

Status of Advanced Virgo

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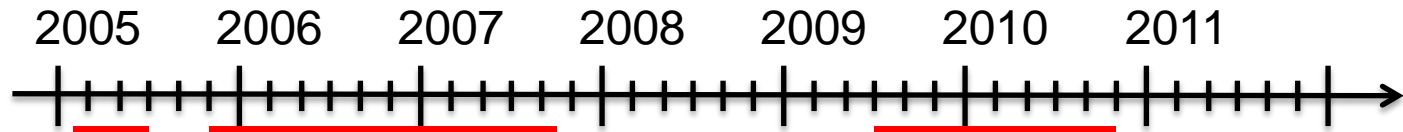
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GWPAW 2013, Pune, India





1st generation achievements



LIGO

Virgo

VSR1

VSR2

VSR3

VSR4

• A long history

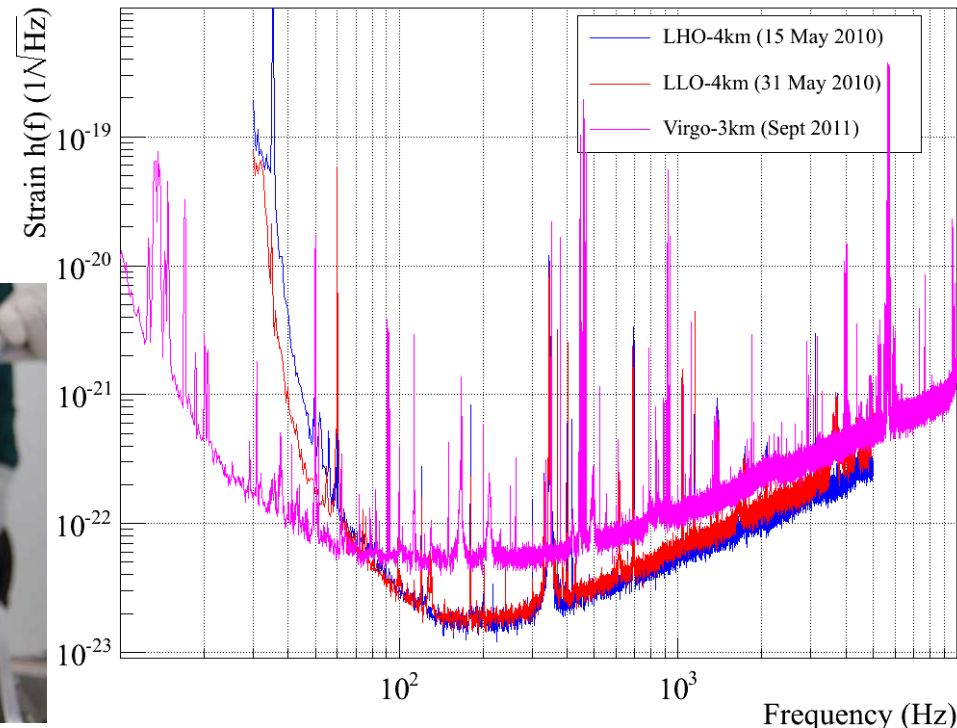
- ◆ LIGO approval 1990
- ◆ Virgo approval 1993

