anode current [nA]
0
50
100
150
200
250
300
Vertical step #
0
5
10
15
20
25
Horizontal step #
0
5
10
15
20
25

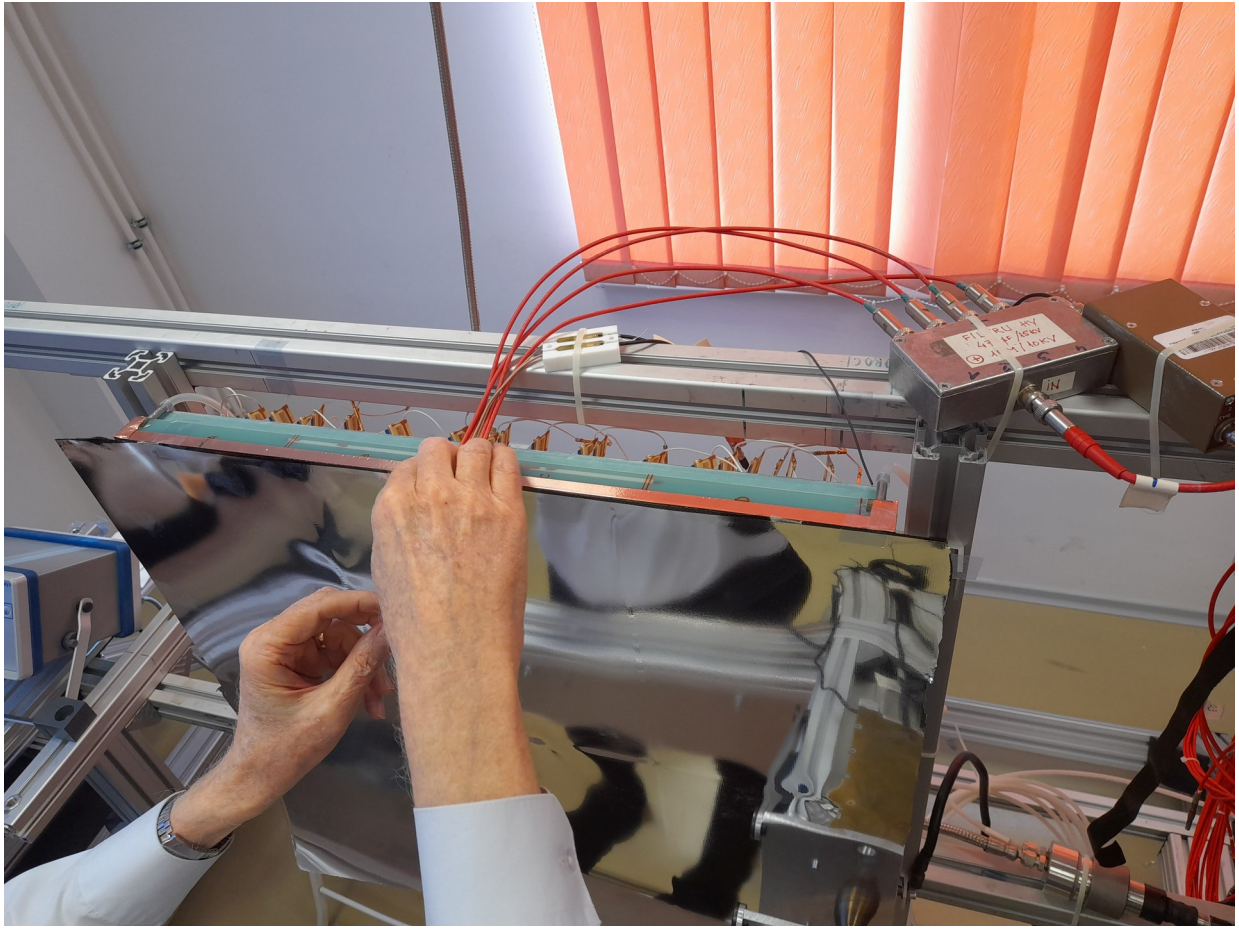

rotated_Xray_tube_10V_5A_2mm_1800V_anode_600V_drift_8l_per_h
Anode current [nA]
0
50
100
150
200
250
300
350
400
Vertical step #
0
5
10
15
20
25
Horizontal step #
0
5
10
15
20
25

8 l/h / 5.5 l/h

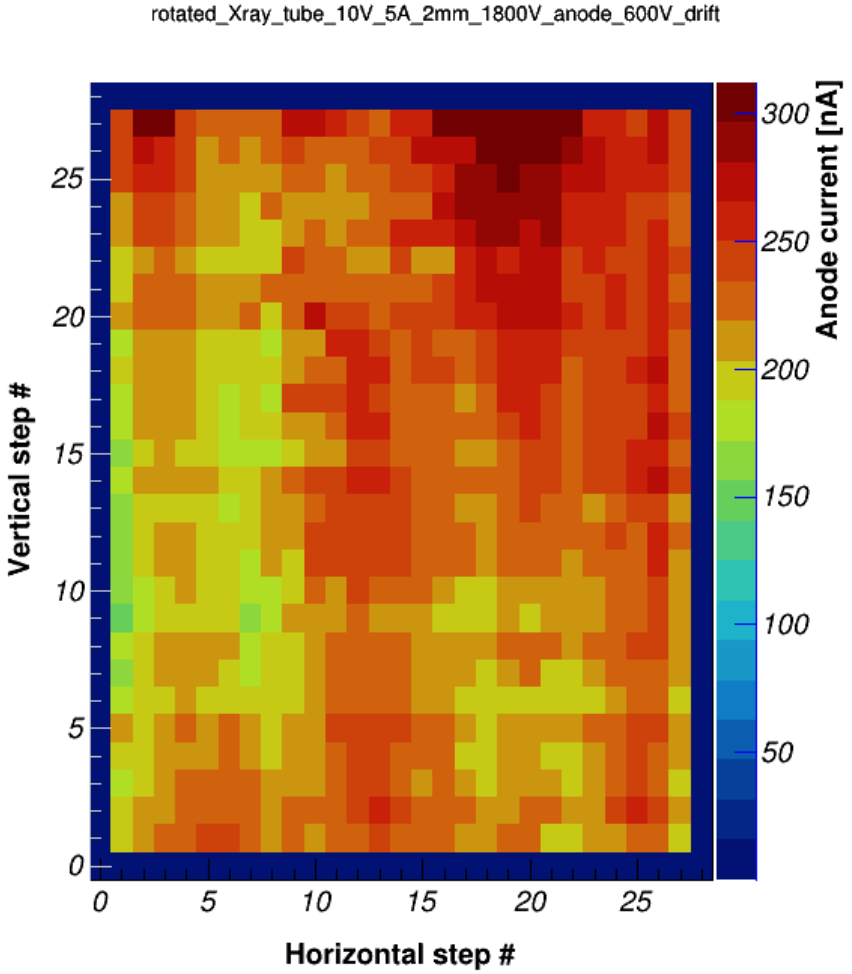

ratio rotated_Xray_tube_10V_5A_2mm_1800V_anode_600V_drift_8l_per_h vs
rotated_Xray_tube_10V_5A_2mm_1800V_anode_600V_drift
Vertical step #
Horizontal step #
5
10
15
20
25
1.1
1.2
1.3
1.4

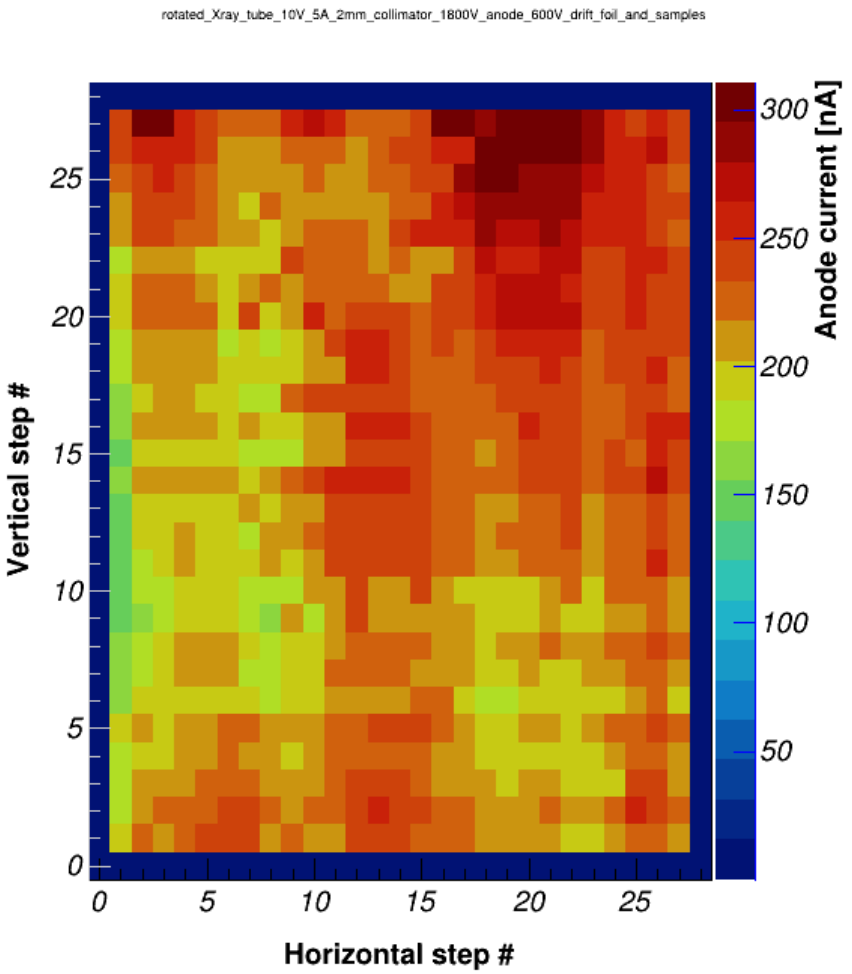

ratio rotated_Xray_tube_10V_5A_2mm_1800V_anode_600V_drift_8l_per_h vs
rotated_Xray_tube_10V_5A_2mm_1800V_anode_600V_drift
Ratio
1.1
1.15
1.2
1.25
1.3
1.35
1.4
Vertical step #
Horizontal step #
5
10
15
20
25

