Resolution Study cont.

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Outline

Look at different files from the May/June run and attempt to identify common conditions for achieving good resolution results.
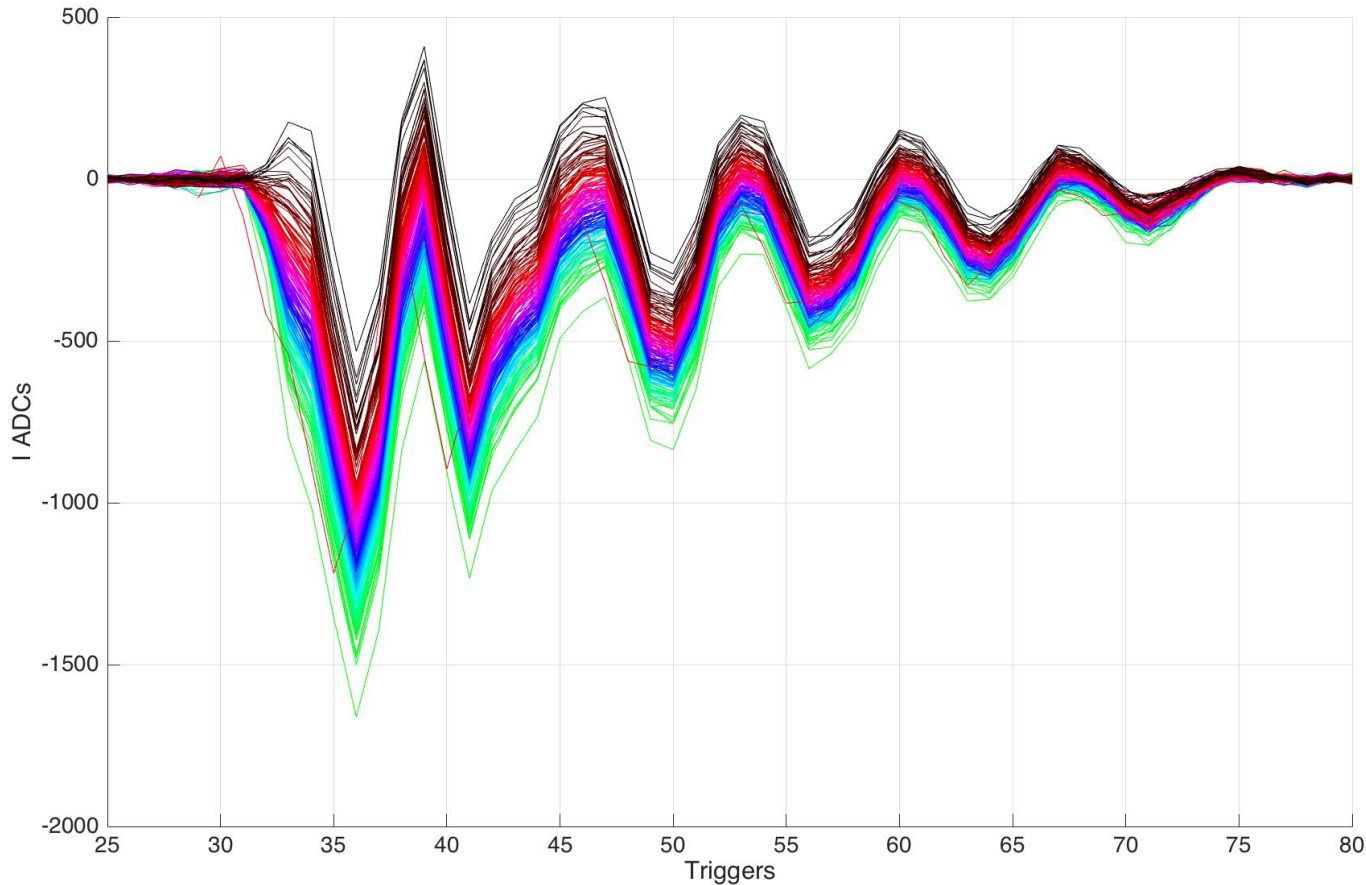
- Study 1:   Stray waveforms.
    Apply fitting to rolling data file.

- Study 2:   Apply fitting to different resolution runs.
    Look at variations in theta from jitRun vs calibration.

Study 1: Stray waveforms

IPA I signal colour-coded by height.   jitRun14(601:800) → 33nm geometric

Note: unwanted trigger in red that has sample jumped
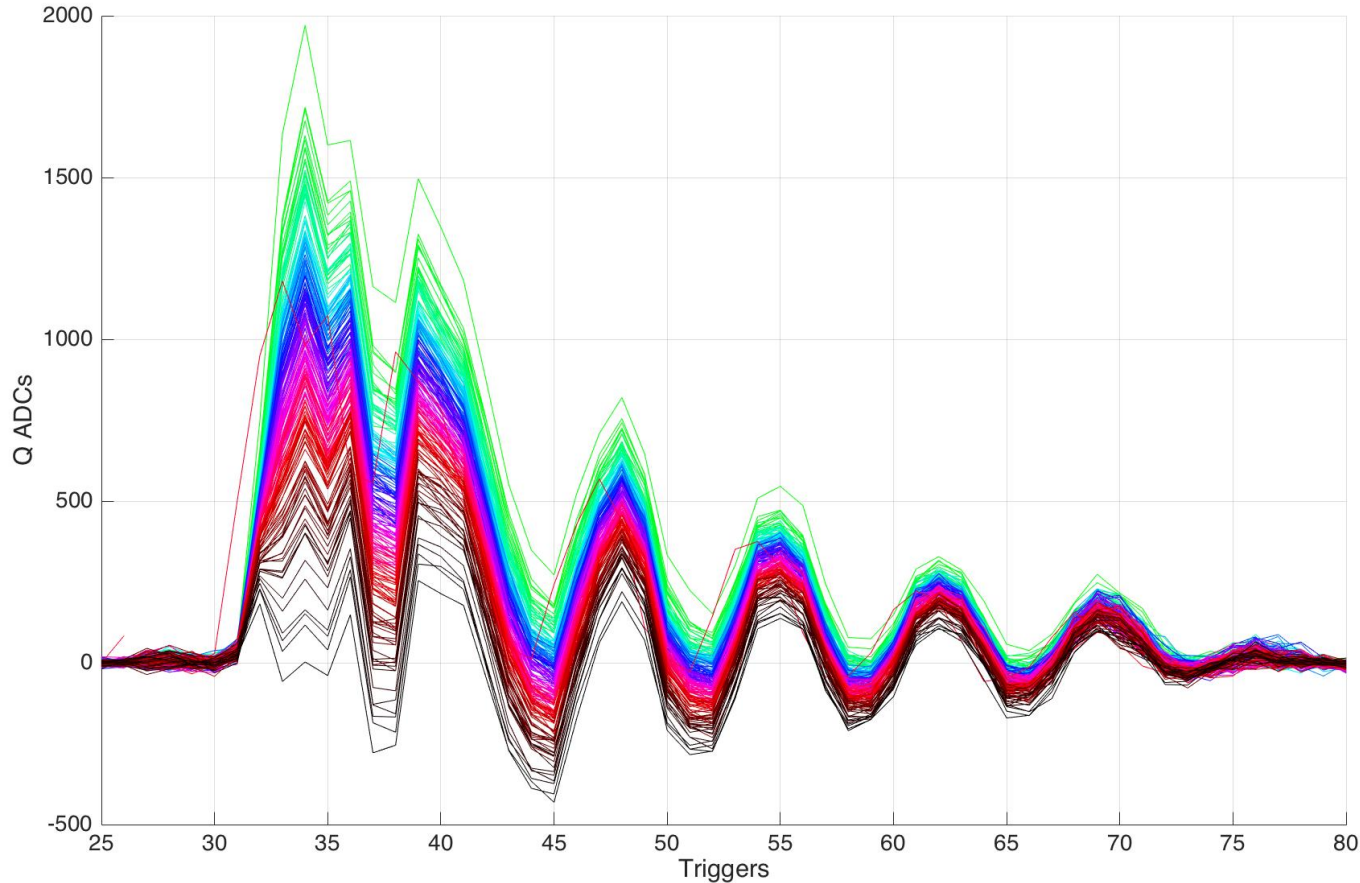
Study 1: Stray waveforms

