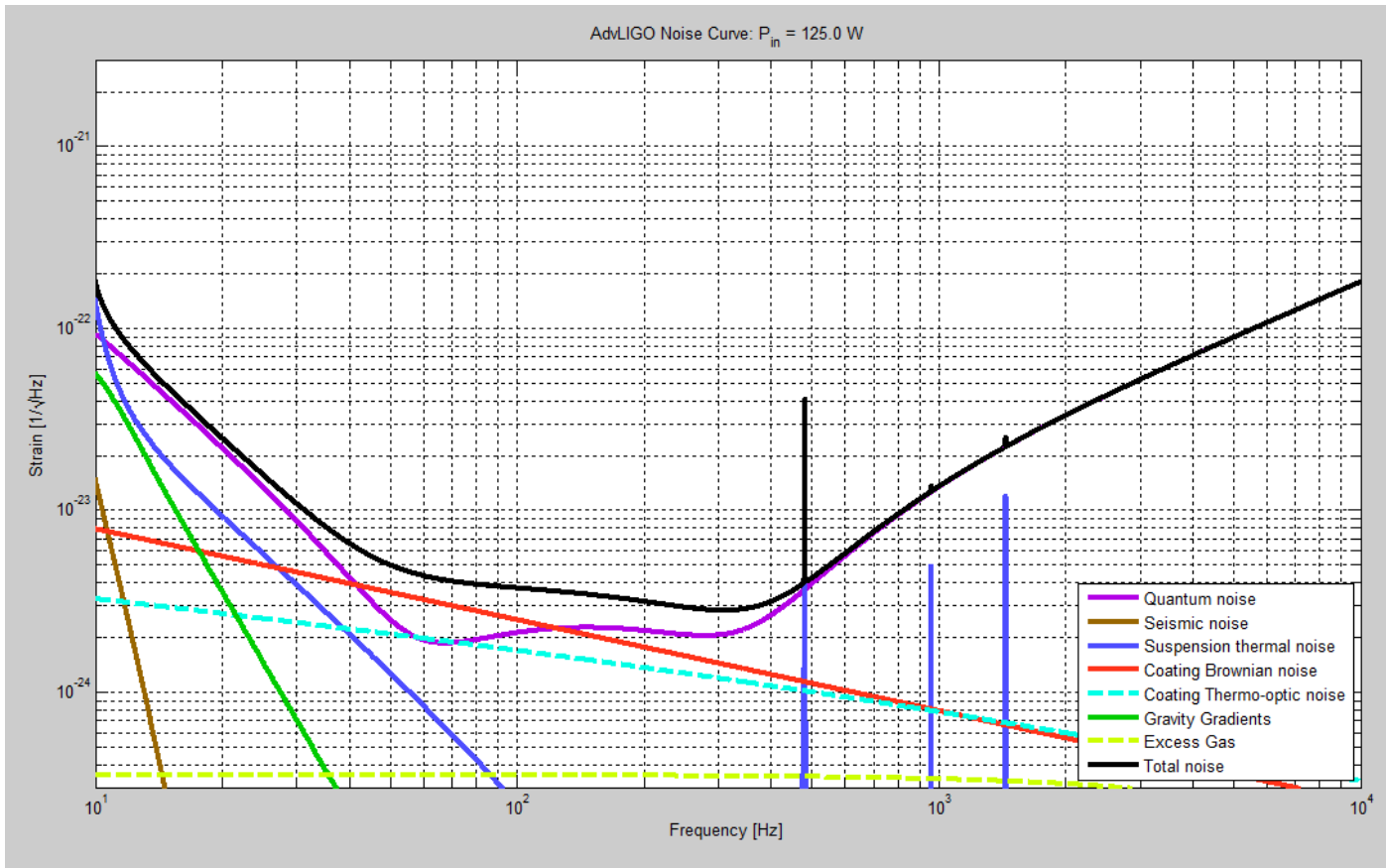![LIGO]

BENC*h* **7.0**

Advanced LIGO Sensitivity Modeling in MATLAB

Clare Bayley, MIT
LSC/VIRGO Joint Meeting
March 21st, 2008

What *is* Bench?

```
>>  bench7(10,10000,IFOModel,SourceModel,3)
```

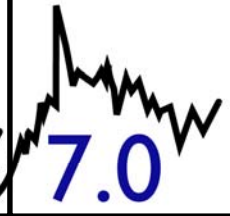

AdvLIGO Noise Curve: P_{in} = 125.0 W

Why is it useful?

- Quantum Noise
- Seismic Noise
- Suspension Thermal Noise
- Coating Brownian Noise
- Coating Thermo-Optic
  - Both refractive and elastic
- Gravity Gradients
- Excess Gas

LIGO

BENC*h* 7.0

Version history:

Version 0 –
> Sam Finn wrote the original version. Thank you, Sam, for getting us going!

