Gravitational Physics

Fisica della Gravitazione

Prof. Eugenio Coccia

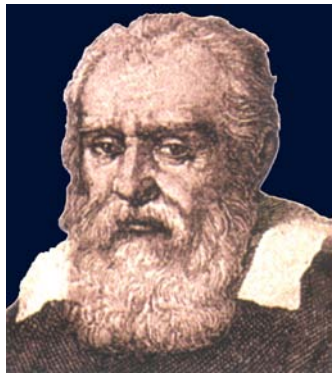
Experimental activities on gravitation have had a remarkable development in recent years. They contribute significantly to our understanding of the fundamental interactions.

The University of Rome “Tor Vergata” has a tradition in this field and is present in major initiatives such as the ones for the detection of gravitational waves.

We will discuss the main experimental tests of gravitational physics and their meaning and will present the challenges of future experiments.

Program

• The principle of equivalence. Measurements of G and of the universality of free fall.
• Experiments and limits on deviations from Newton's law and on the existence of additional interactions.
• Gravitomagnetism. Measurements of the Lense-Thirring effect.
• PPN formalism and alternative theories.
• Noise reduction in experiments for the detection of weak signals
• Astrophysical sources of gravitational waves: supernovae, coalescence of neutron stars and blacks holes, pulsars.
• Stochastic background of gravitational waves.
• Experiments for the detection of gravitational waves on the ground and in space.
• Experiments for the detection of dark matter and dark energy
•Data analysis techniques.



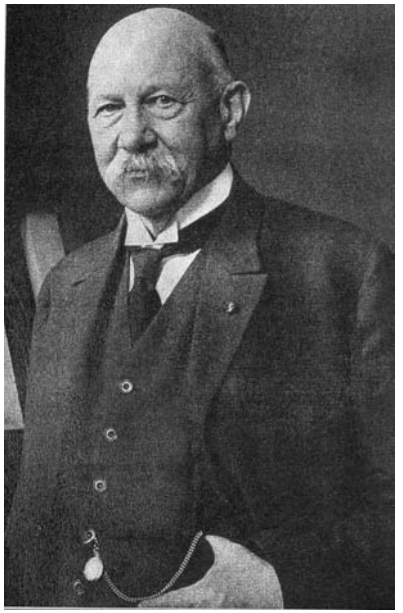
Experimental gravitational physicists are heirs to several great traditions:

- High precision mechanical experiments (Cavendish, Eotvos, Dicke..)
  detection of weak forces applied on mechanical test bodies

- High precision optical measurements (Michelson, laser developers…)

- Operation of ultraprecise e-m measurement systems (microwave pioneers of World War II)

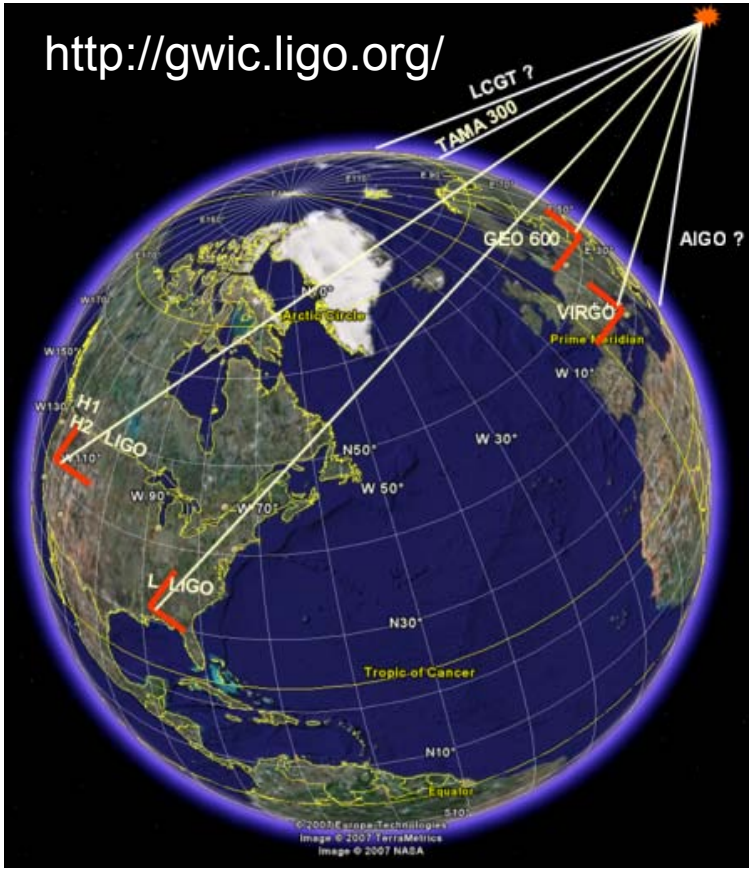
- Low temperature physics (K. Onnes)
  superfluids and superconductors technology



Tor Vergata
protagonist on gravitational wave detectors in operation

NAUTILUS,

INFN Frascati National Lab



Lectures in Caccin room (Aula Caccin)

Tuesday and Wednesday 11:00 - 13:00
October 11 - January 25

Receiving

Tuesday and Wednesday 3-4 pm

email: coccia@roma2.infn.it

Exam

25’ Seminar on one of the subjects of the course
15’ Answers to short questions on the rest of the program