Testing New HMS Drift Chambers

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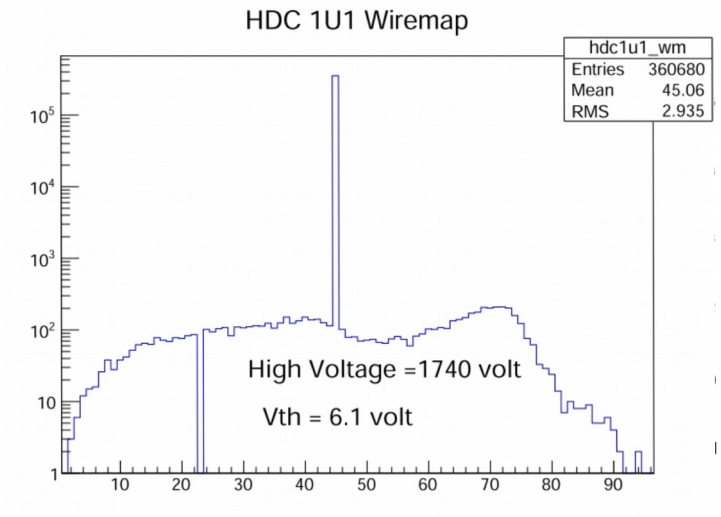
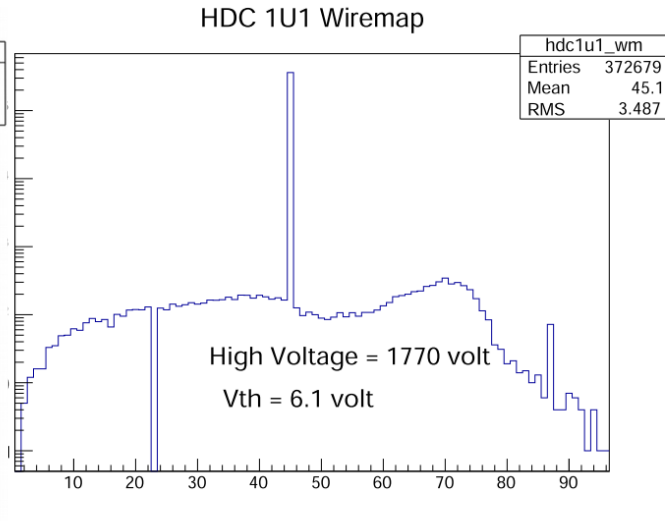
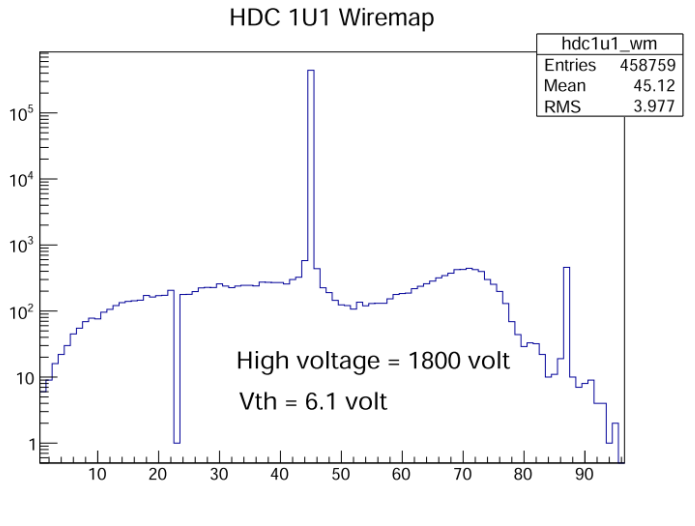
Outline

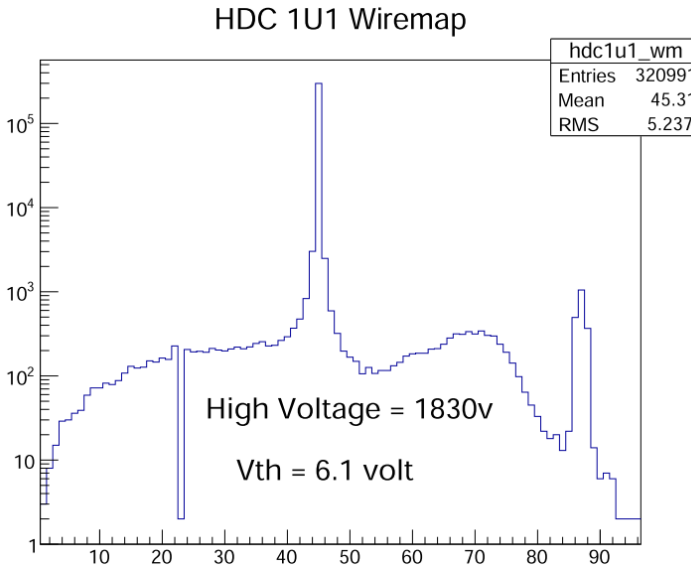
Threshold Voltage
High Voltage
Dark Current (Conditioning)
Efficiency VS Threshold and High Voltage
Problems with the Chamber
Conclusion

