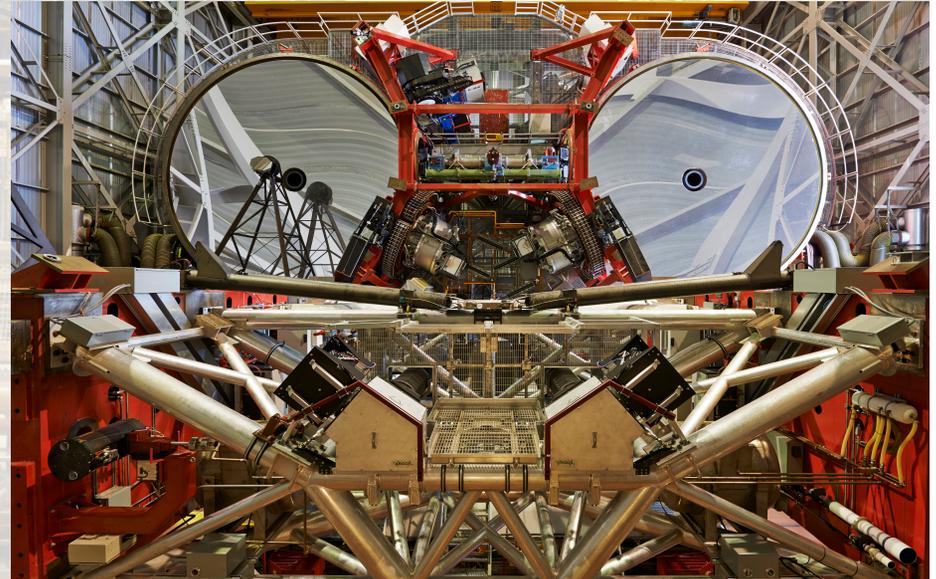




Understanding the Vibration Environment for LBT/AO



P. Escárate, J. Christou, G. Rahmer, D. Miller, J. Hill
Large Binocular Telescope Observatory

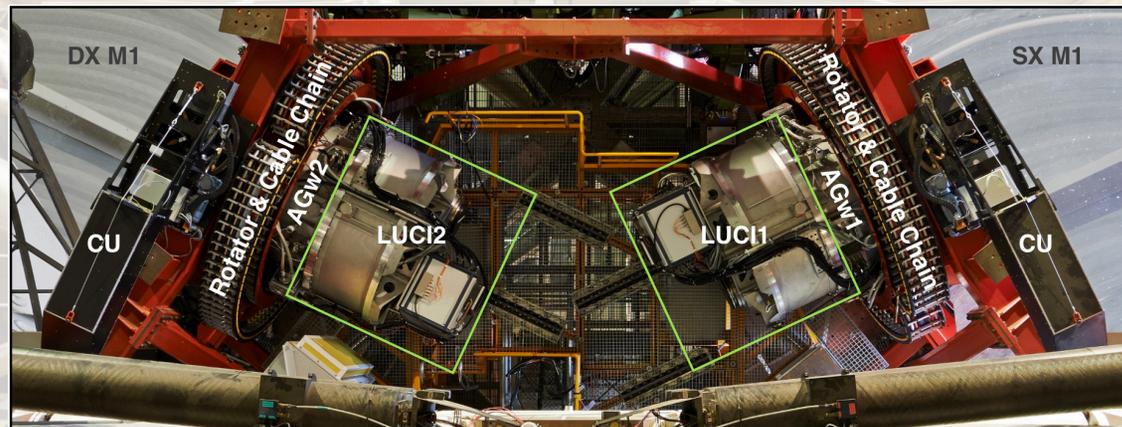


Introduction

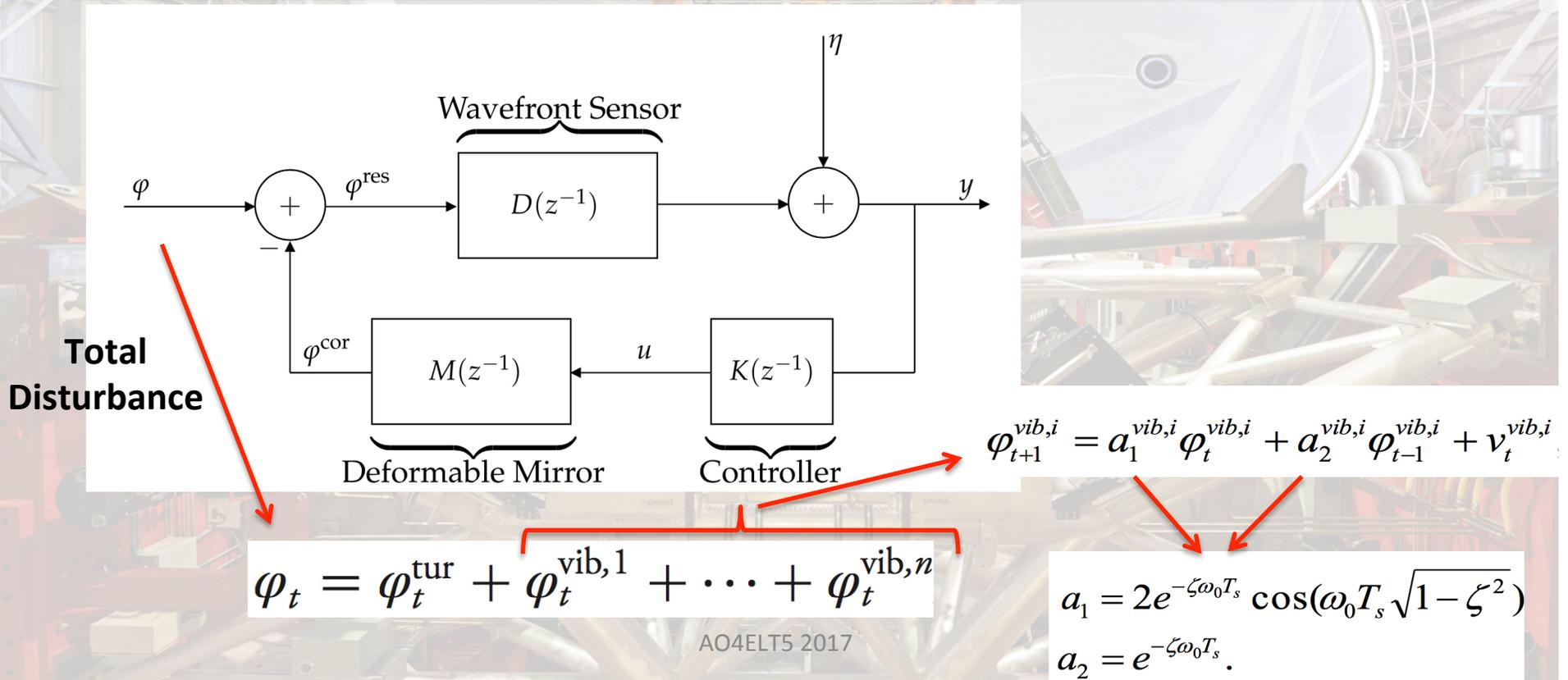
- The majority of current AO systems do not properly compensate for vibrations within the optical path
- Vibrations strongly affect the performance of the AO systems

