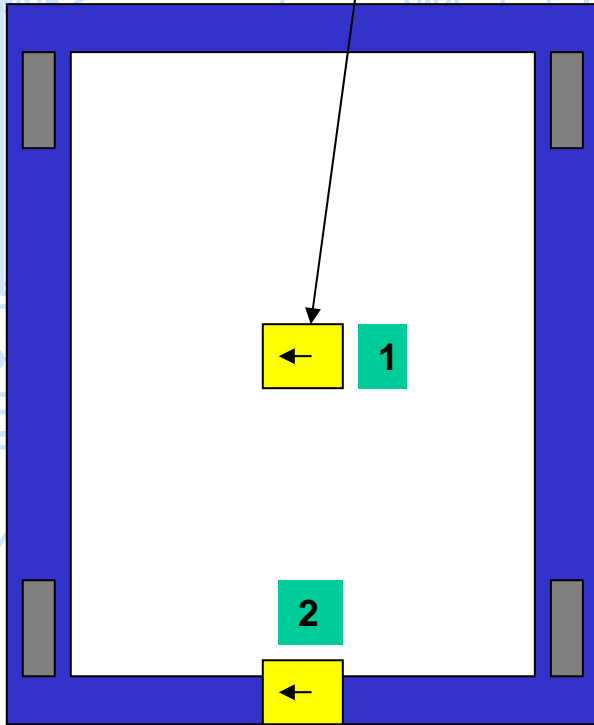


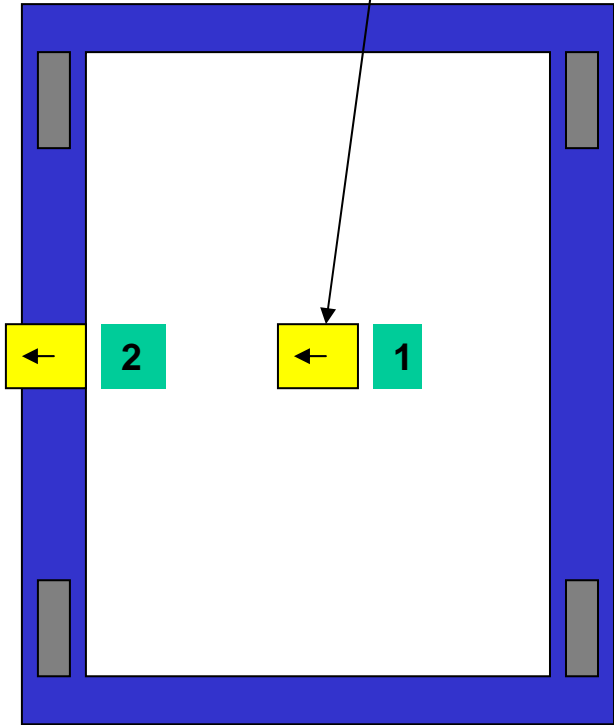
XFEL cryomodule support tests in the mockup tunnel - Measurements on a single 'blue' frame I-

