



Line Noise Investigation

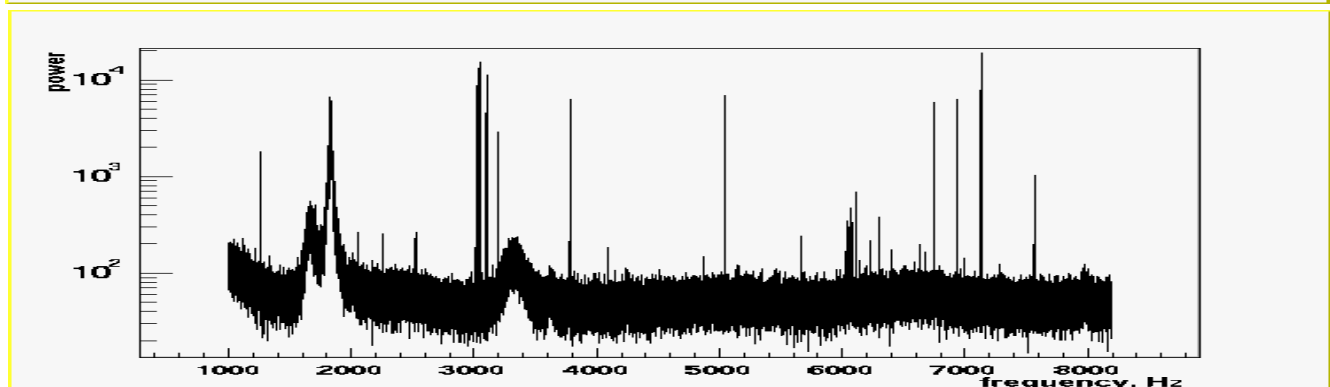
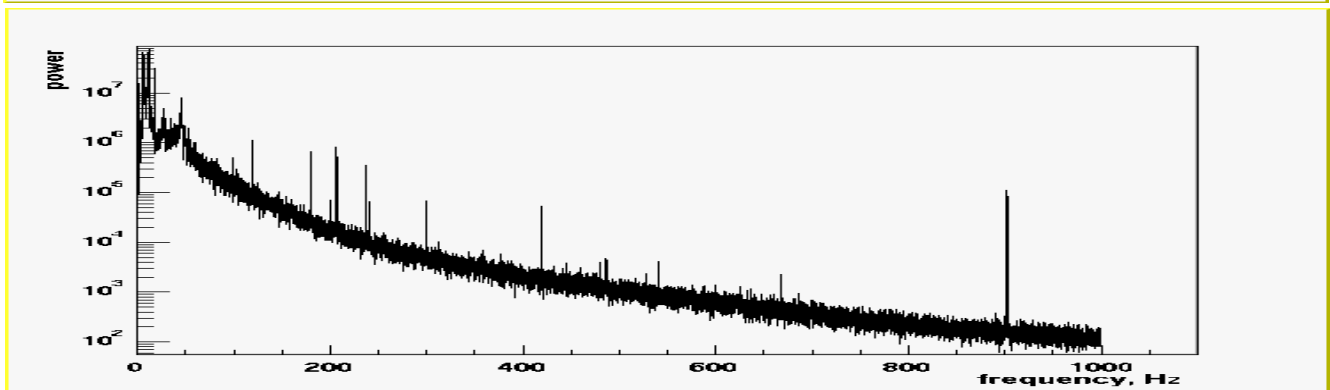
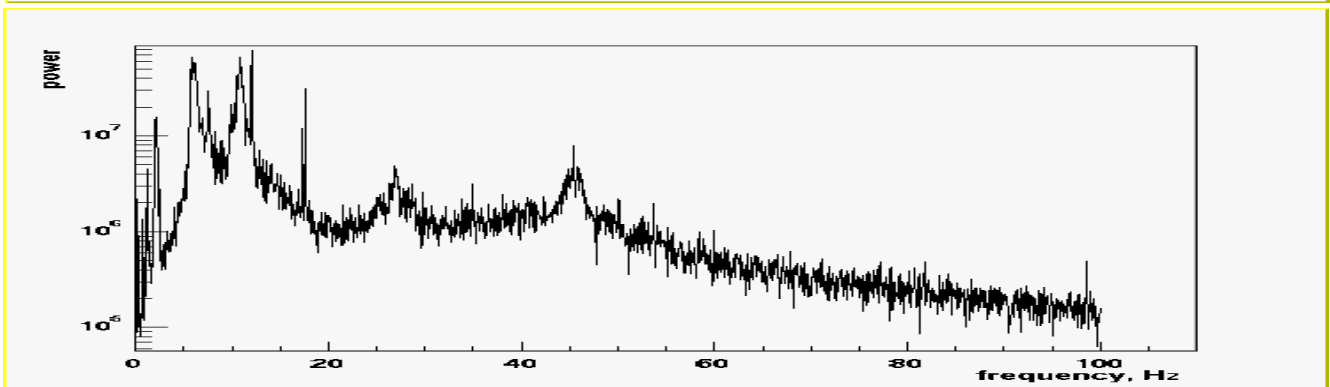
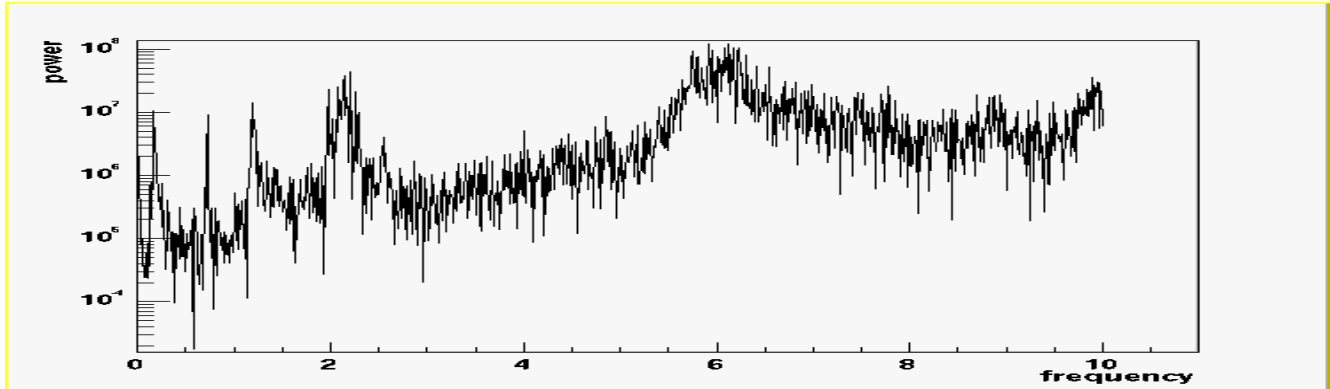
preliminary results

November 29, 2000



Run E2 LSC-AS_Q Lines

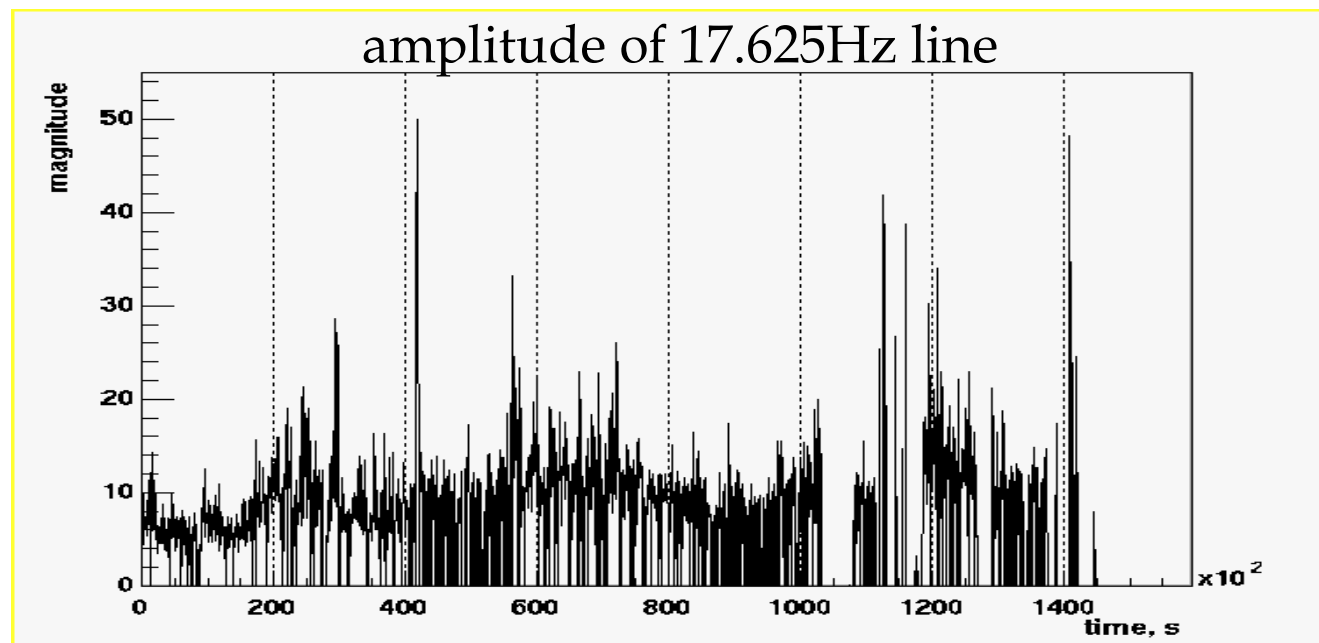
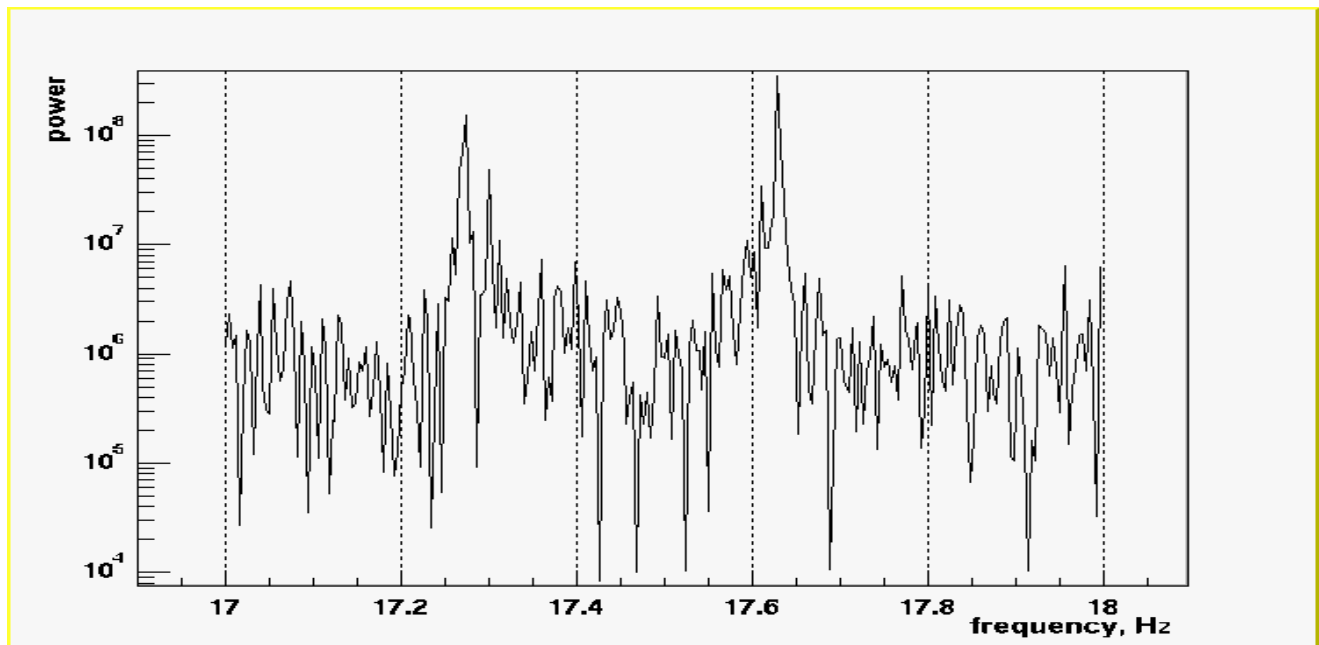
GPS: 657913872





LSC-AS_Q 17 Hz lines (amplitude)