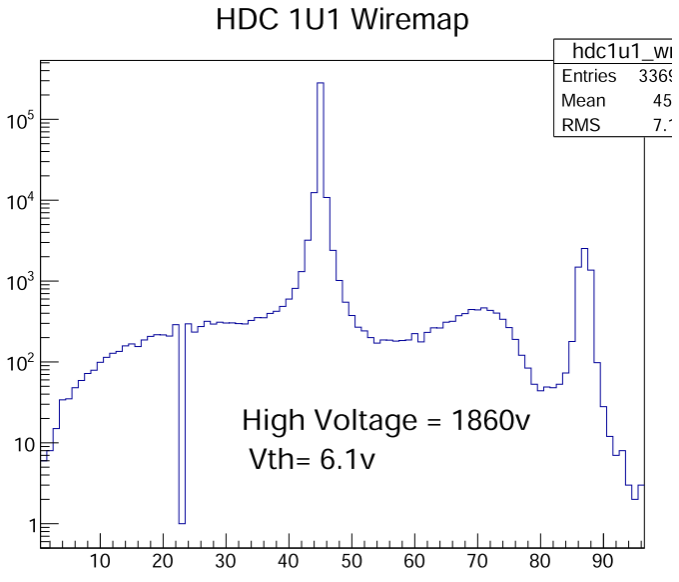
U Planes at Different Voltages

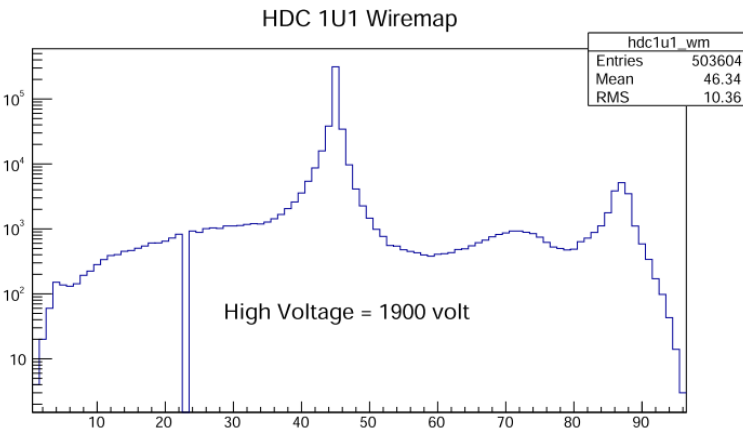




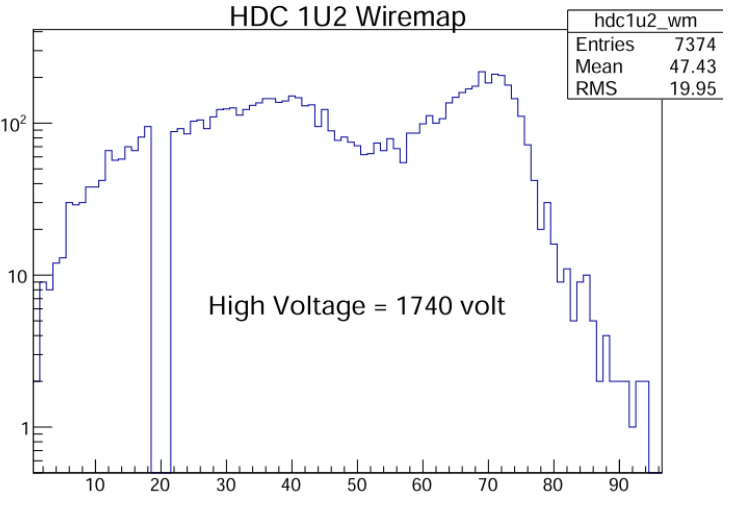


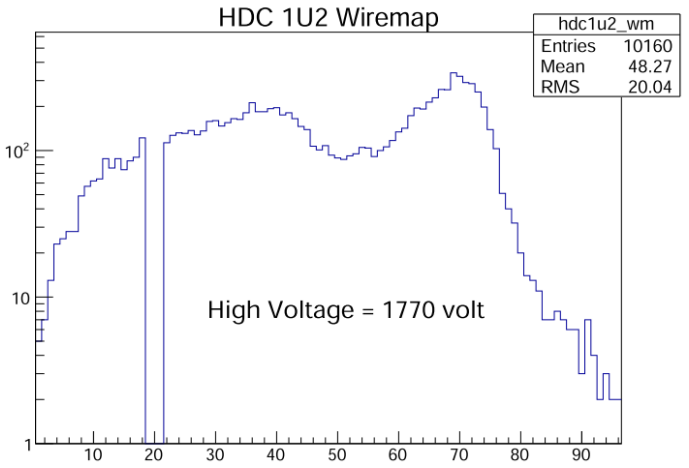


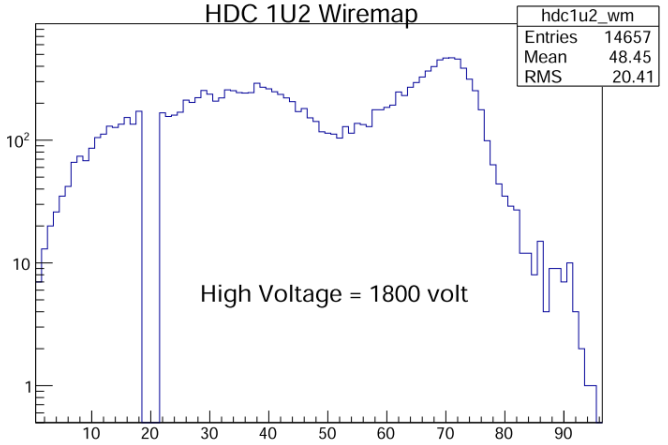


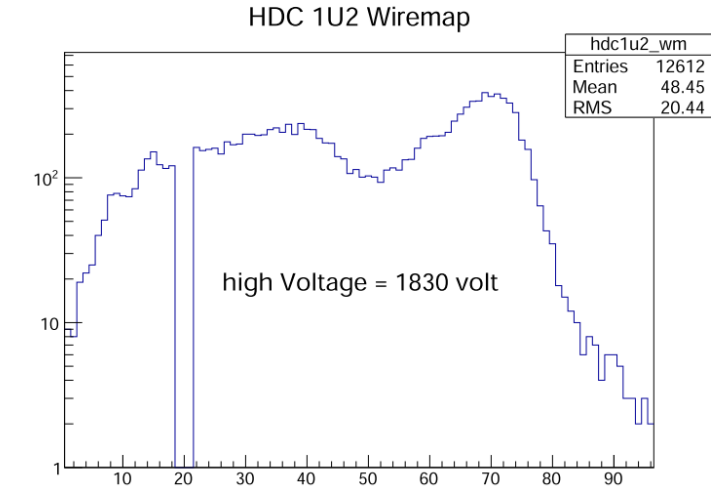


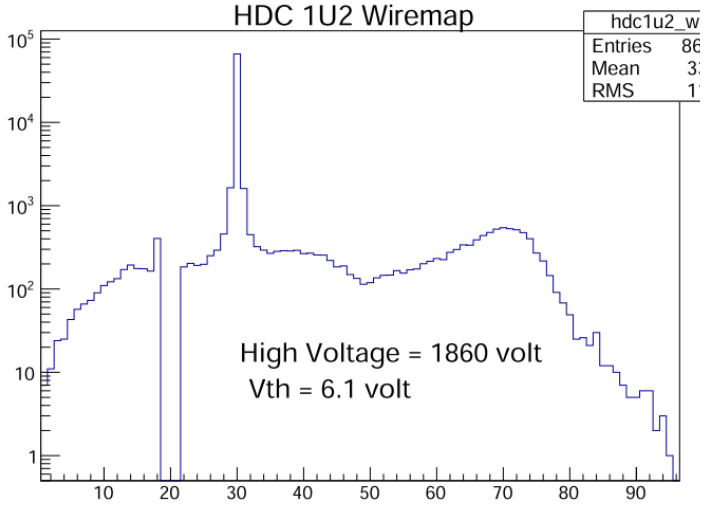
U’ Planes at Different Voltages

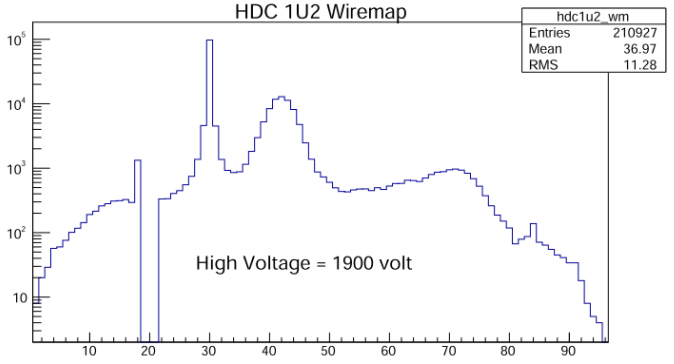




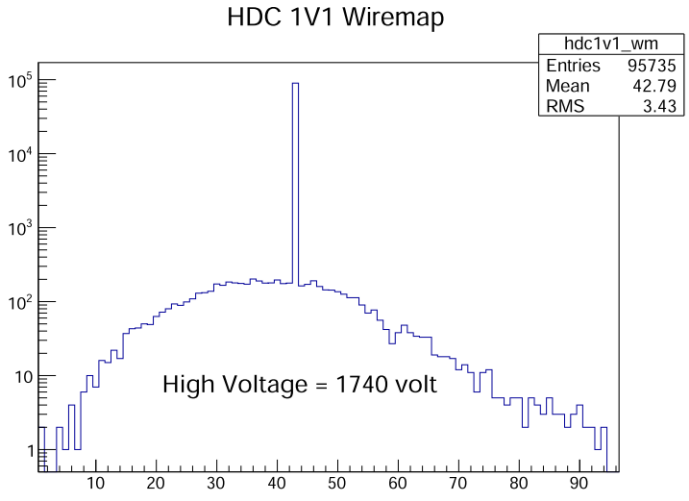


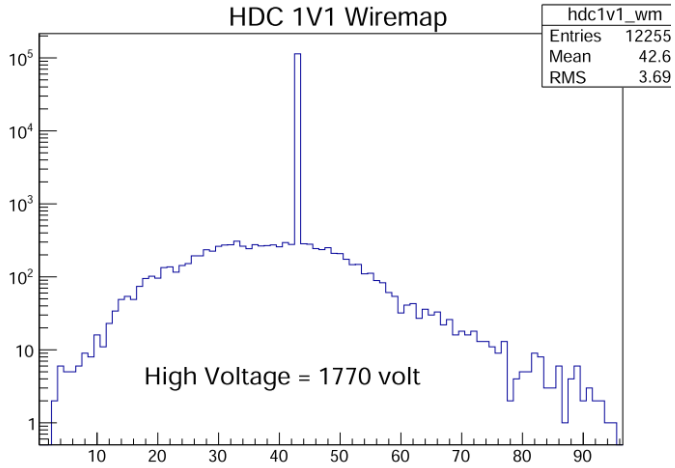


