

MUID Performance Test

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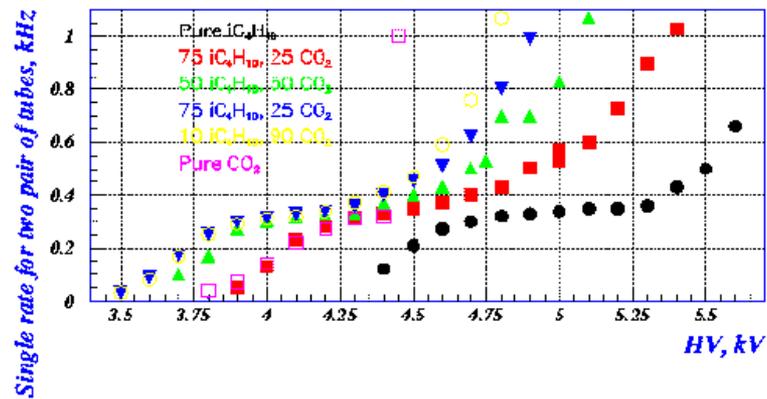
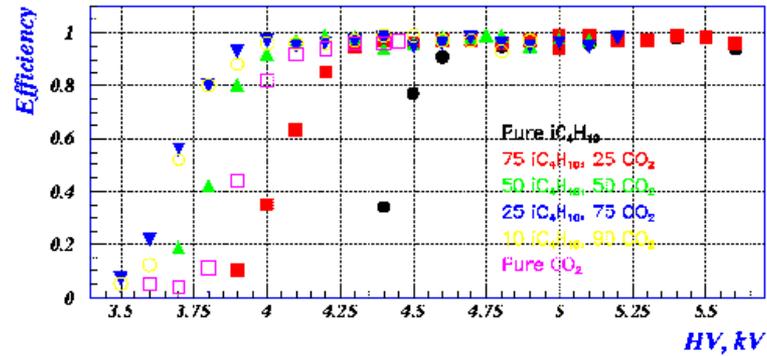
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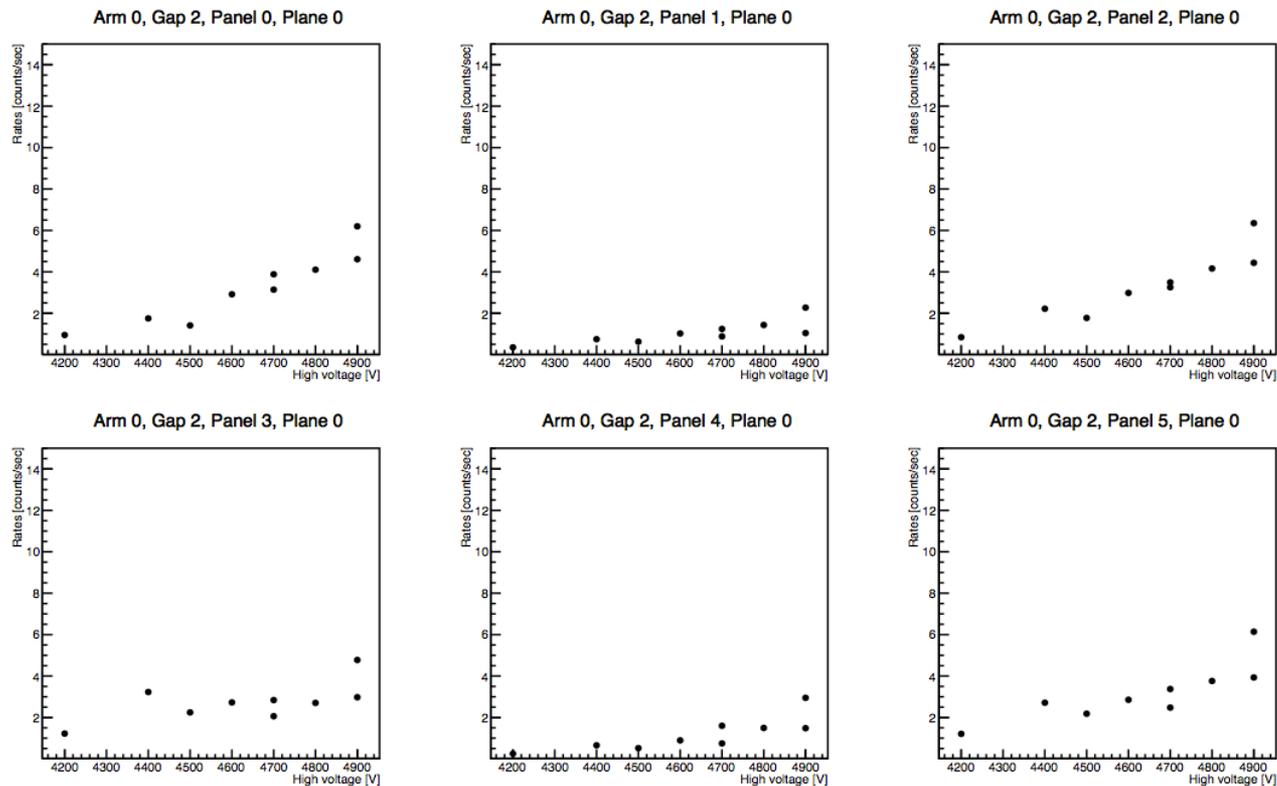
Isobutane, Carbon Dioxide