AO System

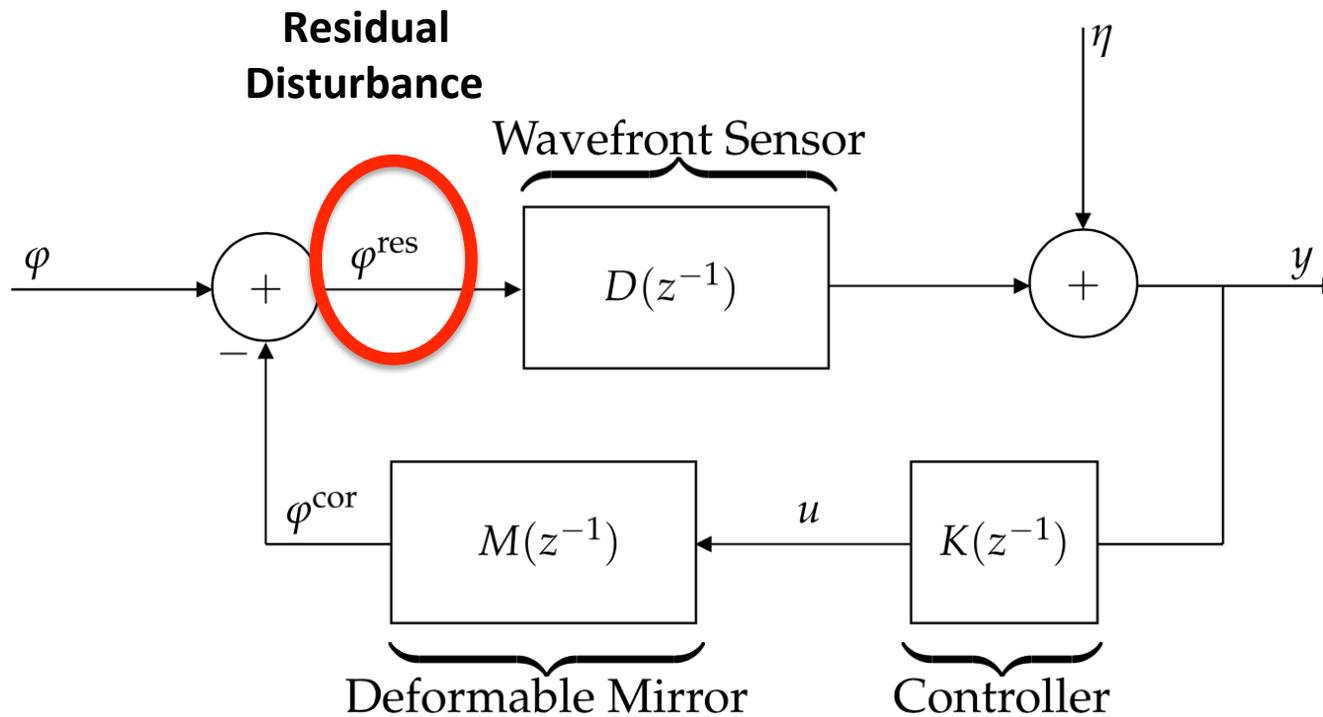
- First Light Adaptive Optics (FLAO)
 - Natural Guide Star (NGS)
 - Pyramid Wavefront Sensors (WFS)



