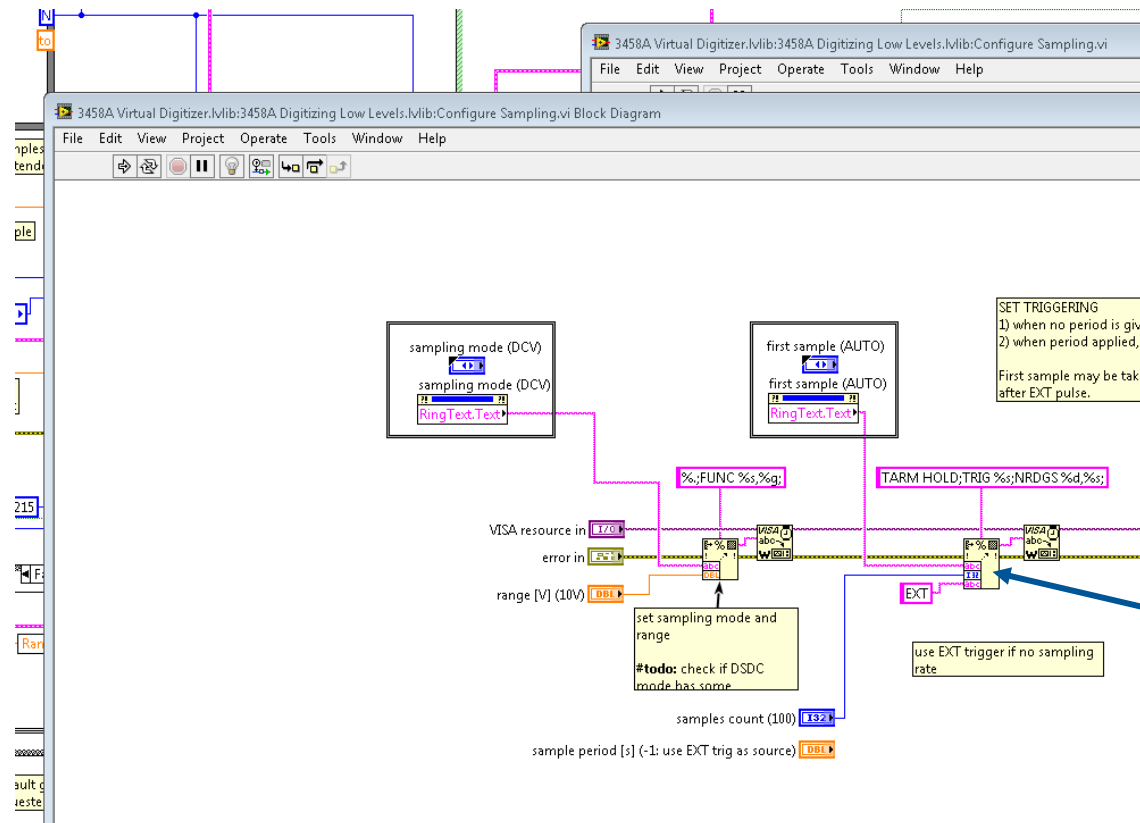


Status of the NPL measurements:

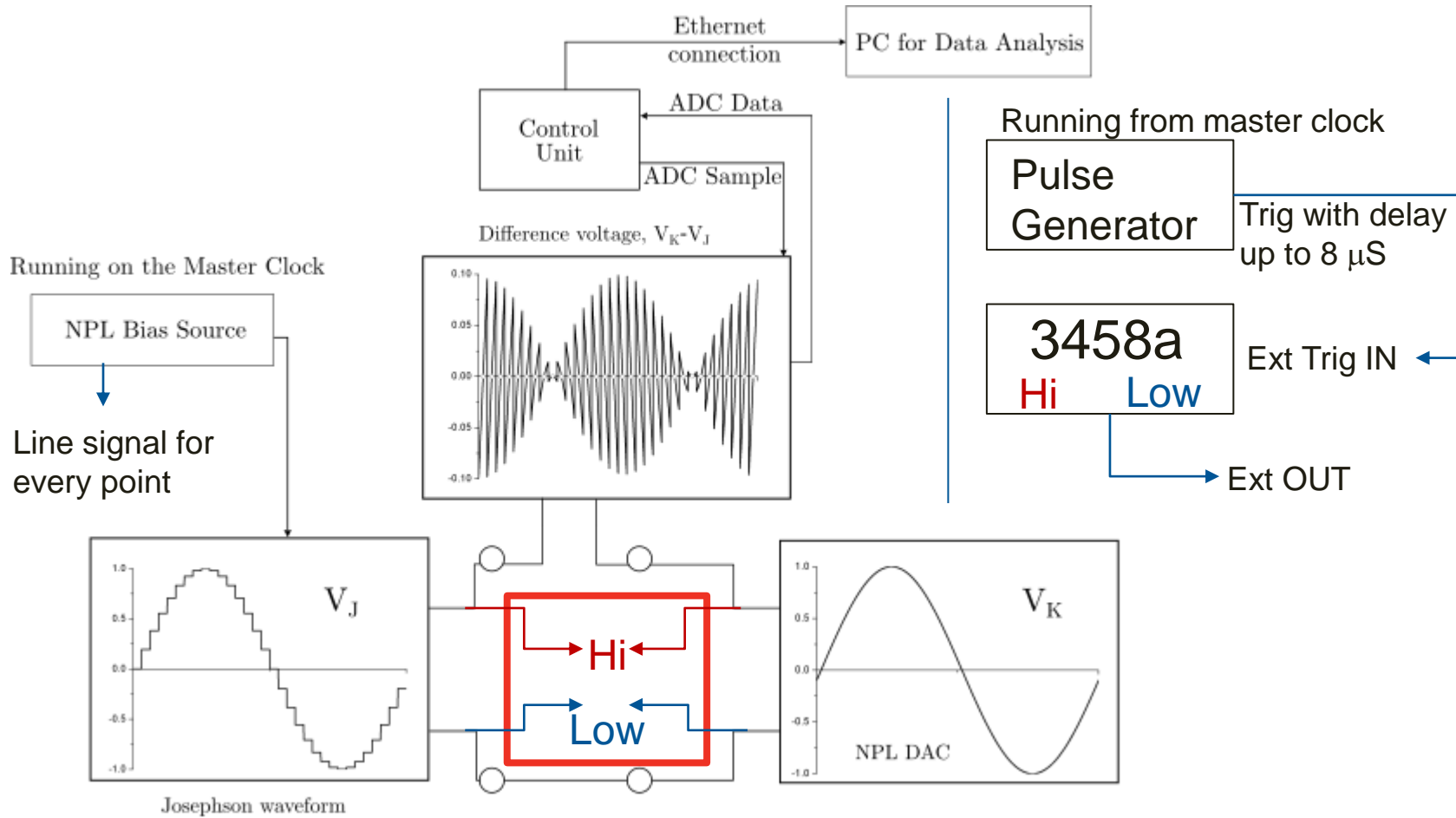
- Our measurements focused on HP 3458a in the end.
- We work required changes to software and hardware.
- We used our modified version of the TWM software.
 - Modification:
 - Low level HP3458a Vi



