Rebuilt Wien using all ceramic screws and washers
Vacuum response to applied high voltage

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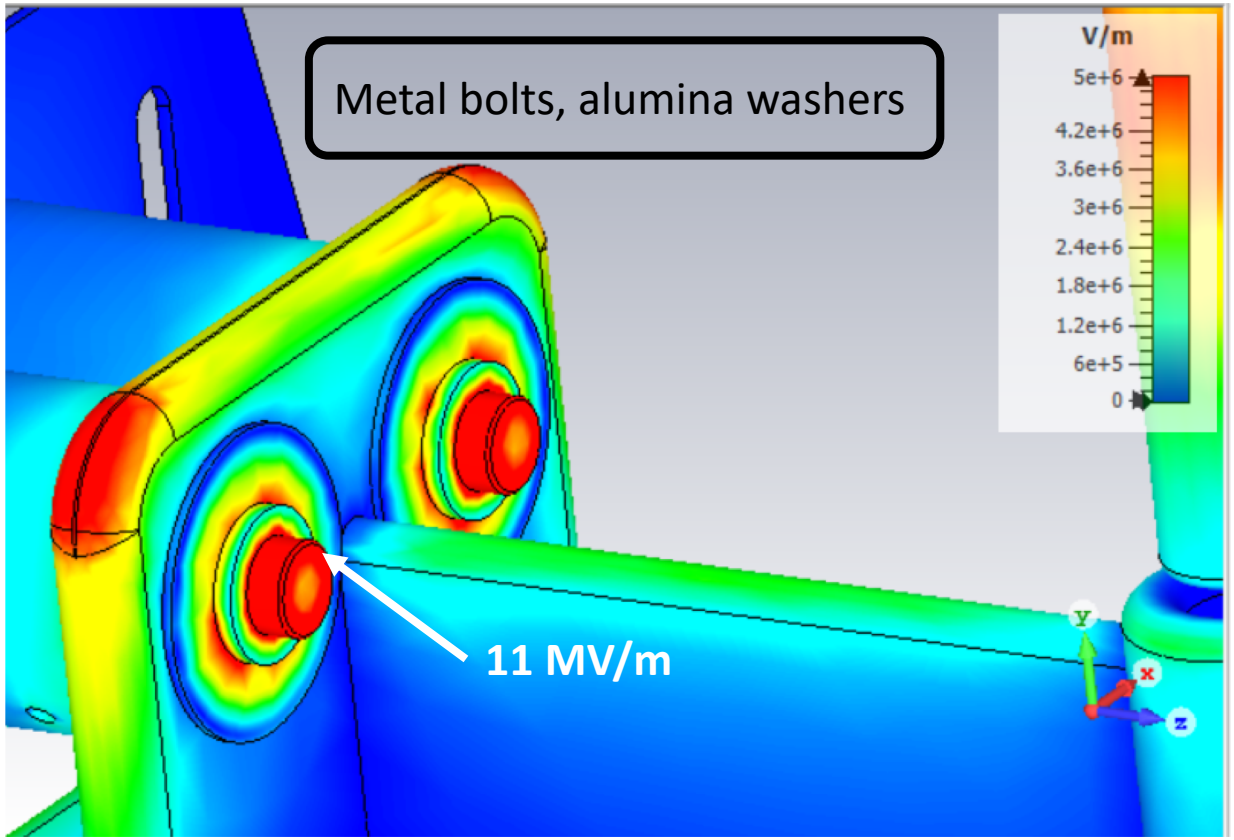
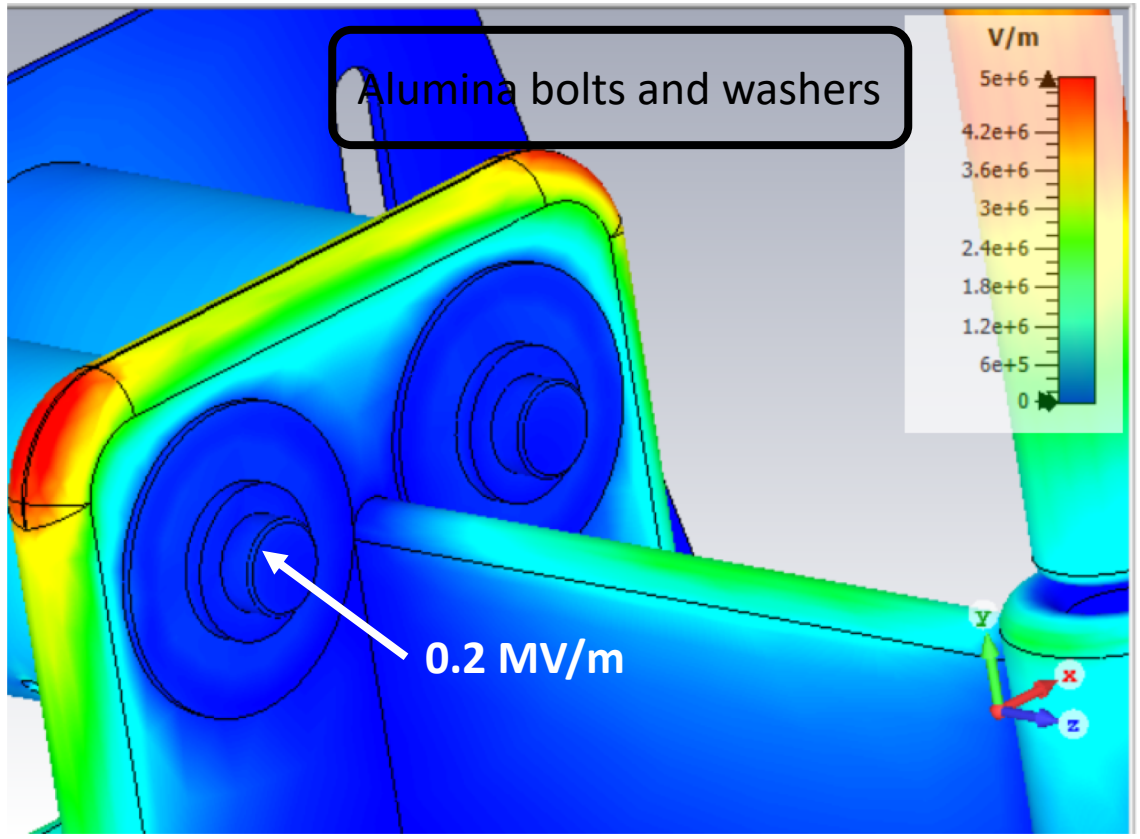
Aug 2020

