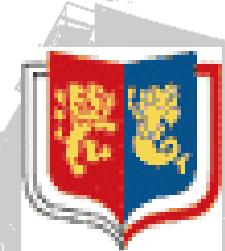


THE STATUS OF *GEO 600*



Hartmut Grote
for the LSC

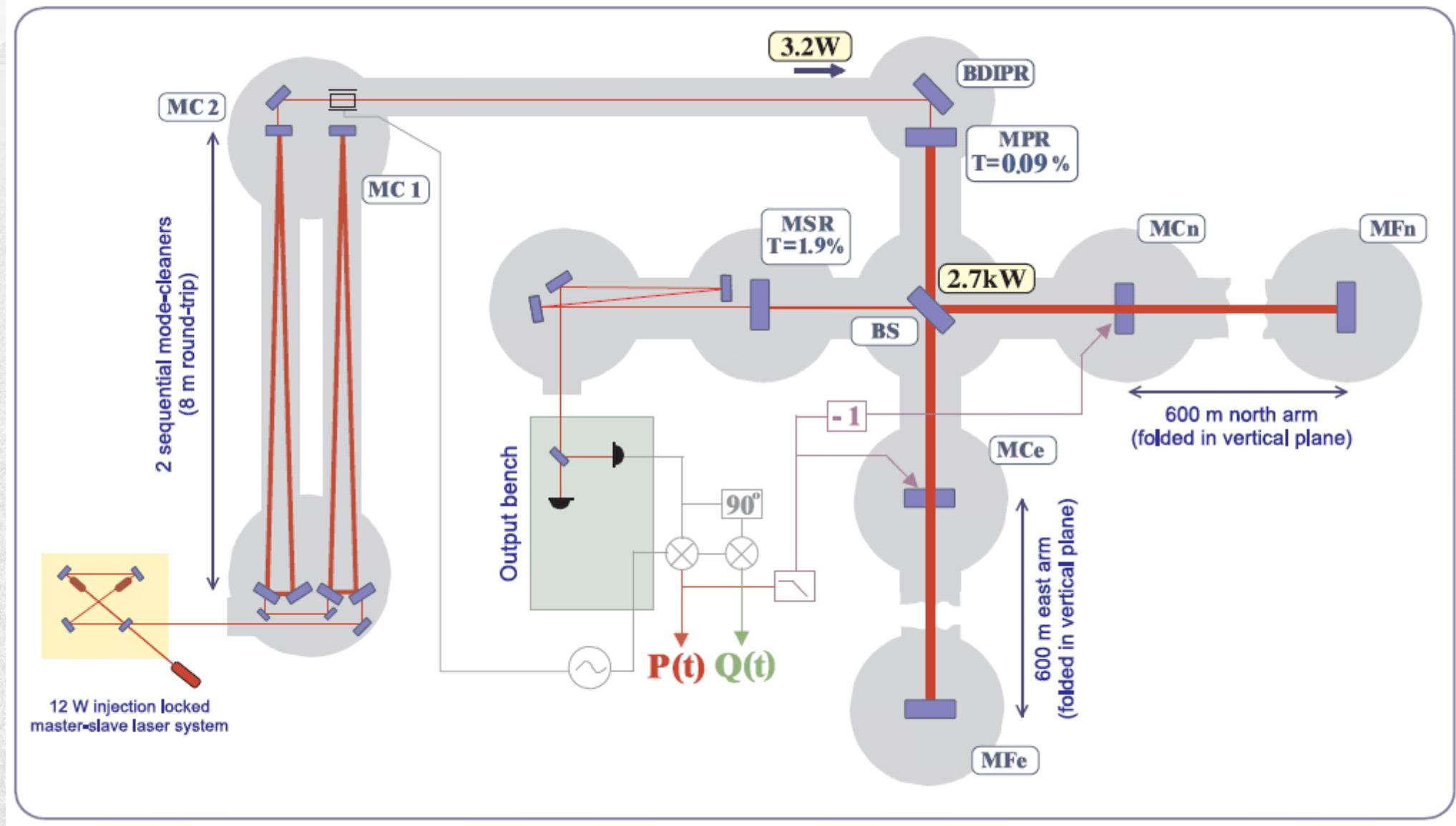
8. Amaldi Conference
New York, 23. June 2009
LSC G0900508

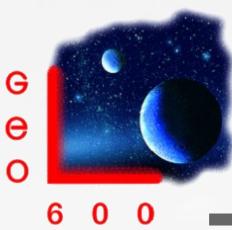


Universitat de les
Illes Balears



The GEO600 Interferometer

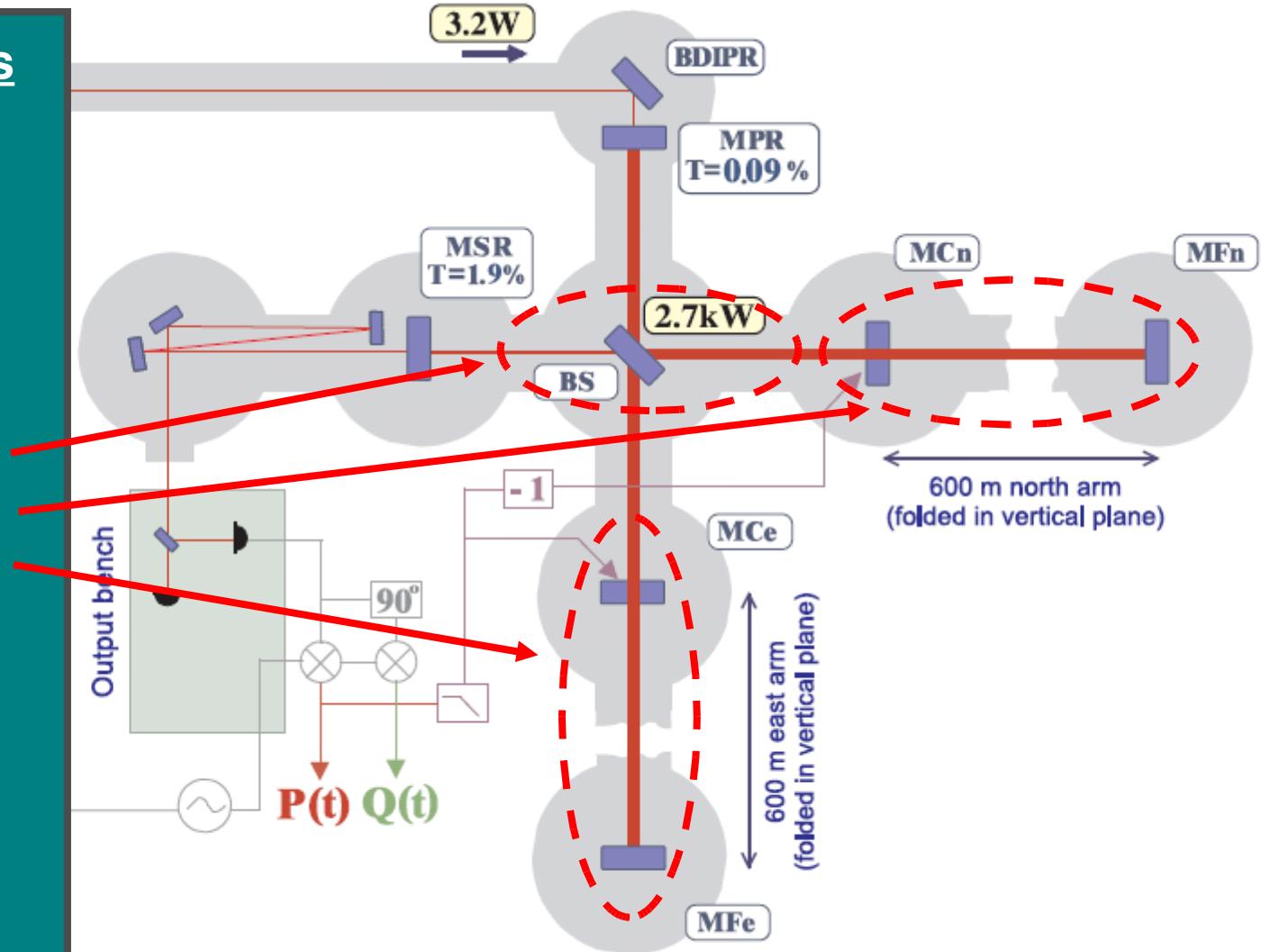
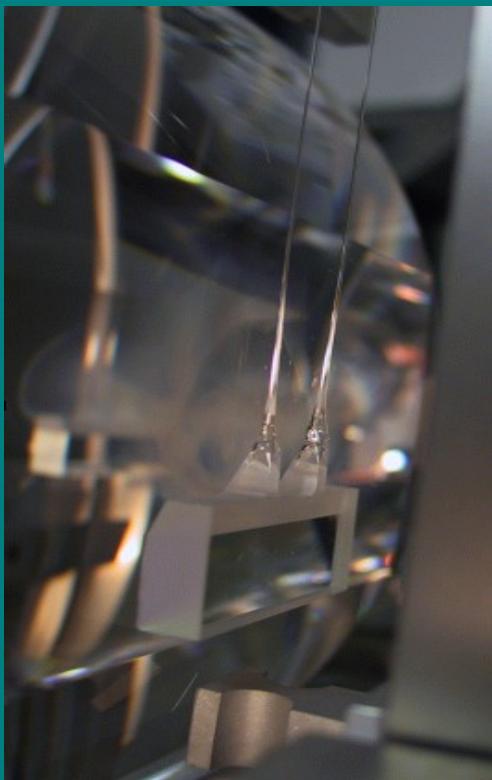