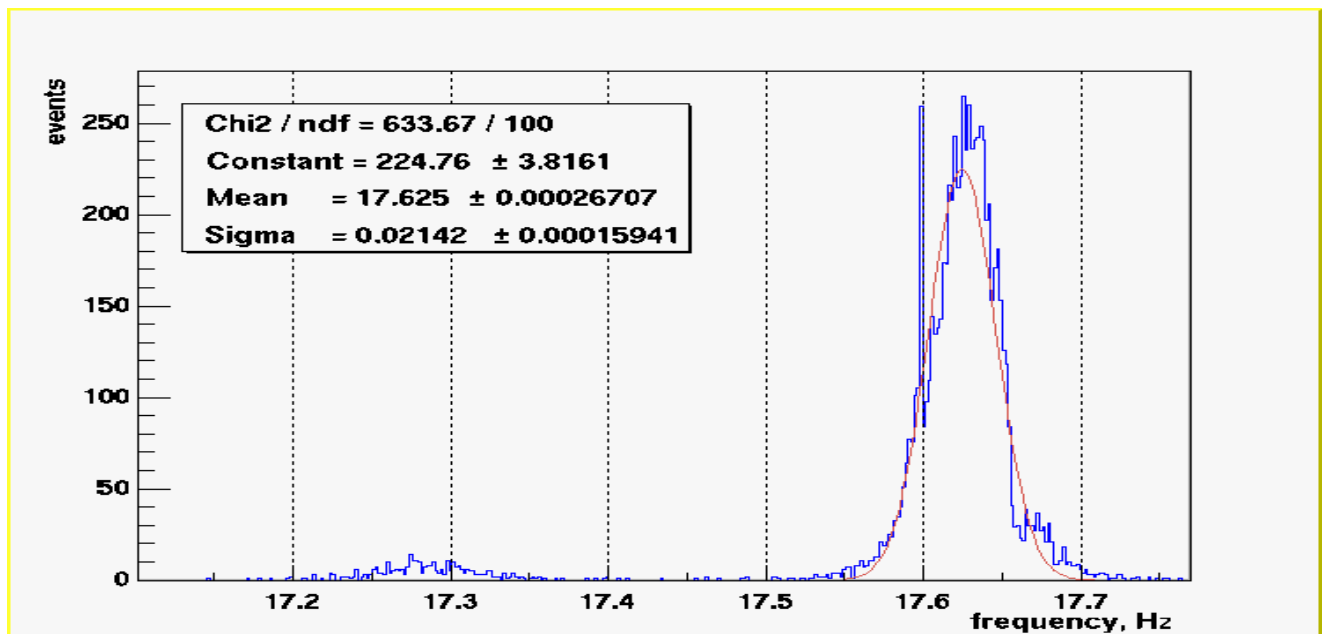
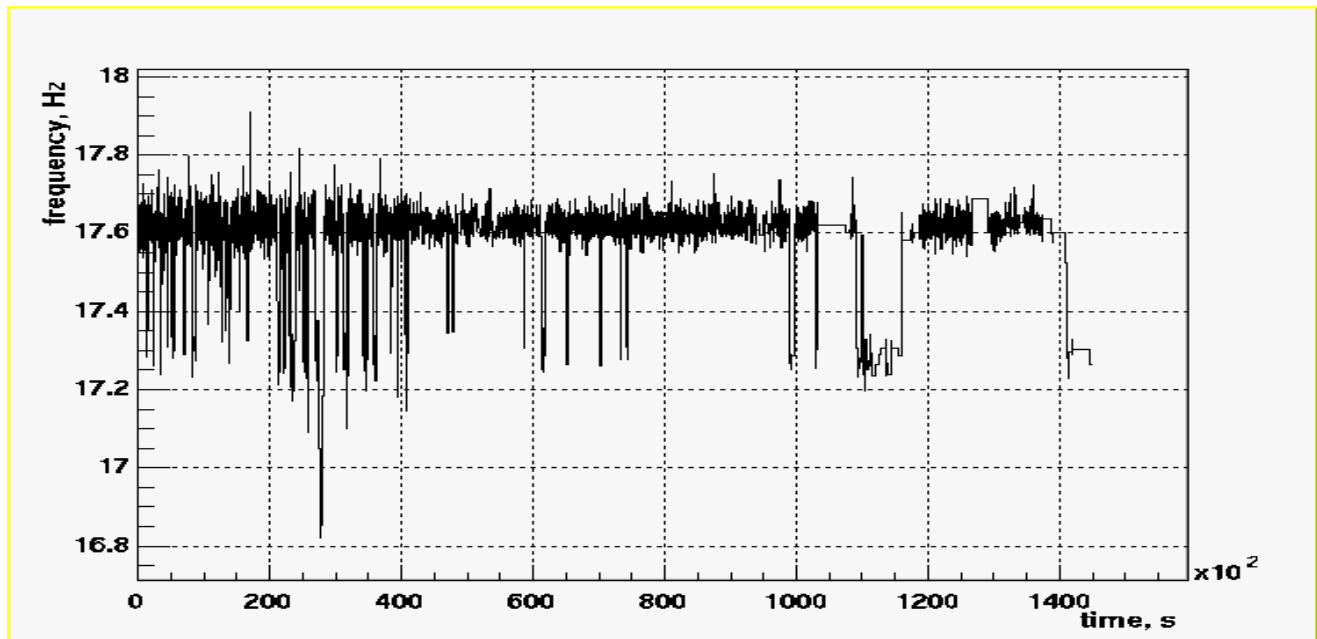
- two lines:
 - 17.286Hz (mean), 0.035Hz (rms)
 - 17.625Hz (mean), 0.022Hz (rms)





LSC-AS_Q 17Hz lines (frequency)

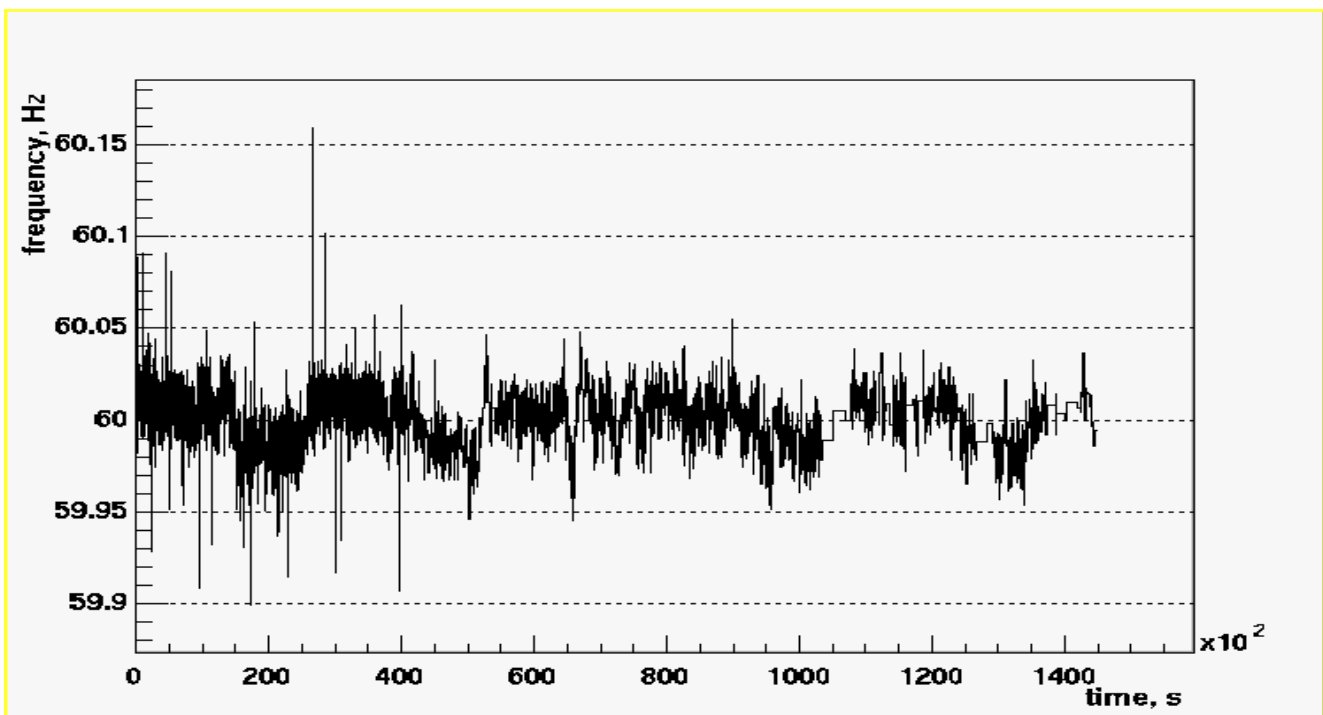
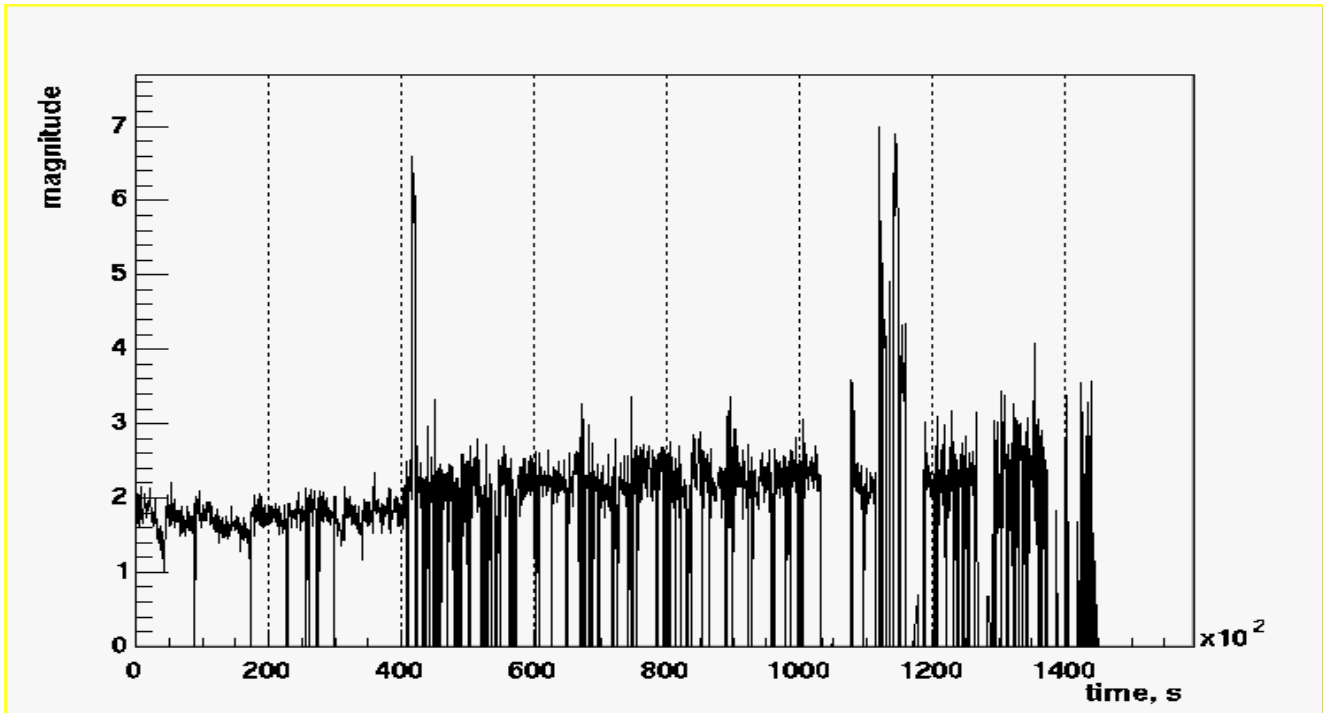
- though, the 17.625Hz line was monitored, sometimes the monitor picked up the 17.2 line, when it dominates





