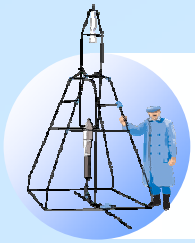
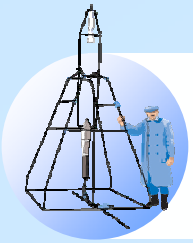


Upconversion Study with the Hilbert-Huang Transform

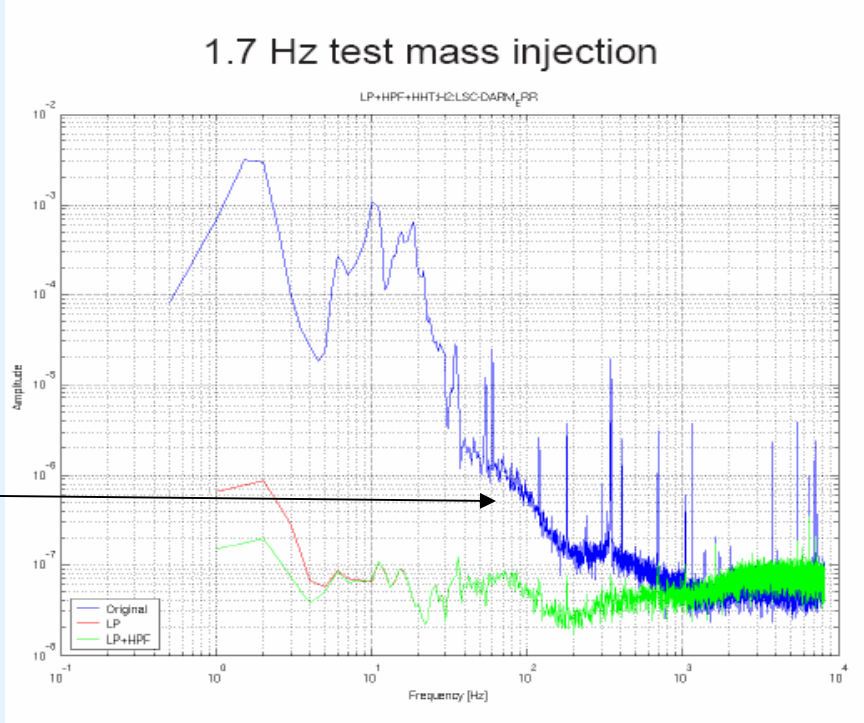
Jordan Camp
Kenji Numata
John Cannizzo
Robert Schofield

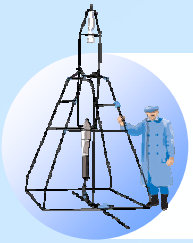
Detchar Meeting
Jan 12, 2007



Upconversion Study

- Excess of detector noise observed between 40 and 200 Hz due to upconversion of seismic noise
- Robert Schofield has simulated this problem with a direct test mass injection at 1.7 Hz
- The Fourier spectrum shows noise excess from 40 to 100 Hz
- We have analyzed the DARM-ERR timeseries with the HHT to see if we could learn anything about the nature of the upconversion

