
H1 Squeezer Experiment Update

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ANU, AEI, MIT, CIT and LHO

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Wiki: <http://baikal.mit.edu/sqwiki/H1Squeezer>

Email list: <http://mm.ligo.caltech.edu/mailman/listinfo/squeezer>

Motivation

- High power operation in future detectors
 - Biggest remaining technical risk (after DC readout)
 - Squeezing allows for lower laser power
- Squeezer technology now ready
 - 7 dB of squeezing down to 10 Hz
 - Has been demonstrated on a bench and on interferometers (40M)

Missing: Low frequency noise demonstration

- Planned Experiments
 - GEO600: prototype for long baseline interferometers
 - Hanford H1: low noise at low frequency

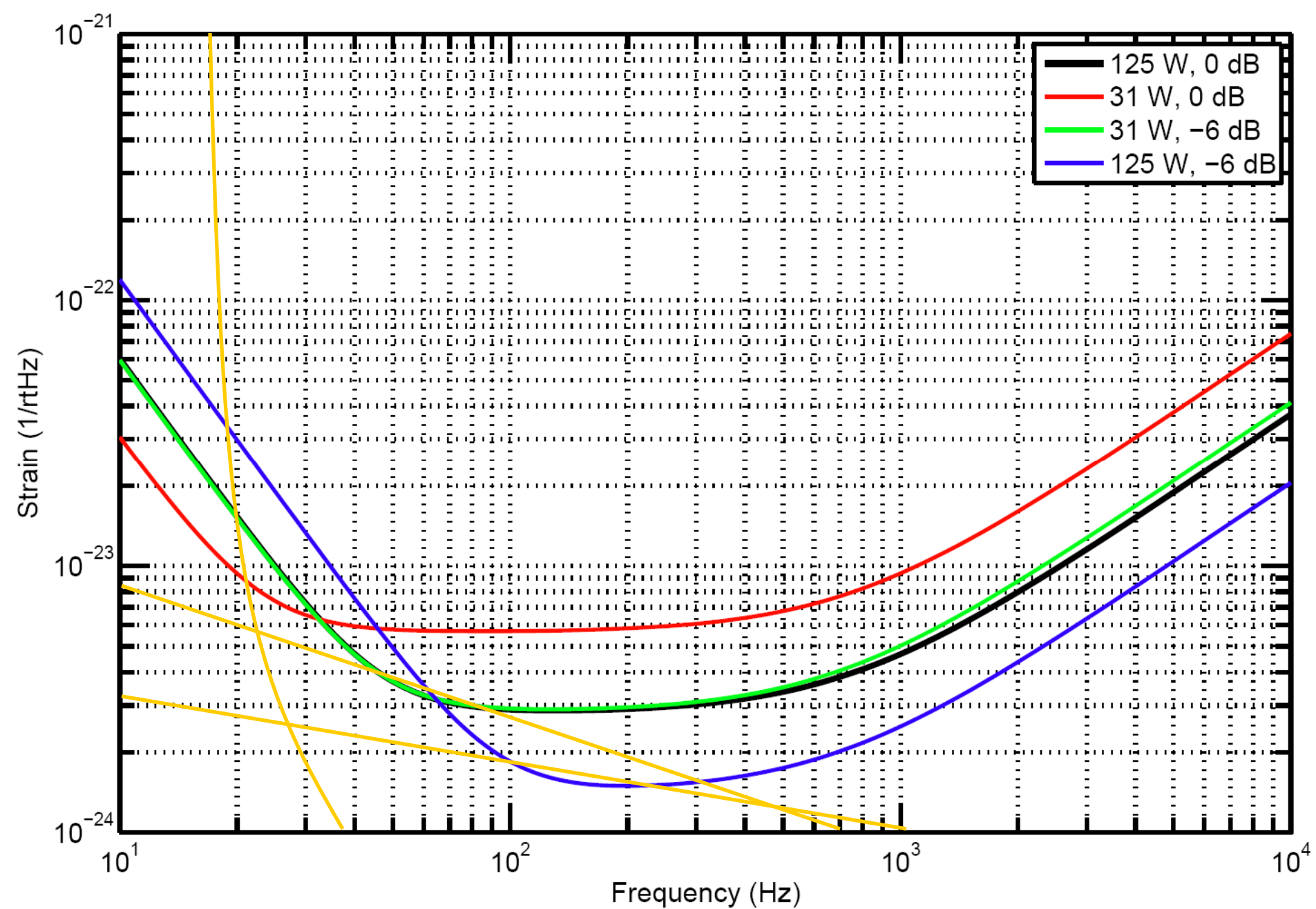
Goal of the H1 Squeezer Experiment

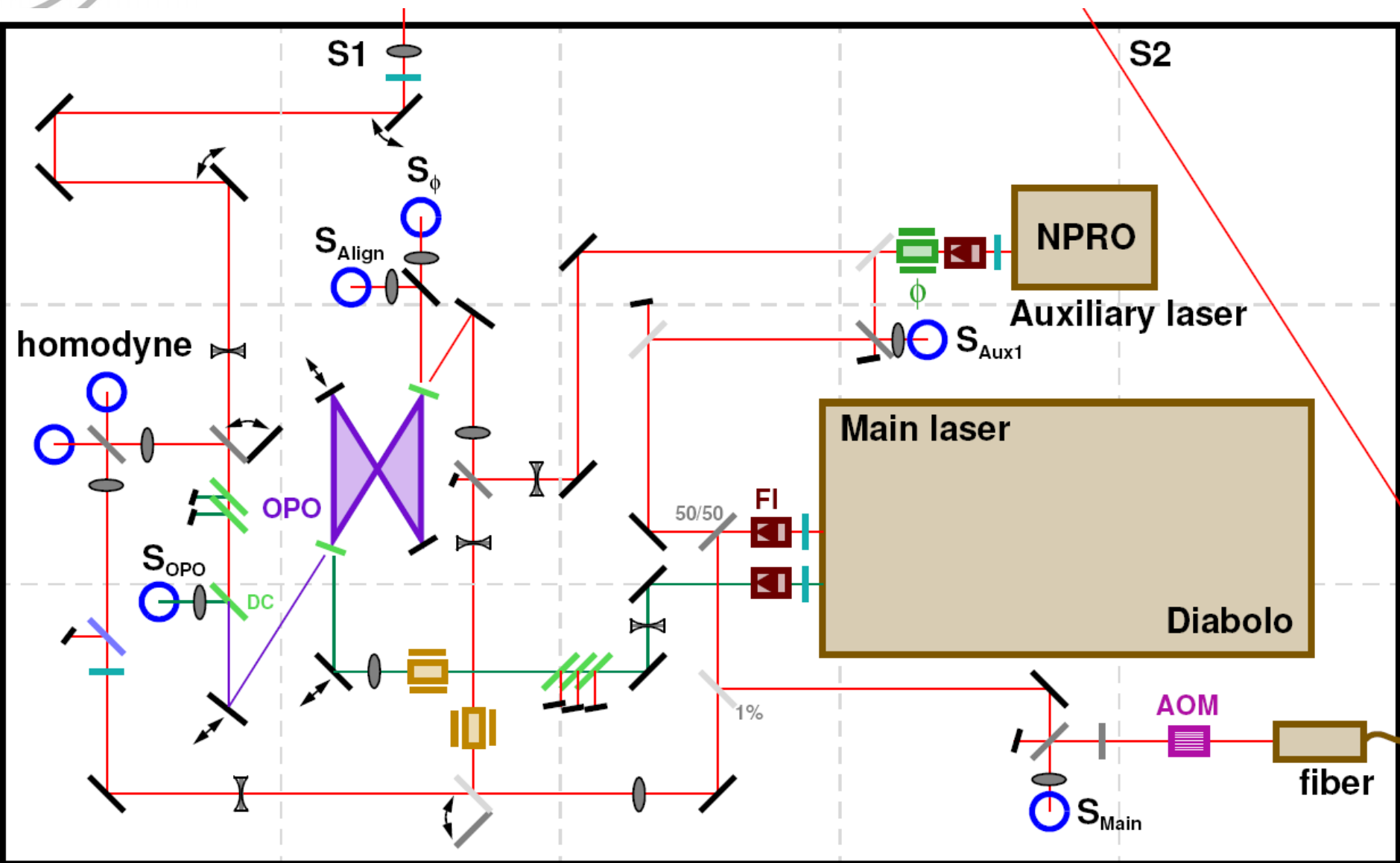
- ❑ Demonstrate squeezing at low frequency with a high sensitive long baseline interferometer
 - Demonstrate 3 dB of squeezing at frequencies where we are shot noise limited
 - Do not introduce noise at other frequencies!
- ❑ (Build a squeezer which could be readily turned into an advanced LIGO upgrade
 - Fully engineered optical breadboard
 - Use LIGO type electronics and controls
 - Prepare for long-term reliability investigations)
- ❑ Be ready for a test on H1 after S6

