



LIGO

Building an



VIRGO

International Gravitational Wave Network



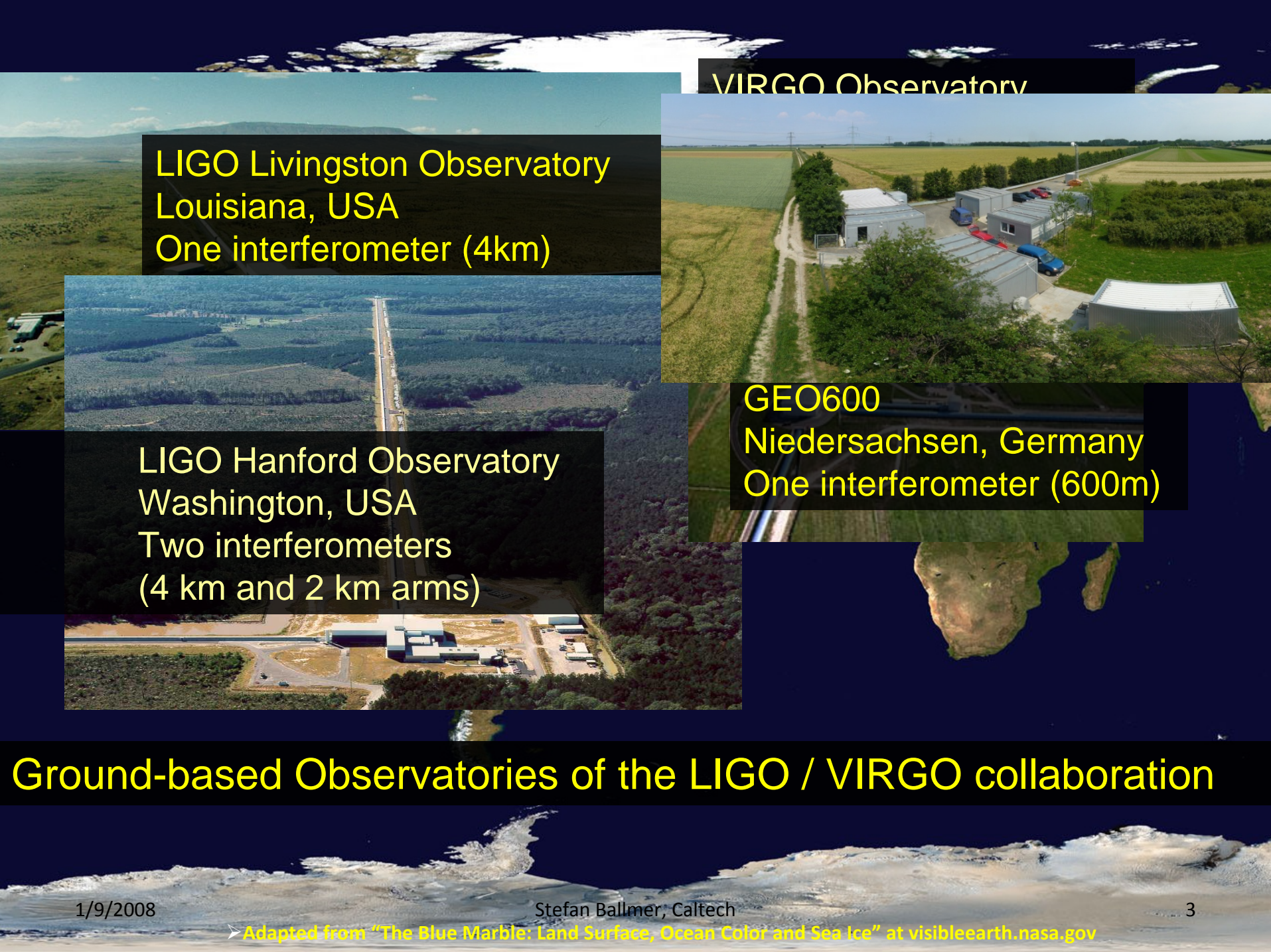
Stefan Ballmer, for the
LIGO / VIRGO
Scientific Collaboration

1/9/2008

LIGO G080006-00-0



- The LIGO Scientific Collaboration and VIRGO
 - Joined forces in May 2007
 - Operate 5 GW interferometers at 4 different sites
 - Recently finished their first extended science run



