

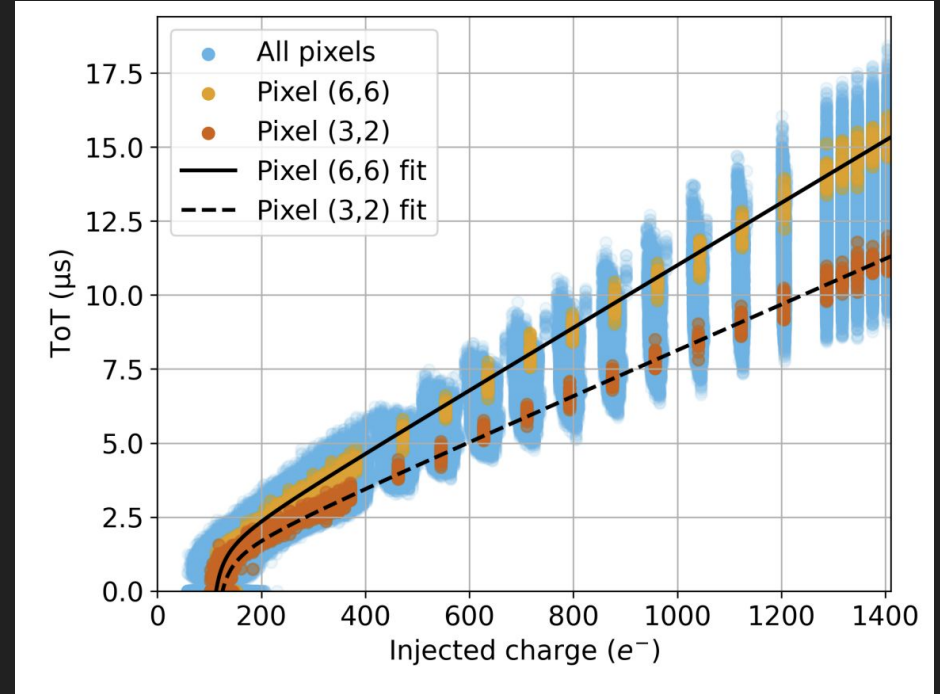
Time over Threshold Studies for DPTS

Oscar Tapia Gallegos
Barak Schmookler

What is Time over Threshold?

- When a pixel activates, it is the time it spends over the threshold.
- Important because it tells us injected charge.

$$ToT = aQ_{inj} + b - \frac{c}{Q_{inj} - d}$$



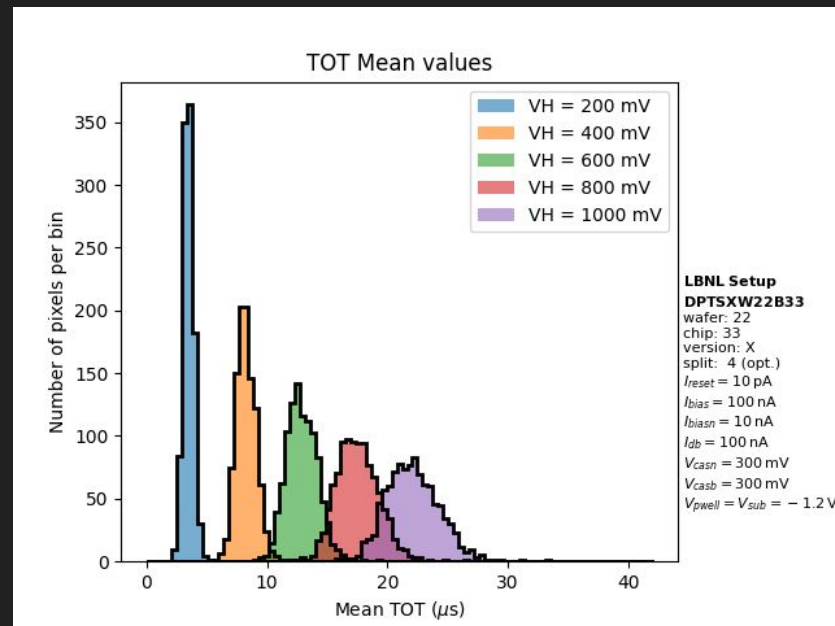
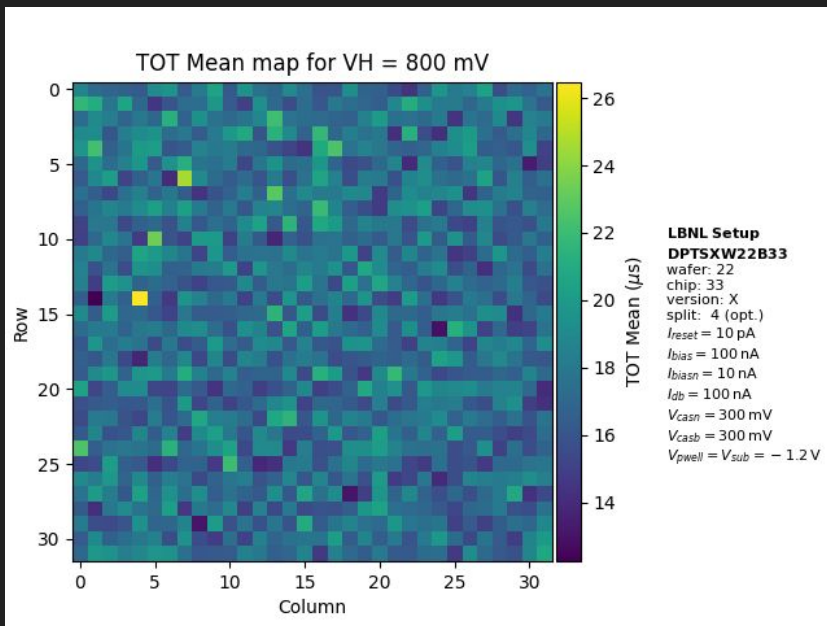
Different voltages and currents we measured:

