

Lavender team

An aerial photograph of the island of Elba, Italy, showing its rugged, mountainous terrain and coastline. The island is surrounded by deep blue water, and the sky is a clear, light blue. The text is overlaid on the image.

Constitutional meeting:
Isola d'Elba
May 24, 2013
midnight – 3am CEST

May 2013

Lisa Barsotti,
Matt Evans,
Nergis Malvalvala,
Stefan Ballmer

GWADW
La Biodola,
Isola d'Elba, Italy

LIGO-G1400641

Long is good

- Coating noise
 - Gain: $L^{1.5}$
 - Cryogenic/Crystal: **no need**
- Displacement noise
 - Gain: L
 - Newtonian N. **irrelevant**
- Radiation pressure
 - Becomes **irrelevant**
- Shot noise
 - Gain: $\sim\sqrt{L}$
 - Freq. **indep.** Squeezing
- Vertical susp. Thermal
 - Gain: constant





Long Uncomplicated
Next-Generation
Gravitational-Wave Observatory
LUNGO

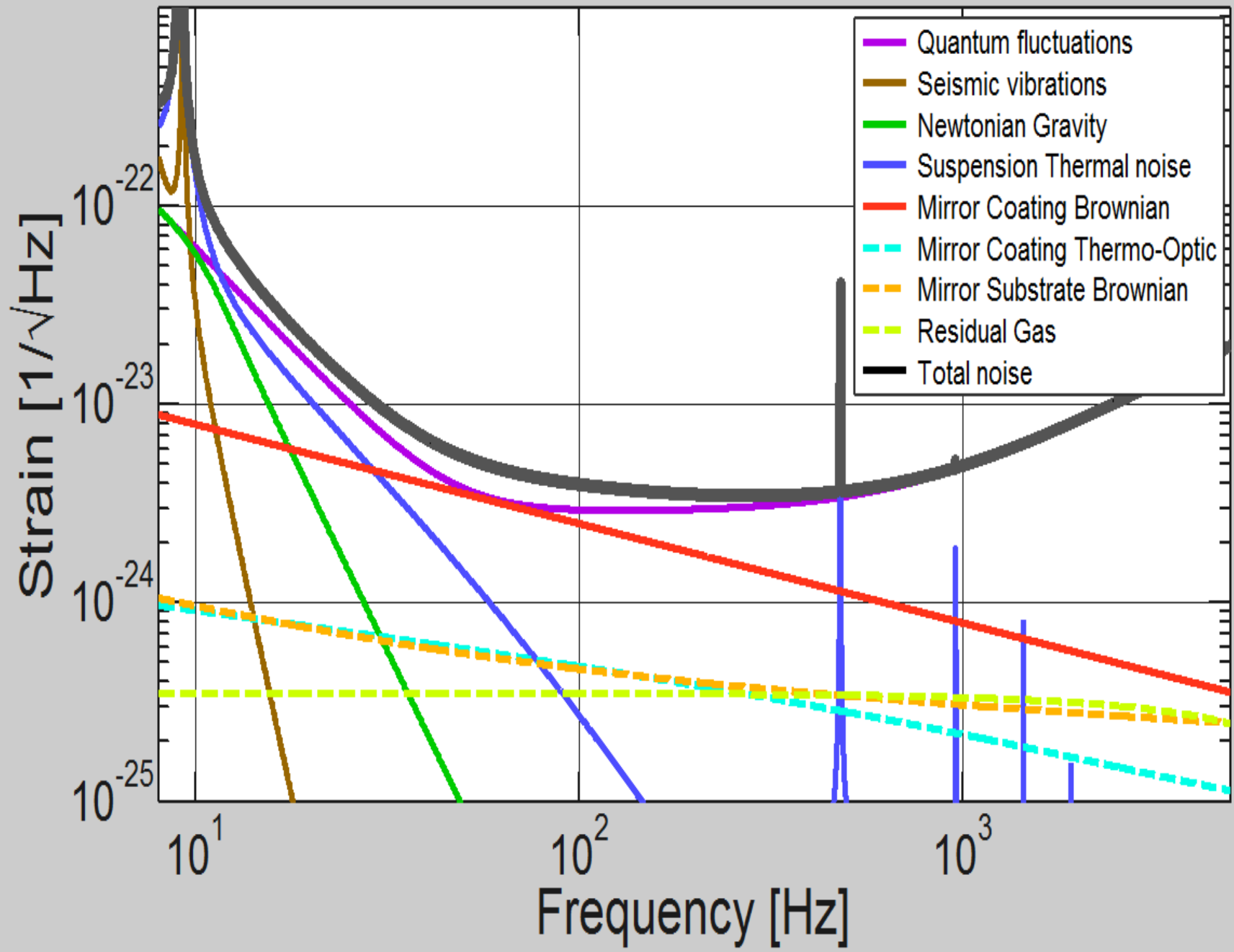
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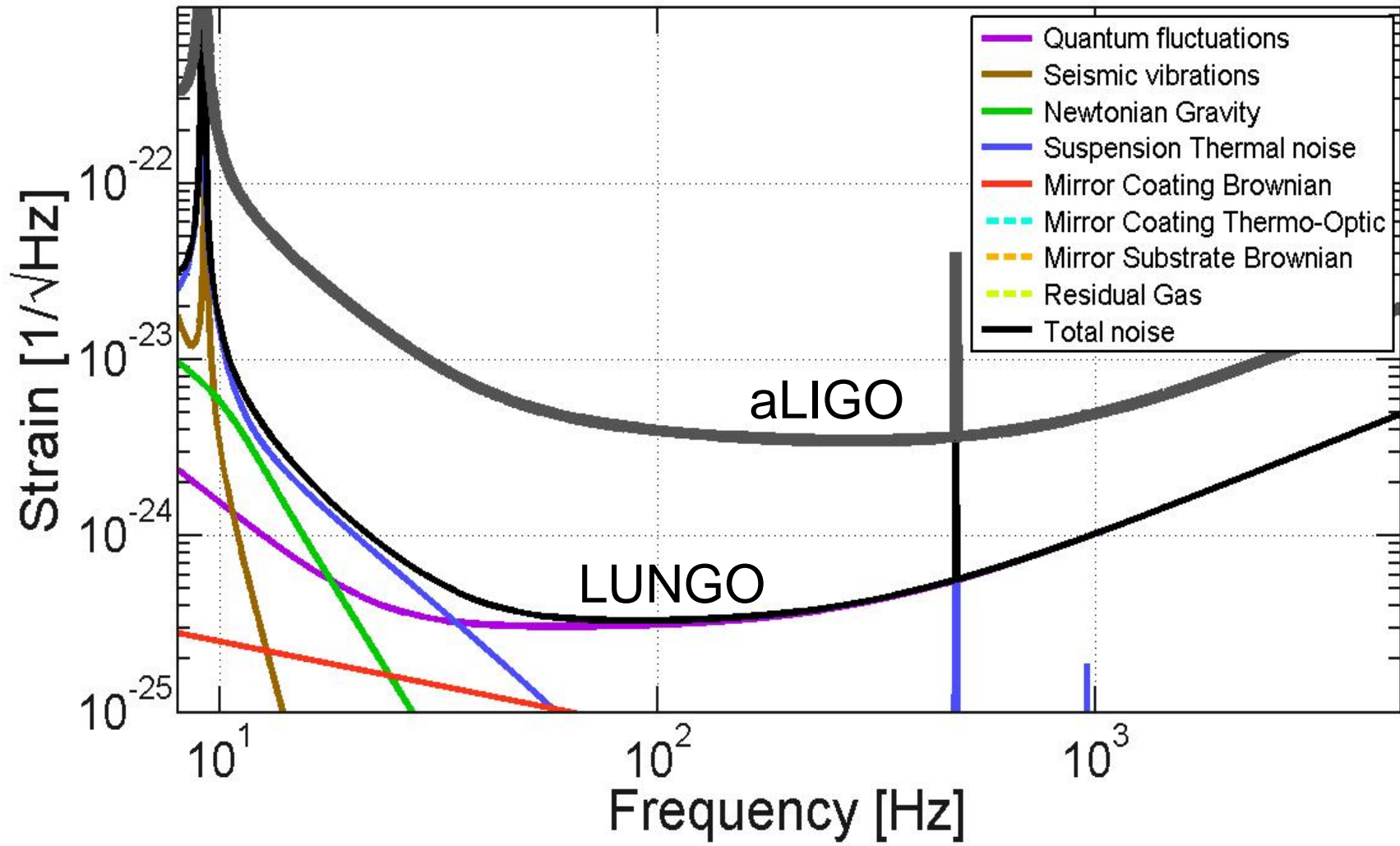
LIGO-G1400641

Range: 190Mpc; L: 4 km (aLIGO: 178 Mpc)



The range for 40km

Range: 2557Mpc (aLIGO: 178 Mpc)



Cost - Benefit

- Vacuum cost
 - ~\$300M per site for 40km arms
 - ~\$3.75M/km per site
- NS/NS range ~2.5Gpc
 - 70Mpc/km
 - 19Mpc / \$1M
- Risk
 - Site selection and characterization
 - ...other than that...maybe steel price?