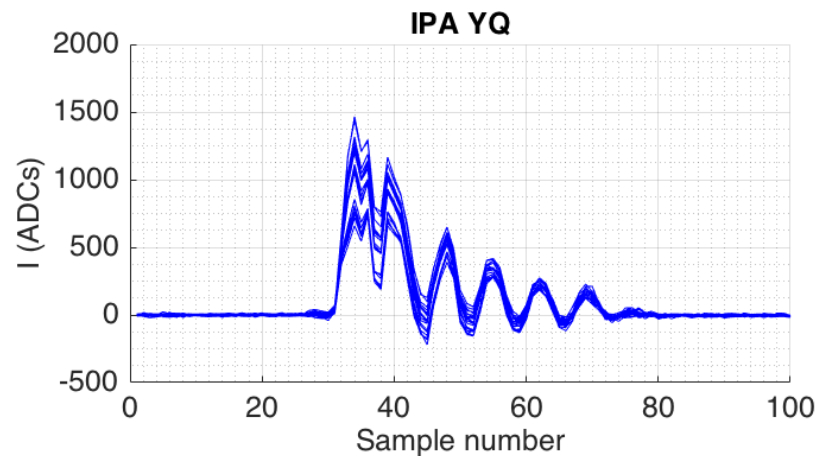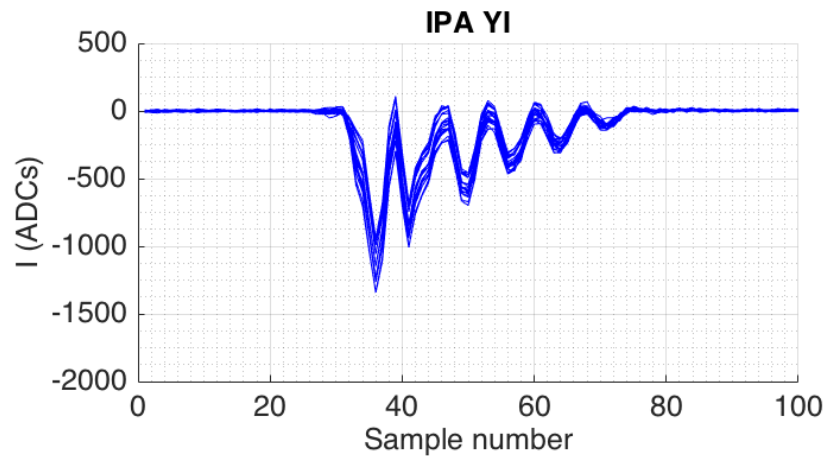IPA Q signals colour-coded by height.   jitRun14(601:800) → 33nm geometric

Note: unwanted trigger in red that has sample jumped
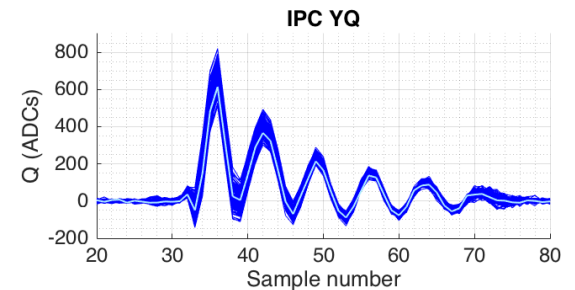
Study 1: Stray waveforms
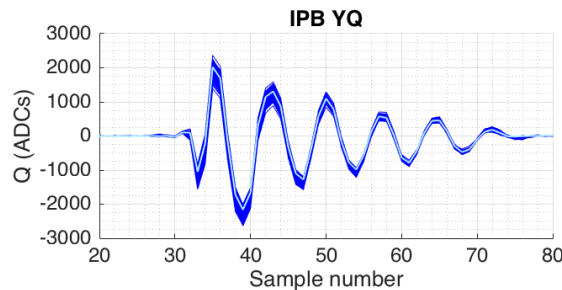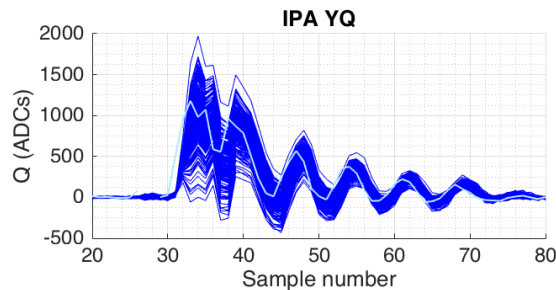

IPA YI

IPA YQ
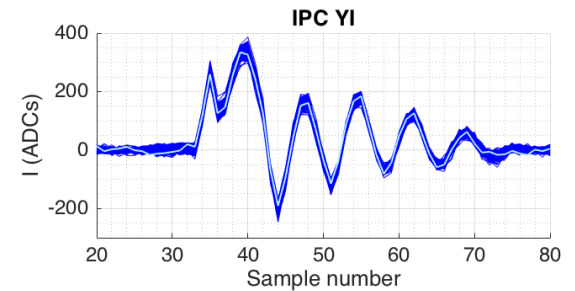
jitRun14(601:800) → 33nm

IPAI and Q signals plotted in 20-triggers by time.