- Nominal
- V_{CASB} : 150mV, 200mV, 225mV, 250mV, 275mV, 350mV
- I_{RESET} : 5pA, 15pA, 25pA, 40pA, 60pA
- V_{CASN} : 200mV, 400mV, 500mV, 600mV
- I_{DB} : 50nA, 200nA, 300nA, 400nA, 500nA
- I_{BIAS} : 50nA, 200nA, 300nA, 400nA, 500nA

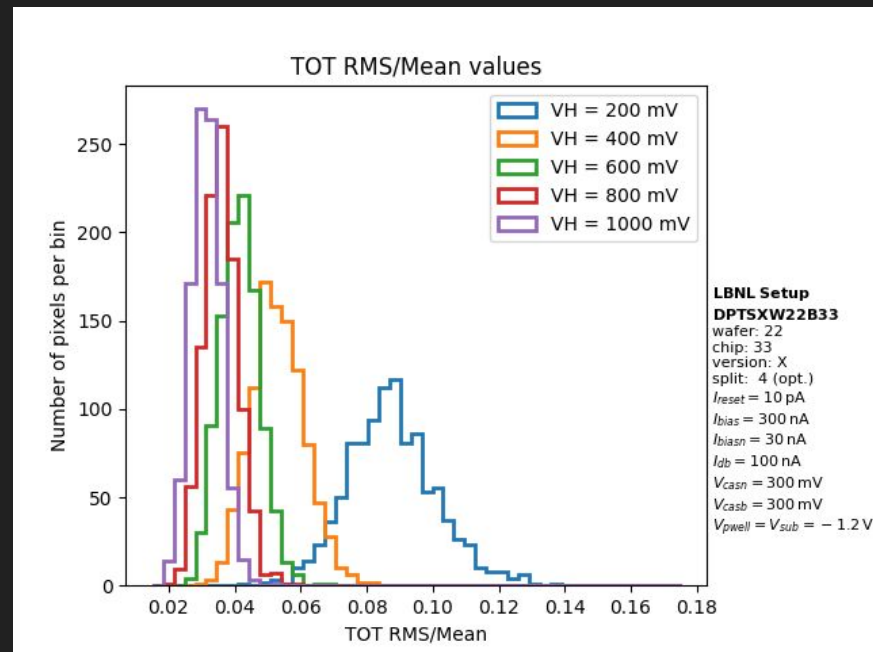
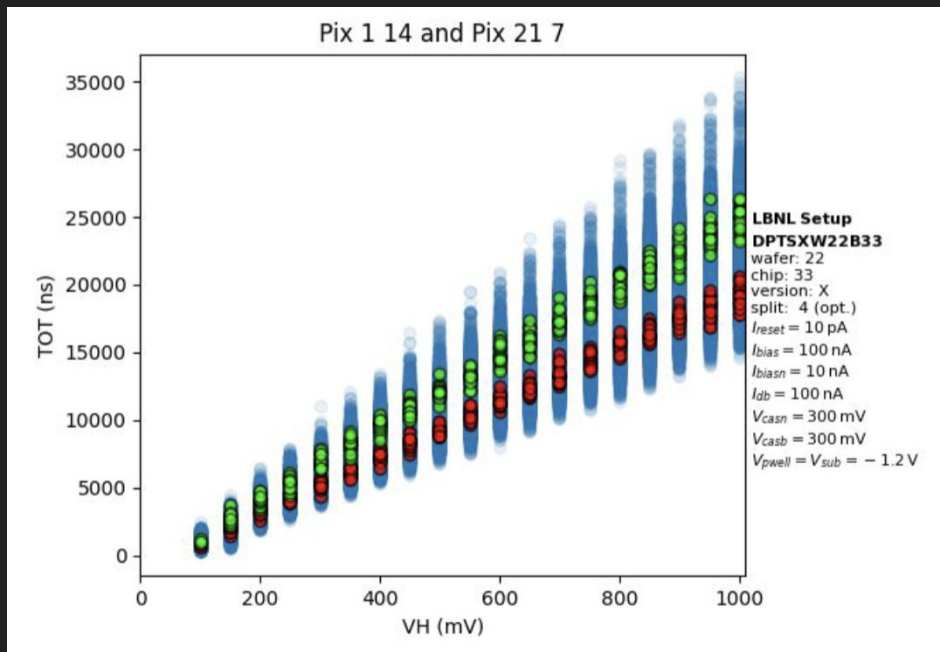
What the nominal settings are:

- $V_CASB = 300 \text{ mV}$
- $V_CASN = 300 \text{ mV}$
- $I_reset = 10 \text{ pA}$
- $I_DB = 100 \text{ nA}$
- $I_BIAS = 100 \text{ nA}$
- $V_H = 600 \text{ mV}$
- $V_SUB = -1.2 \text{ V}$

