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 (2014-08-19 01:00:00) and UTC (2014-08-19 03:30:00). This is the 2nd time we run the charge measurement in ETMX, nothing was change respect to the first measurement, just 3 days difference. We will use similar settings as the last measurements in ETMY, that is BW = 0.02Hz, Av=3.

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 ETMY 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 1.21e-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	4.94017e-3	179	5.20981e-3	-3
+195.3	2.26216e-3	180	2.28553e-3	-6
-195.3	2.97238e-3	-1	2.74441e-3	180
-390.5	5.69529e-3	0	5.92767e-3	179

Driving UL quadrant:

V BIAS (Volts)	Pitch		Yaw	
	Mag (urad)	Phase (deg)	Mag (urad)	Phase (deg)
+390.5	4.65569e-3	178	5.42892e-3	177
+195.3	2.15722e-3	-177	2.49045e-3	180
-195.3	3.4762e-3	4	4.09426e-3	-6
-390.5	5.90023e-3	-1	7.04041e-3	0

Driving LL quadrant:

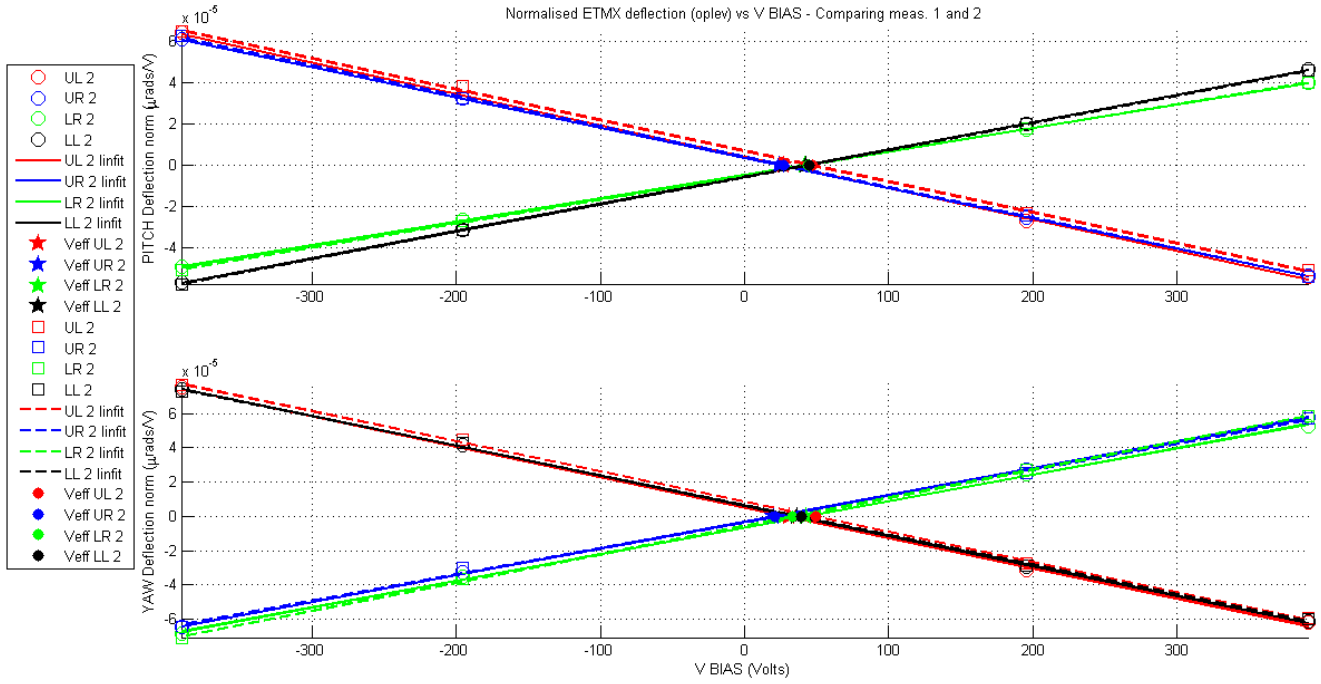
V BIAS (Volts)	Pitch	Yaw

	Mag (urad)	Phase (deg)	Mag (urad)	Phase (deg)
+390.5	4.18074e-3	-2	5.46941e-3	-180
+195.3	1.80525e-3	-9	2.65068e-3	-180
-195.3	2.88544e-3	178	3.9463e-3	-5
-390.5	5.28318e-3	176	6.68813e-3	0

