RMD Device Simulation/Tests

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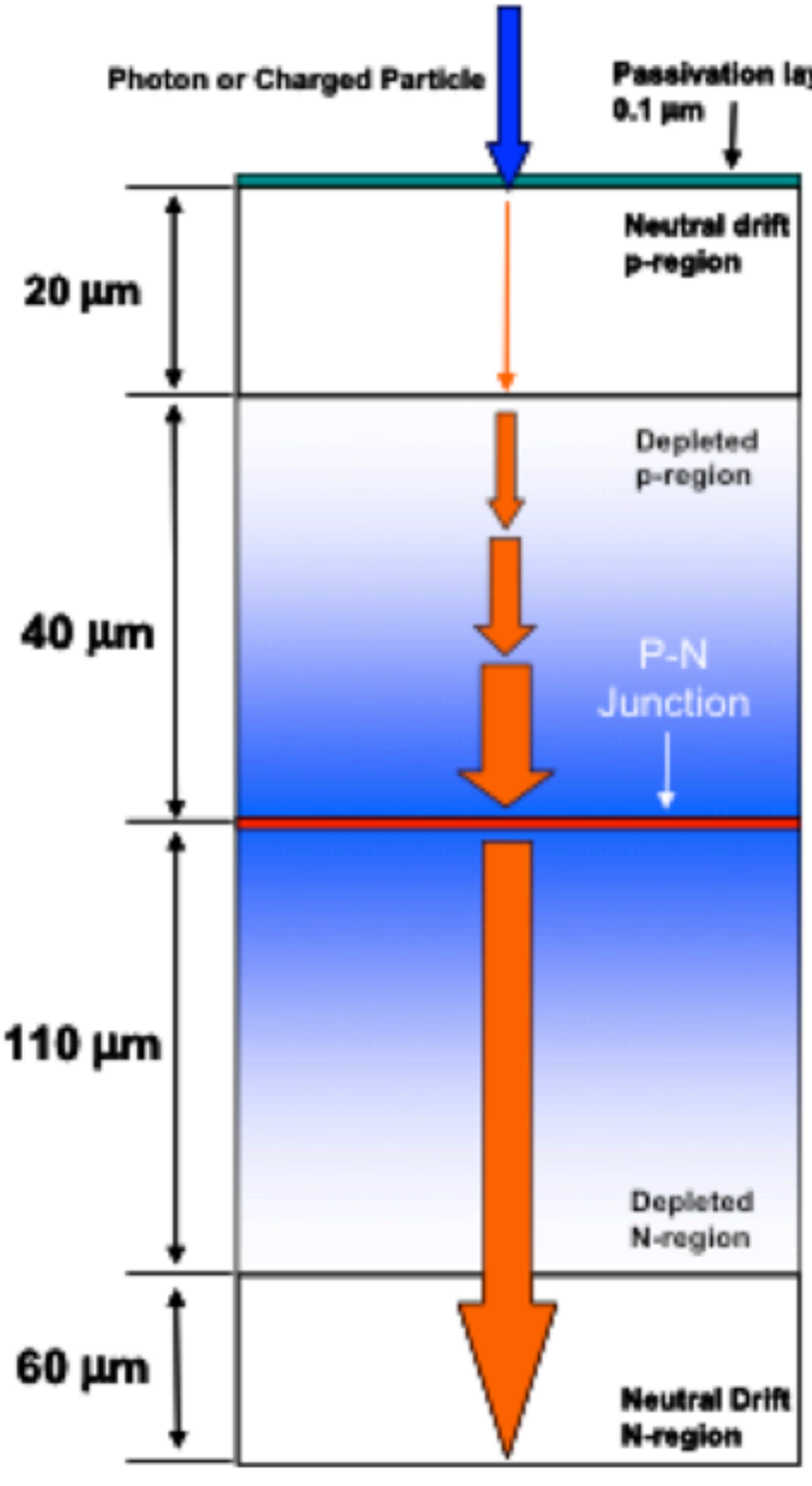
RD50 sim mtg. Jan 13, 2016

-with HFS we are at an intrinsic timing level where differences between laser and MIP time structure are observable

-we have some leeway to engineer the devices to optimize MIP time response (drift region, mesh coupling, stray inductance..)