Nominal Settings Studies

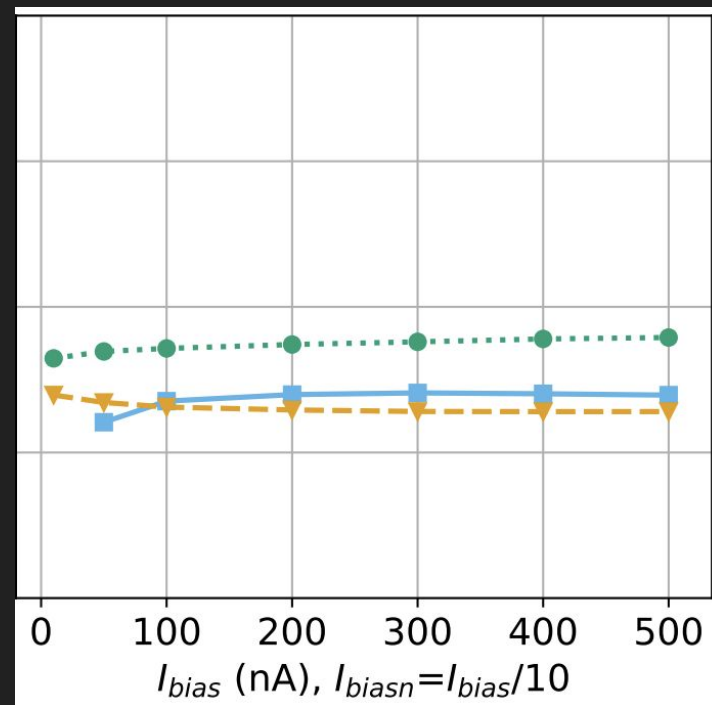
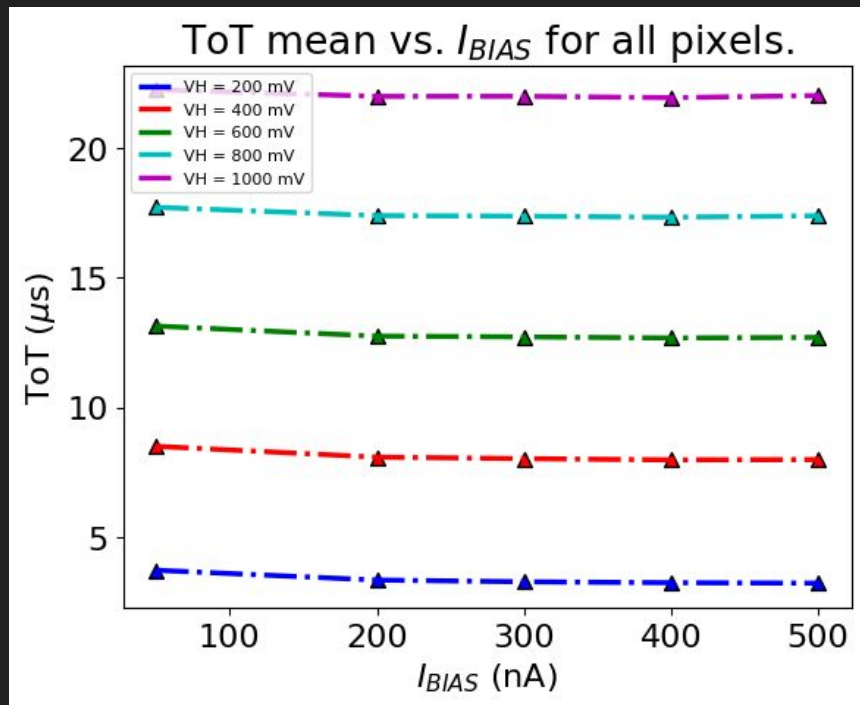