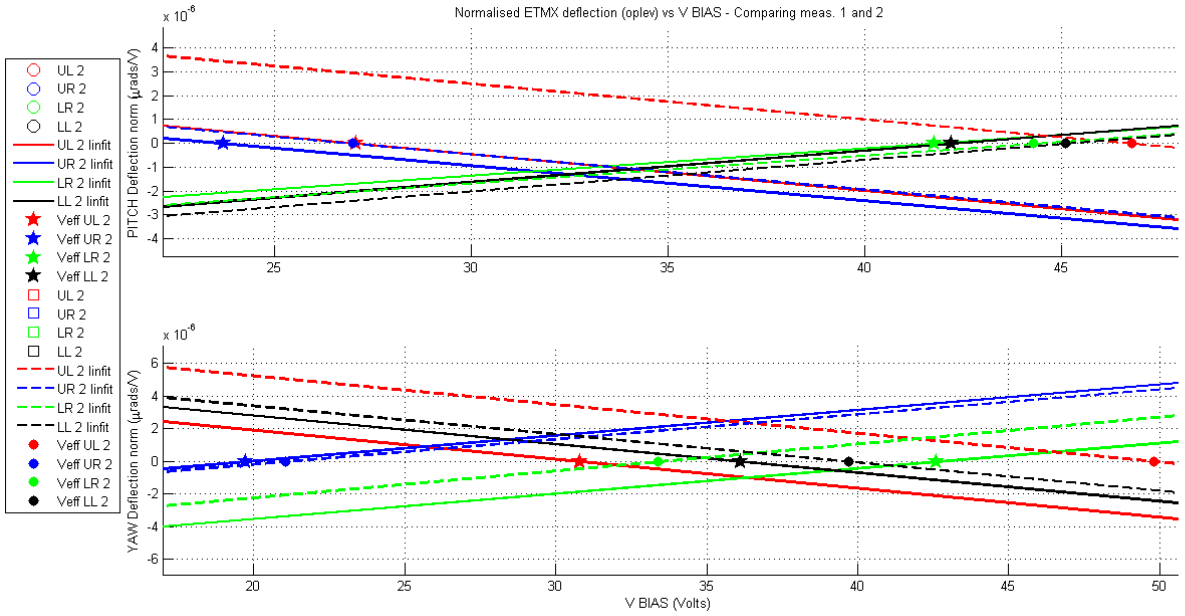
Driving LR quadrant:

V BIAS (Volts)	Pitch		Yaw	
	Mag (urad)	Phase (deg)	Mag (urad)	Phase (deg)
+390.5	3.65061e-3	-1	5.34687e-3	-3
+195.3	1.62111e-3	-3	2.46666e-3	5
-195.3	2.49116e-3	-177	3.35691e-3	179
-390.5	4.66223e-3	178	6.4718e-3	180

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 1 (obtained 3 days ago) and current (measurement 2):



And next we zoom on the zero crossing:



	UL - 1	UL - 2	UR – 1	UR - 2	LR - 1	LR - 2	LL - 1	LL - 2
Veff PITCH [V]	27	47	24	27	42	44	42	45
PITCH slope [10^{-7} µrad/V]	-1.5217	-1.4957	-1.4697	-1.4823	1.1381	1.1597	1.320	1.3208
Veff YAW [V]	31	50	20	21	43	33	36	40
YAW slope [10^{-7} µrad/V]	-1.7726	-1.7629	1.5631	1.5270	1.5498	1.6476	-1.7523	-1.7287

All is good news in this comparison plot. First that the ETMX charge is very small and second that the charge measurements are repeatable even after few days with only quadrant UL having an appreciable charge increase equally consistent in both Pitch and Yaw.