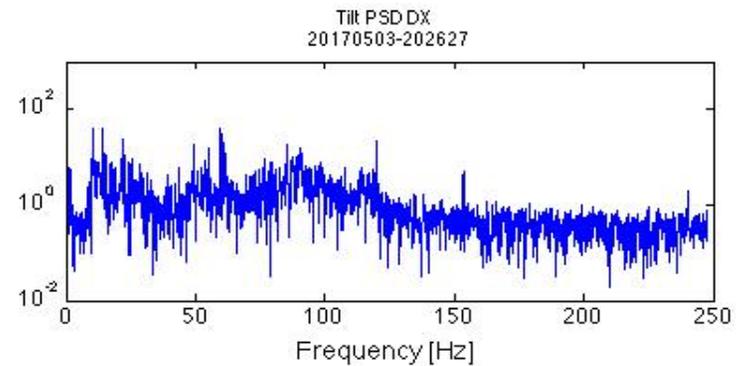
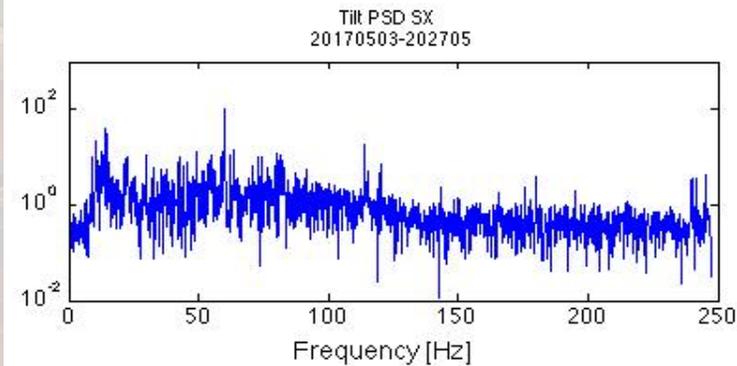
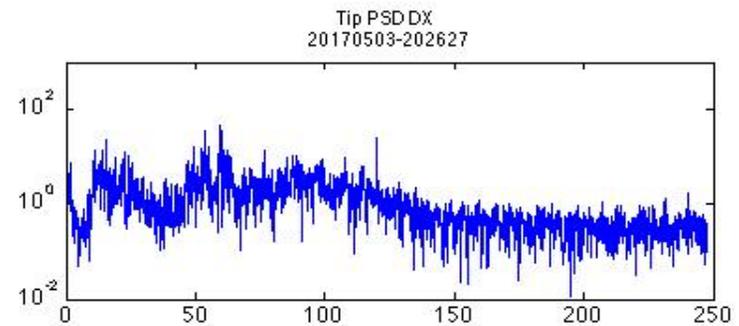
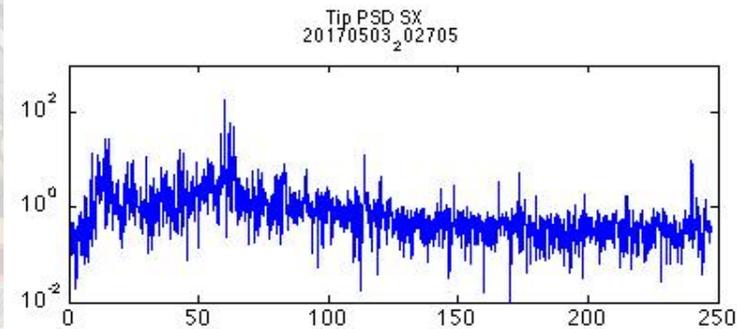
AO System



