

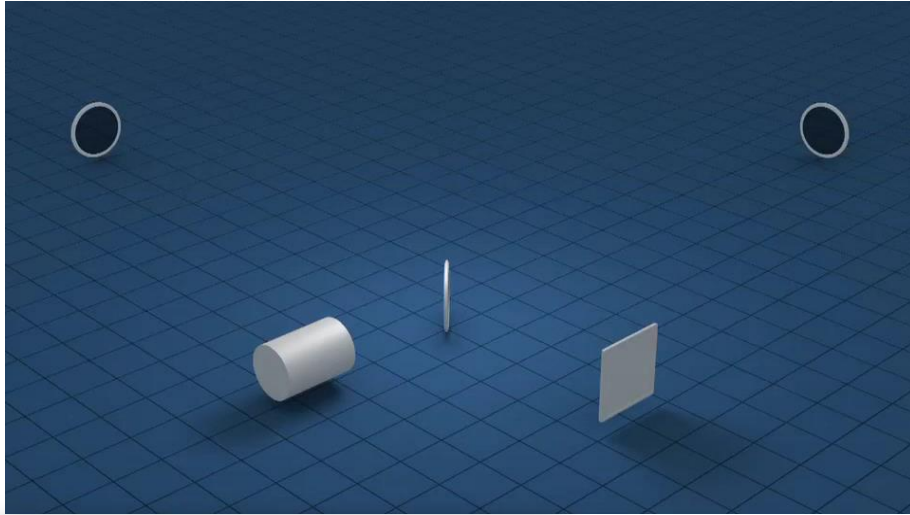


BS and MS thesis projects within the Experimental Gravitational Waves group in Padova

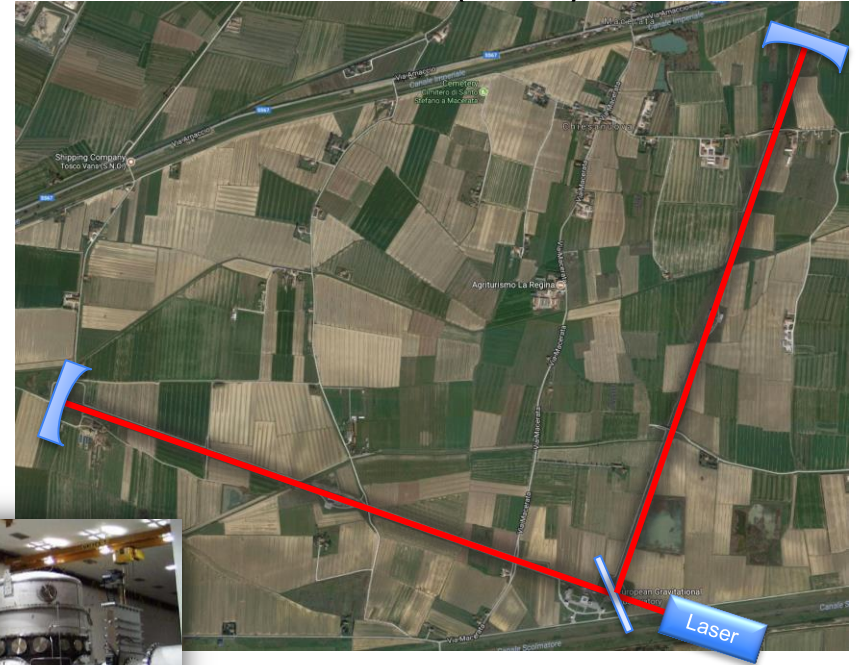
Speaker: Marco Bazzan

Experimental GW Group: Livia Conti, Giacomo Ciani, Jean-Pierre Zendri, Valeria Milotti, Hanna Skliarova, Massimiliano Bonesso, Nicole Busdon