Nominal Settings Studies

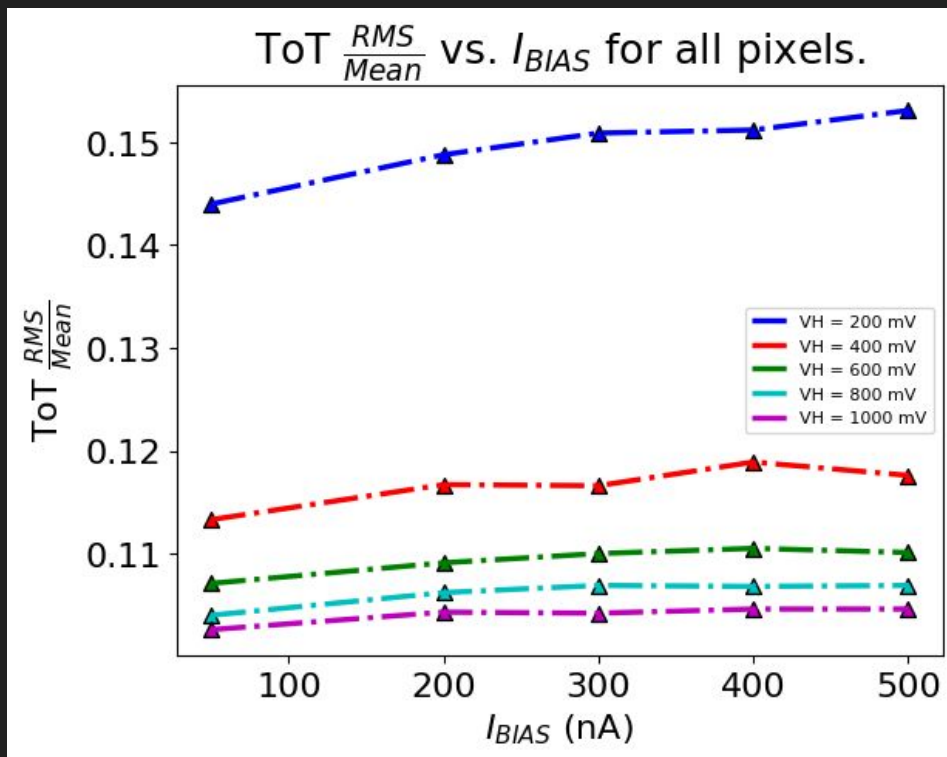


I_BIAS Studies

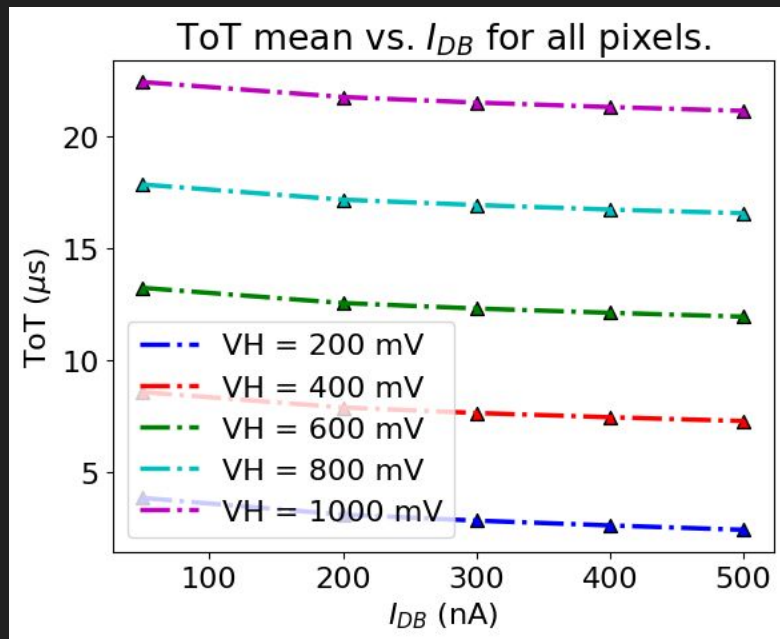
- $V_{sub} = V_{pwell} = 0.0 \text{ V}$
- $V_{sub} = V_{pwell} = -1.2 \text{ V}$
