

These measurements of the ESD Charge were done manually using diaggiui. I drove a sinusoidal excitation at 4Hz and amplitude 30000 counts which is equivalent to about 100 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).

Then we monitor the deflection of the ETMY mass both in Pitch and Yaw looking at the oplev.

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 = 0.01Hz on the range between 1 – 5 Hz and averaged 2 times.

During the measurements the coherence between excitation and Pitch and Yaw was looked at to be sure that the injection was observable. 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. Next I show the results:

**Driving UR quadrant:**

V BIAS (Volts)	Pitch		Yaw	
	Mag (urad)	Phase (deg)	Mag (urad)	Phase (deg)
+400	$4.63 \cdot 10^{-3}$	-16.57	$5.42 \cdot 10^{-3}$	-13.6
+200	$3.93 \cdot 10^{-3}$	-11.67	$2.73 \cdot 10^{-3}$	-16.89
-200	$3.8 \cdot 10^{-3}$	169.33	$5.94 \cdot 10^{-3}$	165.02
-400	$8.44 \cdot 10^{-3}$	164.87	$11.2 \cdot 10^{-3}$	166.87

**Driving UL quadrant:**

V BIAS (Volts)	Pitch		Yaw	
	Mag (urad)	Phase (deg)	Mag (urad)	Phase (deg)
+400	$6.57 \cdot 10^{-3}$		$5.43 \cdot 10^{-3}$	
+200	$1.97 \cdot 10^{-3}$		$1.25 \cdot 10^{-3}$	
-200	$7.36 \cdot 10^{-3}$		$6.38 \cdot 10^{-3}$	
-400	$11.89 \cdot 10^{-3}$		$10.53 \cdot 10^{-3}$	

This measurement was done several times to see repeatability with intervals of tends of minutes to more than 1 hour.

V BIAS (Volts)	Pitch		Yaw	
	Mag (urad)	Phase (deg)	Mag (urad)	Phase (deg)
+400	$6.38 \cdot 10^{-3}$		$5.36 \cdot 10^{-3}$	
+200	$1.82 \cdot 10^{-3}$		$1.07 \cdot 10^{-3}$	
-200	$7.42 \cdot 10^{-3}$		$6.96 \cdot 10^{-3}$	
-400	$12.12 \cdot 10^{-3}$		$10.77 \cdot 10^{-3}$	

V BIAS (Volts)	Pitch		Yaw	
	Mag (urad)	Phase (deg)	Mag (urad)	Phase (deg)
+400	$5.83 \cdot 10^{-3}$		$4.88 \cdot 10^{-3}$	
+200	$1.41 \cdot 10^{-3}$		$0.7 \cdot 10^{-3}$	
-200	$7.78 \cdot 10^{-3}$		$7.49 \cdot 10^{-3}$	
-400	$12.58 \cdot 10^{-3}$		$11.29 \cdot 10^{-3}$	

**Driving LL quadrant: These quadrants had a very low excitation SNR, I gave the coherence values in brackets.**

V BIAS (Volts)	Pitch		Yaw	
	Mag (urad)	Phase (deg)	Mag (urad)	Phase (deg)
+400	$0.54 \cdot 10^{-3}$ (0.8)	-165.84	$0.47 \cdot 10^{-3}$	96.85
+200	$0.33 \cdot 10^{-3}$ (0.85)	95.31	$0.28 \cdot 10^{-3}$ (0.65)	-115.33
-200	$0.395 \cdot 10^{-3}$ (0.65)	10.33	$0.43 \cdot 10^{-3}$ (0.55)	-152.06
-400	$0.59 \cdot 10^{-3}$ (0.95)	37.71	$0.45 \cdot 10^{-3}$ (0.75)	-131.65

**Driving LR quadrant:**

V BIAS (Volts)	Pitch		Yaw	
	Mag (urad)	Phase (deg)	Mag (urad)	Phase (deg)
+400	$6.48 \cdot 10^{-3}$	167.271	$5.34 \cdot 10^{-3}$	-12.16
+200	$1.69 \cdot 10^{-3}$	170	$0.87 \cdot 10^{-3}$	-15.3
-200	$7.71 \cdot 10^{-3}$	-12.98	$7.17 \cdot 10^{-3}$	167.66
-400	$12.5 \cdot 10^{-3}$	-12.67	$11.4 \cdot 10^{-3}$	168.5