Horizontal geophone  
affixed to the tunnel ceiling



`end` configuration

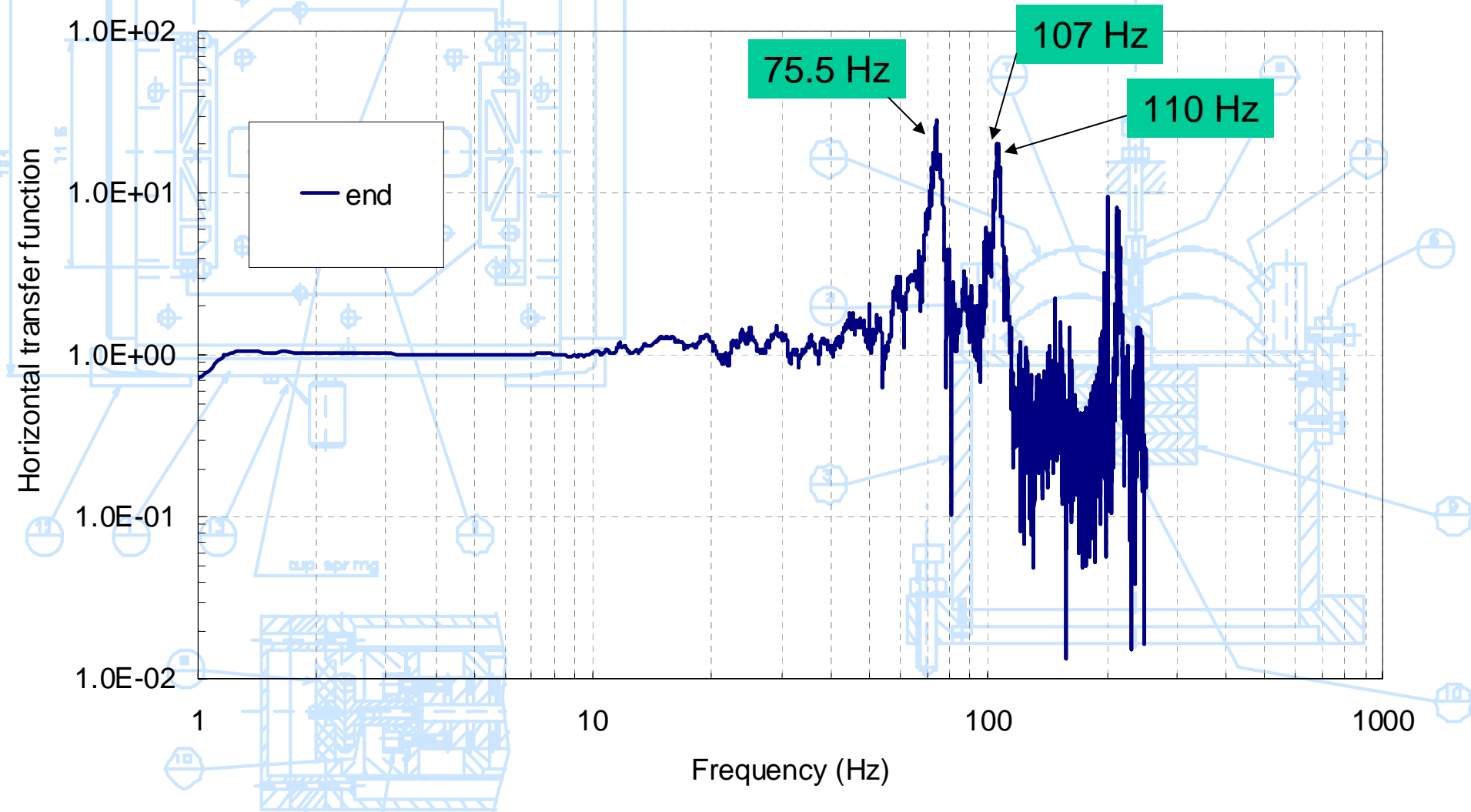
Horizontal geophone  
affixed to the tunnel ceiling