LSC-AS_Q 60.0 Hz harmonics

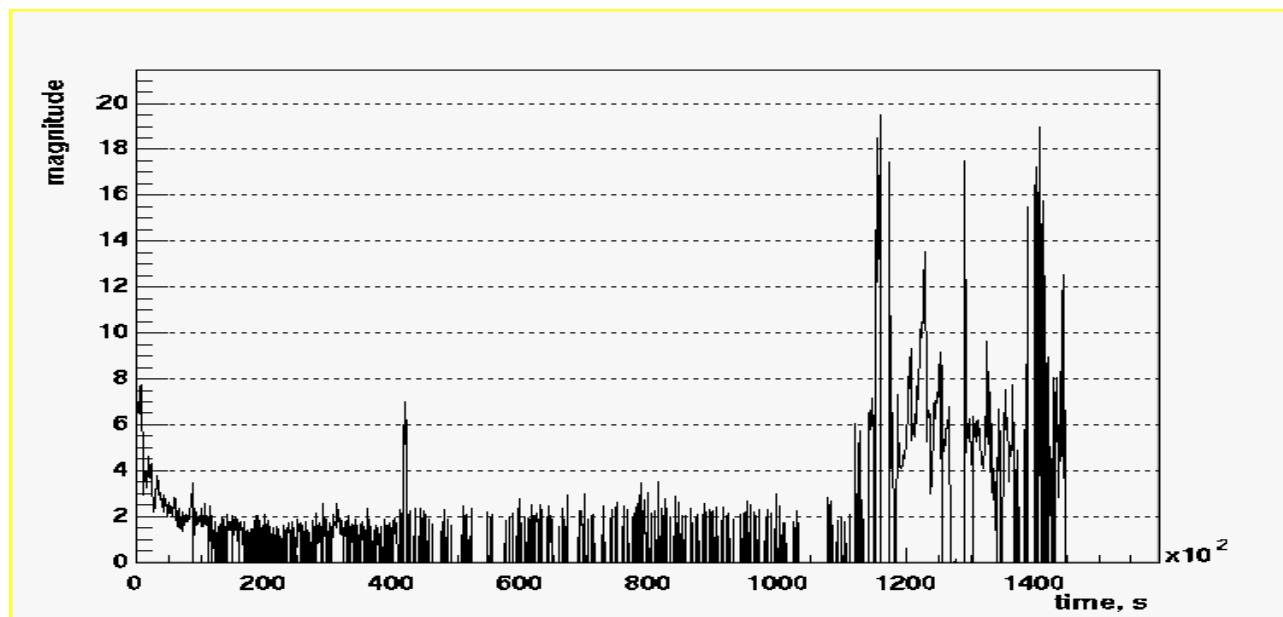
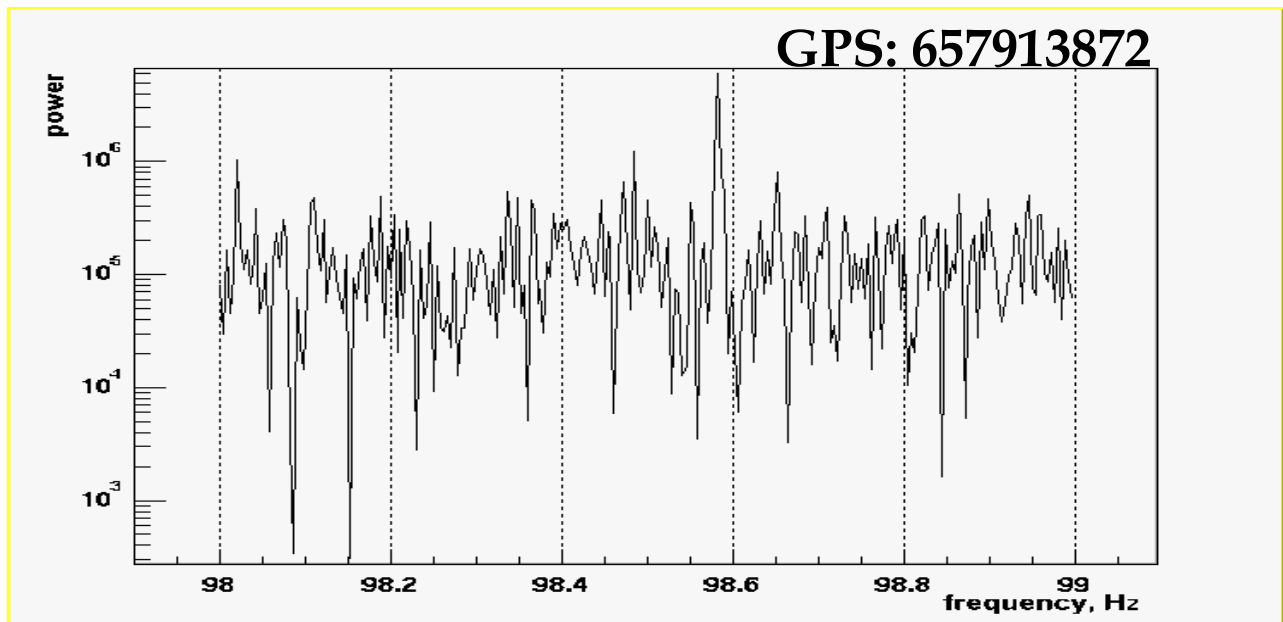
- 60Hz harmonics (1-7) total amplitude





LSC-AS_Q 98.7 Hz lines (amplitude)

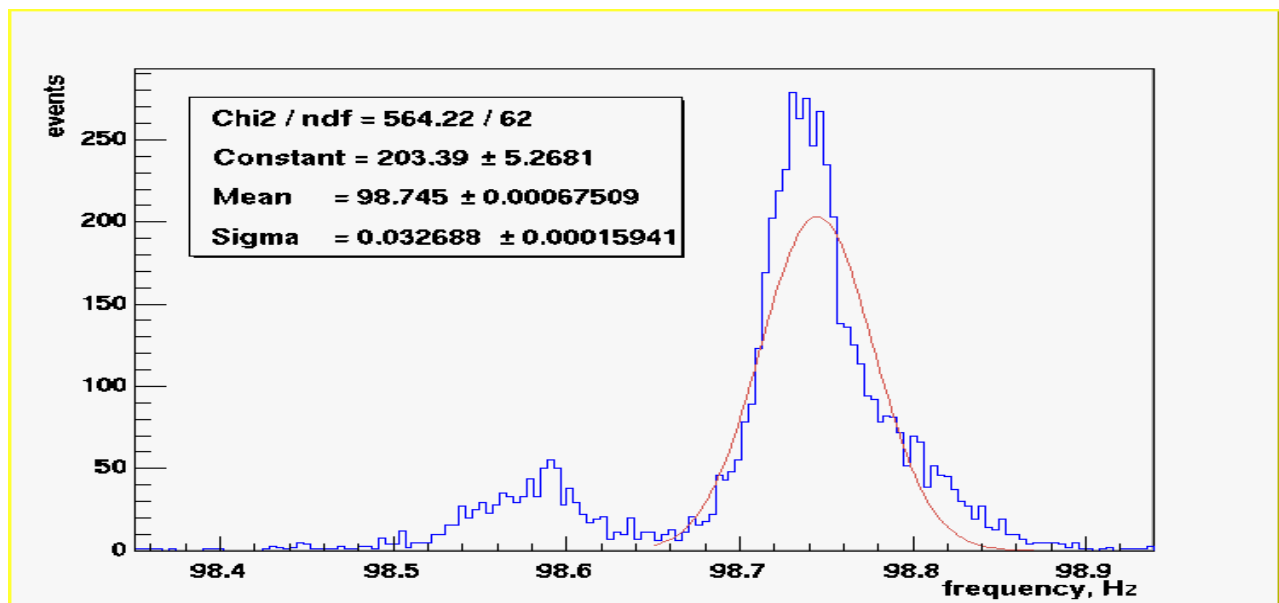
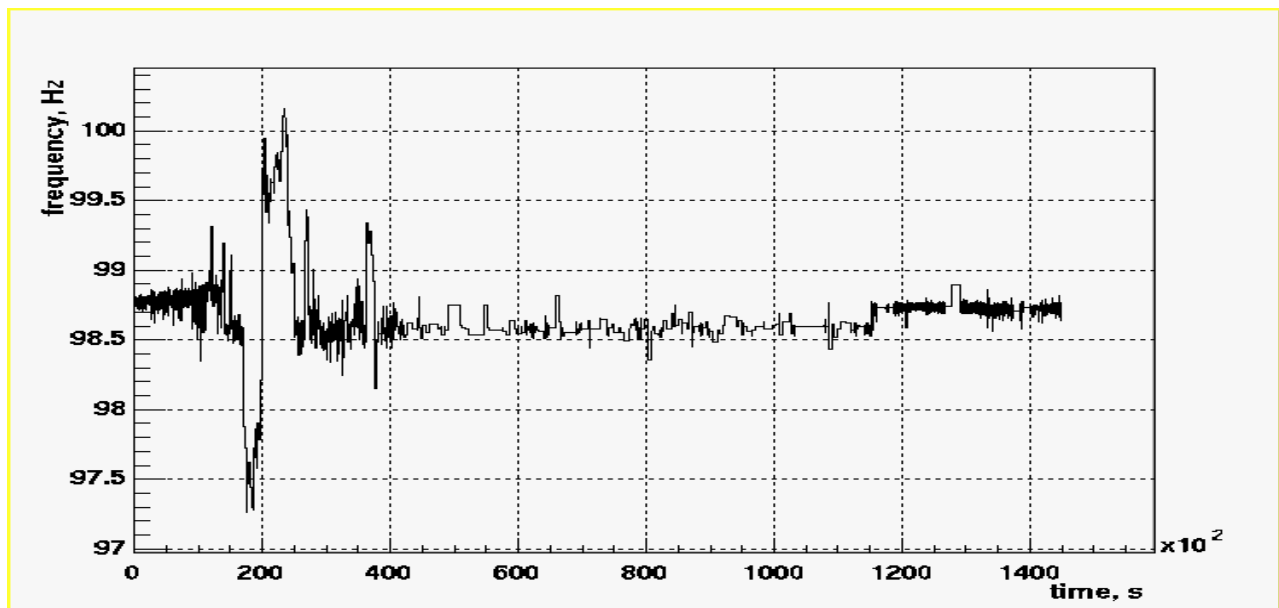
- two lines (highly unstable):
 - 98.580Hz (mean), 0.040Hz (rms)
 - 98.745Hz (mean), 0.033Hz (rms)





LSC-AS_Q 98.7 Hz line (frequency)