Plateau Measurement from 1997

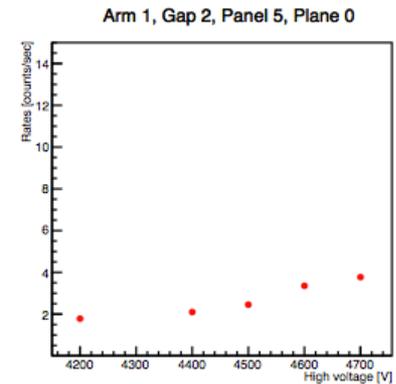
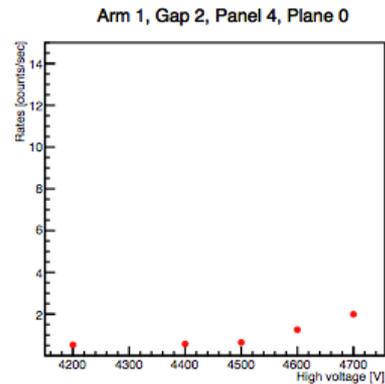
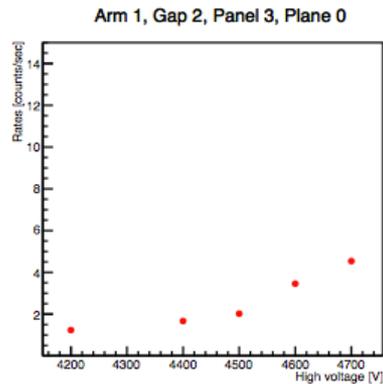
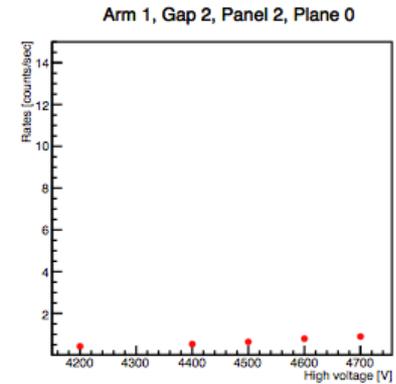
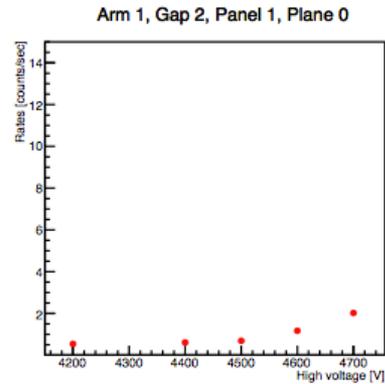
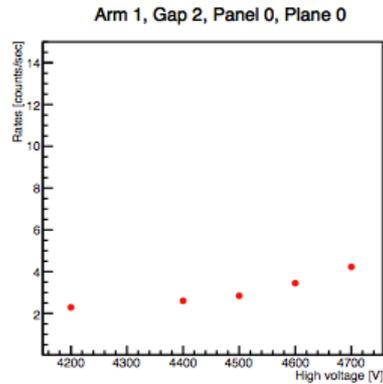
Higher Voltage Performance with nominal gas mixture

We explored the HV response above 4.4kV upto 4.9kV in both South (gap-2) and North (gap-2 and gap-3).



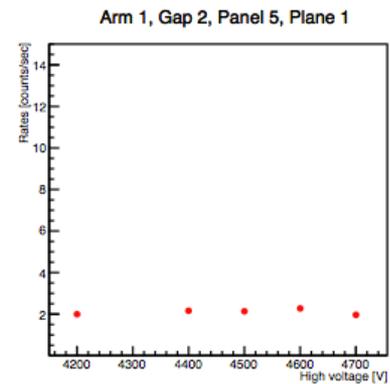
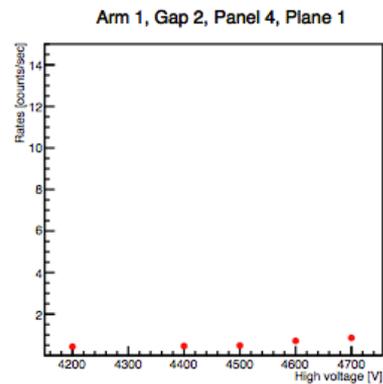
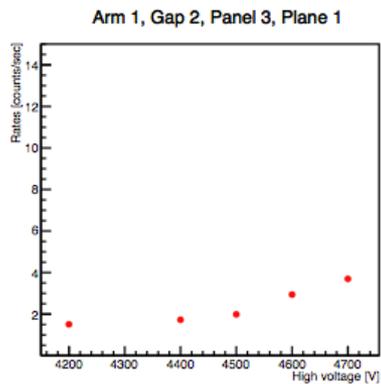
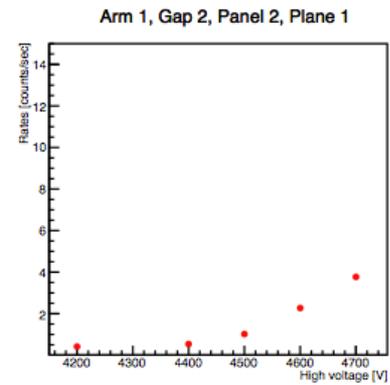
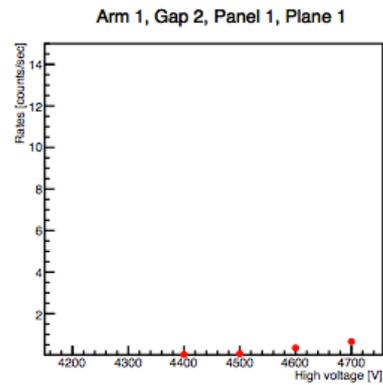
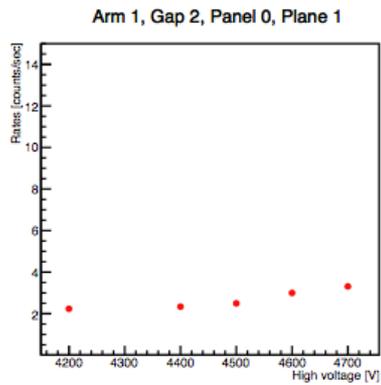
South arm gap 2 HV vs. Rate

