

an optomechanical transducer
for the AURIGA "bar" gw detector

cryogenic optics towards the quantum limit:

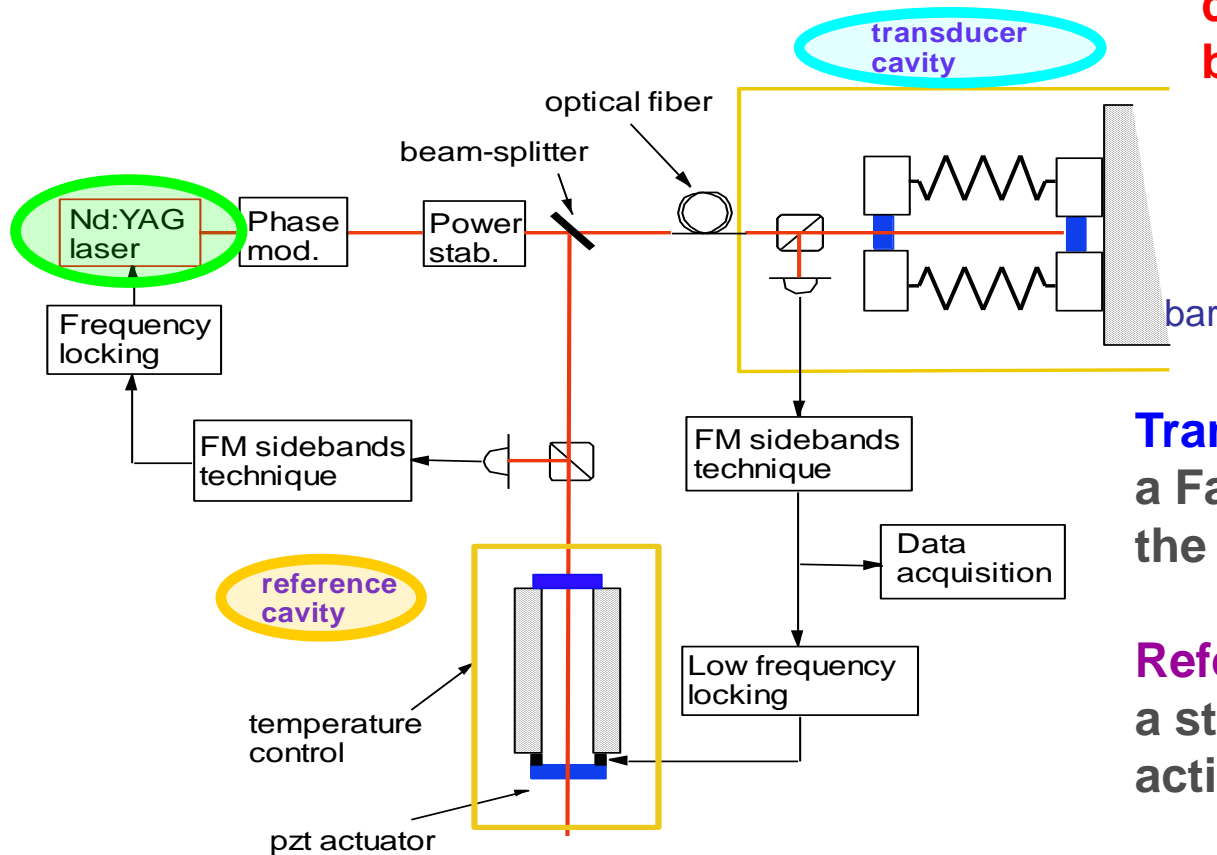
high finesse cavities, fibers, piezo actuators, etc @ 4.2 K

concept and optics: Livia Conti, Maurizio DeRosa, Francesco Marin

cryogenics: Michele Bonaldi, Giovanni A. Prodi, Luca Taffarelli, Jean-Pierre Zendri