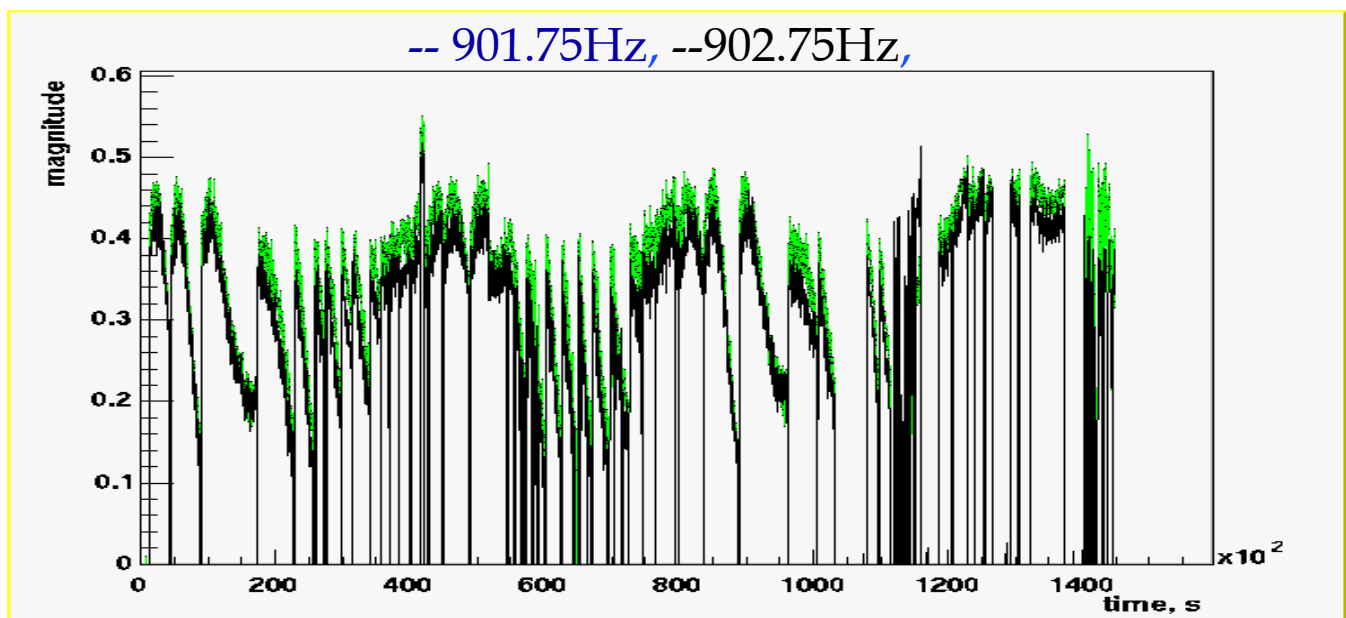
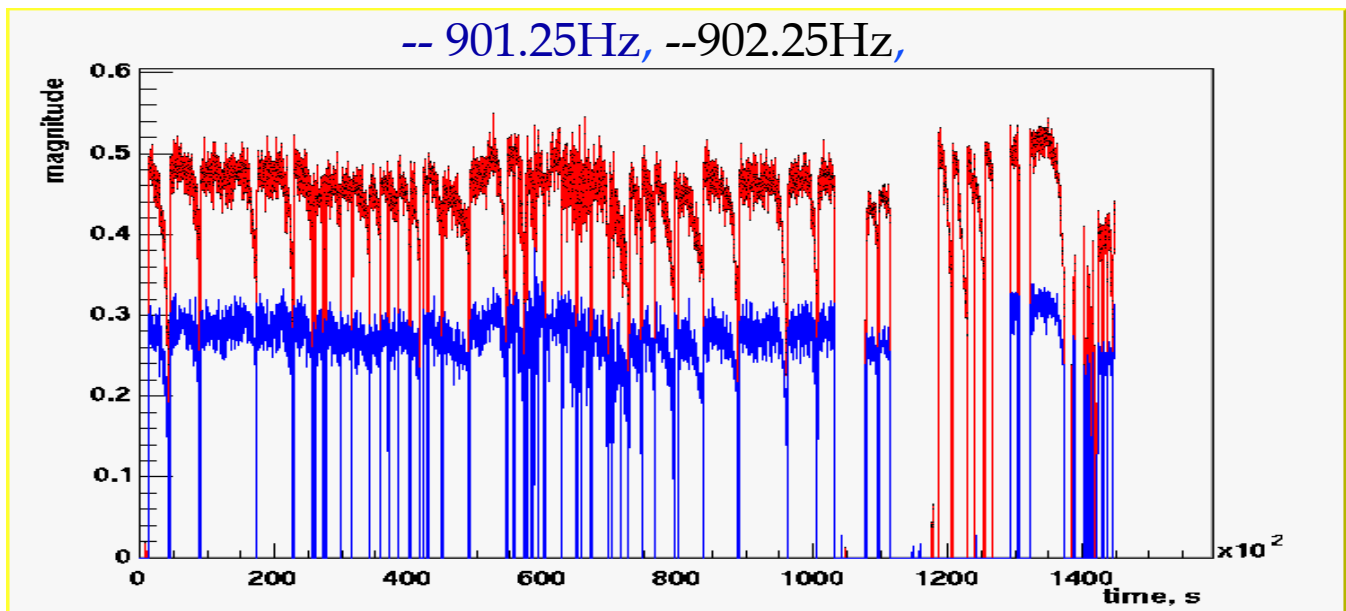
- Only one line (98.7Hz) expected to be monitored. But the line monitor shows the presence of two lines (histogram)





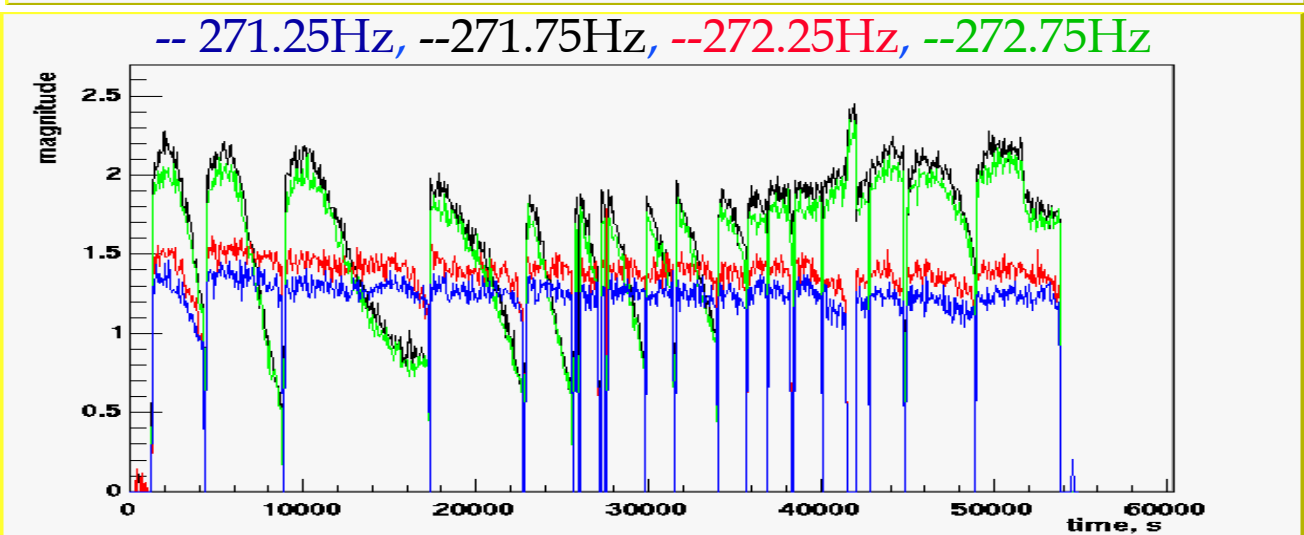
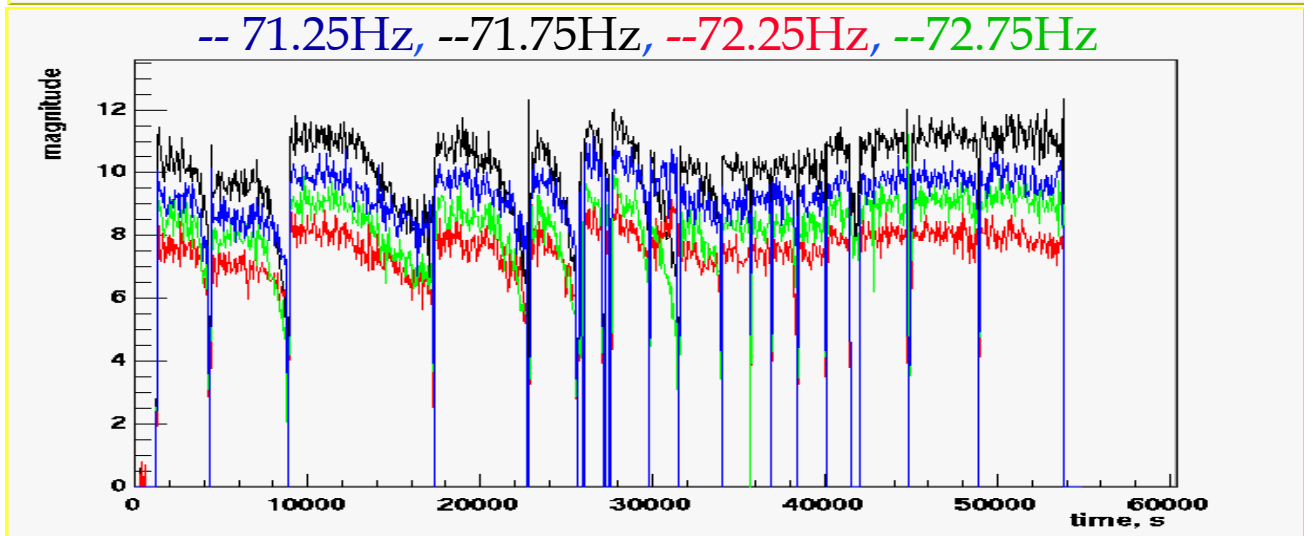
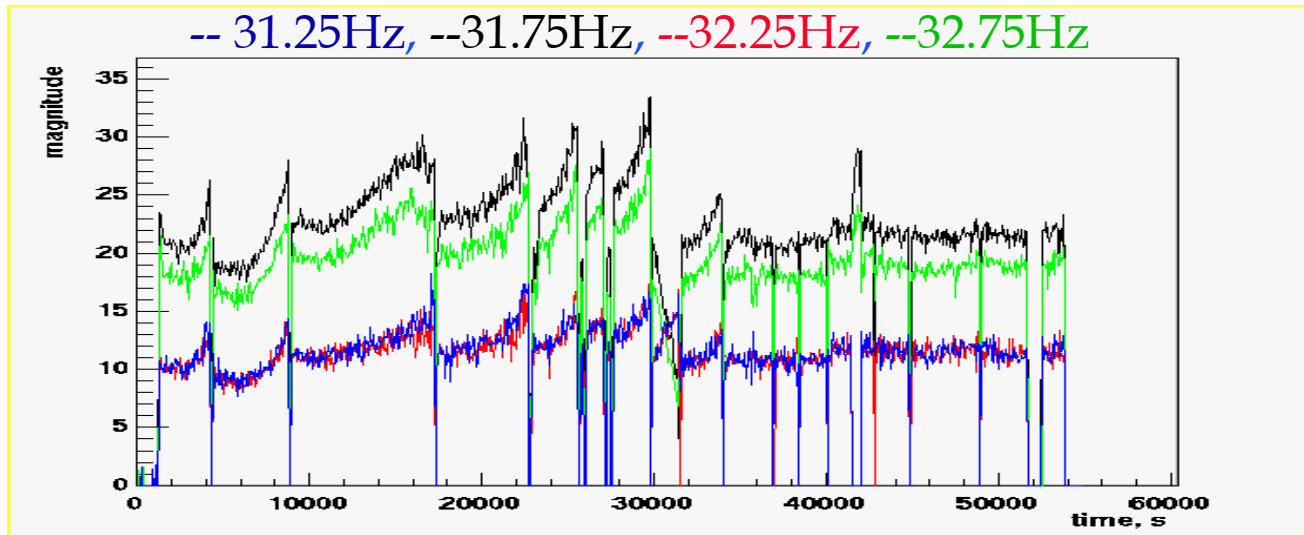
E2 calibration lines

- Channel: H2:LSC-AS_Q
- Start time: UTC(11/09/00-09:17:47), GPS(657796678)
- lines were monitored for ~44 hours, 1 min trend
- X arm: blue - ITM ($\approx 1.25\text{Hz}$), red - ETM ($\approx 2.25\text{Hz}$)
- Y arm: black - ITM($\approx 1.75\text{Hz}$), green-ETM($\approx 2.75\text{Hz}$)



