These measurements of the ETMY charge were done manually using awggui for excitation and diaggui for data processing. The data taken took place between UTC (2014-08-18 21:00:00) and UTC (2014-08-18 23:20:00). The measurements in ETMY on Friday were affected for issues on the ESD power supply, I think the driving signal was smaller than usual and as we know the power supply to the ESD HVA was turned off (due to unknown reason) twice. Today we have looked at it and see no obvious issue, tests show that it is working properly. I will run another measurement (with the right cable configuration so that we can drive LL quadrant) so that we identify current charging state of the mass.

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 ETMY pressure at PT-410 is 3.8e-8 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	4.36905e-3	-14	4.90341e-3	-13
+195.3	1.74251e-3	-19	2.27418e-3	-12
-195.3	3.43644e-3	168	3.96016e-3	166
-390.5	6.27959e-3	167	6.76607e-3	165

Driving UL quadrant: a bit low coherence at VBIAS +195V

V BIAS (Volts)	Pitch		Yaw	
	Mag (urad)	Phase (deg)	Mag (urad)	Phase (deg)
+390.5	3.57242e-3	168	2.08891e-3	162
+195.3	0.7256e-3 (low coherence 0.9)	154	0.67927e-3 (low coherence 0.97)	-20

-195.3	6.47113e-3	-14	6.33276e-3	-12
-390.5	9.73931e-3	-13	8.92222e-3	-14

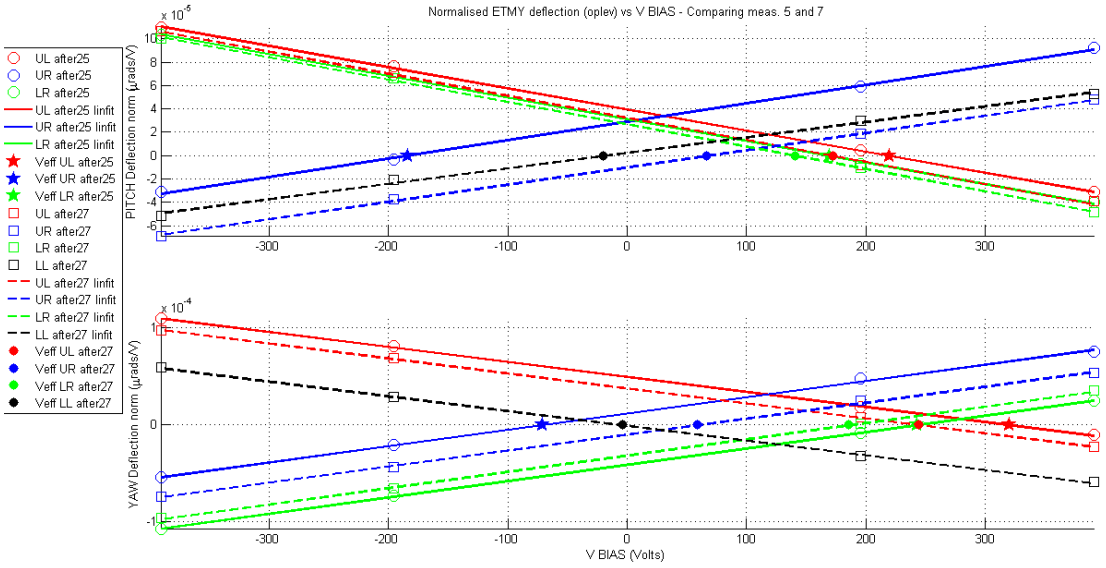
Driving LL quadrant:

V BIAS (Volts)	Pitch		Yaw	
	Mag (urad)	Phase (deg)	Mag (urad)	Phase (deg)
+390.5	4.82529e-3	-14	5.39637e-3	168
+195.3	2.7481e-3	-12.5	2.90972e-3	166
-195.3	1.8723e-3	171	2.68139e-3	-11
-390.5	4.7191e-3	165	5.40129e-3	-14

Driving LR quadrant: low SNR and coherence at VBIAS +195Volt.

V BIAS (Volts)	Pitch		Yaw	
	Mag (urad)	Phase (deg)	Mag (urad)	Phase (deg)
+390.5	4.41586e-3	161	3.22749e-3	-17
+195.3	0.97066e-3 (low coherence 0.91)	152	0.10514e-3 (low coherence 0.8)	-89
-195.3	6.07012e-3	-15	6.01473e-3	166
-390.5	9.1962e-3	-12	8.78963e-3	167

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. We compare it with the previous measurements 3 days ago (labelled suffix 25, while the current ones is 27):



The first thing we notice is that again the charges have changed and again the quadrant with different charge (UR) has changed charge sign. Even more interesting is that the slope of the curves for each quadrant for both

measurements are parallel (this was not the case in previous comparison between measurement 5 and 4). Notice that this slope is related to the dielectric constant and relative dielectric constant of the test mass, the spacing between test mass and electrodes, and geometry of the electrode pattern, the mass of the test mass and the injection frequency. Certainly none of these parameters should have changed, with maybe the exception of the spacing between the electrodes and the test mass.

Remember that the difference between measurement 5 and current one is swapping the LL quadrant cable with the BIAS one before the ESD LP filter and 3 days difference.

	UL - 25	UL - 27	UR - 25	UR -27	LR - 25	LR -27
Veff PITCH [V]	220	172	-184	66	169	141
PITCH slope [10^{-7} µrad/V]	-1.8133	-1.8914	1.5825	1.4807	-1.8588	-1.9162
Veff YAW [V]	320	244	-71	59	242	186
YAW slope [10^{-7} µrad/V]	-1.5542	-1.5477	1.6861	1.6539	1.6895	1.6863