



# SWG Summary

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LSC meeting, LLO, Louisiana

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LIGO-G030148-00-Z

# Updates

- Suspensions

- » summary from Glasgow (Cantley):

- PPARC proposal for ~\$12 M for Advanced LIGO on track
- Work on prototype Adv. LIGO triple suspensions for LASTI in collab. with Caltech ongoing
- new result on silica ribbon suspension (next slide)

- » summary from Caltech (Willems)

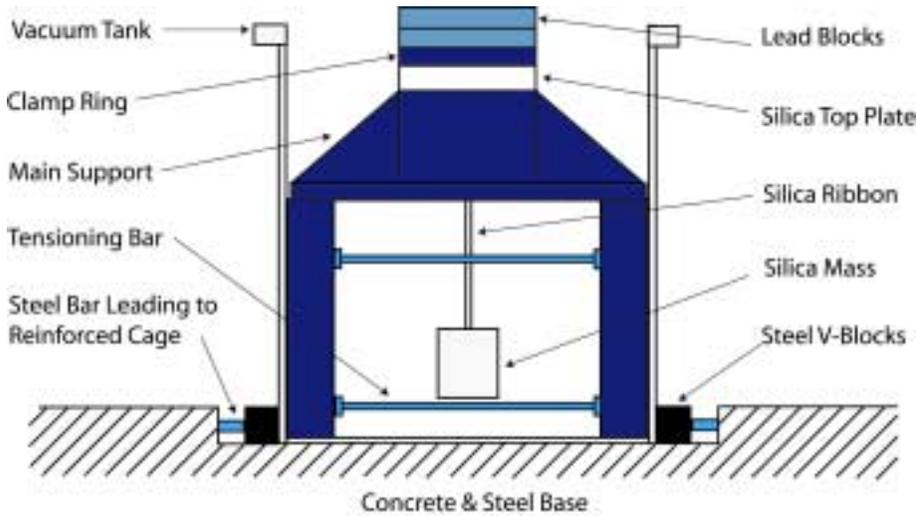
- LASTI modecleaner constructed, recycling mirror underway
- highlighted challenges for integrating subsystems, e.g.
  - mass and space constraints, EM interference, sensor noise
- results (upper limits) on creep measurements in bonds
  - silica/silica  $< 6e-14 \text{ ms}^{-1}$
  - silica/sapphire  $< 5e-13 \text{ ms}^{-1}$

- Isolation - Preisolator work for retrofit (Lantz)

- hydraulic (HEPI) and electromagnetic (MEPI) schemes under investigation at LASTI



# Silica ribbon pendulum losses – initial results (Glasgow)

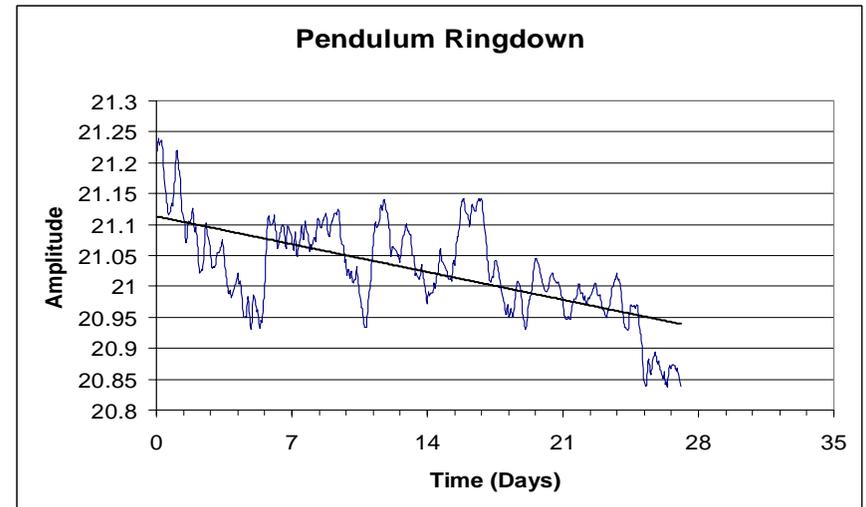
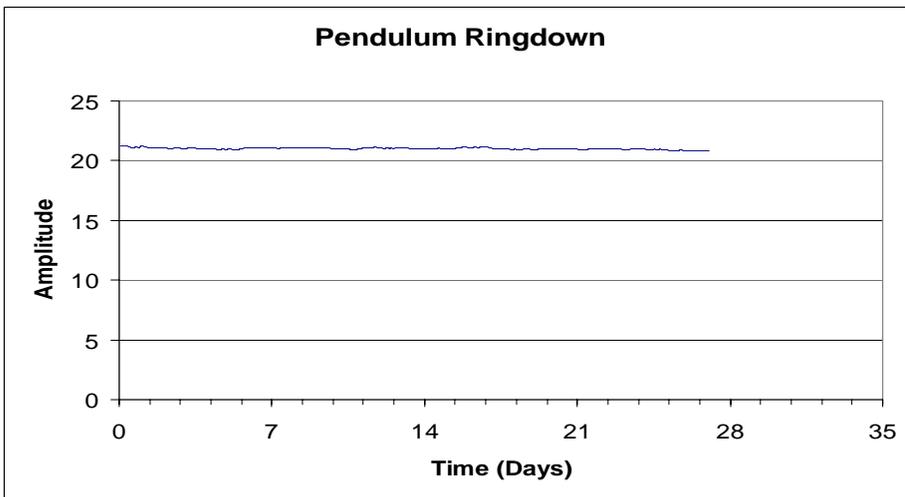