The GEO600 Interferometer



Triple suspensions
with monolithic
ultimate stage



Approx. 140 fibre years on running IFO with ~5 partial ventings

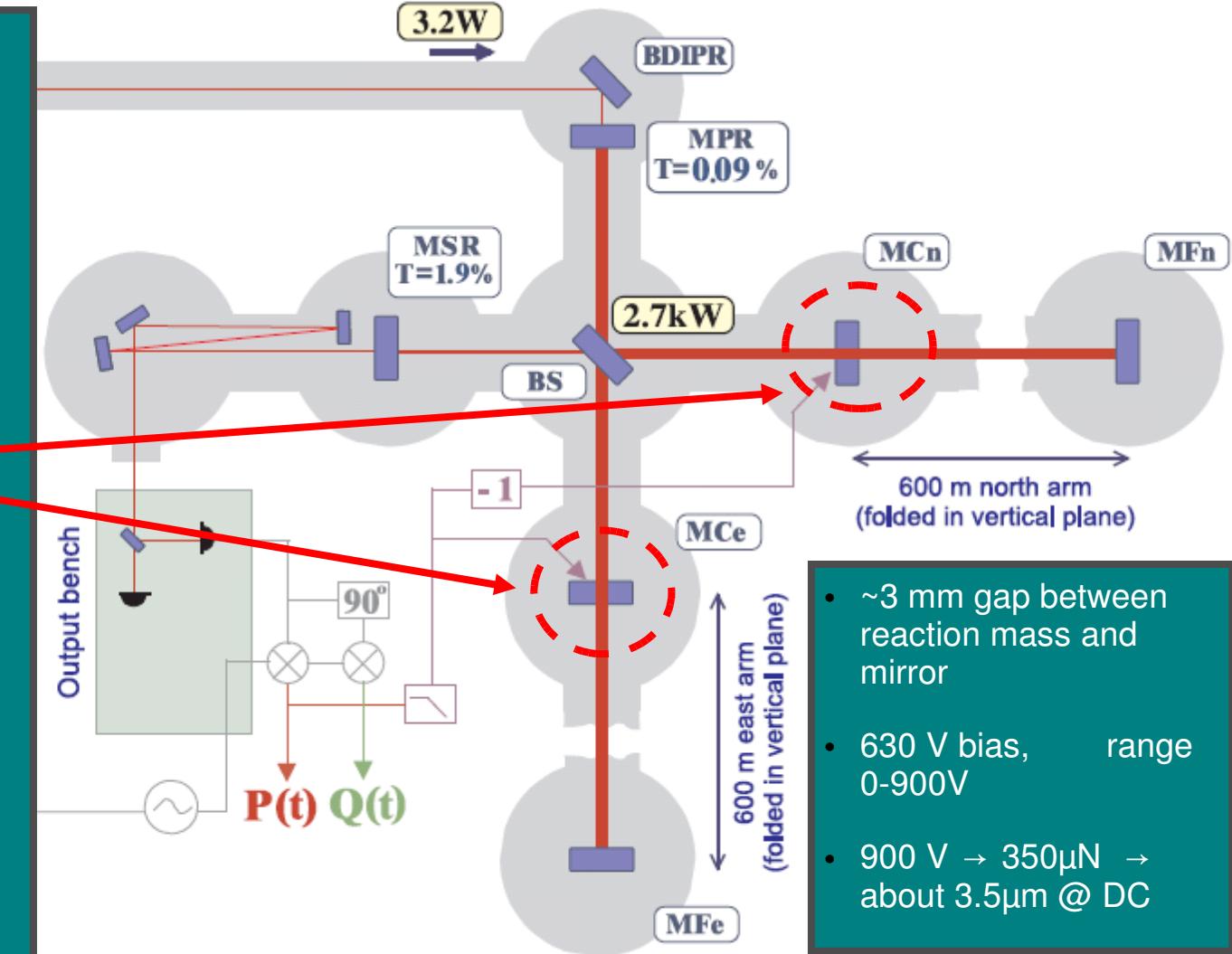
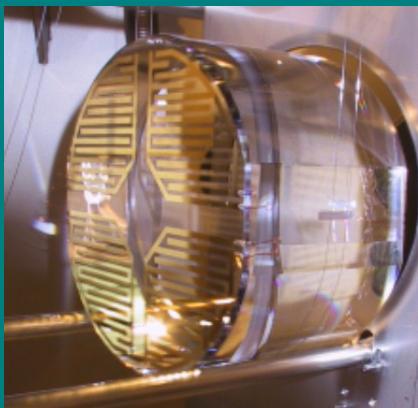


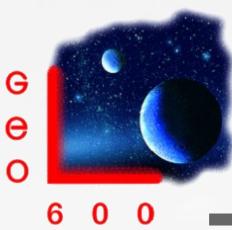
The GEO600 Interferometer



Electro-Static Drives:

- Used for fast control of diff. arm length



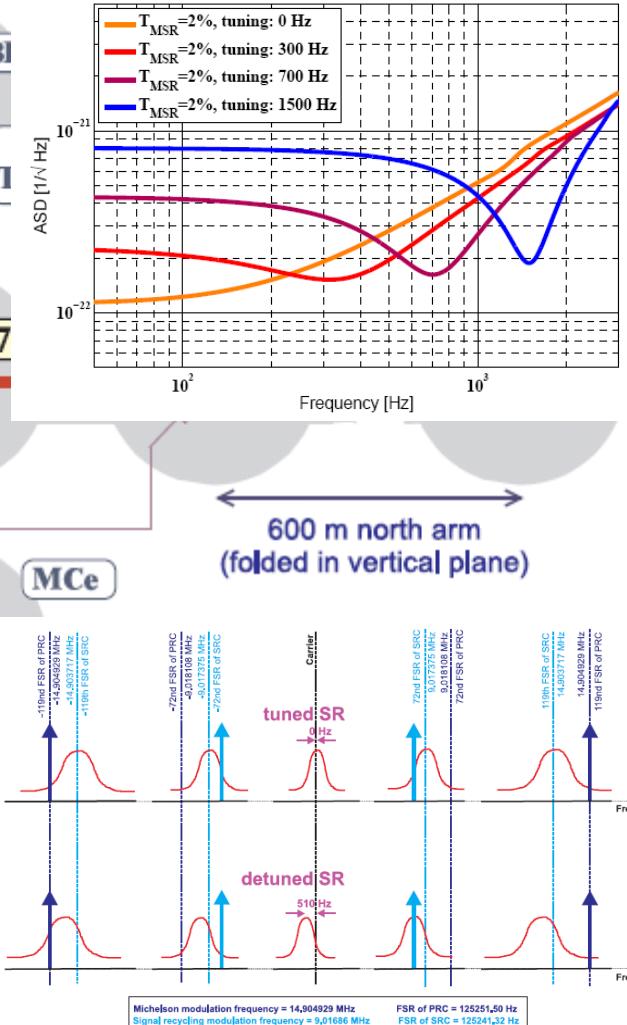
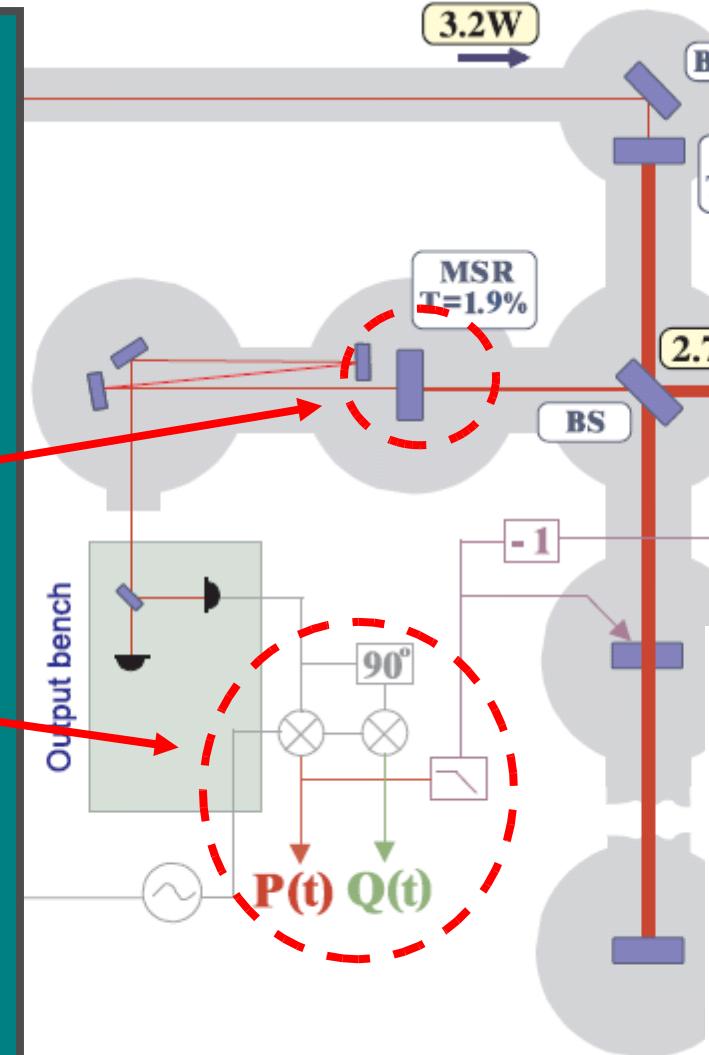