Study 1: Stray waveforms

Sadly this sample-jumped trigger (shown in light blue) only appears on the IPA I and Q channels (ADCs 4 and 5), and is not removed by existing cuts.
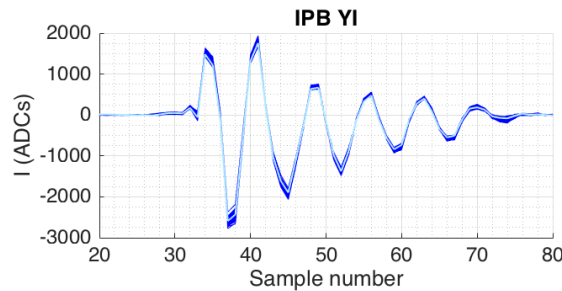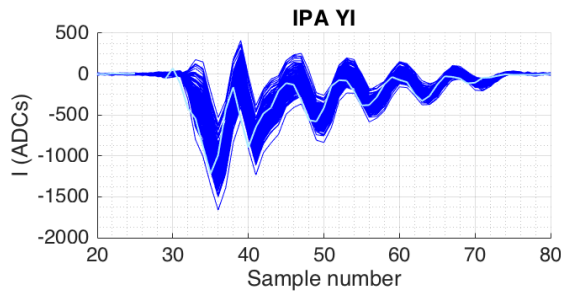
Introduce 5 sigma cut at every sample number,
then apply across entire trigger on every channel to
successfully remove.
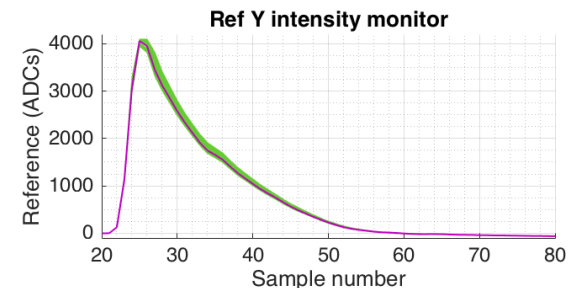
Study 1: Rolling resolution

- jitRun13: triggers 1:400
- jitRun14: triggers 401 to 2400
- jitRun15: triggers 2401 to 3400

Time gap: 67 seconds

Time gap: 8 minutes and 7 seconds
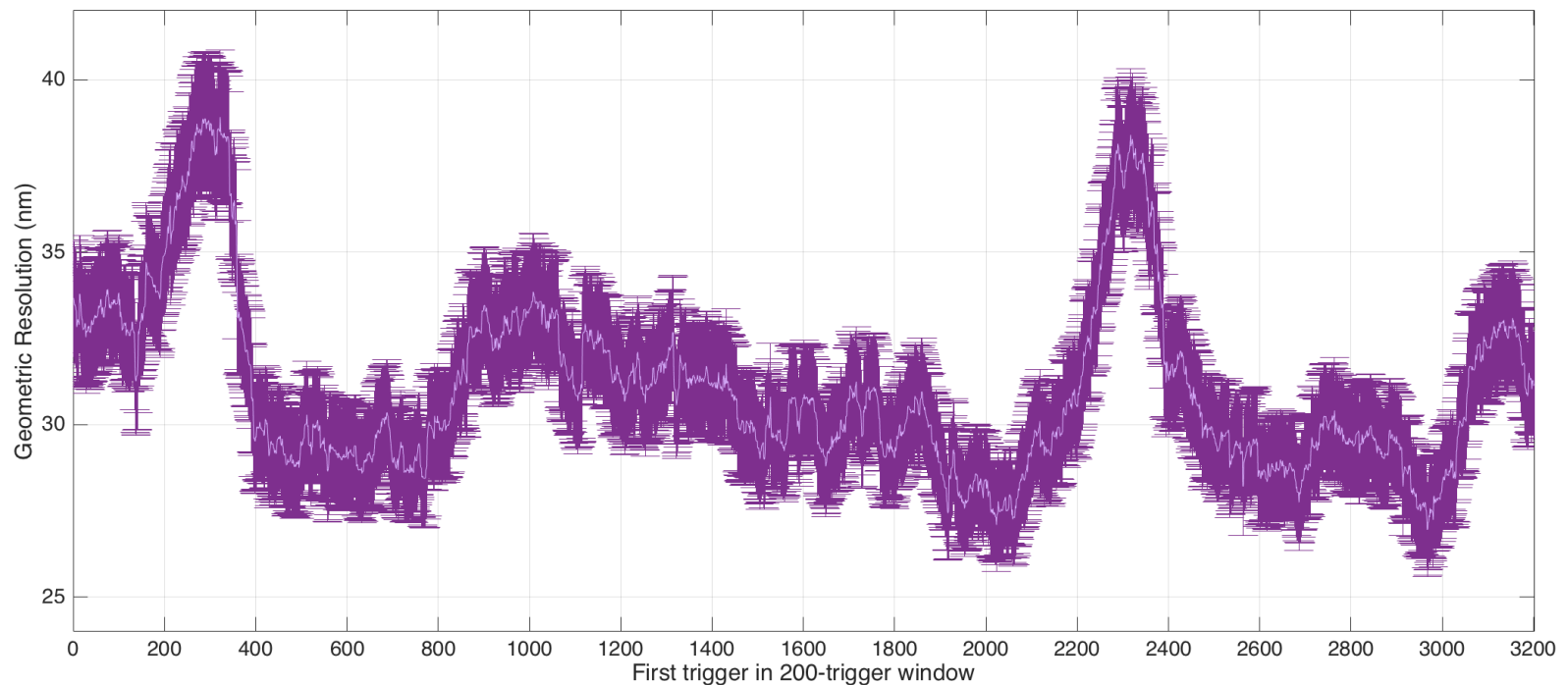
Study 1: fitting (traditional)