- $V_{sub} = V_{pwell} = -3.0 \text{ V}$



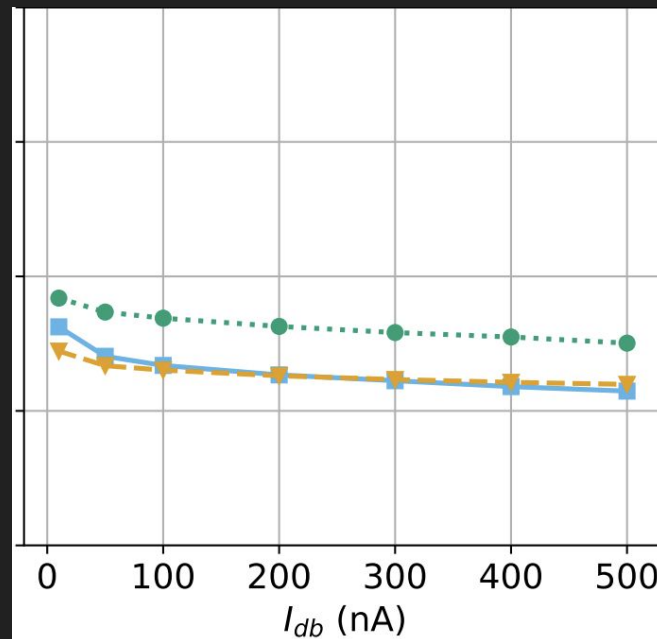
I_BIAS Studies



I_{DB} Studies



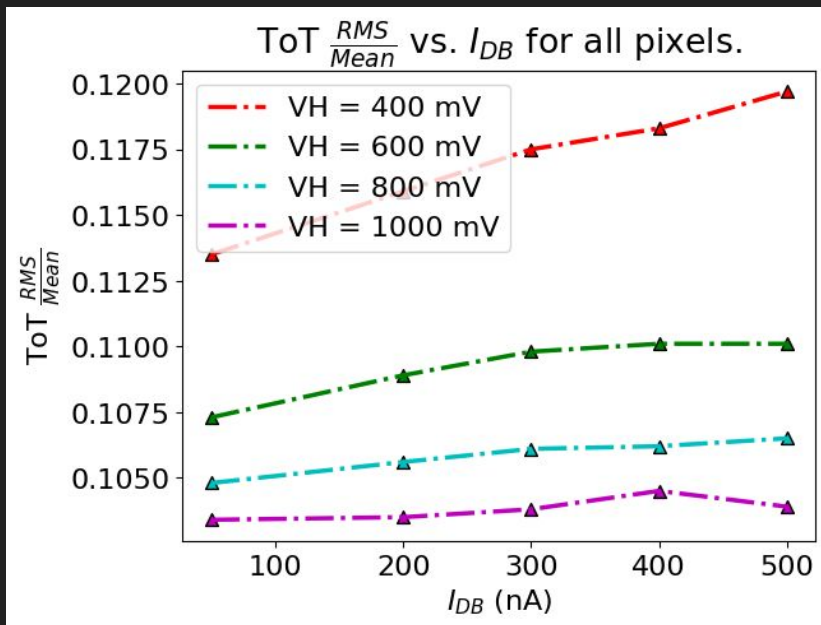
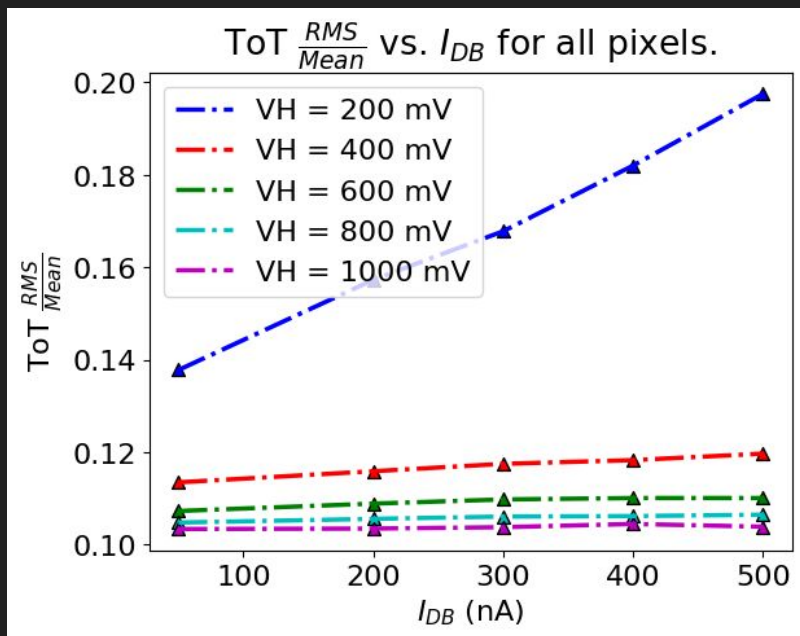
LBLN Setup



