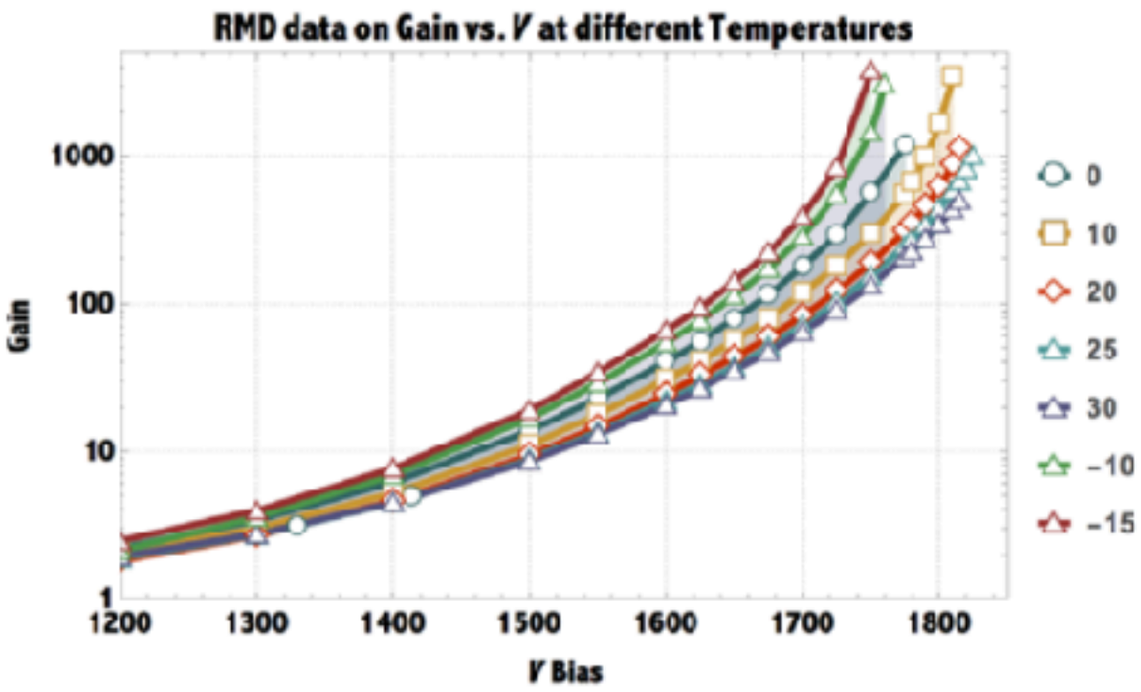
Follow up on Laser tests in environmental chamber at SSD Lab

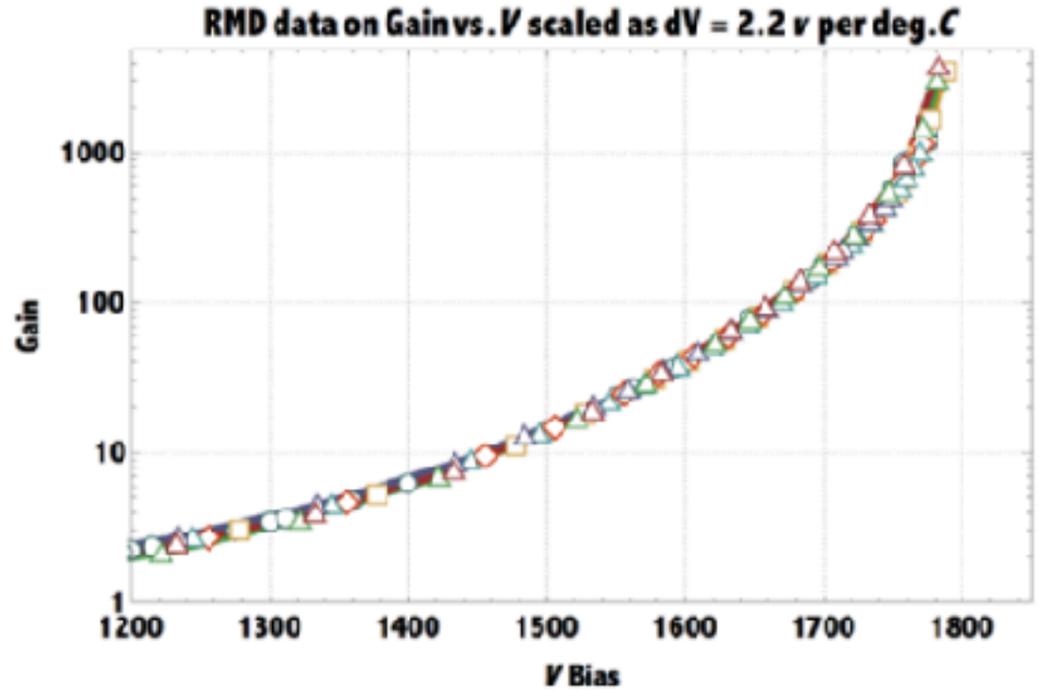
S.White, CERN/U.Virginia HFS mtg. April 19, 2018