The GEO600 Interferometer



Signal-Recycling:

- Shaping detector response
- Complex detector (resonance conditions with detuned SR)
- GW signal is spread over both quadratures P and Q .





Astrowatch (...listen)



- Astrowatch by GEO and LIGO-H2
- Bridge the gap between S5(VSR1) and S6(VSR2)
- Triggered searches GRB, SGR, SN,...





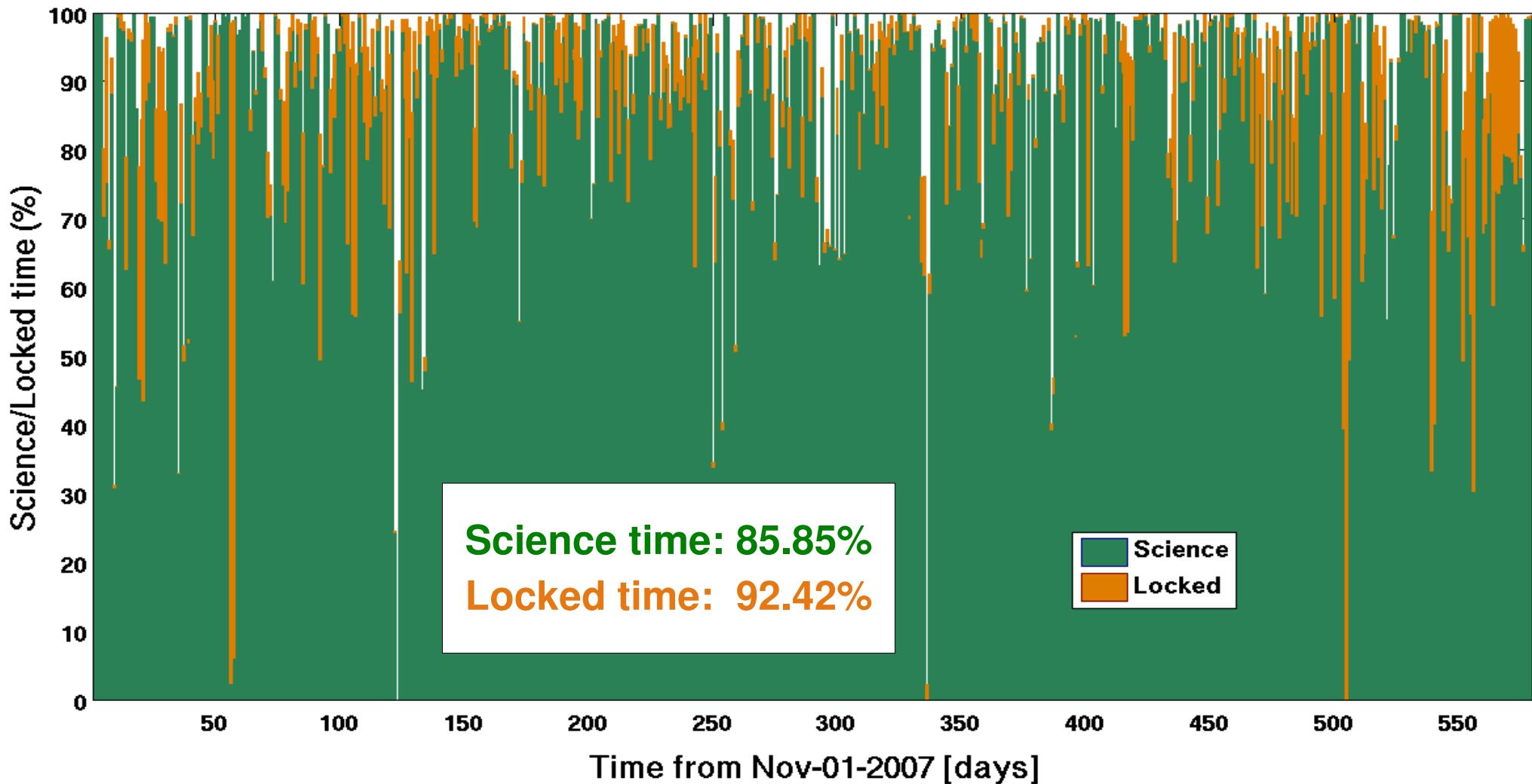
Operation in Astrowatch

- Remote weekend shifts by operators
- No night shifts, -> lost only about 1.5% of total time by not automatically relocking interferometer at night
- Allowed for daytime experiments
(goal: 80% science time)