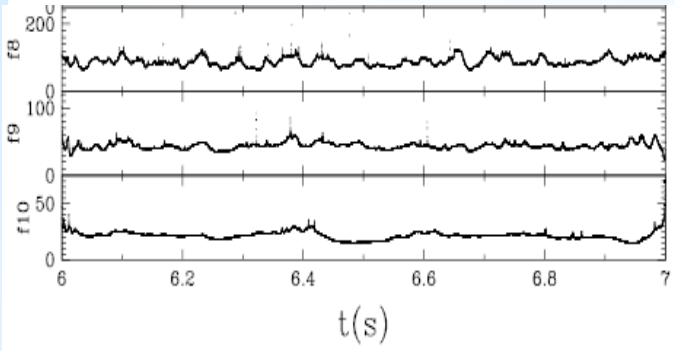


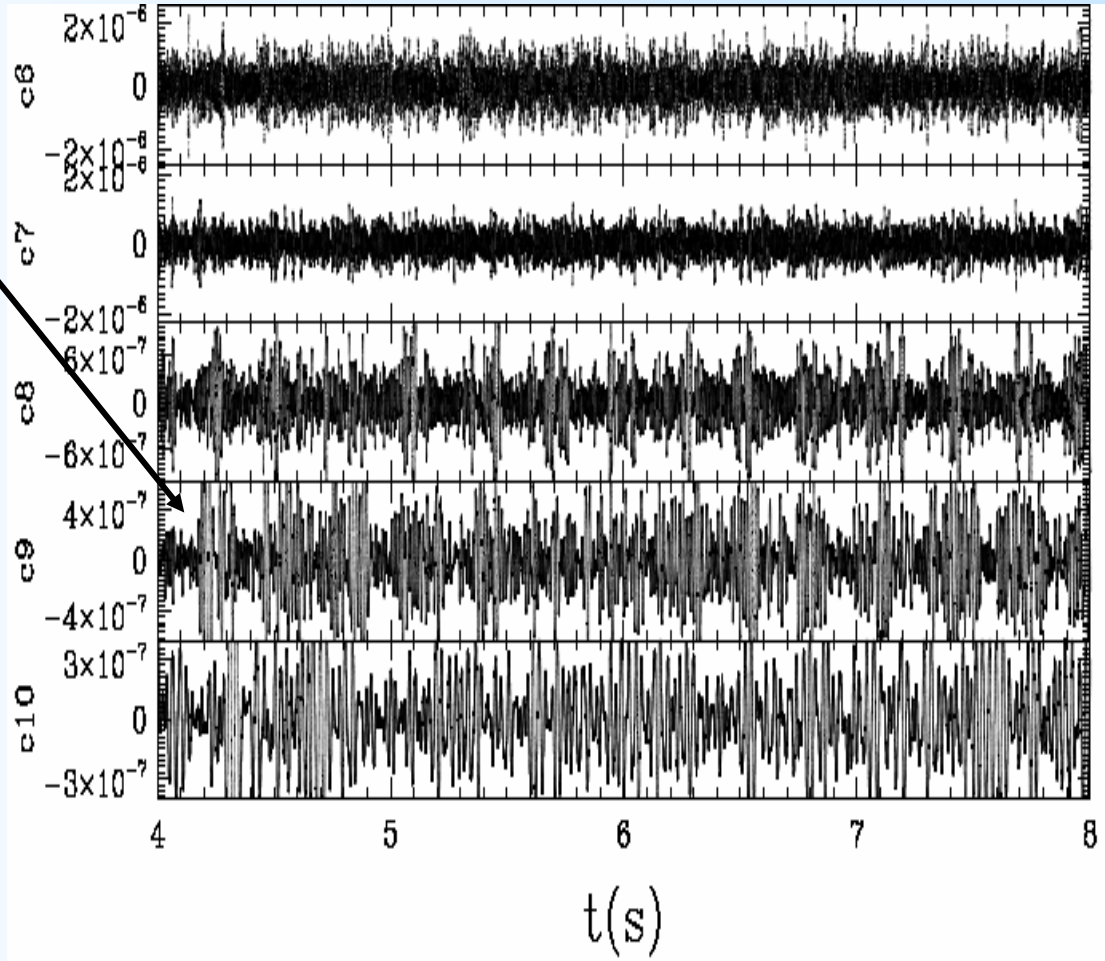


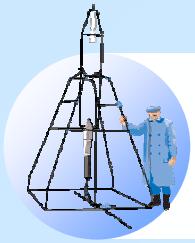
HHT analysis of upconversion

- HHT shows bursts of noise at 2nd harmonic of 1.7 Hz stimulus

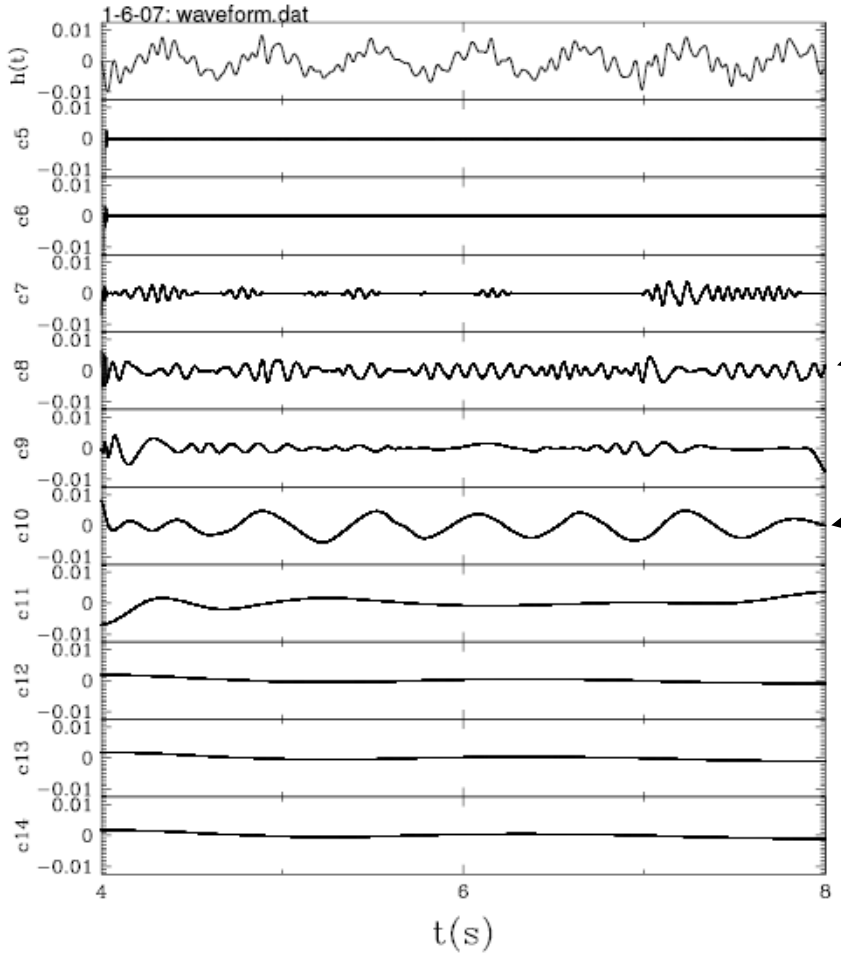
- Associated frequencies for c8, c9, c10 are 30 – 100 Hz