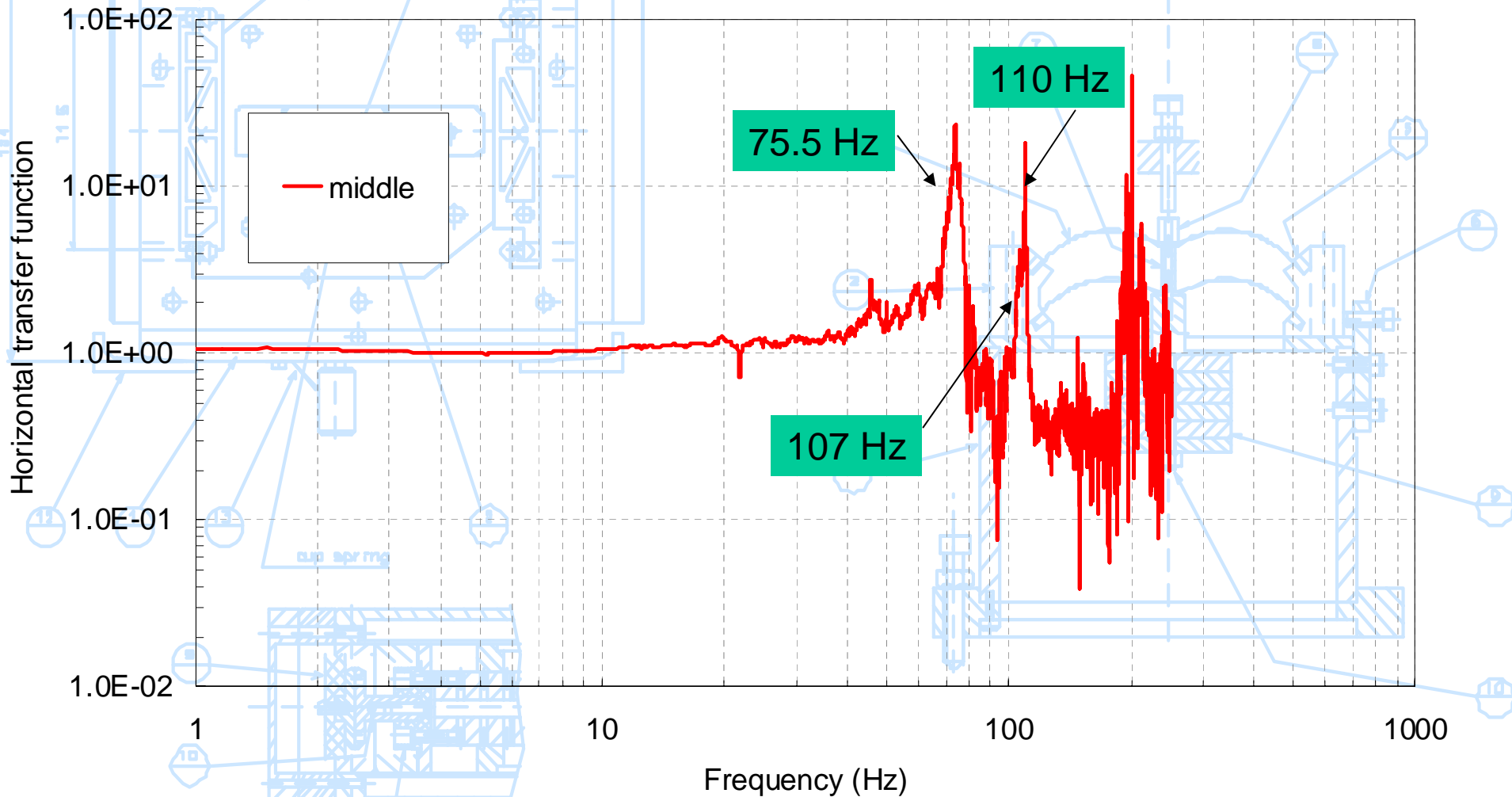
`middle` configuration

Sensor positions on Frame #1

Mock-up tunnel top frame (bolted)



Mock-up tunnel top frame (bolted)



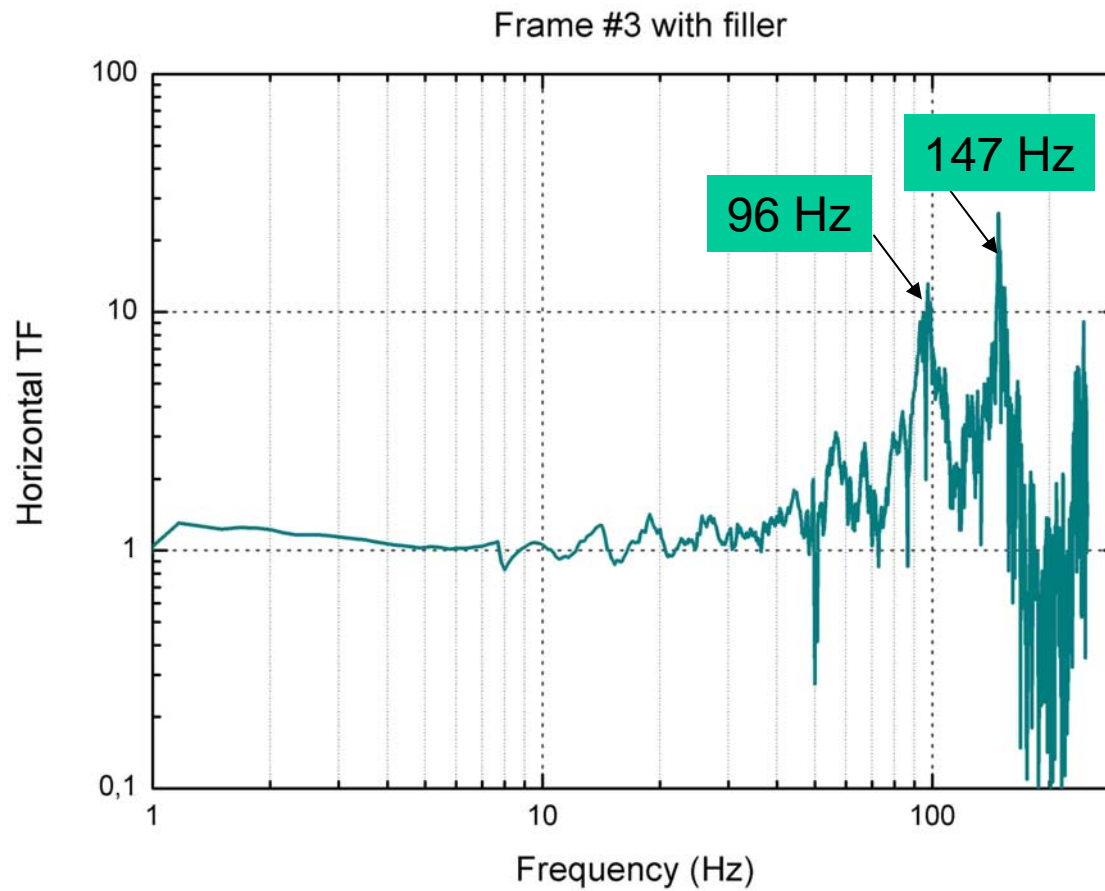
Normal modes found:

- 75.5 Hz first order pendulum mode (transverse direction with respect to the beam line)
- 107 Hz twist (torsional) mode (maximum amplitude at the two ends, minimum half way)
- 110 Hz second order pendulum mode ? (like for the 75.5 Hz the amplitude is not dependent on the position of the sensor on the frame)

Comments

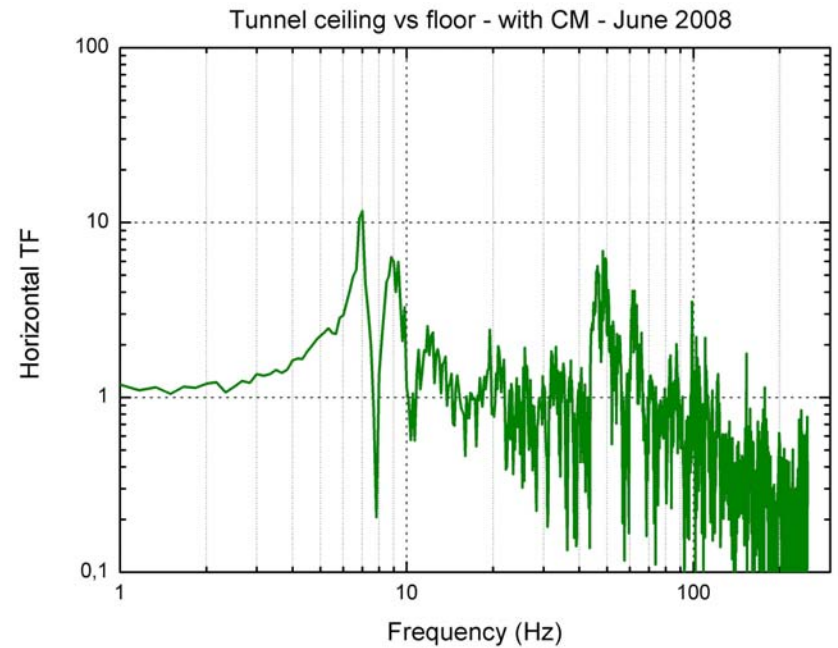
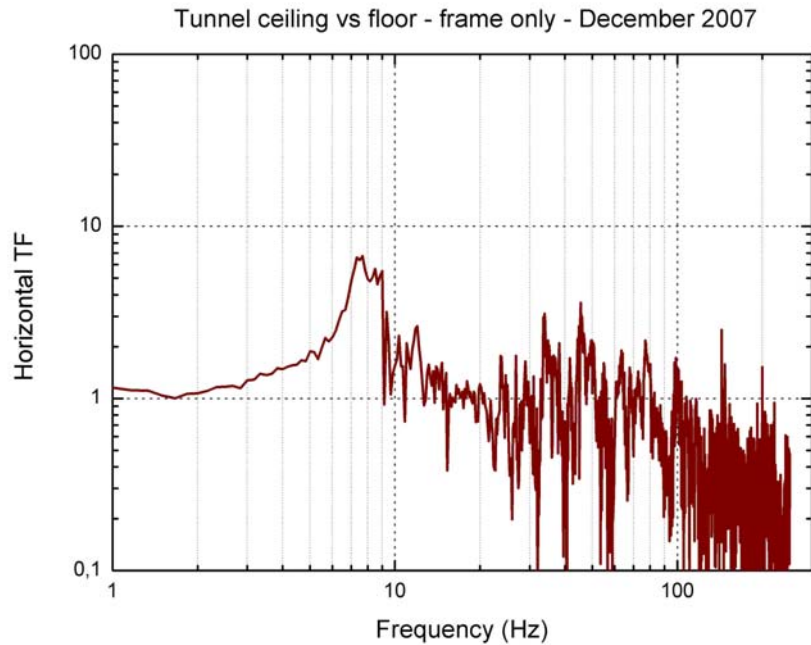
- same results on Frame #2 and Frame #3
- first mode at much lower frequency than ANSYS prediction (~120 Hz)
- effect of the frame to ceiling fixation?