Four week ringdown test

*Measured  $Q \sim 8.8E8$*

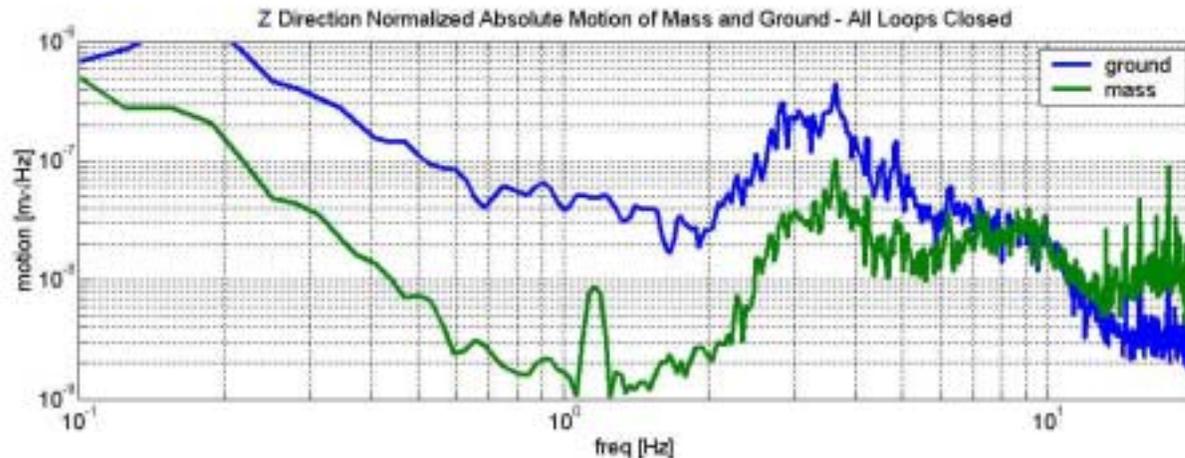
Highest measured  $Q$  for a linear pendulum

