These measurements of the ETMX charge were done manually using awggui for excitation and diaggui for data processing. The data taken took place between UTC (2014-08-20 19:13:00) and UTC (2014-08-20 21:30:00). This is the 3rd time we run the charge measurement in ETMX, nothing was change respect to the first two measurements. This measurement is to verify stability of the charge just before turning on the green laser light. We will use similar settings as the last measurements in ETMY, that is BW = 0.02Hz, Av=3.

NOTE: When I started measurements in LL and LR quadrants I noticed a lot of movement in end X and end Y maybe indication of seismic activity.

I drove a sinusoidal excitation at 4Hz and amplitude 30000 counts which is equivalent to 91.5 Volts on the ESD ($30000*20*40/2^{18}$, as the DACs drive +-10V and they are 18 bits and then we have an amplifier of Gain 40). Notice that this actuation signal amplitude is divided to the deflection measurements in the tables below to get the standardised plots at the end of this document.

Then we monitor the deflection of the ETMX mass both in Pitch and Yaw looking at the *oplev*. The *oplev* has been carefully centred to the QPD before the measurements.

The magnitudes of the deflection given below are in *urad* and are obtained through a power spectrum plot of the oplev pitch and yaw signals. This power spectrum was measured with a **BW = 0.02Hz** (actual value is **0.0234375**) on the range between 1 – 5 Hz and averaged **3** times.

During the measurements the coherence between excitation and Pitch and Yaw was monitored to be sure that the excitation was observed. I also measured the phase (in degrees) of the transfer function between excitation and oplev pitch and yaw (the phase was measured to confirm it is 180 degrees different for the deflections with + and - BIAS). The same excitation was applied to the 4 quadrants of the ESD.

The ETMX pressure at PT-510 is 1.02e-6 good enough for these measurements. ISI Watchdog ST1 and ST2 green so no much drift of the oplev. Next I show the results:

Driving UR quadrant:

V BIAS (Volts)	Pitch		Yaw	
	Mag (urad)	Phase (deg)	Mag (urad)	Phase (deg)
+390.5	4.61246e-3	-180	4.73078e-3	-1
+195.3	2.07479e-3	-179	2.40011e-3	-4
-195.3	3.20397e-3	0	3.51047e-3	179
-390.5	5.80015e-3	0	5.91744e-3	177

Driving UL quadrant: **low coherence VBIAS +195V pitch and yaw**

V BIAS (Volts)	Pitch		Yaw	
	Mag (urad)	Phase (deg)	Mag (urad)	Phase (deg)
+390.5	4.68828e-3	178	5.53376e-3	179
+195.3	1.97068e-3	176	2.41273e-3 (low coherence 0.96)	178

-195.3	3.39595e-3	0	4.03089e-3	4
-390.5	6.11756e-3	-2	7.14115e-3	-2

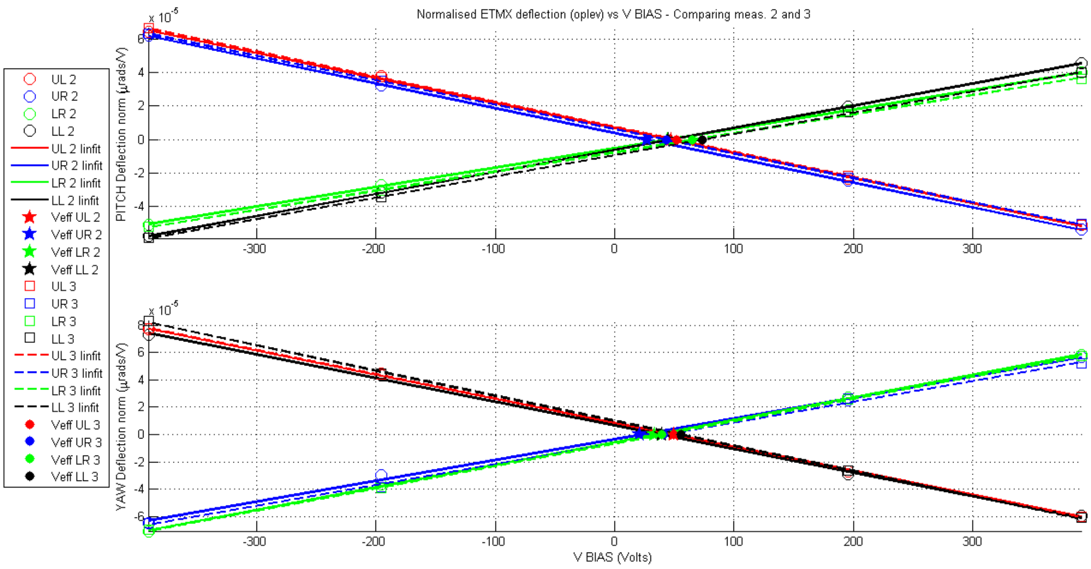
Driving LL quadrant: low coherence VBIAS +195V in yaw, notice movement of oplev mainly in yaw