How resolution for 200 triggers varies with time. Fitted resolutions normalised with fit coefficients.
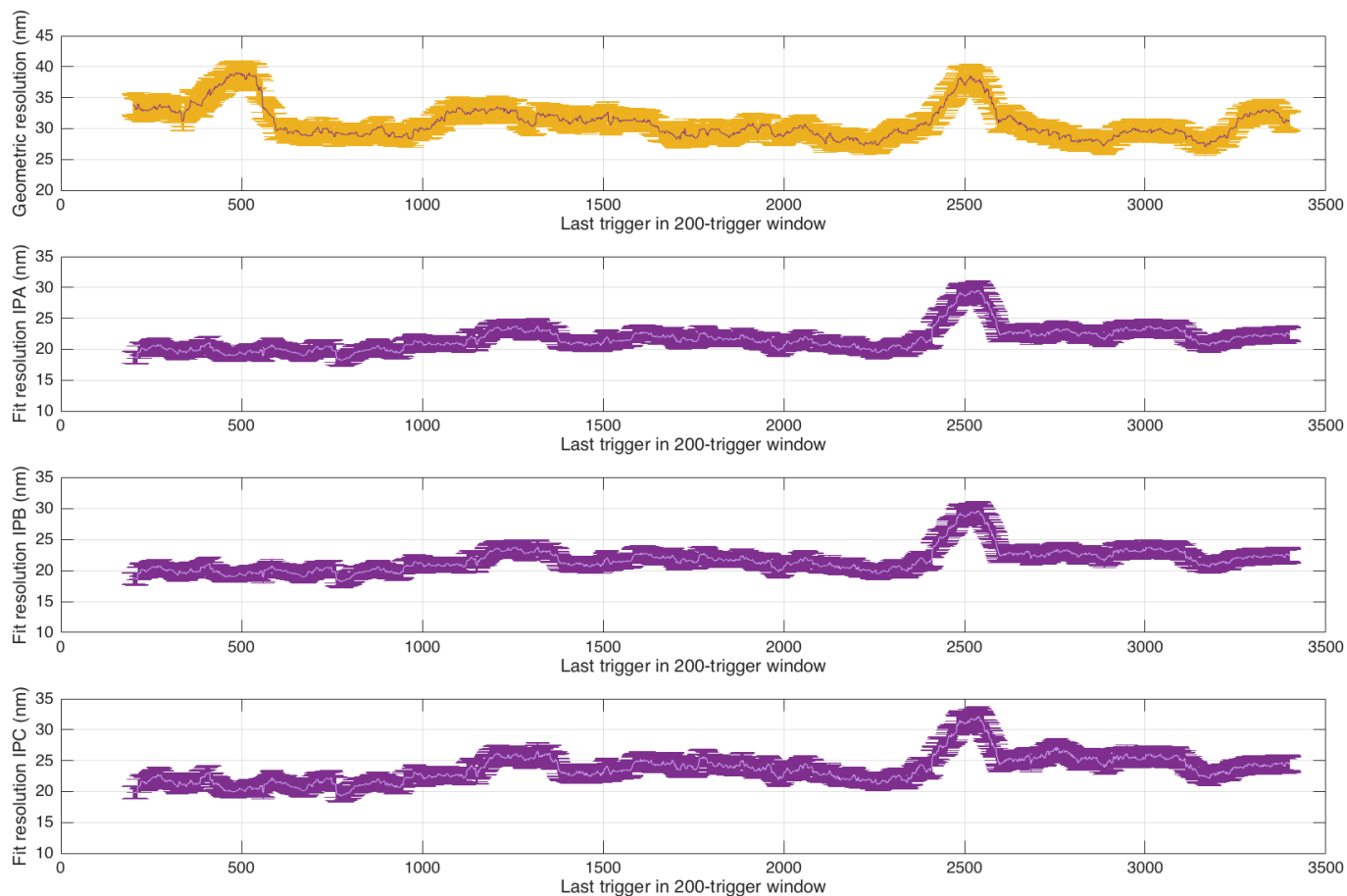
Study 1: fitting (I')

How resolution for 200 triggers varies with time. Fitted res normalised with geometric coefficients.

Study 1: fitting (I'Q')

How resolution for 200 triggers varies with time. Fitted res normalised with geometric coefficients.

Study 1: fitting (I'Q'q)

How resolution for 200 triggers varies with time. Fitted res normalised with geometric coefficients.
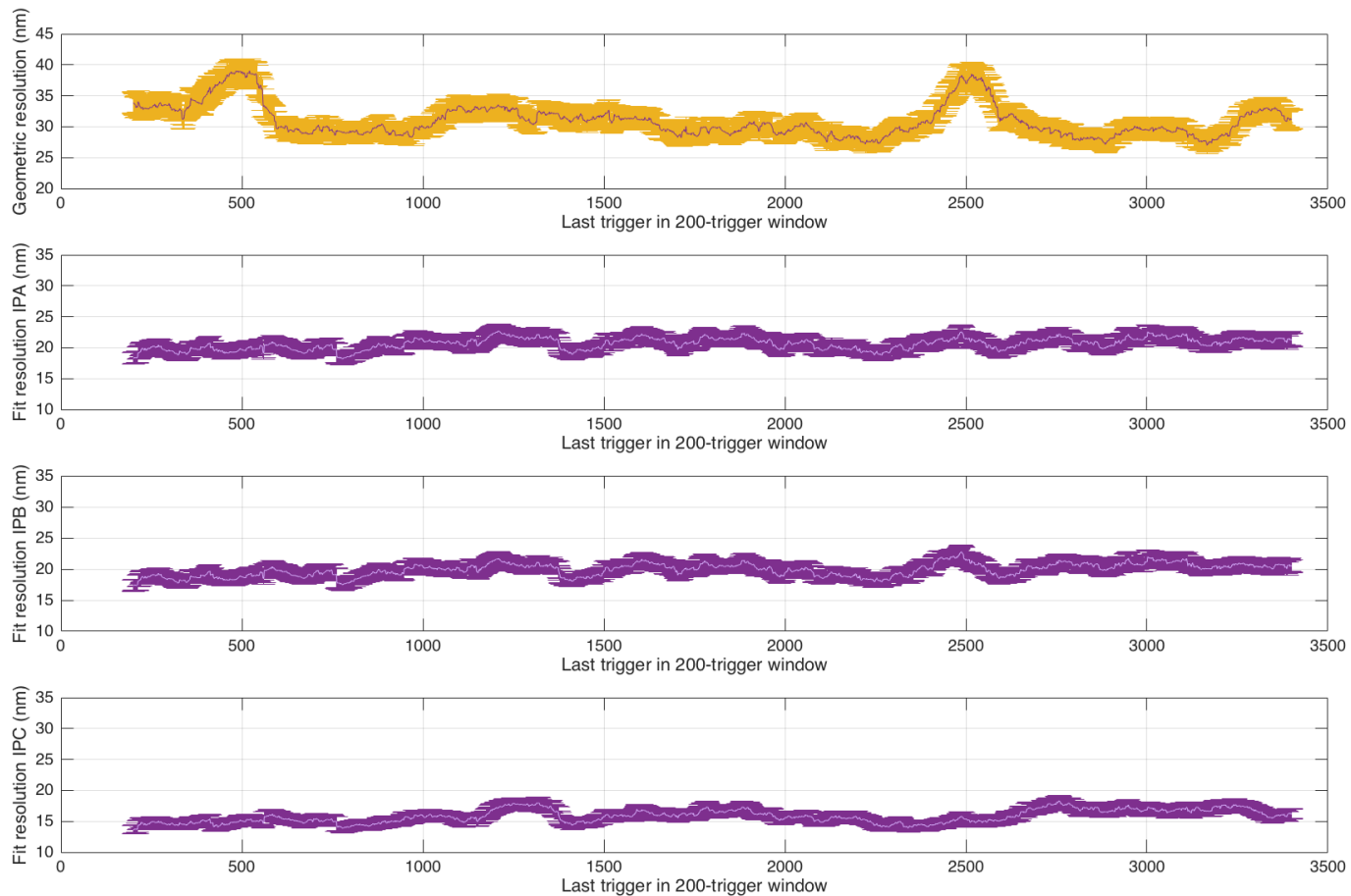
Study 1: Reference charge