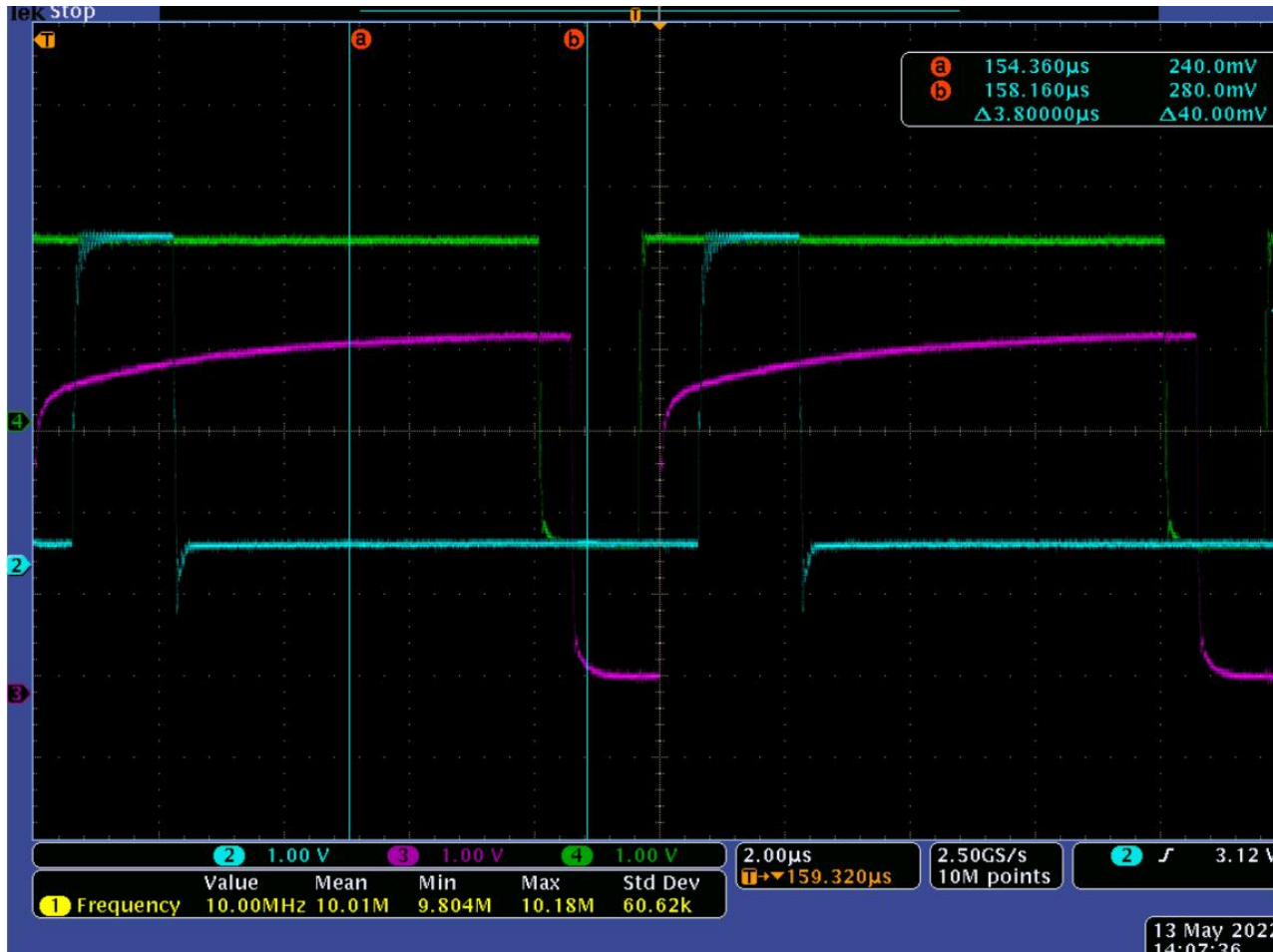
Found via I/O trace
software that NRDGS
NUM, TIMER always!
And not triggering from
our line EXT trigger

Case Statement removed!

Hardware setup:



Measuring in practice:



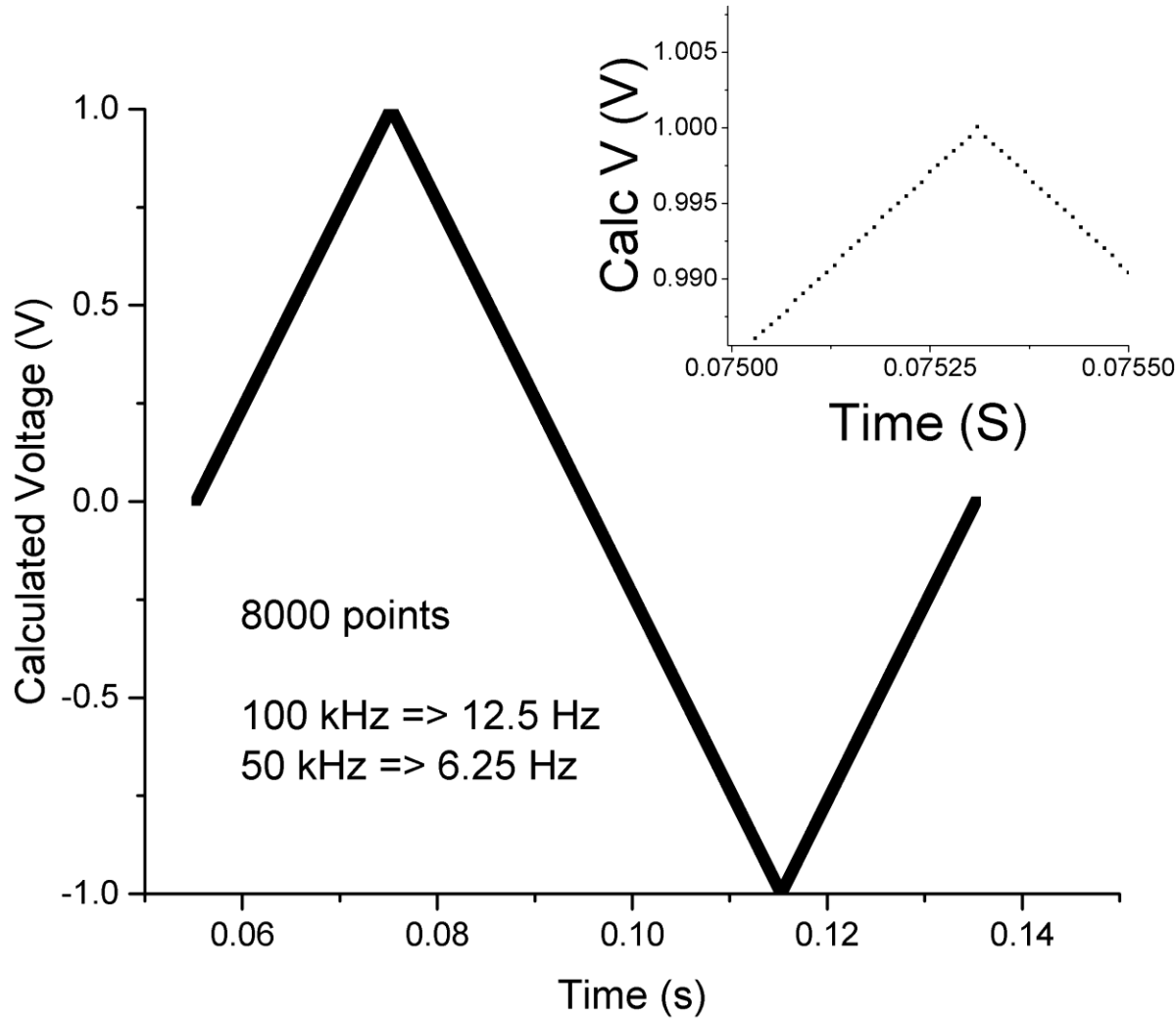
Green = Delay
trigger from pulse
generator

Blue = Line trigger
from Bias Source

Purple = 3458a EXT
OUT signal using
the point when the
measurement are
running.

Triggering of a HP 3458a using a delayed pulse

Example Triangle waveform:



Example of calculated triangle wave used in the following slides

Previous results from 2005:

Characterization of a High-Resolution Analog-to-Digital Converter With a Josephson AC Voltage Source

Waldemar G. Kürten Ihlenfeld, Enrico Mohns, Ralf Behr, Jonathan M. Williams, Pravin Patel, Günther Ramm, and Hans Bachmair

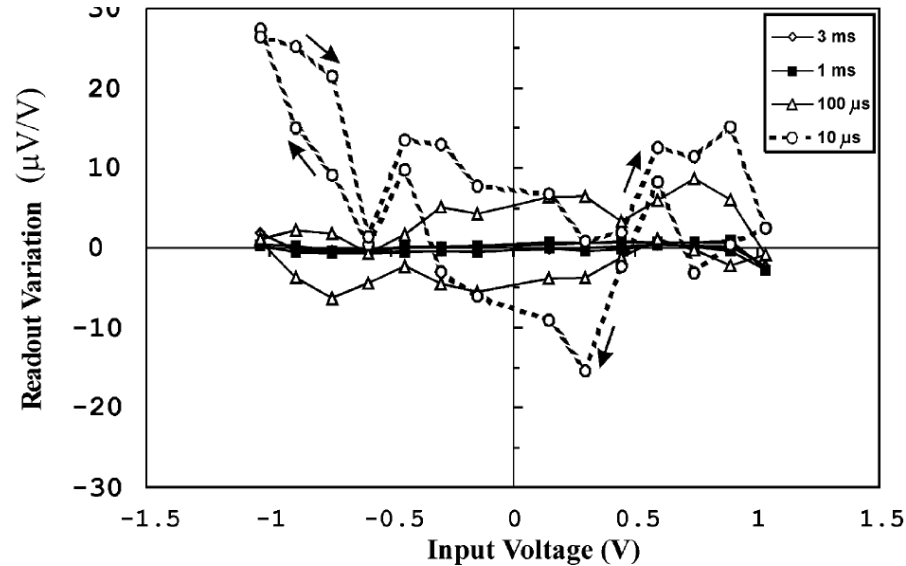


Fig. 4. Hysteretic behavior of the DSV, dependent upon the input voltage and aperture times. The smaller the aperture time, the higher is the hysteretic effect, which is believed to be mainly due to remaining charges in the integrating ADC that are not completely discharged before a new cycle begins. These curves do