Although data scatter a bit, but in general the rate increase can be seen from 4.5kV.

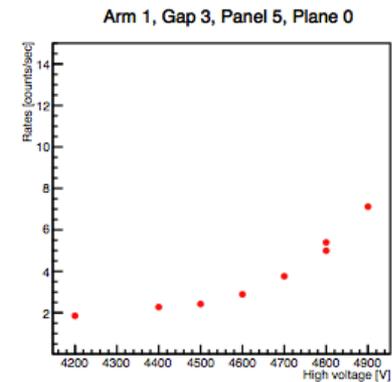
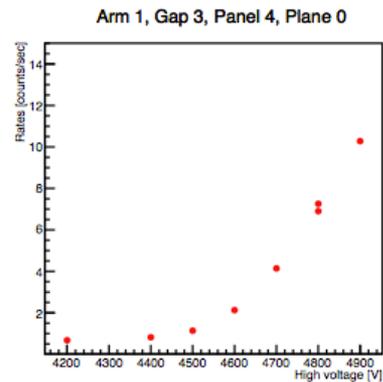
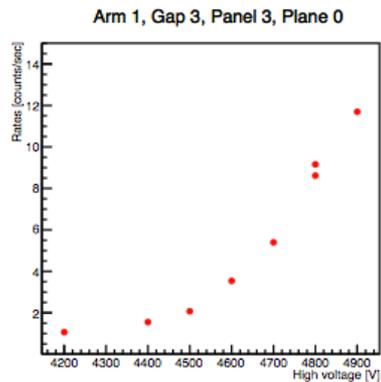
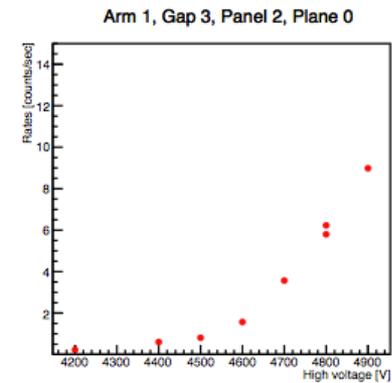
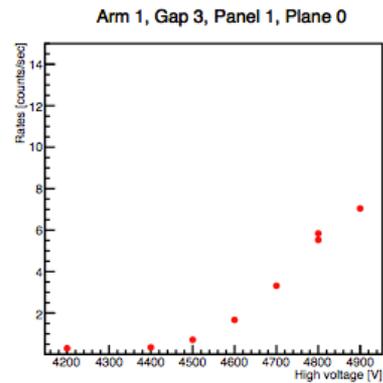
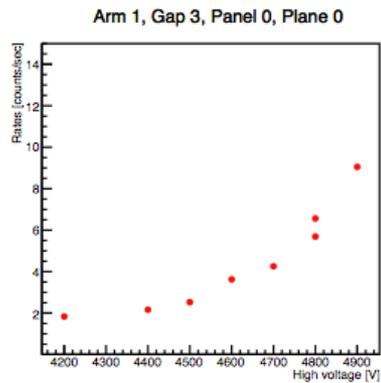


North arm gap 2 HV vs. Rate

All points over 4400V shows that 4400V is limit of the plateau curve in this gas mixture(w/o SF6).