on 3/22 I reported on results from laser and fixed energy beta source(for MIP calibration)
-> sub- 10 picosecond RMS timing at MIP equivalent
This large data set extending to -20 deg. C potentially useful for extracting electronic vs. intrinsic jitter.
Not quite there yet.
Here I show some exercises related to earlier “scaling” observations.
These could be useful for resolving alternate impact ionization models.

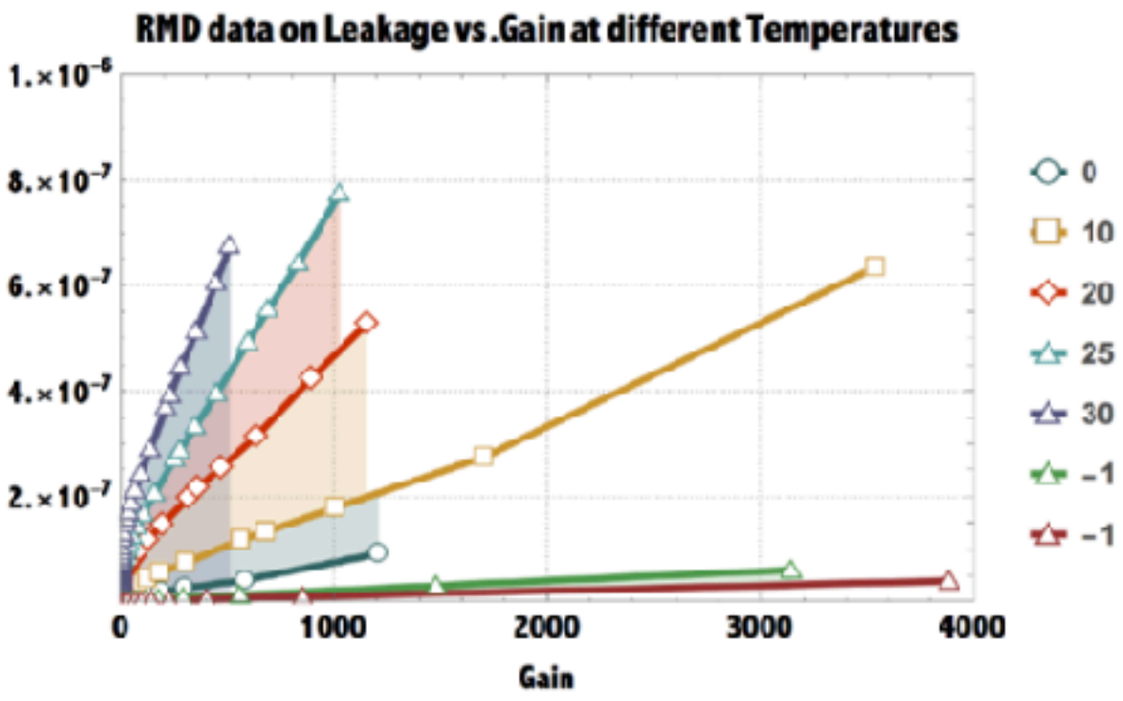
exercise w Mickel's data I showed 1 month ago