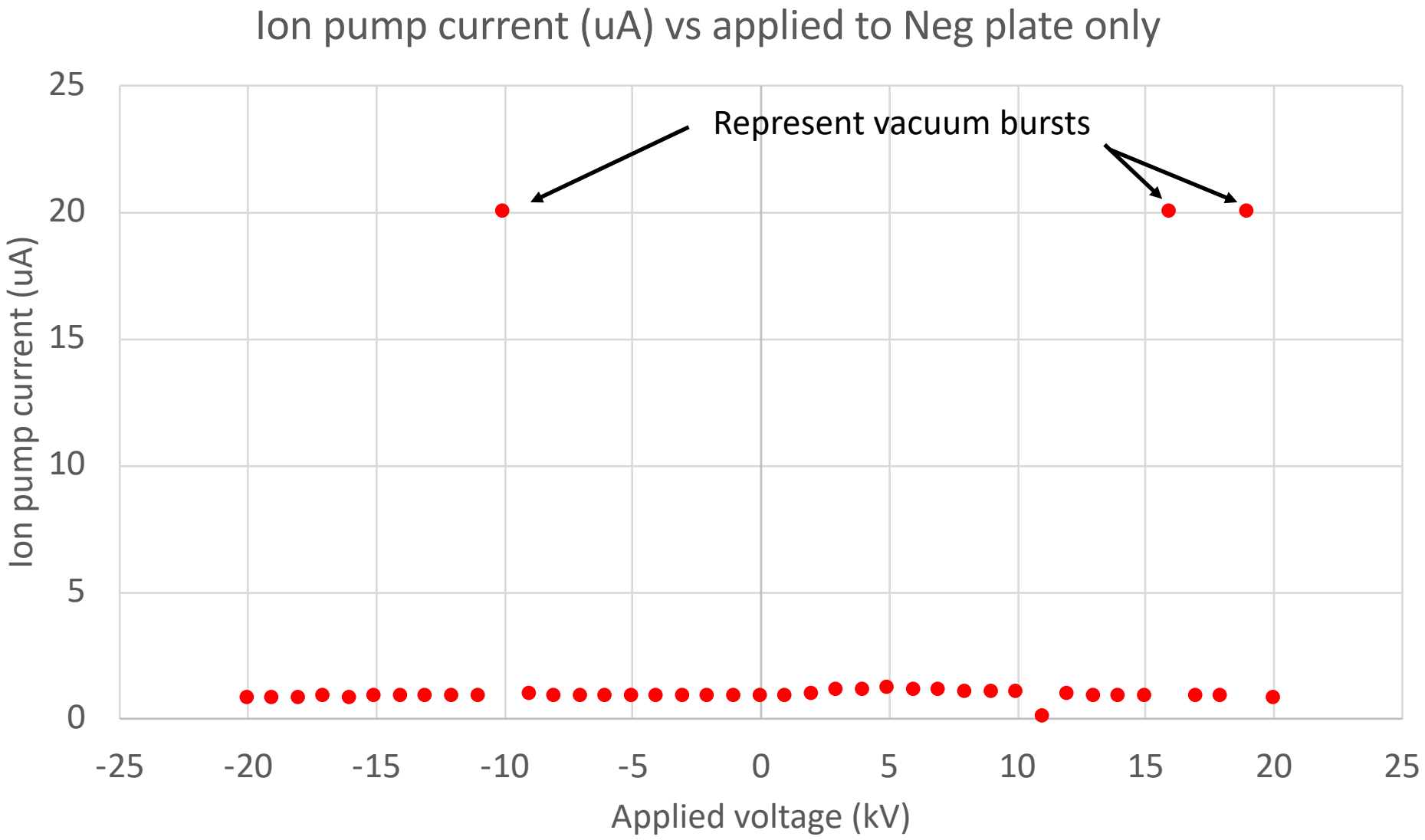
CST shows the gradient is much smaller if we use ceramic screws and washers instead of SS





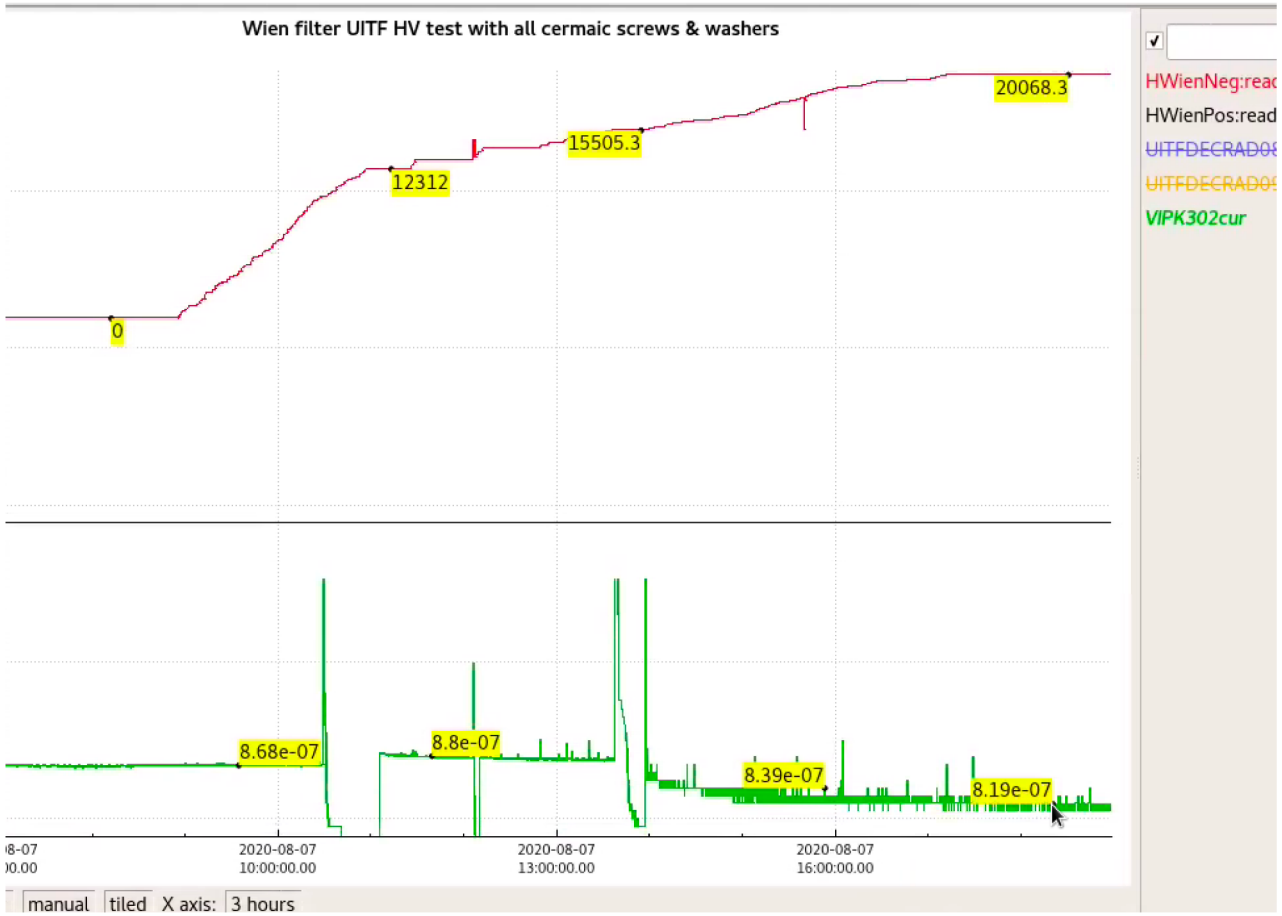
We re-assembled the Wien with alumina screws and washers

