LIGO

Update on LIGO instruments
OpenLVKEM town hall, 13 April 2023

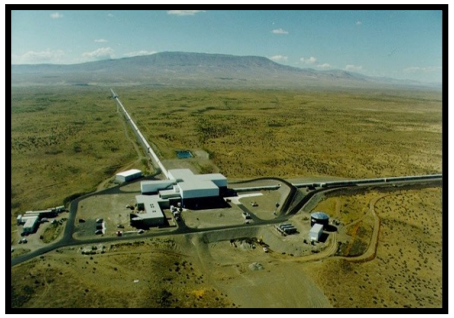
P. Fritschel, LIGO Lab, M.I.T.

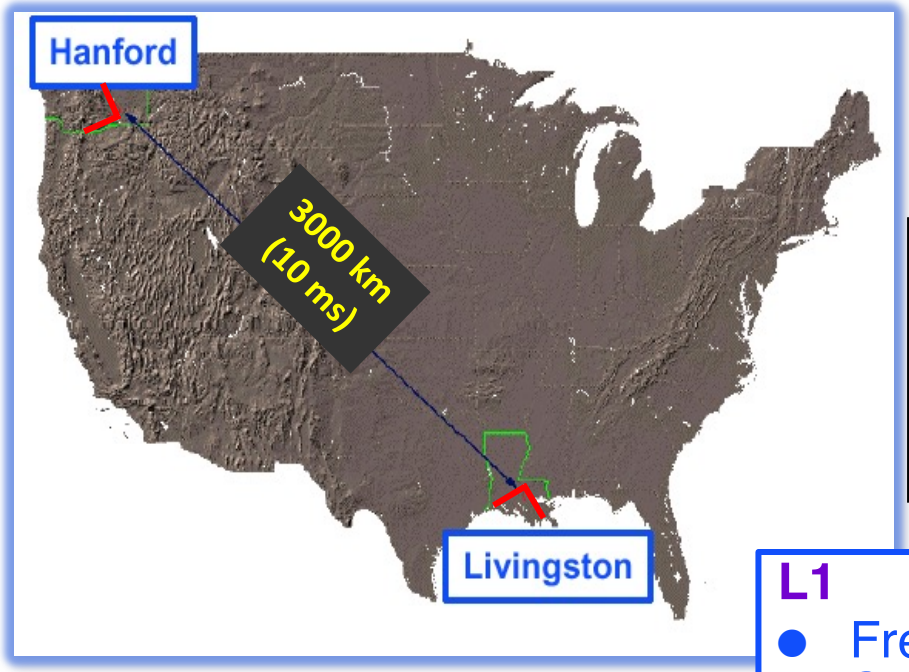
LIGO-G2300838-v1

LIGO Interferometer Status

H1

- Frequency Dependent Squeezing operational
- Much effort on achieving stability at high power (thermal compensation, alignment control, parametric instabilities)
- Continued investigations of technical noises





L1

- Frequency Dependent Squeezing operational
- Laser power increase
- Mid-frequency noise is elevated compared to a year ago (10%) – cause unknown

H1 & L1

- Significant periods of undisturbed running, useful for testing.

Summary of LIGO Improvement Goals

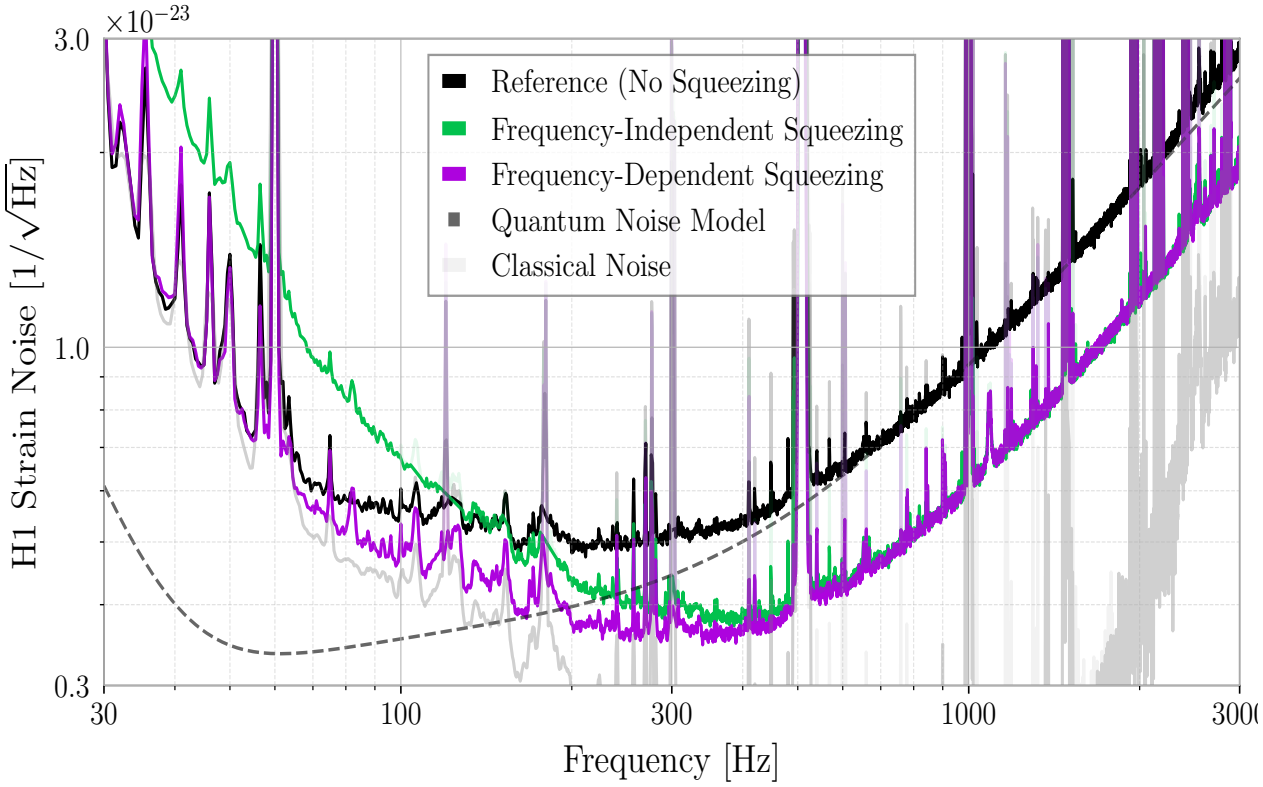
	Hanford, H1		Livingston, L1	
400 kW circulating arm power	✓ (440 kW)		300 kW	
Squeezed light efficacy **4.5 dB**	✓		✓	
300 m filter cavity for frequency-dependent squeezing	Automation in progress	**4.5 dB**	Automation in progress	**5.8 dB**
Low frequency technical noise reduction (f < 100 Hz)	✓ work continues		✓ work continues	
Binary Neutron Star inspiral detection range: **160-190 Mpc**	145 Mpc		150 Mpc	

BNS range over 24 hrs (earlier this week)

still in commissioning mode

Frequency Dependent Squeezing: H1 and L1

Hanford



Livingston