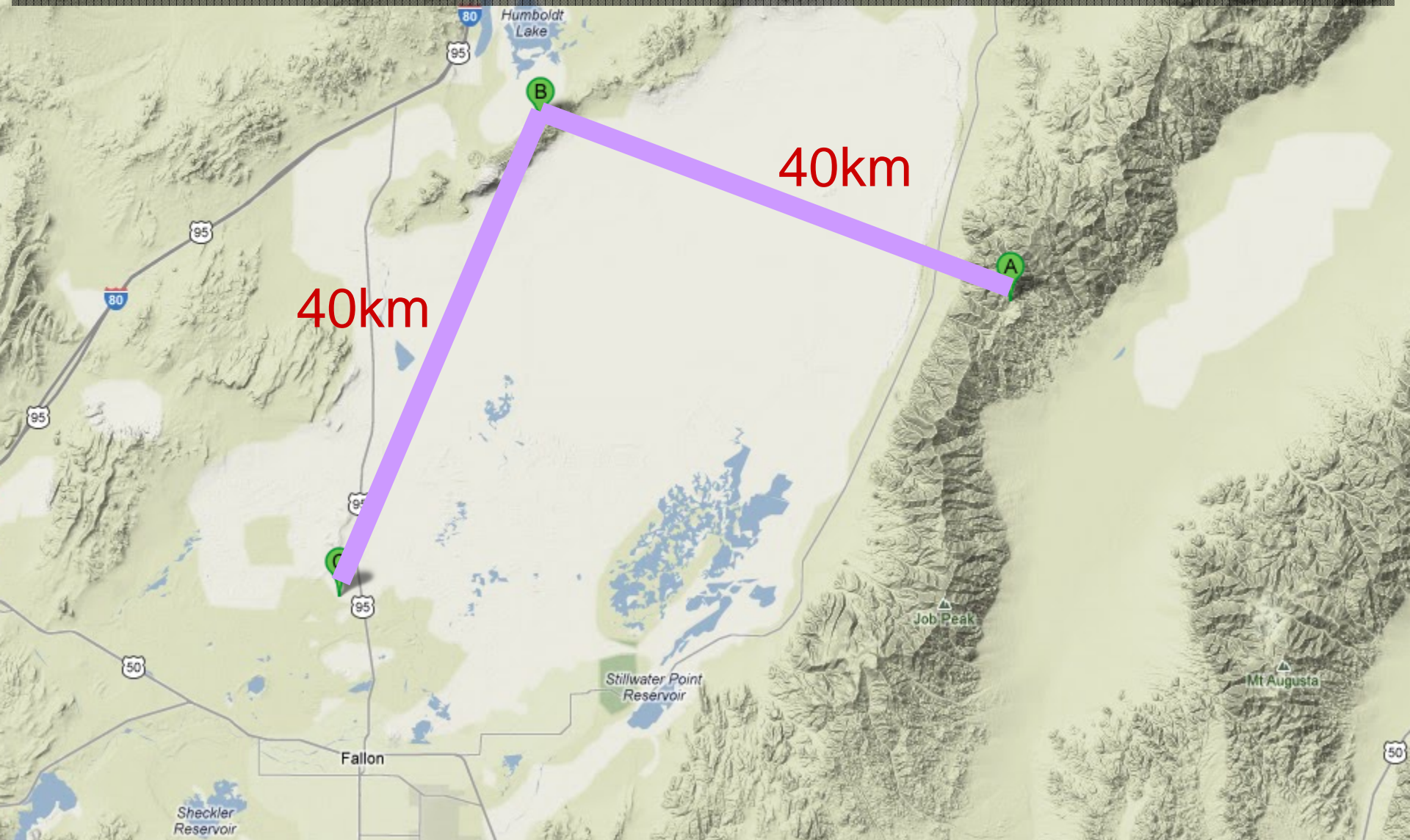
Site selection

- End stations into **mountains**, otherwise as **flat** as possible
- **Height difference** due to earth curvature
 - About 31m, any basin curvature helps
- Can we fit such a thing on earth? ...