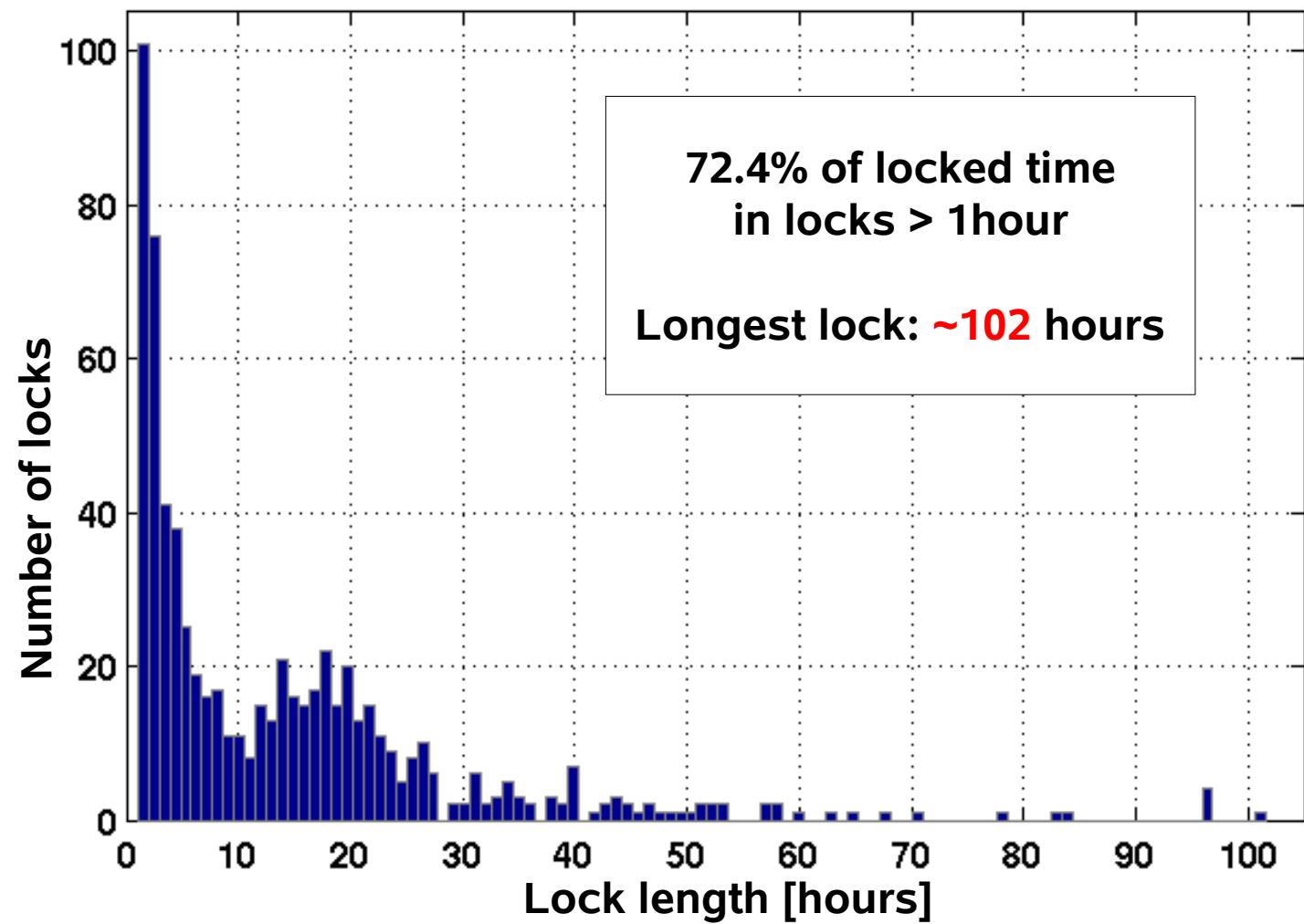
GEO - Astrowatch Science Time



Nov 2007 – June 2009: 496 days of science data collected



Histogram of Lock Lengthes (>1h)

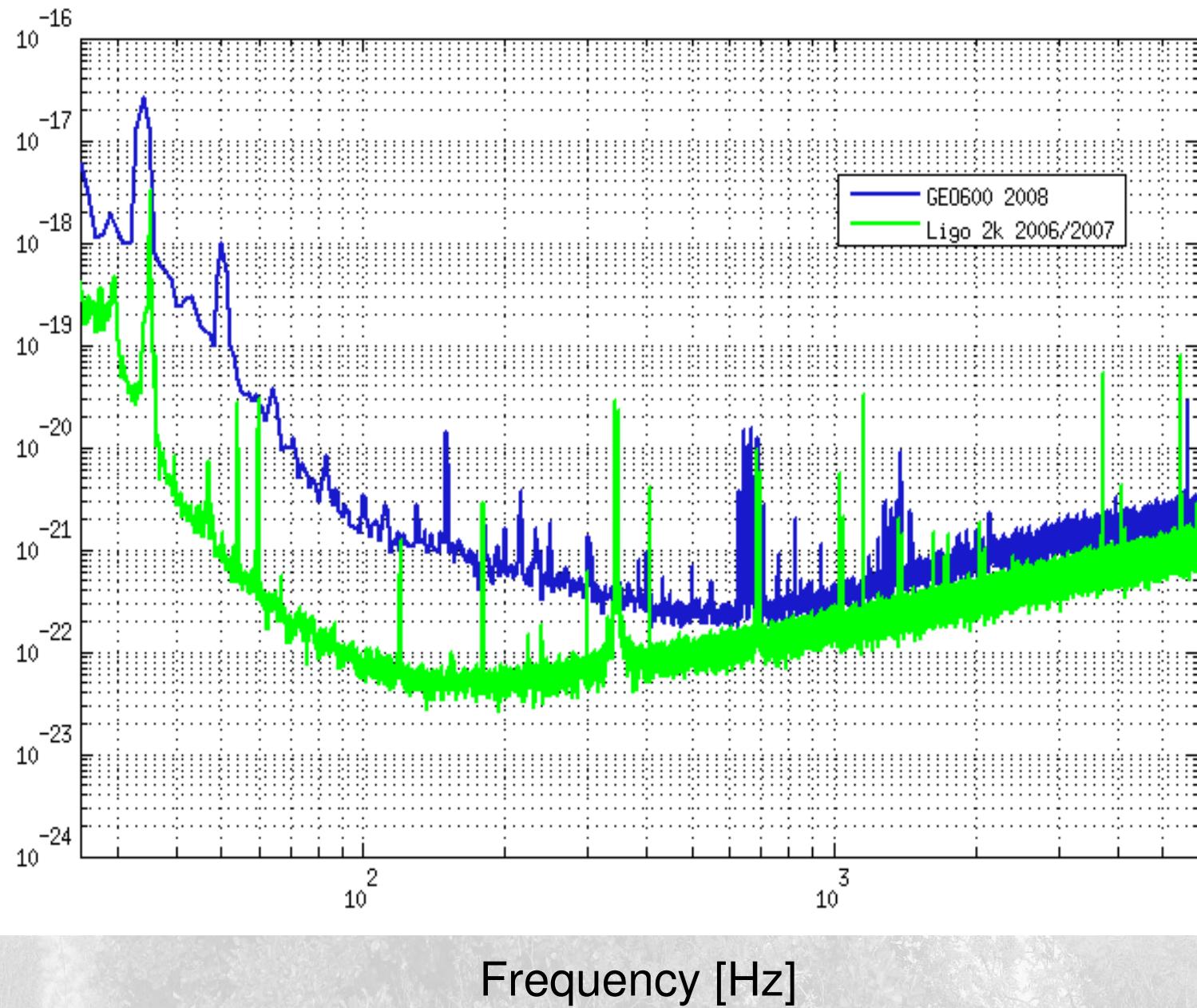




GEO600 / Ligo H2 in Astrowatch



Strain [$1 / \text{Hz}$]