HOWEVER must confirm pendulum not being significantly driven by seismic noise



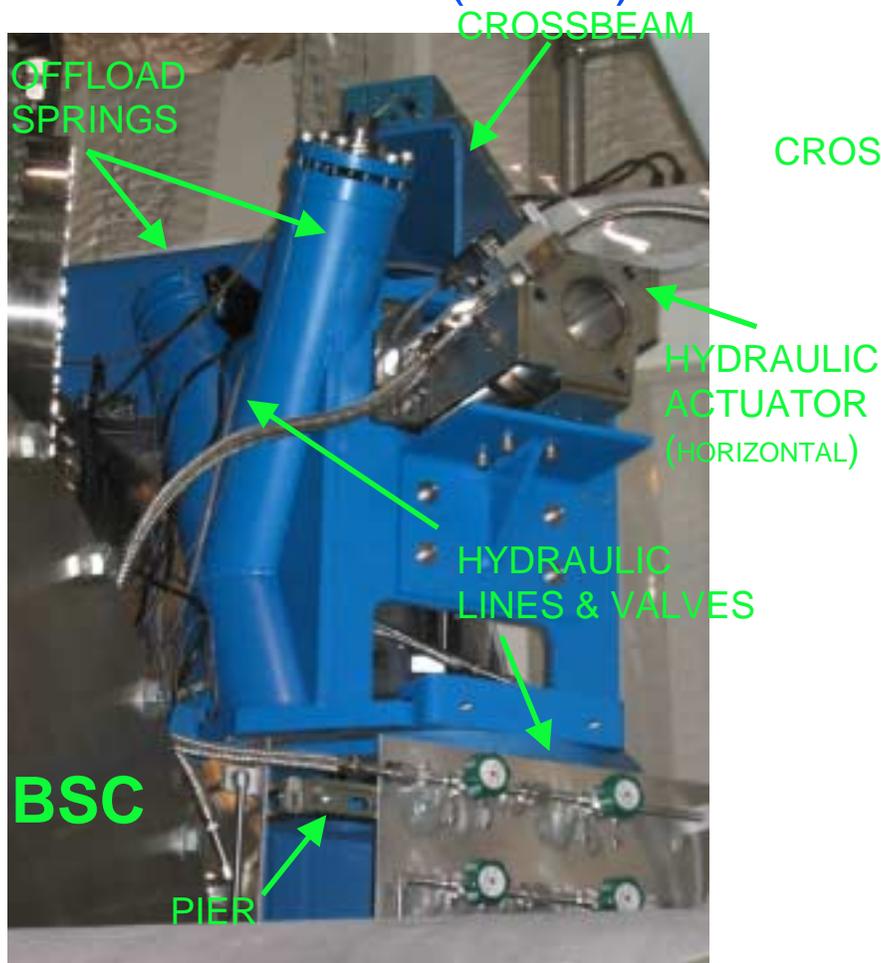
# External Pre-Isolation Upgrade

- External Pre-Isolation (EPI) Upgrade is required to allow both reliable locking and to allow better noise performance while locked
  - » Design review scheduled for ~4/18
  - » Prototype testing at LASTI facility has demonstrated 10x reduction in 0.5 to ~2.5 Hz band (compared to 15x reduction requirement in the 1-3 Hz band); testing and optimization continues (see preliminary HEPI data below)
  - » Earliest installation start is Oct with completion ~Jan
  - » To date have focused on LLO (more acute) problem; Plan to install PEPI systems at LHO for wind noise needs more evaluation

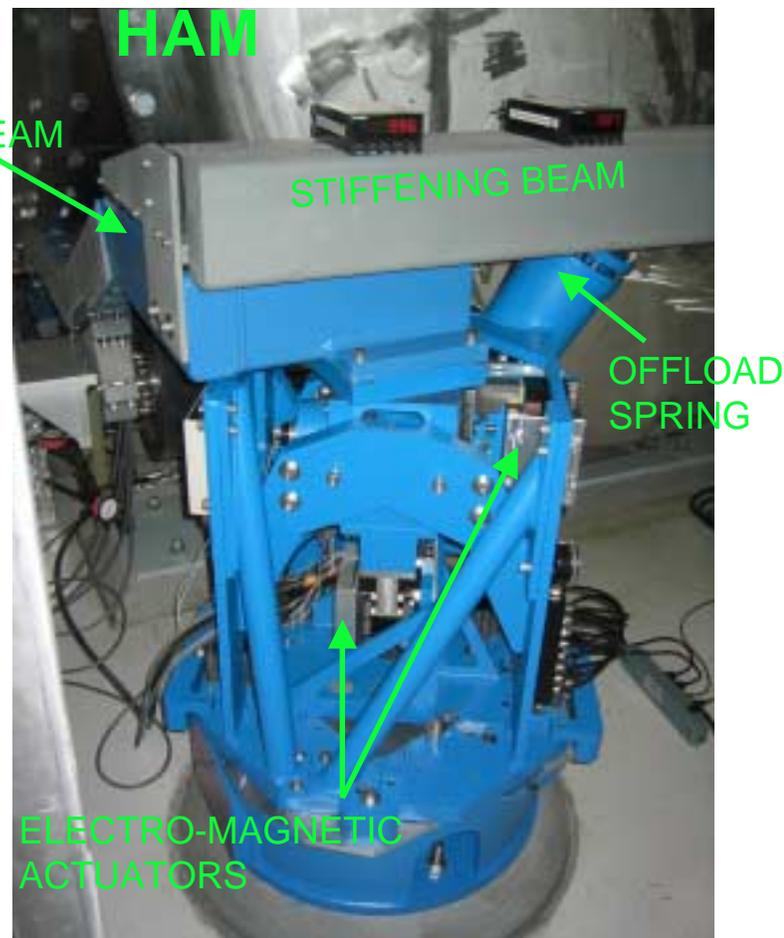


# Commissioning at LASTI: SEI Upgrade

## Hydraulic External Pre-Isolator (HEPI)



## Electro-Magnetic External Pre-Isolator (MEPI)



- Glassy metals (Desalvo)
  - » possible alternative to silica suspensions: substantial developments necessary
- Quadruple suspension status (Robertson)
  - » parameter space for design closing in from interface considerations
- a) Investigation of effect of heating on Q of silica fibres &  
b) Investigation of electric charges on silica test masses (Mitrofanov)
  - » a) adsorbed water (weakly bonded) significant
  - » b) conclusion “ more questions than answers”
- Piezoelectric pre-isolation and microseismic feedforward for S2 (Giaime)
  - » redesign from S1 - improved performance for better operation of interferometer at LLO

- FF reduction extended up to 0.35 Hz
- PEPI removes excess FF noise down to about 0.65 Hz
- Bad zone reduced from 0.2–0.8 to 0.35–0.65 Hz.
- RMS motion reduced by factor of 3.