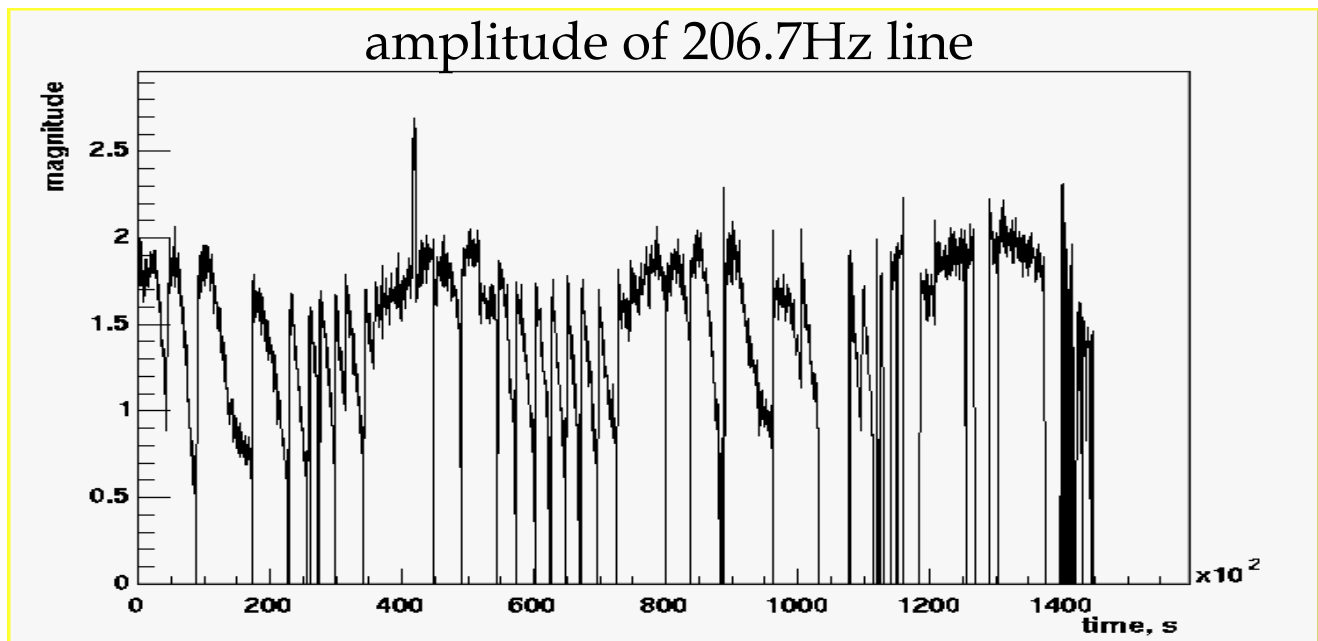
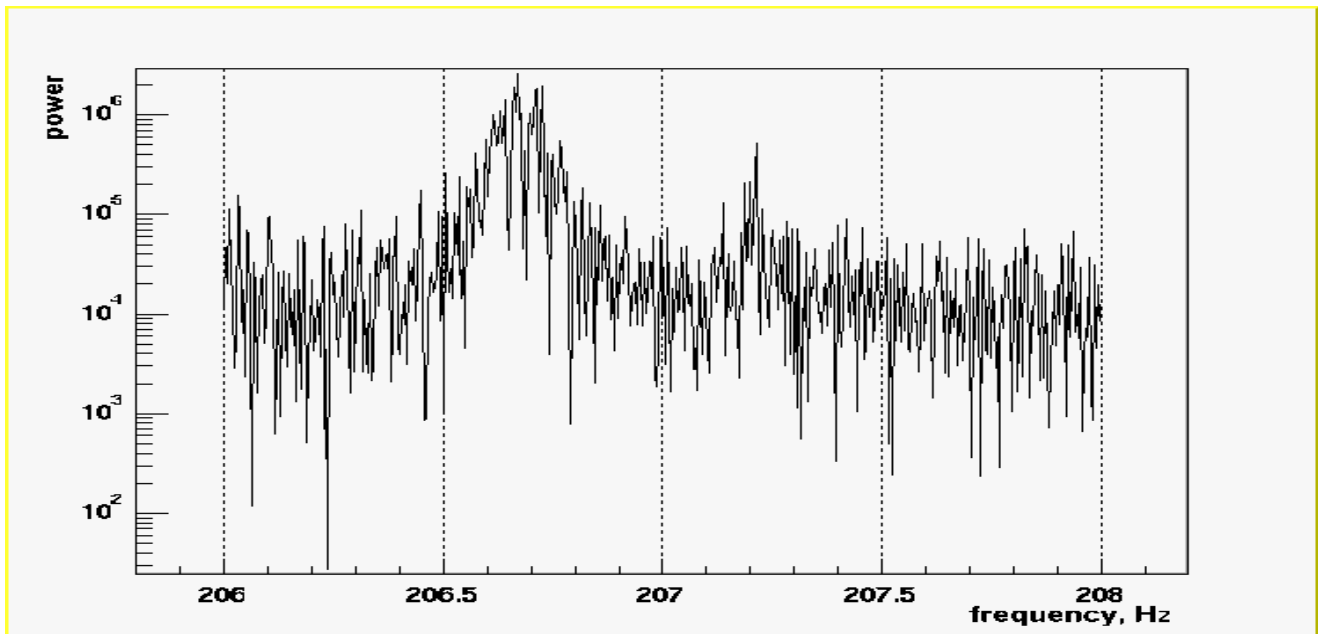


calibration lines



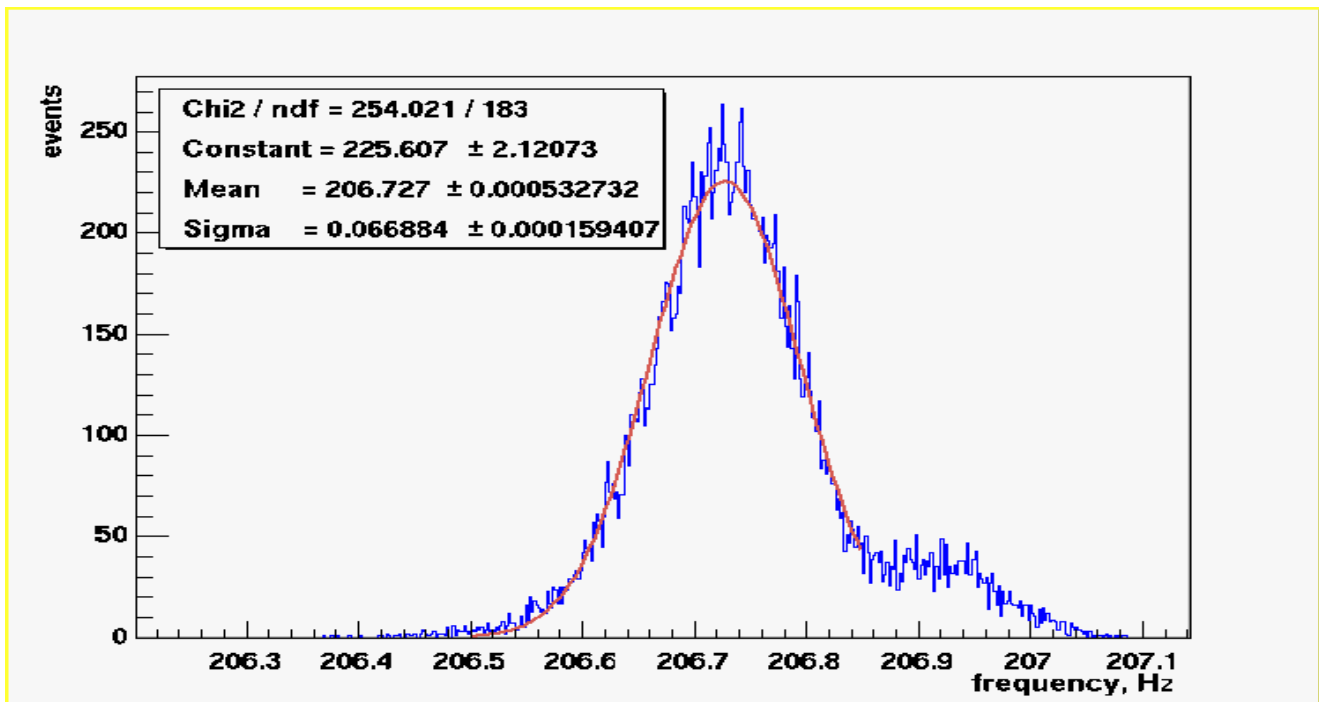
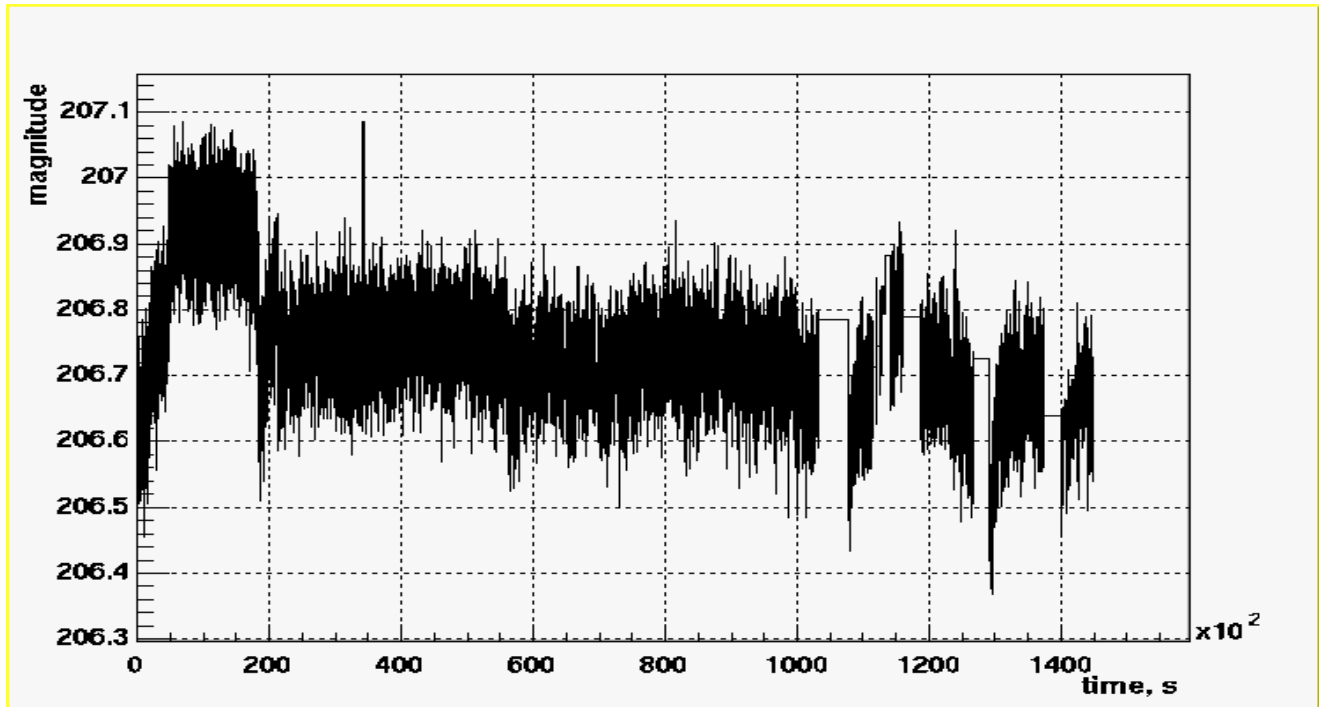


LSC-AS_Q 206.7 Hz line (amplitude)





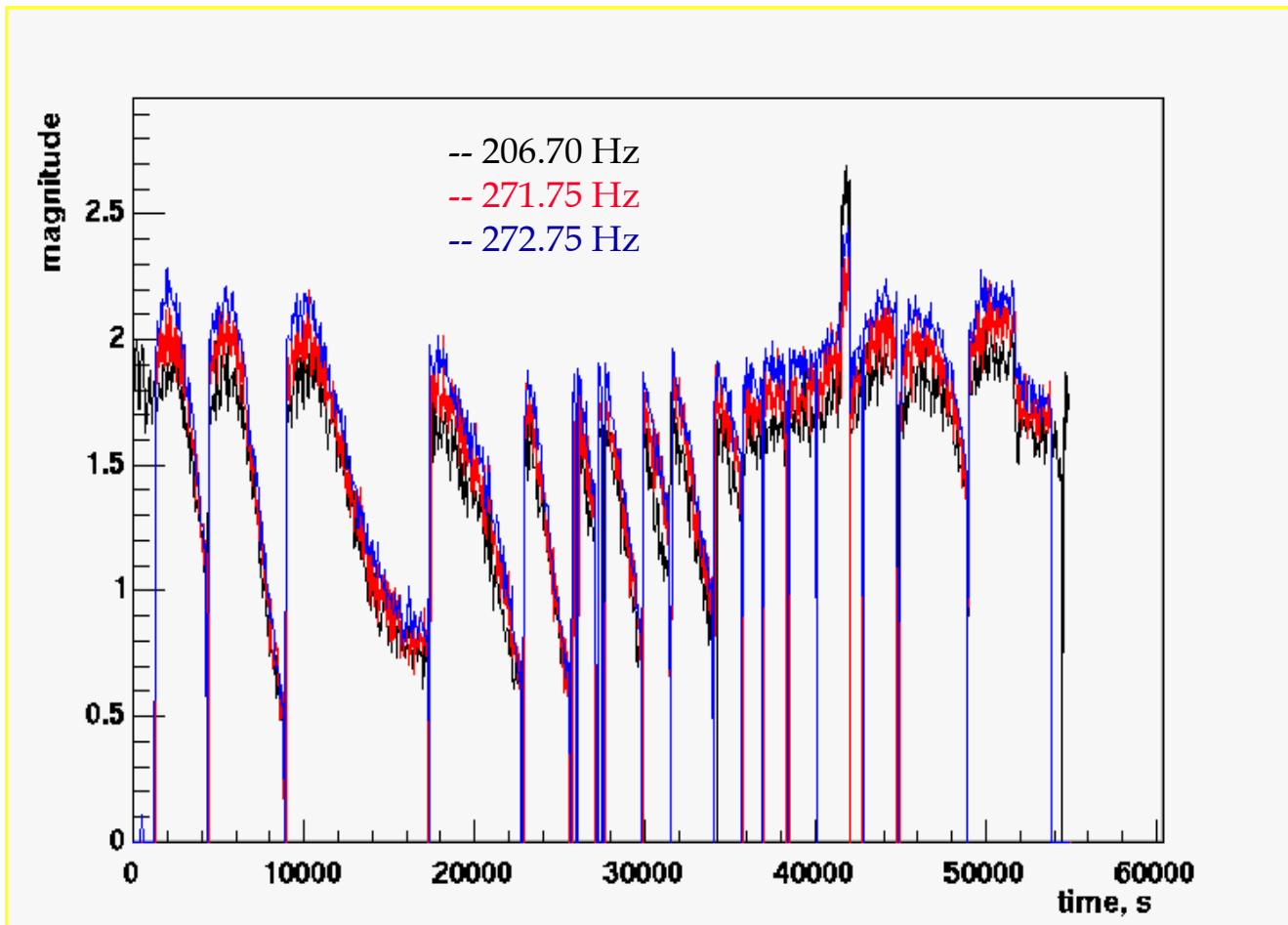
LSC-AS_Q 206.7 Hz line (frequency)