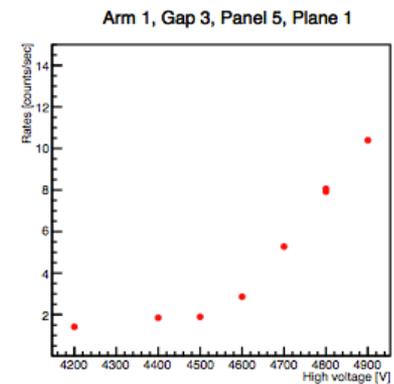
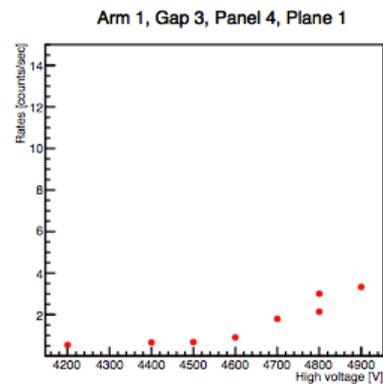
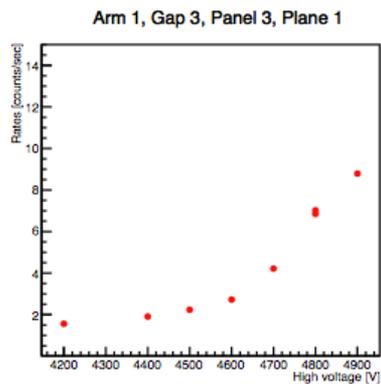
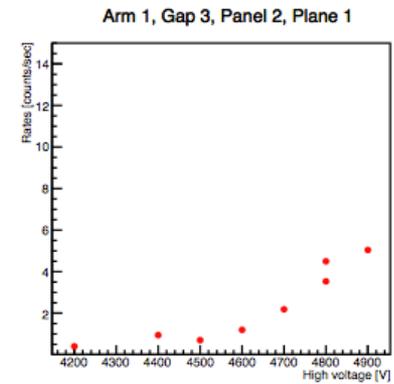
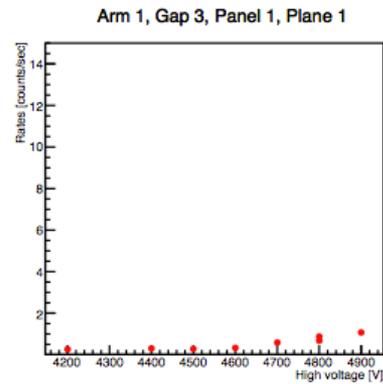
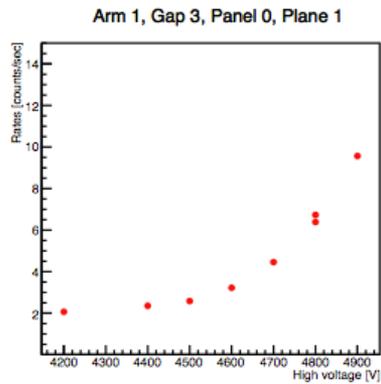