Foil

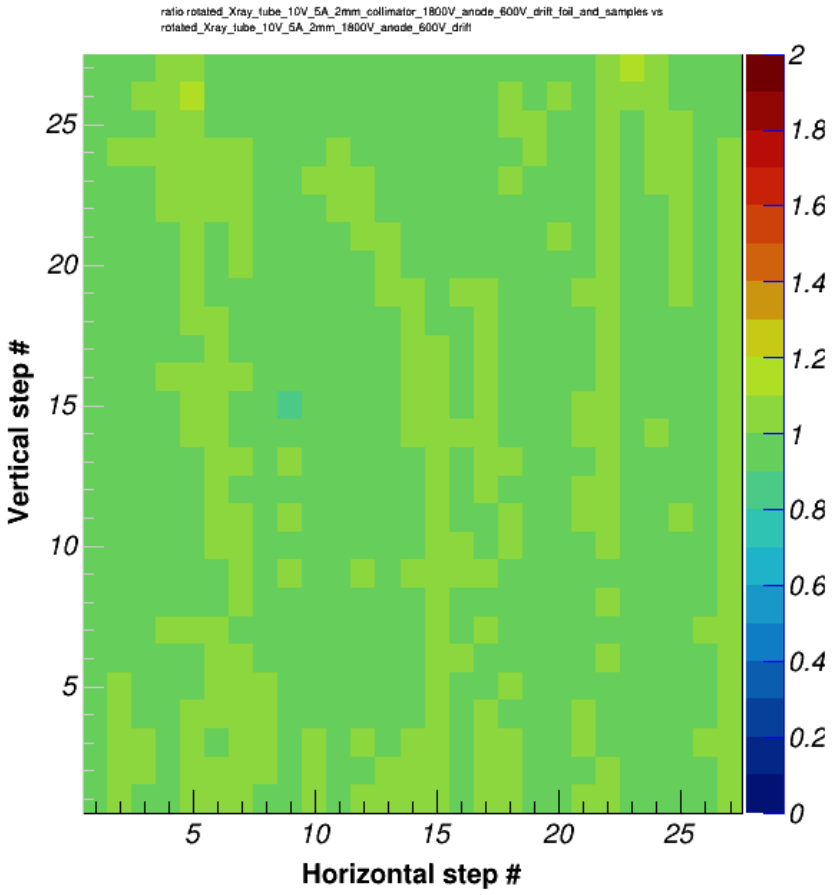


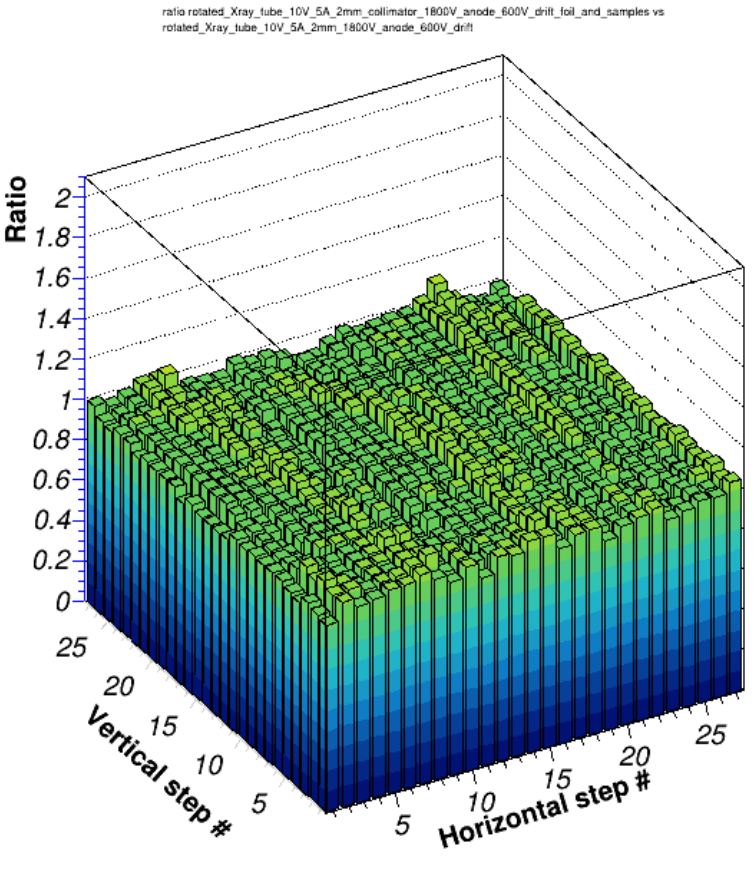
No foil vs extra foil





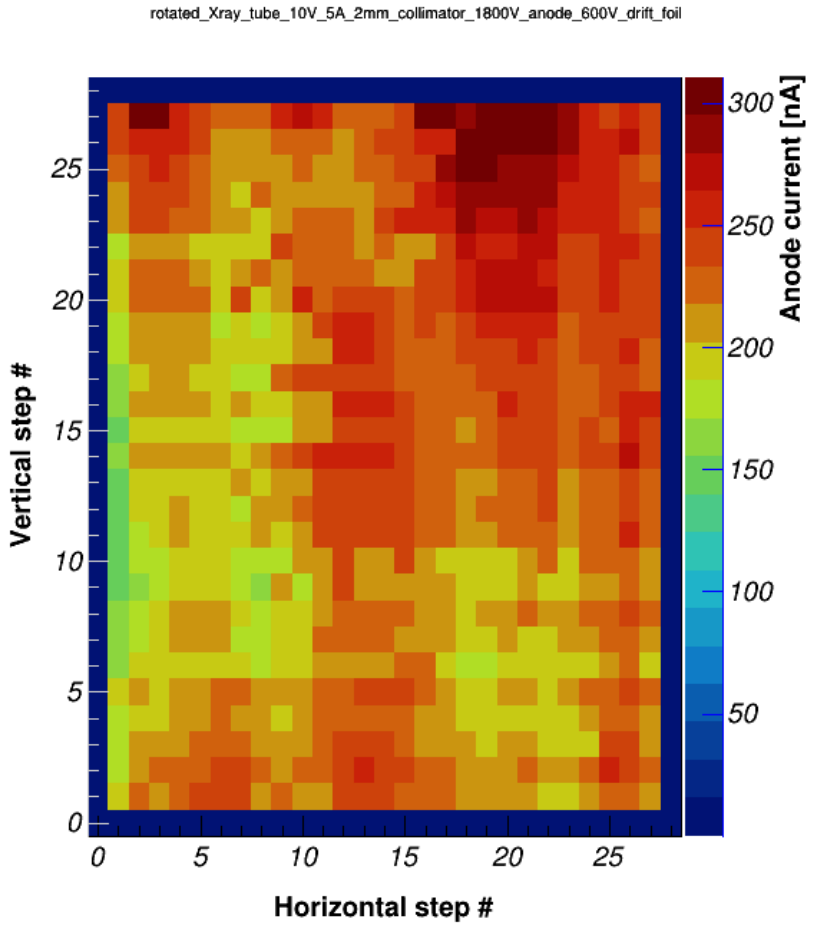
Extra foil vs no foil

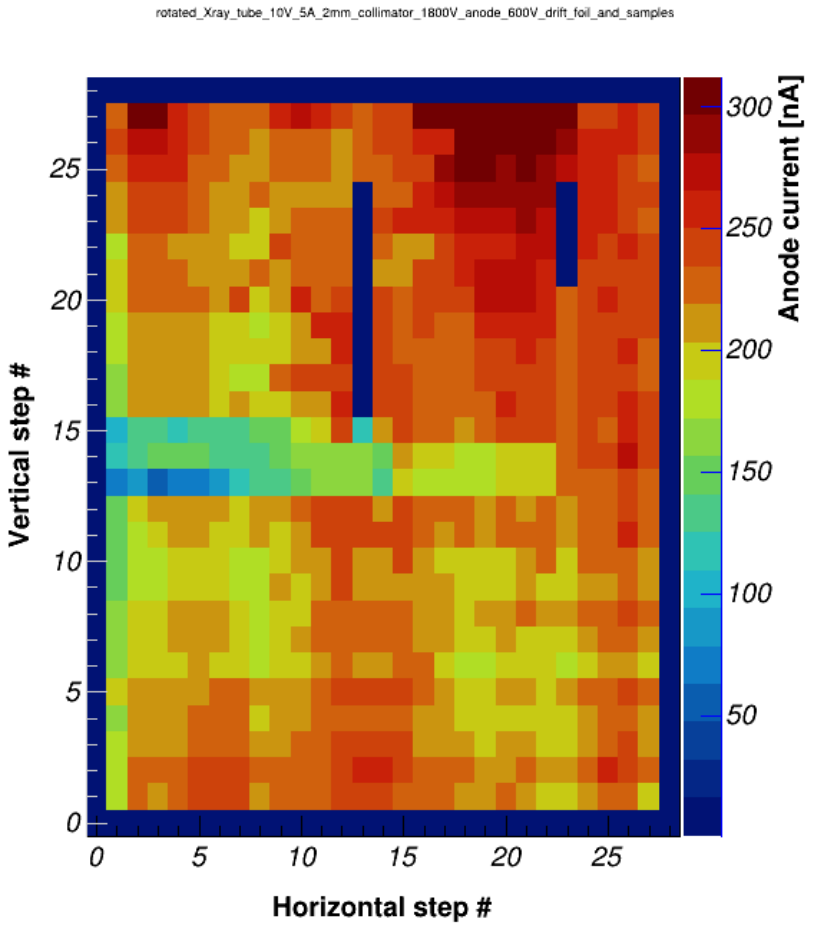




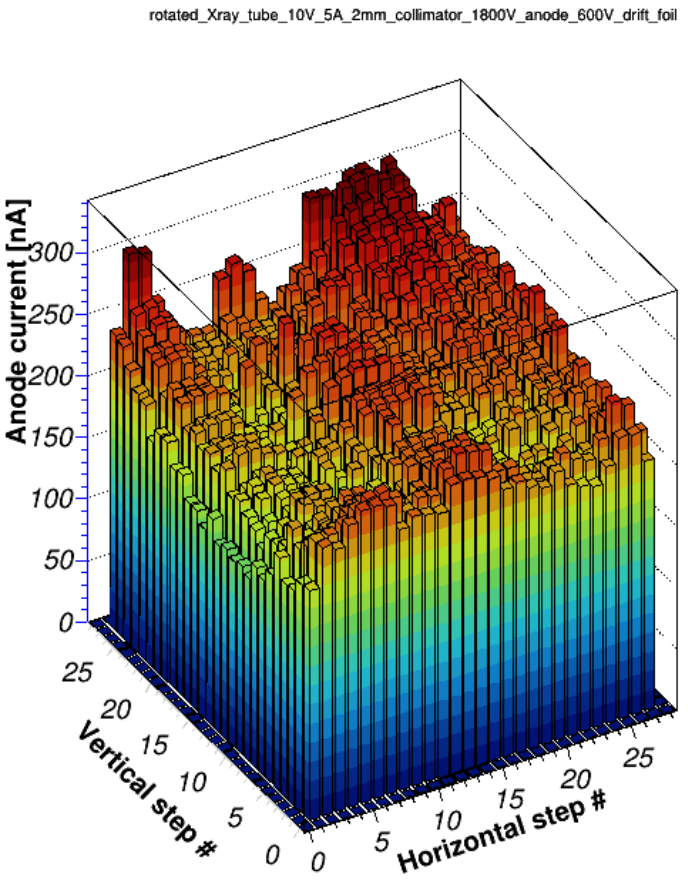