H1 Squeezer Time Line

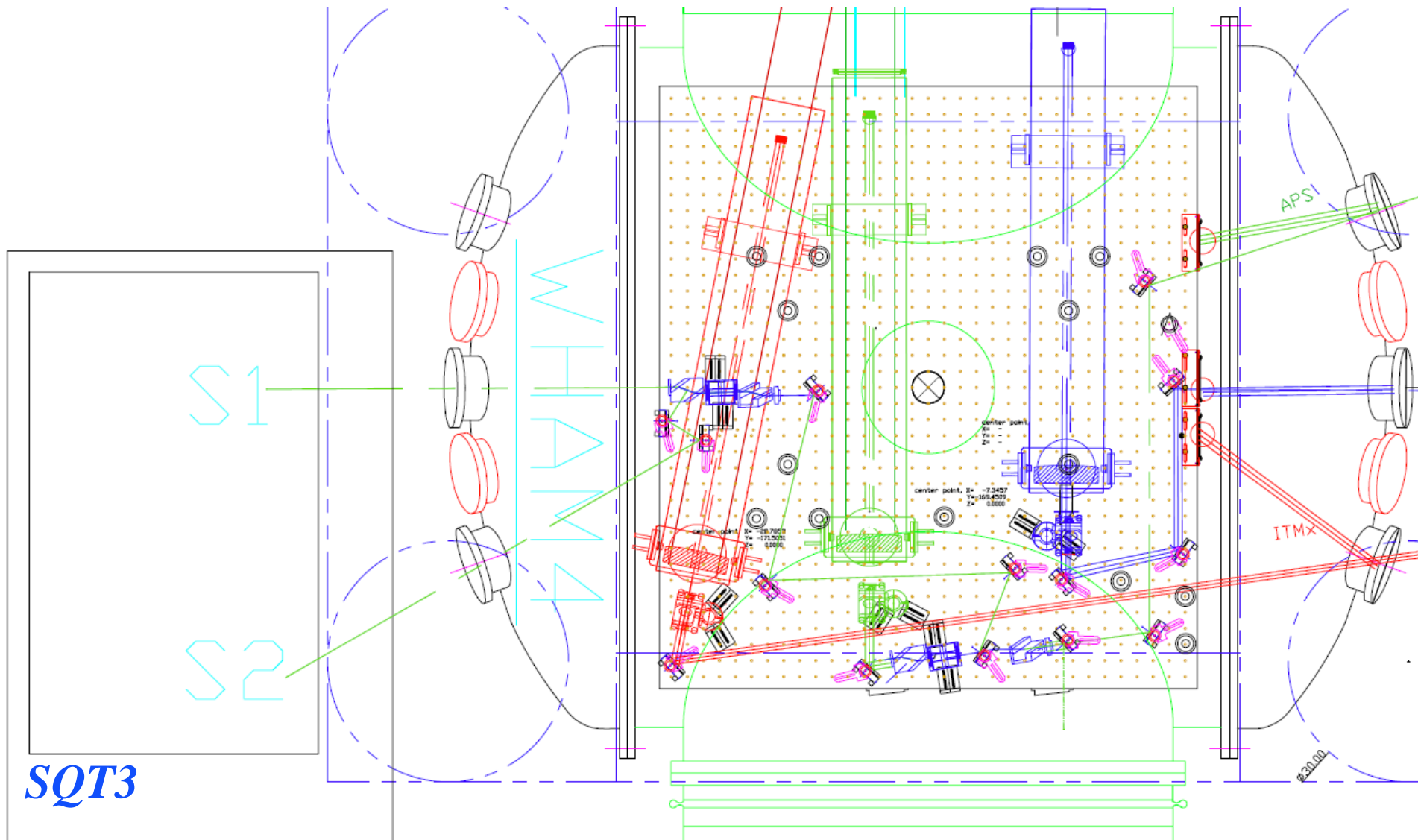


- ❑ Fixed start date for H1 experiment: 2/15/2011
 - ❑ Fixed end date for H1 experiment: 10/3/2011
- Better be ready!