North arm gap 2 HV vs. Rate



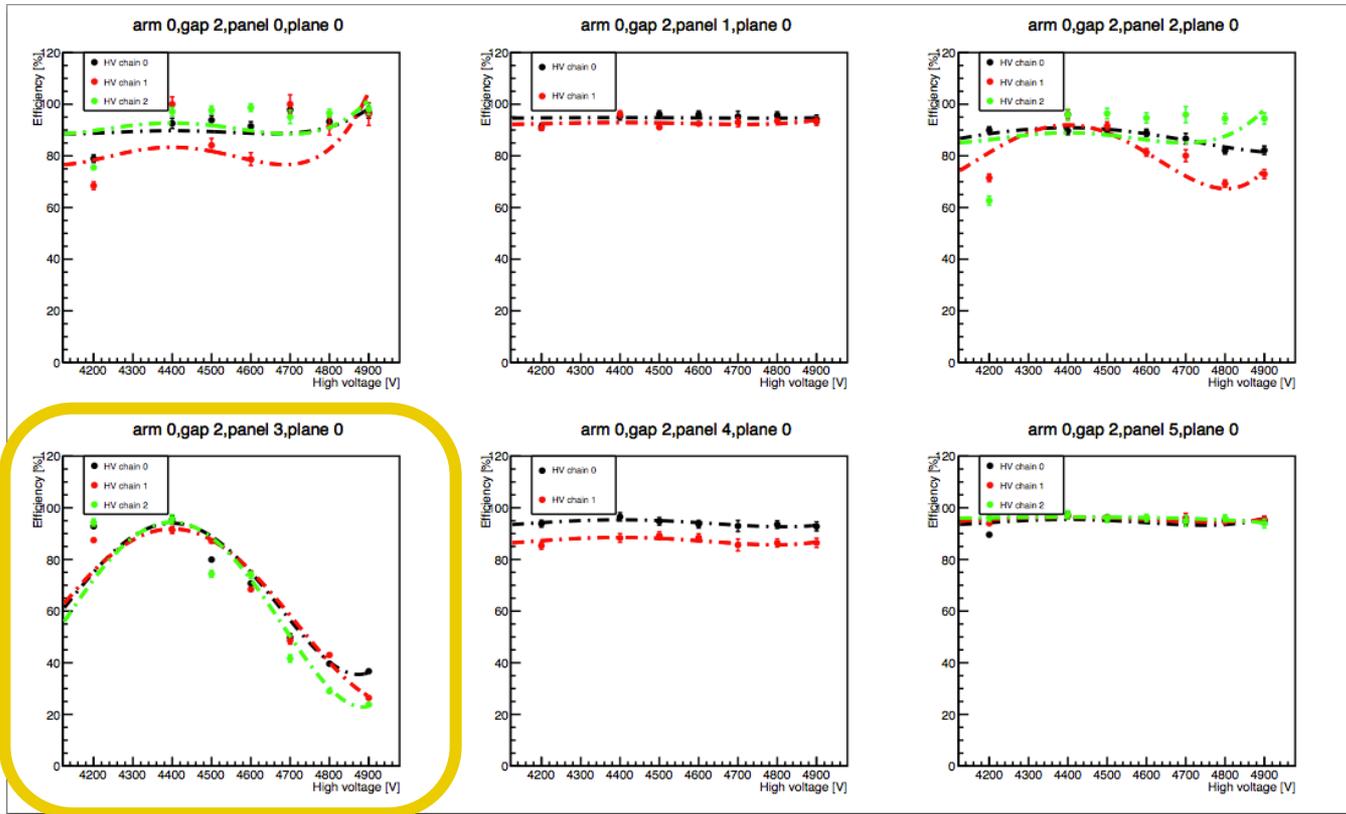
North arm gap 3 HV vs. Rate

The rise starts from 4.5kV which is consistent with 1997 measurement.



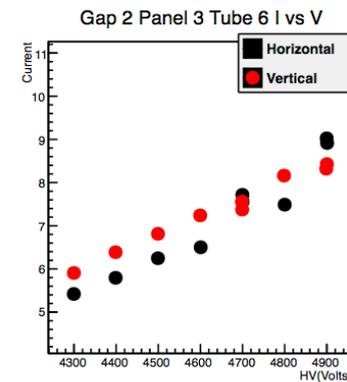
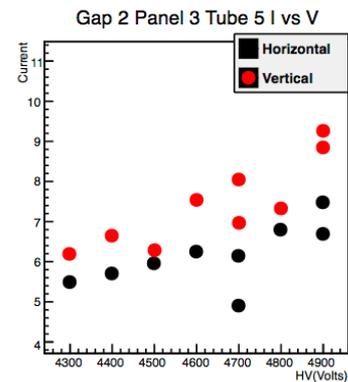
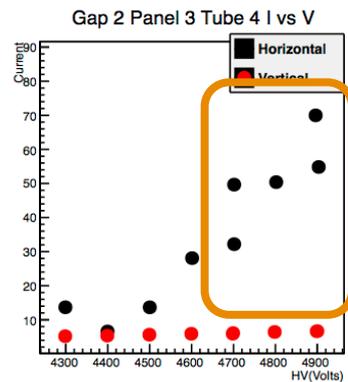
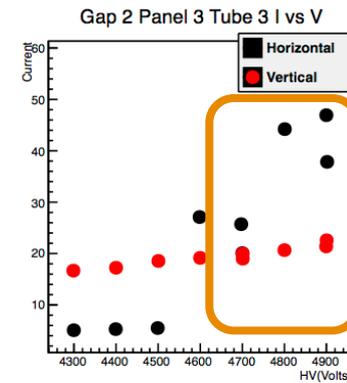
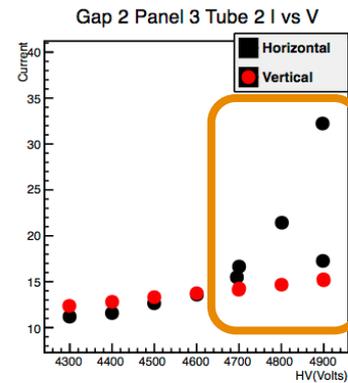
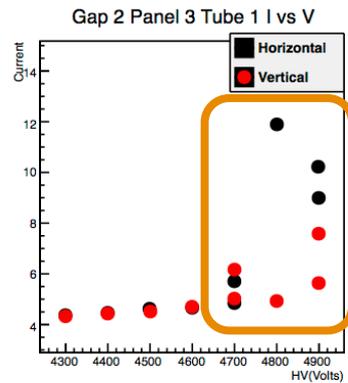
North arm gap 3 HV vs. Rate

Consistent with horizontal plane. Rise starts from 4.5kV.



South arm gap 2 HV vs. Efficiency

Efficiencies stay high at higher voltages in general. There are some scattered data though in some HV chains. The panel 3 behavior is not completely understood.



South arm gap 2 panel 3 HV vs. Current

We found that the current increases rapidly from 4700V. So we thought that this could be related to the road reconstruction so that this could cause the efficiency drop.

Performance with 0.5% SF₆

91.5%CO₂, 8% isobutane, and 0.5% SF₆.