Foil samples

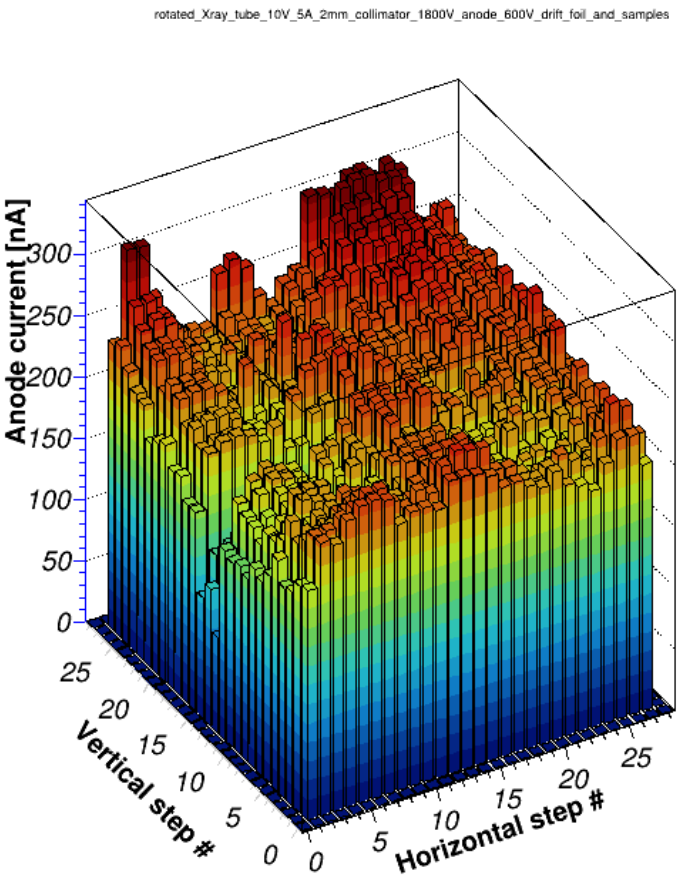
Foil vs foil and samples



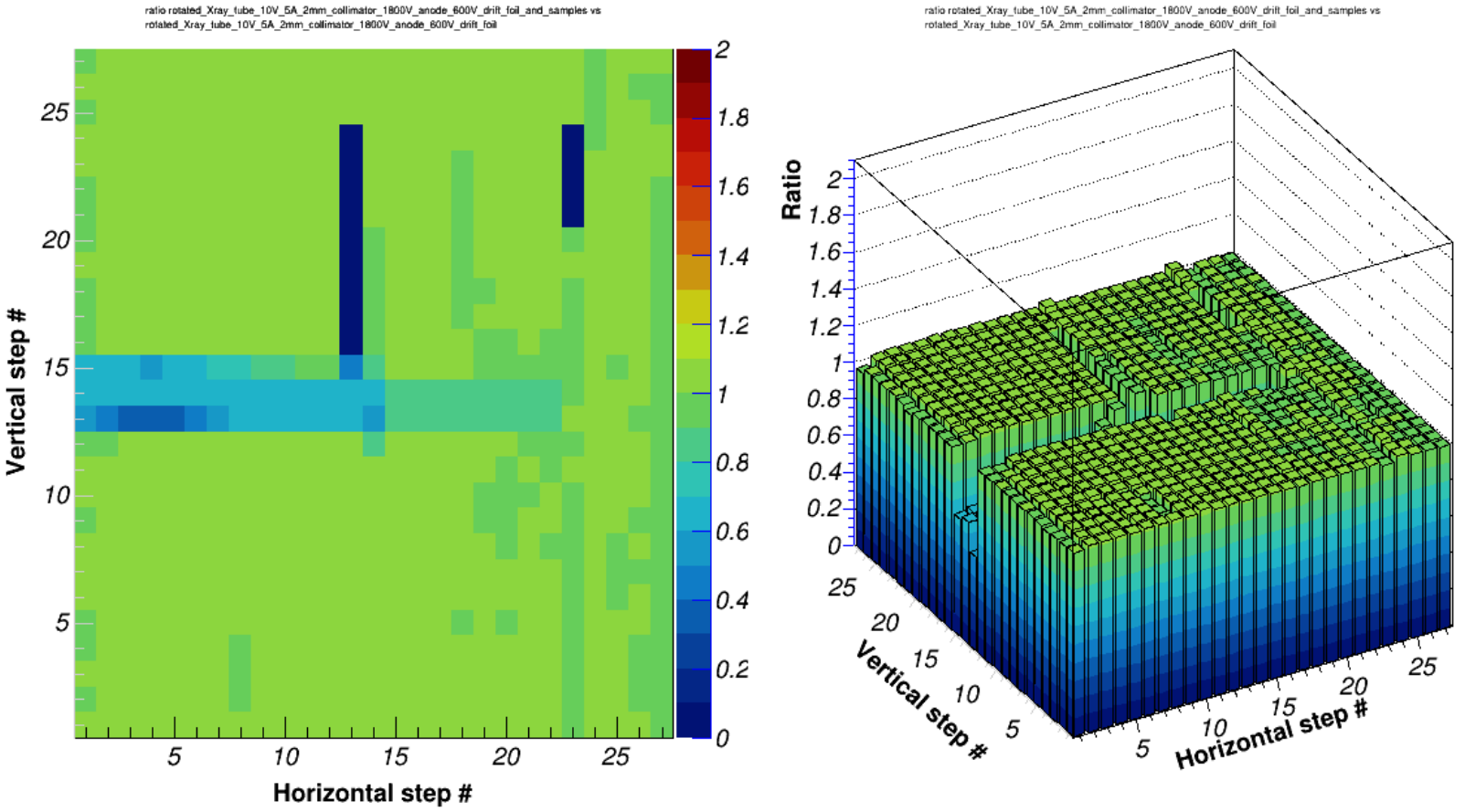


Foil vs foil and samples

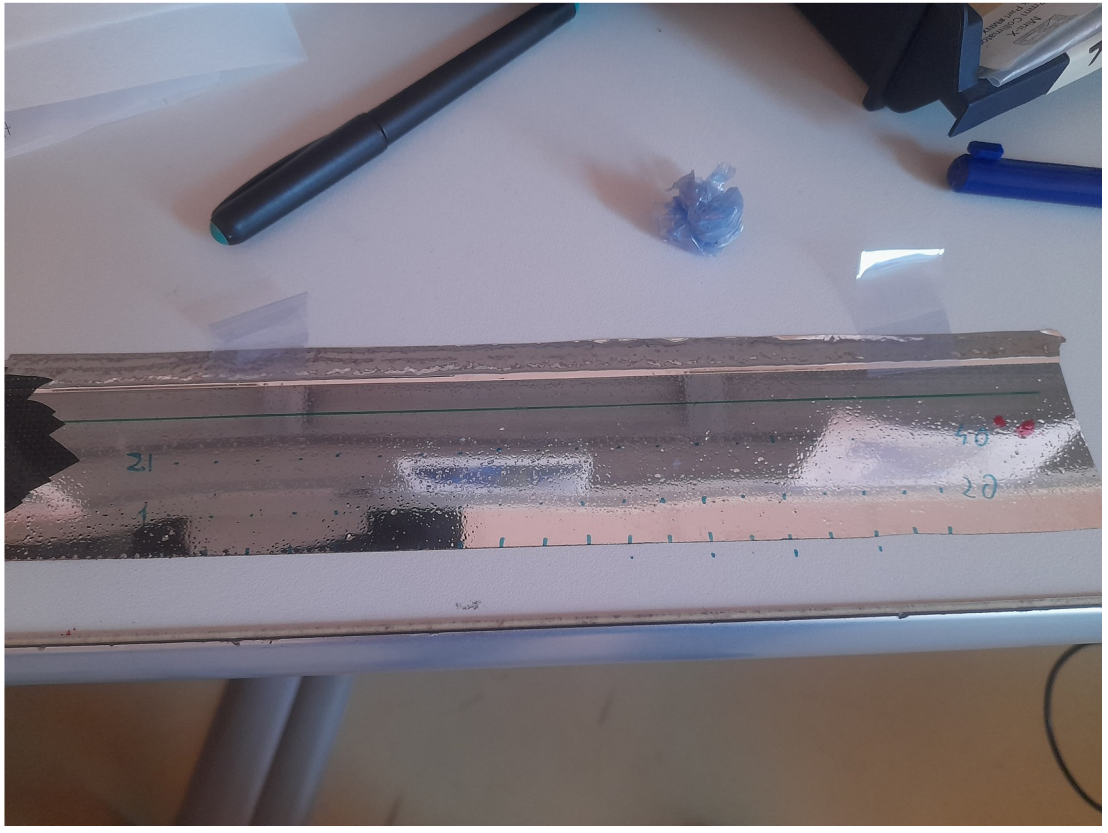




Foil and samples / foil