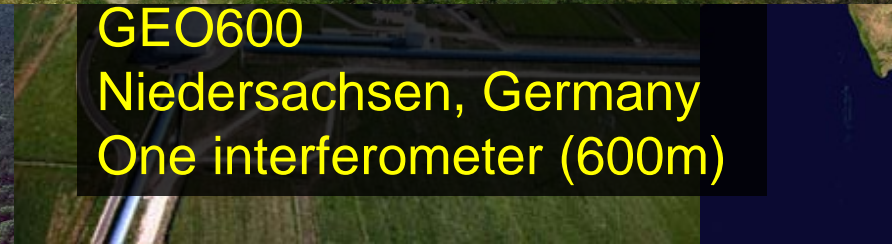
VIRGO Observatory



LIGO Livingston Observatory
Louisiana, USA
One interferometer (4km)



LIGO Hanford Observatory
Washington, USA
Two interferometers
(4 km and 2 km arms)



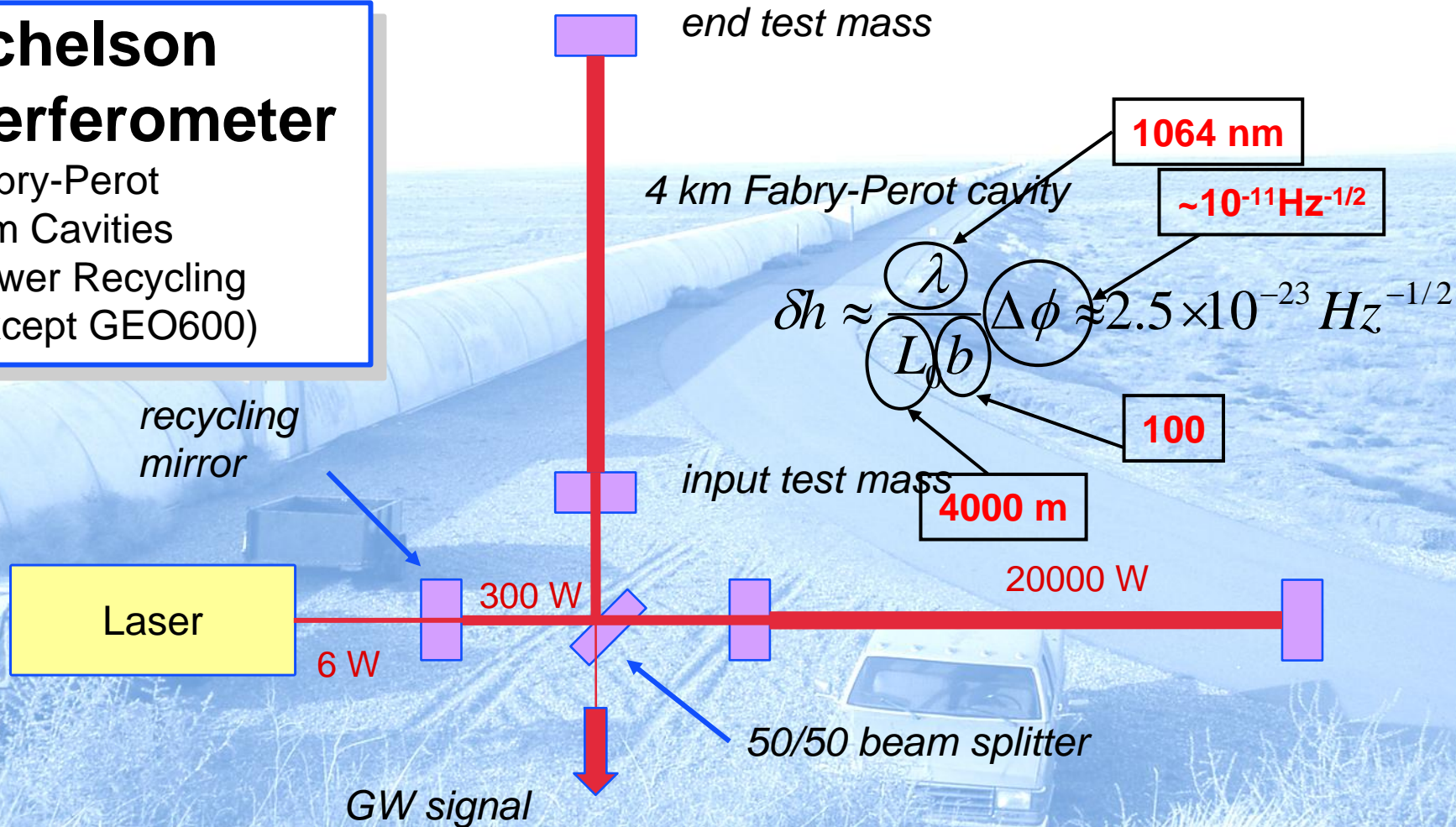
GEO600
Niedersachsen, Germany
One interferometer (600m)



