

This document shows the modifications of the ISI dynamic due to the addition of the damping components on the ISI and the QUAD. It also shows a comparison of the two ISI used for the single arm in their final configurations (BSC8 with ITMY&FMY; BSC6 with ETMY&TMSY). The two units look pretty consistent.

Three series of measurements were done on ISI-BSC6 at the End station (Bold fonts shows what was added between measurements)

- 2012 03 29: At EY on the teststand – QUAD (Damped – No vibration absorbers) – TMS (Damped)
- No TMD – No stage1 Vibration absorbers – No Viton under the keel masses.
- 2012 04 11: At EY **in the chamber** – QUAD (Damped – No vibration absorbers) - TMS (Damped) – **TMDs on stage 0-1 blade – 6 stage 1 vibration absorbers – Viton pads under keel masses**
- 2012 04 16: At EY in the chamber – QUAD (Damped –**Vibration absorbers**) - TMS (Damped) – TMDs on stage 0-1 blade – 6 stage 1 vibration absorbers – Viton pads under keel masses

Note: Due to a change in the sample rate (2k to 4K) of the geophones channels, there is a phase delay at high frequency on measurements realized before April 2012.

Effect of the ISI damping components on stage 1:

Measurements were done in the local basis. Calibrated and “idealized” transfer functions in the Cartesian basis are calculated. Geophones are not symmetrized.

Figures showing transfer functions before and after installing the TMD and stage 1 vibration absorbers can be found in the SVN:

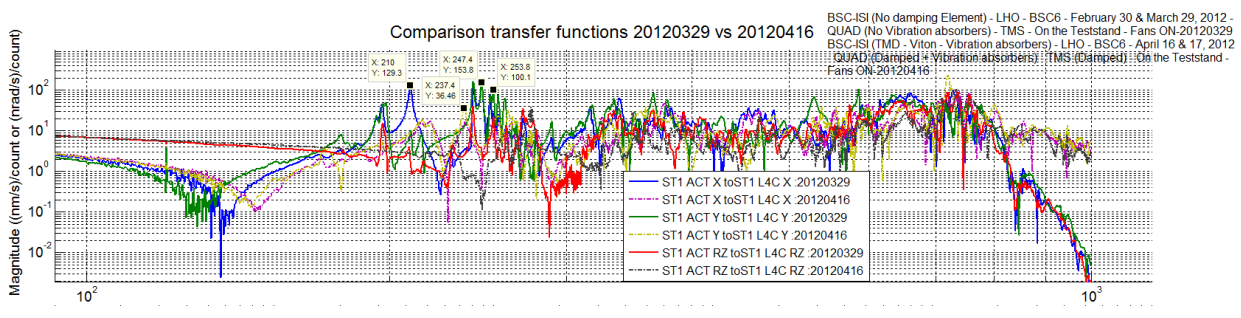
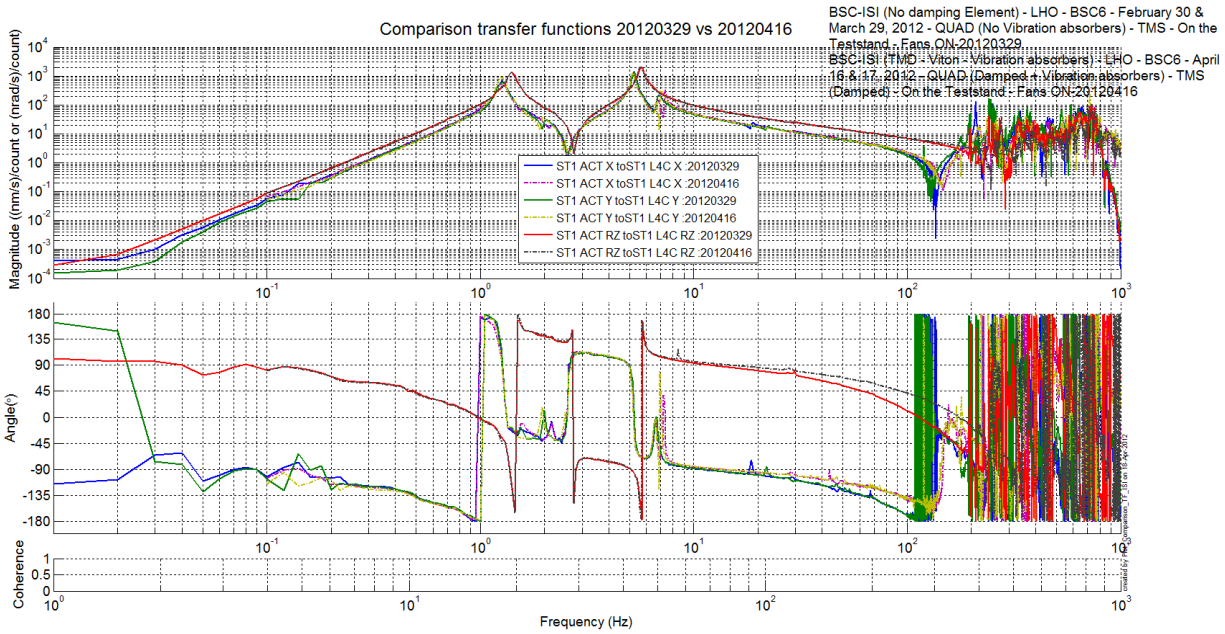
seismic/BSC-ISI/H2/ETMY/Data/Figures/Transfer_Functions/Comparisons/C2C/