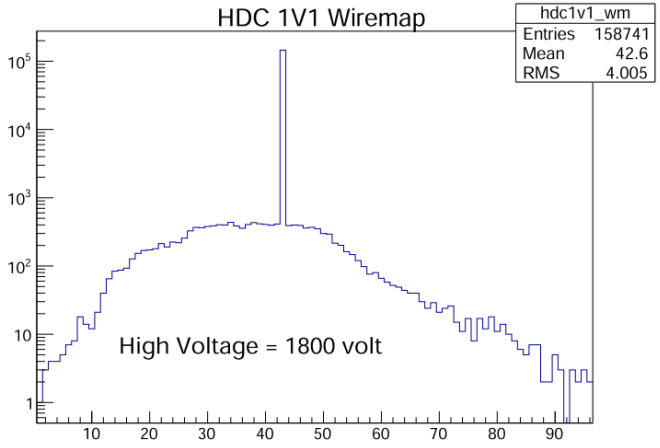


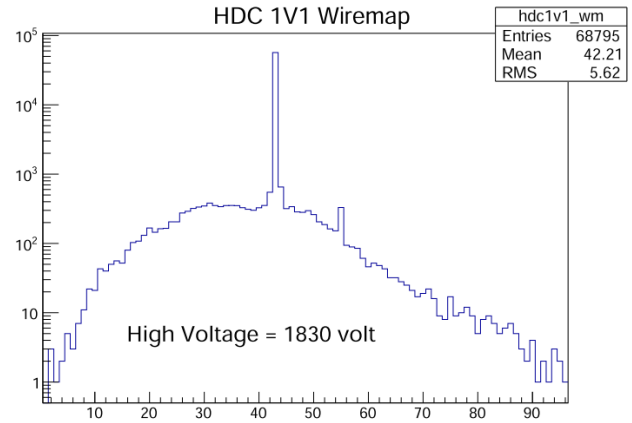


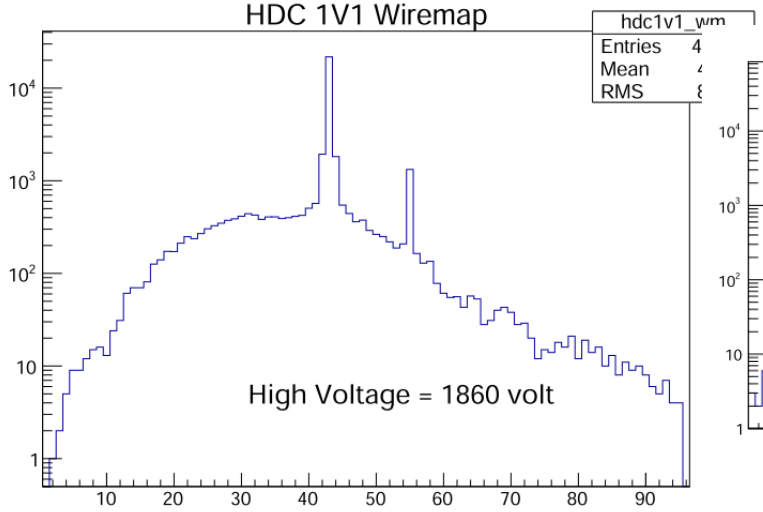
V Planes at Different Voltages

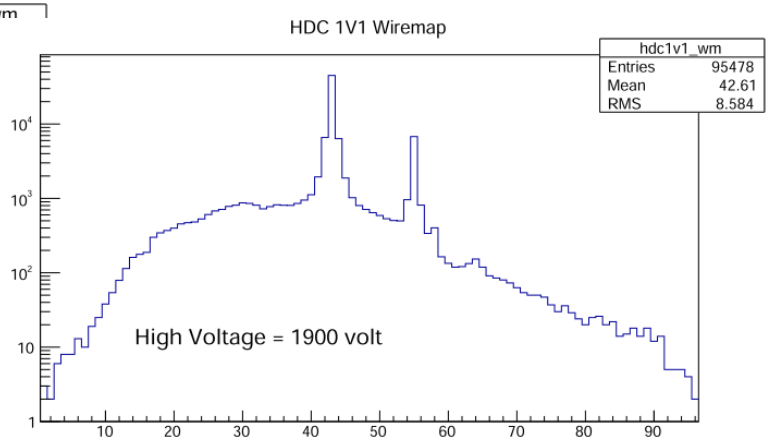




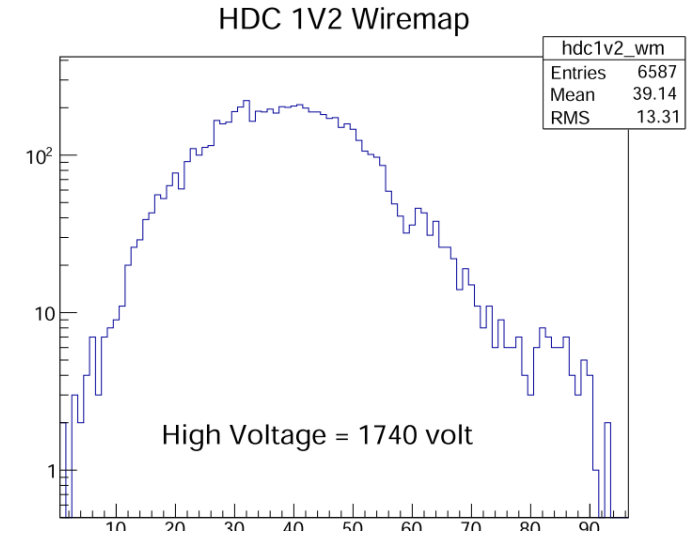


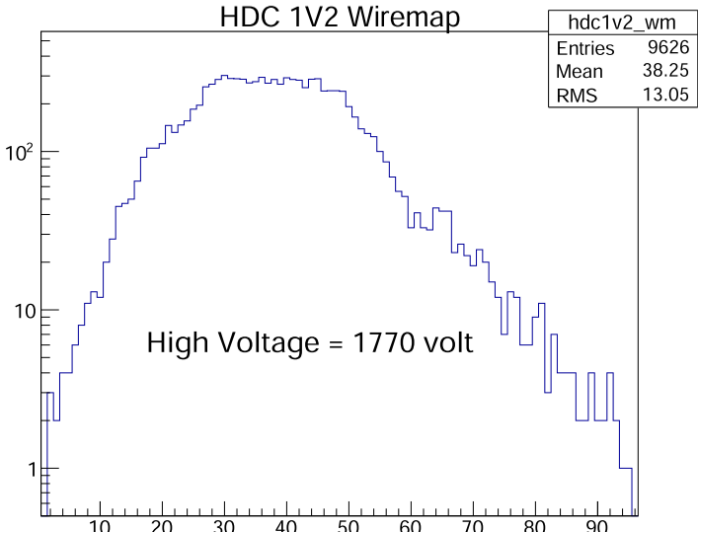


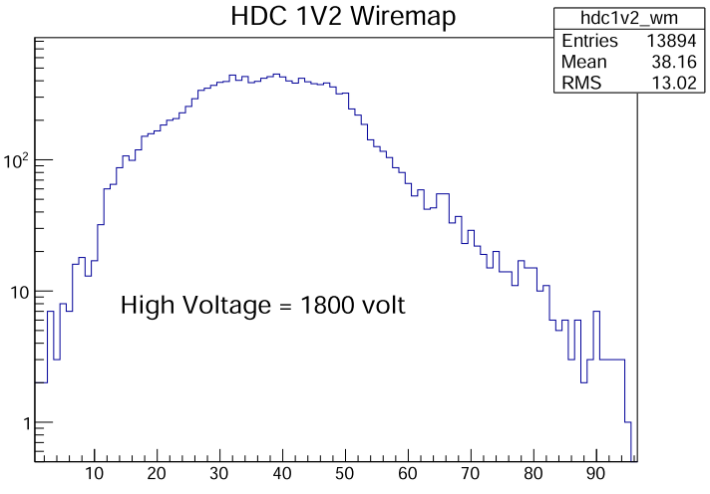


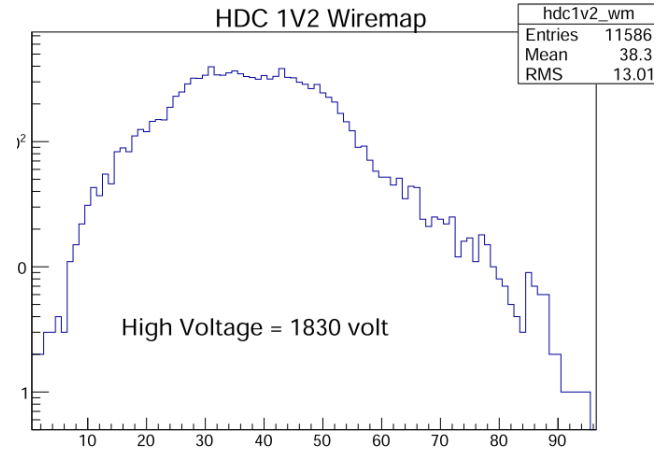


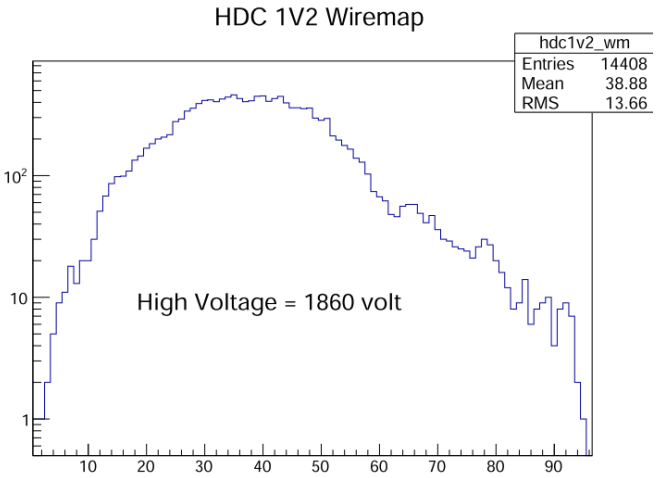
V’ Planes at Different Voltages

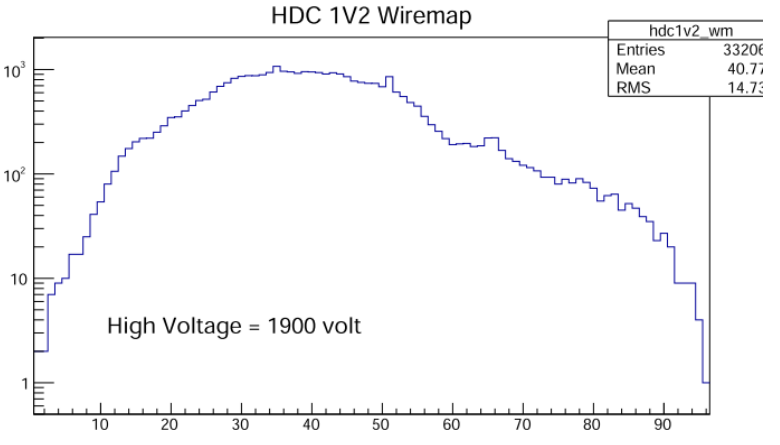