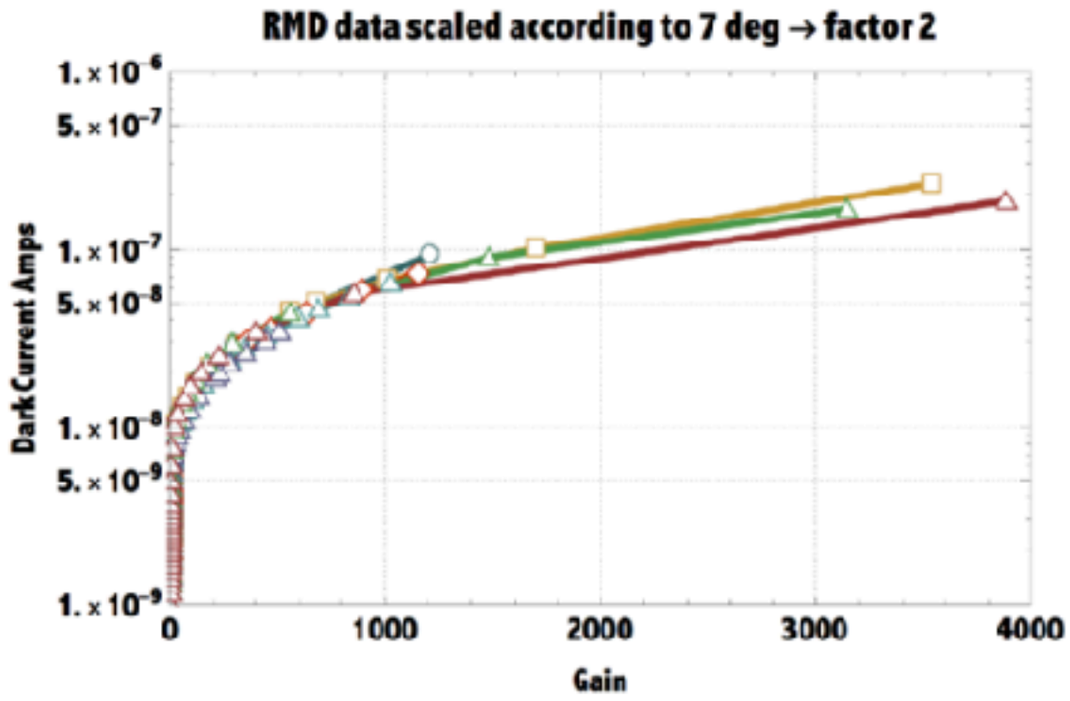
new



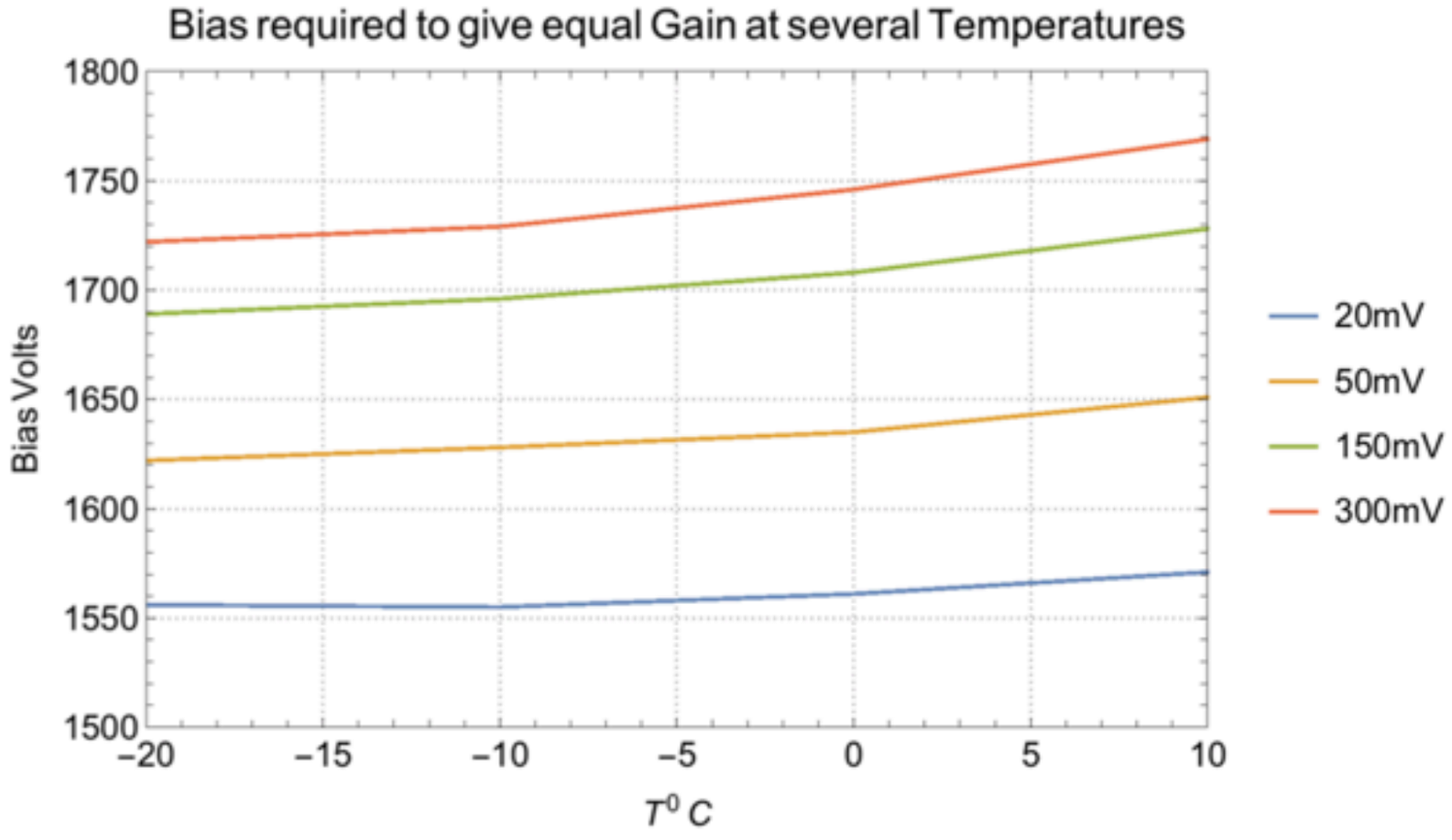


known





Out[•]=



In[•]:= `delta = Table[(tempdat[[i + 1, j, 3]] - tempdat[[i, j, 3]]), {j, 4}, {i, 3}];`

Now compare this to the model.

∂_V to get same Gain for a 10 degree step in T

Out[•]//TableForm=

	-20	-10	0
20mV	-1	6	10
50mV	6	7	15.9
150mV	7	12	20
300mV	7	17	23

a lot of things wrong with this picture. Aside from question of whether T was well controlled

"Gain" variations with T not independent of amplitude. Maybe peak amplitude not a good measure of gain.

Now try to deal with leakage current vs temp at fixed "Gain"

```
i300 = tempdat[[All, 4, 4]]; i150 = tempdat[[All, 3, 4]];
i50 = tempdat[[All, 2, 4]];
v300 = tempdat[[All, 4, 3]]
```

Out[•]= {1722, 1729, 1746, 1769}

```
In[•]:= fiti = NonlinearModelFit[
          Transpose[{tempdat[[All, 1, 1]], i300}], a + b * 2^{(x / 8)}, {a, b}, x]
```

Out[•]= FittedModel[$0.06206 + 0.0960248 \times 2^{x/8}$]

```
In[•]:= fiti2 = NonlinearModelFit[
          Transpose[{tempdat[[All, 1, 1]], i150}], a + b * 2^{(x / 8)}, {a, b}, x]
```

Out[•]= FittedModel[$0.0496786 + 0.0551573 \times 2^{x/8}$]

```
In[•]:= fiti3 = NonlinearModelFit[
          Transpose[{tempdat[[All, 1, 1]], i50}], 0.05 + b * 2^{(x / 8)}, {b}, x]
```

Out[•]= FittedModel[$0.05 + 0.0311237 \times 2^{x/8}$]

Out[•]=