Plate (Neg for now) both polarities

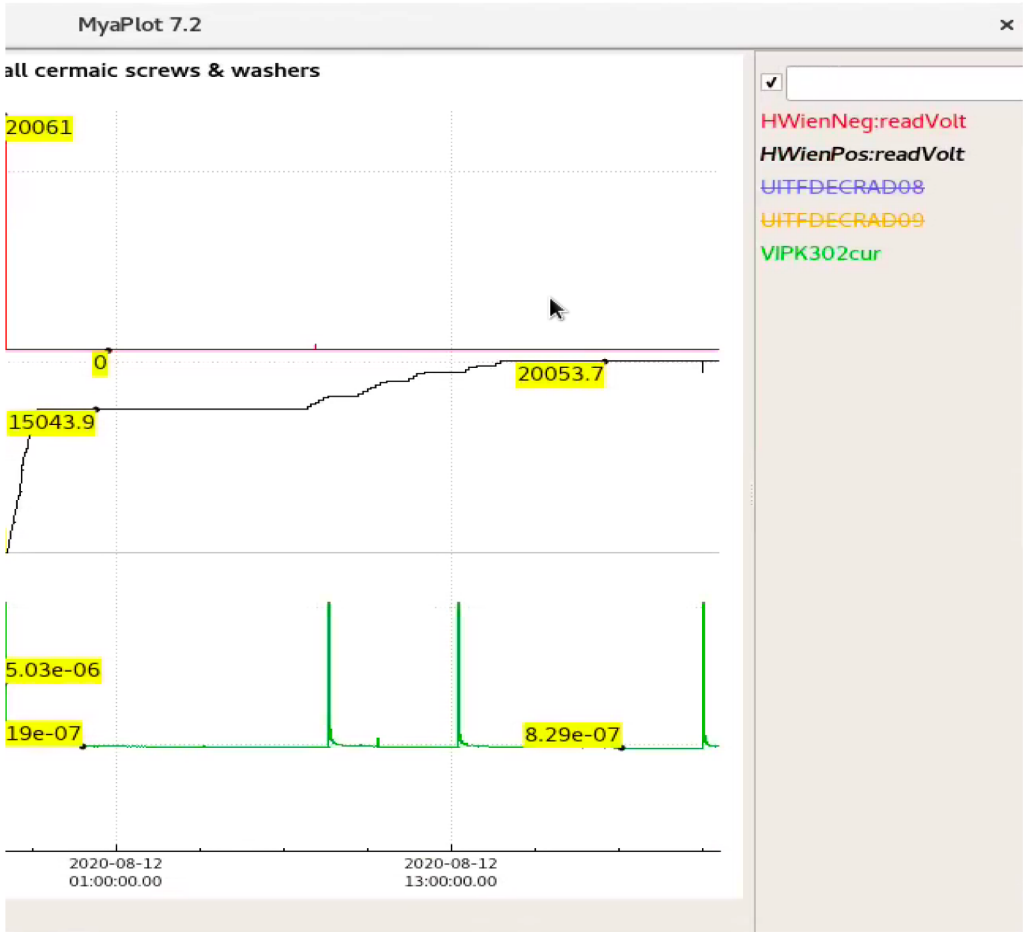


Neg plate both polarities

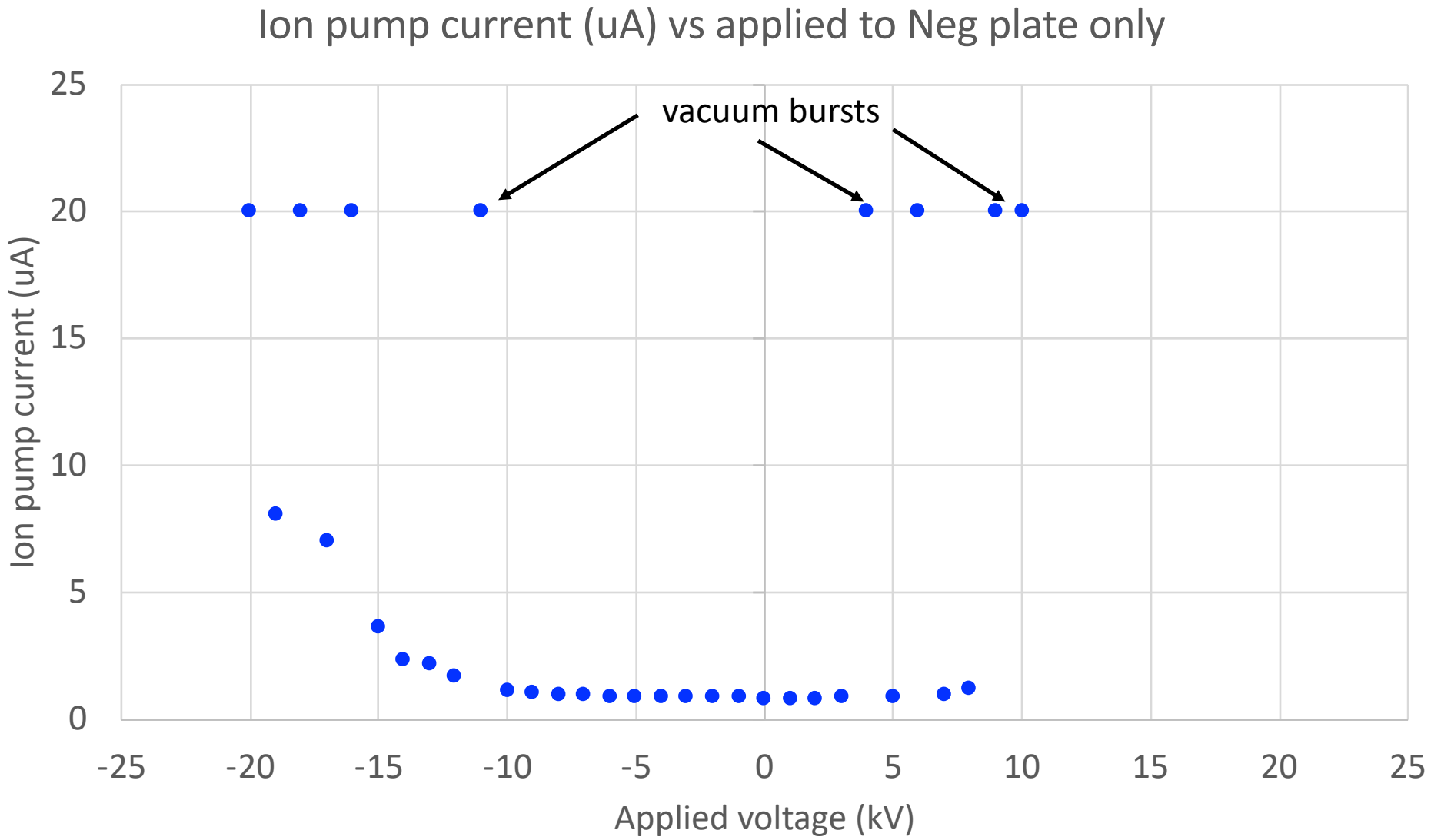
Negative bias



Positive bias

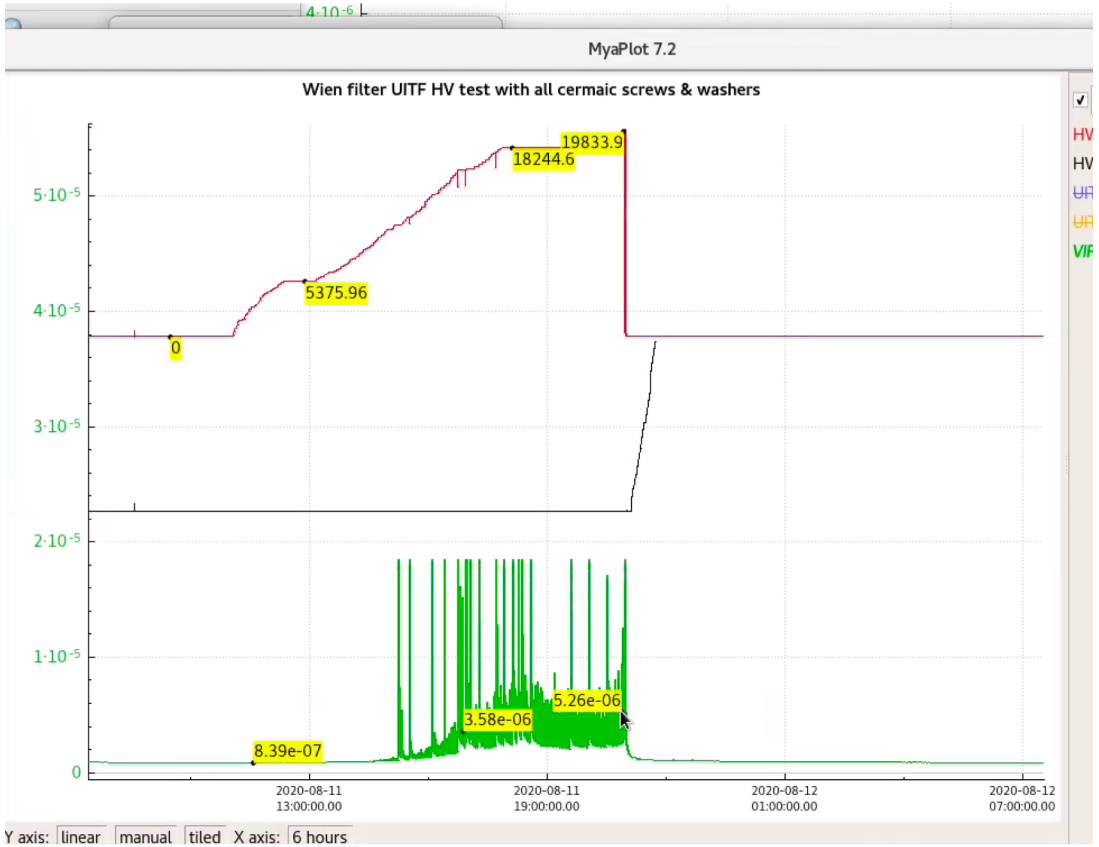


Pos plate both polarities

