

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 (2014-08-27 18:30:00) and UTC (2014-08-27 ?????). This is the last measurement before opening the ion pump gate valve at ETMY to confirm its charging properties.

**NOTE: Some HEPI activity at ETMY made the ISI Watchdogs trip several times during the LR quadrant measurements (this was the last quadrant to be analysed here). It took too long to bring the system back to stability so I did not take measurements for that quadrant.**

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 3.7e-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: low coherence at VBIAS -195V, changed to a different VBIAS -250V.**

V BIAS (Volts)	Pitch		Yaw	
	Mag (urad)	Phase (deg)	Mag (urad)	Phase (deg)
+390.5	6.2965e-3	-13	6.532e-3	-15
+195.3	3.6964e-3	-10	3.6114e-3	-20
<b>-250</b>	<b>2.2875e-3</b>	<b>166</b>	<b>3.8268e-3</b>	<b>162</b>
-390.5	4.2178e-3	167	5.7542e-3	165

**Driving UL quadrant: low coherence at VBIAS +195V in yaw it was so low that I decided to use different VBIAS +305V instead**

V BIAS (Volts)	Pitch		Yaw	
	Mag (urad)	Phase (deg)	Mag (urad)	Phase (deg)
+390.5	4.5245e-3	162	2.789e-3 (low coherence 0.97)	170
<b>+305</b>	<b>3.5546e-3</b>	<b>171</b>	<b>1.0956e-3</b>	<b>166</b>

			(low coherence 0.8)	
-195.3	5.44e-3	-16	6.439e-3	-15
-390.5	8.794e-3	-16	8.7279e-3	-15

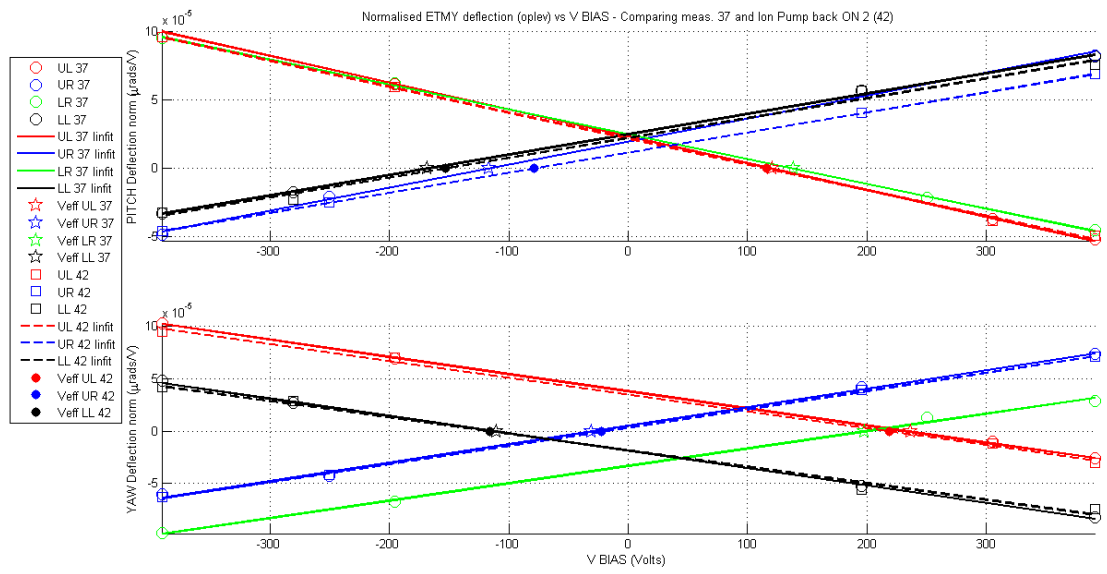
Driving LL quadrant: **Very low coherence at VBIAS -195V it was so low that I decided to use different VBIAS -280V instead**

V BIAS (Volts)	Pitch		Yaw	
	Mag (urad)	Phase (deg)	Mag (urad)	Phase (deg)
+390.5	6.9053e-3	-17	6.8129e-3	163
+195.3	5.1984e-3	-7	5.1394e-3 (low coherence 0.98)	162
<b>-280.5</b>	<b>2.0857e-3 (low coherence 0.98)</b>	<b>175</b>	<b>2.664e-3</b>	<b>-16</b>
-390.5	2.98e-3	160	3.874e-3	-14

Driving LR quadrant: **This quadrant was not taken because work at ETMY HEPI made the system very unstable during these measurements so I rejected this measurements.**

V BIAS (Volts)	Pitch		Yaw	
	Mag (urad)	Phase (deg)	Mag (urad)	Phase (deg)
+390.5				
<b>+250</b>				
-195.3				
-390.5				

Plotting the above results in the standard way “Normalised deflection [ $\mu\text{rad/V}$ ] vs V BIAS”, the normalisation of the deflection is by the amplitude of the excitation = 91.5Volt. We compare it with the previous measurements (labelled suffix 37, with the current ones is 42):



	UL - 42	UR -42	LR -42	LL - 42
Veff PITCH [V]	116	-78.6	0	-153
PITCH slope [ $10^{-7}$ $\mu$ rad/V]	-1.8947	1.469	0	1.4585
Veff YAW [V]	218.5	-22.5	0	-115.5
YAW slope [ $10^{-7}$ $\mu$ rad/V]	-1.613	1.7441	0	-1.5701