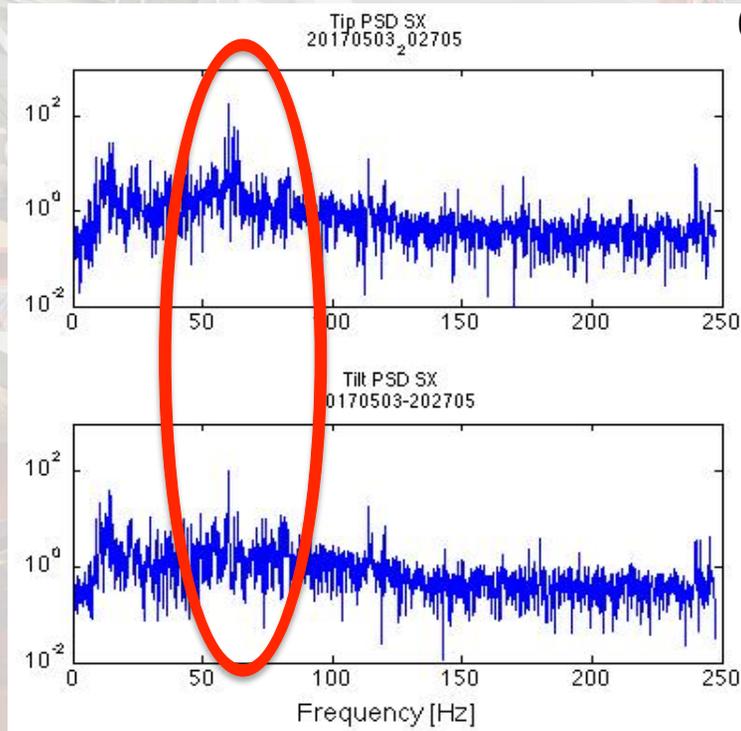
WFS Measurements



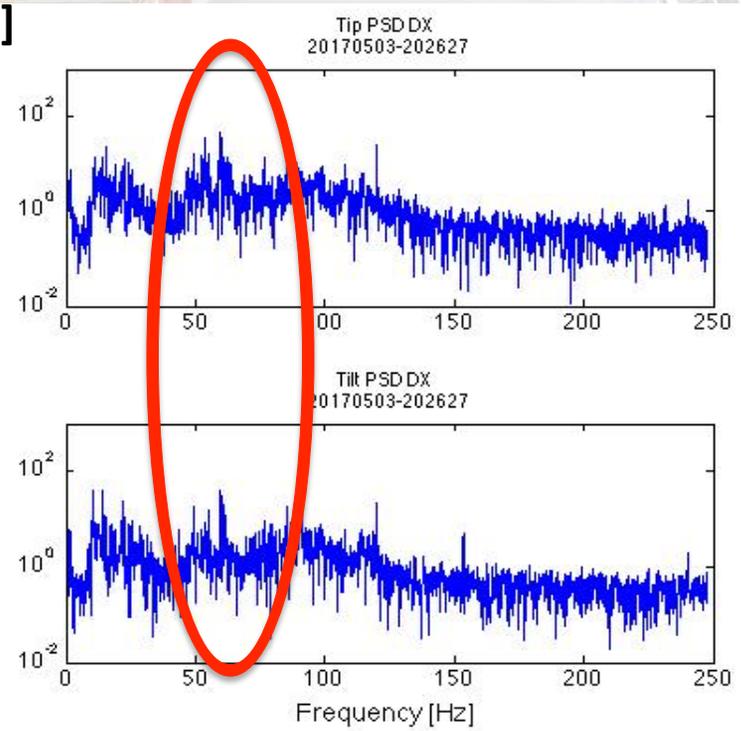
WFS Measurements



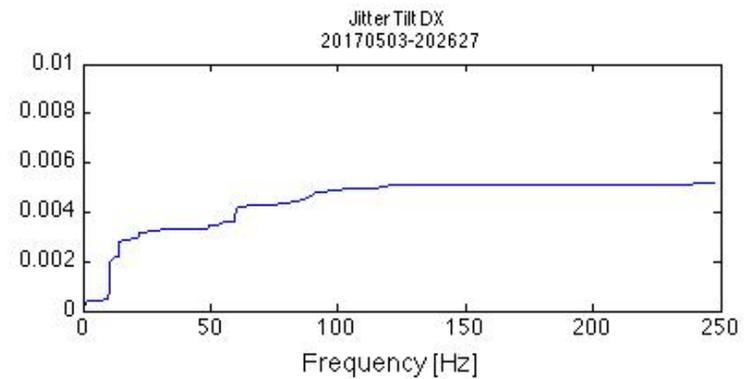
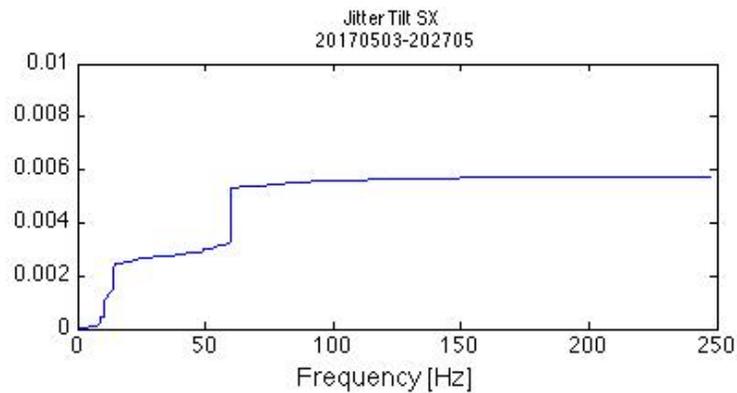
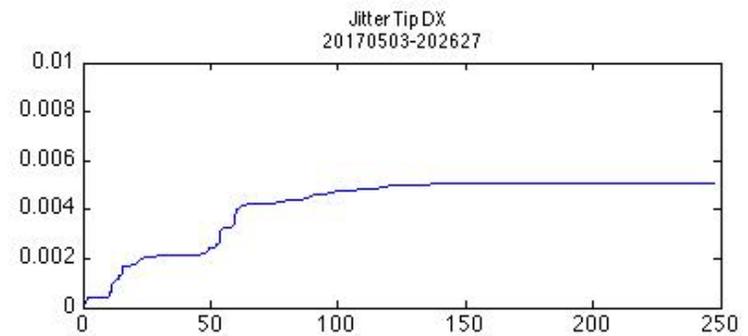
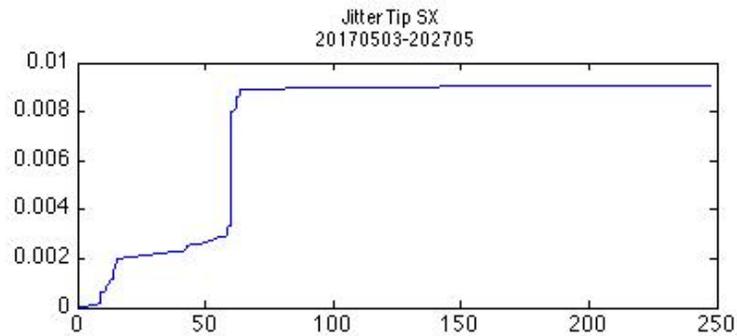
WFS Measurements



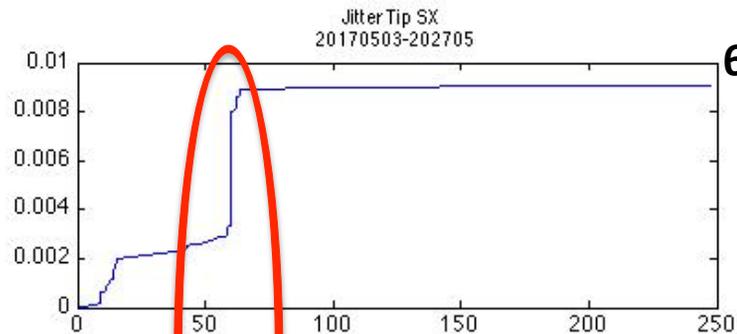
60 [Hz]
Peak



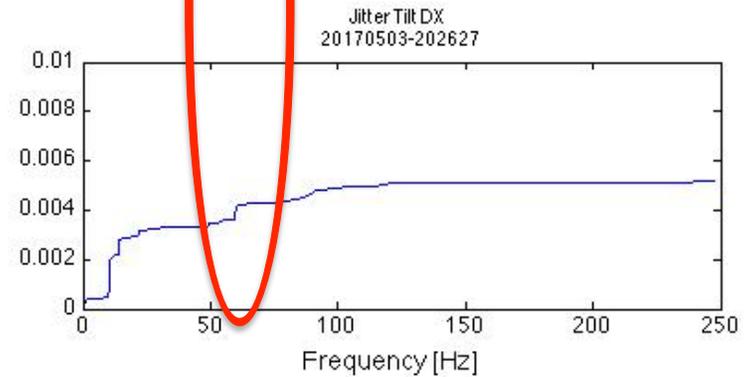
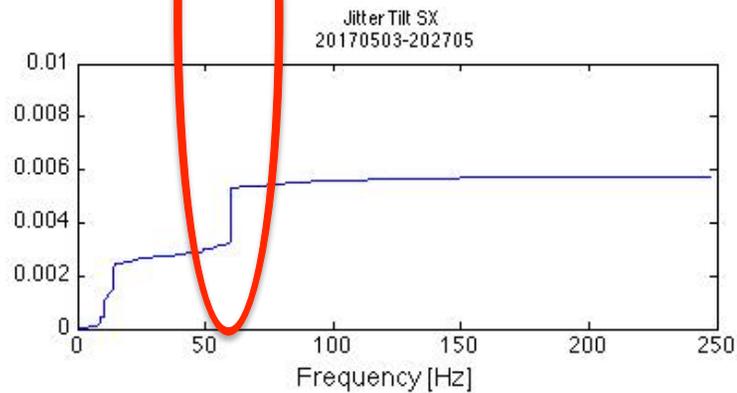
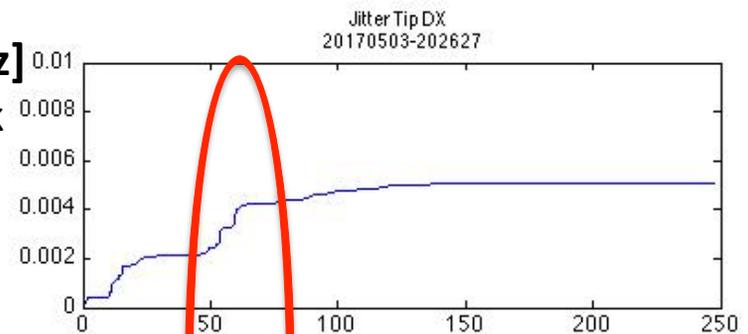
WFS Measurements