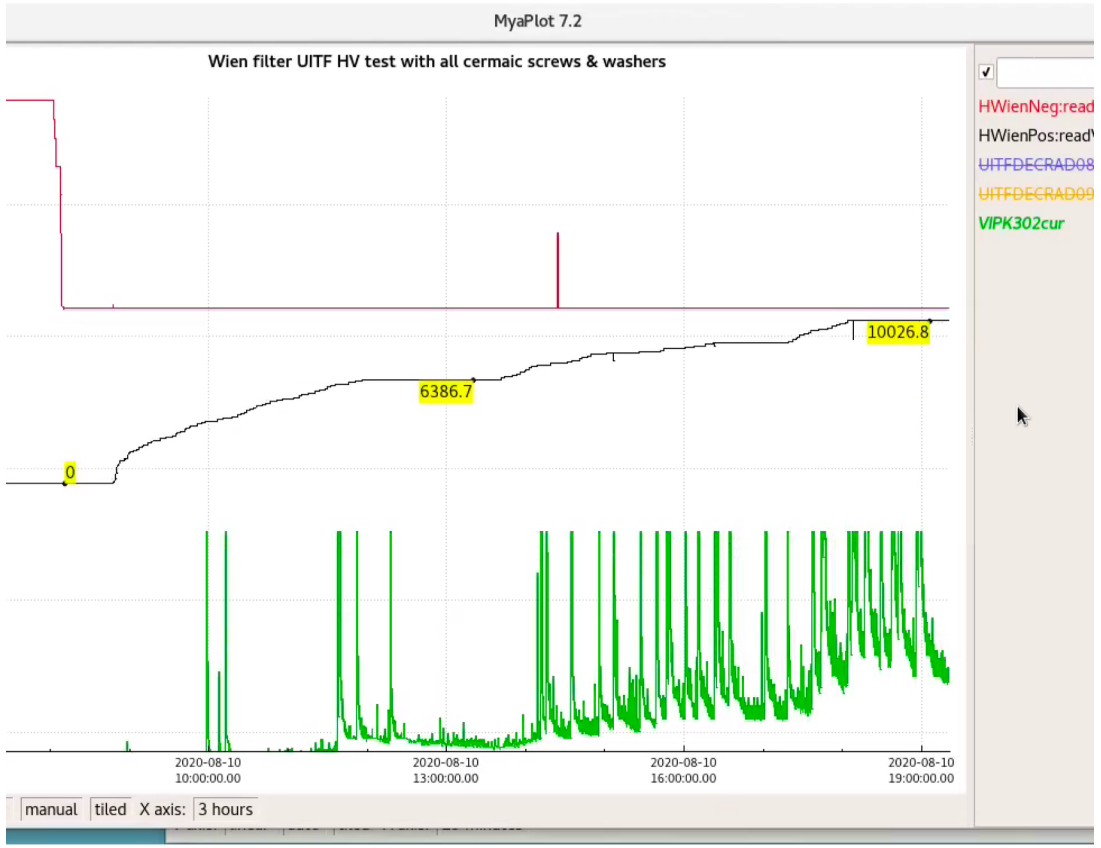


Pos plate both polarities

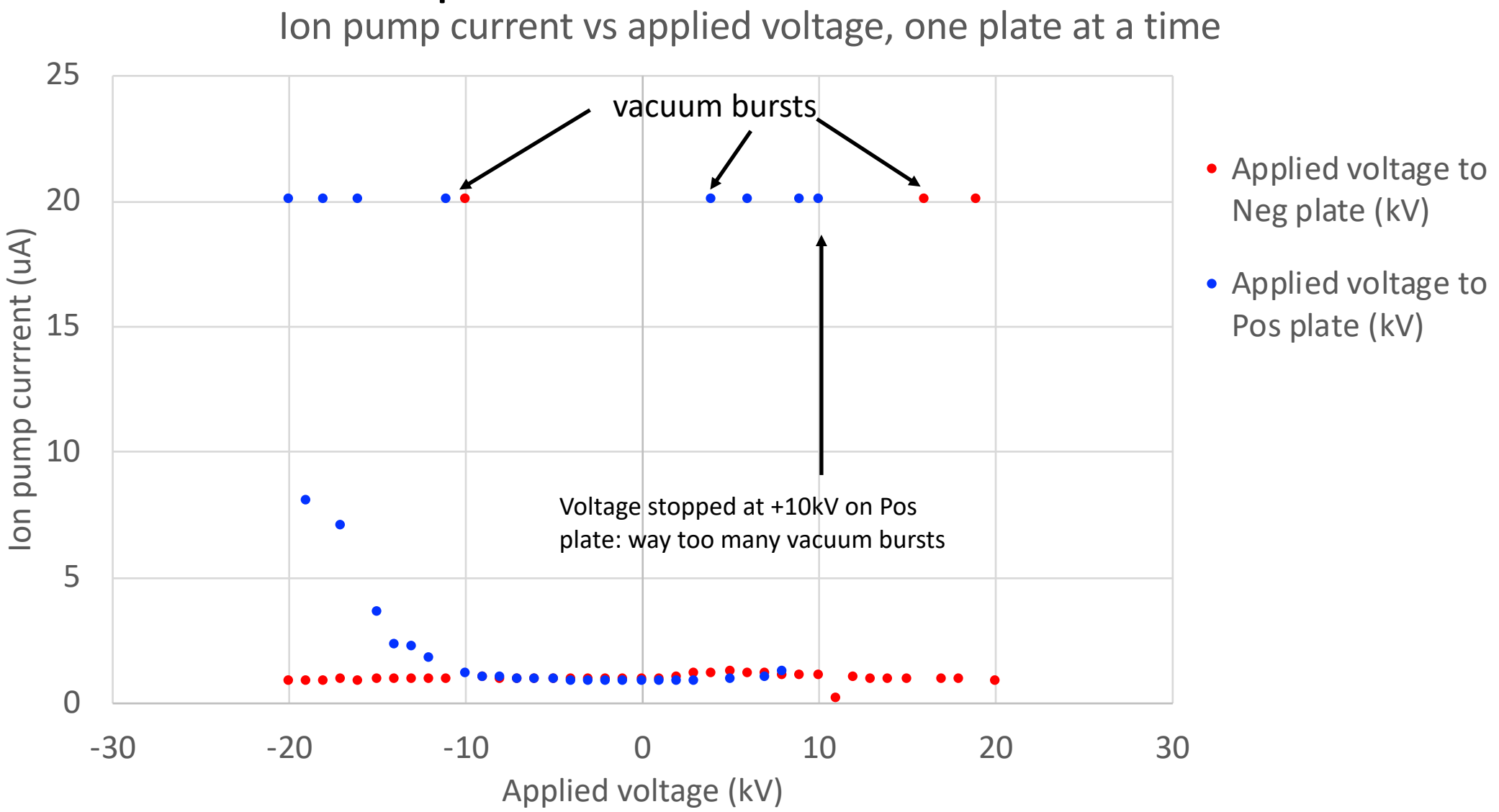
Negative bias



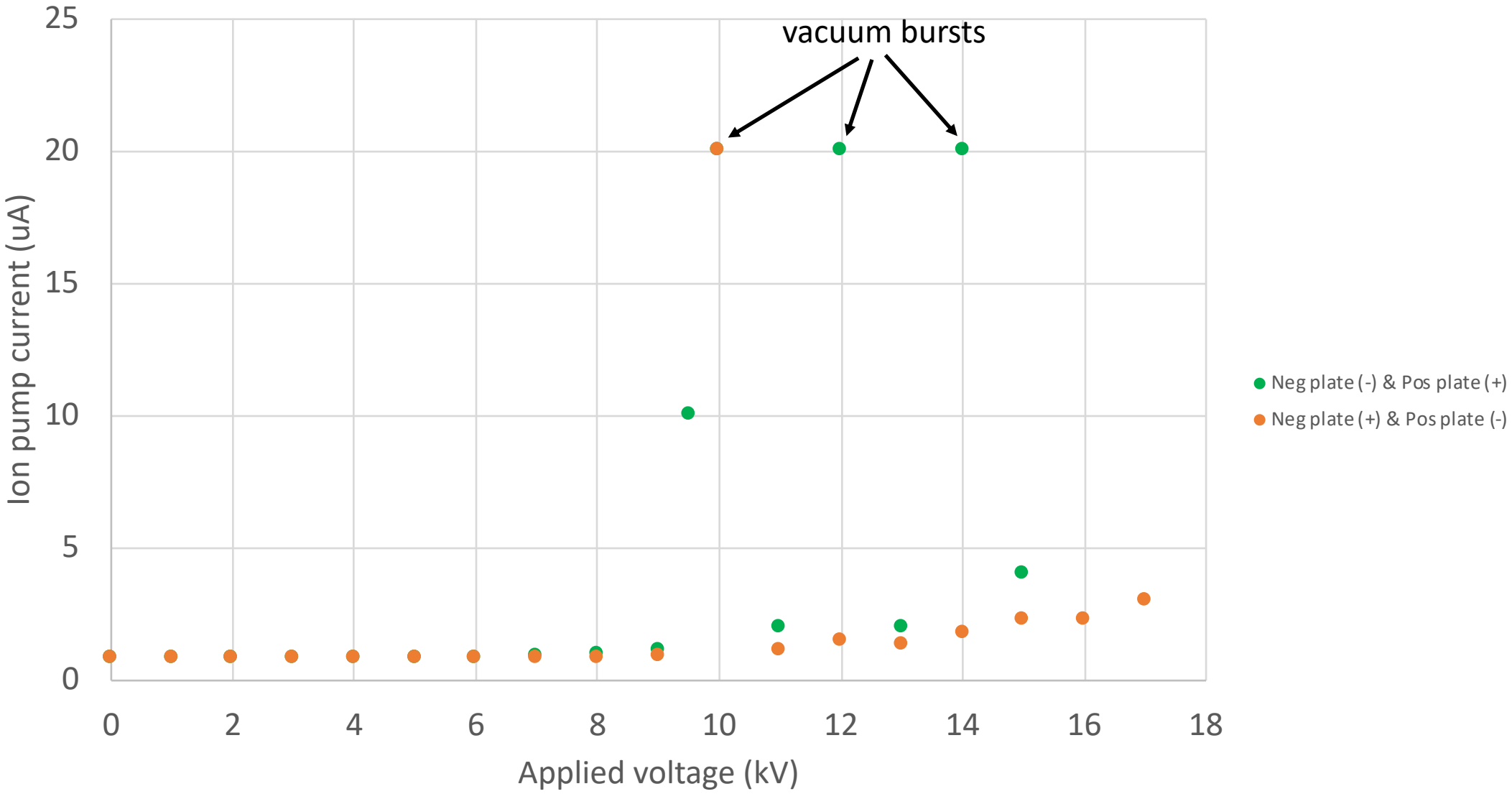
Positive bias



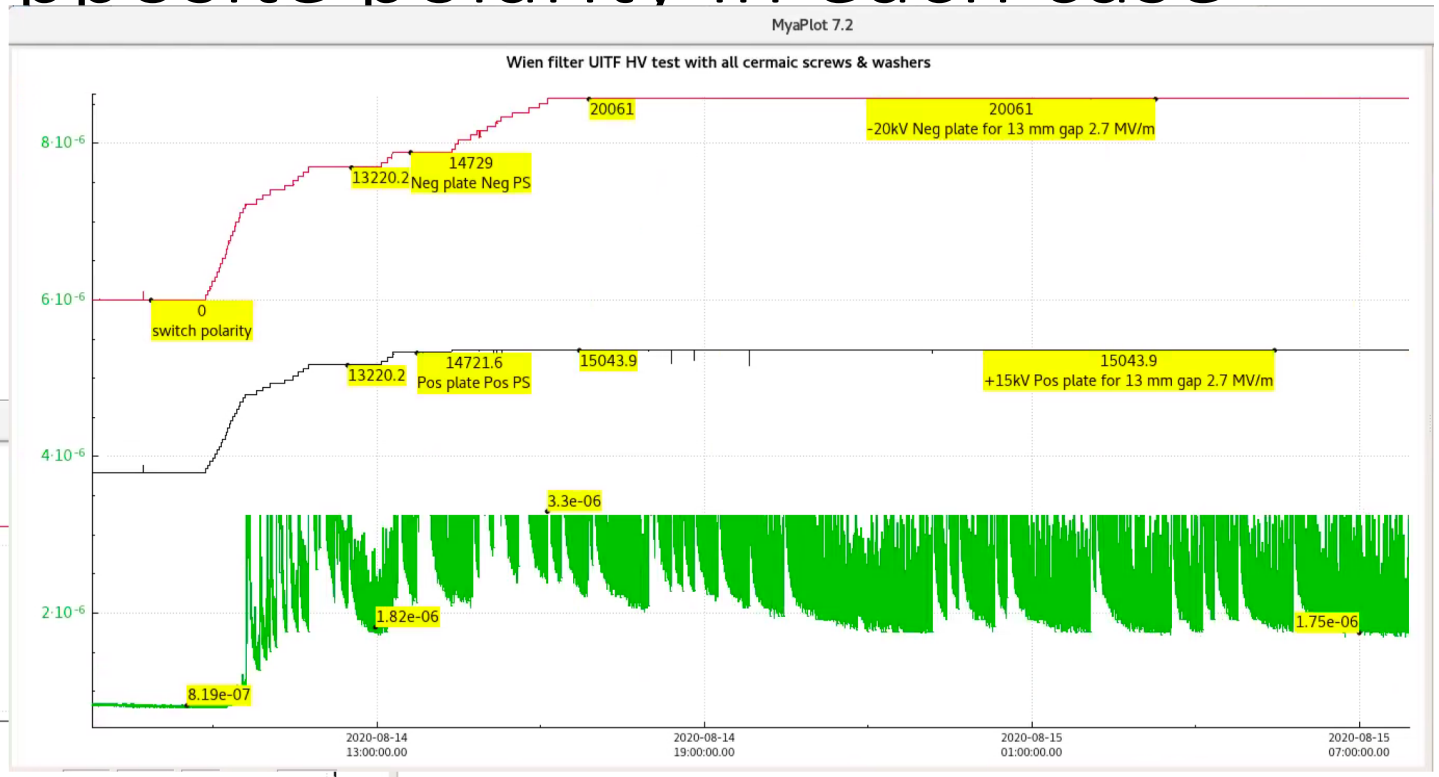