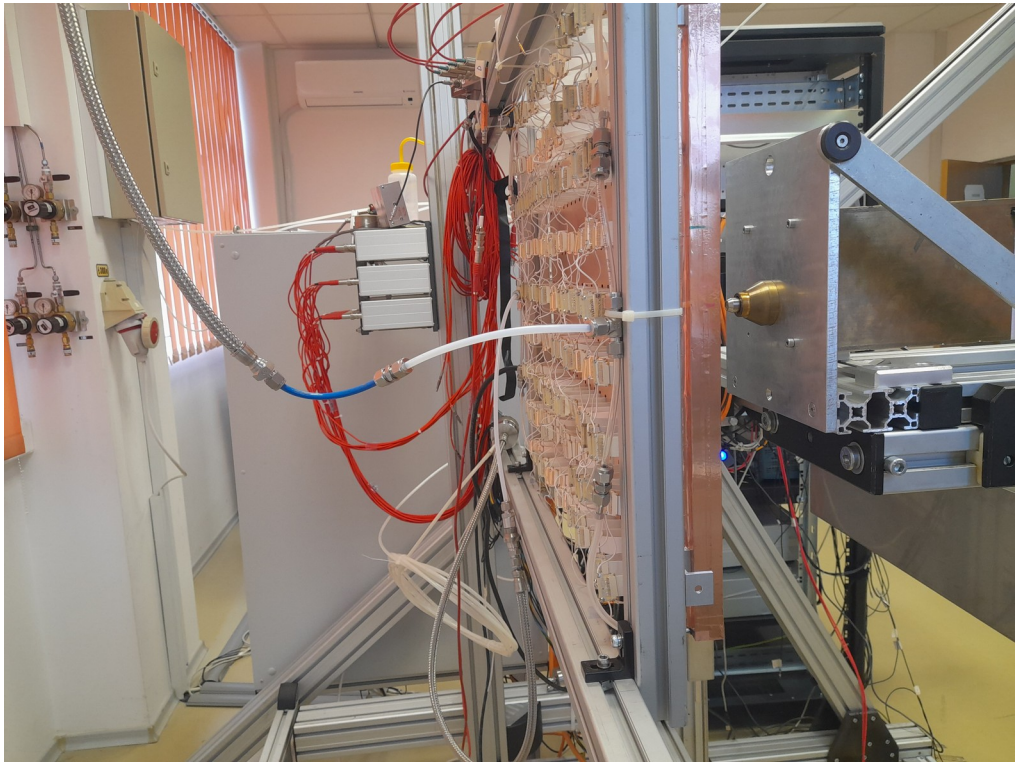
Foil sample uniformity test

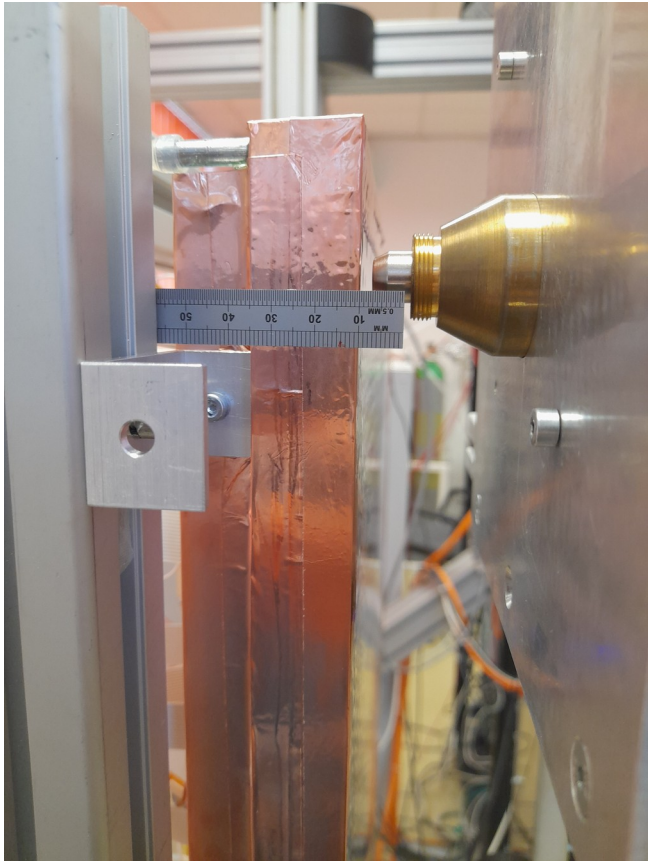


- 40 points tested

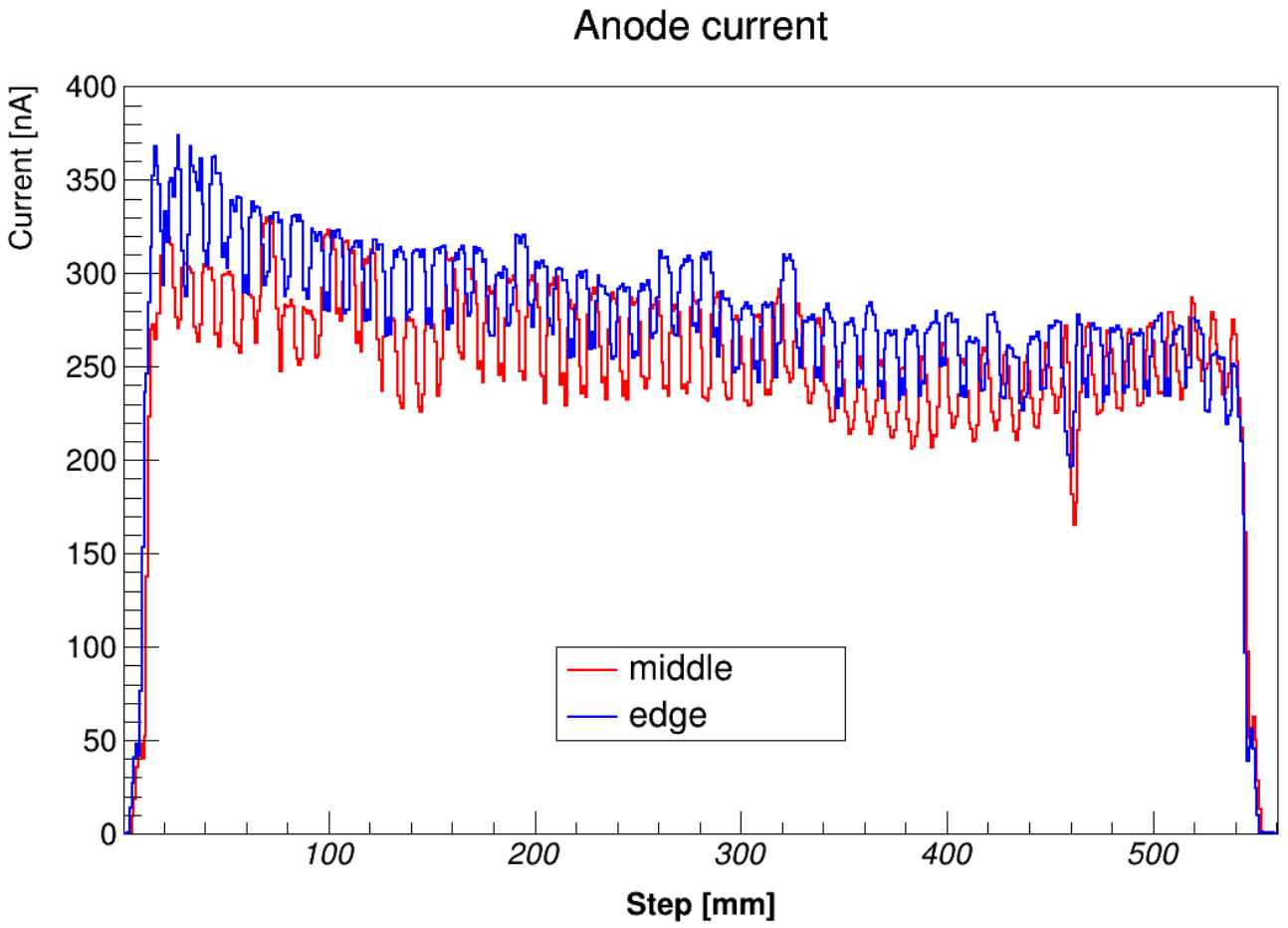
- foil is uniform within noise fluctuations

Millimeter scan (2 mm collimator)