Ground-based Observatories of the LIGO / VIRGO collaboration

Michelson Interferometer

- + Fabry-Perot Arm Cavities
- + Power Recycling (except GEO600)



(Numbers for LIGO 4km)

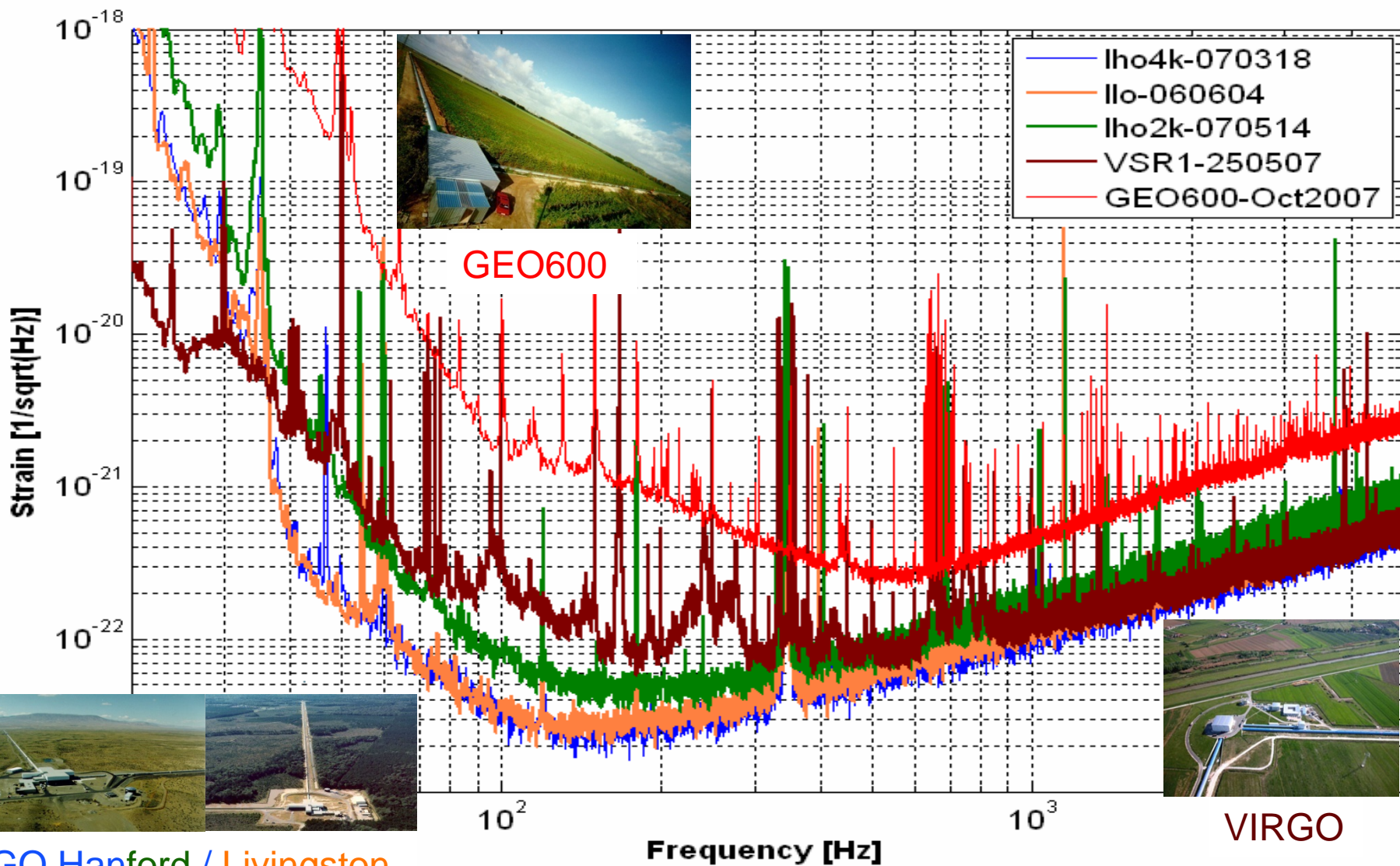


LIGO

S5 Strain Sensitivities of LSC/Virgo

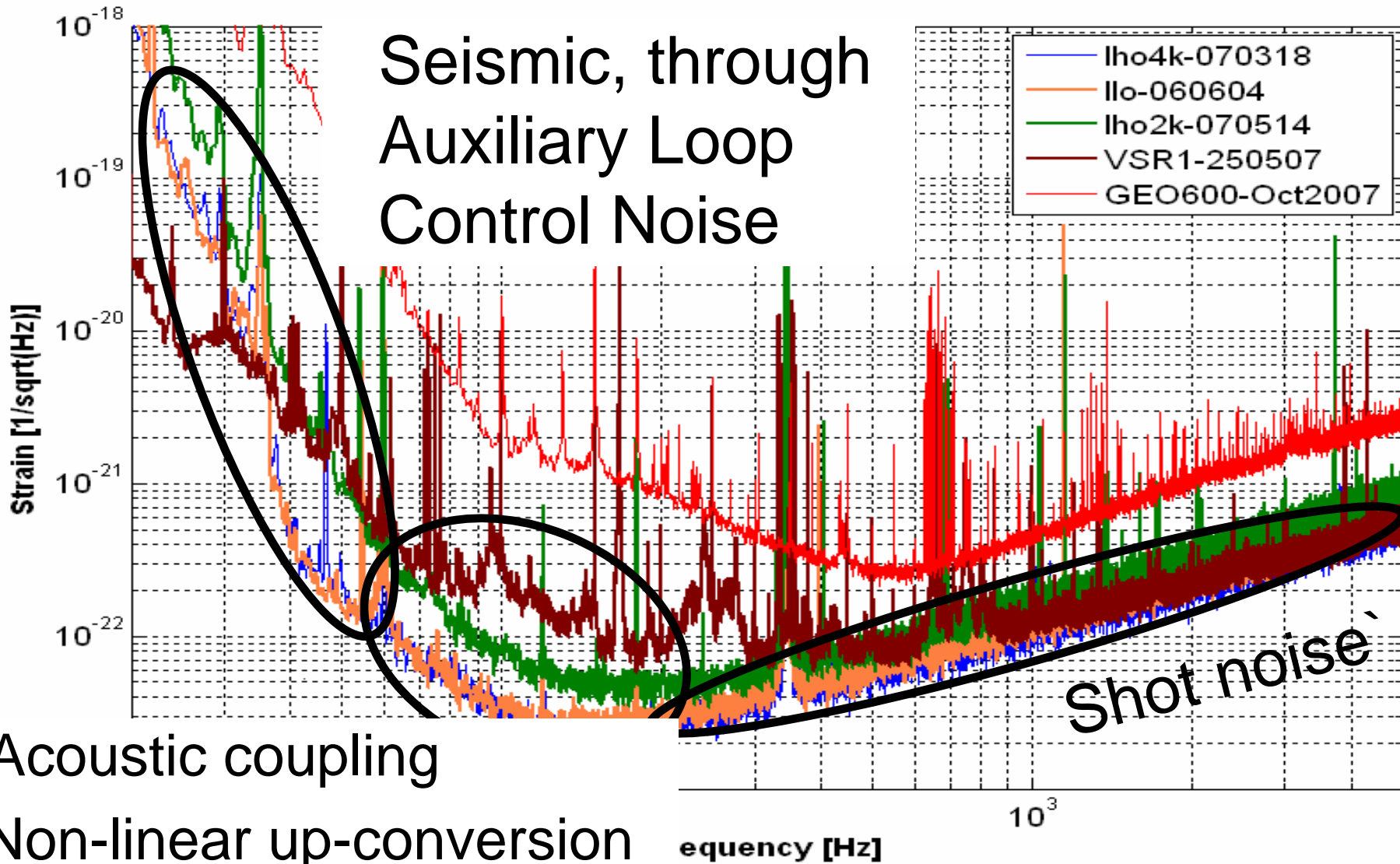


VIRGO

