

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 (2014-08-23 20:14:00) and UTC (2014-08-23 22:20:00). This is the fifth measurement taken after closing the gate valve of the ion pump in ETMY. This happened about 69 hours ago.

I drove a sinusoidal excitation at 4Hz and amplitude 30000 counts which is equivalent to 91.5 Volts on the ESD ($30000 \cdot 20 \cdot 40 / 2^{18}$, as the DACs drive $\pm 10V$ 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 $4.79e-8$ 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	7.1897e-3	-15	7.1347e-3	-17
+195.3	4.4728e-3	-18	4.1387e-3	-13
-250	2.3088e-3	172	3.7199e-3	164
-390.5	4.3923e-3	171	5.6142e-3	166

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	5.0101e-3	166	2.287e-3 (low coherence 0.95)	174
+305	3.1536e-3	174	1.1132e-3 (low coherence 0.88)	152
-195.3	5.1518e-3	-10	6.1999e-3	-17

-390.5	8.8323e-3	-12	8.7446e-3	-15
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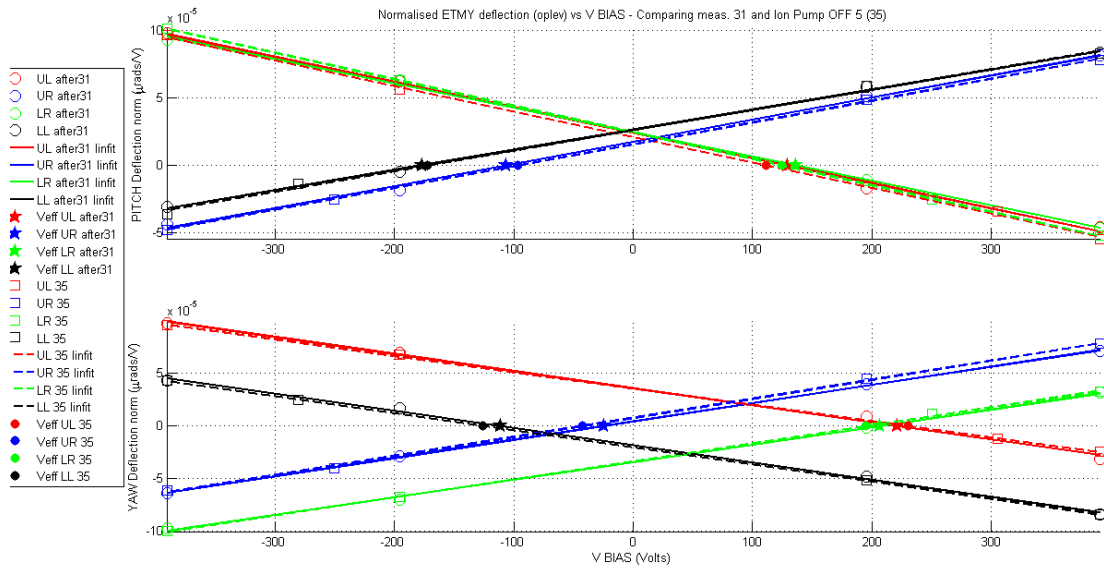
Driving LL quadrant: **Very low coherence at VBIAS -195V it was so low that I decided to use different VBIAS -280V instead**

V BIAS (Volts)	Pitch		Yaw	
	Mag (urad)	Phase (deg)	Mag (urad)	Phase (deg)
+390.5	7.6269e-3	-11	7.7074e-3	170
+195.3	5.3728e-3	-12	4.7739e-3	164
-280.5	1.261e-3 (low coherence 0.87)	162	2.279e-3 (low coherence 0.96)	-10
-390.5	3.3213e-3	164	3.9757e-3	-18

Driving LR quadrant: **low coherence at VBIAS +195V it was so low that I decided to use different VBIAS +250V instead**

V BIAS (Volts)	Pitch		Yaw	
	Mag (urad)	Phase (deg)	Mag (urad)	Phase (deg)
+390.5	4.763e-3	168	2.995e-3 (low coherence 0.98)	-11
+250	2.3327e-3	171	1.015e-3 (low coherence 0.94)	-22
-195.3	5.7929e-3 (low coherence 0.98)	-13	6.1947e-3 (low coherence 0.98)	166
-390.5	9.3295e-3	-13	9.2051e-3	167

Plotting the above results in the standard way “Normalised deflection [$\mu\text{rad}/\text{V}$] 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 31, with the current ones is 35):



	UL - 31	UL - 35	UR - 31	UR - 35	LR - 31	LR - 35	LL - 31	LL - 35
Veff PITCH [V]	129	111	-107	-97	136	125	-177	-172
PITCH slope [10⁻⁷ µrad/V]	-1.8801	-1.899	1.6476	1.6292	-1.8173	-1.9760	1.4952	1.5228
Veff YAW [V]	221	230	-25	-43	206	194	-112	-126
YAW slope [10⁻⁷ µrad/V]	-1.6318	-1.5566	1.7435	1.8185	1.6707	1.7215	- 1.6348	- 1.6291

Now the time difference between measurements is 50 hours and results are once more consistent. We no longer see the discharge trend in quadrant labelled LL though.