-interplay between simulation and lab measurements will be key

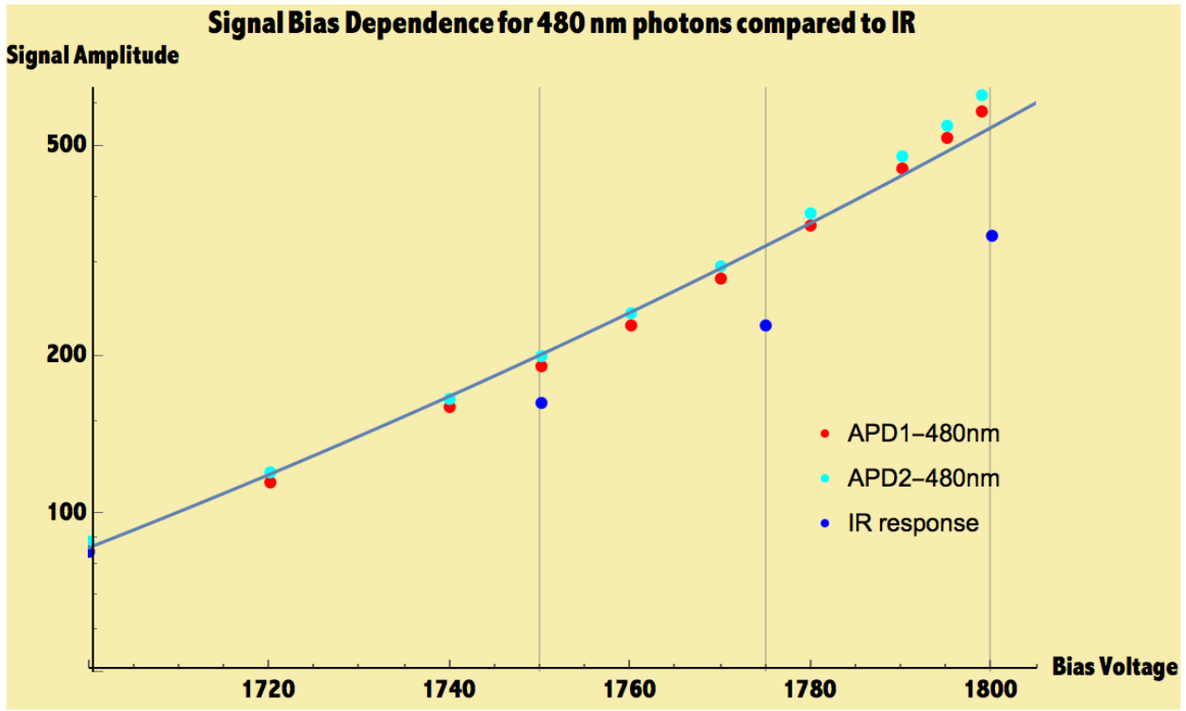
Si characteristics

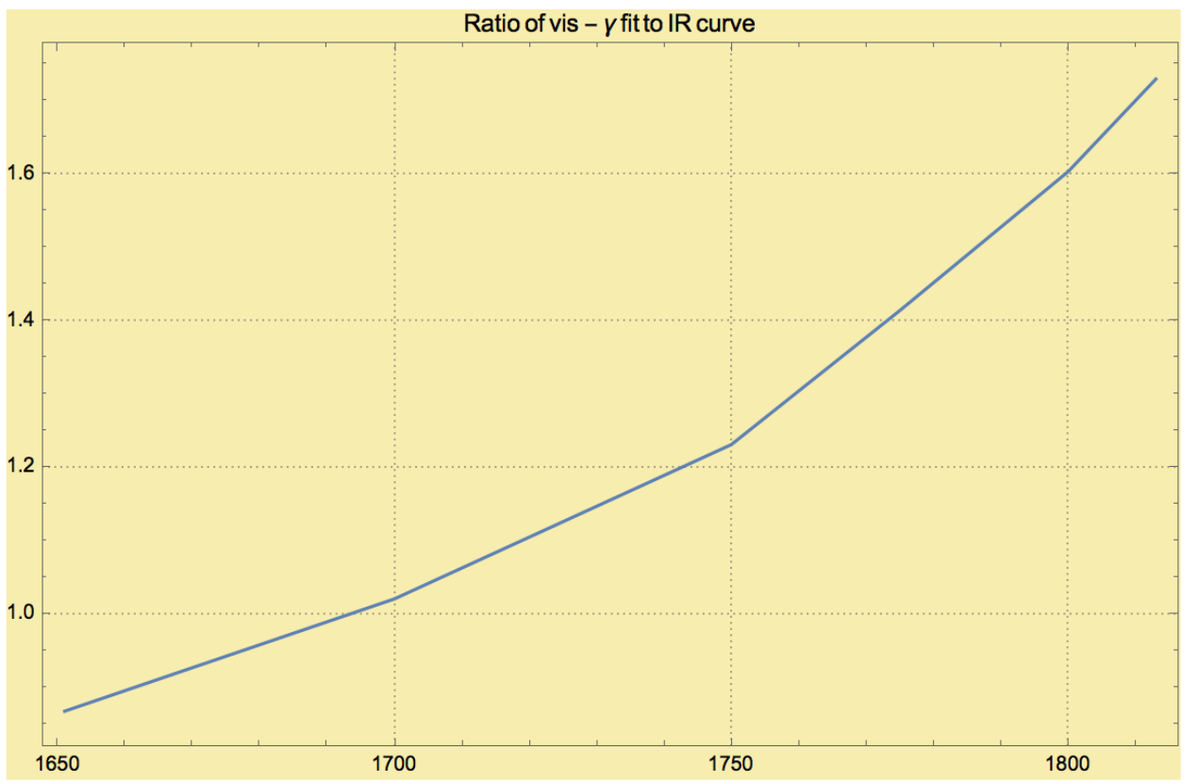


-charge collection in neutral drift p-region (recent visible laser measurements by Lu, Sofia, Christian)

- details of depletion and impact ionization zone (gain curves for IR vs. visible, pulse shape vs. bias..)
- new packaging and FEE development should enable return to network analyzer tests..)
- some of this could guide improvements through packaging and Si processing planned for 2016