The incredible machine

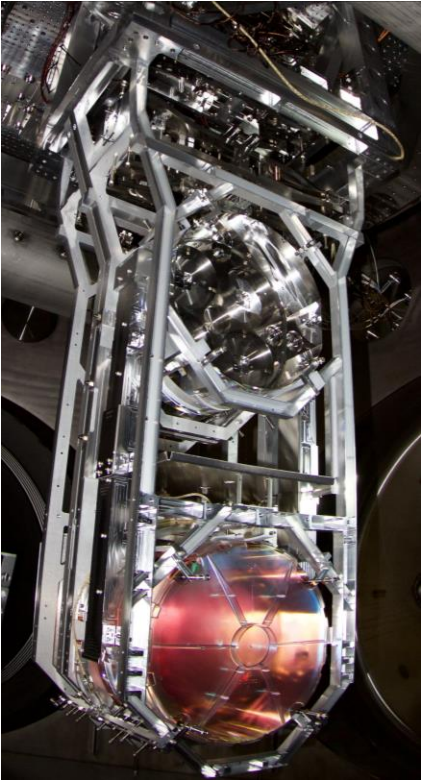
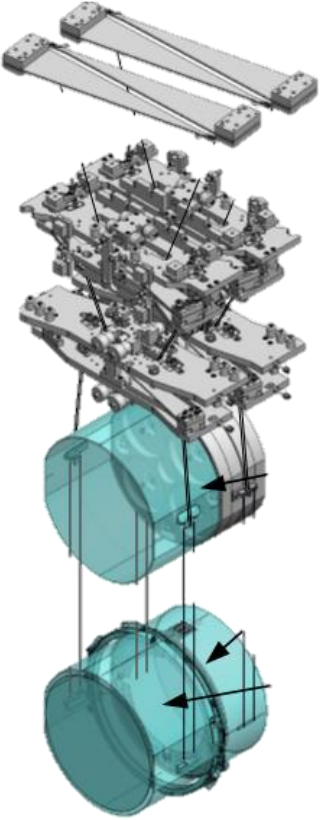
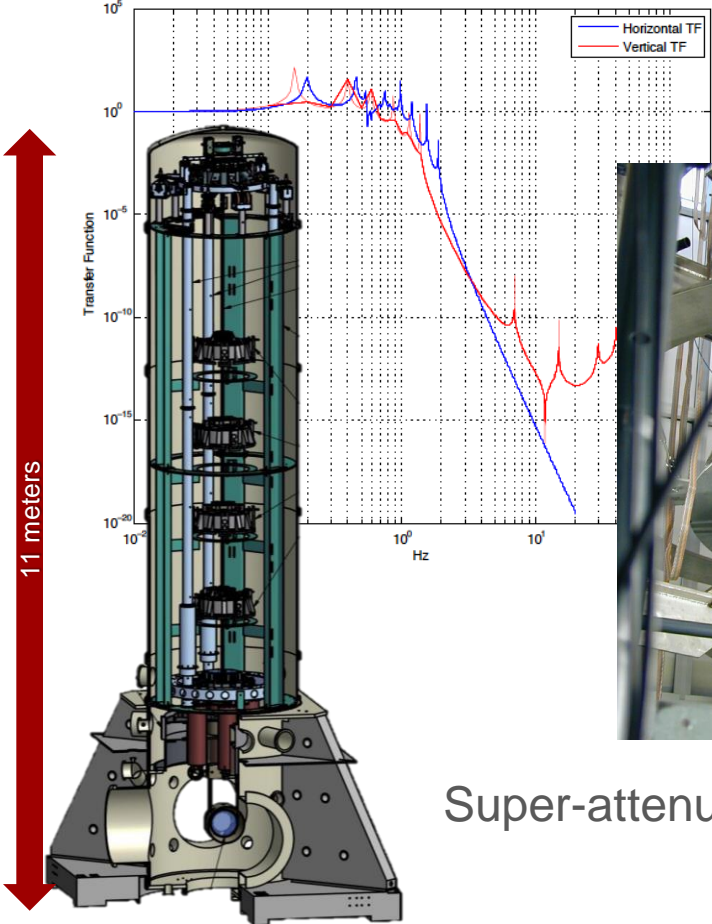


Interferometer *Virgo* Cascina (Pisa)



Sensitivity: 10^{-19} m !!!!!!!!!!!!!!!!!!!!!!!!!!!!!