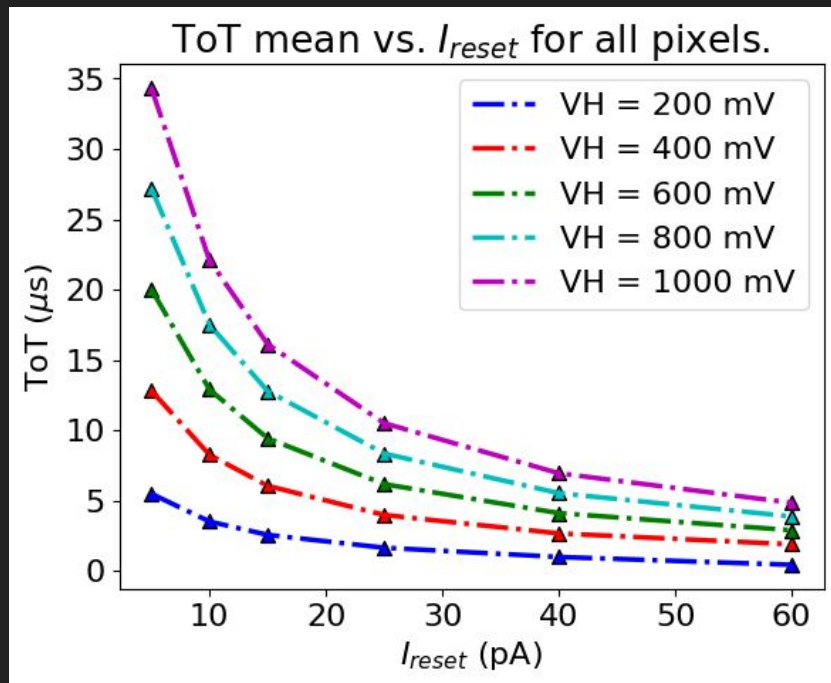
Paper Findings

<https://arxiv.org/pdf/2212.08621.pdf>₉

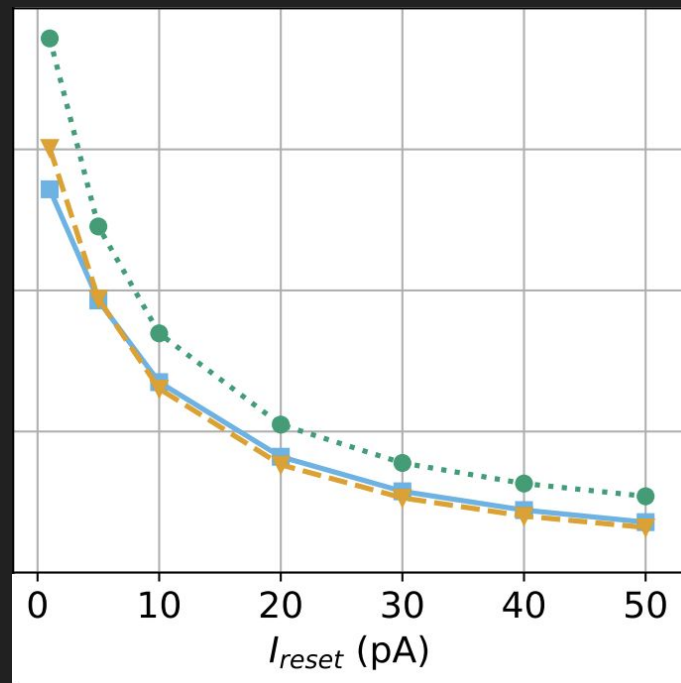
I_{DB} Studies



I_Reset Studies



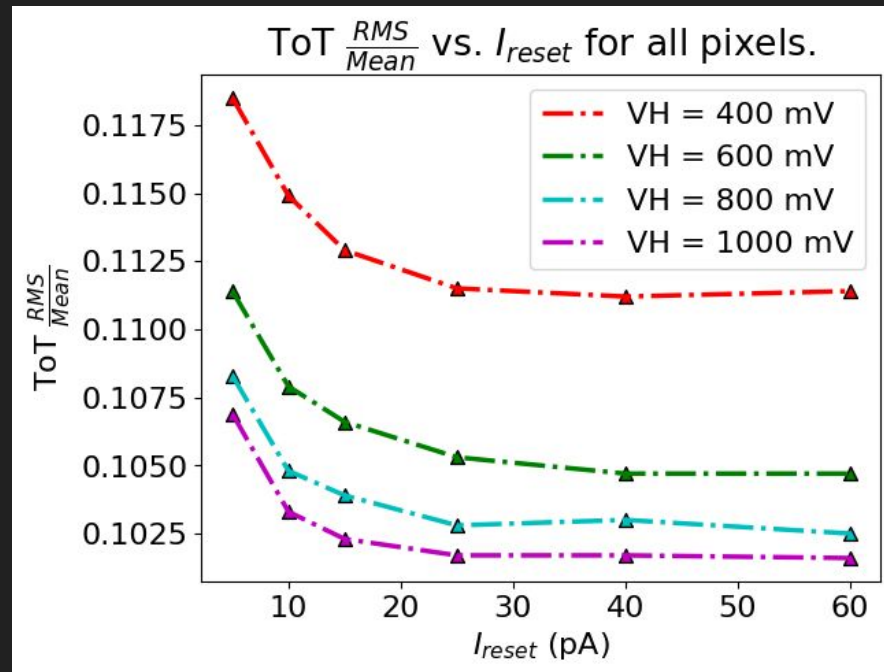
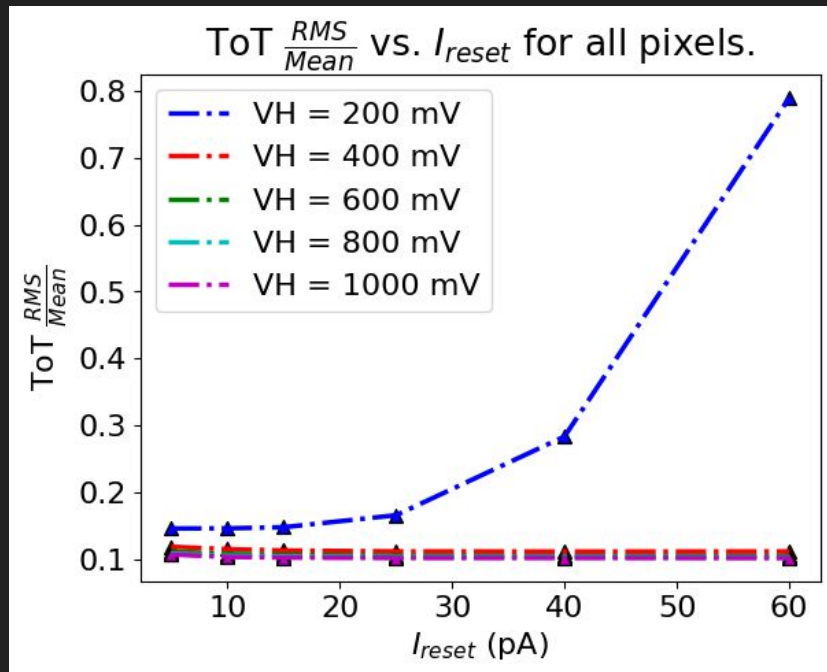
LBNL Setup