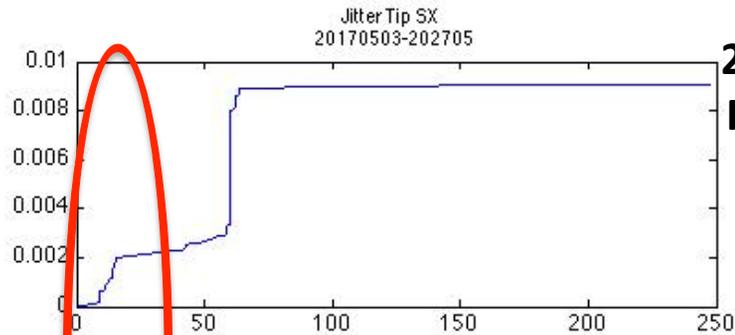
WFS Measurements



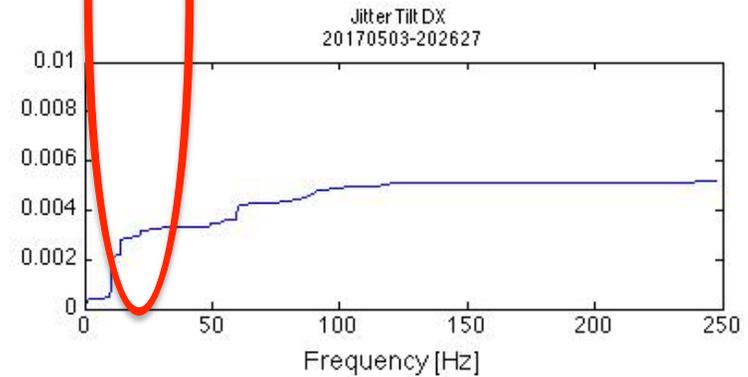
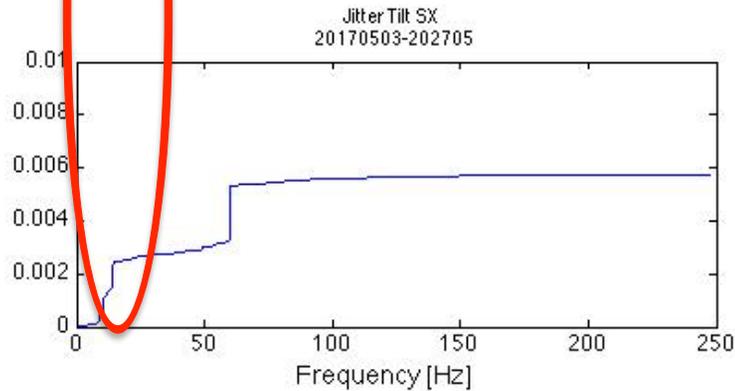
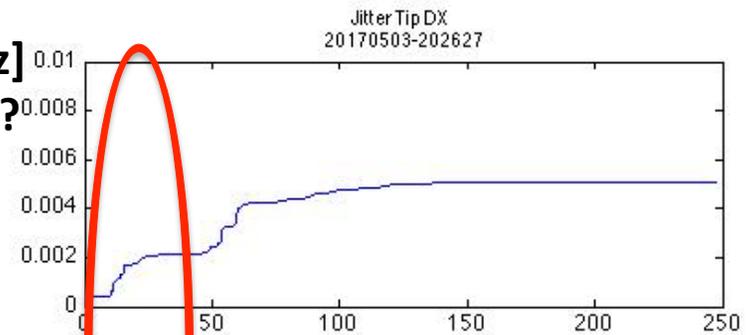
60 [Hz]
Peak