Comparing both plates but one plate biased at a time with both polarities

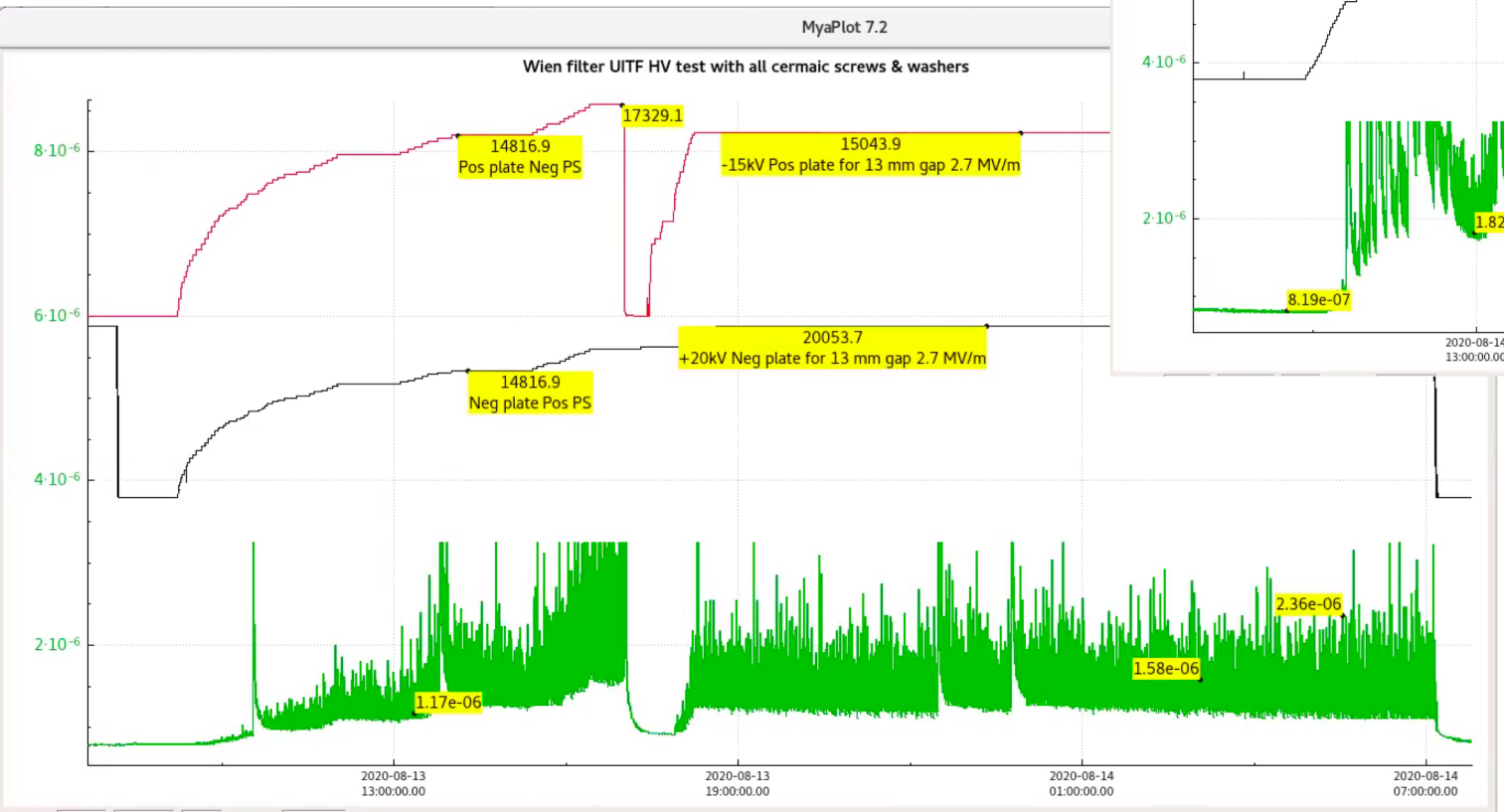


Both plates biased simultaneously:



Comparing the vacuum response, both plates energized at the same time, but with opposite polarity in each case





Similar behavior was reported by Joe during the very first time these Wien electrodes were HV tested with the original SHV-style 20kV feedthroughs and metal screws

200kV Wien HV testing starts

Lognumber 3544085. Submitted by grames on Fri, 03/09/2018 - 17:35.