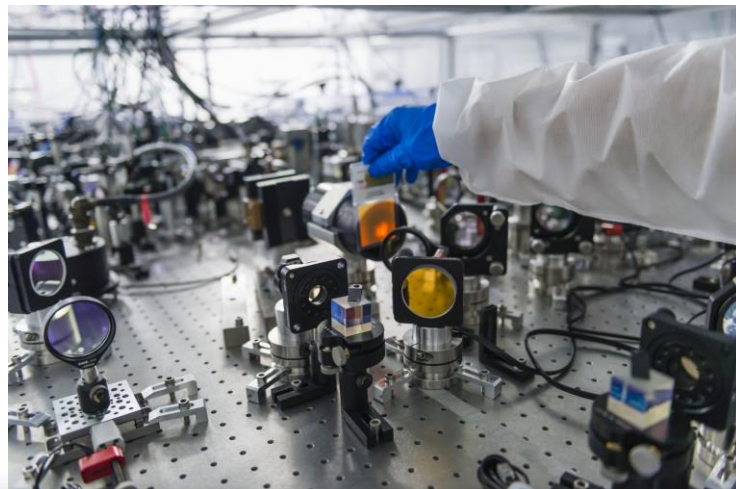
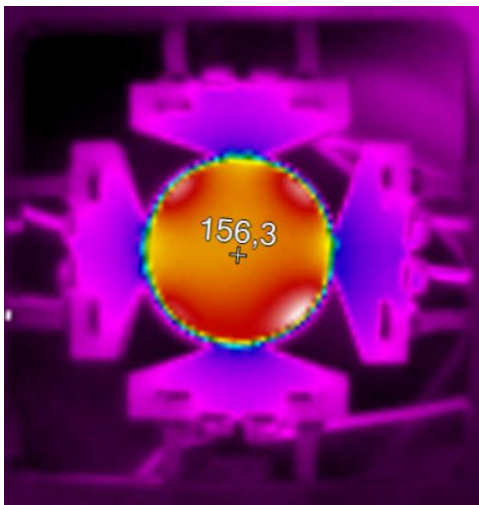
Mechanics



Super-attenuators. Vibration control. Thermal noise.

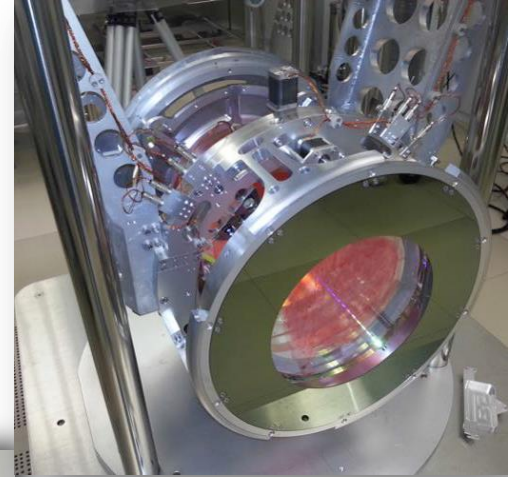
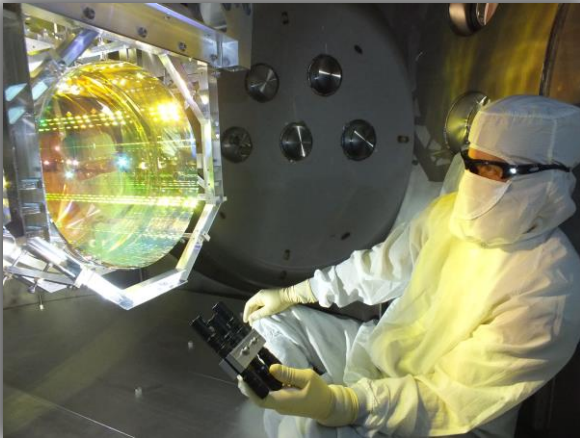
Optics

- High power lasers, high stability (>100W)
- Adaptive Optics
- Beam control and stabilization
- Quantum noise reduction



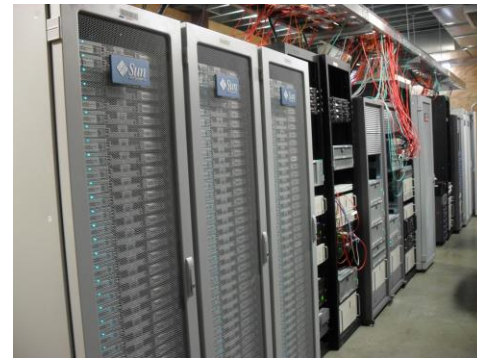
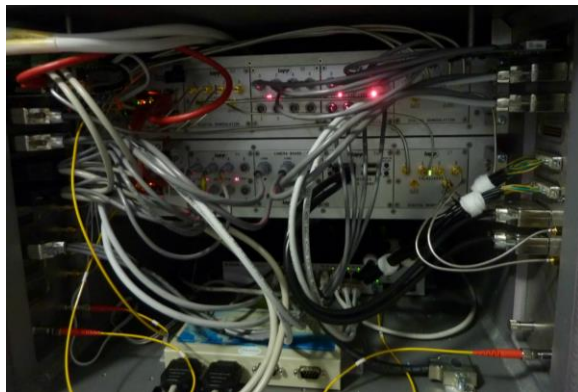
Materials

- Special optical coatings
 - Fabrication
 - Characterization
 - Understanding structure- property relationship



Electronics

- Real-time control
 - Dedicated softwares
 - Custom electronics
 - Remote control



- Data calibration and storage:
 - 37 MB/s... 3000 GB/day!