How resolution for 200 triggers varies with time. Fitted res normalised with geometric coefficients.
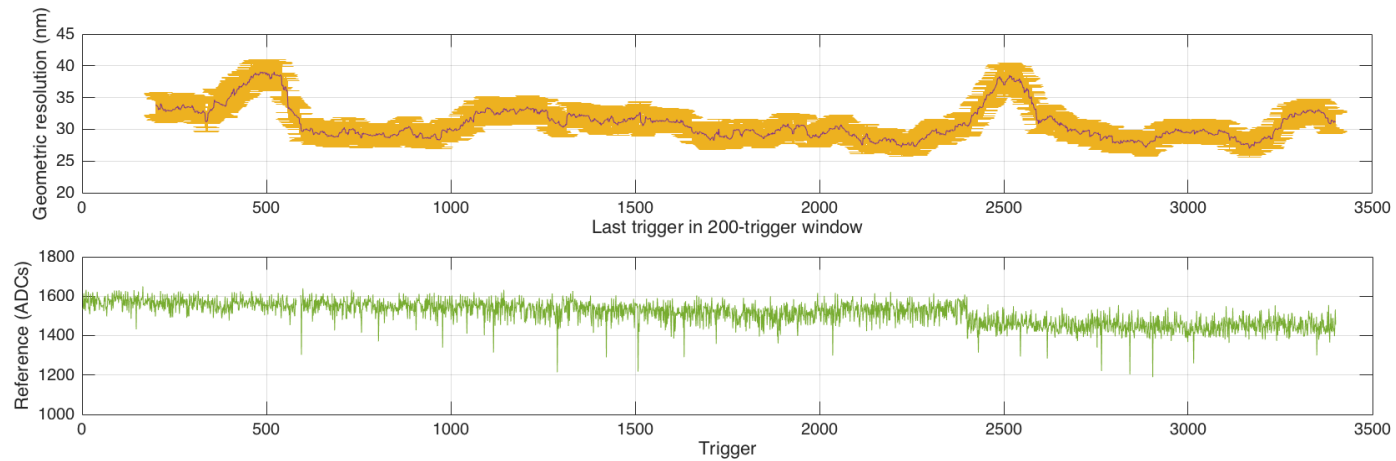
Study 2: jitRun9 (~40nm)