Response to Red&IR vs. Bias HV

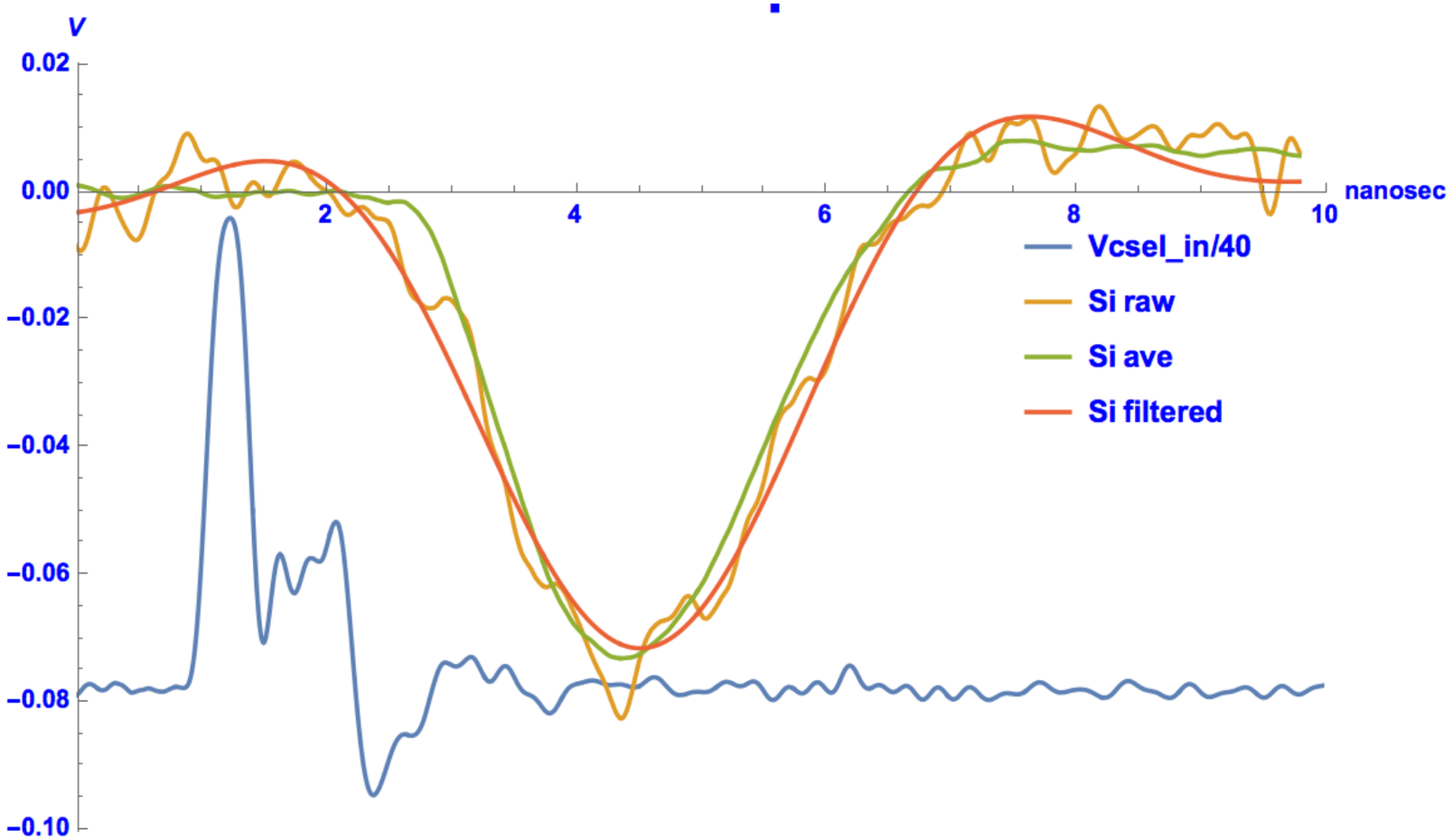


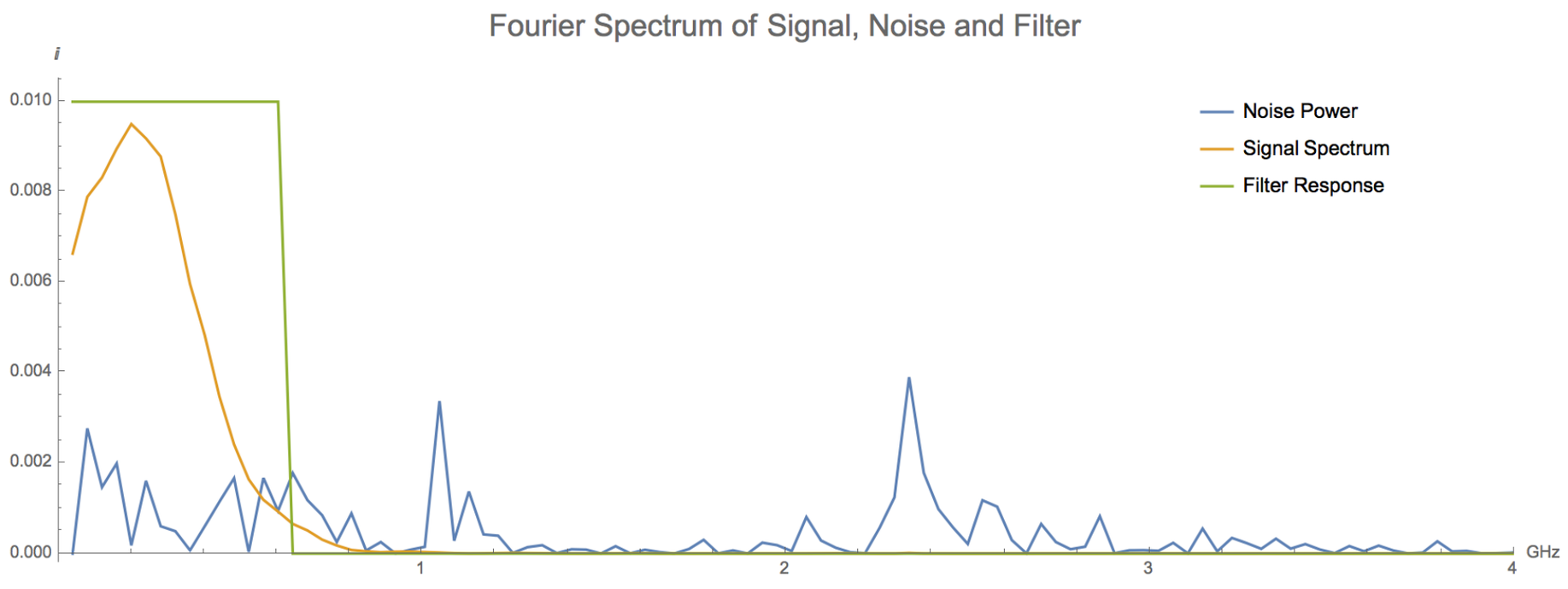


this can be viewed for evidence that gain curves done as dc measurements with 480 nm is not representative of the Bias dependence of the response to MIPs
the interpretation is complicated by the fact that 480nm photons interact in a shallow surface layer and the higher bias may result in better extraction efficiency