N39°35.31' W118°48.15'



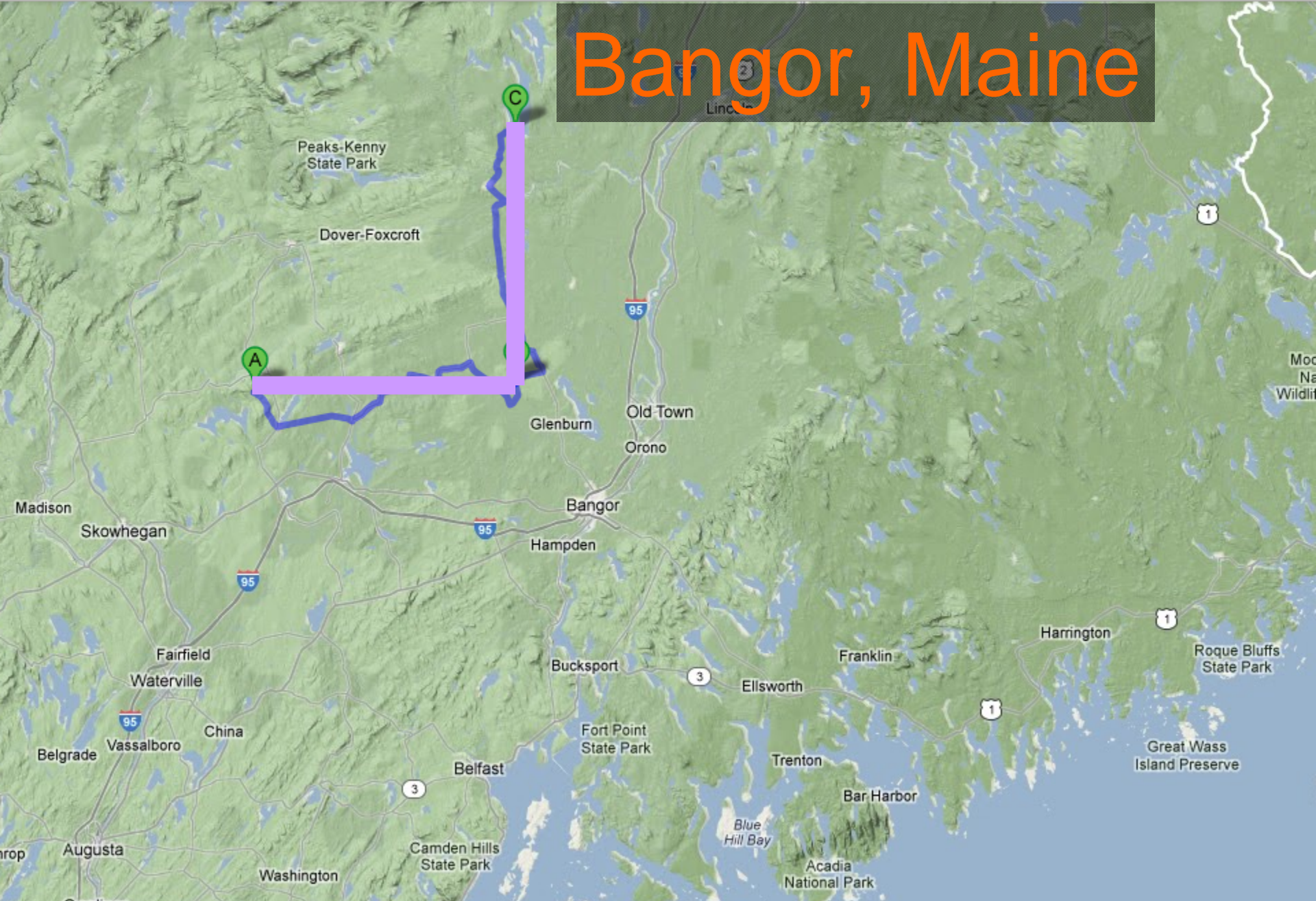
Carson Sink, Nevada (Alkali flat)