WFS Measurements

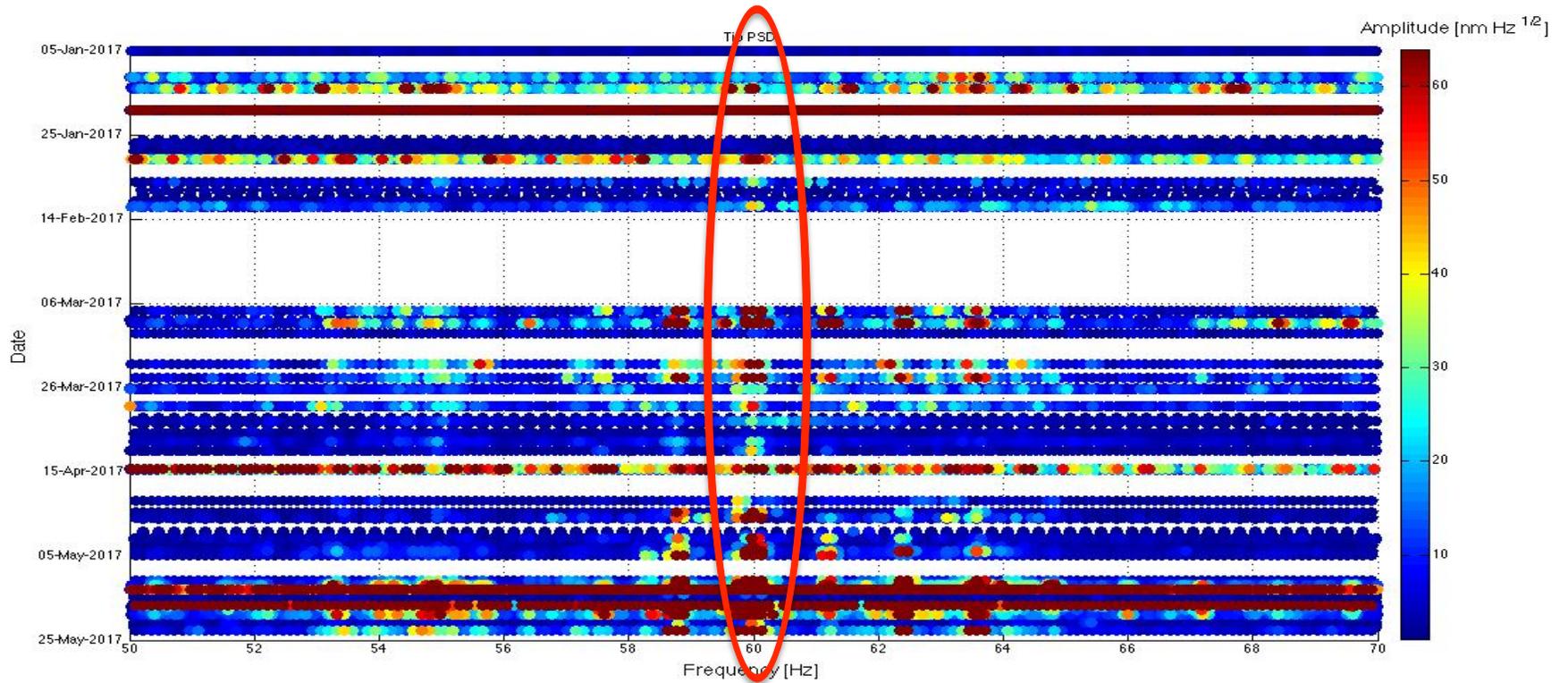


20 [Hz]
Peak ?