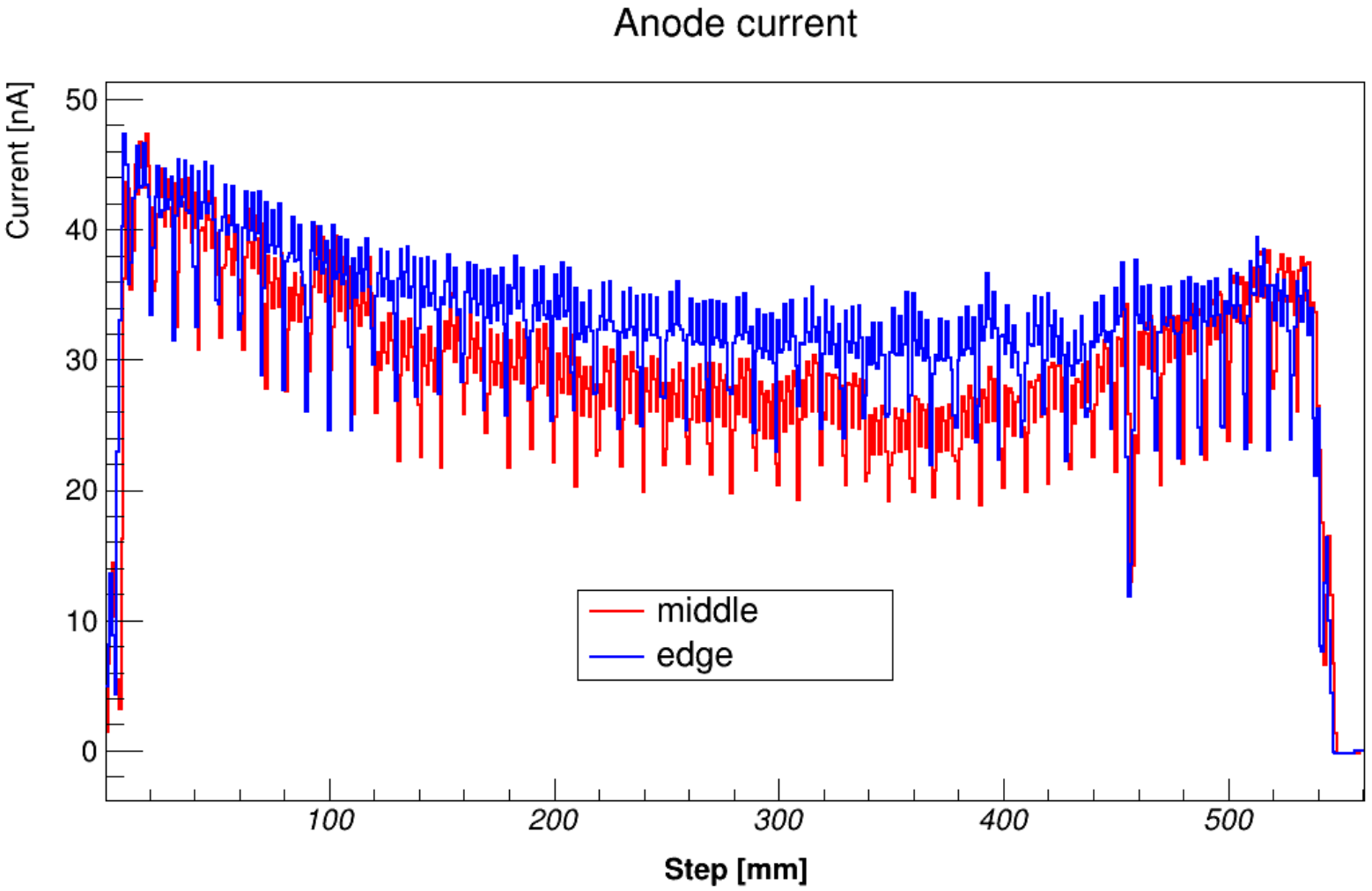




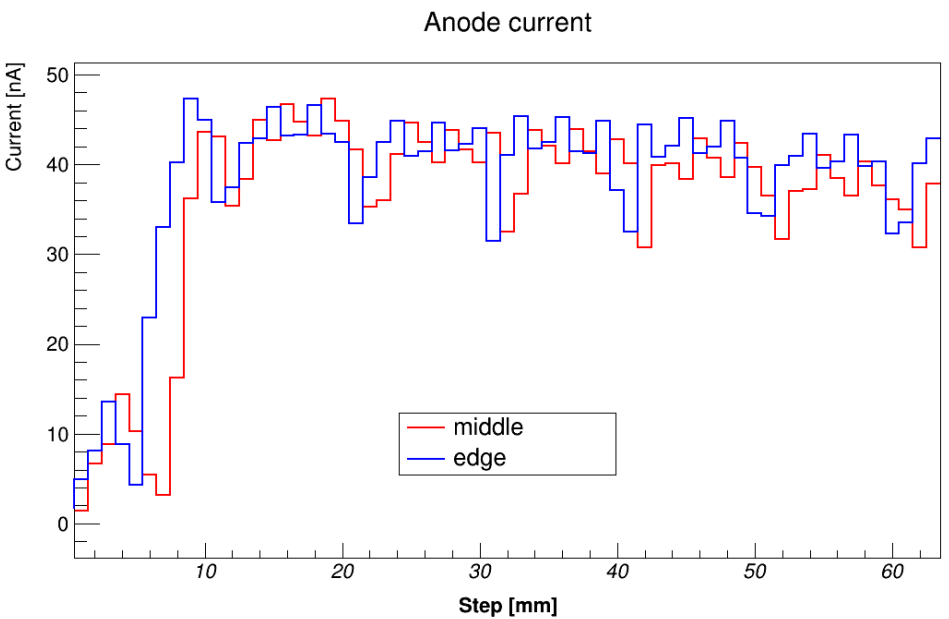
Millimeter scan

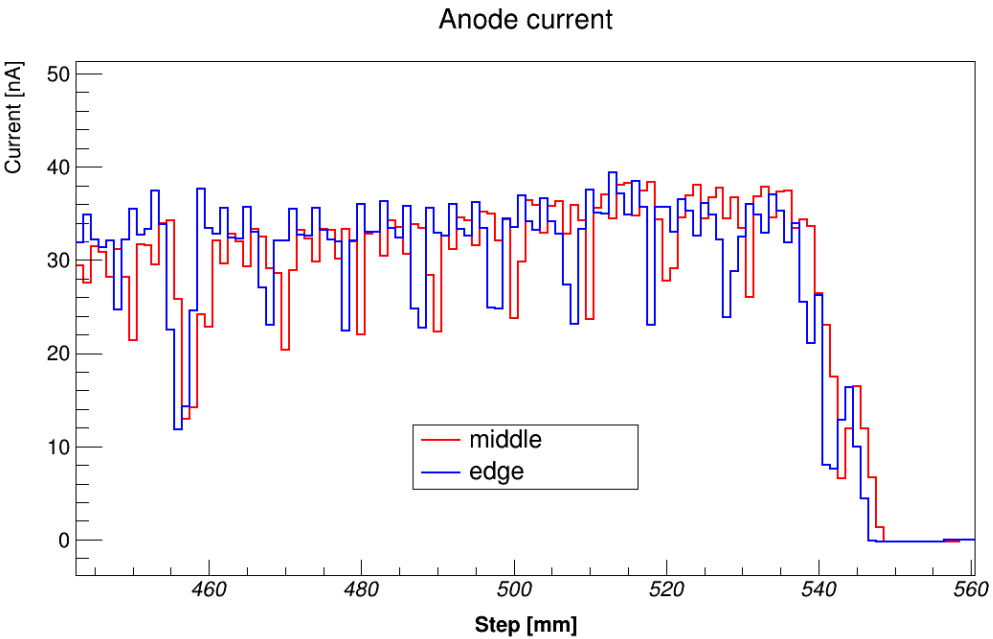


Millimeter scan with millimeter collimator

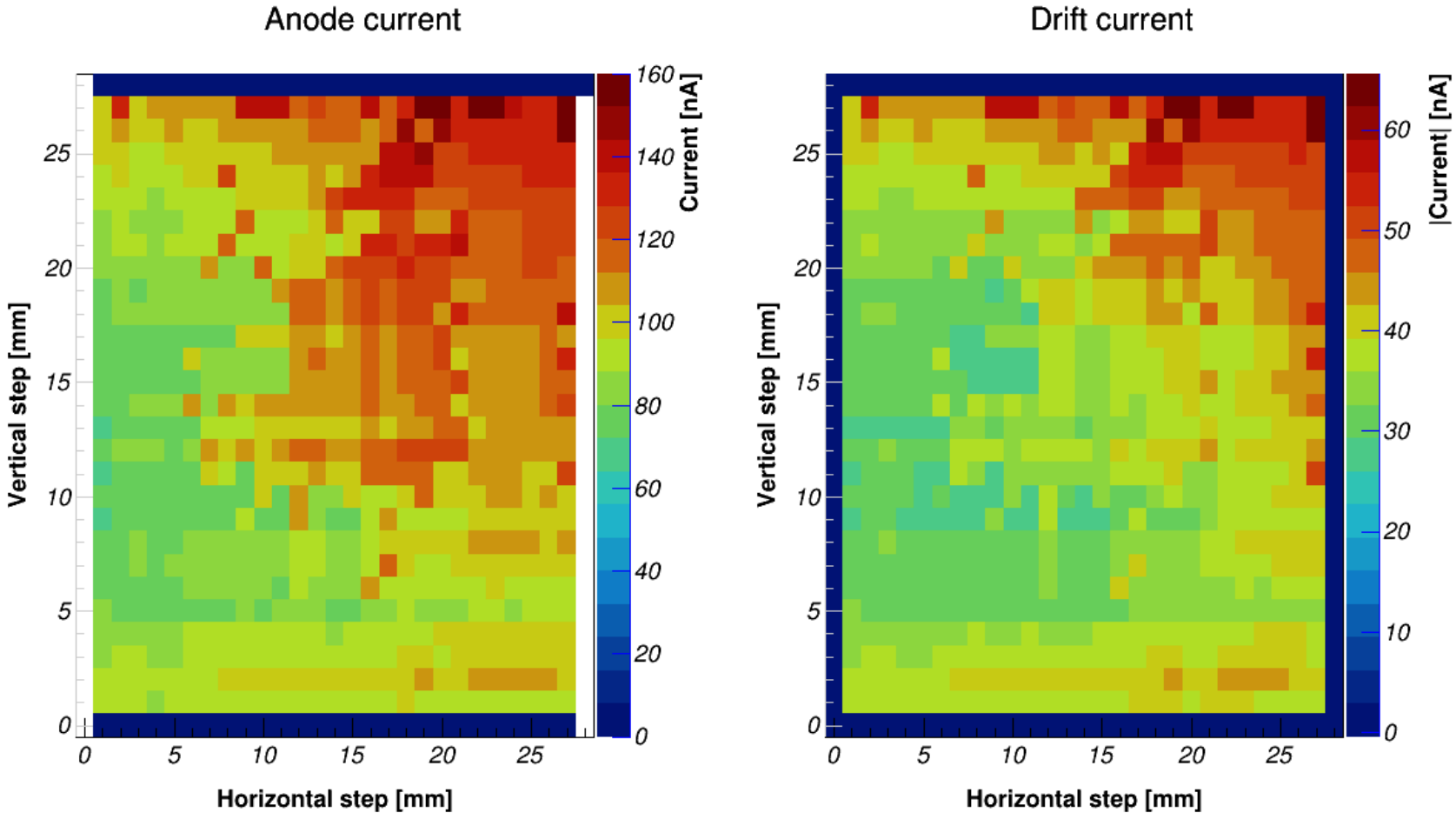


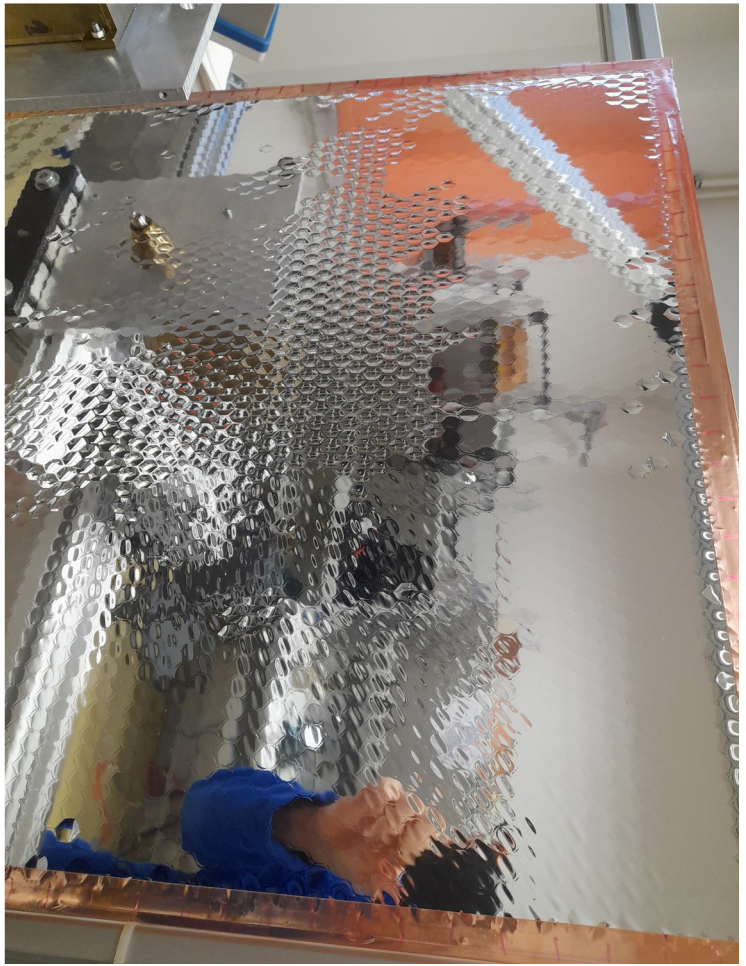
Edges

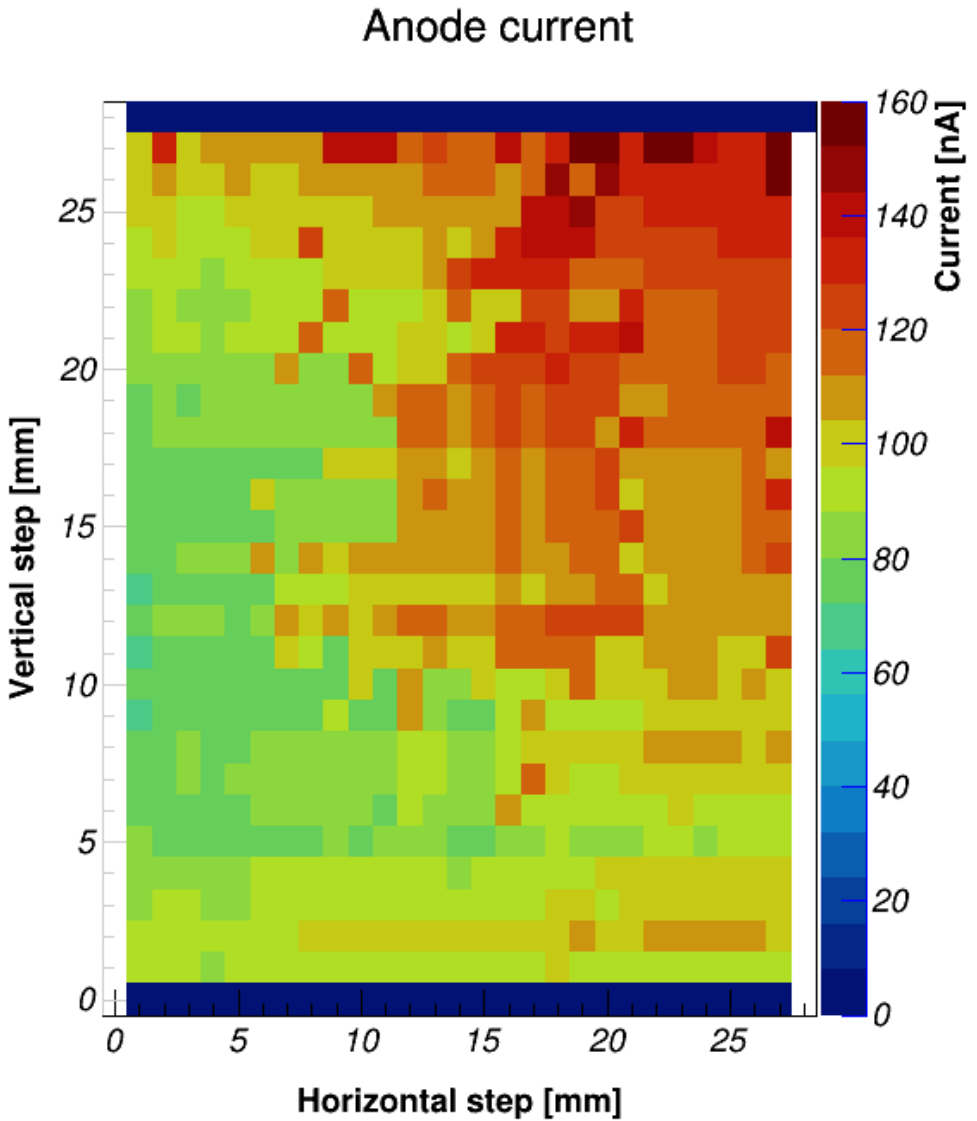

Anode current
Current [nA]
50
40
30
20
10
0
10
20
30
40
50
60