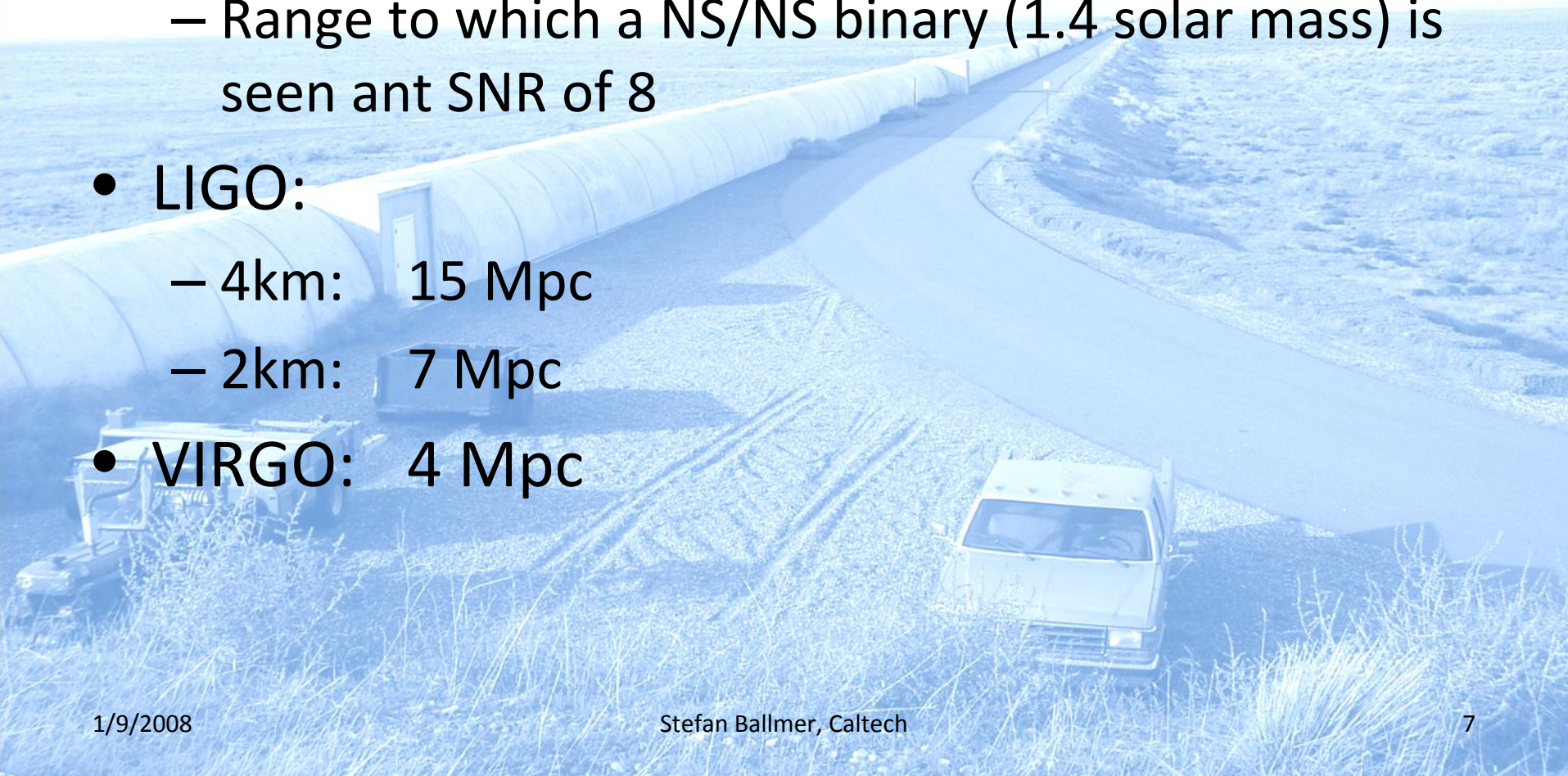


LIGO Hanford / Livingston

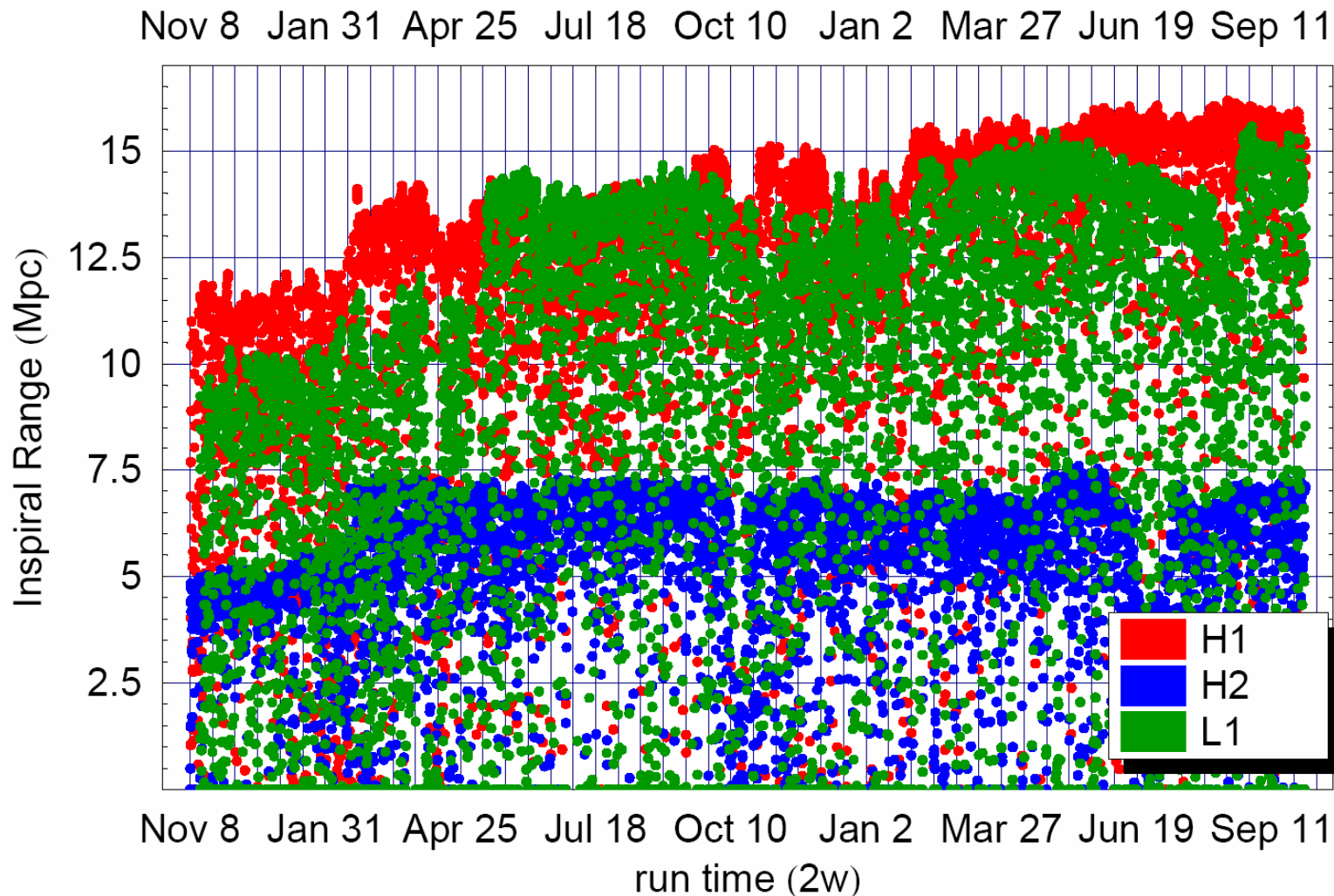
VIRGO



- Acoustic coupling
- Non-linear up-conversion

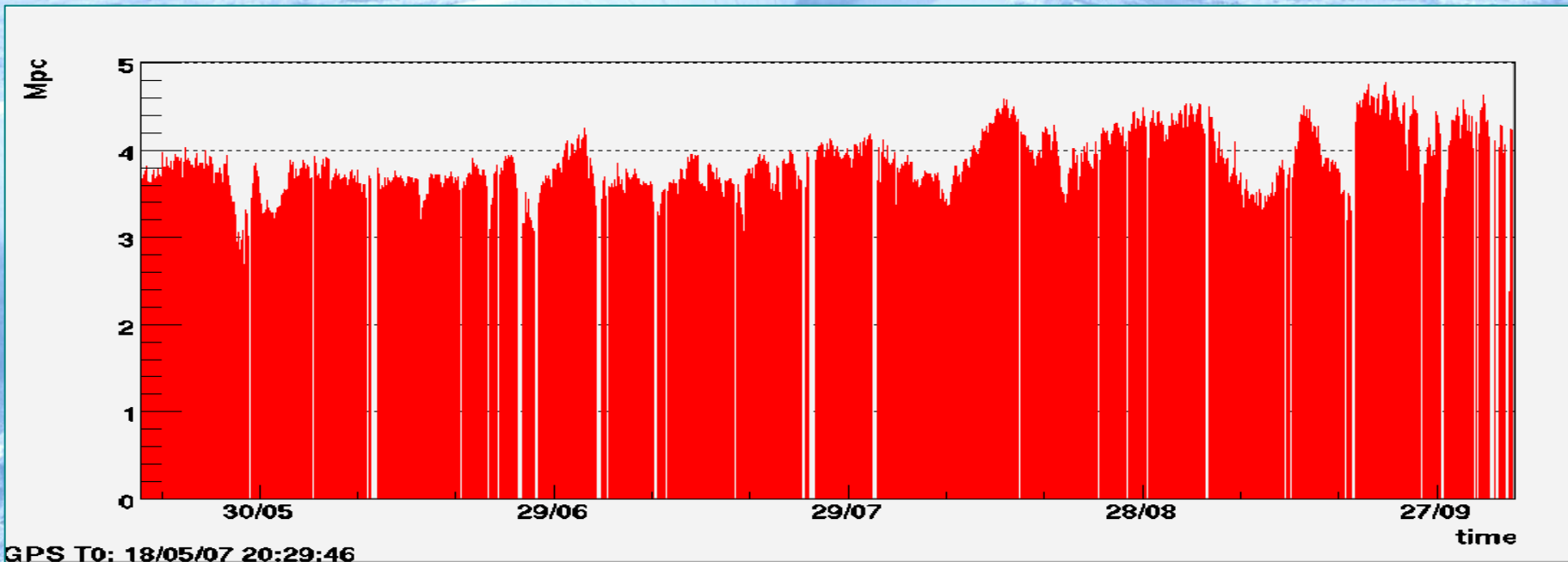
- A standard candle:
 - Range to which a NS/NS binary (1.4 solar mass) is seen ant SNR of 8
 - LIGO:
 - 4km: 15 Mpc
 - 2km: 7 Mpc
 - VIRGO: 4 Mpc
- 