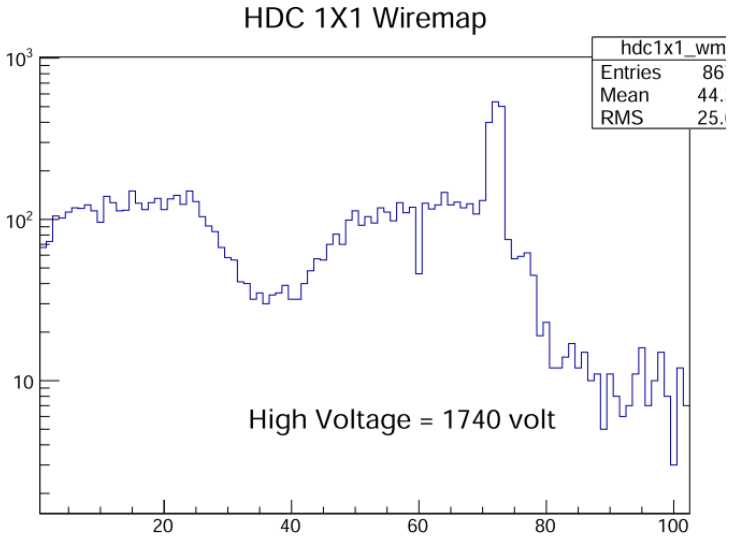


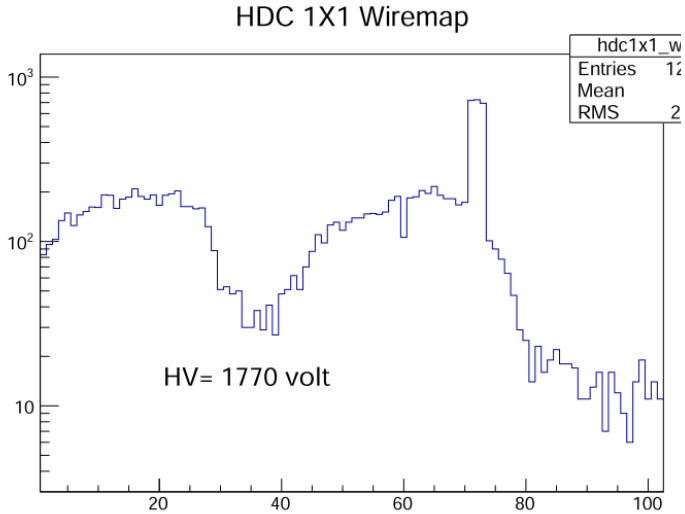


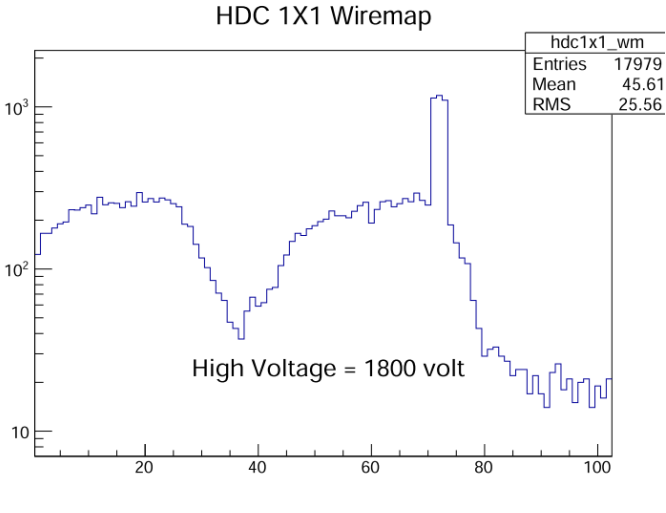


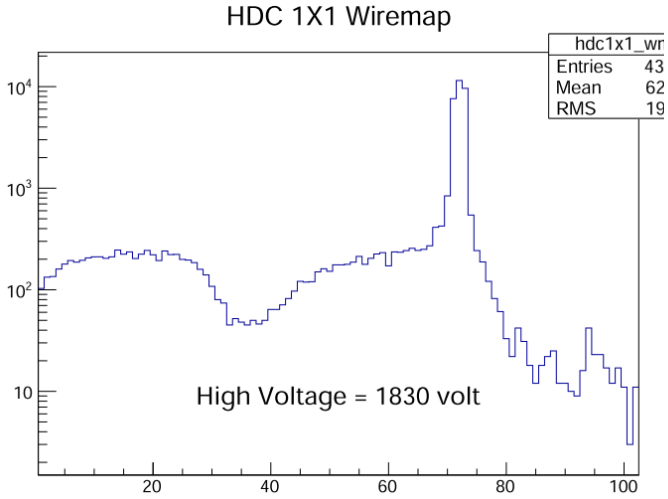


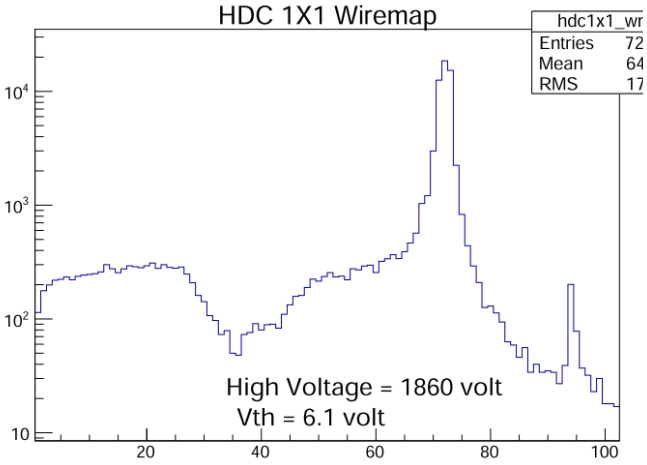
X Planes at Different Voltages

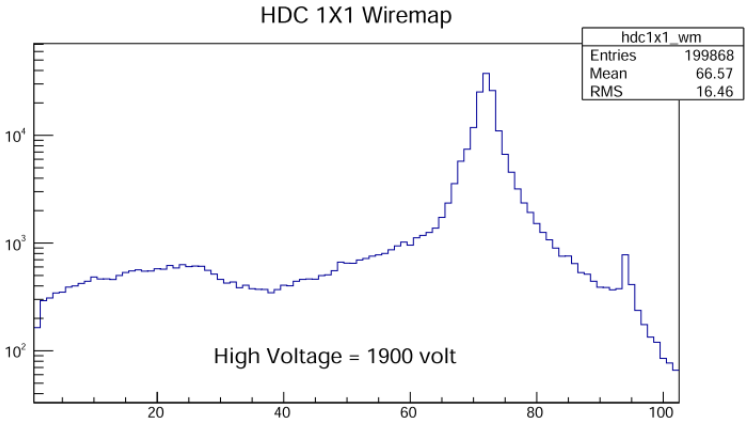




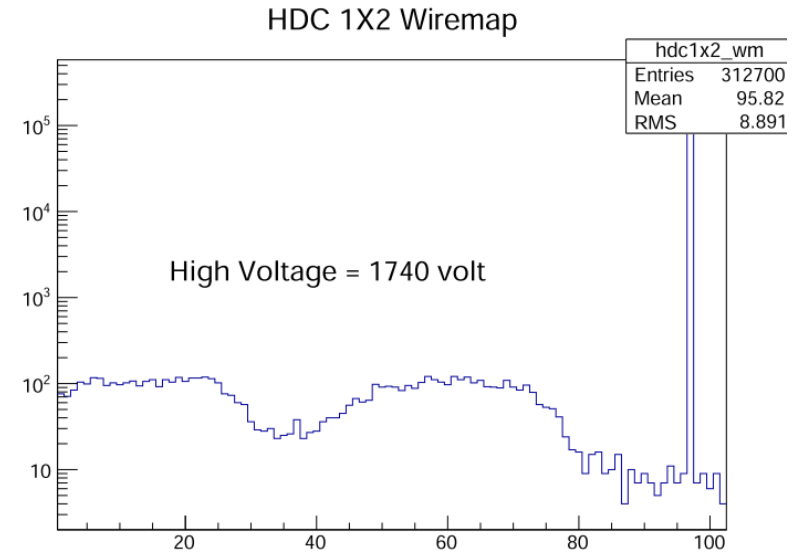


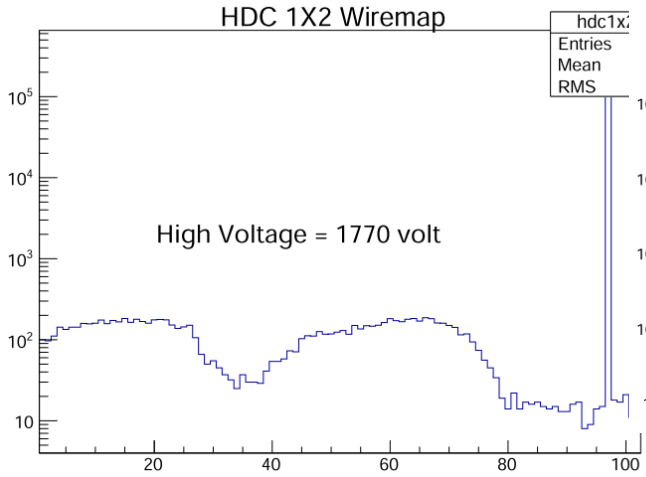


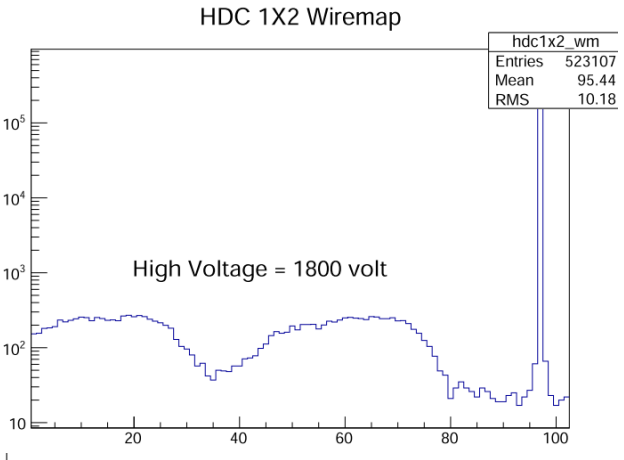


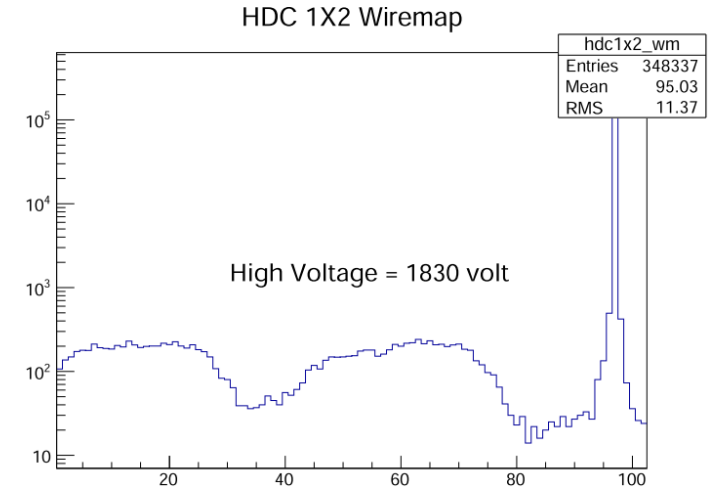


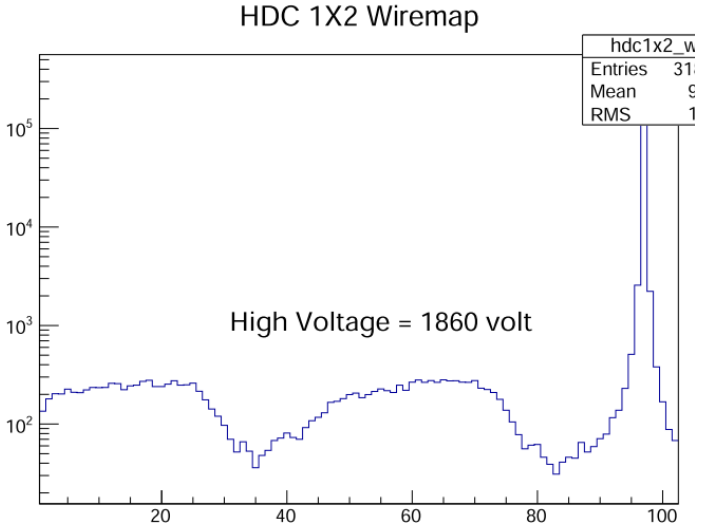