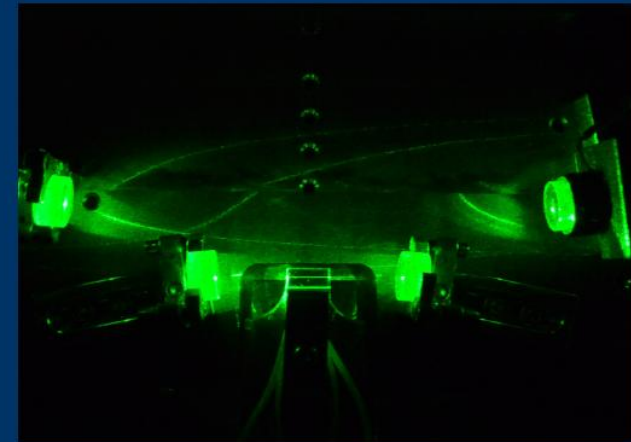
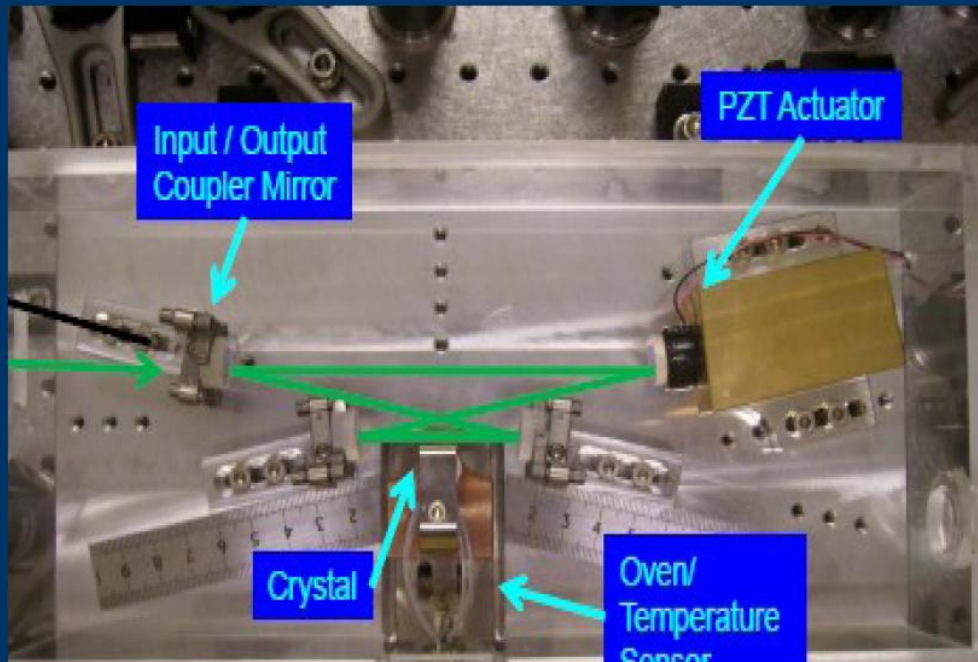




HAM4 Layout



New cavity from Ping Koy's group



- ANU machine shop just finished machining more of these bases, including 2 with 4" beam height
- Barely stable cavity- g is almost 1

Recent Progress

- ❑ Technical review was on 8/19/08
 - Most action items have been addressed (L080140-00/L080130-00)
- ❑ Budget/schedule review was on 1/15/09
 - Looked at costs saving by using existing equipment from H2
 - Report available at M0900042-v1
- ❑ Use LIGO I laser to pump a AEI designed SHG
- ❑ Laser system assembly at MIT
- ❑ First 50k\$ allocated to build SHG & laser locking
 - Building of SHG started at MIT
 - Electronics is in development (borrow from initial & adv. LIGO)
 - No slack left in schedule