Last updated on Fri, 03/09/2018 - 17:36

Logbooks:	UITFLOG
Entry Makers:	grames

We connected the new +/- 30 kV Matsusada high voltage power supplies to prototype 200kV Wien installed at UITF. The new supplies/controls are nice, easy to use. We have POS supply connected to one plate and NEG to the other. No HV switches yet.

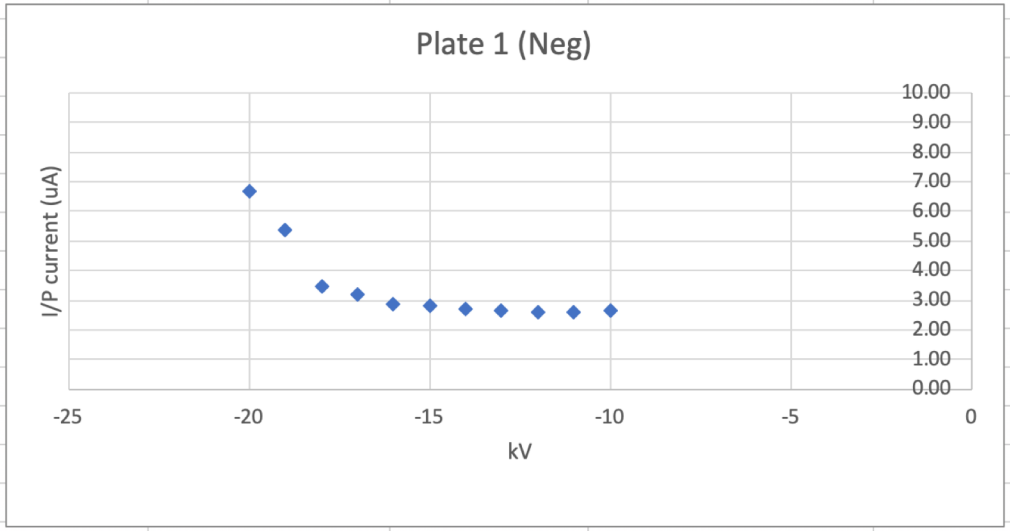
We began by enabling both supplies, but ony applying voltage to POS or NEG one at a time w/ the other supply set for 0 V. We monitored the IP's and Decarad both upstream and downstream of the Wien filter. The upstream gun valve and downstream manual valves are both closed.

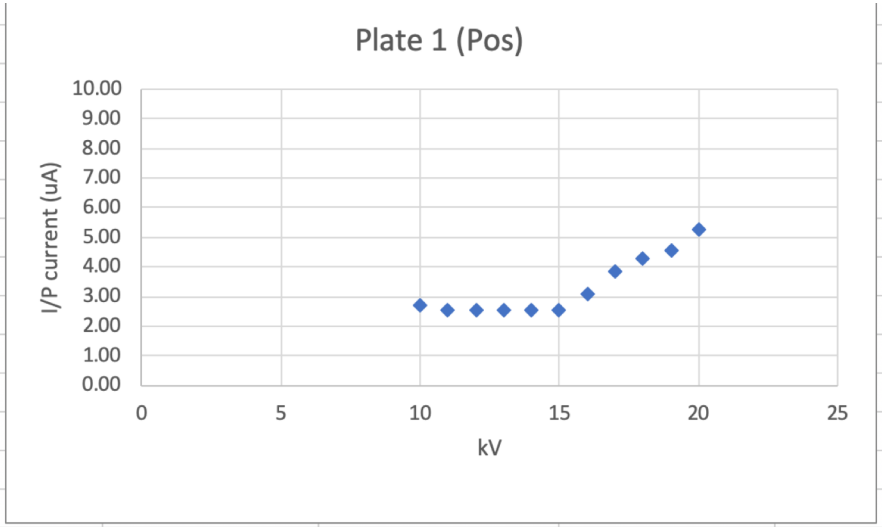
We tested three different conditions:
a) POS plate to ~10kV (other 0V)
b) NEG plate to ~10kV (other 0V)
c) POS and NEG each to ~8650V for differentional of ~17kV (see fig. 1)

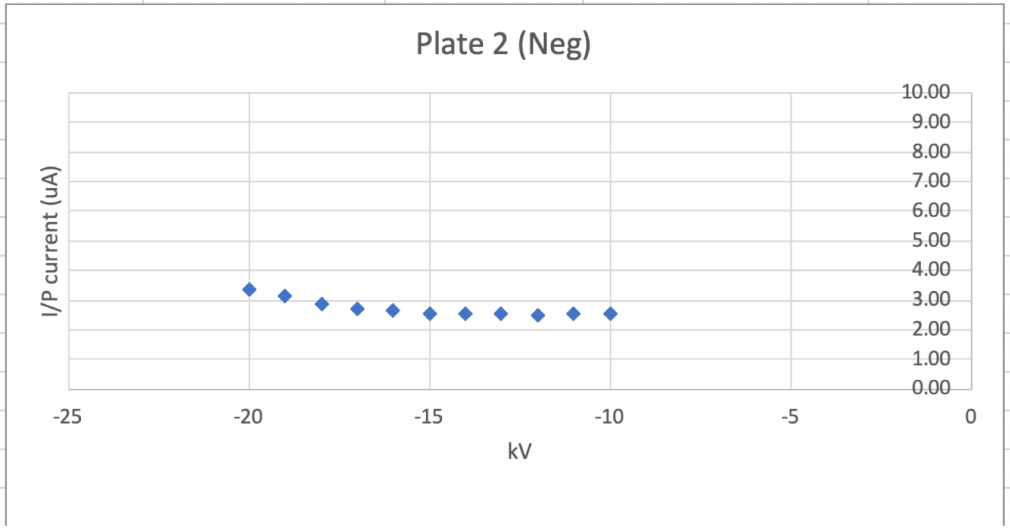
The HVPS parameters are not in archiver and the plotting tools crashed, but Fig. 2 shows the vacuum and decarad archives signals. The first large vacuum spike is when POS increased above 7-8 kV. Then the second vacuum activity is when NEG is increased above 7-8 kV, but no vacuum bursts and vacuum looked to be rolling over. Finally, as both POS and NEG were increased the vacuum level would rise and slowly recover, but when both were increased above 7-8 kV there were a couple large burps. Fig. 2 shows the decarad probes and neither really responded, both either a) steel good attenuator, b) decarad not sensitive, or c) no field emission. I'm guessing a little of "a" and "b" given the signature.