Step [mm]
middle
edge


Anode current
Current [nA]
50
40
30
20
10
0
460
480
500
520
540
560
Step [mm]
middle
edge

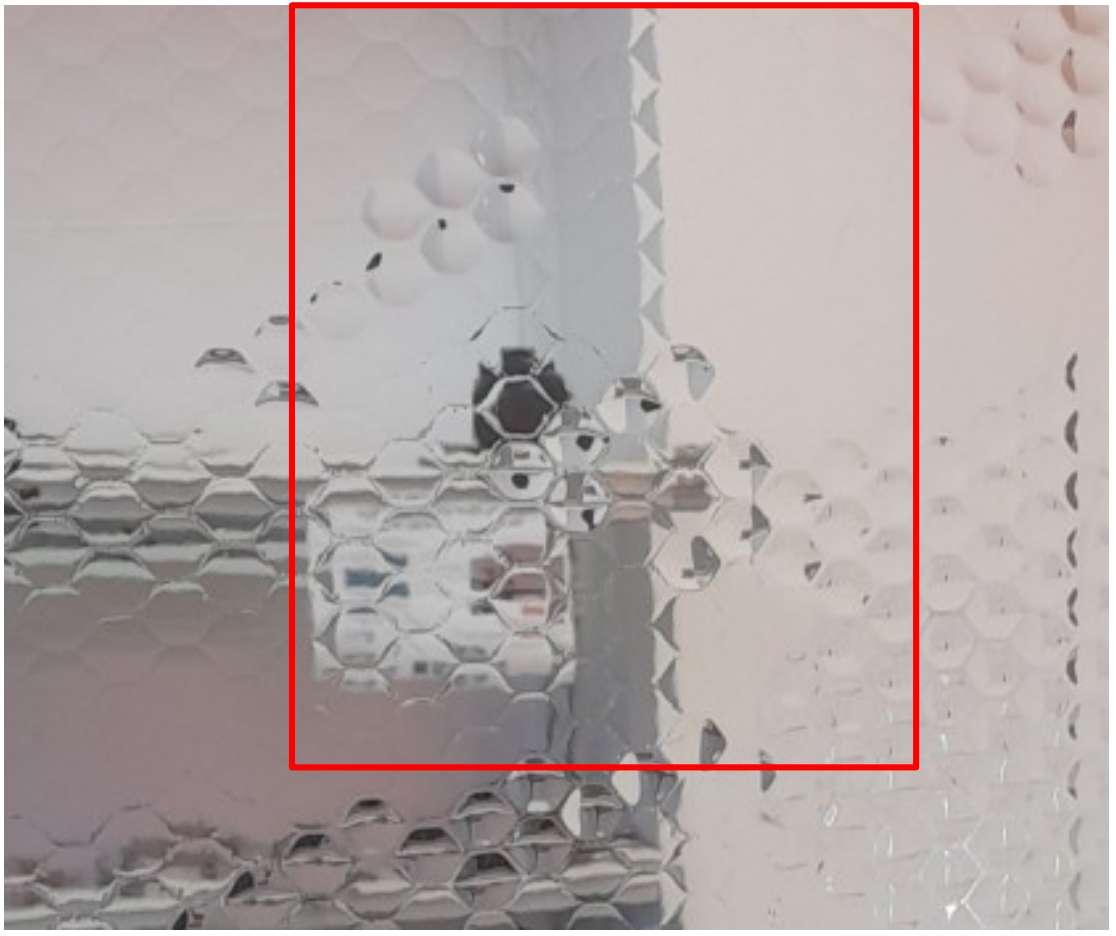
Middle of honeycomb cell

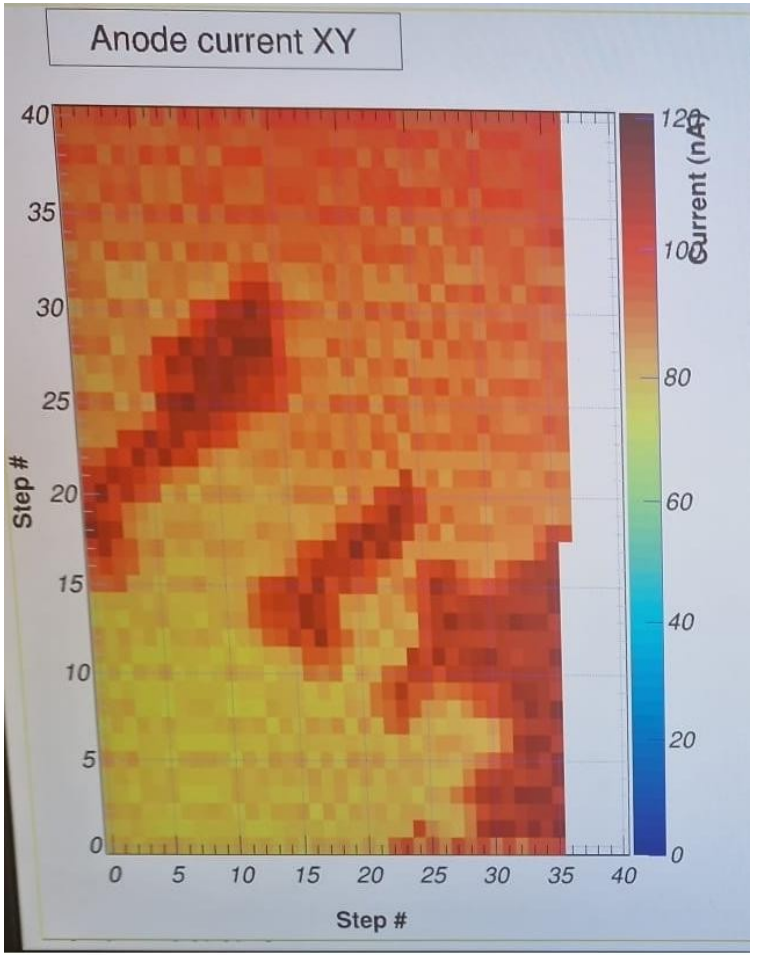




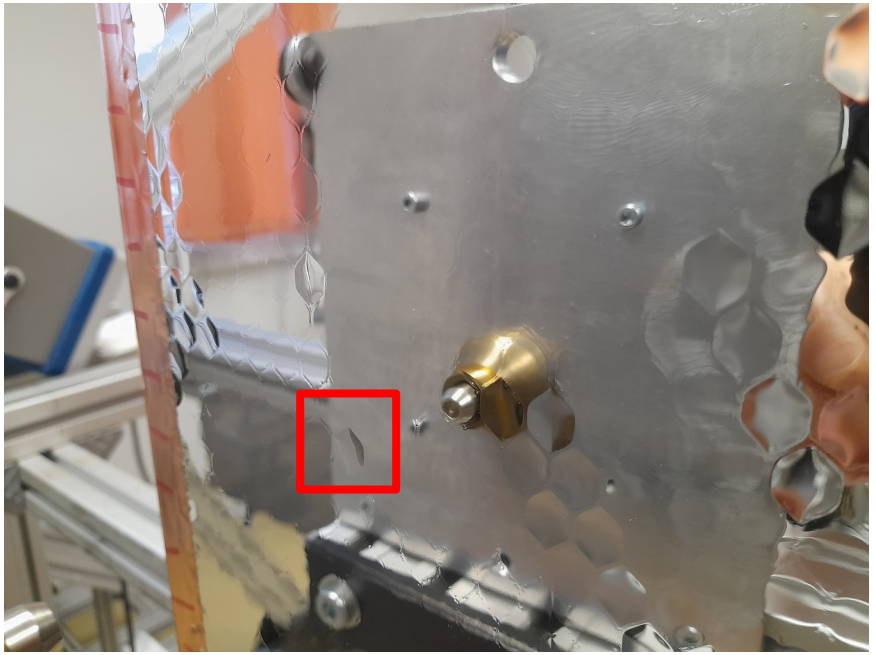

Anode current
Vertical step [mm]
Horizontal step [mm]
Current [nA]
0
5
10
15
20
25
0
20
40
60
80
100
120
140
160