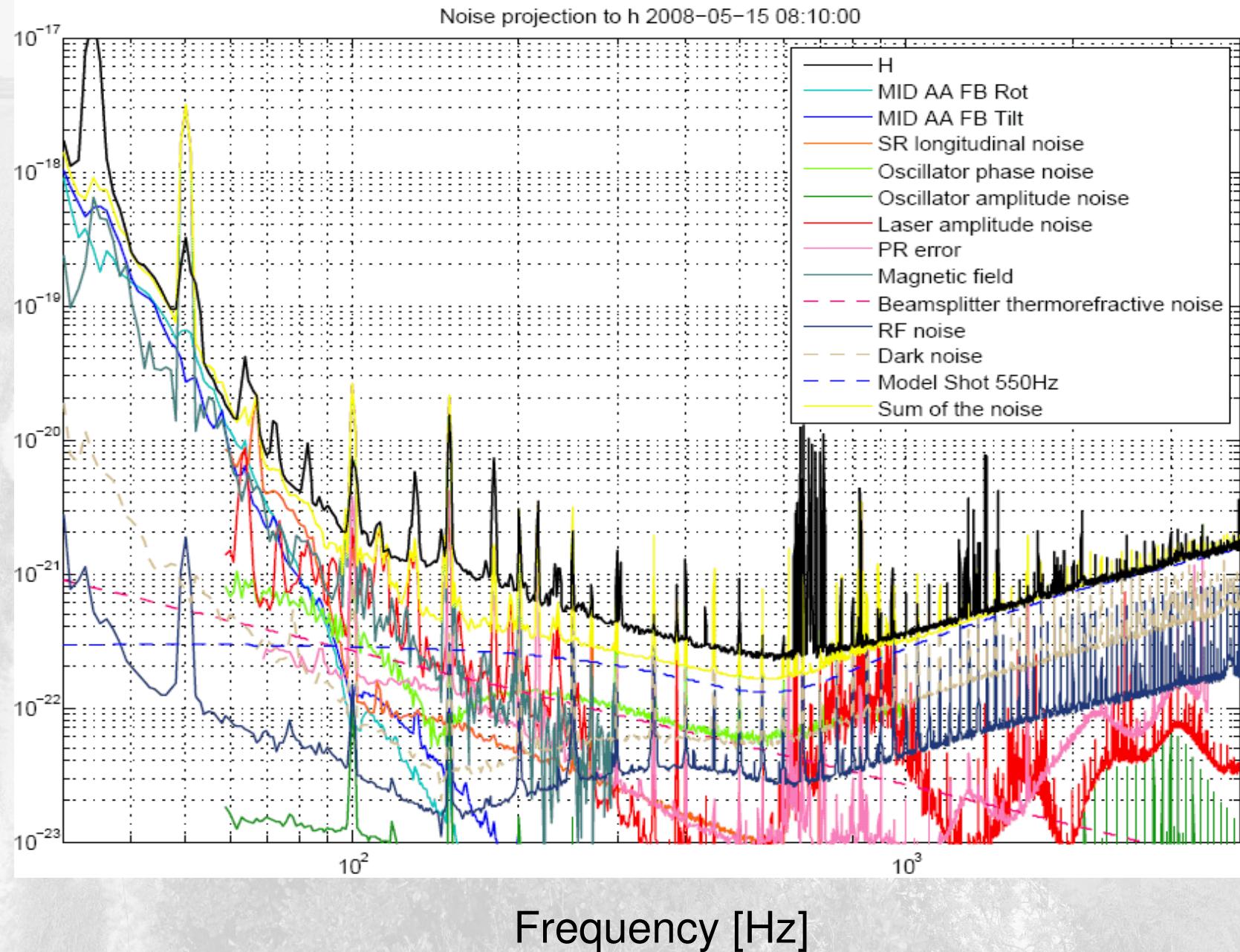


10



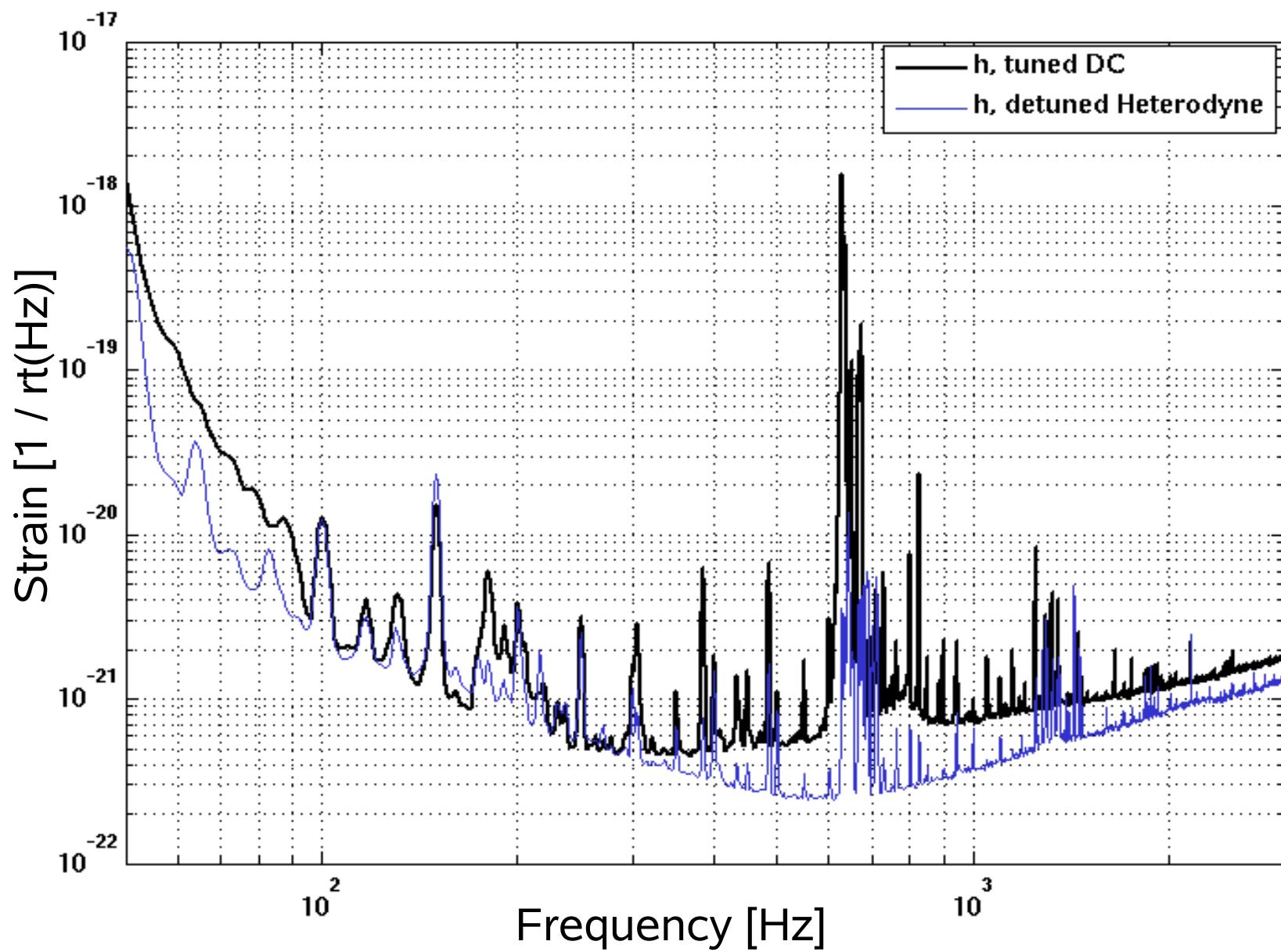
Noise Projections

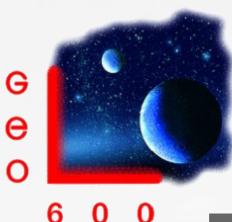
Strain [1/sqrt(Hz)]





Recent DC-Readout vs. Heterodyne





Plans



2009

- We will end Astrowatch on 7. July 2009
- Start of GEO-HF: Sequential upgrades
 - Squeezing (tuned SR with DC-readout)
 - OMC
 - Adv. Ligo CDS system for SQZ, OMC, GEOcontrols

2010

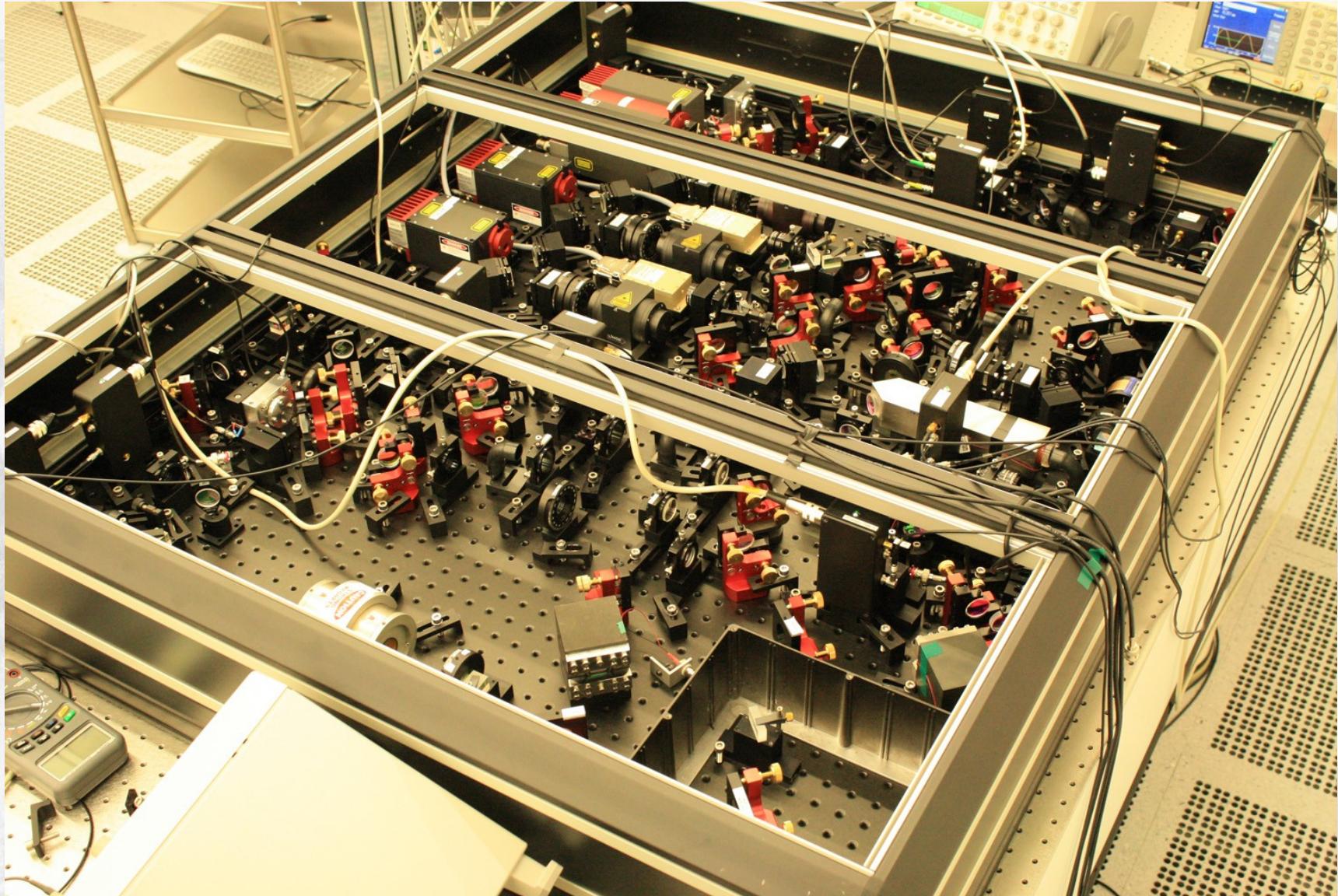
- Circulating light power increase ~factor 8
new IMC mirrors, new EOMs ?, shadow sensors fix, thermal compensation for BS, 35W main laser

2011

- Signal recycling bandwidth increase ~factor 4
- ...