X’ Planes at Different Voltages

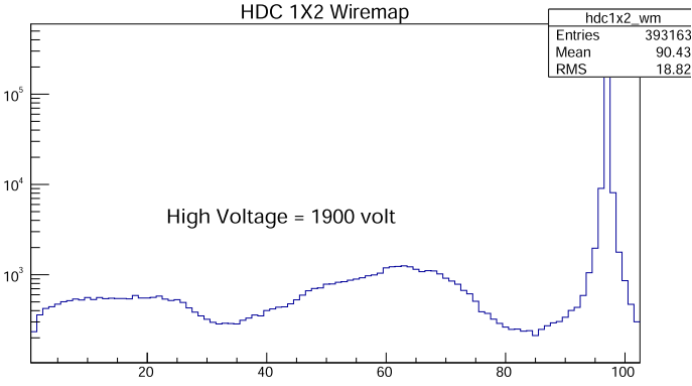




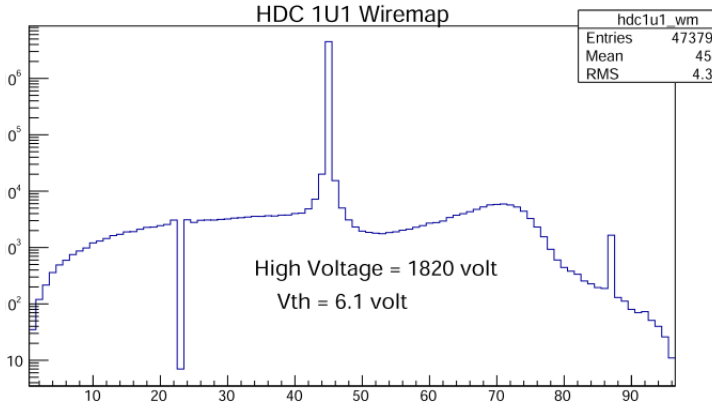


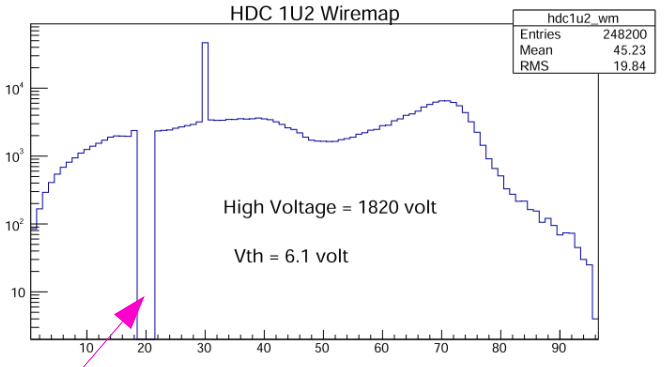


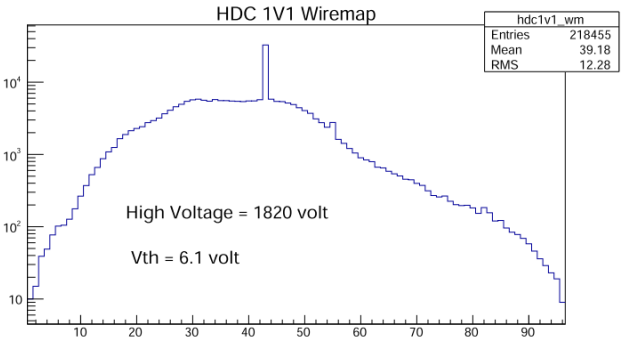


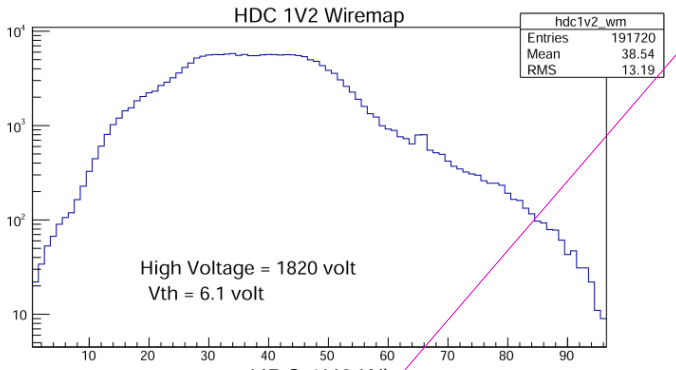


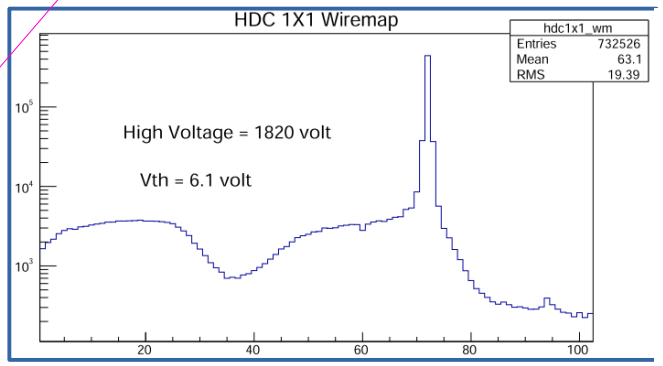
Overnight Run

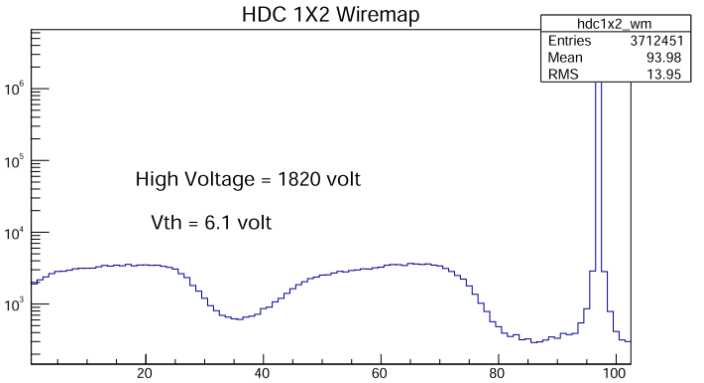


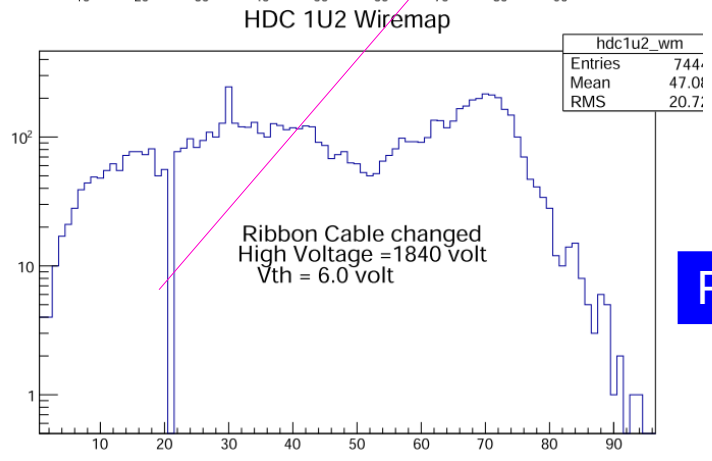






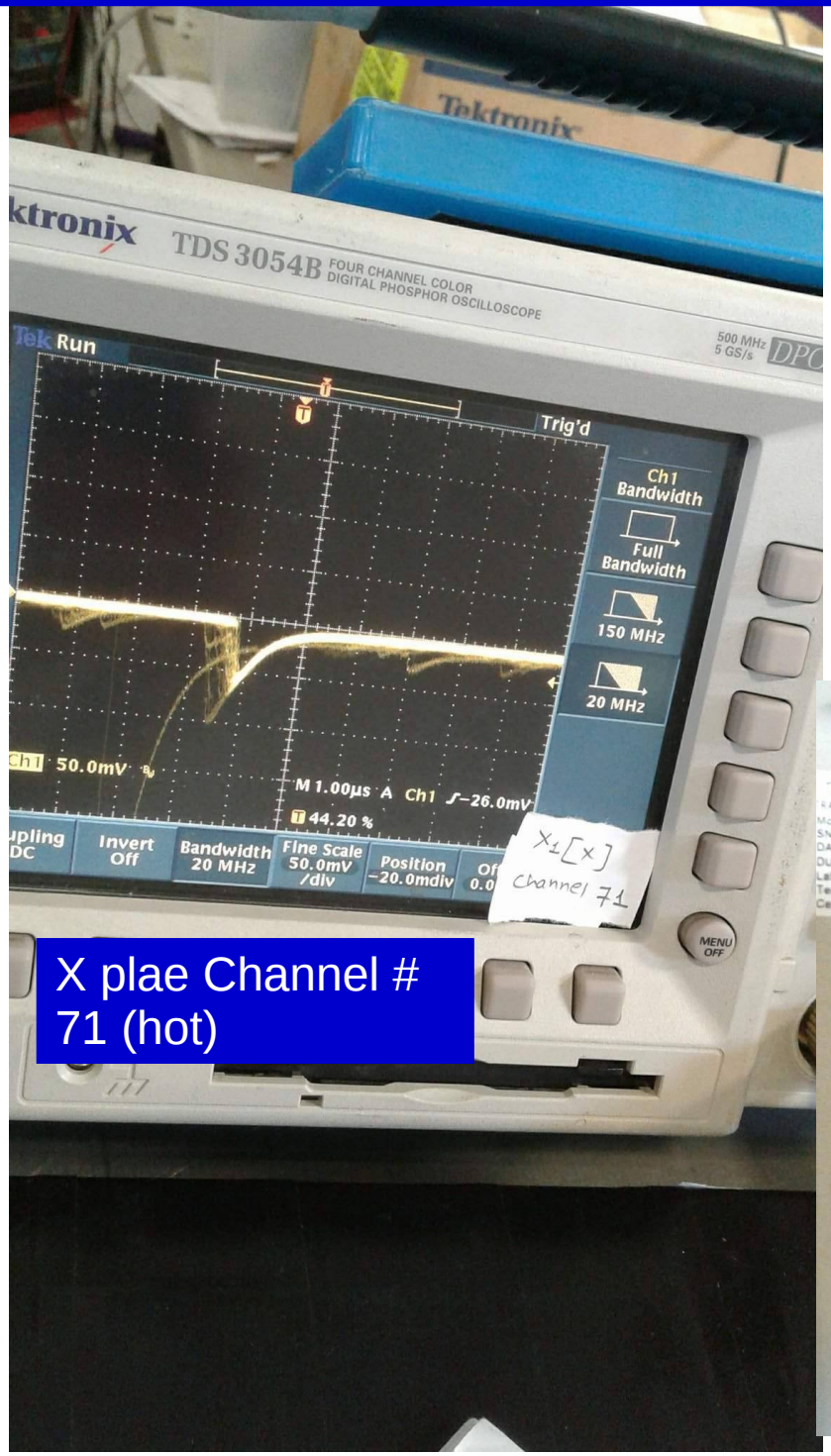




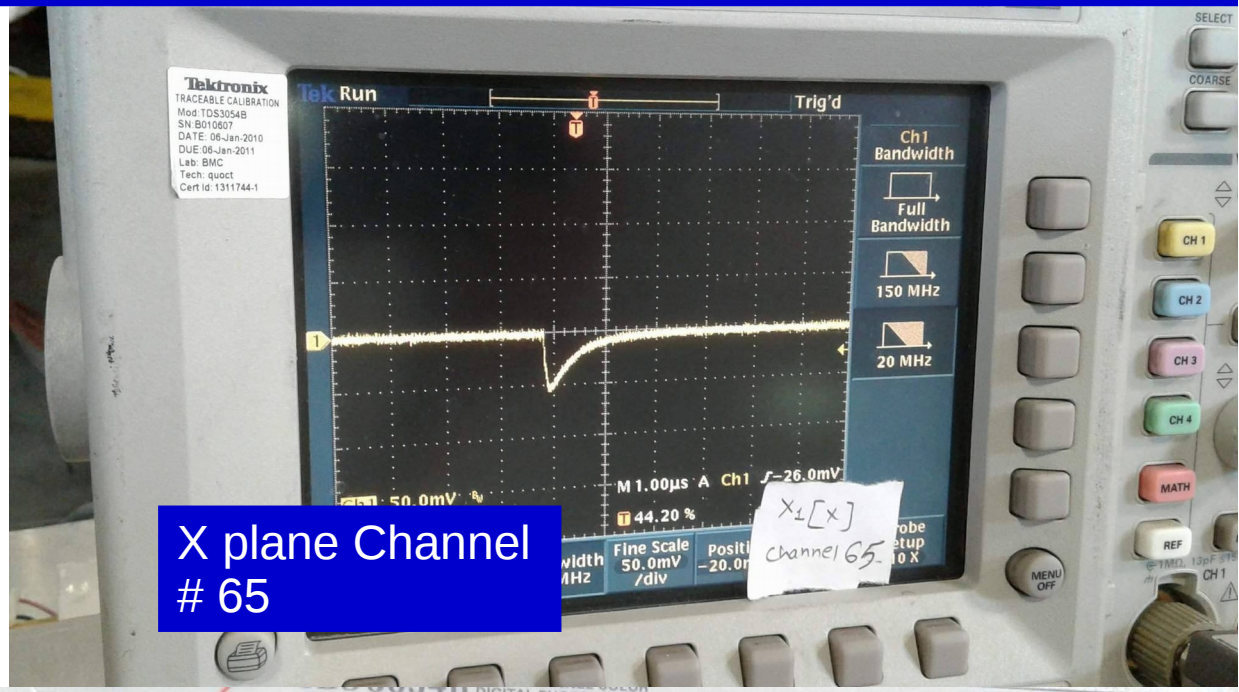


Ribbon cable changed.