Previous results from 2012:

Application of a Josephson quantum voltage source to the measurement of microsecond timescale settling time on the Agilent 3458A $8\frac{1}{2}$ digit voltmeter

D Henderson¹, J M Williams¹ and T Yamada²

¹ National Physical Laboratory, Hampton Road, Teddington, Middlesex TW11 0LW, UK

² National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Japan
<http://stacks.iop.org/MST/23/124006>

E-mail: dale.henderson@npl.co.uk

Received 4 May 2012, in final form 30 August 2012

Running at 5 kHz not 100 kHz!

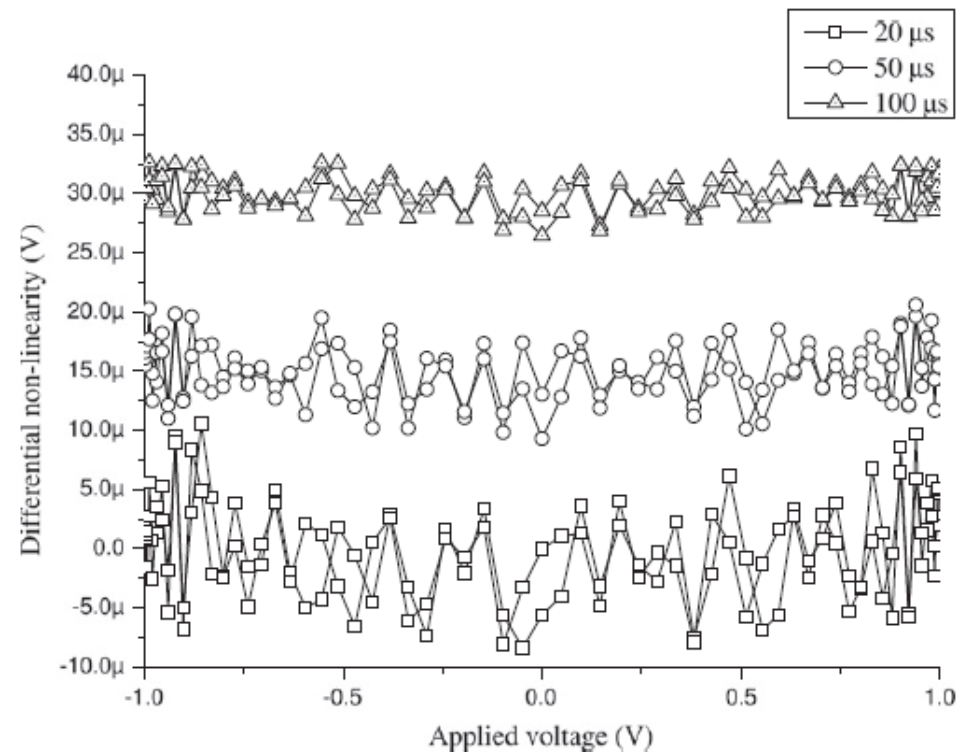
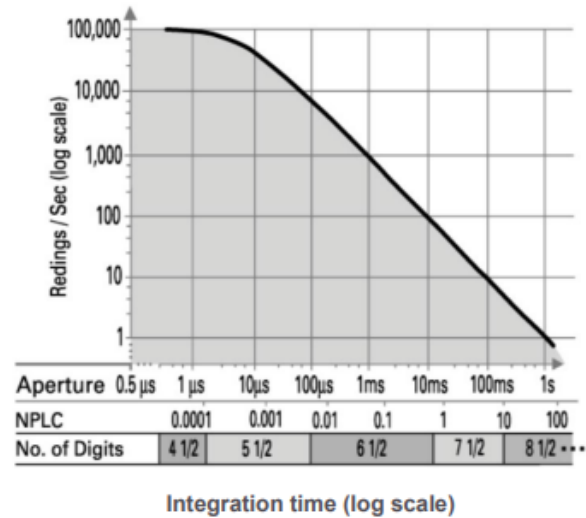


Figure 10. The differential nonlinearity for the same aperture delay and three aperture durations, offset for clarity. DNL was found to scale inversely with aperture duration.