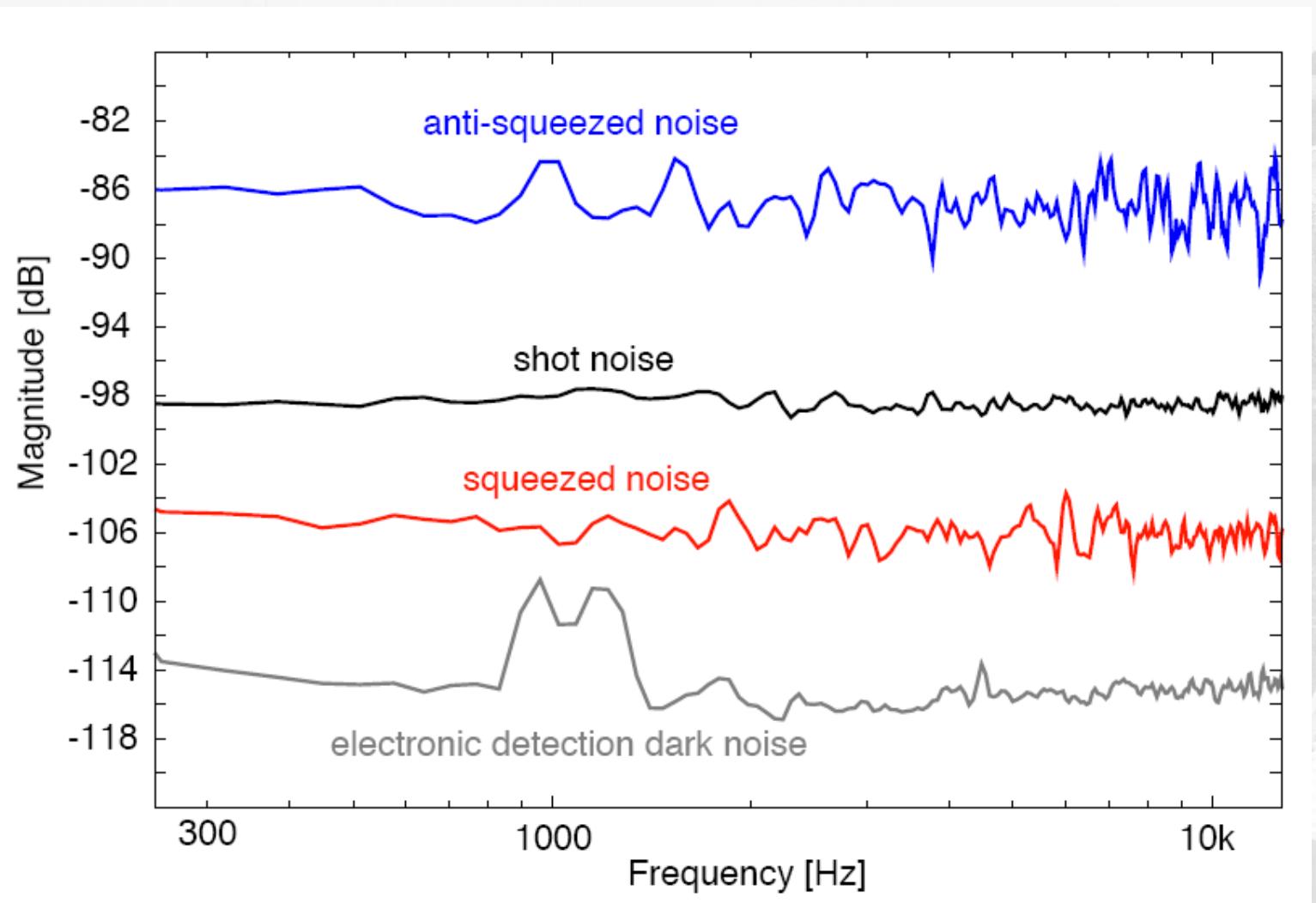


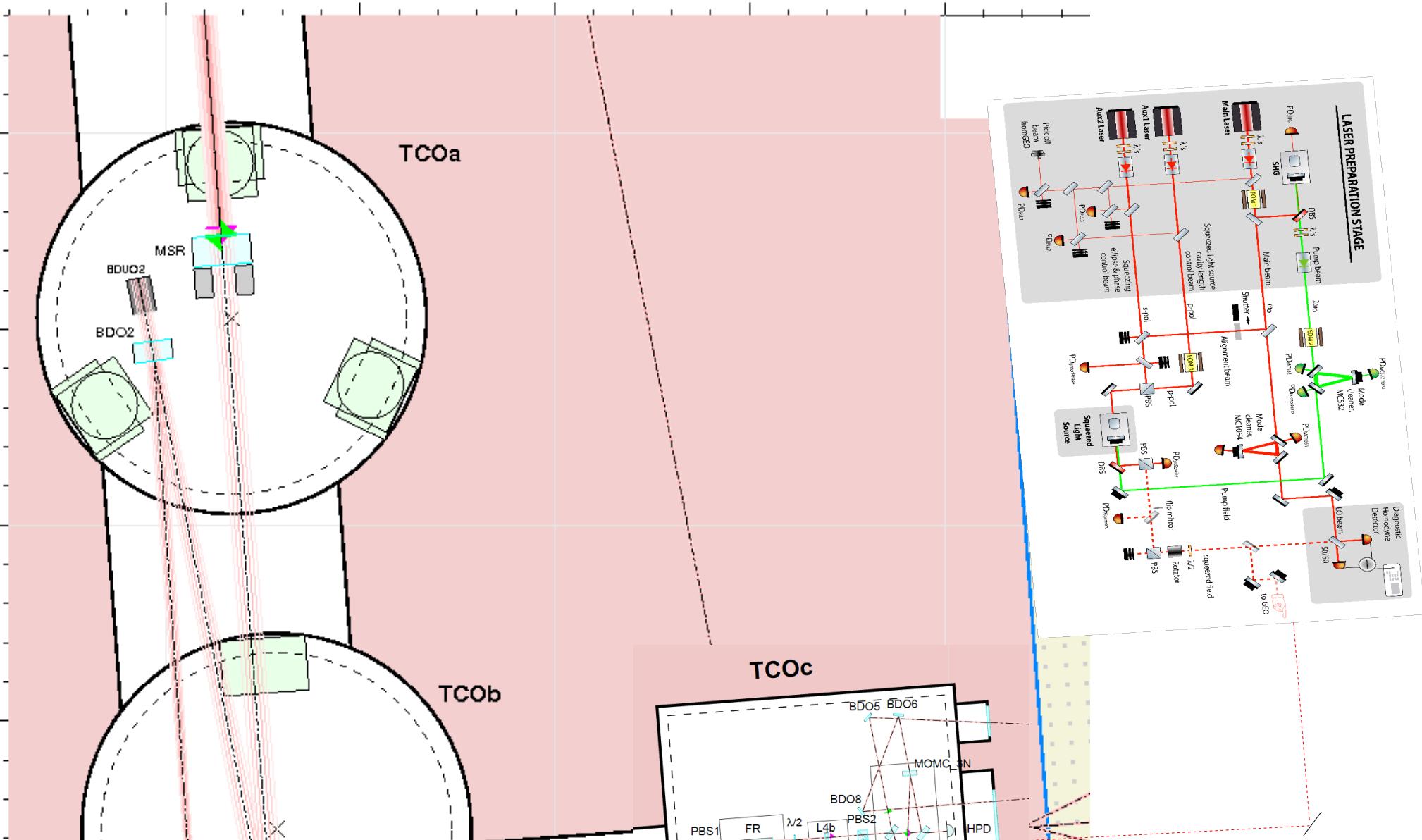
The GEO-Squeezer





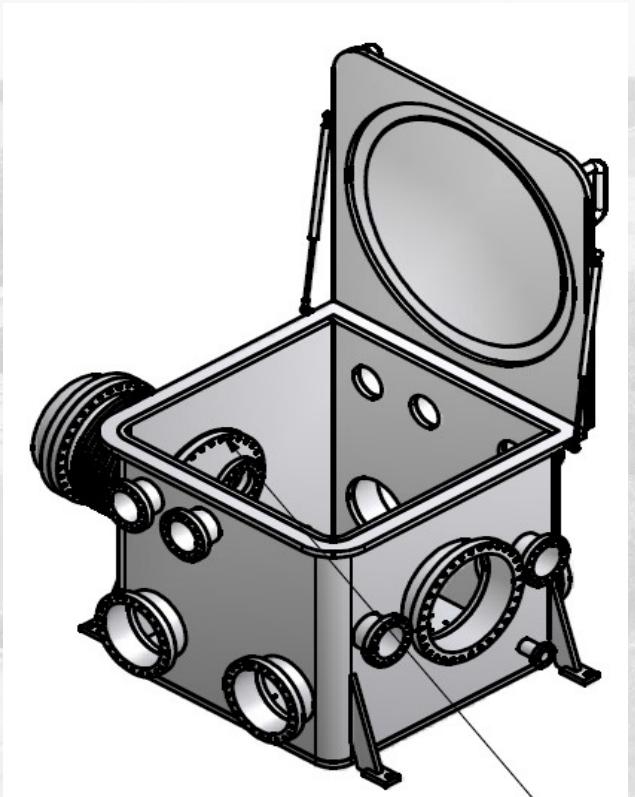
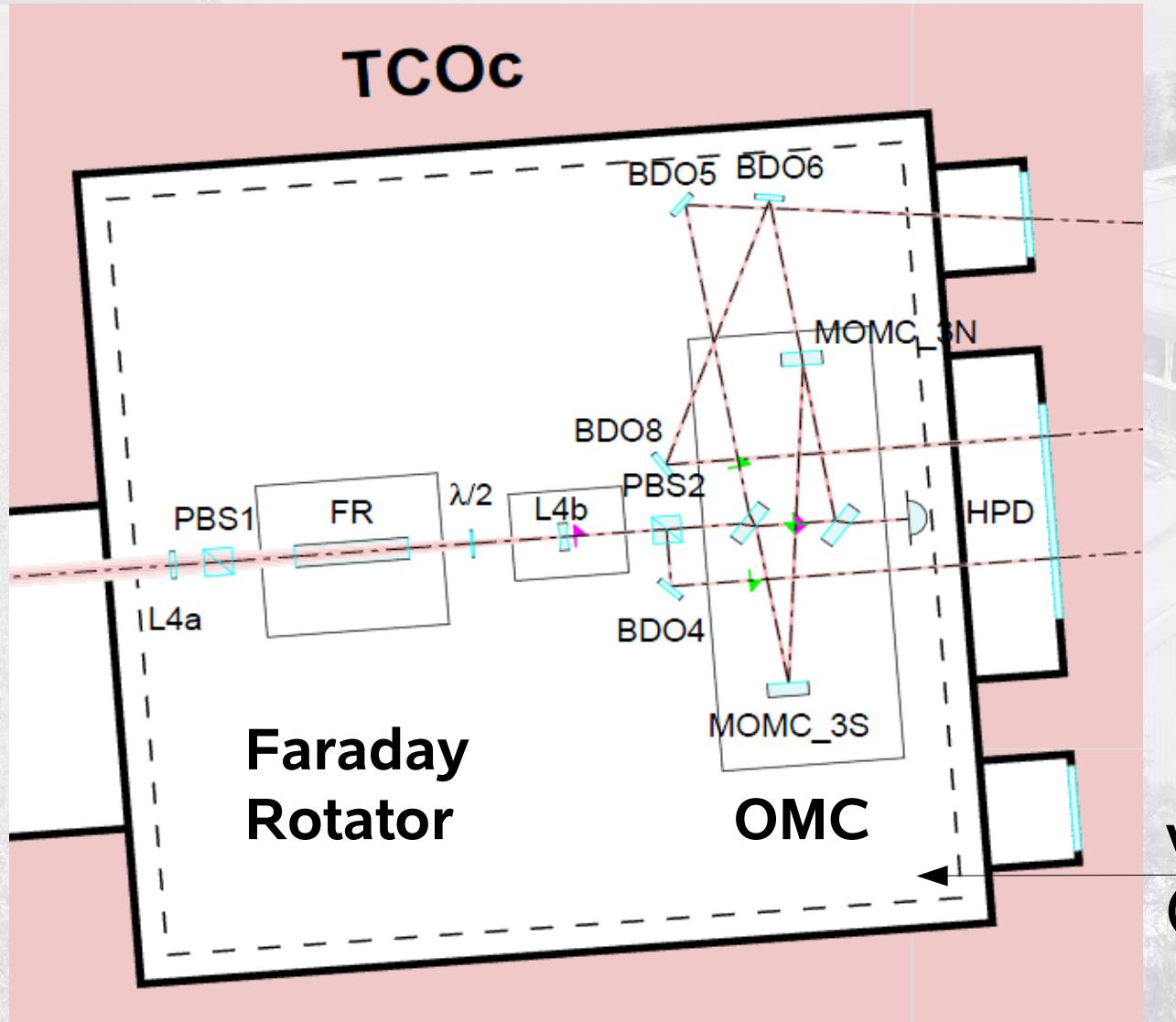
...and a first glance at the performance