LSC-AS_Q 206.7 Hz line

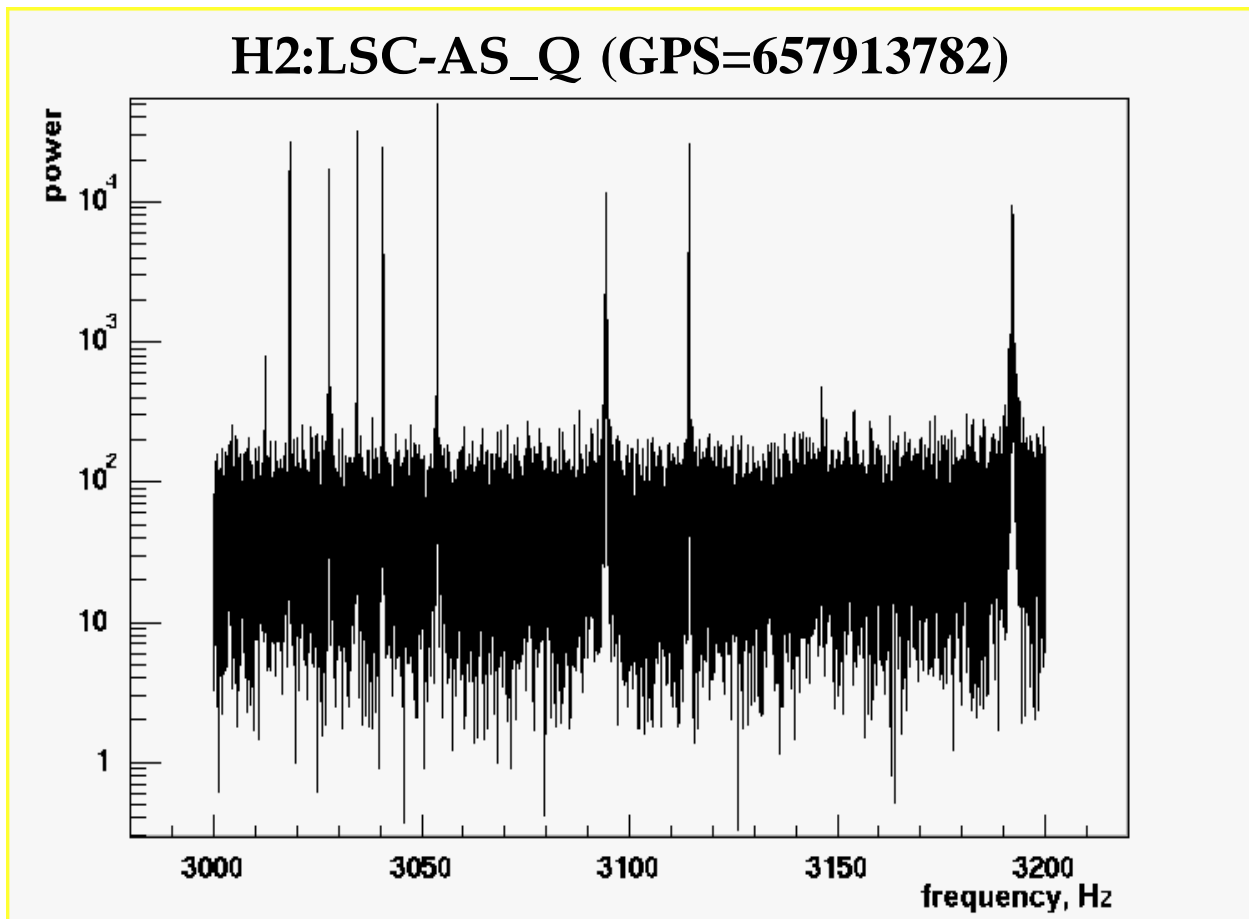
- amplitude correlation between 206.7 Hz line and Y arm calibration lines
271.75 Hz (ITMY) & 272.75 Hz (ETMY)
 - excitation of one (or two) Y test masses with constant amplitude
 - source ?





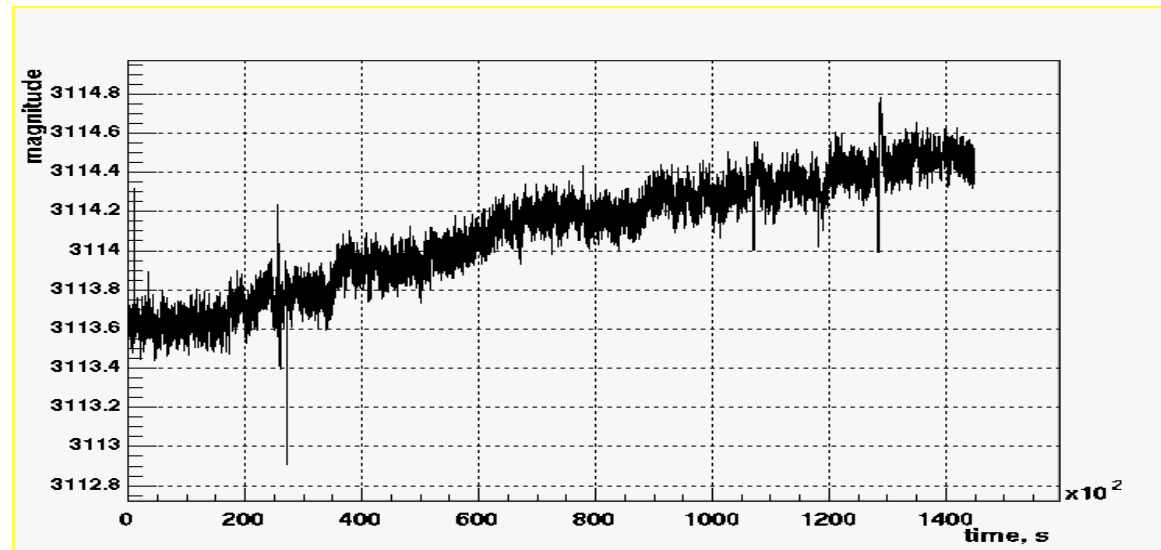
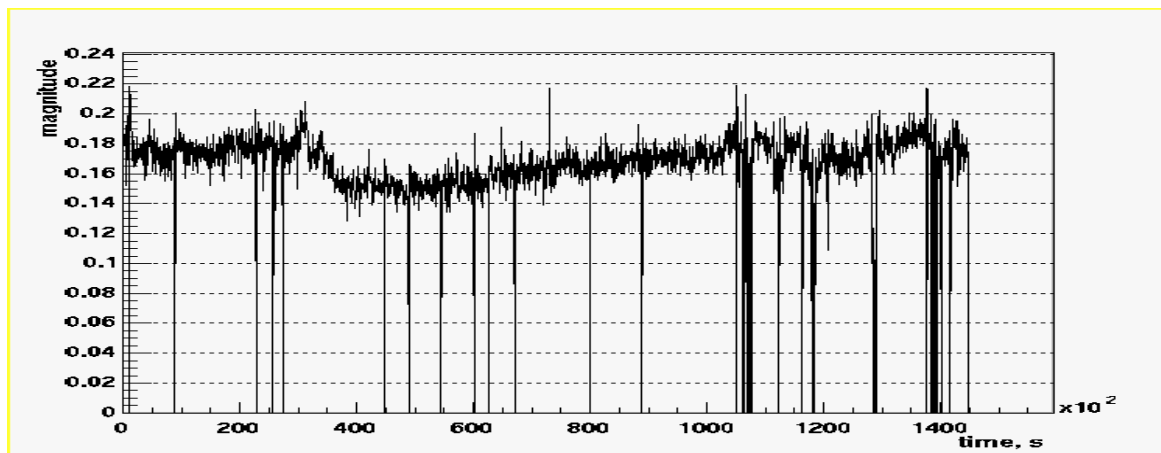
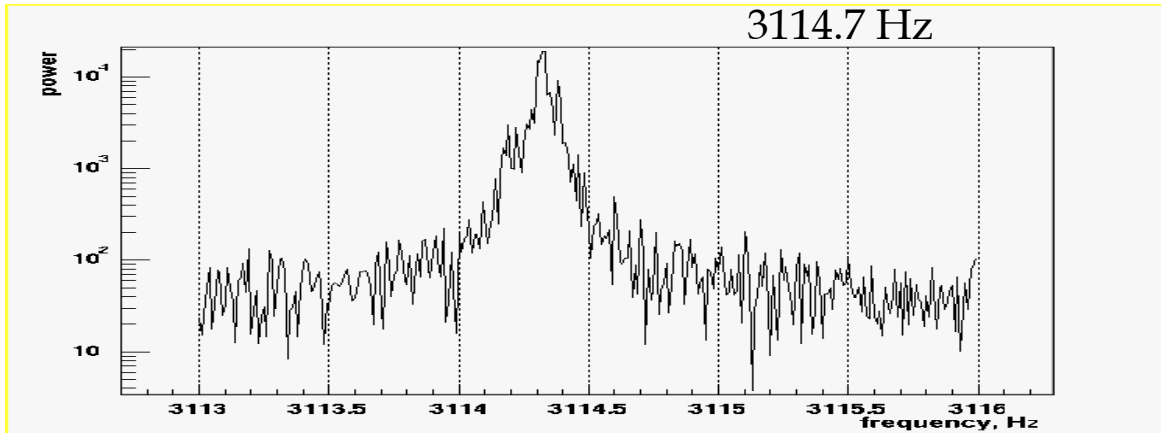
3000Hz - 3200Hz

- single lines
 - 3018.25, 3027.70 ,3034.50, 3040.70
 - 3053.70, 3094.40, 3114.30, 3192.10
 - frequency drift with time ($\sim 0.5\text{Hz/day}$)
 - width 0.2Hz-0.3Hz
 - highly correlated (amplitude(t) & frequency(t))
 - were monitored for 44hours starting on 11/09/00-09:17:47