• Virgo reach its nominal sensitivity

- ◆ Demonstrate low frequency capability
- ◆ 1.2 years of science data collected

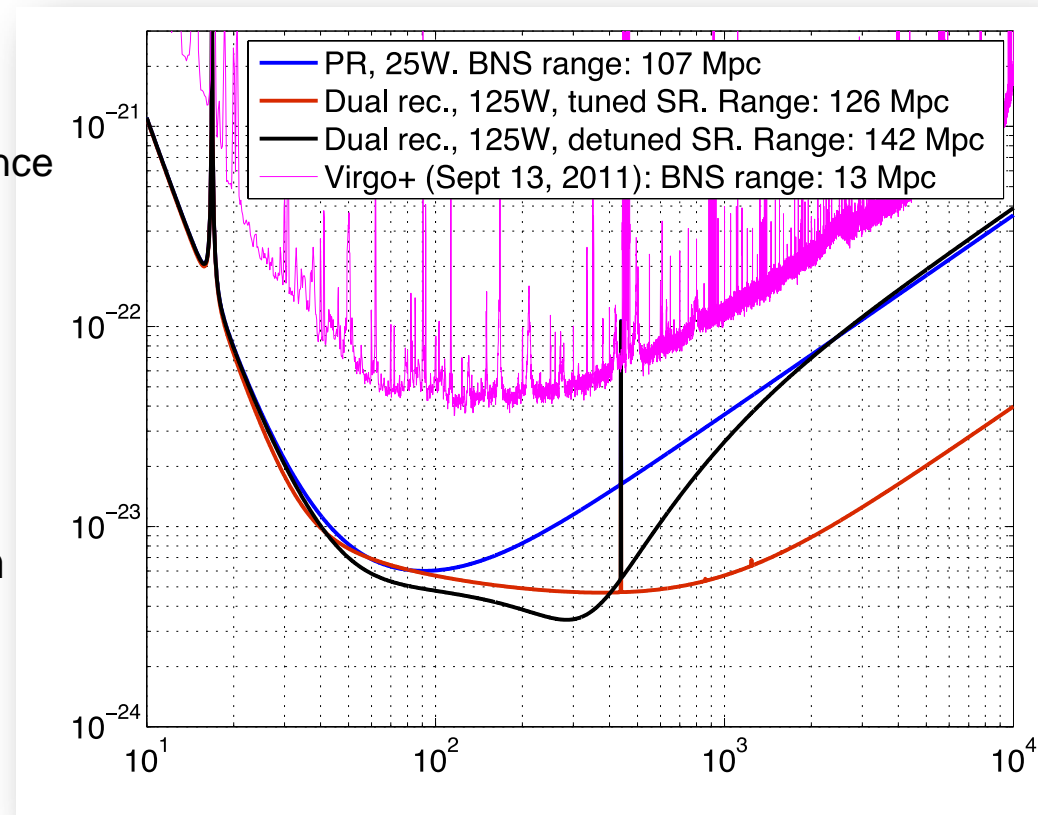
• Improvements through the runs

- ◆ Noise hunting,
- ◆ Improved laser,
- ◆ Electronics,
- ◆ Diffuse light,
- ◆ Thermal compensation,
- ◆ Monolithic suspension,
- ◆ Mirrors
- ◆ ...