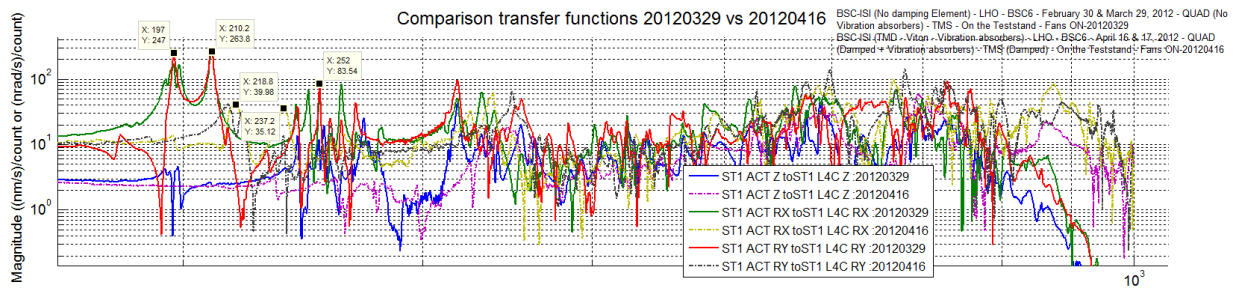
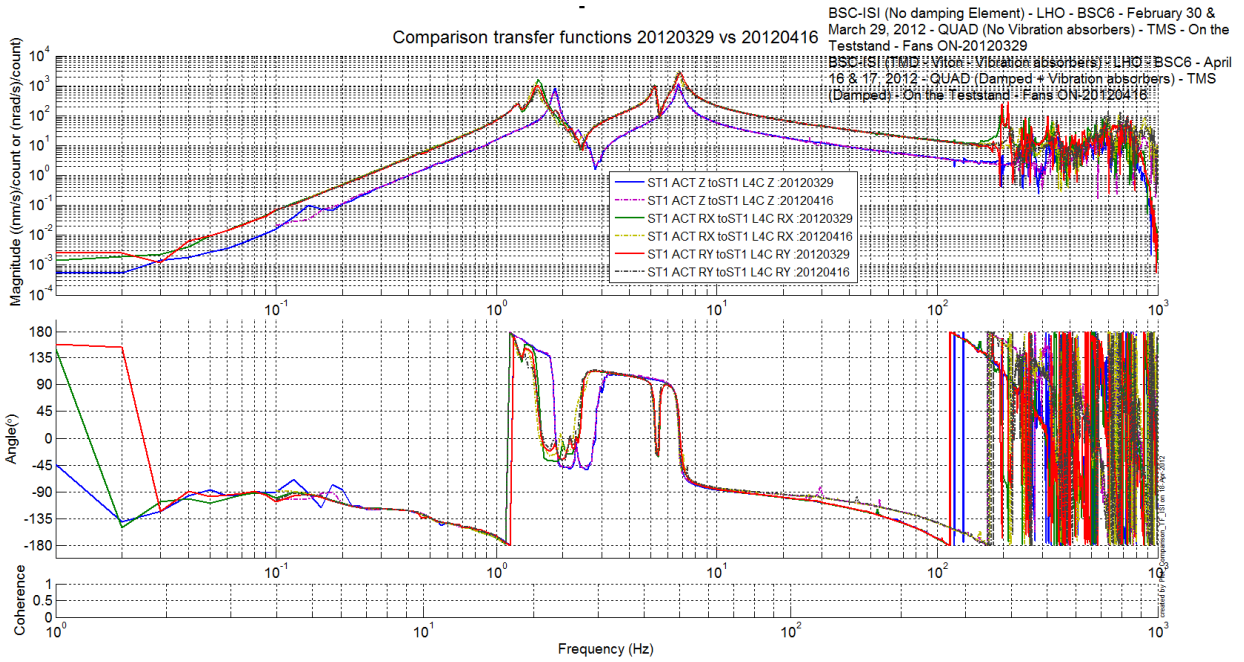
- [LHO ISI BSC6 Comparison TF C2C ST1 ACT H to ST1 L4C H 20120329 vs 20120416.fig](#)
- [LHO ISI BSC6 Comparison TF C2C ST1 ACT V to ST1 L4C V 20120329 vs 20120416.fig](#)