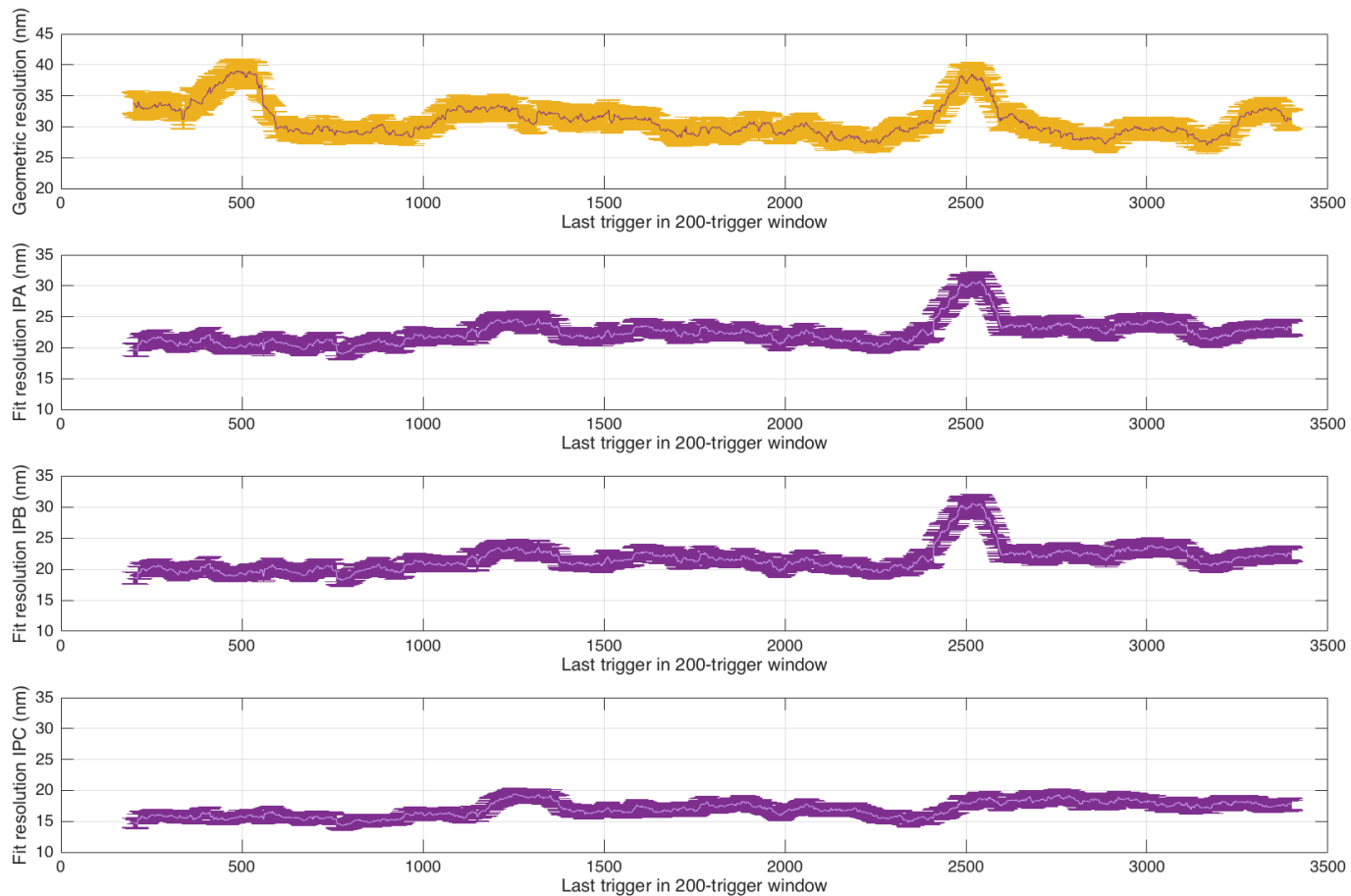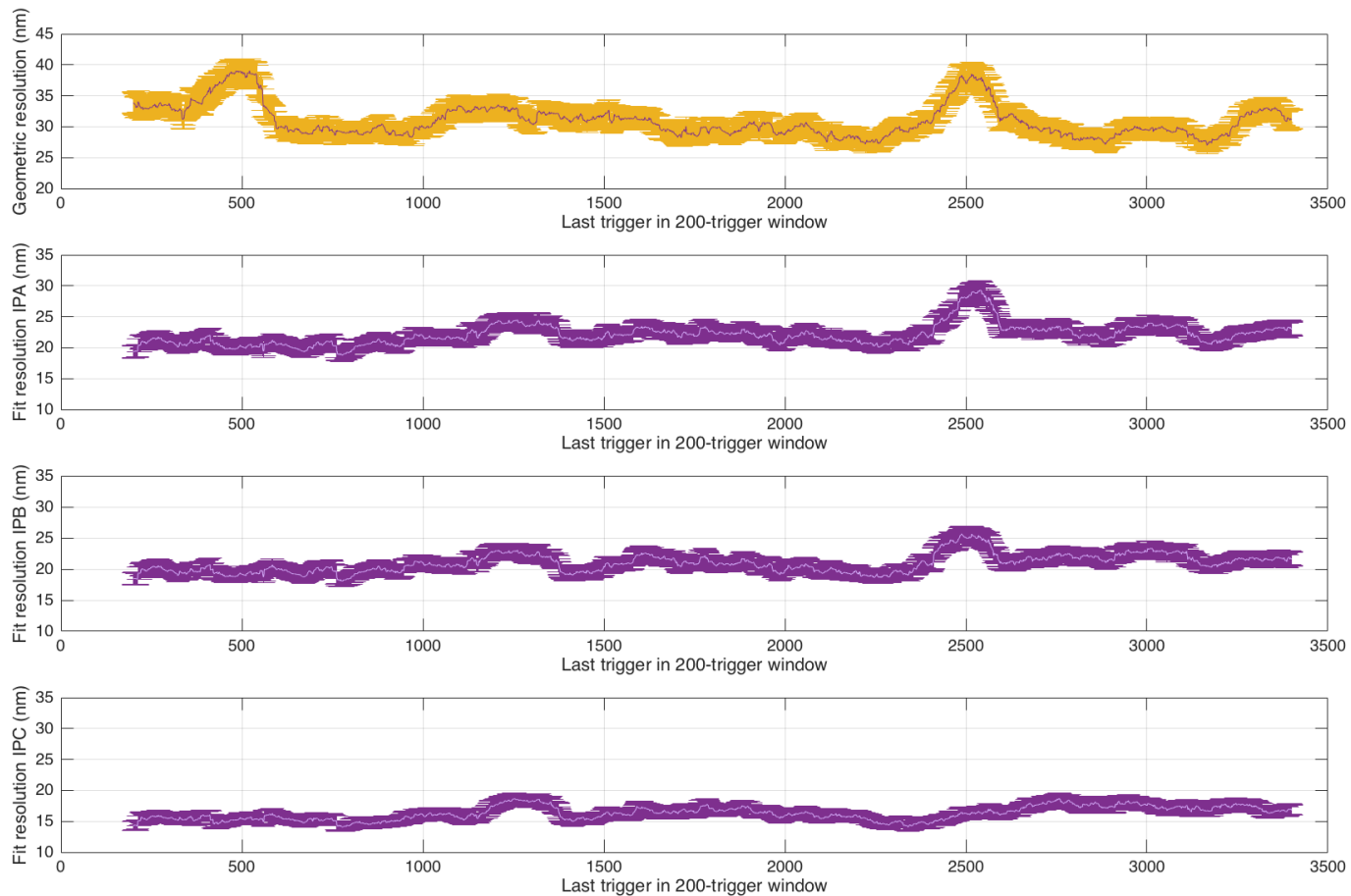Try looking at the spread of Q/I with time. Colour coded with triggers 1:400.

Compare to the calibration for calculating theta – fit to calibration plotted in black.
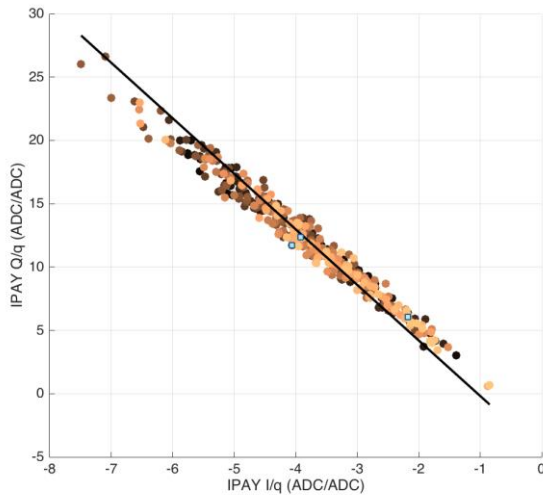
IPA