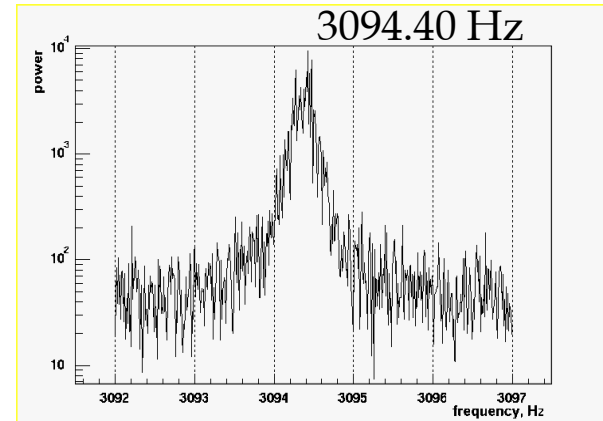
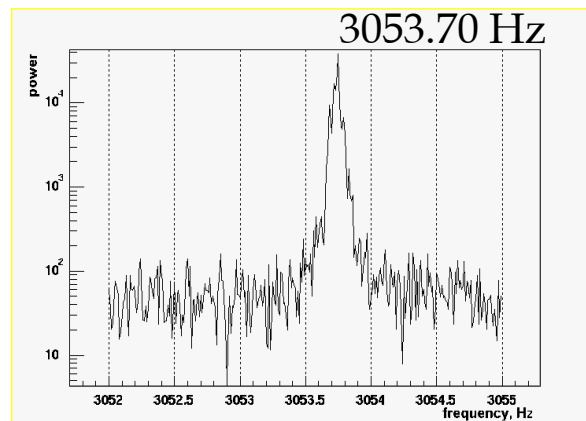
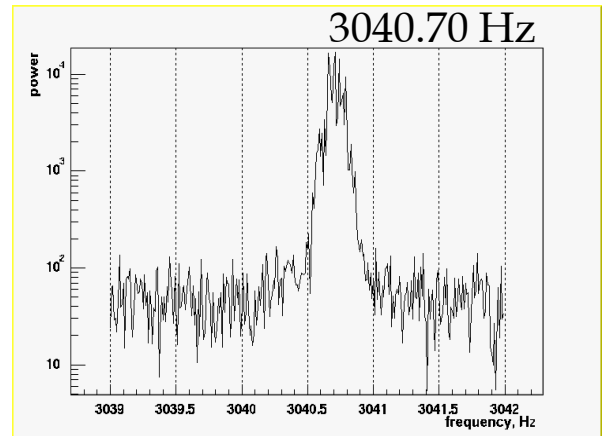
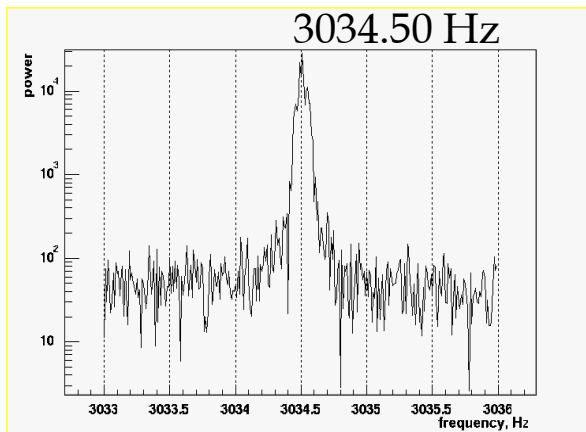
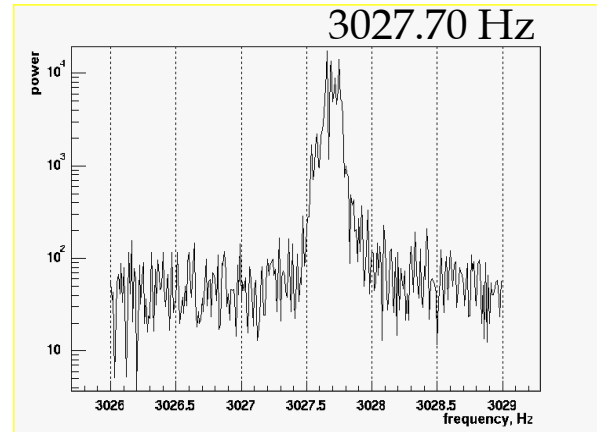
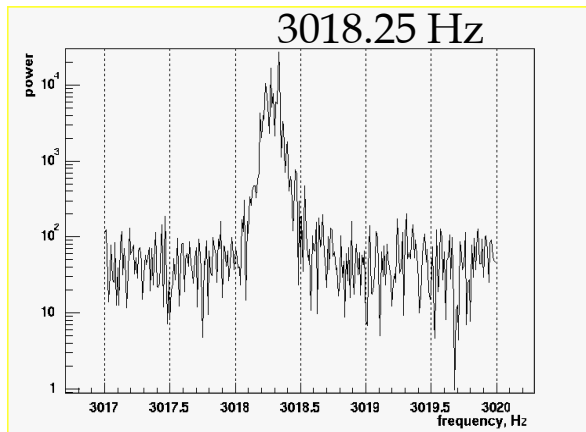
LSC-AS_Q 3114.7Hz Line





LSC-AS_Q 3kHz Lines

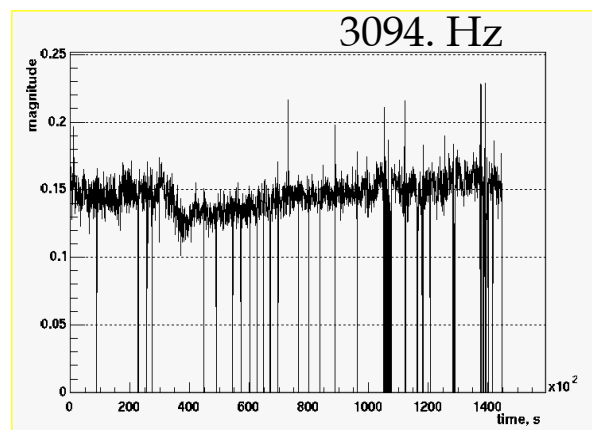
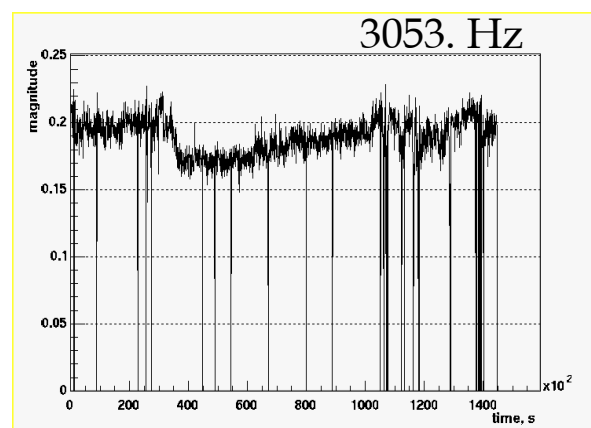
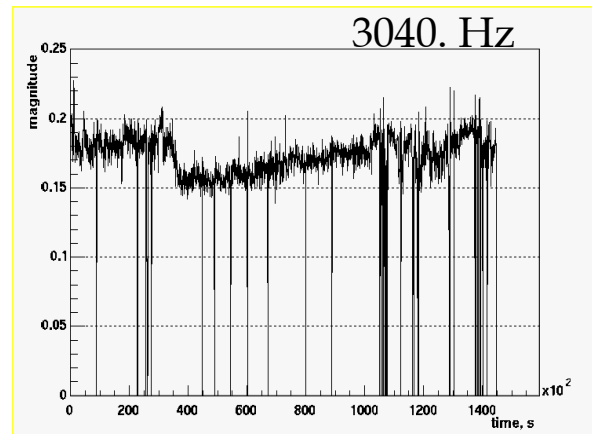
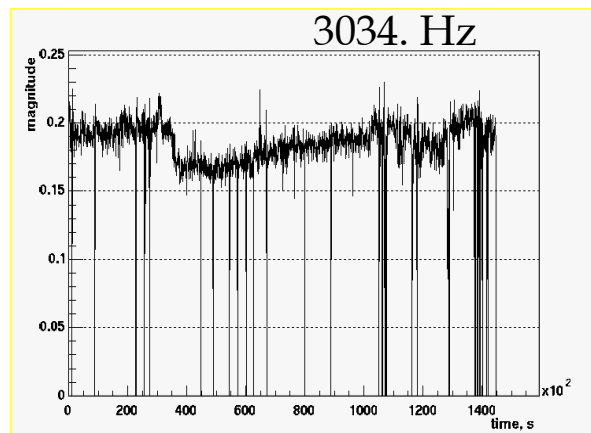
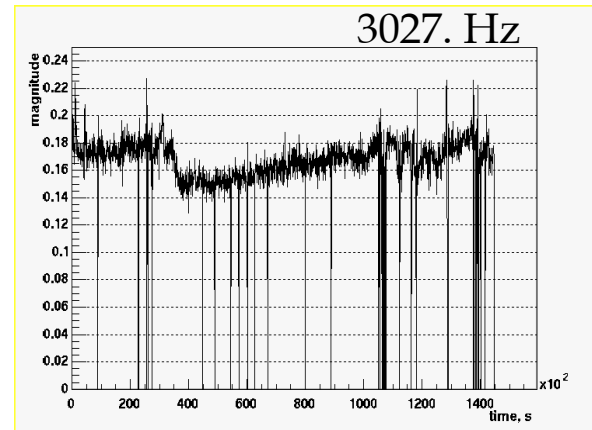
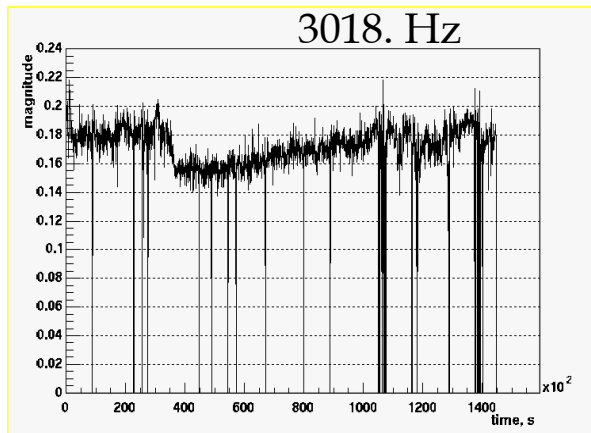
● GPS=657913782





Line Amplitude (1min trend)

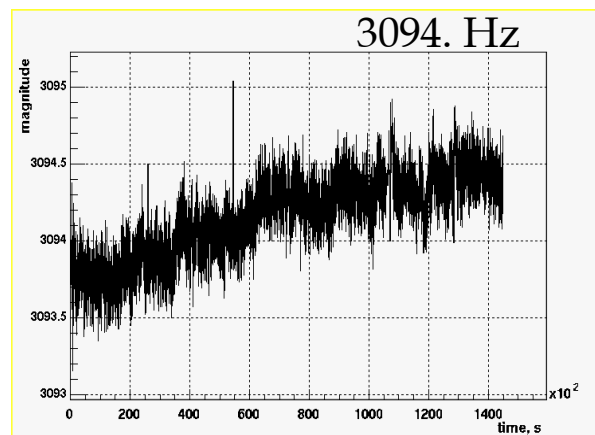
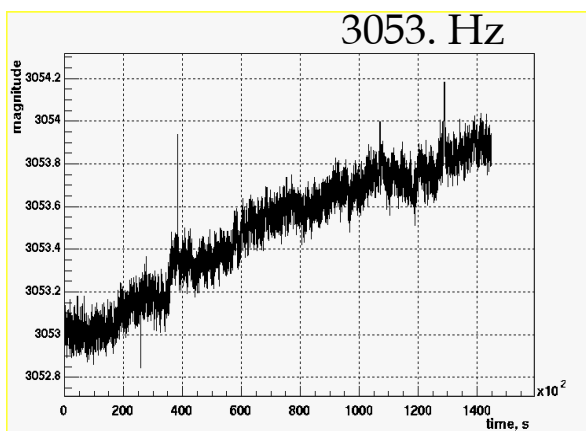
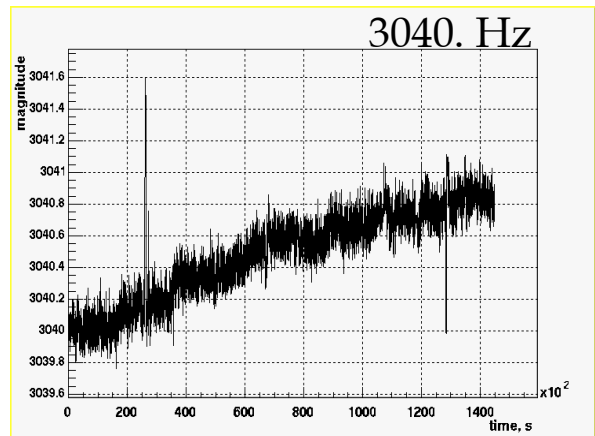
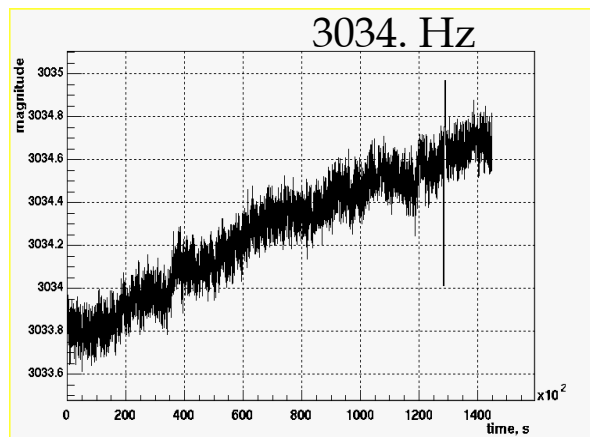
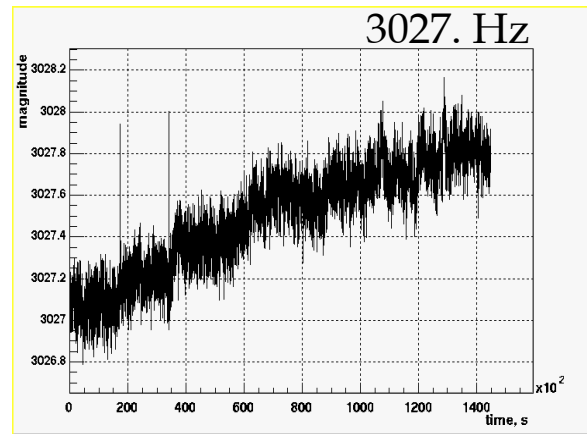
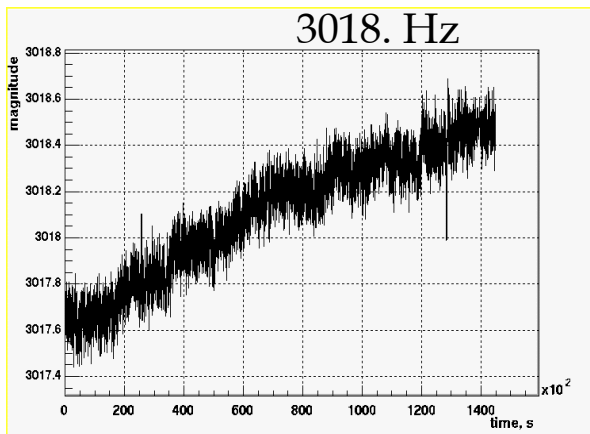
- ~44 hours, starting 11/09/00-09:17:47