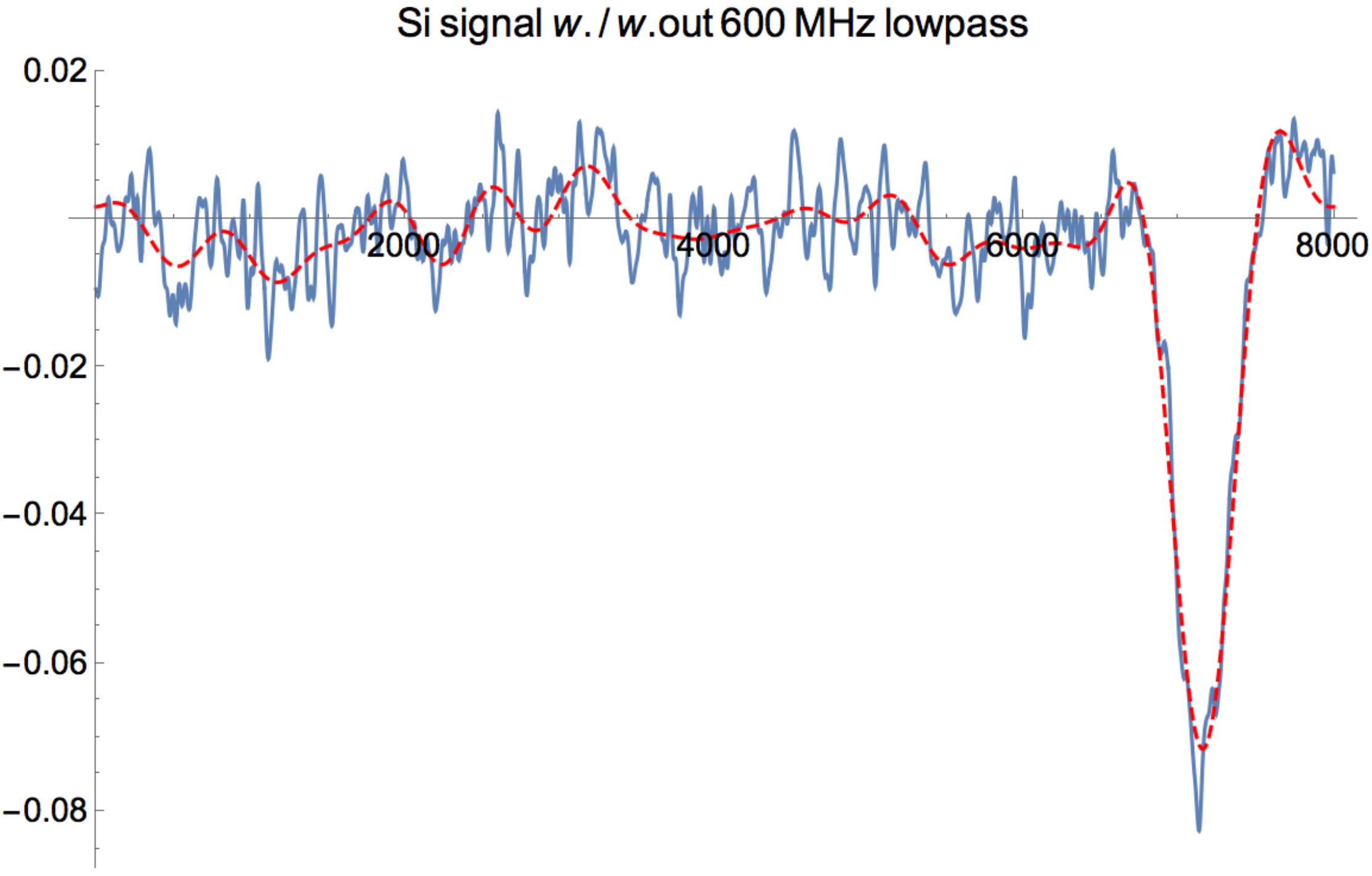
Pulse Width vs. HV

Out[384]=

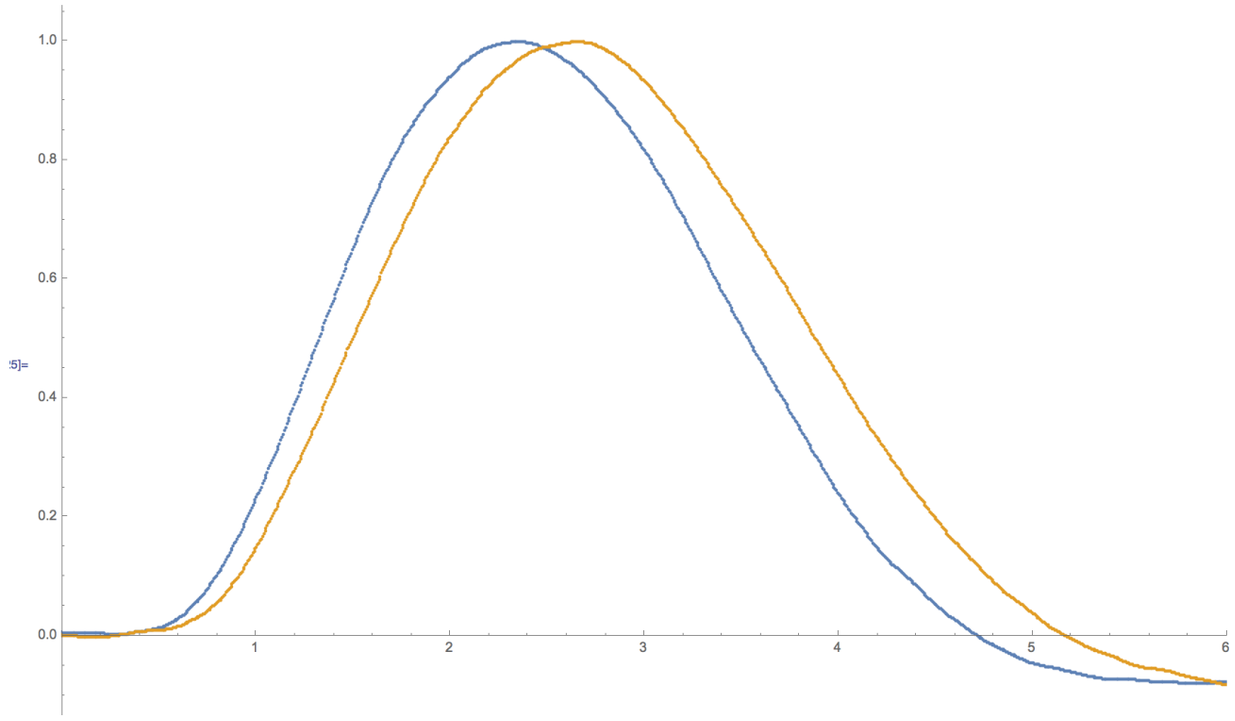