Simon Chelkowski: *How to inject a squeezed vacuum field into a gravitational wave detector*

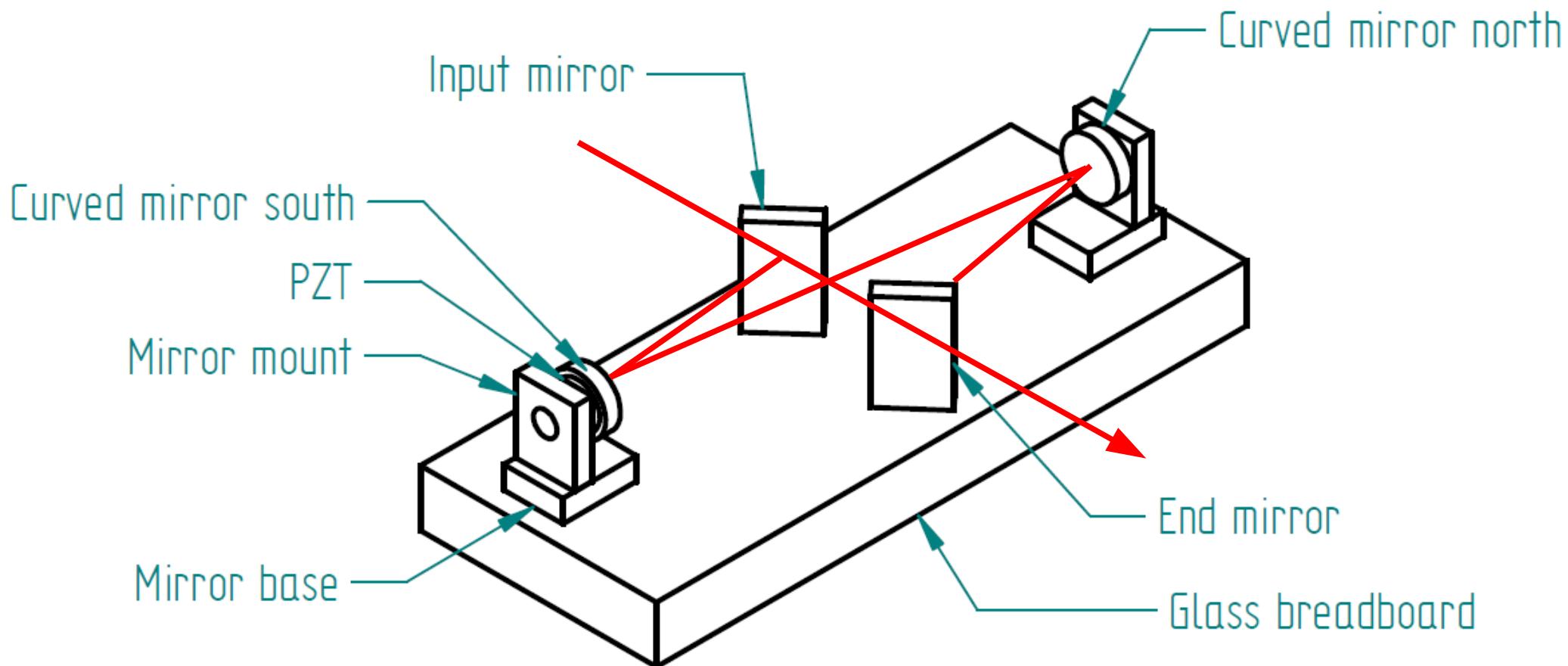
New Vacuum Chamber



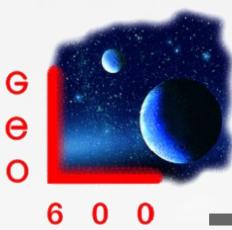
**Vibration-Isolated platform
(Minus-K)**