Version 3.3 - 8/25/2005 –
> Fixed error with Poisson ratios in coating thermal noise and changed residual gas noise coefficient

Version 3.4 - 9/17/2005 –
> Added thermorefractive noise to noise model

Version 3.4a - 3/14/2006 –
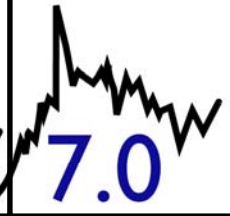> Fixed error with beam widths in thermoelastic noise

Version 4.0 - 4/18/2006 –
> Incorporated various new features.

Refactored – Modular Design
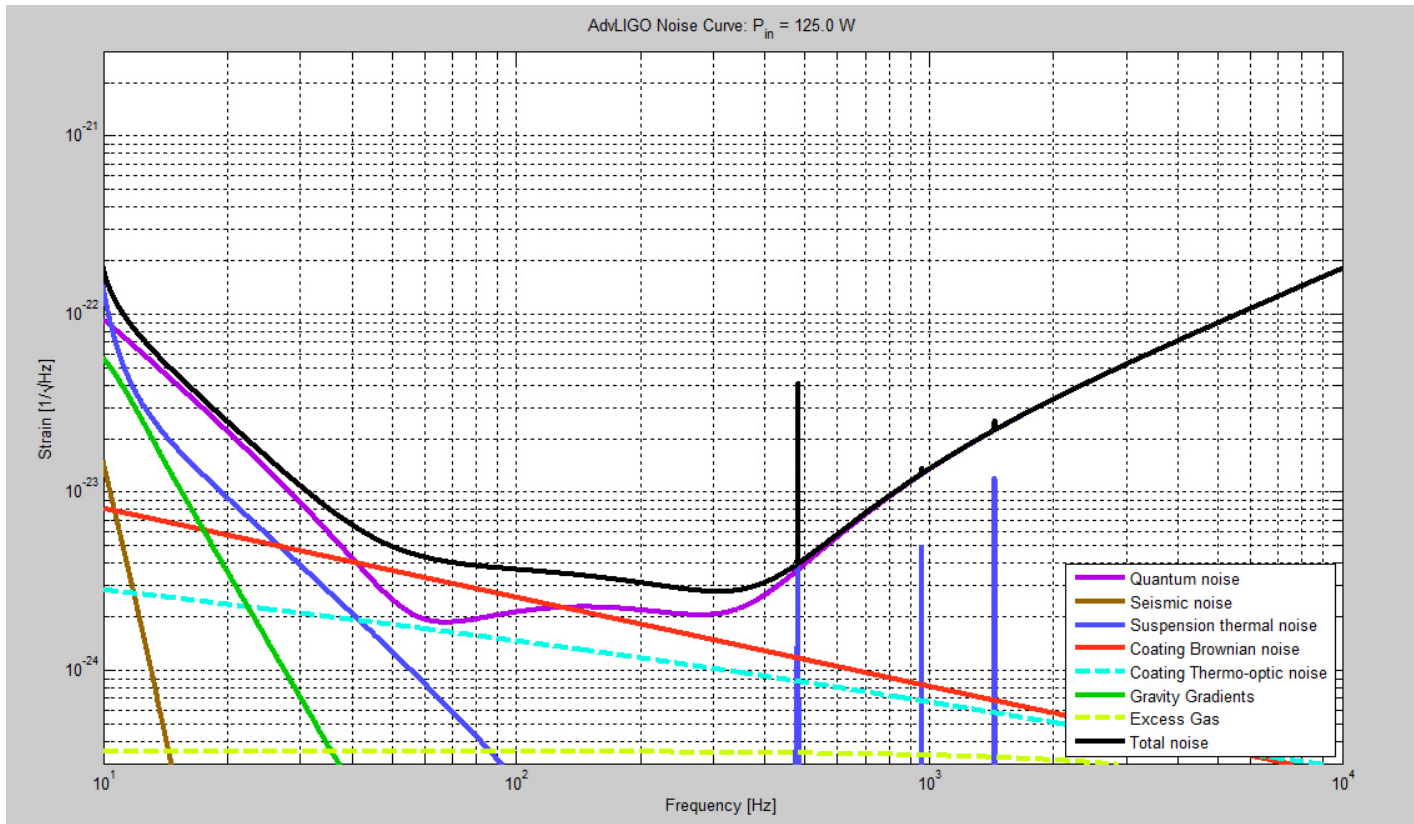
Plans for GUI

Optimization Algorithms

Coating Optimization

AdvLIGO Noise Curve: P_{in} = 125.0 W

Legend:
- Quantum noise
- Seismic noise
- Suspension thermal noise
- Coating Brownian noise
- Coating Thermo-optic noise
- Gravity Gradients
- Excess Gas
- Total noise

Strain [1/√Hz] vs Frequency [Hz]

It's not just for LIGO anymore!

Where can I get it?

LIGO

B_{ENCH} 7.0

http://lhocds.ligo-wa.caltech.edu:8000/advligo/Bench