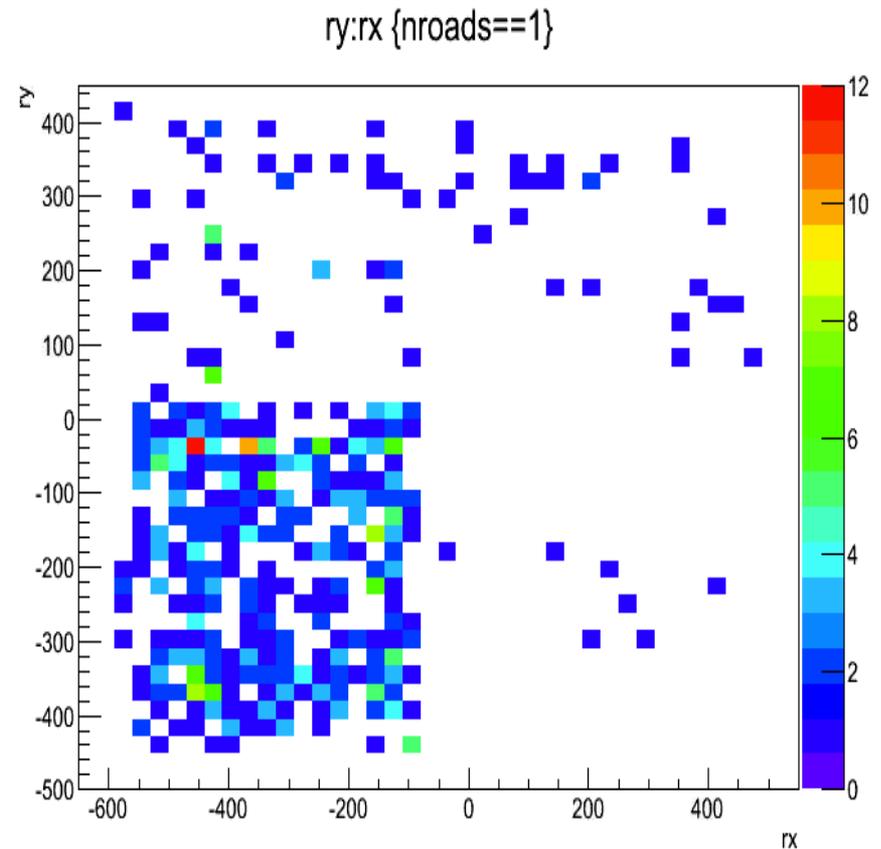
New gas mixture plateau

The trigger rate dropped significantly from 700Hz -> a few Hz at 4400V.

Even the 4900V event rate is 37Hz.

After careful cross checks on the measurement, we concluded this is the real response of the detector.

Most likely the entire plateau curve is pushed significantly higher voltage side and we are still in the very low efficiency region even at 4900V.