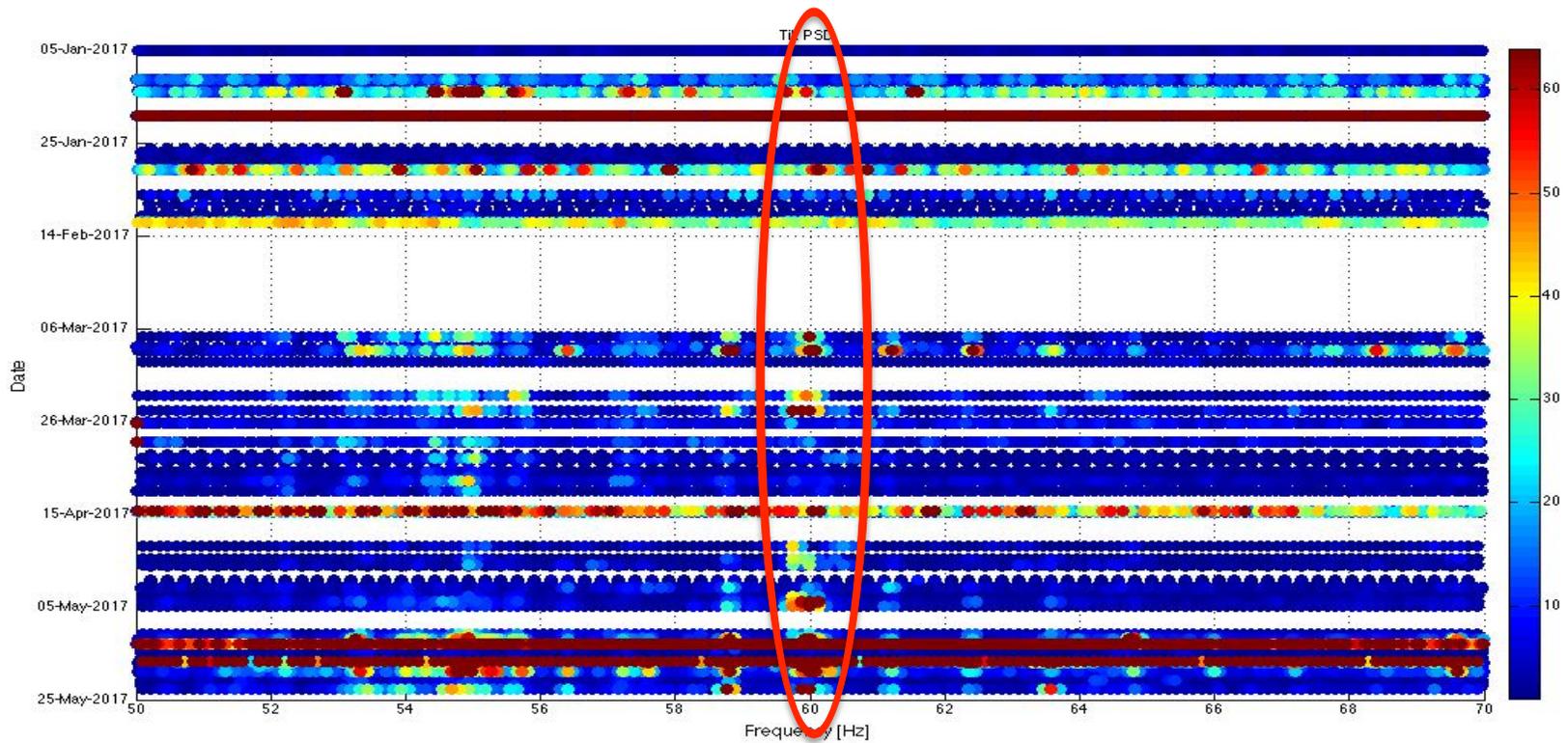


WFS Measurements

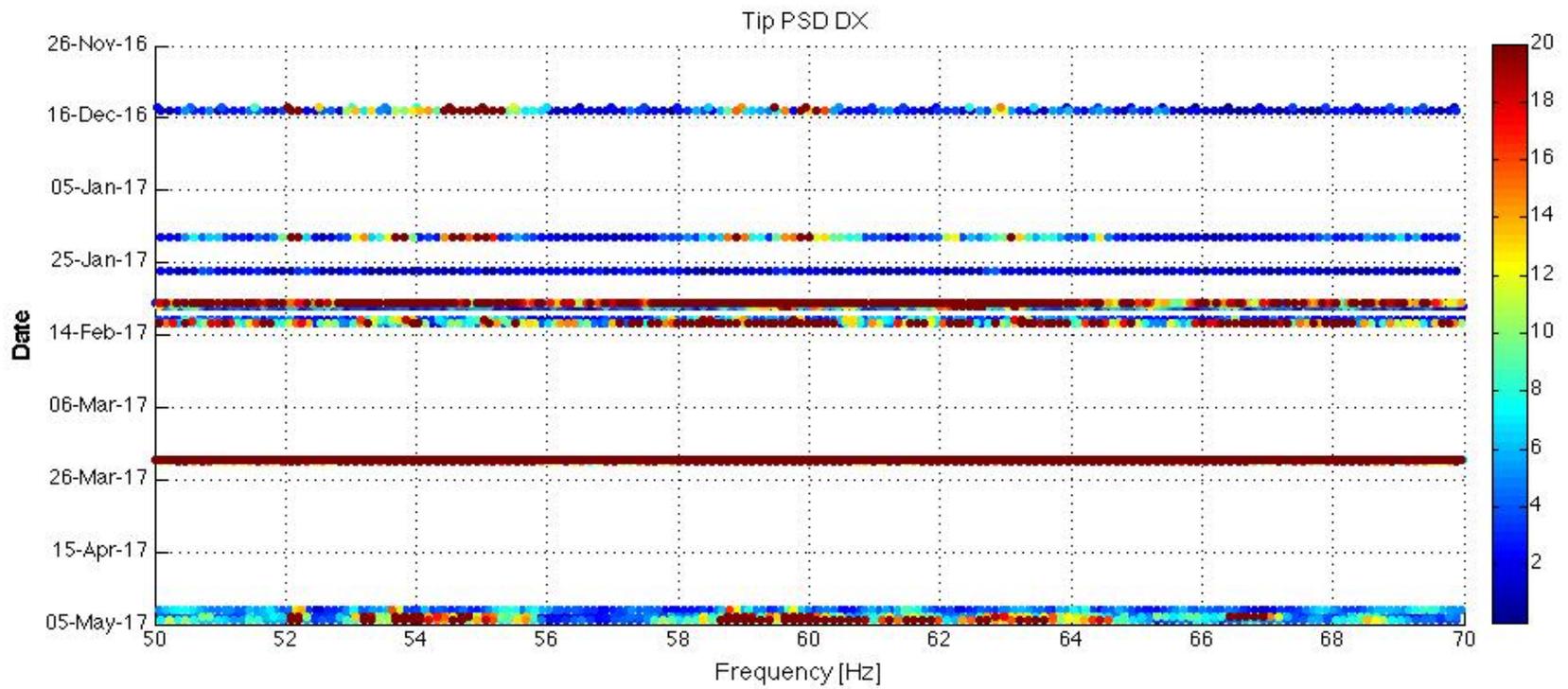




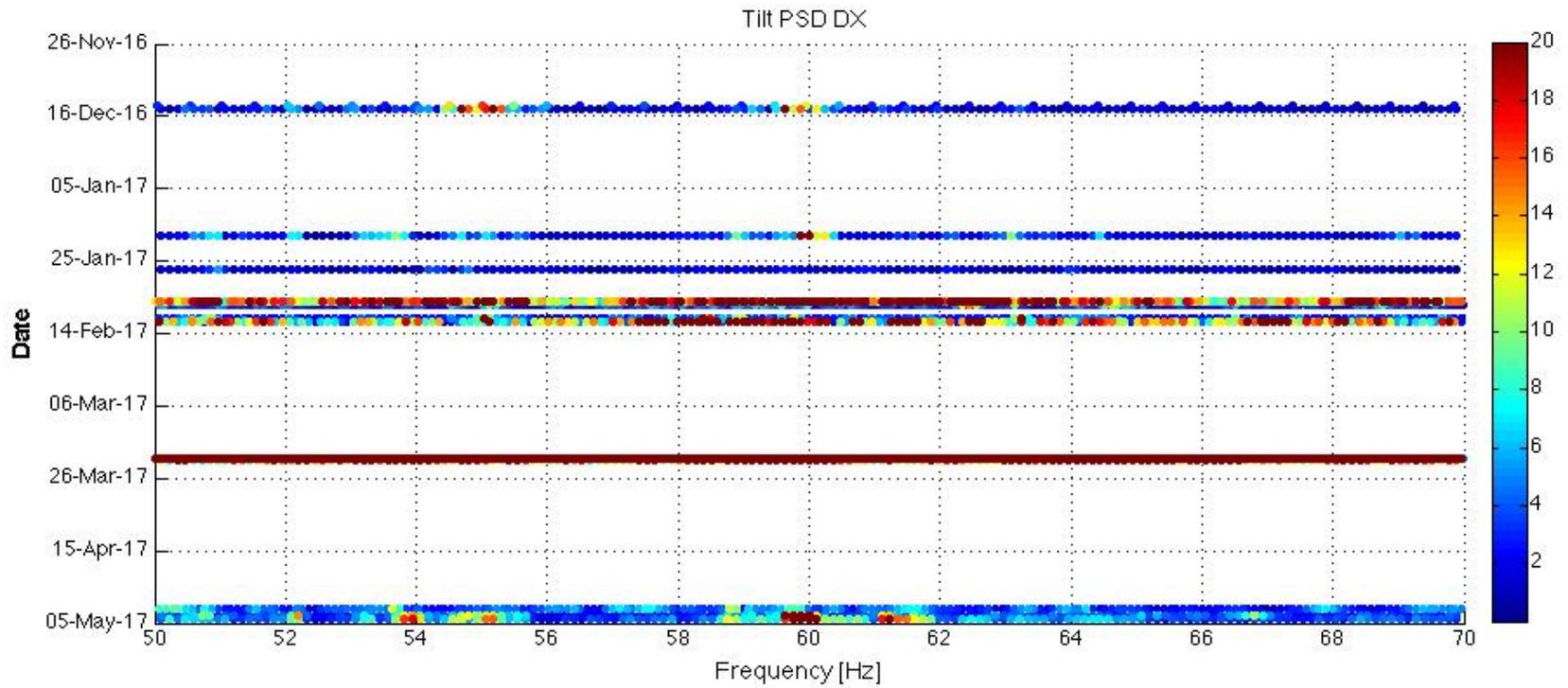
WFS Measurements



WFS Measurements

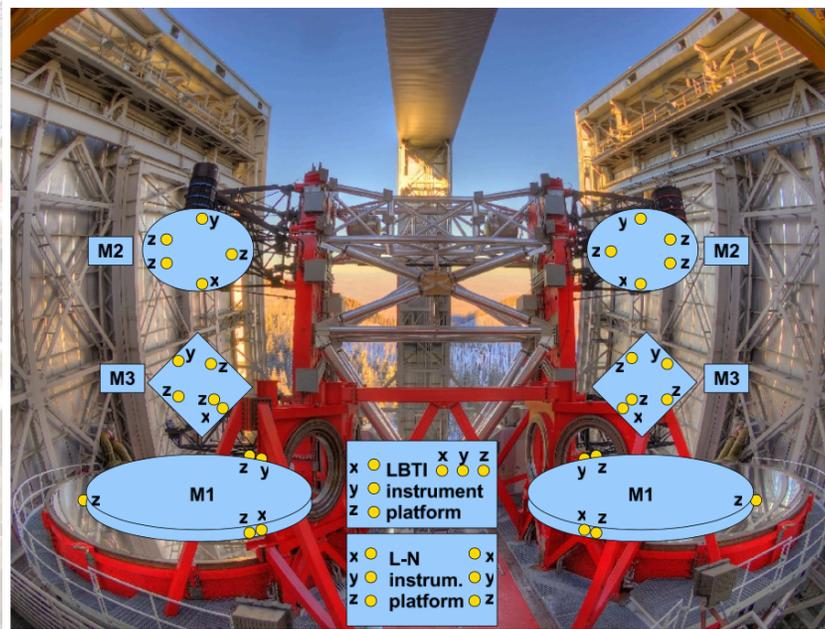


WFS Measurements



OVMS System

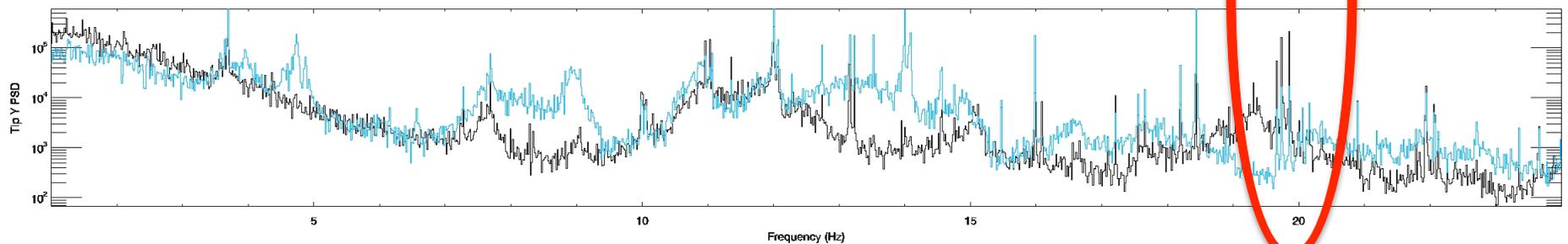
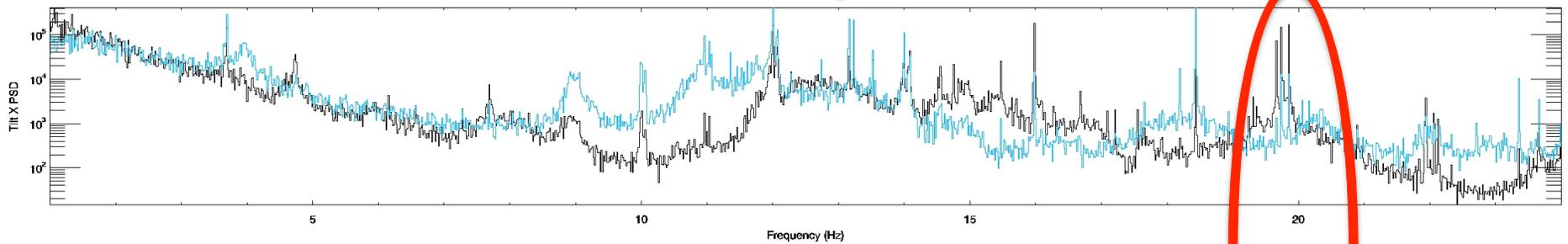
- The optical path difference and vibration monitoring system for the LBT



OVSM Measurements

$$\varphi_t = \varphi_t^{\text{tur}} + \varphi_t^{\text{vib},1} + \dots + \varphi_t^{\text{vib},n}$$

Direct Measurement



Future Work

- Correlate OVSM and WFS measurements
- Correlate the WFS measurements with operations conditions
- Develop vibration mitigation Strategies
- Use the OVMS measurements in the AO control Loop

Thanks!!