Optical Transducer

The Concept



Variations of the transducer cavity length are measured by the stabilized laser

Transducer cavity:
a Fabry-Perot cavity between the bar and the resonant plate

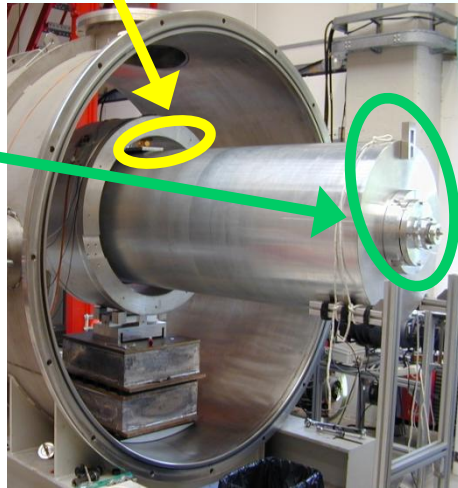
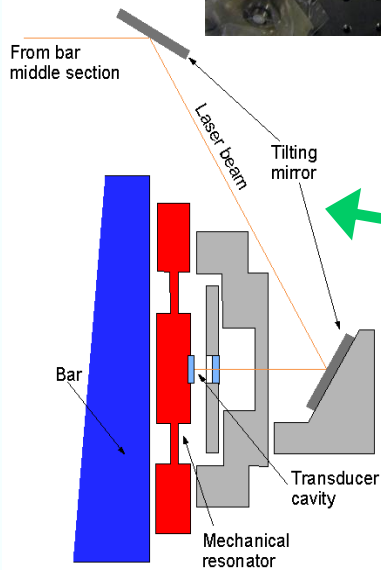
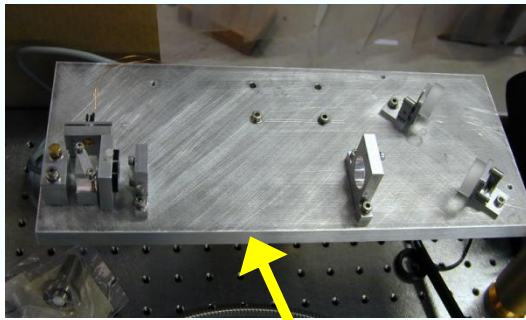
Reference cavity:
a stable Fabry-Perot cavity acting as length reference