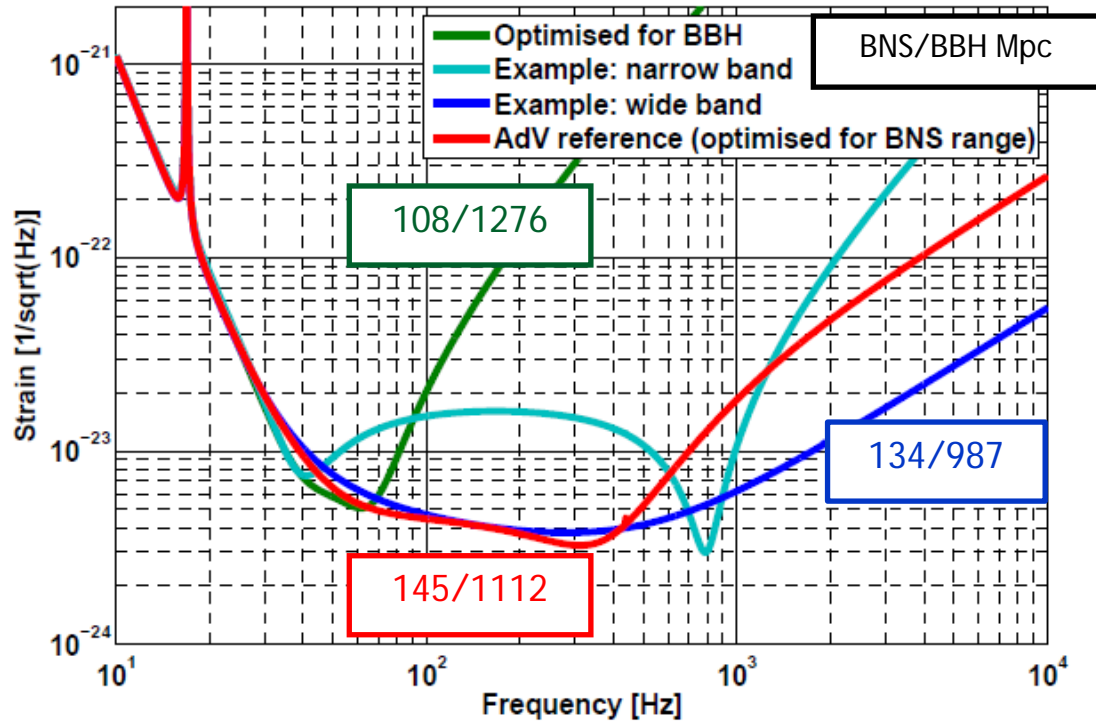


Advanced Virgo

- Goal: increase sensitivity by a factor 10
- Need to fight thermal, quantum , “technical” noises, increase power
- How?
 - ◆ Heavier mirrors
 - ◆ Upgrade monolithic suspension
 - » Virgo+ : a useful learning experience
 - ◆ Use larger beam
 - » Vacuum modification
 - ◆ High quality optics
 - » Low absorption
 - » Coating thermal noise
 - » 0.2nm rms surfaces
 - » Thermal compensation
 - ◆ All sensing devices under vacuum
 - » New suspended benches
 - » Need more lab space
 - ◆ Add signal recycling
 - » Not used right away
 - ◆ ...