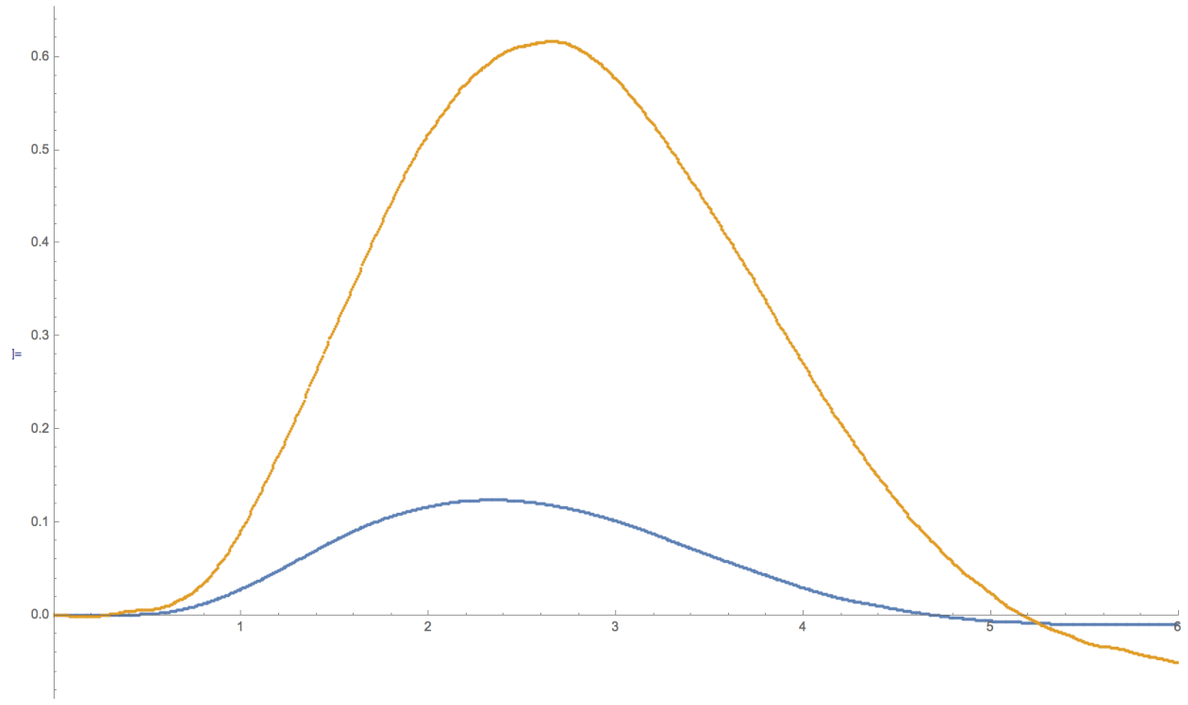


filter


Si signal w. / w.out 600 MHz lowpass
0.02
−0.02
−0.04
−0.06
−0.08
2000
4000
6000
8000