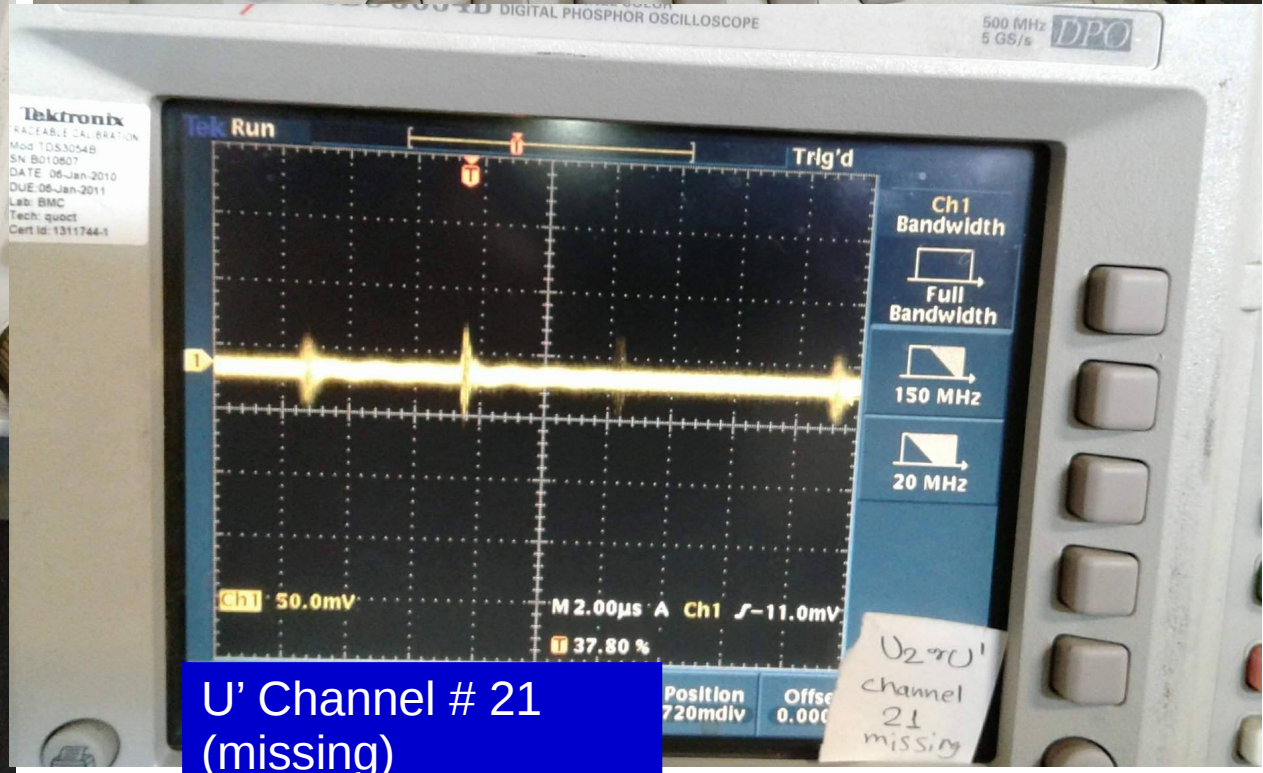
Test with Oscilloscope



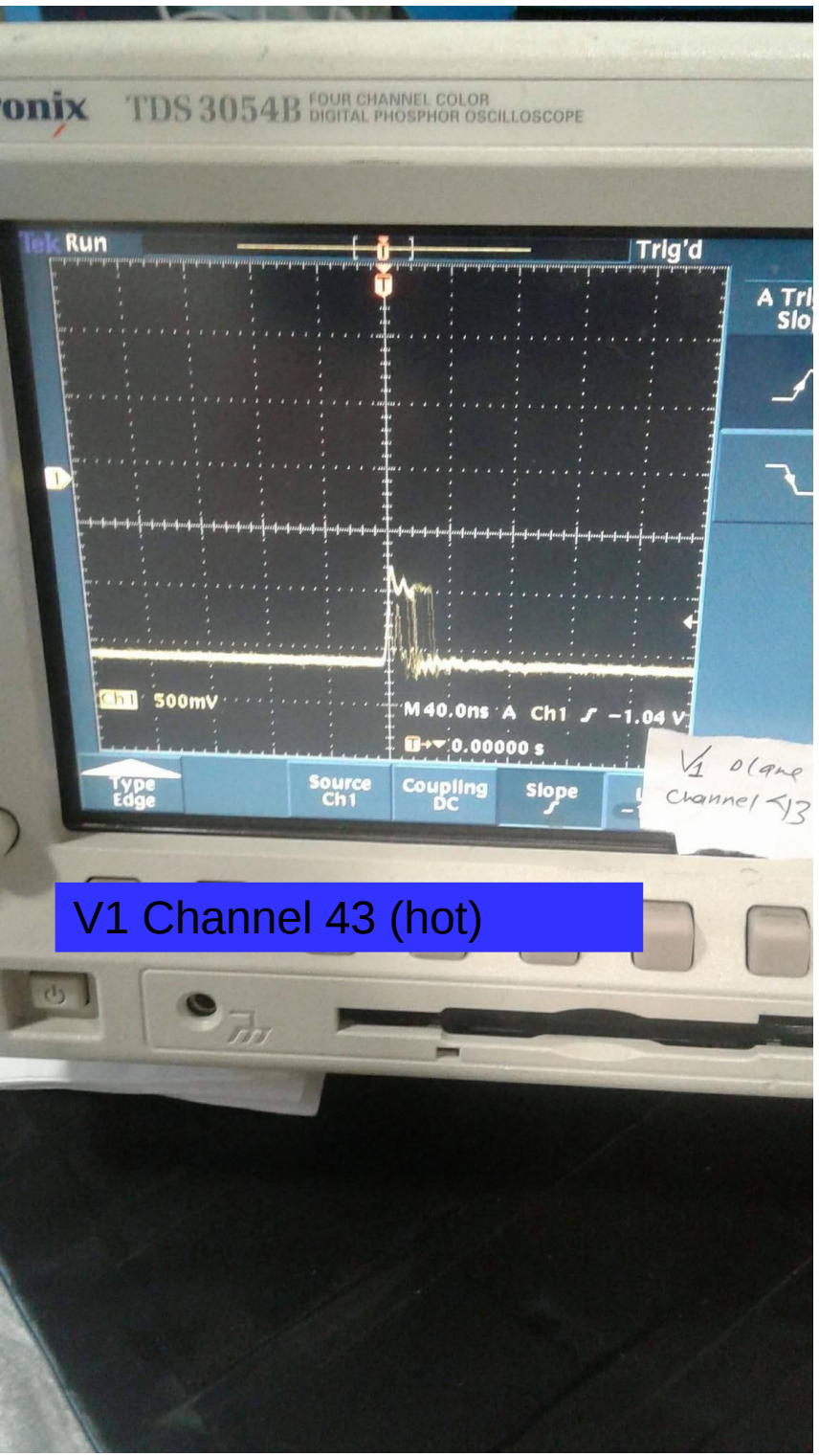
X plae Channel # 71 (hot)



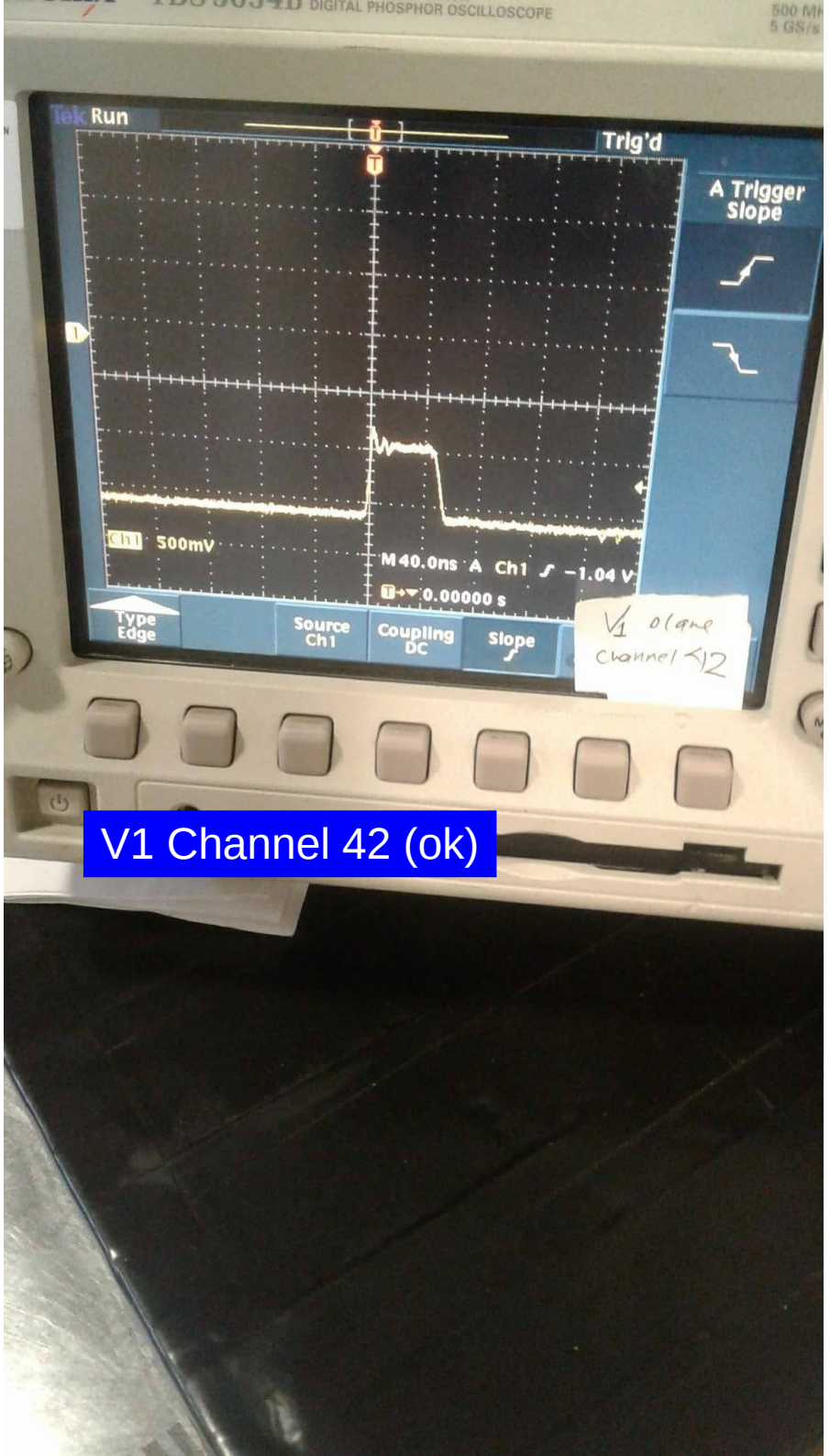
X plane Channel # 65



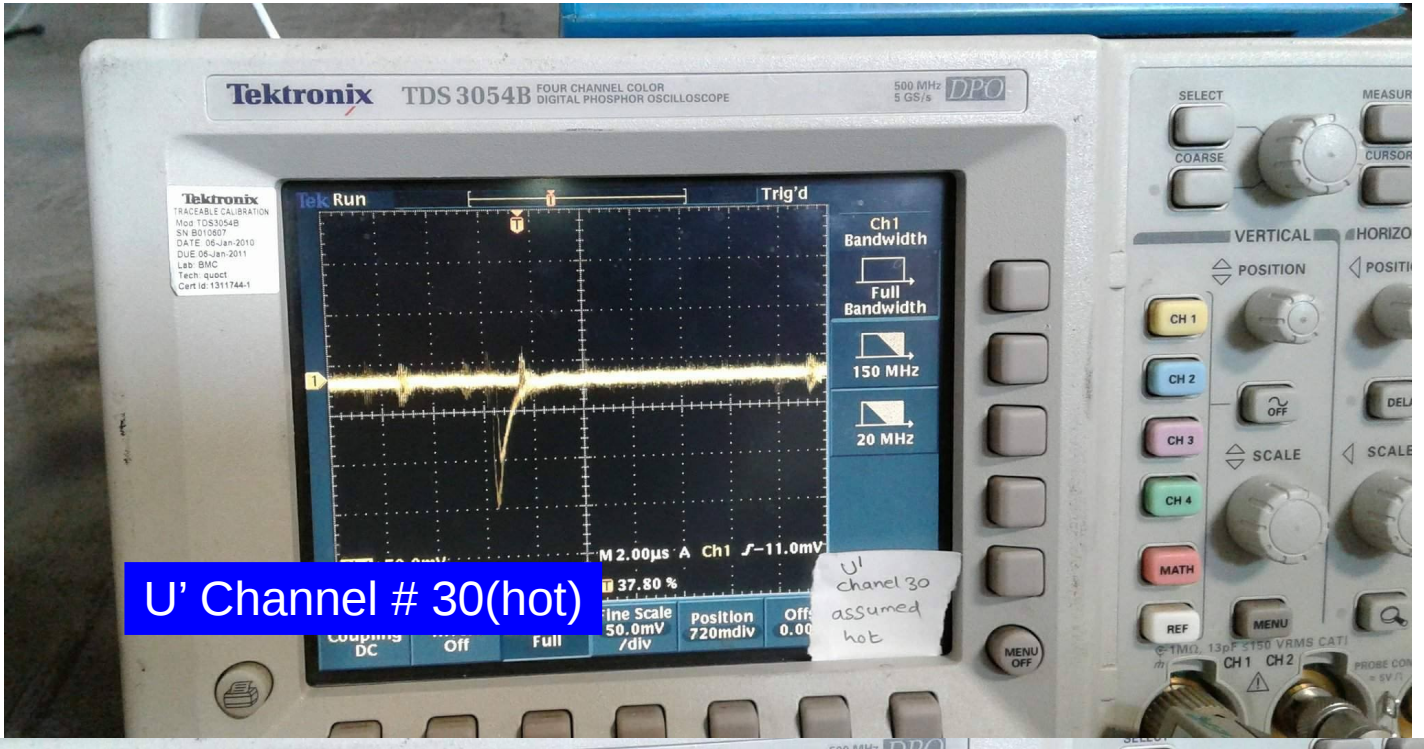
U' Channel # 21 (missing)