- S5 started in Nov 2005 and ended Oct 2007
 - LIGO collected 1 year of triple coincidence data
 - Duty cycle: ~75% per IFO, 53% triple coincidence
- GEO joined
 - in *overnight & weekend mode* January 20th 2006
 - in *24/7 mode* May 1st 2006 (Duty cycle: ~91%)
 - back in *overnight & weekend mode* Oct. 2006 – Oct. 2007
- VIRGO joint May 18th 2007 (VSR1)
 - Duty cycle: 81%



LIGO Range history (VIRGO)

- Main causes of horizon variations:
 - bad weather
 - ‘Thermal effects’ combined with control noise
 - non stationarities due to alignment fluctuations



- Data is 'in the can':
 - See following 3 talks for some preliminary results
 - More to come
- Upgrades (Enhanced LIGO / VIRGO+)
 - currently under way
 - Factor 2-3 sensitivity improvement
 - See Giovanni Losurdo's talk
- Observation during upgrades...

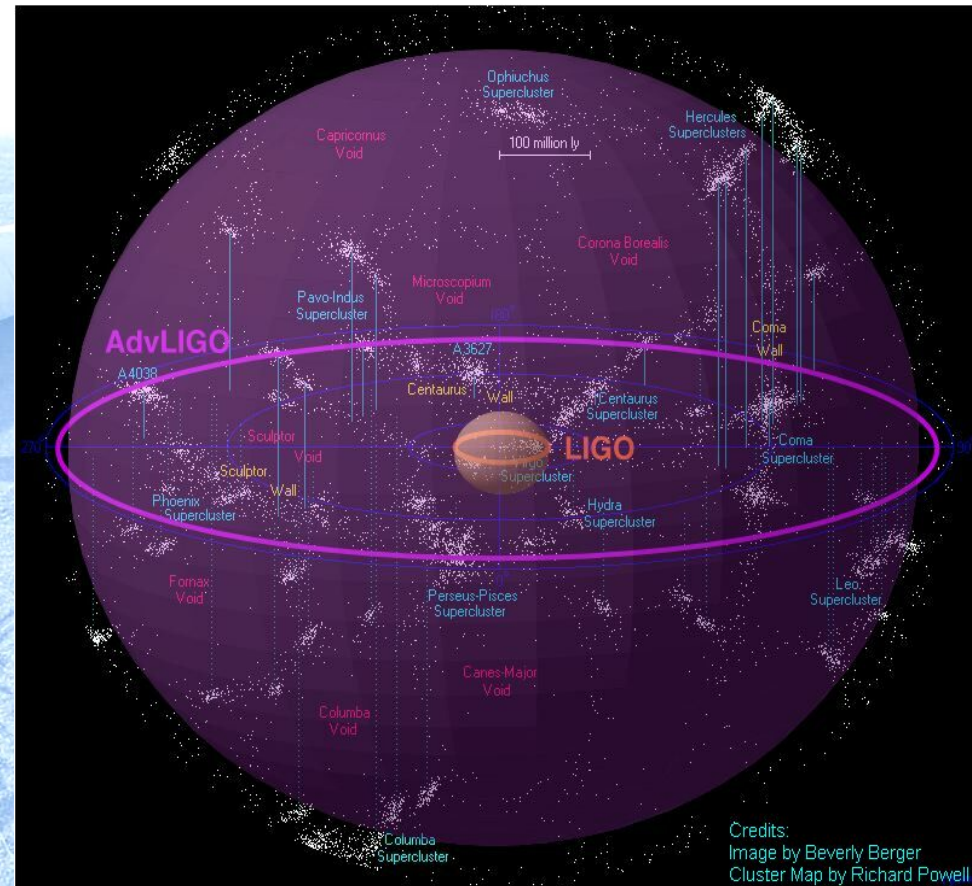
Astrowatch

- What ?
 - Science data run starting Nov. 2007
- Why ?
 - Cover the time when LIGO/VIRGO are upgrading
 - Galactic supernova rate about 1/50 years
- Who ?
 - GEO600, LIGO H2 as upgrades permit, and bars
 - Similar to S5 running conditions

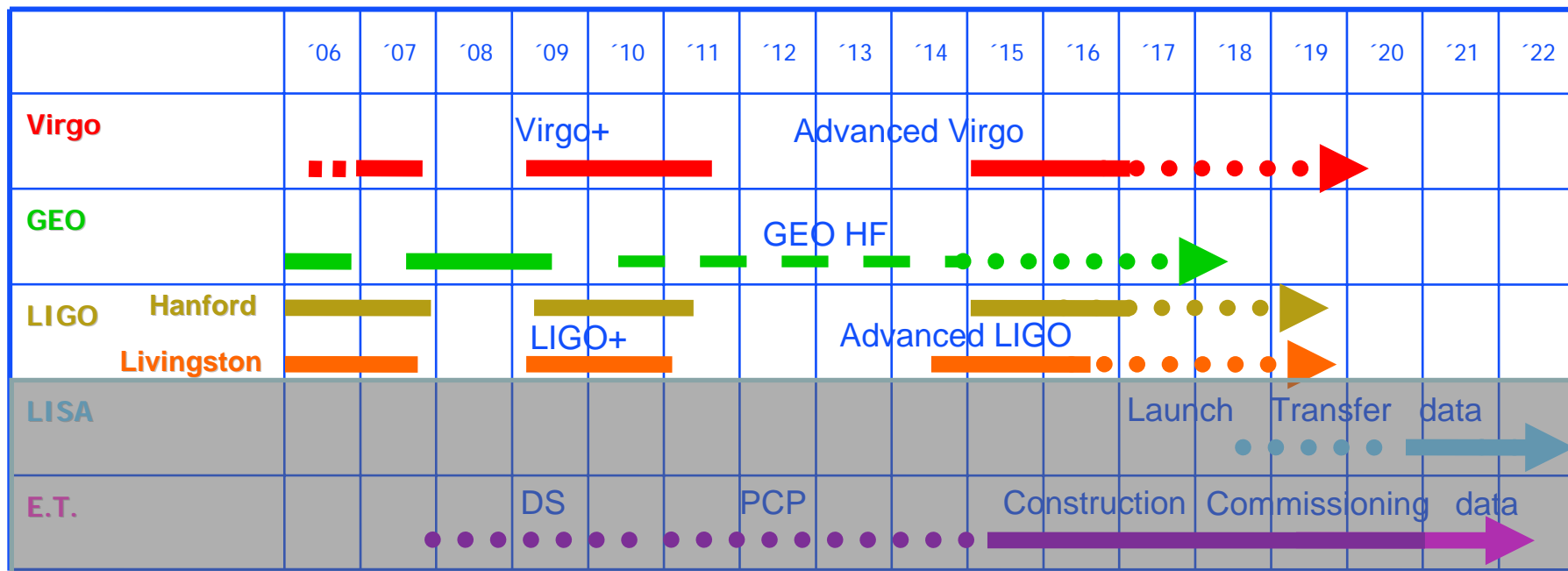
LIGO What's next (mid term)?



- GEO HF
- Advanced LIGO
- Advanced VIRGO
- Details in Giovanni Losurdo's talk



You are here



1st Generation 2nd Generation 3rd Gen.

- The LIGO / VIRGO GW observatories have
 - concluded their first long science run
 - are currently being upgraded
 - GEO & Hanford 2km continue data collection during this upgrade

LIGO

VIRGO



12/14/2007