XFEL cryomodule support tests in the mockup tunnel - Measurements on Frame #3 with fillerI-



The hunch was correct, + 60% transverse stiffness gained !

August 18<sup>th</sup> 2008

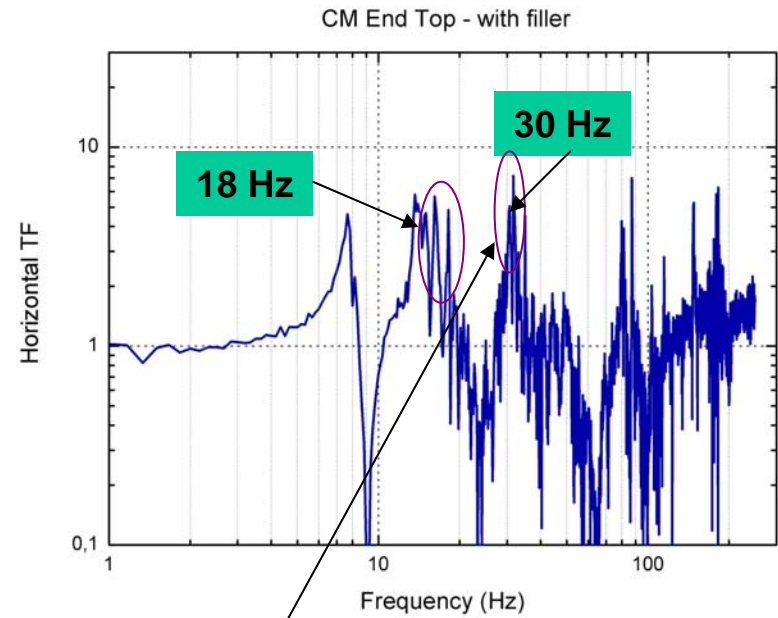
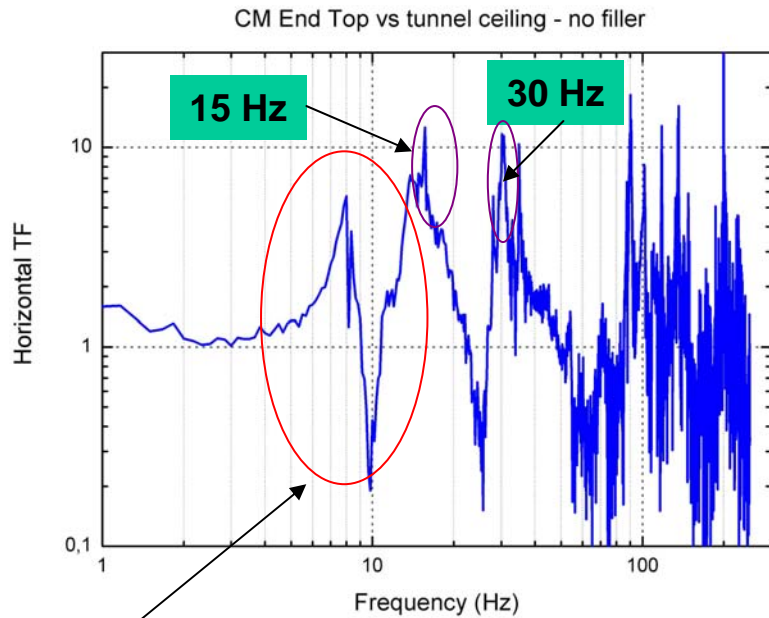


## Comments

- The ceiling has its own dynamics with modes at low frequencies.
- Some loading effect after the suspension of the cryomodule (peaks move).

August 18<sup>th</sup> 2008

# XFEL cryomodule support tests in the mockup tunnel - CM Top End vs Ceiling -



Jerk from ceiling elasticity

The resonance at ~30 Hz, not affected by the filling appears to be the first internal mode of the suspension ( it should correspond to the flexing of the blue frame columns )