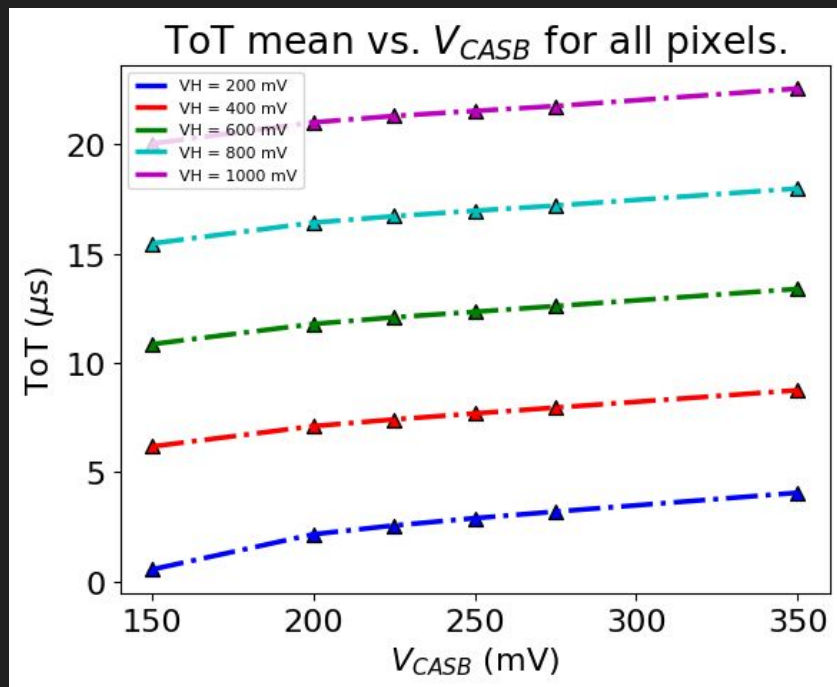
Paper Findings

<https://arxiv.org/pdf/2212.08621.pdf>

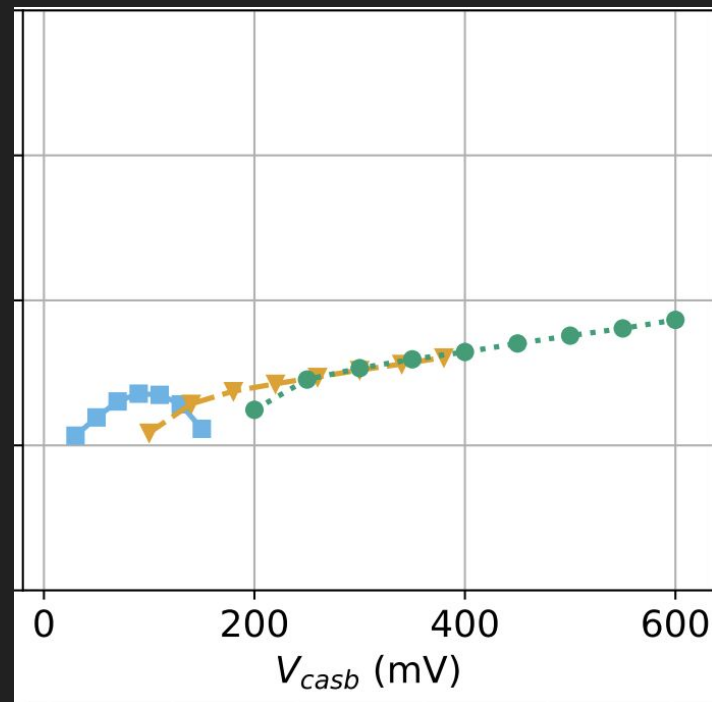
I_Reset Studies



V_CASB Studies



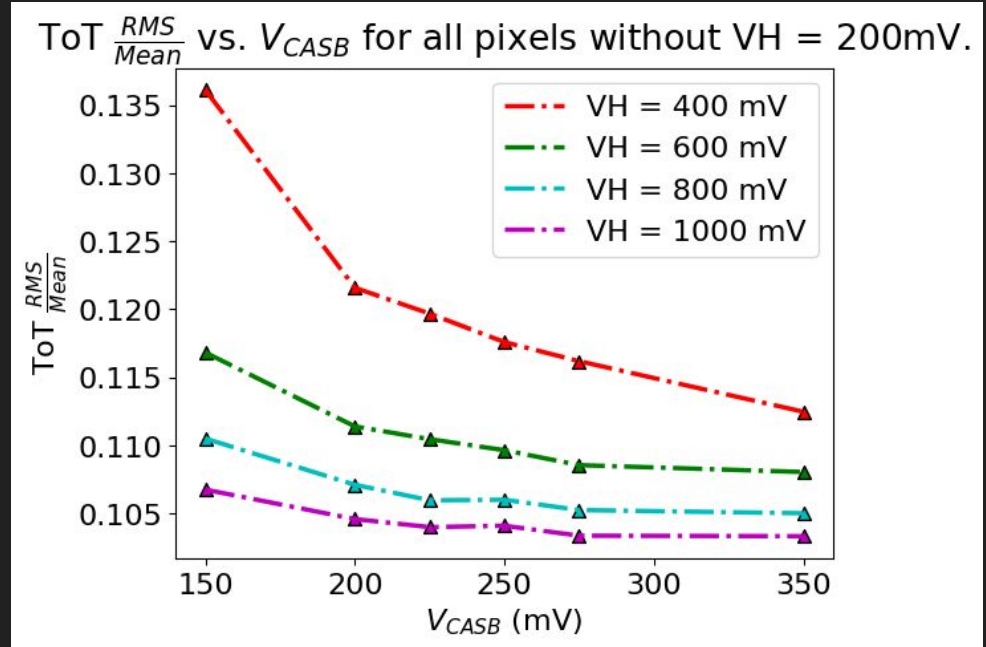
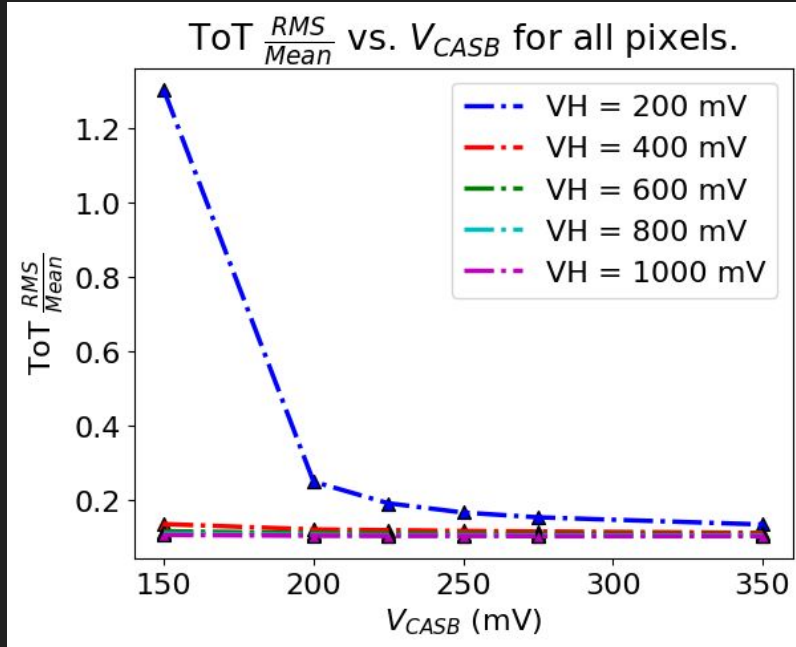
LBNL Setup