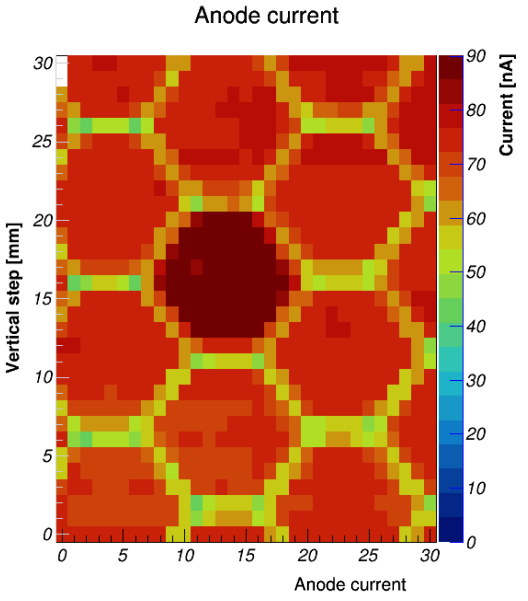
3 mm step scan

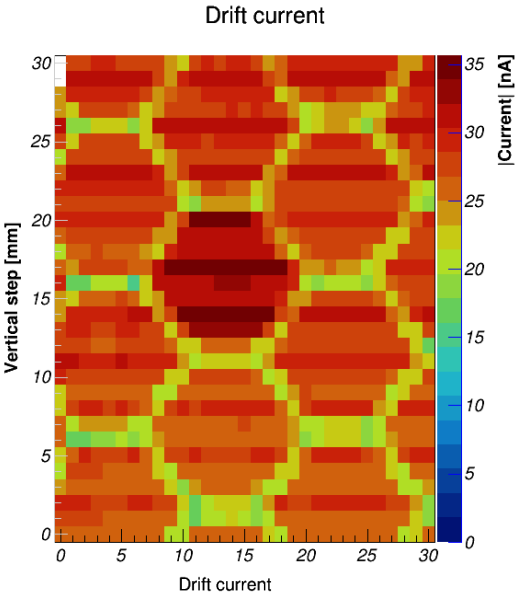


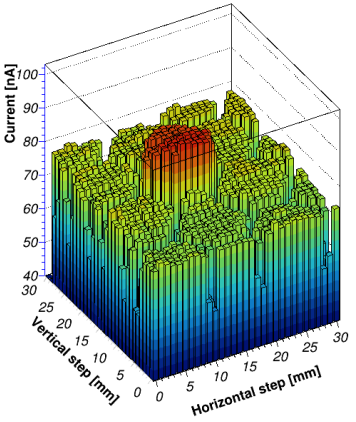


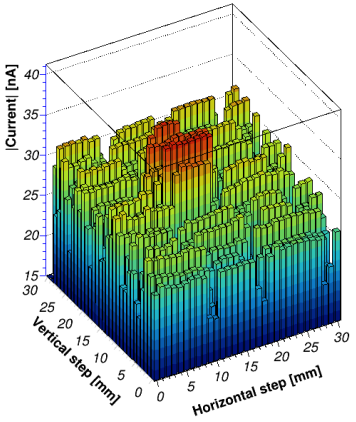
1 mm step 2D scan





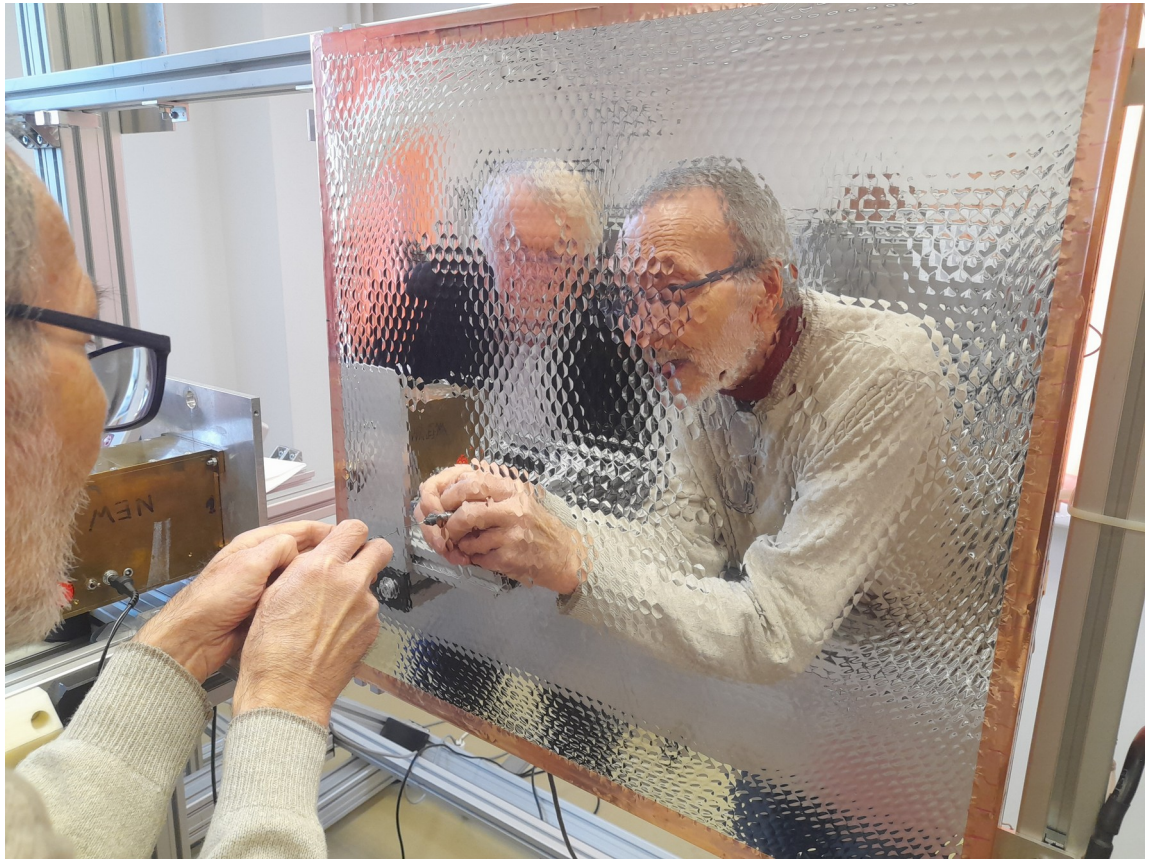






~80%

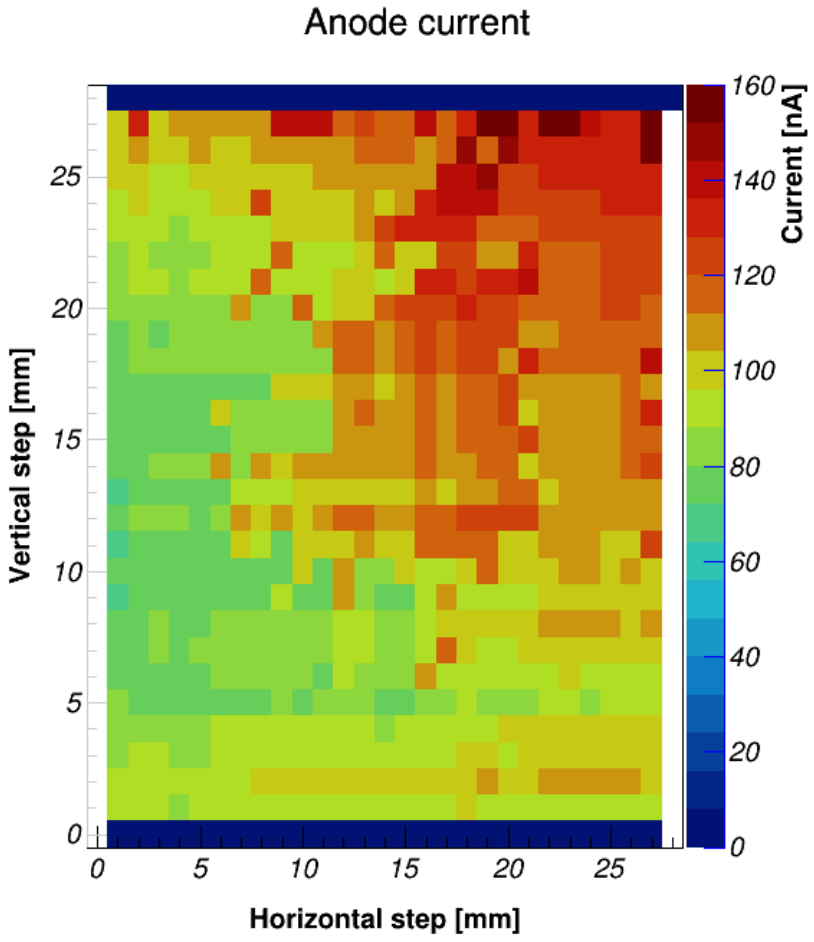
Connecting two honeycomb cells

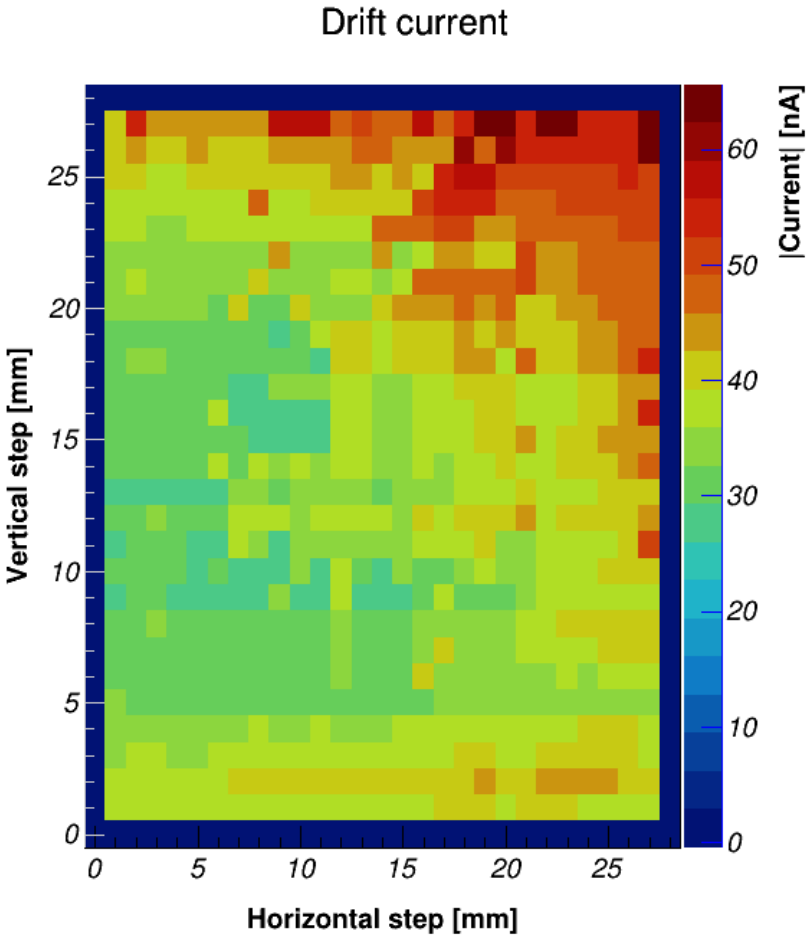


Before: 107 nA