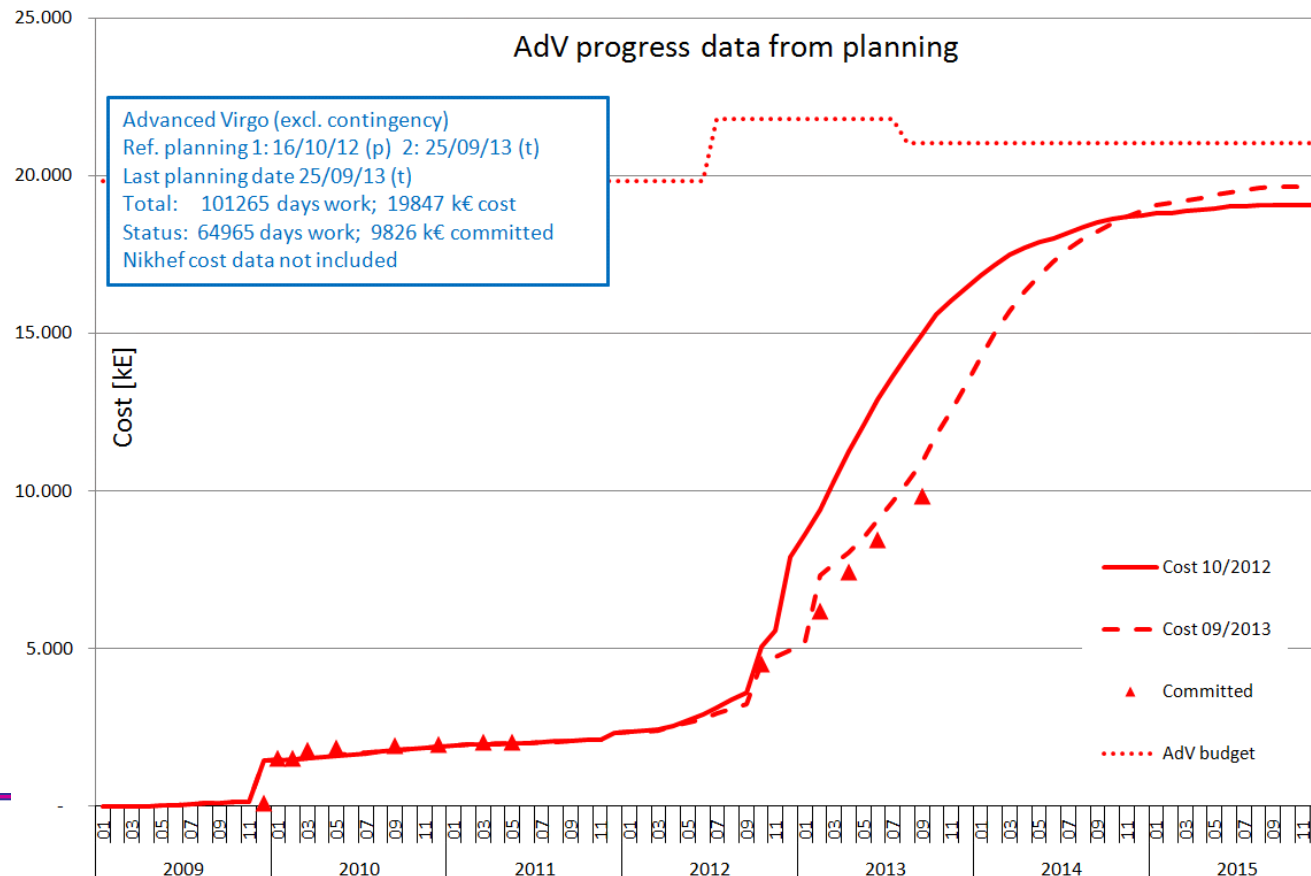
AdV Sensitivity tunability



- Signal recycling: sensitivity could be adjusted
 - ◆ Within some limits...
- Can be tuned to detect/study various sources
 - ◆ Require signal recycling, not scheduled for the first AdV science run

AdV construction status

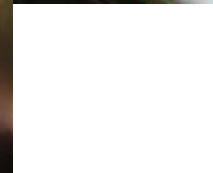
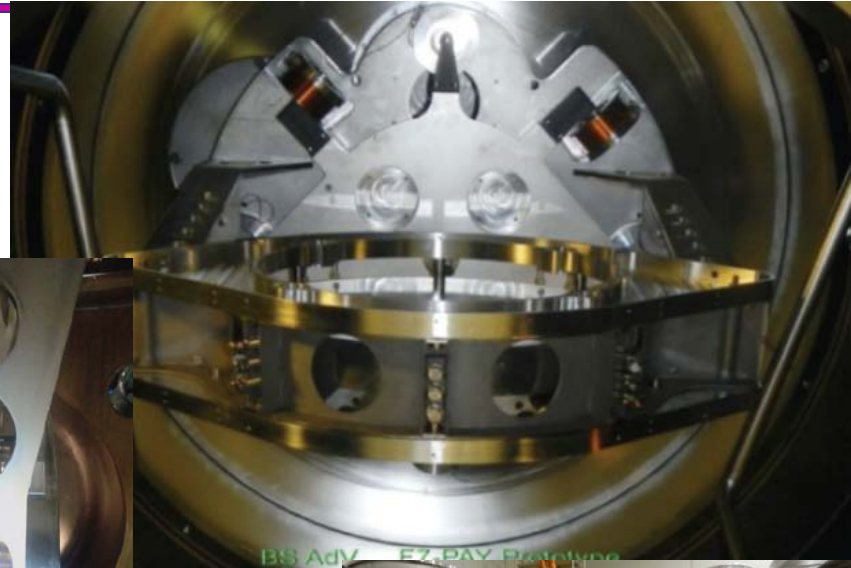
- AdV approved end 2009 ~ 2 years after aLIGO
 - ◆ AdV budget ~ 23 M€ (investments)
- Committed budget: more than 50% since last October



Prototyping & tests: examples

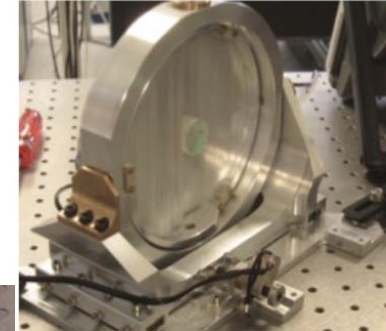
- Examples of integration tests:

- ◆ New payload geometry,
- ◆ New seismic isolation + chamber for new in-vacuum optical benches



Parts production

- Production is on going for many parts
 - ◆ Examples with vacuum part, seismic isolation for new benches, telescopes, optics...