Effects (very similar to ISI-BSC8):

- TMDs act on the first mode (~252Hz) of the stage 0-1 blade. After addition, we clearly see one of the 2 new resonances (at 238 Hz).
- The vibration absorbers installed on stage 1 doors strongly reduce the stage 1 Qs in the [200; 300]Hz bandwidth

The effects of the TMDs and the stage 1 vibration absorbers on ISI-BSC6 are very similar to those observed on ISI-BSC8.



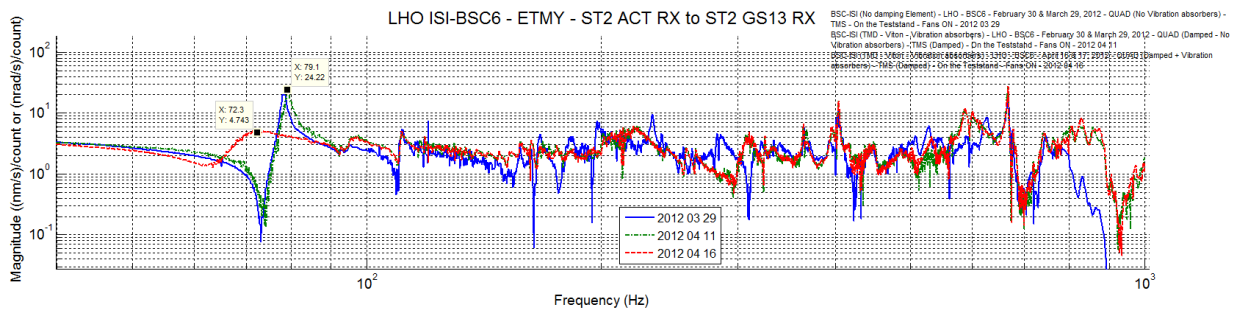
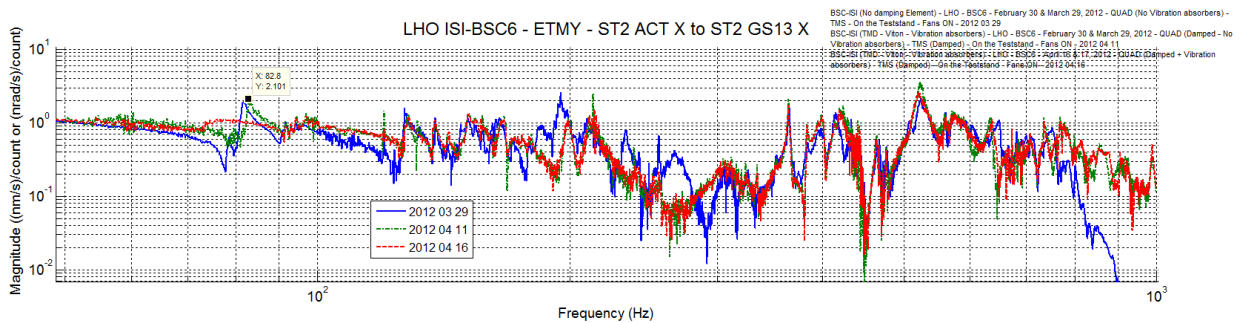