3458a Specs

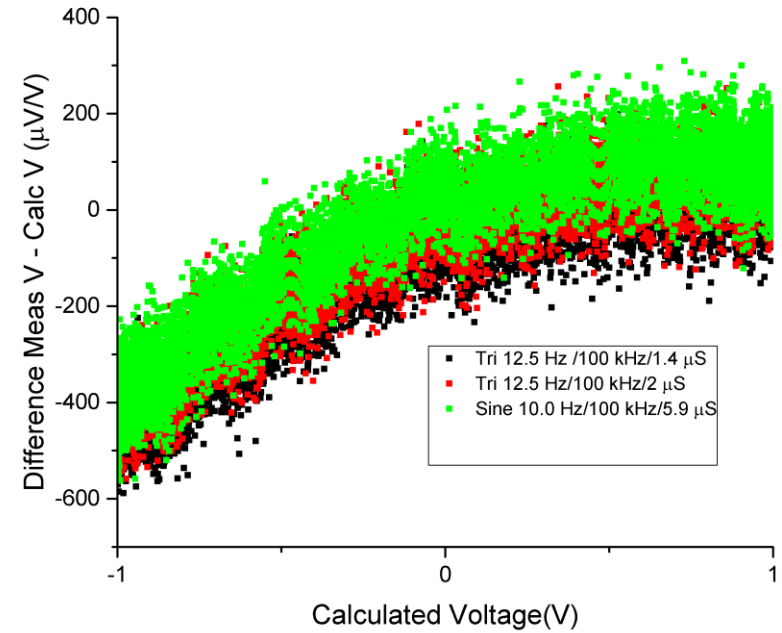
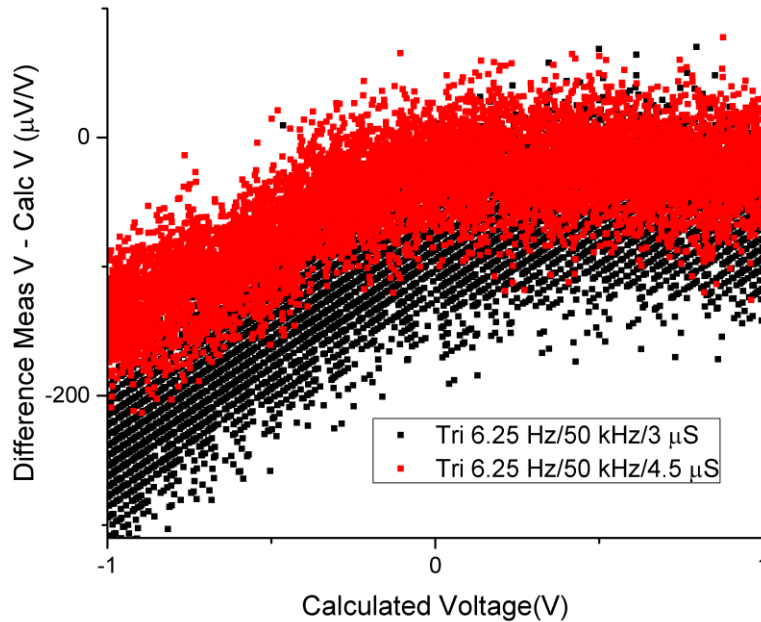
Reading rate (auto-zero off)



Selected reading rates¹

NPLC	Aperture	Digits	Bits	Readings / s	
				A-zero off	A-zero on
0.0001	1.4 μs	4.5	16	100,000 ³	4,130
0.0006	10 μs	5.5	18	50,000	3,150
0.01	167 μs ²	6.5	21	5,300	930
0.1	1.67 ms ²	6.5	21	592	245
1	16.6 ms ²	7.5	25	60	29.4
10	0.166 s ²	8.5	28	6	3
100		8.5	28	36 / min	18 / min
1000		8.5	28	3.6 / min	1.8 min

Our Results: Static Gain



The dependence of the difference between the measured voltage and input voltage on the input voltage. Various sampling rates, apertures and delays are used.

Significantly worst at 100 kHz but improves at 50 kHz