After: 86 nA

Signal at 80%

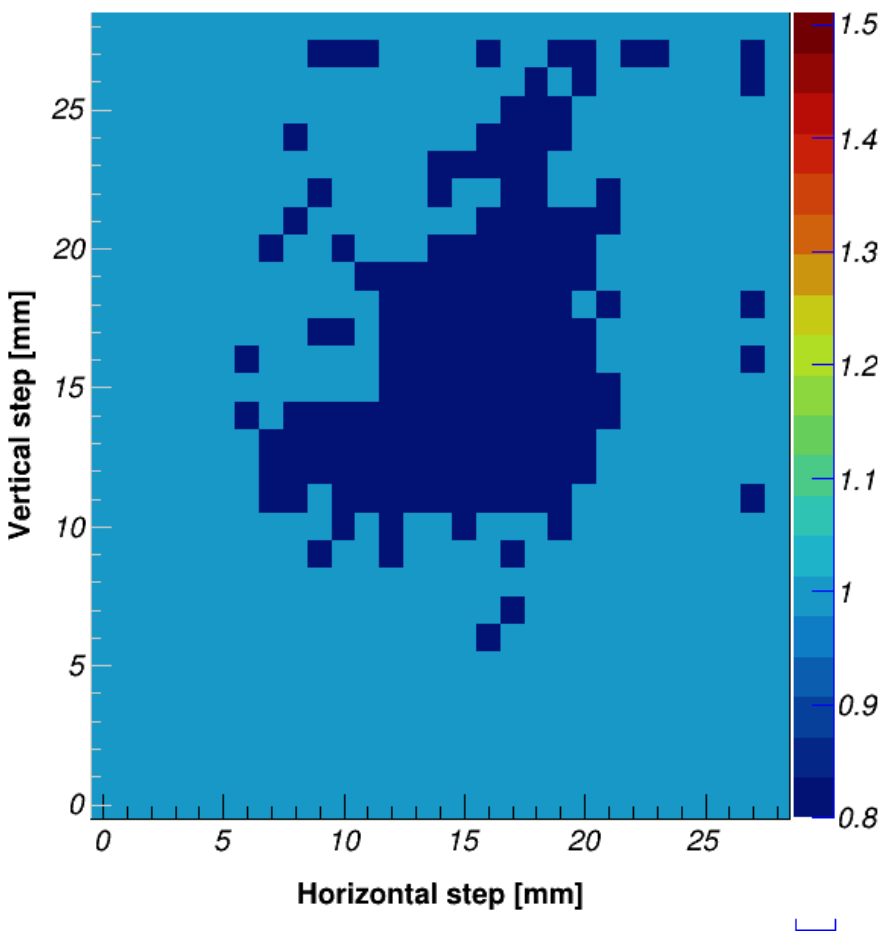
Before correction



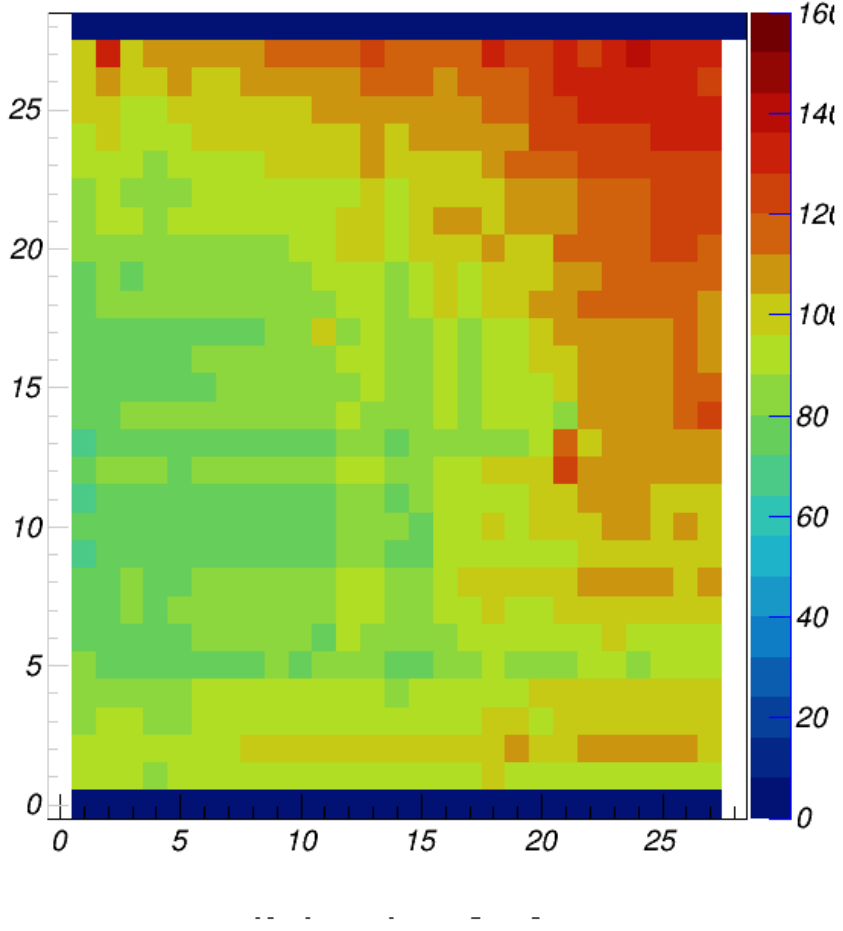


Single cell correction

0.8 correction map

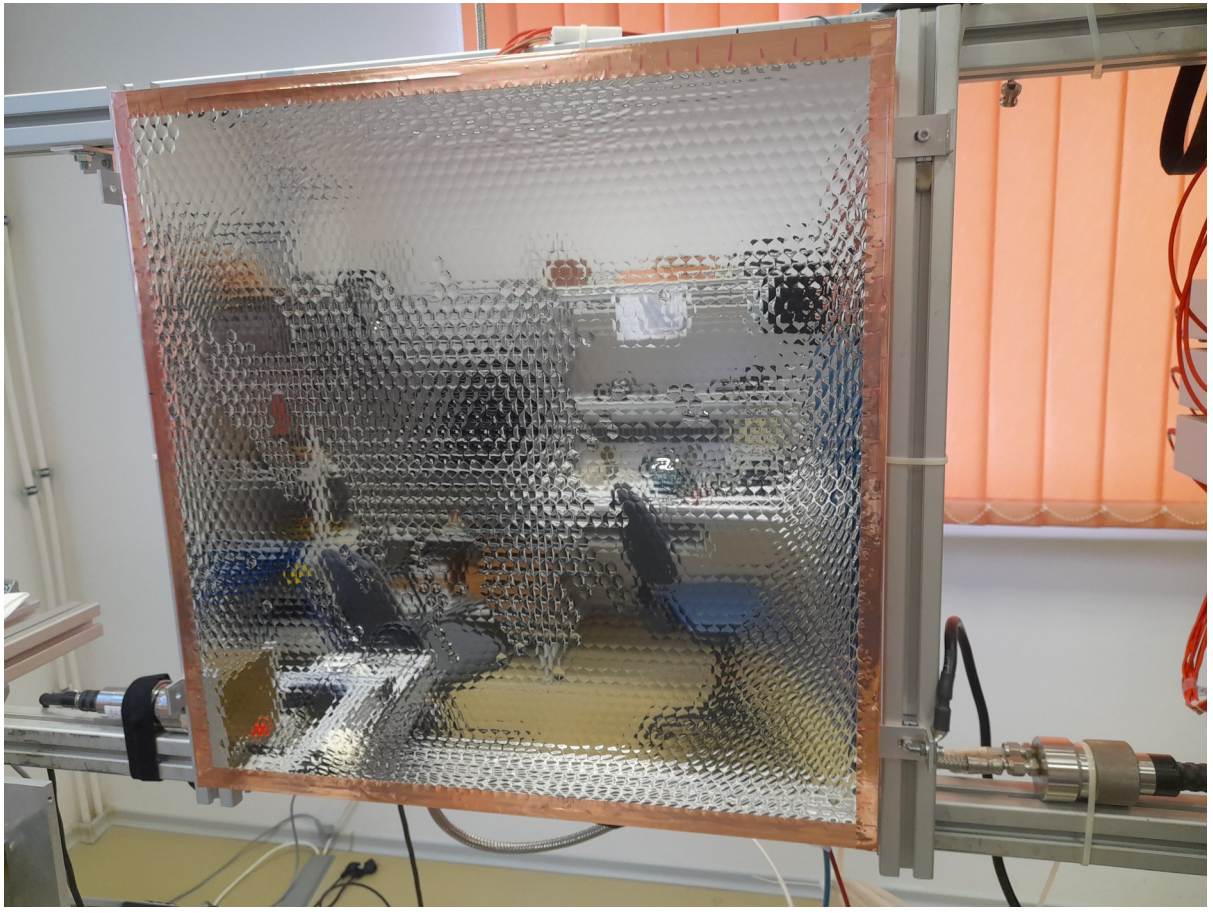


Anode current

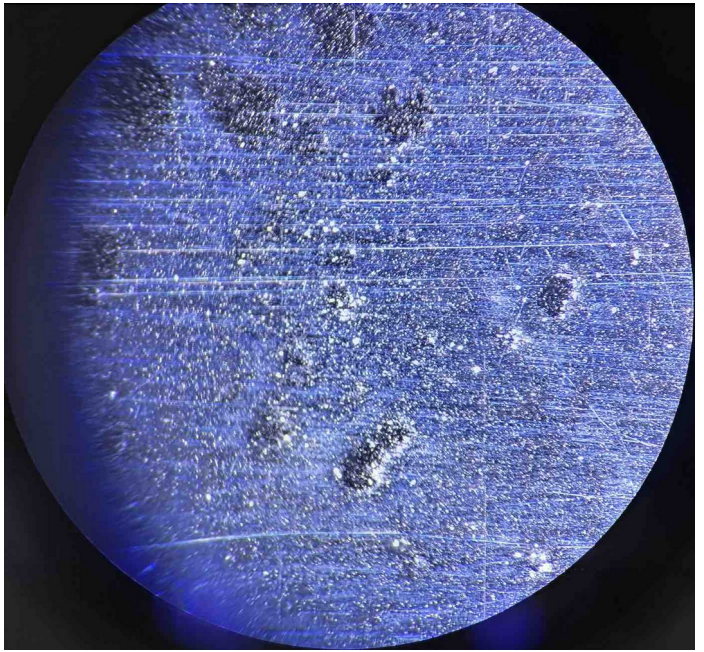


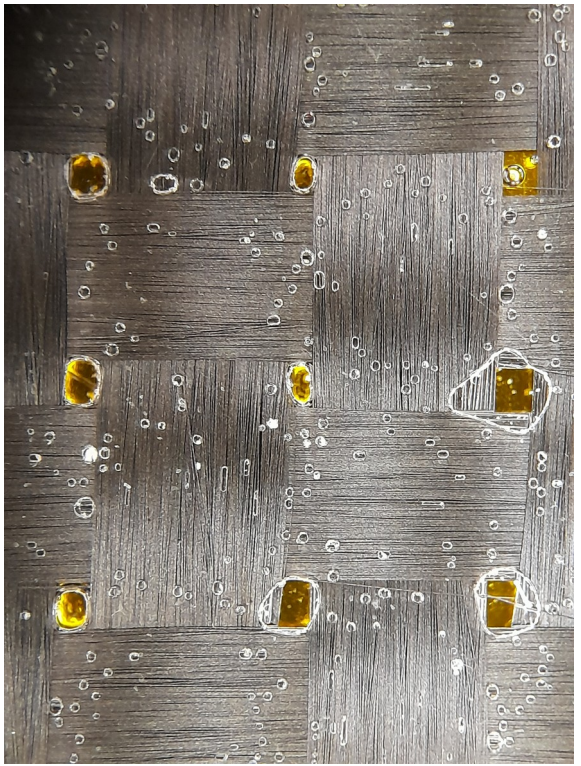
Not all points are corrected

Outside foil



Inside foil





Honeycomb bending