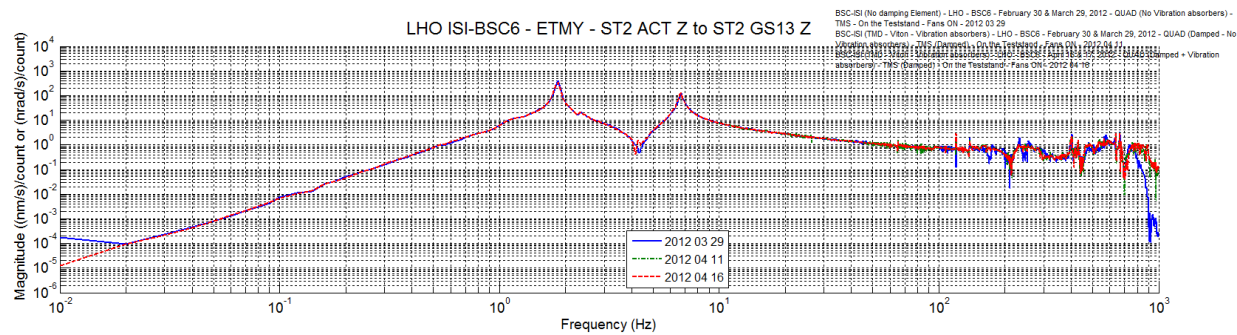
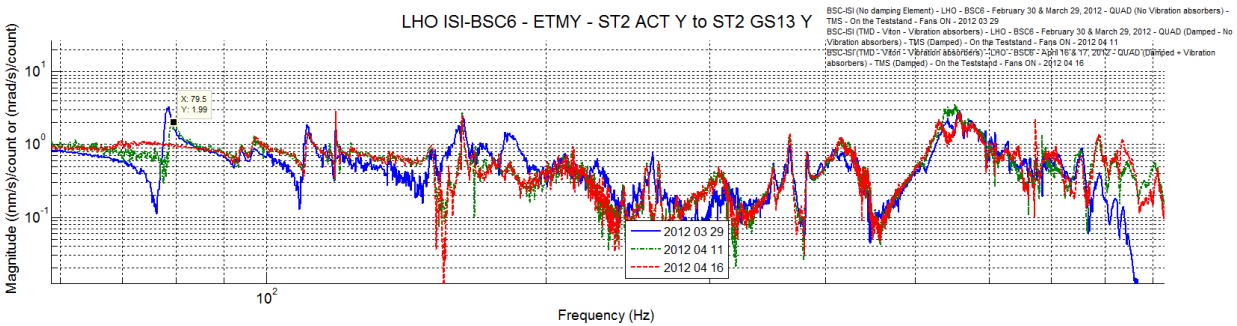
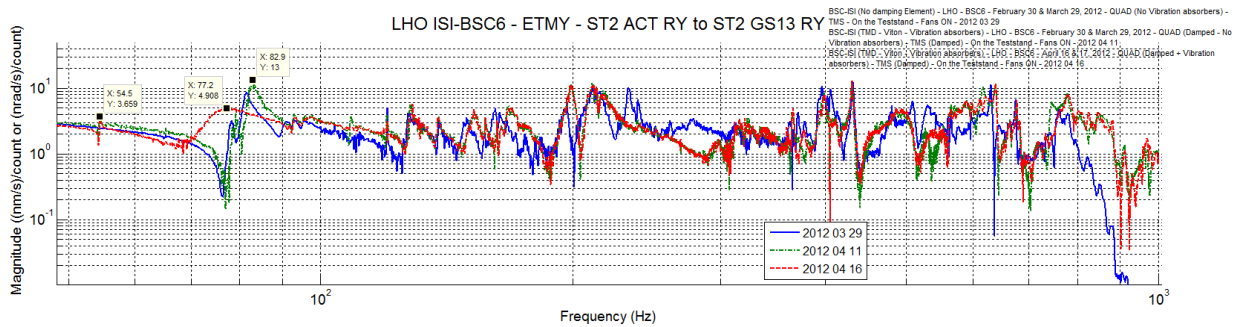
Stage 2 Transfer functions:

- On the teststand, QUAD resonances are visible at 79 Hz and 83Hz on the stage 2 transfer functions (mainly X - Y - RX - RY) – **2012 03 29**
- After adding the viton pads under the keel masses, the Qs of stage 2 seem lightly reduced. The effect is limited. Stage 2 doesn't have resonances with high Qs at high frequencies (similar to ISI-BSC8) – **2012 04 11**
- After adding the Vibration absorbers on the QUAD, amplitude at QUAD resonances are reduced by a factor of 5 on RX and by a factor of 2.6 on RY and “disappear” in the X-Y directions – **2012 04 16**

Figures that show the evolution of the transfer functions after addition of the damping components seismic/BSC-ISI/H2/ETMY/Data/Figures/Transfer_Functions/Comparisons/C2C/

- [LHO ISI BSC6 Evolution TF C2C ST2 ACT X TO ST2 GS13 X.fig](#)
- [LHO ISI BSC6 Evolution TF C2C ST2 ACT Y TO ST2 GS13 Y.fig](#)
- [LHO ISI BSC6 Evolution TF C2C ST2 ACT Z TO ST2 GS13 Z.fig](#)
- [LHO ISI BSC6 Evolution TF C2C ST2 ACT RX TO ST2 GS13 RX.fig](#)
- [LHO ISI BSC6 Evolution TF C2C ST2 ACT RY TO ST2 GS13 RY.fig](#)
- [LHO ISI BSC6 Evolution TF C2C ST2 ACT RZ TO ST2 GS13 RZ.fig](#)
-





Comparison BSC6 vs BSC8

The Figures/links below show a comparison between ISI-BSC6 and ISI-BSC8 in their final configuration. They show a pretty good consistency between the two units (with the two different types of payload). The ST1 CPS and ST1 L4C transfer functions are slightly different at low frequency due to the different states of HEPI during measurements.

The two configurations are the following:

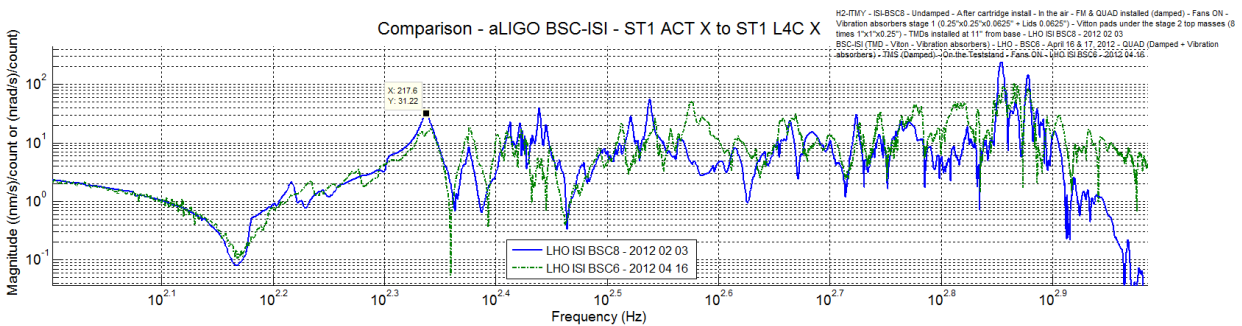
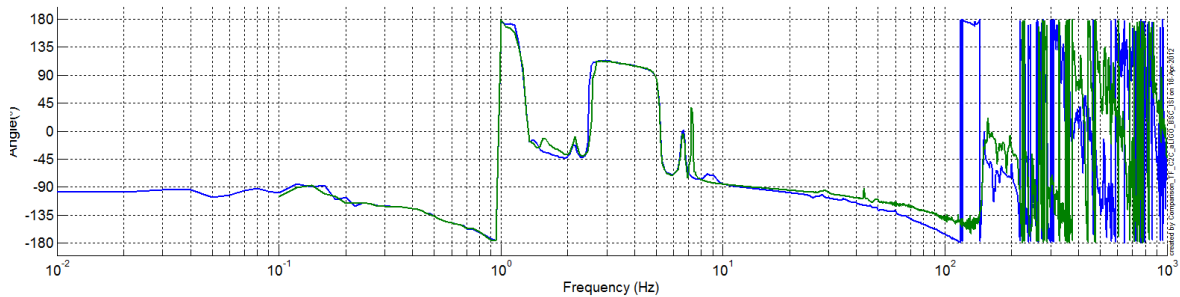
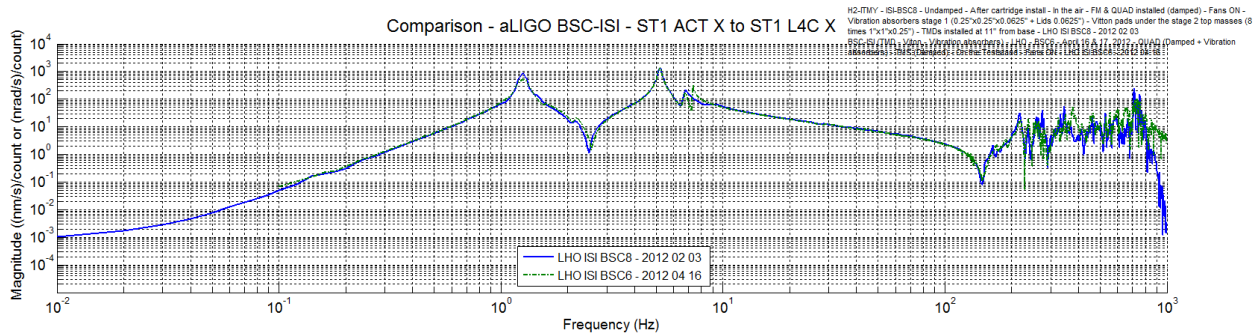
- **2012 02 03: LHO ISI-BSC8** - After cartridge install - In the air - FM & QUAD installed with Vibration absorbers (damped) - Fans ON - Vibration absorbers stage 1 (0.25"x0.25"x0.0625" + Lids 0.0625") - Viton pads under the stage 2 top masses (8 times 1"x1"x0.25") - TMDs installed at 11" from base
- **2012 04 16: LHO ISI-BSC6** - After Cartridge - (TMD - Viton - Vibration absorbers) - QUAD (Damped + Vibration absorbers) - TMS (Damped) - On the Teststand - Fans ON