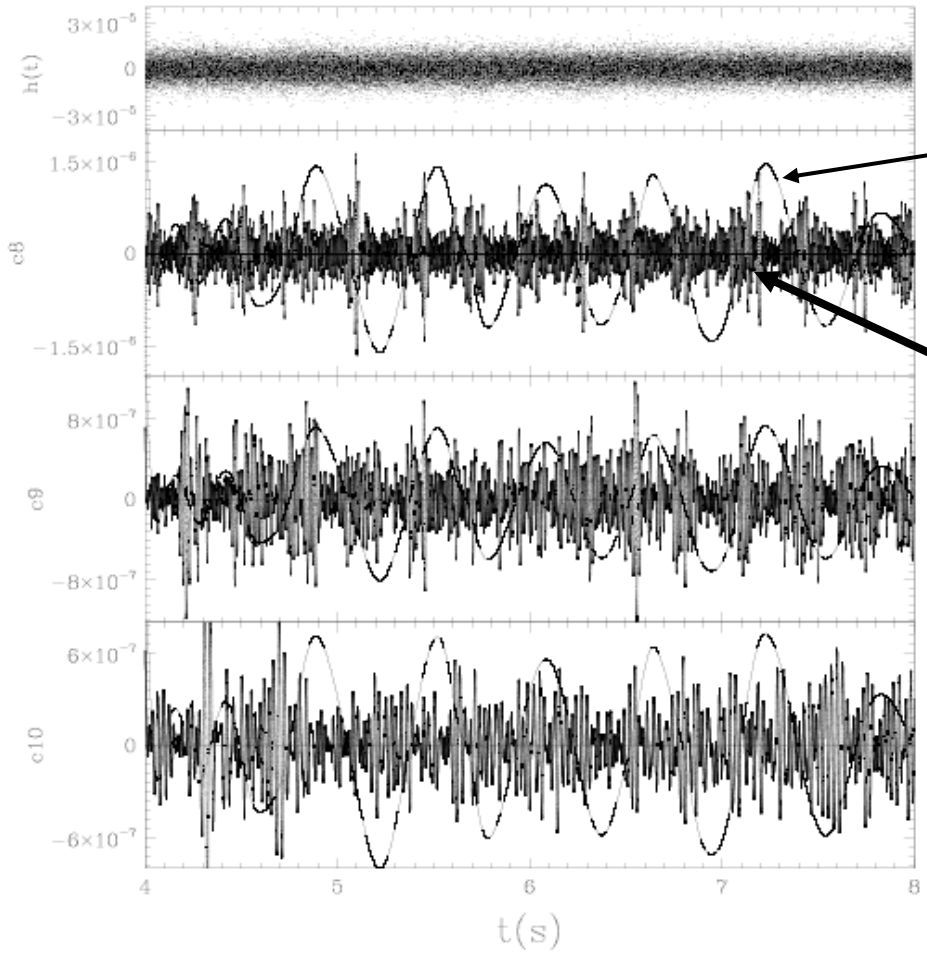
Identification of 1.7 Hz stimulus



14 Hz bounce mode

1.7 Hz test mass motion

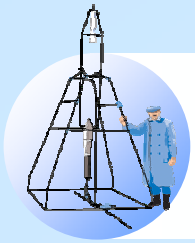
Phasing of upconversion burst noise relative to test mass motion



1.7 Hz Test mass motion

Bursts of upconversion noise occur at zero-crossing of test mass motion

This corresponds to zero-crossing of SUS coil current (we think…)



Next

- Study of upconversion noise from microseismic peak
  - RS has indicated very noisy time interval to study
- Need to consider new stimulus experiments that might reveal more of noise properties / origins