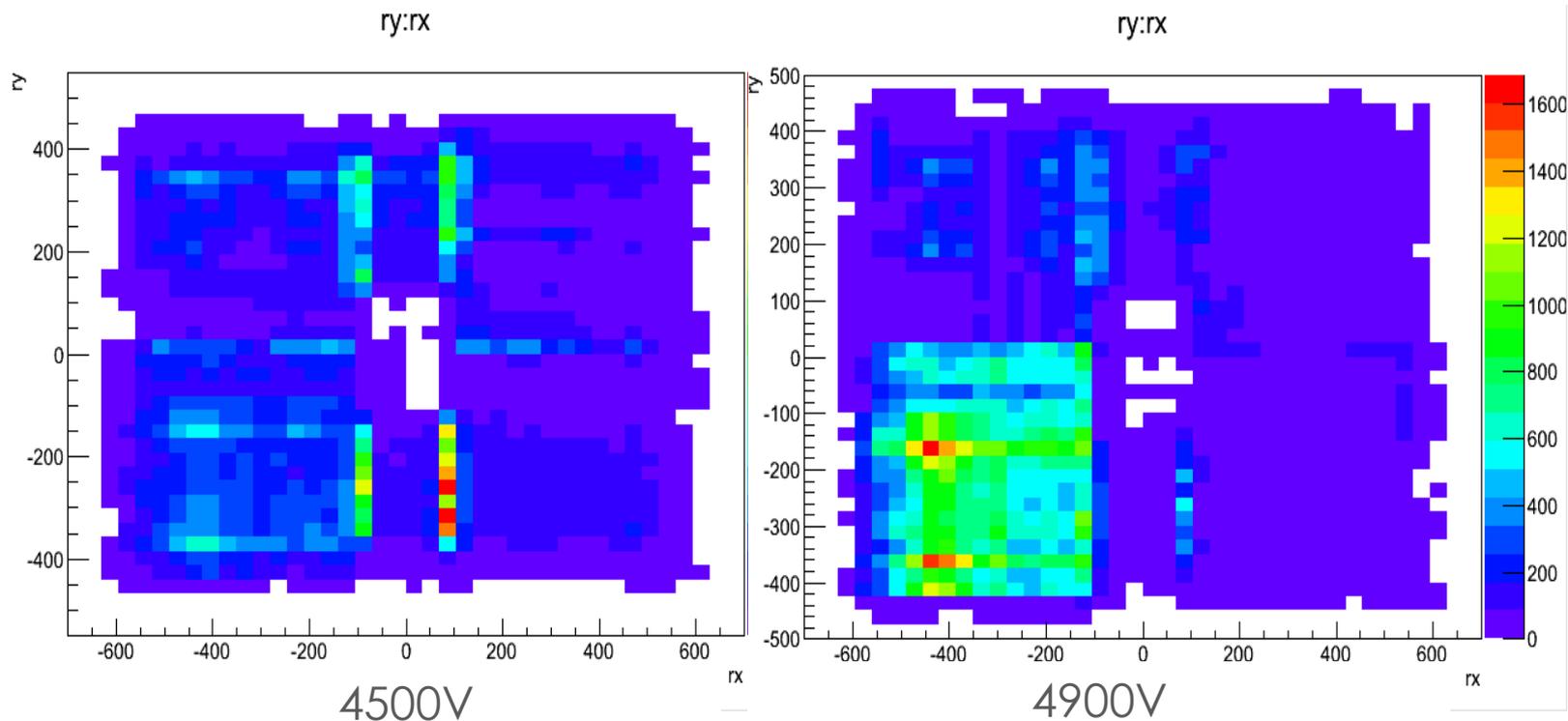


Summary

- HV scan up to 4.9kV with nominal gas mixture
 - We observed consistent plateau region with 1997 measurement with the nominal gas mixture
 - Extra current draw started from 4700V.
 - South, panel3 gap-3 H starts dropping efficiency above 4400V. Remain mysterious.
 - Some panels starts abnormal behavior once we supply over 4600V.
 - No trips were observed within 1 hour of measurement, except for 4900V (20 trips at 4900V).
 - We may be raise the voltage up to 4500 – 4550V as a trade off of minor problems. Like efficiency behavior of South, panel-3, gap-2 H needs to be understood.
- With 0.5% SF6 the signal of MUIDs are quenched drastically. Running with this gas mixture with this fraction is unfeasible.
- We need to consider some Argon gas to lower the working voltage of the new gas mixture.

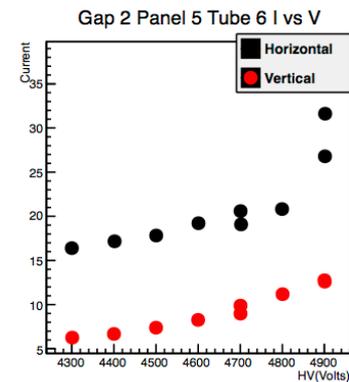
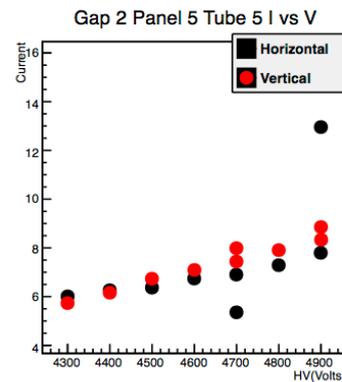
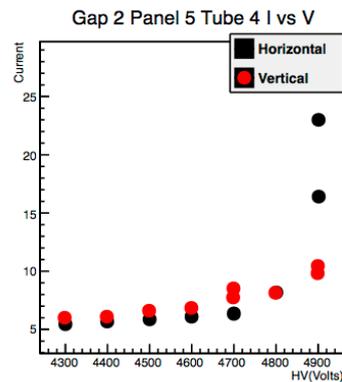
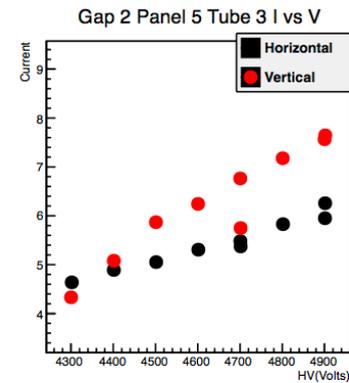
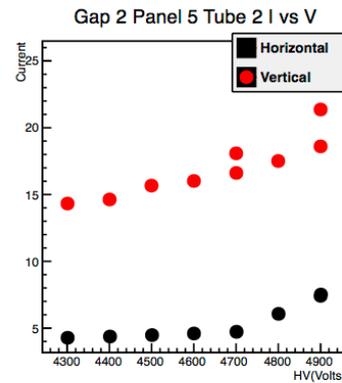
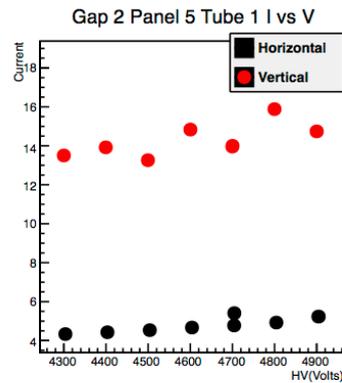
Detailed Discussions

Some panels started to behave abnormally. Details are looked into.