from:N44°58.22' W69°27.55' to:N44°58.57' W68°56.24' to:N45°20.01' W



Bangor, Maine



The Message

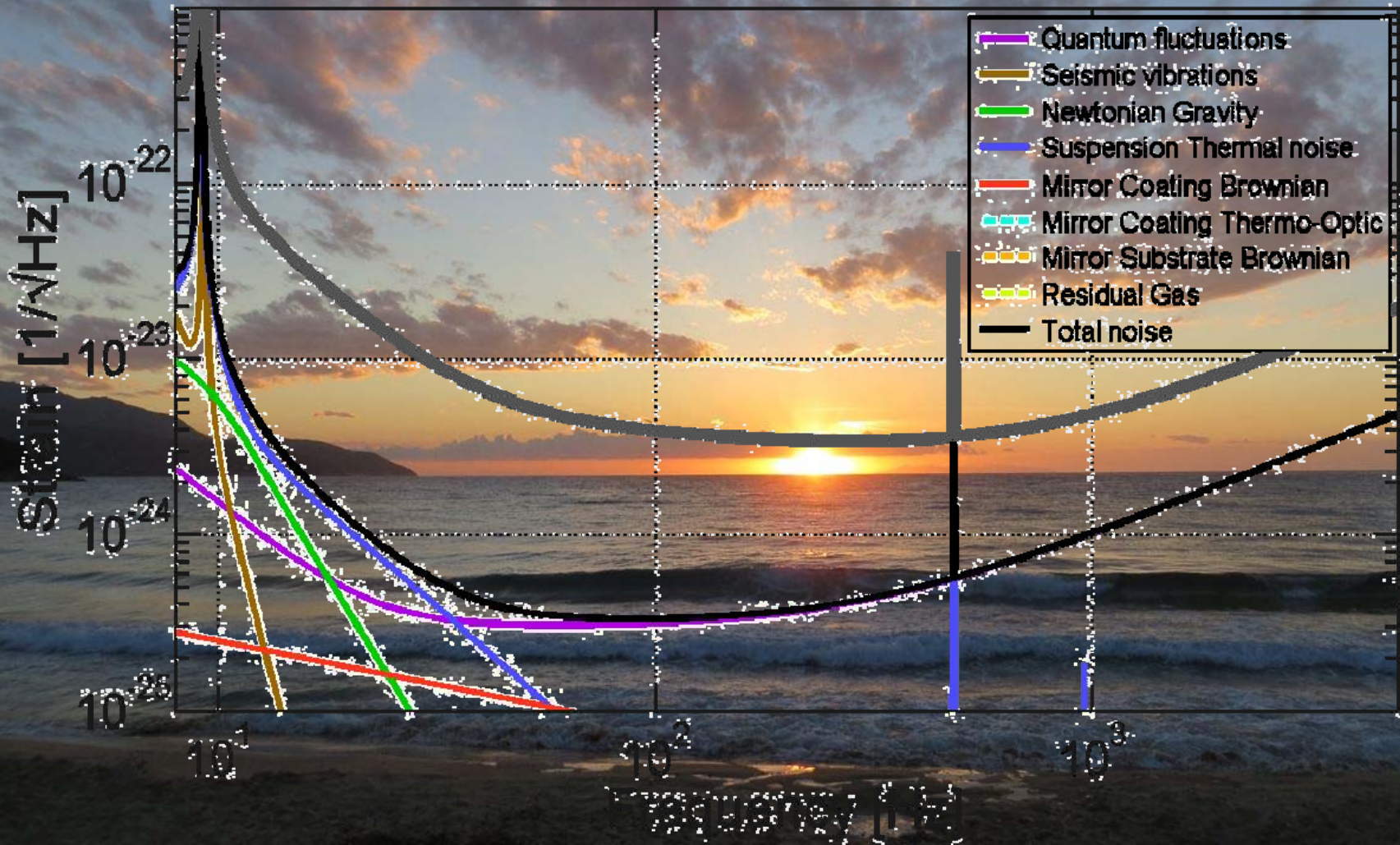
- Yes, you guessed it...

MAKE IT LONG!

- Invest in steel...
- Make the 4km **LUNGO** prototype (aLIGO) work

LUNGO

Range: 2557Mpc (aLIGO: 178 Mpc)



World Hi

Enroute H-3

Enroute L-11

Enroute L-9

CG-18 WAC

World Lo

SPECIAL MILITARY ACTIVITY
CTC RENO RADIO ON 122.2 122.5
OR FALLON APP ON 126.2
FOR ACTIVITY STATUS

CAUTION
INTENSIVE GLIDER
ACTIVITY UP TO FL 180

FOR ADVISORY SERVICE
THE MOAS CTC/FALLON APP

FOR ADVISORY SERVICE
THE MOAS CTC/FALLON APP

096° 22nm

010° 22nm