V BIAS (Volts)	Pitch		Yaw	
	Mag (urad)	Phase (deg)	Mag (urad)	Phase (deg)
+390.5	3.65657e-3	1.6	5.54493e-3	175
+195.3	1.48359e-3	-4	2.44286e-3 (low coherence 0.98)	-174
-195.3	3.15342e-3	179	4.10036e-3	-2
-390.5	5.39614e-3	178	7.63809e-3	3

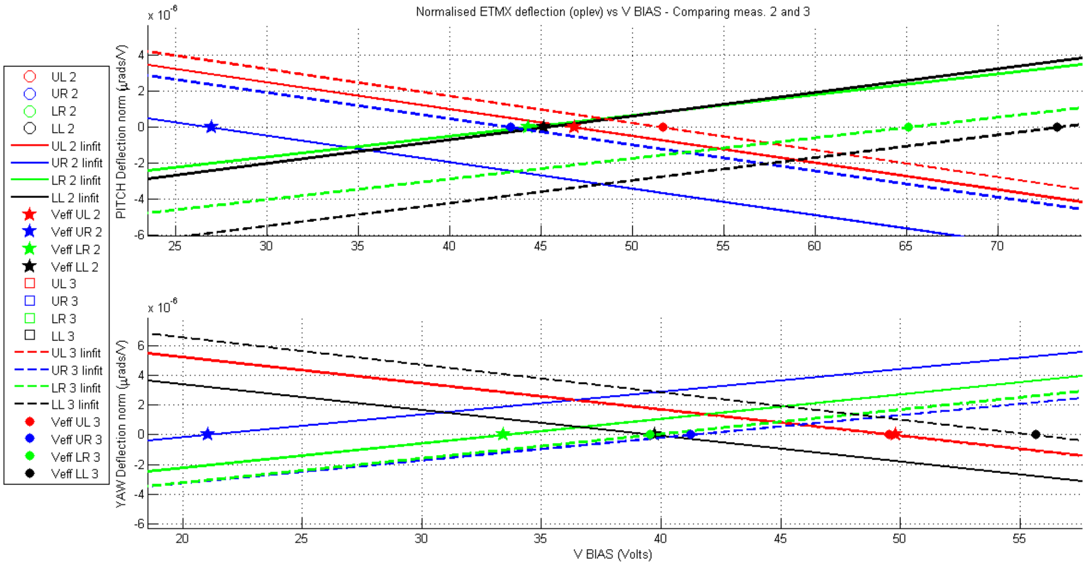
Driving LR quadrant: low coherence VBIAS +195V in yaw

V BIAS (Volts)	Pitch		Yaw	
	Mag (urad)	Phase (deg)	Mag (urad)	Phase (deg)
+390.5	3.33082e-3	-2	5.24984e-3	-2
+195.3	1.49836e-3	-5	2.35498e-3 (low coherence 0.98)	-2
-195.3	2.80054e-3	178	3.58616e-3	-179
-390.5	4.75724e-3	179	6.38243e-3	179

Plotting the above results in the standard way "Normalised deflection [μrad/V] vs V BIAS", the normalisation of the deflection is by the amplitude of the excitation = 91.5Volt. Comparison between measurement 2 and current (measurement 3):



And next we zoom on the zero crossing:



	UL - 1	UL - 2	UL - 3	UR - 1	UR – 2	UR - 3	LR - 1	LR - 2	LR - 3	LL - 1	LL - 2	LL - 3
Veff PITCH [V]	27	47	52	24	27	43	42	44	65	42	45	73
PITCH slope [10^{-7} µrad/V]	-1.5217	-1.4957	-1.5087	-1.4697	-1.4823	-1.4598	1.1381	1.1597	1.1450	1.320	1.3208	1.2718
Veff YAW [V]	31	50	50	20	21	41	43	33	39	36	40	56
YAW slope [10^{-7} µrad/V]	-1.7726	-1.7629	-1.7780	1.5631	1.5270	1.5215	1.5498	1.6476	1.6333	-1.7523	-1.7287	-1.8404