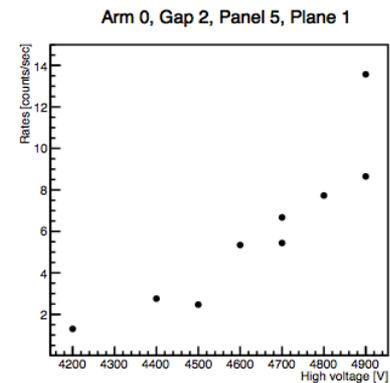
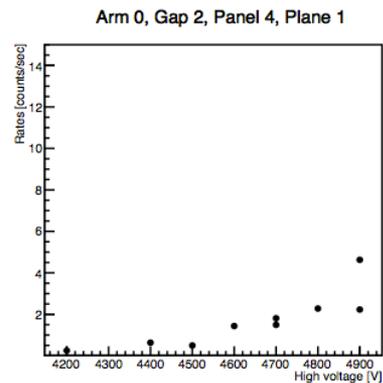
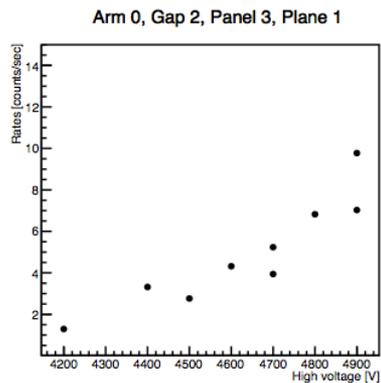
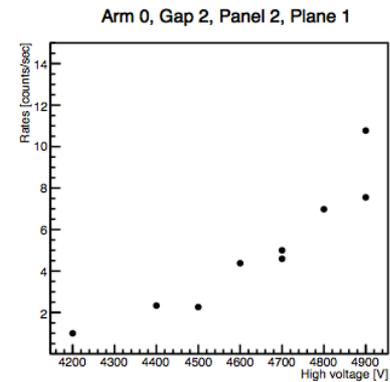
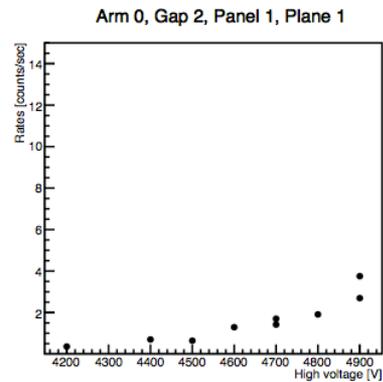
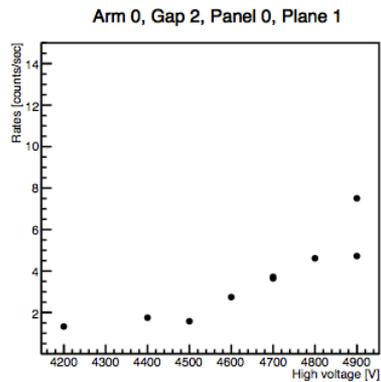
Road reconstruction in South arm

As higher the voltage, panel 5 became hot. Most likely driven by a couple of tubes start firing continuously. However, we did not observe substantial rate increase in this panel. Only reconstructed roads are enhanced. This enhancement quenches somewhat by asking `#roads==1`, but not completely.



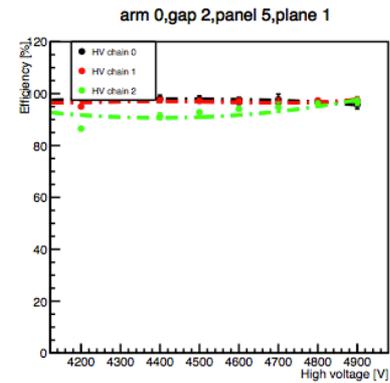
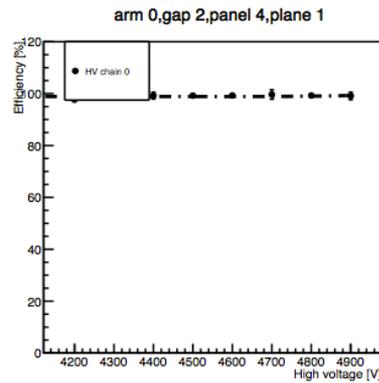
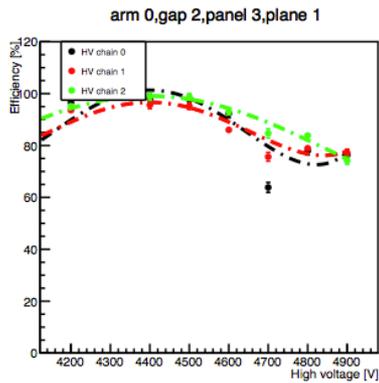
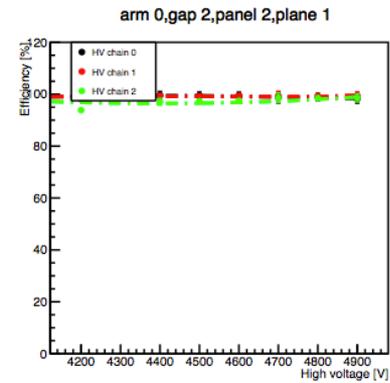
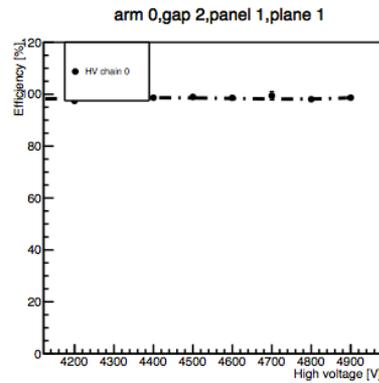
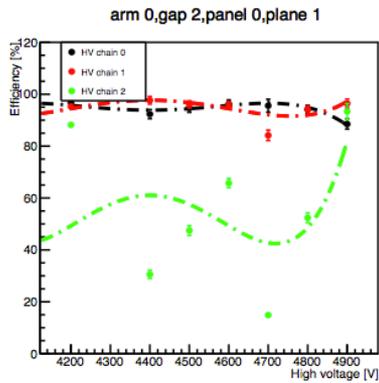
South arm gap 2 panel 5 HV vs. Current

Although roads are extra-ordinary reconstructed in this panel though, no substantial anomaly was found in the current draw.



South arm gap 2 HV vs. Rate

This plane was included in the trigger, therefore the results are somewhat biased.



South arm gap 2 HV vs. Efficiency

This is the vertical data and this vertical plane happened to be included into the trigger during this measurement. Thus these efficiencies are biased and appeared to be higher than real.