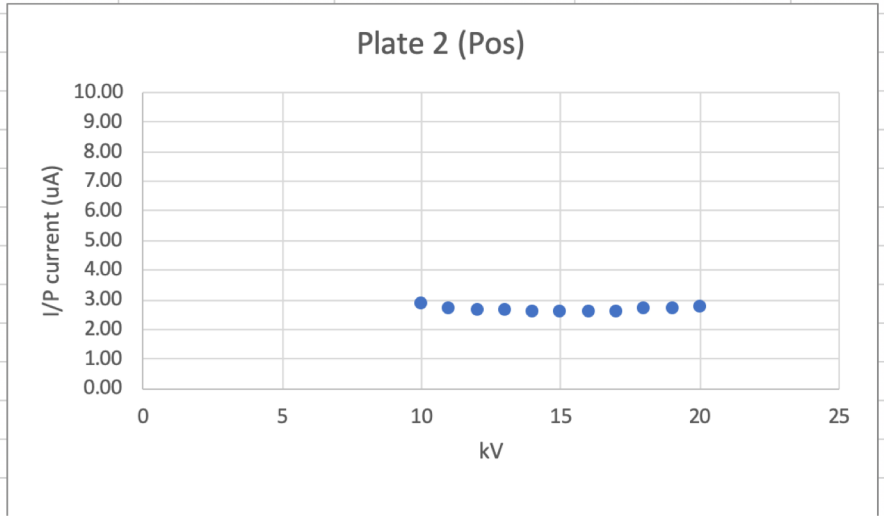
It does appear that the POS plate is more sensitive above 7-8 kV. Vacuum is recovering. On Monday I will test w/ POS up to 5kV an see about raising NEG higher. Either way, the target is stable 40kV differential and we are seeing vacuum discharges at 17kV so a ways to address/solve.

And again similar behavior was observed with Gabriel's 40kV feedthroughs and metal screws: one plate showed more vacuum activity than the other plate





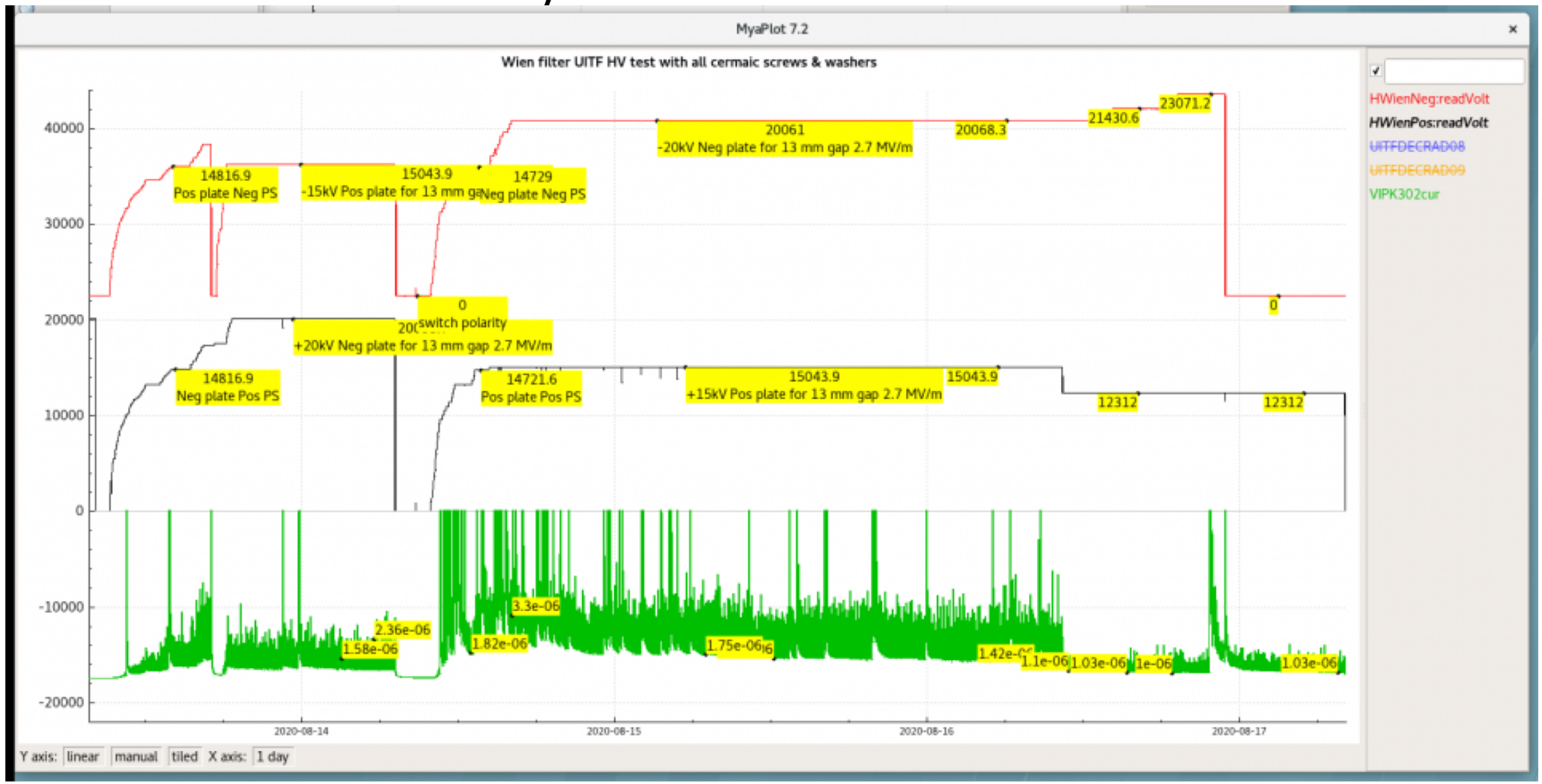




Conclusions

- One of the plates shows much more vacuum activity than the other one, in particular when biased positive
- Behavior was observed the very first time the electrodes were high voltage tested in March 2018
- Behavior seems to be uncorrelated to HV feedthrough type
- Behavior is present regardless is ceramic or metal screws are used, but with ceramic screws the vacuum activity seems to be much less than with metal screws
- This is why I tried what is described in the following slide, but before showing that: I do not fully understand the behavior of one of the electrode plates. Need to discuss for coming up with a plan.

For 13 mm gap, total voltage across gap should me 35 kV to achieve 2.7 MV/m.



PS trip 1.5 after reaching -23kV on Neg plate, but need to try opposite polarity.

Vacuum activity is much less if Pos plate voltage is reduced from +15kV to +12 kV, and Neg plate increased to -23kV