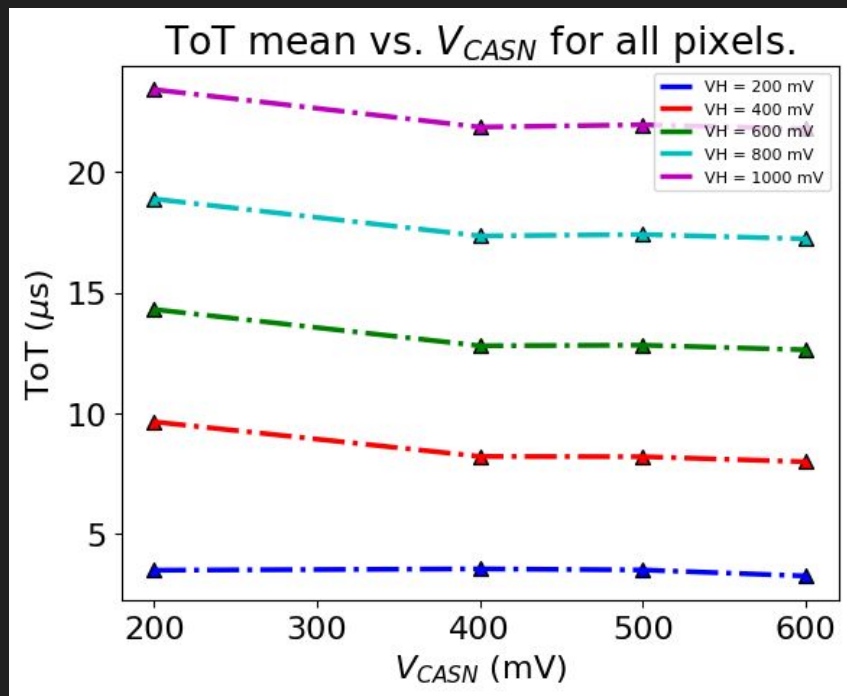
Paper Findings

<https://arxiv.org/pdf/2212.08621.pdf>

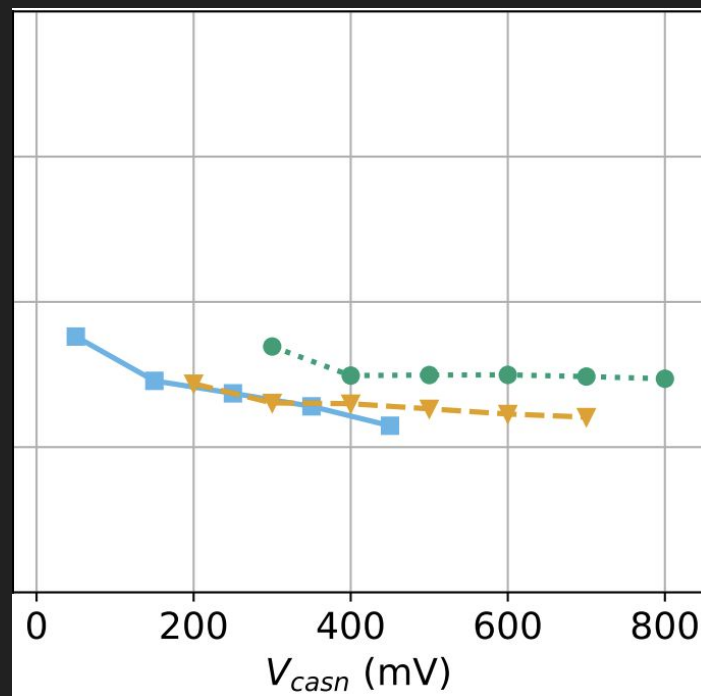
V_CASB Studies



V_CASN Studies



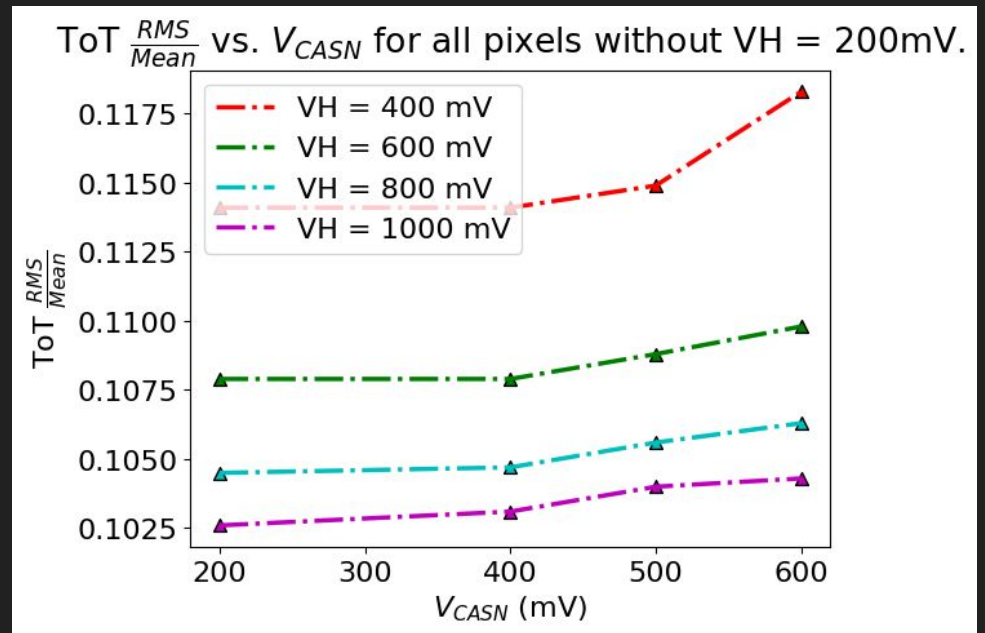
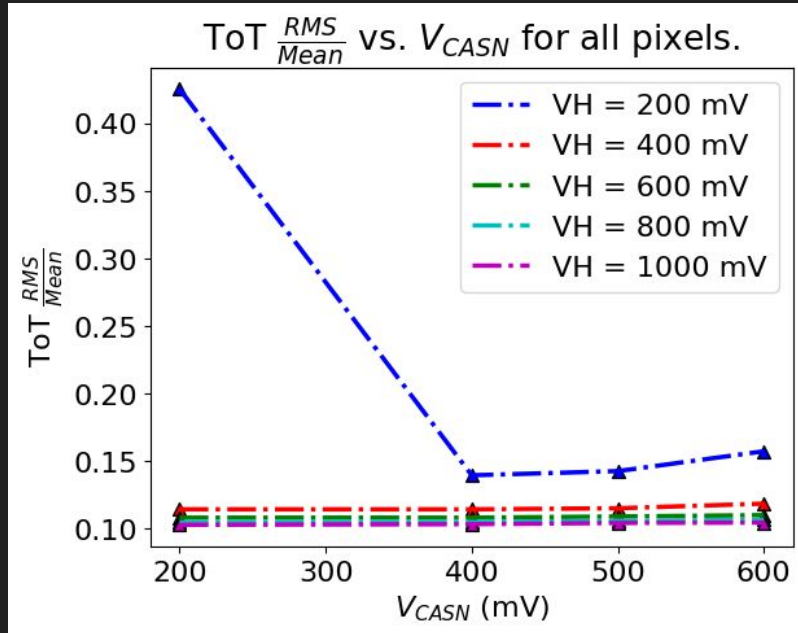
LBL Setup



Paper Findings

<https://arxiv.org/pdf/2212.08621.pdf>

V_CASN Studies



Future Directions and Conclusion

- Our ITS3 chip follows the same trends as measured in the ALICE paper.
- Relative mean/RMS has a discernible trend, but is still relatively constant.
- Test detector with source
- Look into pixel to pixel ToT differences to find specific patterns.