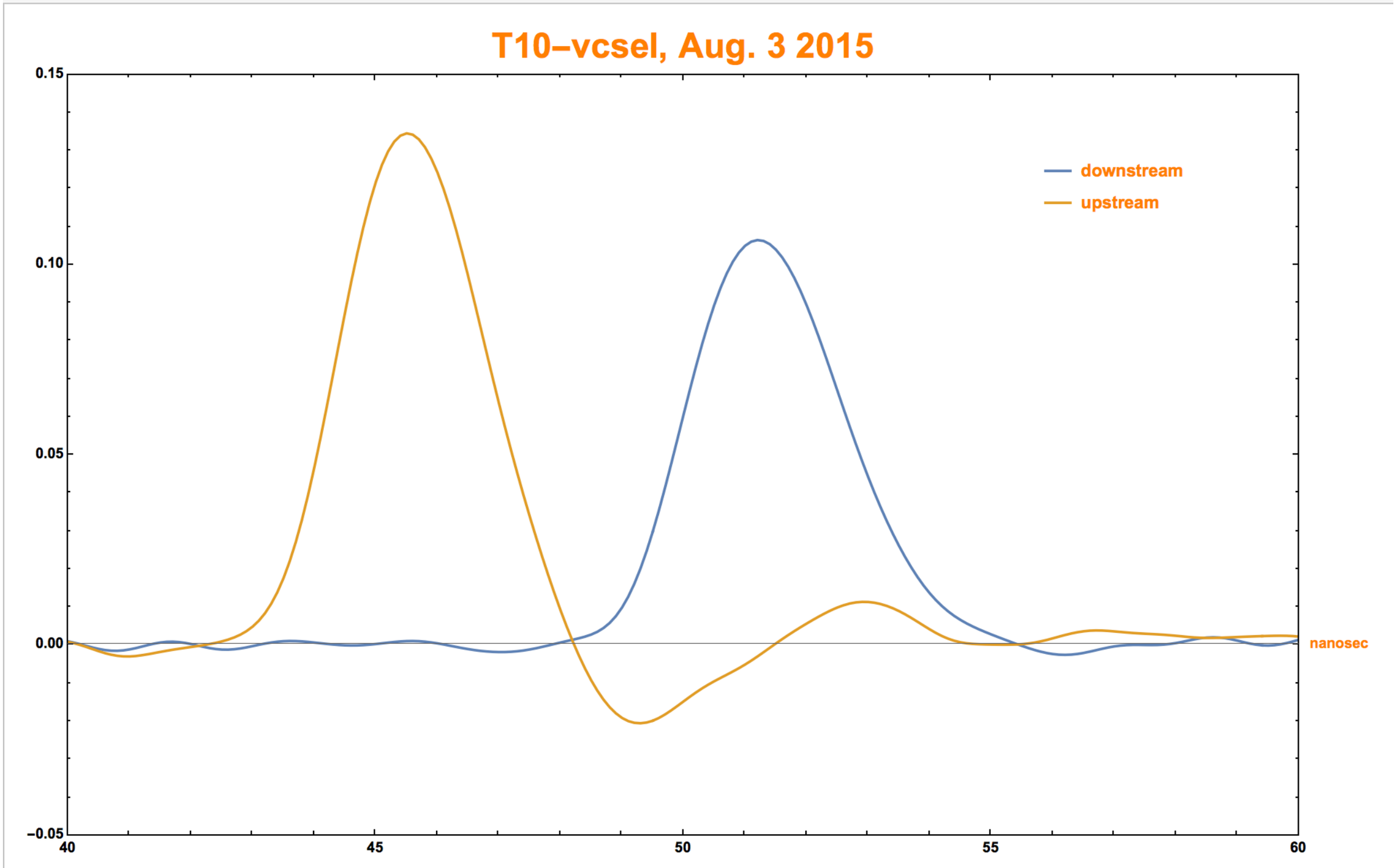
Time Structure vs. Bias





above are waveforms for 1700V bias (blue) and 1813 V (gold) In the left plot the signals are scaled to each have peak amplitude=1. Clearly the signal is faster at low bias. Whether there is a slew rate limitation or an intrinsic better speed in the lower bias case is unclear.

Aug- T10 pion vs Vcsel



additional structure apparent in MIP vs. Vcsel