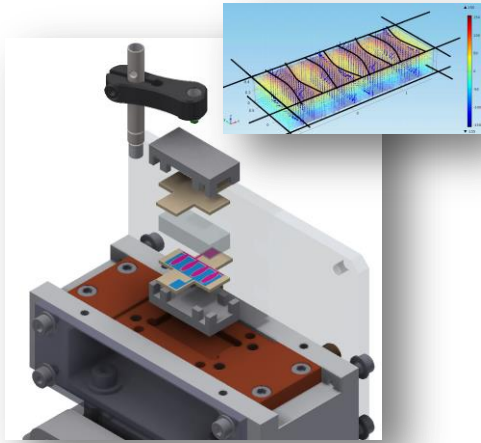


Padova people

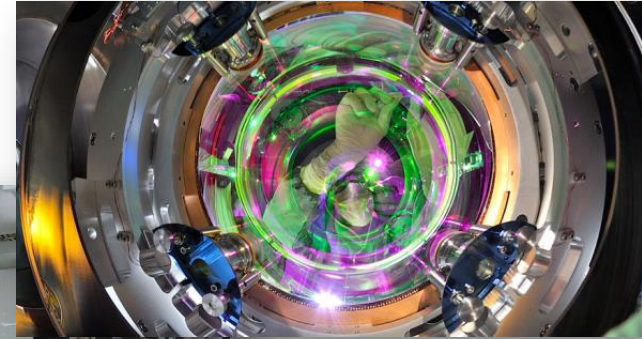
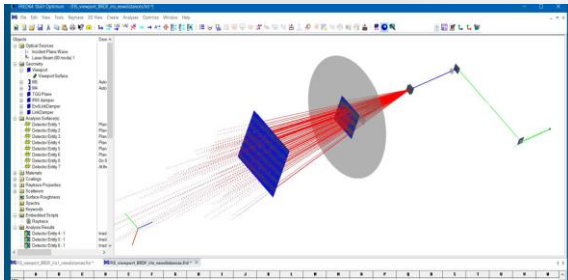
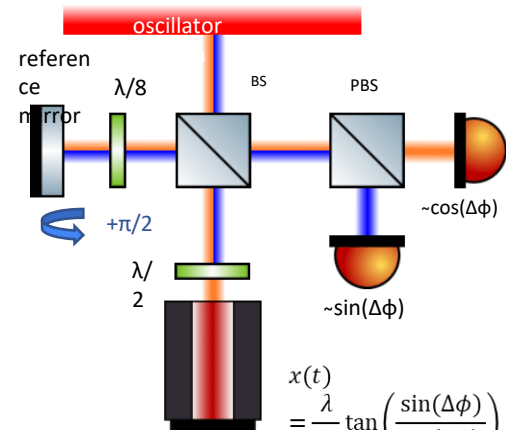


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L. Conti, N. Busdon, V. Milotti, H. Skliarova, J.-P.
Zendri, M. Bonesso

- **Long tradition** in **Gravitational Waves experimental science** (dating back to the Auriga bar detector)
- Leading contribution to **Advanced Virgo quantum noise reduction**
- R&D for present (Advanced Virgo) and future (**Einstein Telescope**) detectors
- **Multidisciplinary** research bridging
 - **laser/quantum optics,**
 - **solid state physics/material science**
 - **electronics**



- **Laser mode-matching** sensing and correction
- **Thermal noise** in mechanical systems out of thermodynamic equilibrium
- **Scattered light** impact in GW detectors
- **Optical coatings** characterization and optimization
- **Ultra-low absorption materials** characterization at cryogenic temperatures



Contacts

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Group: Our labs are either in the DFA or at the INFN- PD labs hosted in the High – Energy Building in Legnaro National Laboratories. Contact us for further information or for a tour!