Calibration theta: -1.347 rads

JitRun theta: -1.312 rads

Delta theta: 0.035 rads
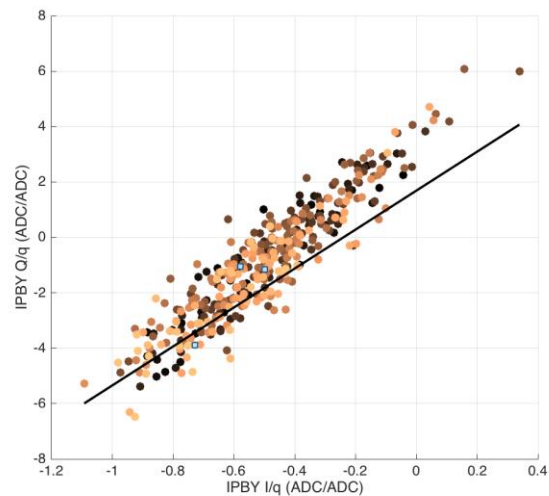
IPB

Calibration theta: 1.430 rads

JitRun theta: 1.456 rads

Delta theta: 0.026 rads

IPC

Calibration theta: 1.420 rads

JitRun theta: 1.335 rads

Delta theta: **0.085 rads**

Study 2: Fitting improvements

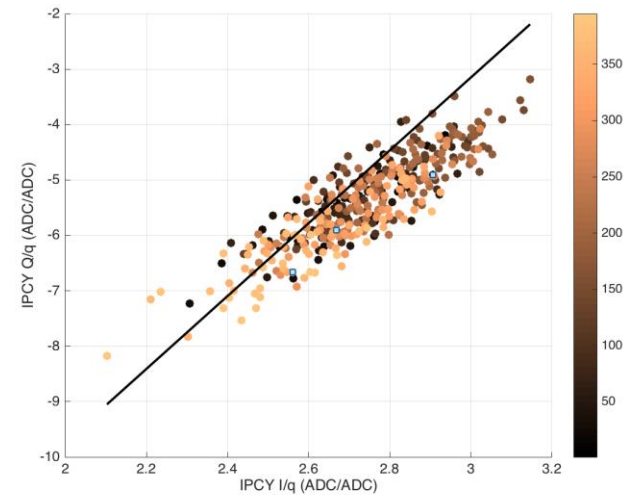|	JitRun file	jitRun7_10dB_	jitRun8_10dB_	jitRun9_10dB_	jitRun10_10dB_	jitRun11_10dB_	jitRun13_10dB_	jitRun14_10dB_	jitRun15_10dB_
	Cal file	AQD0FFyScan8_10dB_	AQD0FFyScan9_10dB_	AQD0FFyScan10_10dB_	AQD0FFyScan11_10dB_	AQD0FFyScan11_10dB_	AQD0FFyScan13_10dB_	AQD0FFyScan13_10dB_	AQD0FFyScan13_10dB_
	Ref Y att (dB)	50	47	53	44	44	47	47	47
theta from jitrun	A theta	0.948	-0.942	-1.312	1.332	1.328	-0.948	-0.946	-0.929
	B theta	0.559	-1.306	1.456	0.972	0.968	-1.296	-1.298	-1.281
	C theta	0.460	-1.331	1.335	0.888	0.880	-1.334	-1.326	-1.310
theta from cal	A theta	0.925	-0.976	-1.347	1.312	1.312	-0.963	-0.963	-0.963
	B theta	0.519	-1.345	1.430	0.932	0.932	-1.329	-1.329	-1.329
	C theta	0.503	-1.348	1.420	0.916	0.916	-1.329	-1.329	-1.329
Delta theta		0.023	0.034	0.035	0.020	0.016	0.015	0.017	0.034
		0.040	0.040	0.026	0.040	0.036	0.033	0.031	0.048
		-0.043	0.017	-0.084	-0.028	-0.036	-0.005	0.004	0.019
geometric	geo res	28.34	20.59	40.86	31.12	28.90	34.35	30.49	30.52
fit	fit A	25.96	19.76	26.18	22.18	21.30	19.65	21.48	22.60
fit Iprime	fit A	26.36	19.54	27.42	22.88	21.92	20.67	22.26	23.33
fit IQ	fit A	24.40	19.27	26.00	22.31	21.40	20.52	22.18	22.91
fit IQq	fit A	22.41	19.26	25.10	21.18	20.93	19.26	20.97	21.52
fit	fit B	25.99	19.77	26.21	22.18	21.31	19.66	21.49	22.61
fit Iprime	fit B	26.09	19.85	26.00	22.10	21.37	19.48	21.42	22.51
fit IQ	fit B	24.07	19.53	24.50	21.49	20.86	19.34	20.91	22.01
fit IQq	fit B	22.07	19.52	23.65	20.43	20.40	18.19	20.15	20.85
fit	fit C	28.79	21.18	29.00	23.24	22.19	21.06	23.26	24.38
fit Iprime	fit C	20.22	18.19	20.28	18.84	17.49	15.92	17.14	18.61
fit IQ	fit C	19.90	17.78	20.02	18.40	17.26	15.52	16.56	17.98
fit IQq	fit C	18.60	17.77	19.28	17.83	16.70	14.63	16.17	17.48