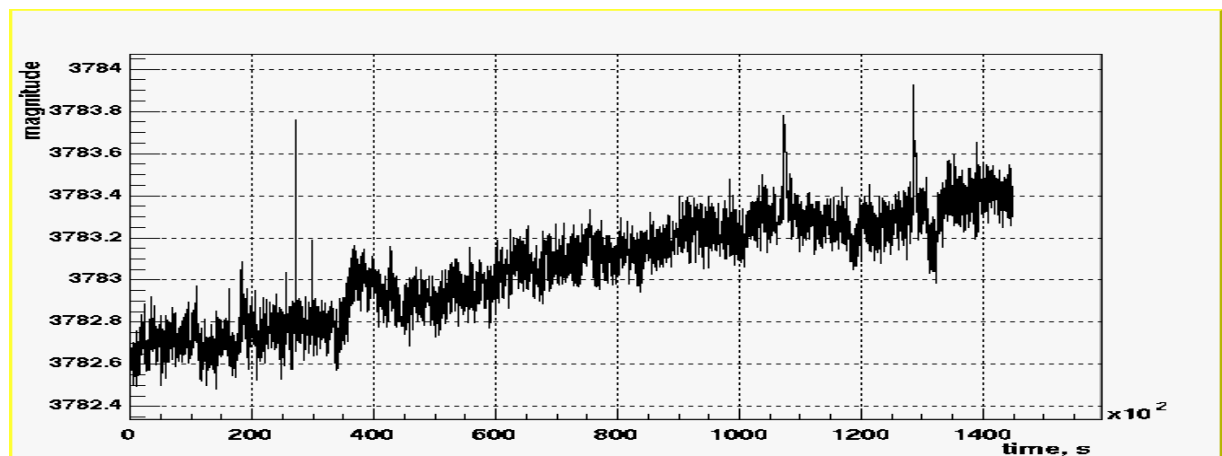
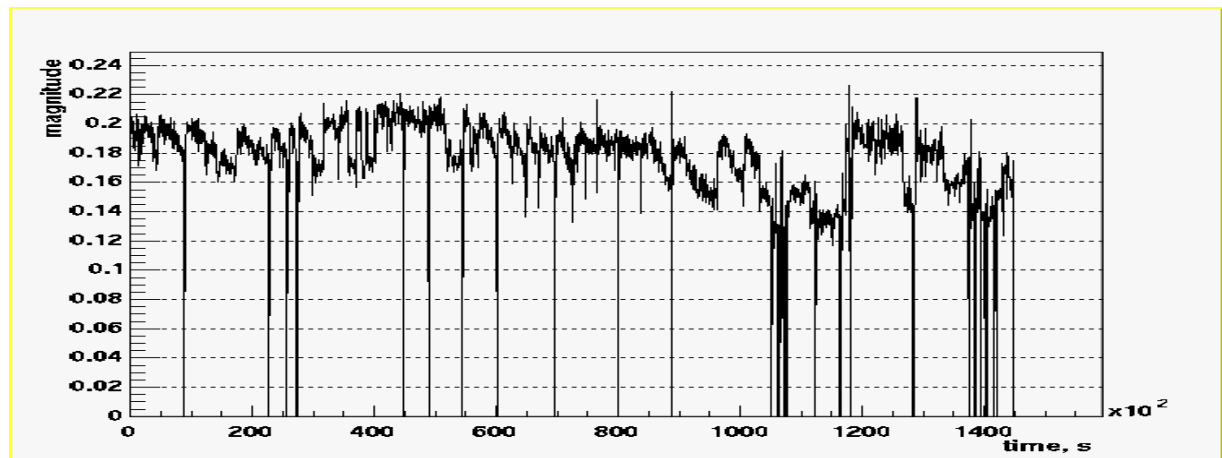
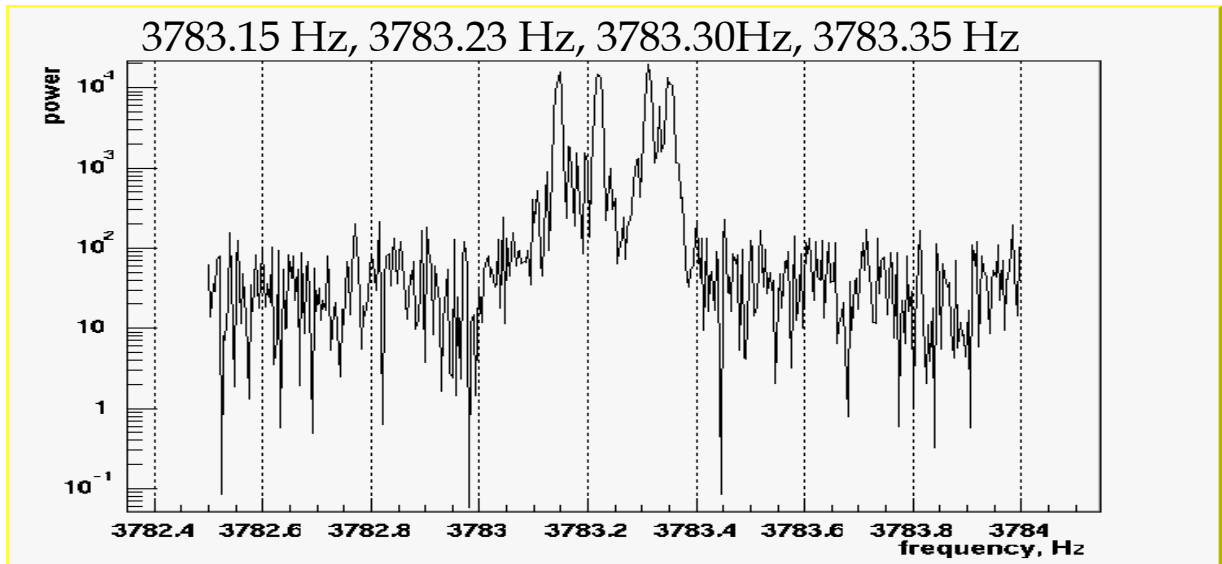
Line Frequency (5sec trend)

- ~44 hours, starting 11/09/00-09:17:47





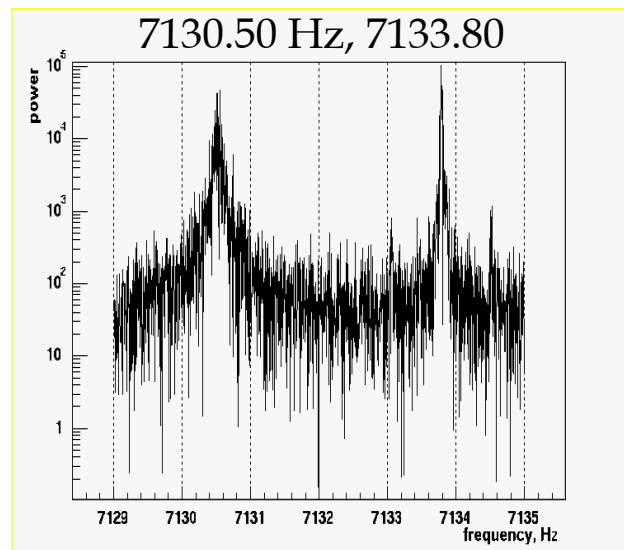
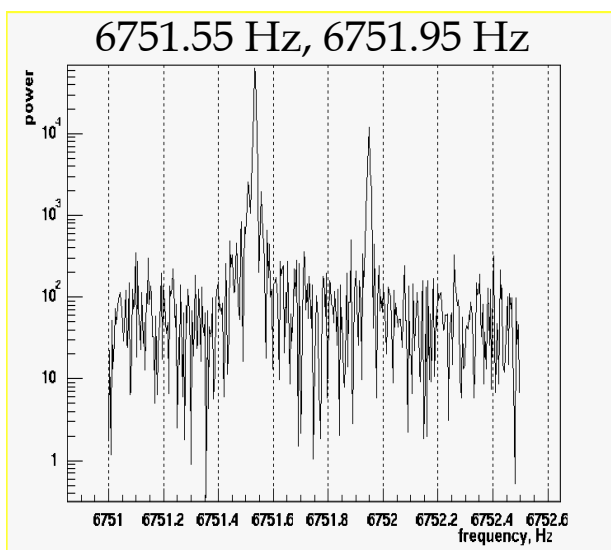
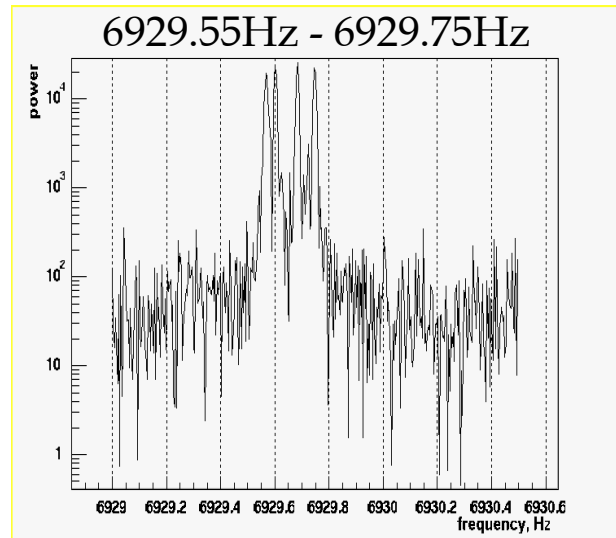
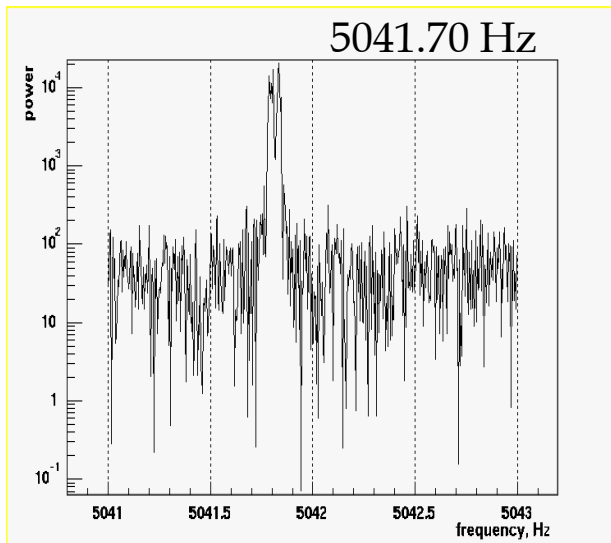
LSC-AS_Q 3783.3 Hz Lines





LSC-AS_Q Lines above 5kHz

- GPS=657913782
- have not been monitored yet





List of Lines

frequency [Hz]	width [Hz]	source
0.72 (repeatedly appeared)	-	
	pendulum mode	
6.1	~0.5	
	?	
17.8	0.2	
	RM pendulum	
31.25, 71.25, 271.25, 901.25	0.0	
	ITMX calibration lines	
31.75, 71.75, 271.75, 901.75	0.0	
	ITMY calibration lines	
32.25, 72.25, 272.25, 902.25	0.0	
	ETMX calibration lines	
32.75, 72.75, 272.75, 902.75	0.0	
	ETMY calibration lines	
53.35 (repeatedly appeared)	-	
	?	
98.7 (repeatedly appeared)	-	
	?	
60.0 (and harmonics)	-	
	power lines	
206.72	0.1	
	Periscope Structure IOO	
236.90		