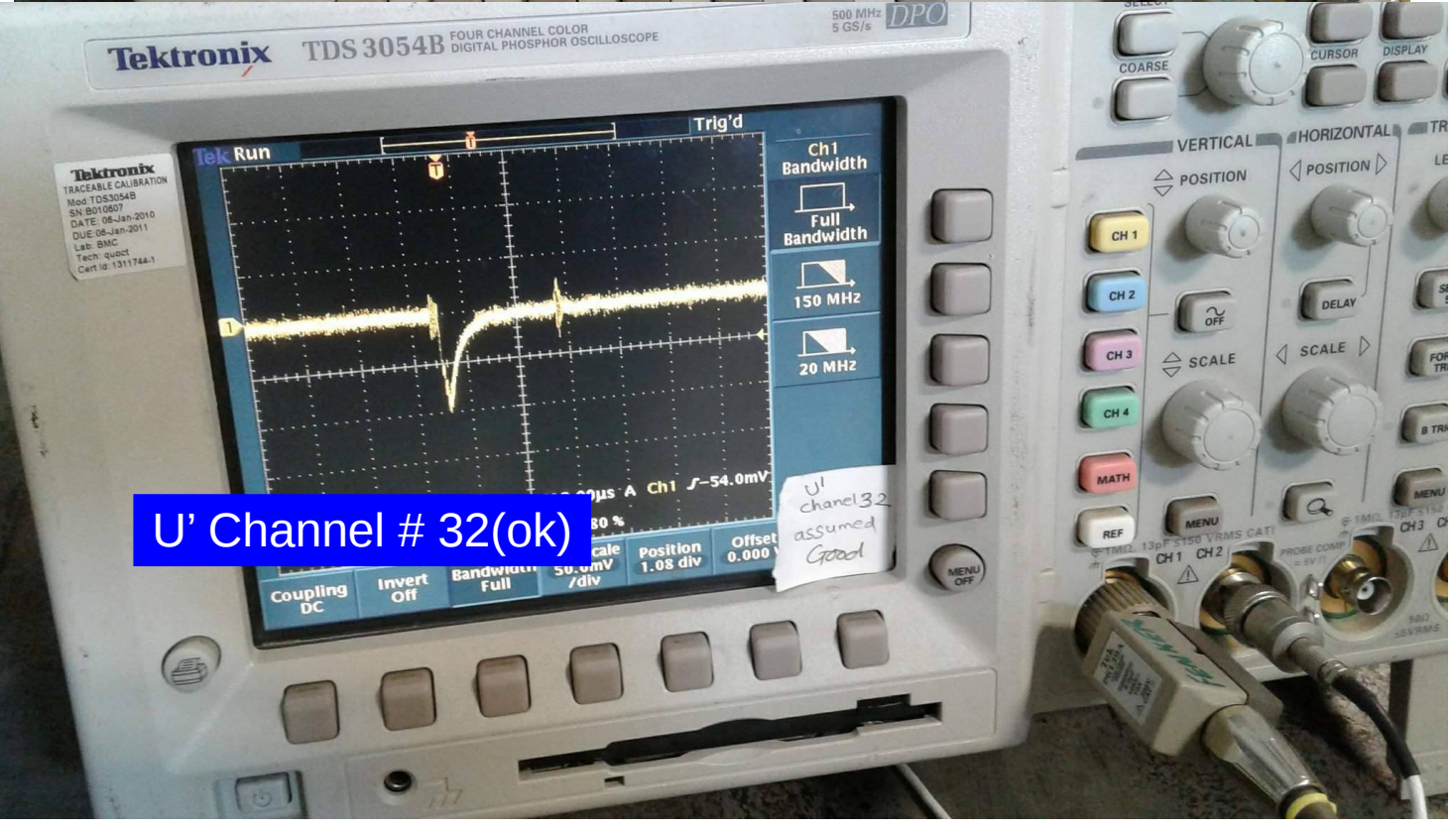


V1 Channel 43 (hot)



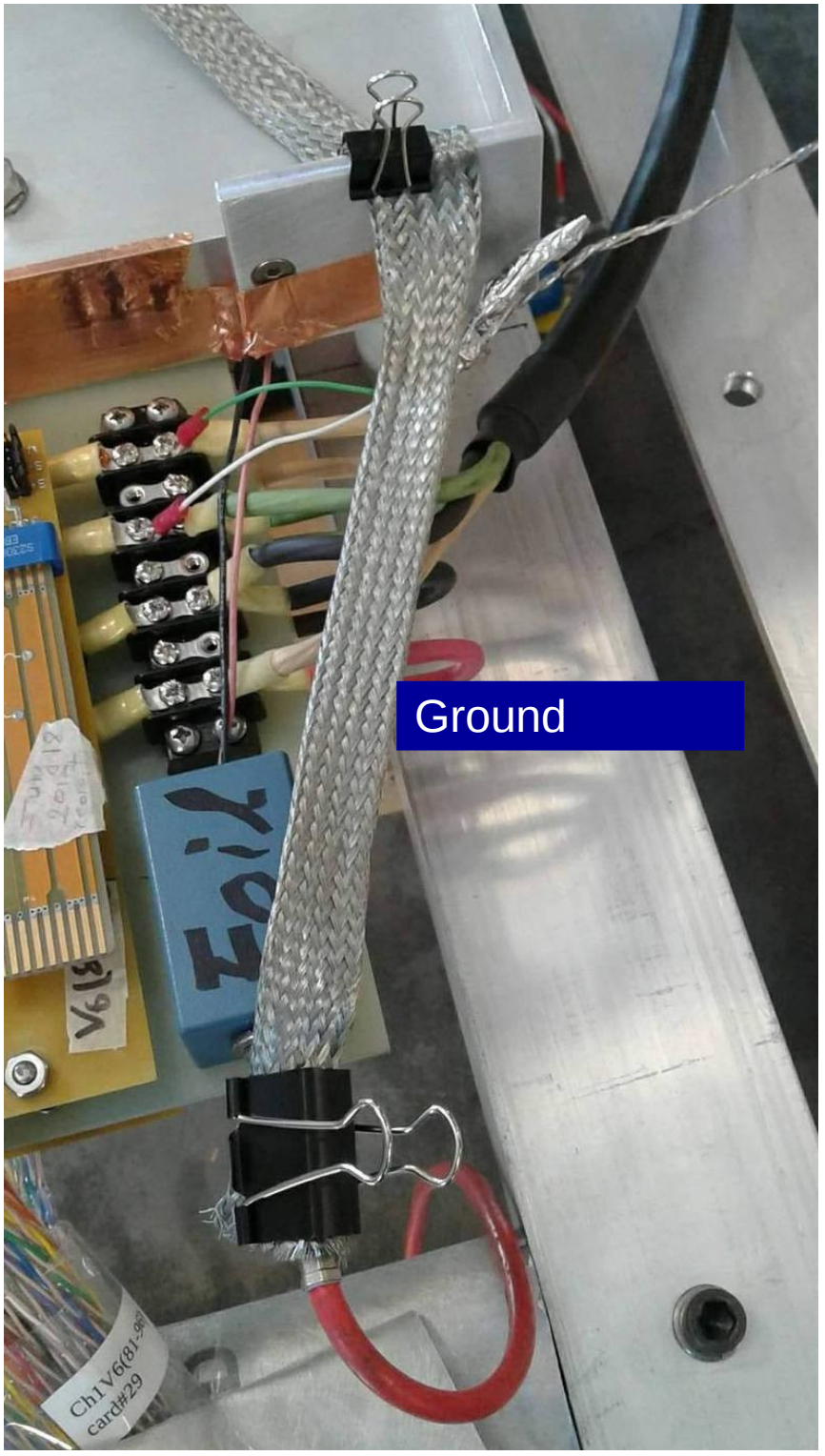
V1 Channel 42 (ok)


Tektronix TDS 3054B FOUR CHANNEL COLOR DIGITAL PHOSPHOR OSCILLOSCOPE
500 MHz 5 GS/s DPO
Tek Run
Trig'd
Ch1 Bandwidth
Full Bandwidth
150 MHz
20 MHz
M 2.00µs A Ch1 ƒ -11.0mV
37.80 %
U' chanel 30 assumed hot
Position 720mdiv
VERTICAL
POSITION
SCALE
CH 1
CH 2
CH 3
CH 4
MATH
REF
MENU
U' Channel # 30(hot)