Laser source frequency
locked to the reference cavity

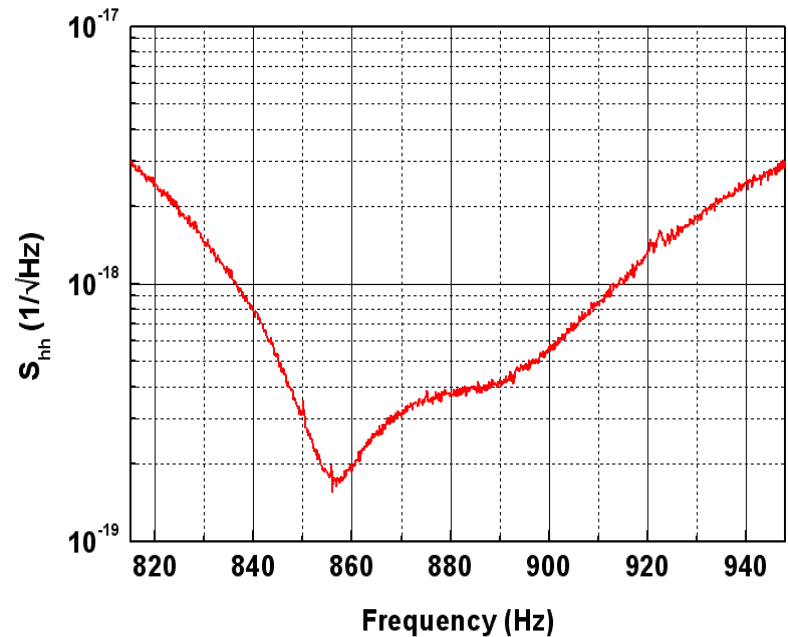
Optical Transducer

Status: Room temperature test

Experimental set-up



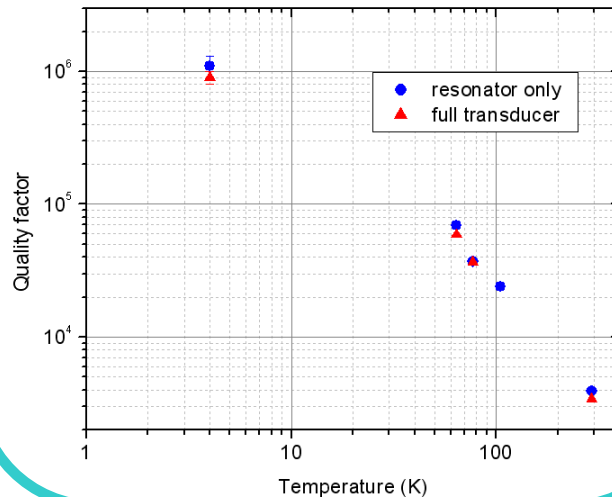
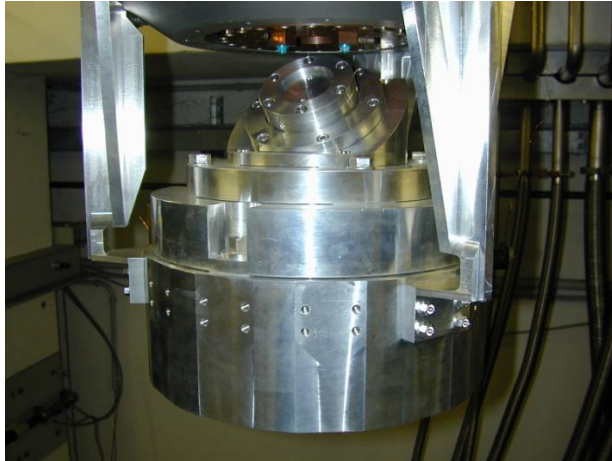
Achieved gw sensitivity



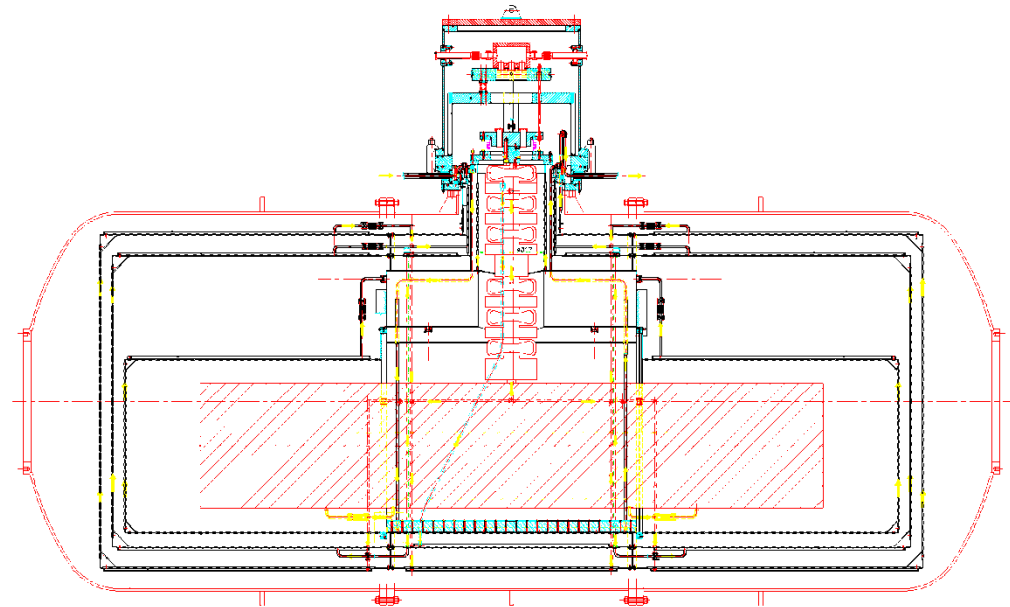
Optical Transducer

Status: Cryogenics

Q measurements in the
Transducer Test Facility



New Cryostat for the bar
resonator under construction



will operate at 4.2 K ~ 1 year

- a prototype gw detector in coincidence with AURIGA
- study at low T the coating thermal noise and the substrate thermoelastic noises ("thermodynamic" and "photothermal") at the displacement level $\sim 10^{-20}$ m/Hz^{1/2}