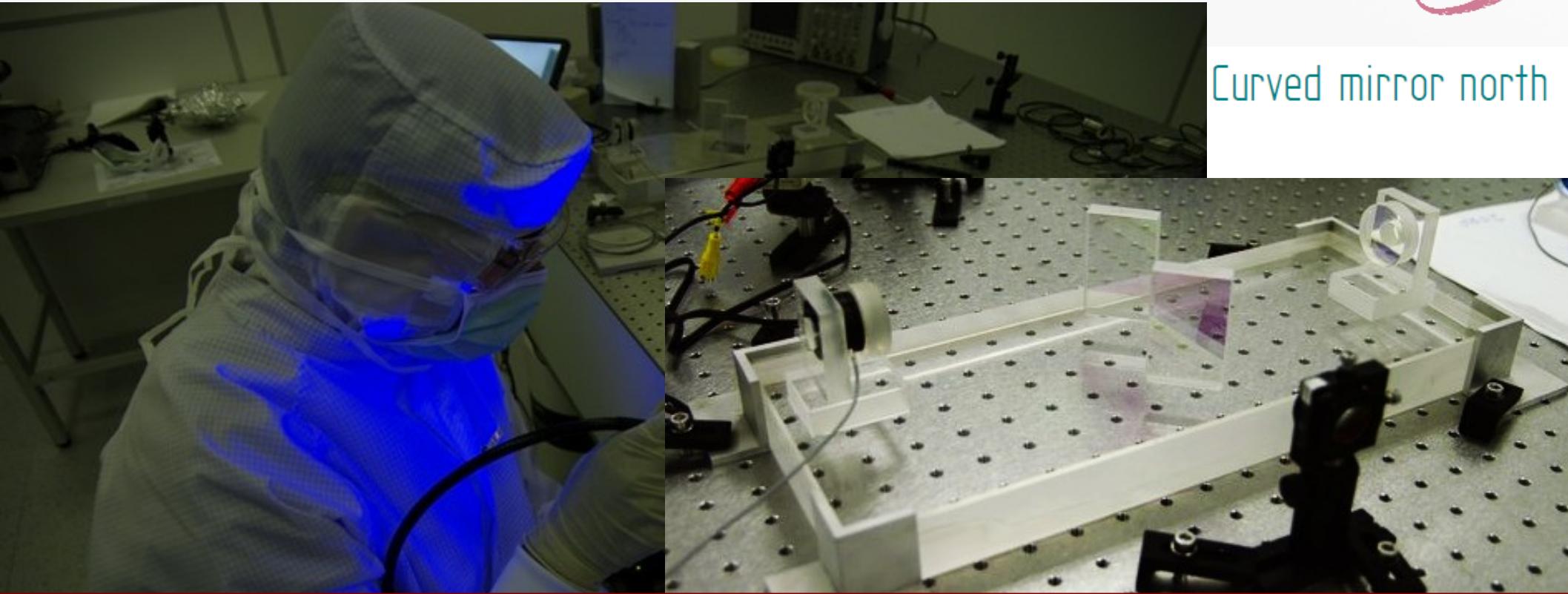
GEO - OMC



- Finesse 150
- Rejection of HOM and SB power > 100



GEO - OMC



Curved mirror north

Jerome Degallaix: *Commissioning of the tuned DC readout at GEO600*

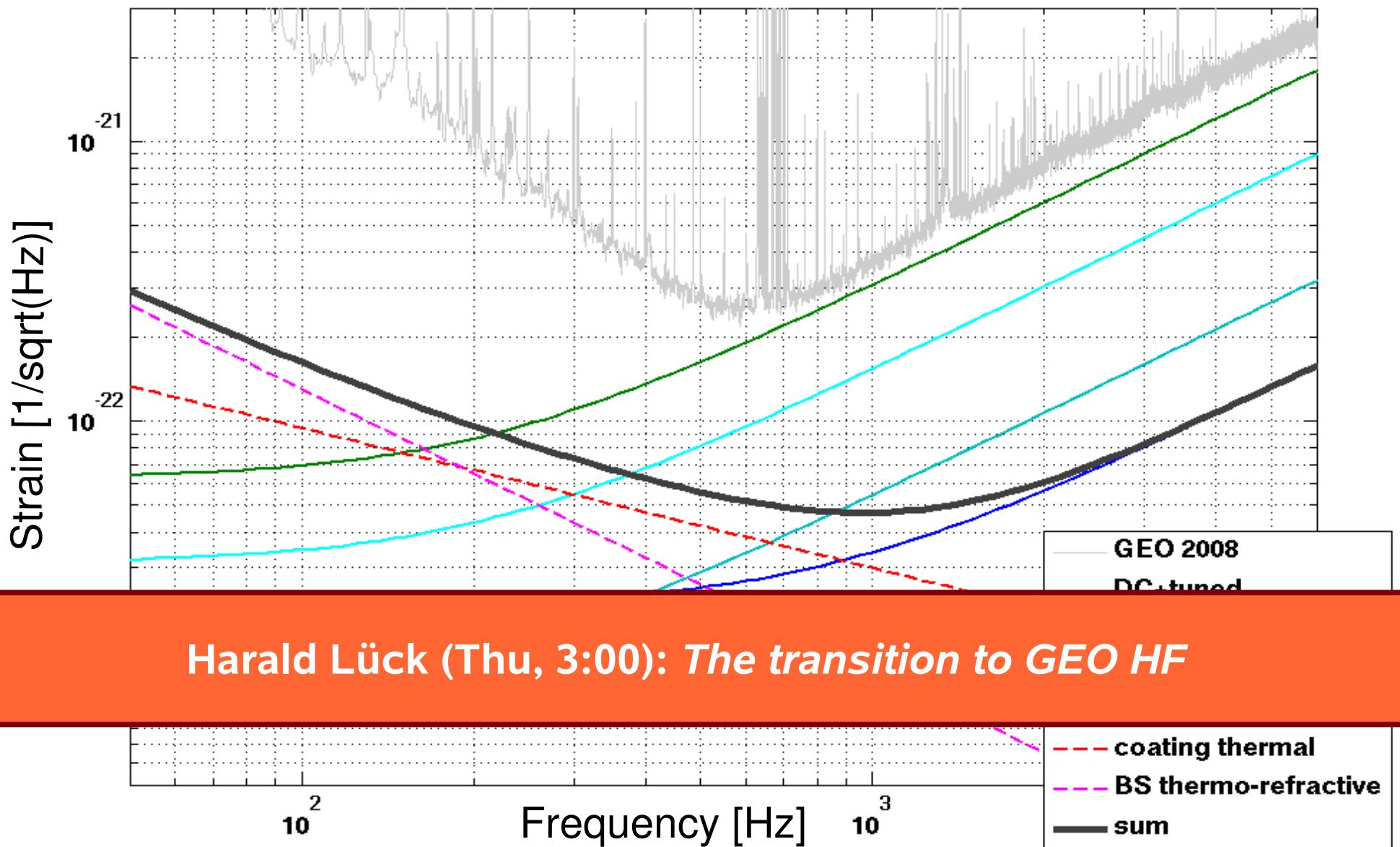
Mirko Prijatelj:

Control and Automatic Alignment of the Output Mode Cleaner of GEO

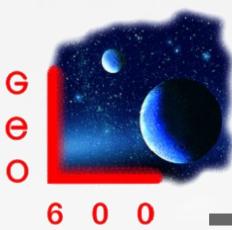
PROJECTION OF 10W AND 3D POWER > 100



GEO-HF Sensitivities



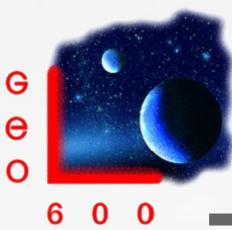
Harald Lück (Thu, 3:00): *The transition to GEO HF*



Summary

- Astrowatch since Nov 2007: > **85%** science time
- Start of GEO-HF upgrades on 7. July 2009:
 - Squeezing (DC readout, tuned SR)
 - OMC
 - Circulating light power increase
 - Signal recycling bandwidth increase





GEO Sensitivities