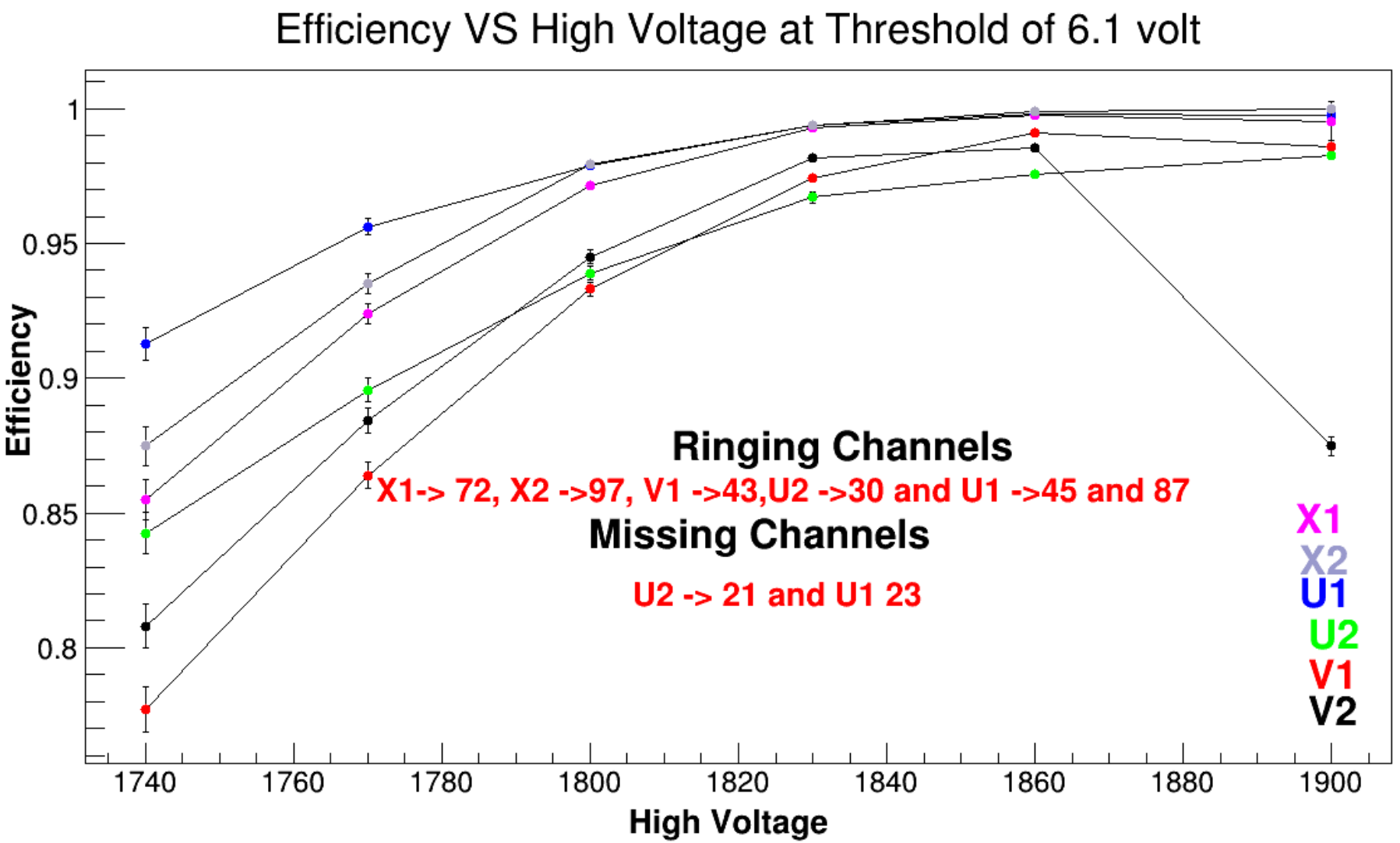

Tektronix TDS 3054B FOUR CHANNEL COLOR DIGITAL PHOSPHOR OSCILLOSCOPE
500 MHz 5 GS/s DPO
Tek Run
Trig'd
Ch1 Bandwidth
Full Bandwidth
150 MHz
20 MHz
A Ch1 ƒ -54.0mV
U' chanel 32 assumed Good
Coupling DC
Invert Off
Position 1.08 div
VERTICAL
HORIZONTAL
POSITION
SCALE
DELAY
CH 1
CH 2
CH 3
CH 4
MATH
REF
MENU
U' Channel # 32(ok)

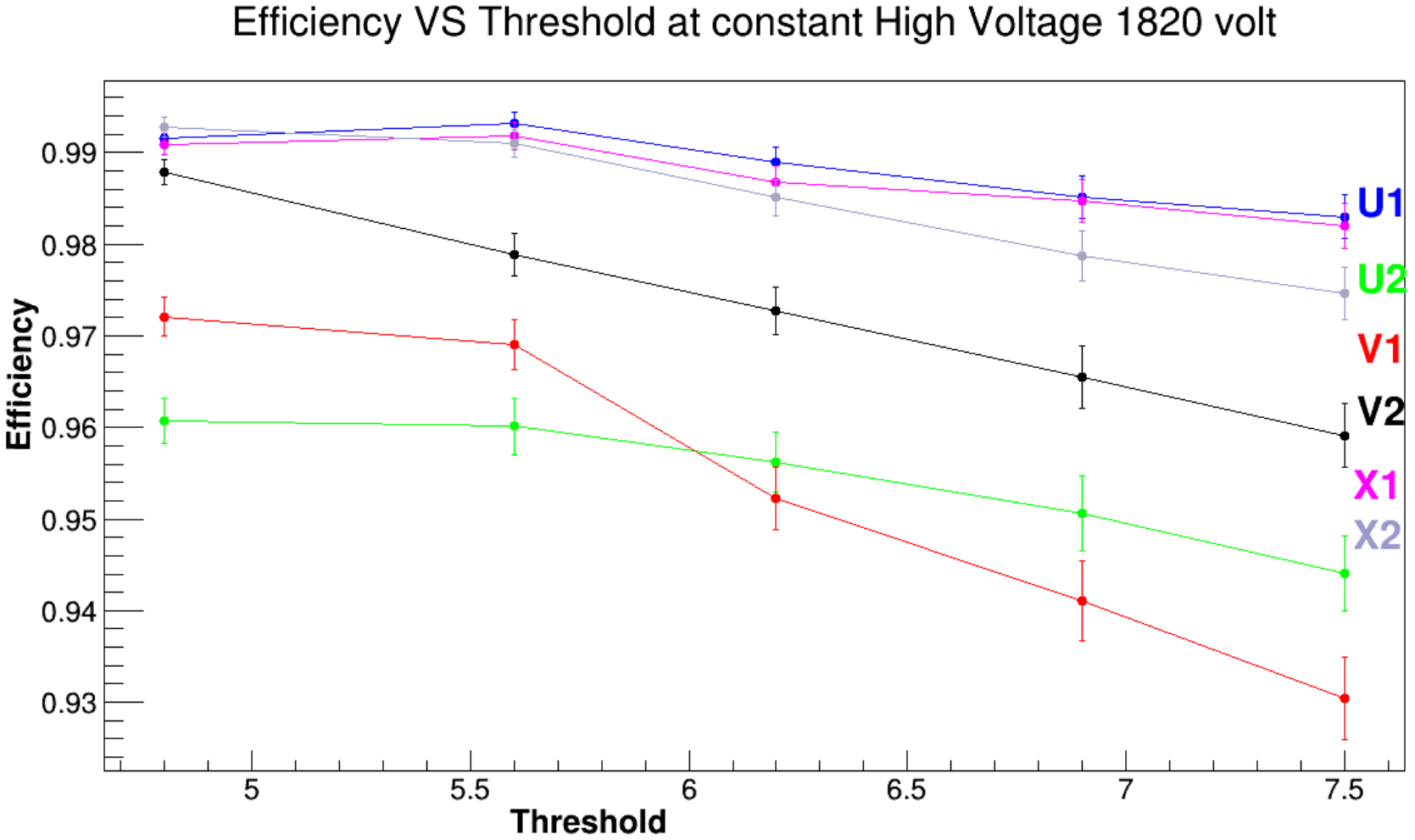
What we already did


Shielding
P2
P4

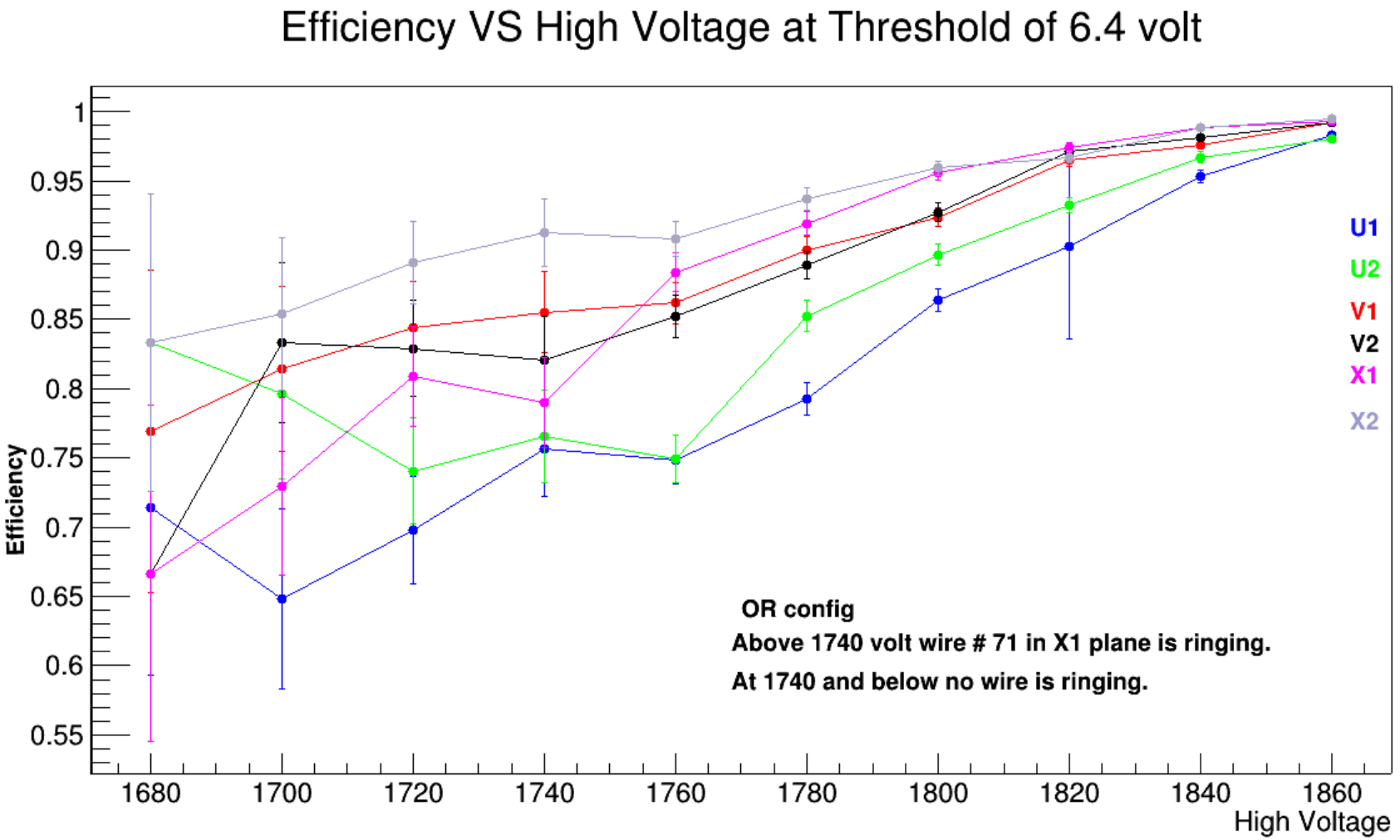

Ground
Foil
V6(81)
Ch1V6(81-96)
card#29

Chamber I


Efficiency VS High Voltage at Threshold of 6.1 volt
Efficiency
1
0.95
0.9
0.85
0.8
1740
1760
1780
1800
1820
1840
1860
1880
1900
High Voltage
Ringing Channels
X1-> 72, X2 ->97, V1 ->43,U2 ->30 and U1 ->45 and 87
Missing Channels
U2 -> 21 and U1 23
X1
X2
U1
U2
V1
V2


Efficiency VS Threshold at constant High Voltage 1820 volt
Efficiency
0.99
0.98
0.97
0.96
0.95
0.94
0.93
5
5.5
6
6.5
7
7.5
Threshold
U1
U2
V1
V2
X1
X2

Chamber II


Efficiency VS High Voltage at Threshold of 6.4 volt
Efficiency
1
0.95
0.9
0.85
0.8
0.75
0.7
0.65
0.6
0.55
1680
1700
1720
1740
1760
1780
1800
1820
1840
1860
High Voltage
U1
U2
V1
V2
X1
X2
OR config
Above 1740 volt wire # 71 in X1 plane is ringing.
At 1740 and below no wire is ringing.

Summary

Chamber I

Missing Channel
1. U1 plane wire # 23
2. U2 plane wire # 21

Hot Channel
1. U1 plane wire # 45 and 87
2. U2 plane wire # 30
3. V1 plane wire # 43
4. X1 plane wire # 72
5. X2 plane wire # 97

At 1905 volt it draws ~45 uA current.

Chamber II

Missing Channels
1. V2 plane wire # 23
2. X1 plane wire # 71
3. X2 plane wire # 34

At 1905 volt it draws ~37 uA current.

What we need if we open it...

Tools
Workers
Work Place
Time

Conclusion

Need to improve new chambers

Thank you