Site infrastructure modifications

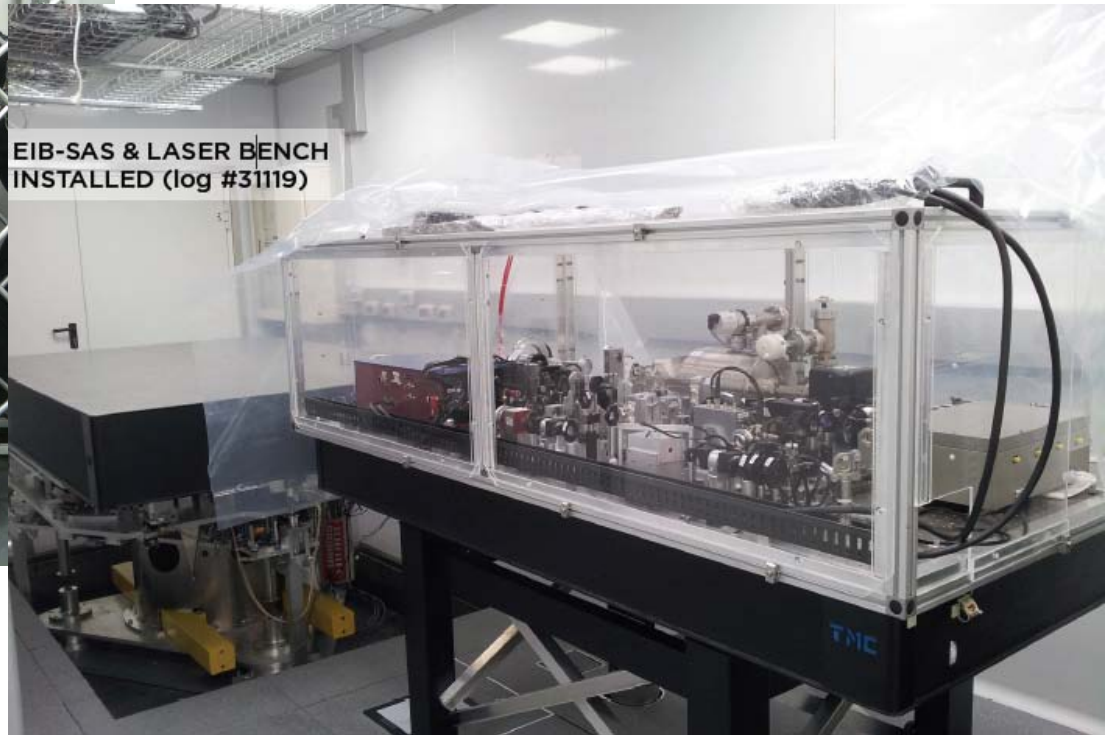
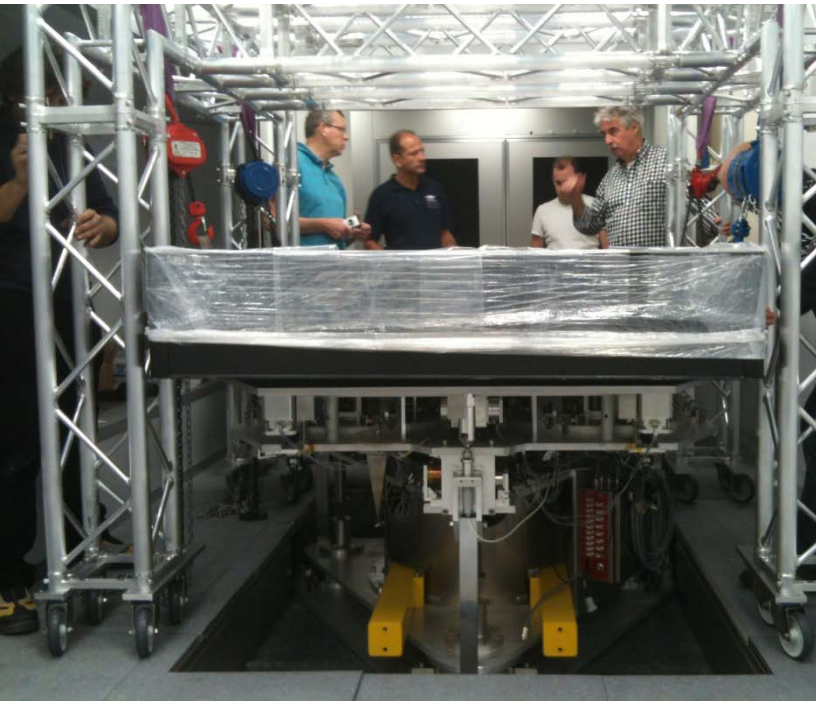
- Laser and detection lab have been enlarged

- ◆ Dusty work (cutting concrete) completed
- ◆ New air conditioning machine installed
- ◆ And more changes like scaffoldings, LN2 supply...



Starting the installation

- Laser and injection system installation started



- Target: begin input mode cleaner commissioning mid-2014

Collecting data with AdVirgo?

- **Planning:**
 - ◆ Main AdV milestones unchanged over last year

- **Some guesses made for sensitivity progresses**

- ◆ But commissioning is difficult to predict.

- **Looking forward to the exciting physics with the advanced detectors!**