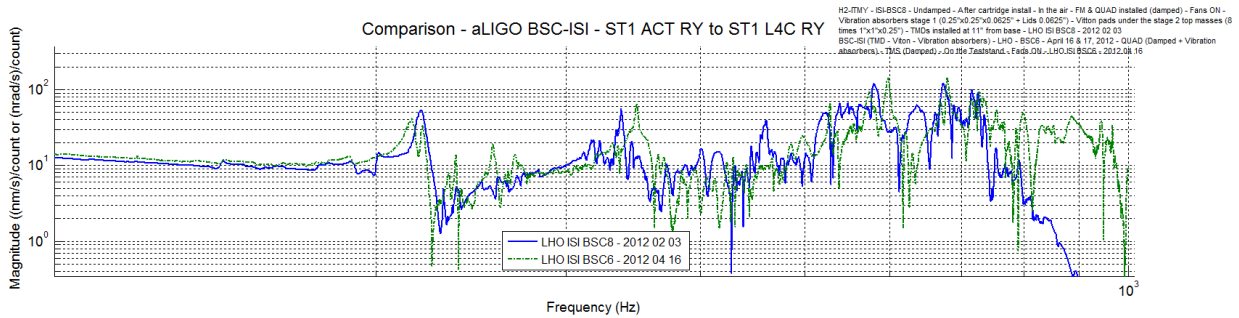
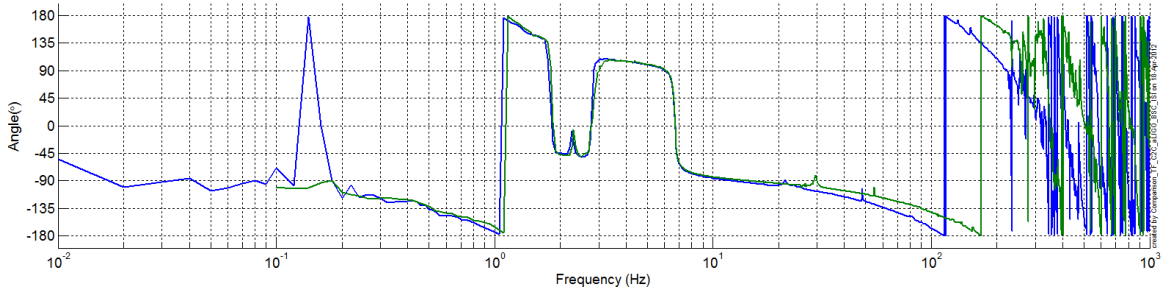
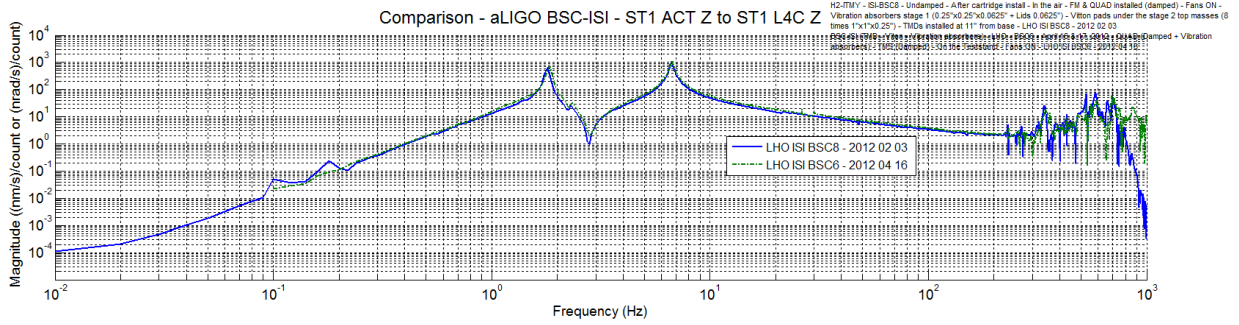
Stage 1

The figures can be found in the SVN at:

/seismic/BSC-ISI/Common/Comparison_aLIGO_BSC_ISI/C2C/

- [aLIGO BSC ISI Comparison TF C2C ST1 ACT X TO ST1 L4C X.fig](#)
- [aLIGO BSC ISI Comparison TF C2C ST1 ACT Y TO ST1 L4C Y.fig](#)
- [aLIGO BSC ISI Comparison TF C2C ST1 ACT Z TO ST1 L4C Z.fig](#)
- [aLIGO BSC ISI Comparison TF C2C ST1 ACT RX TO ST1 L4C RX.fig](#)
- [aLIGO BSC ISI Comparison TF C2C ST1 ACT RY TO ST1 L4C RY.fig](#)
- [aLIGO BSC ISI Comparison TF C2C ST1 ACT RZ TO ST1 L4C RZ.fig](#)





Stage 2

The figures can be found in the SVN at:

/seismic/BSC-ISI/Common/Comparison_aLIGO_BSC_ISI/C2C/

- [aLIGO BSC ISI Comparison TF C2C ST2 ACT X TO ST2 GS13 X.fig](#)
- [aLIGO BSC ISI Comparison TF C2C ST2 ACT Y TO ST2 GS13 Y.fig](#)
- [aLIGO BSC ISI Comparison TF C2C ST2 ACT Z TO ST2 GS13 Z.fig](#)
- [aLIGO BSC ISI Comparison TF C2C ST2 ACT RX TO ST2 GS13 RX.fig](#)
- [aLIGO BSC ISI Comparison TF C2C ST2 ACT RY TO ST2 GS13 RY.fig](#)
- [aLIGO BSC ISI Comparison TF C2C ST2 ACT RZ TO ST2 GS13 RZ.fig](#)