Appendix

A few other useful plots from last week.
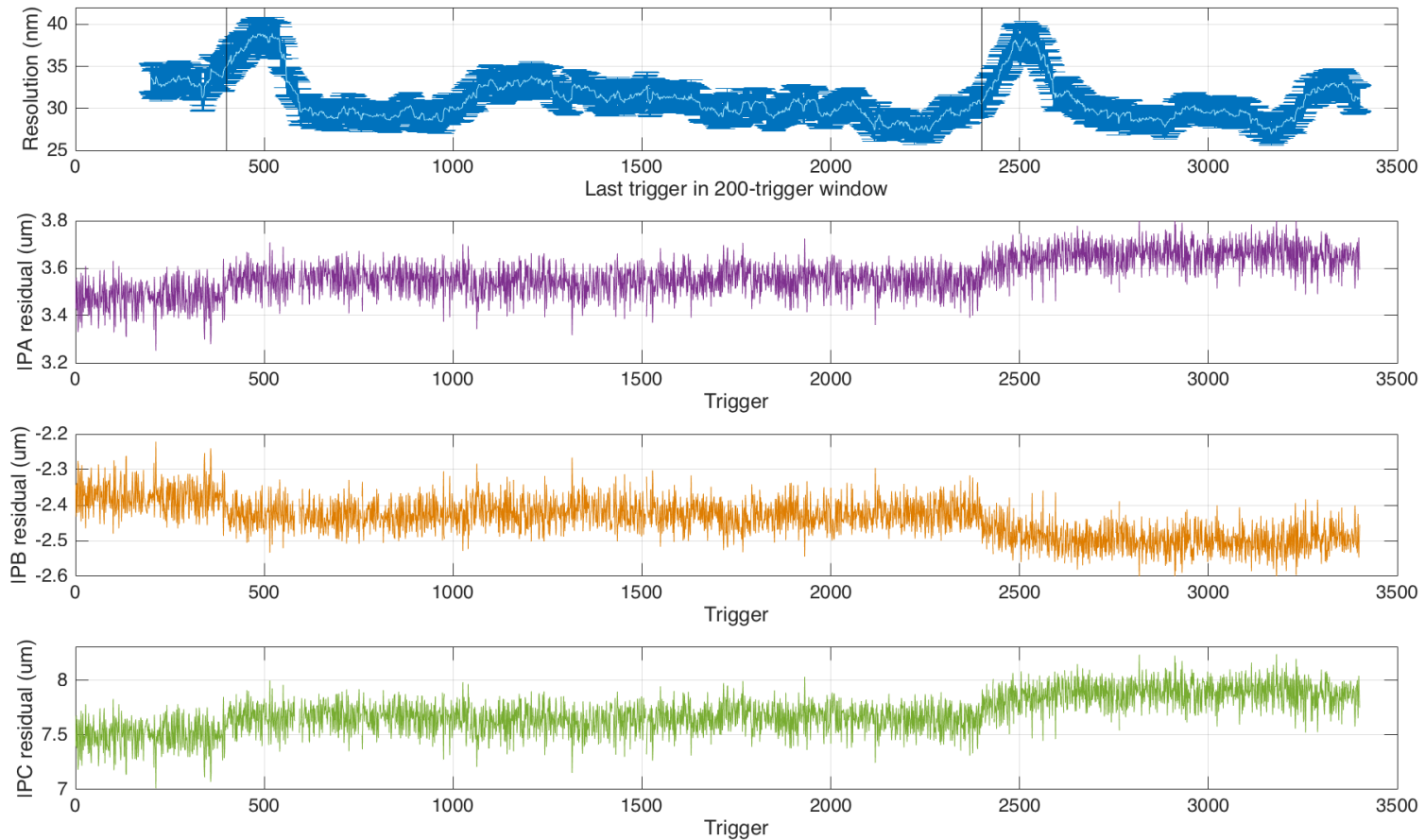
Study 1: Res & position

200-trigger resolution against same axes as the position trigger by trigger at IPA,B, C.
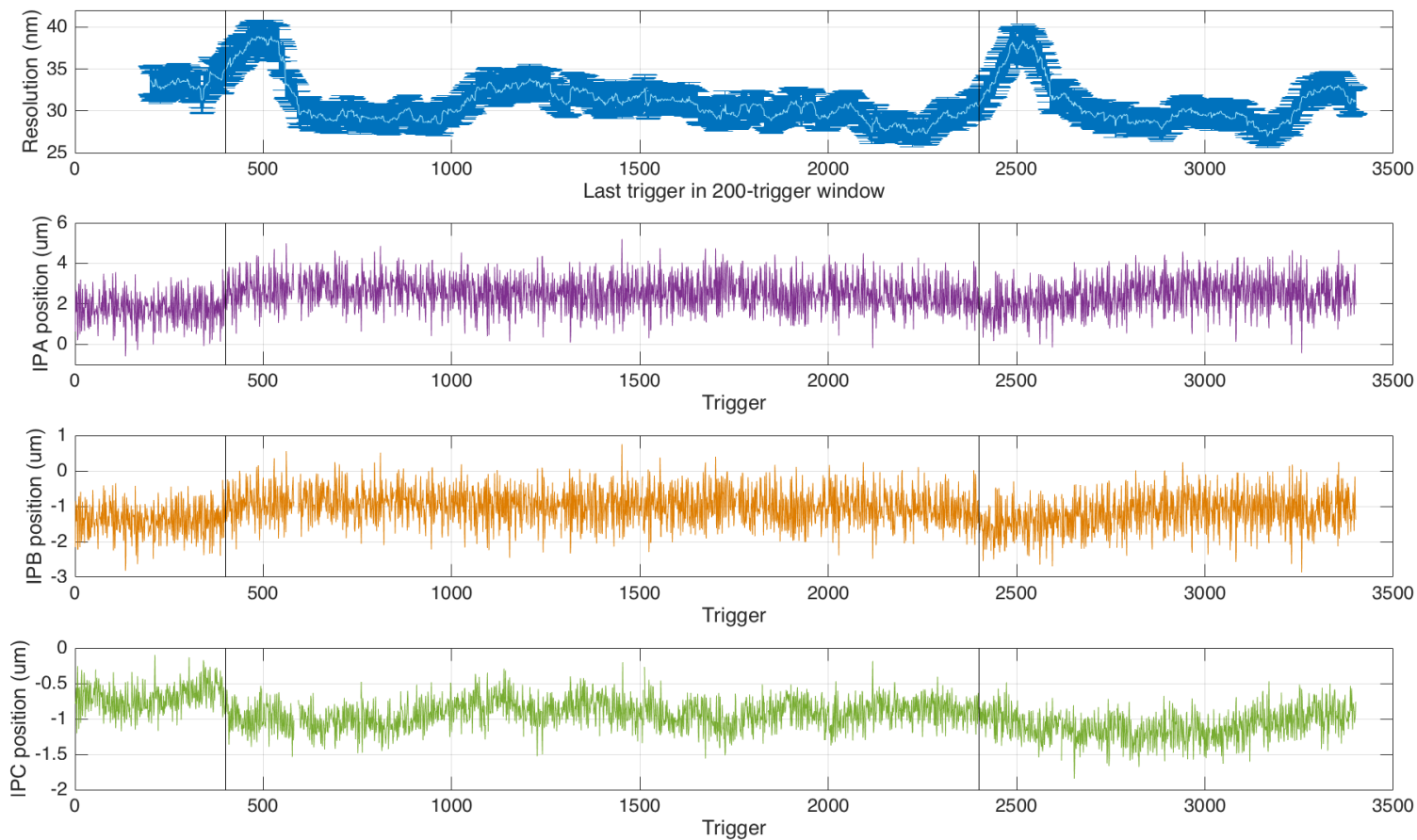
Study 1: Res & residual

How the position residual varies with time as compared to the 200-trigger resolution window.

Study 1: theta with time

How theta for 200 triggers varies with time as compared to the 200-trigger resolution window.

Also plotted as solid straight line is the theta value from the corresponding calibration file.