

Mercoledì 20 Aprile 2016, ore 18.00, Aula Magna del Collegio Morgagni

## **“OPENING THE GRAVITATIONAL WAVE WINDOW TO THE UNIVERSE”**

Prof. Eugenio Coccia

University of Rome "Tor Vergata" and Gran Sasso Science Institute (INFN), Italy

### **Abstract**

Gravitational waves were predicted in 1916 by Einstein as ripples in spacetime caused by the acceleration and deceleration of masses. A century after this prediction, the first direct detection of gravitational waves has recently been reported by the LIGO and Virgo Collaborations. The signal matches the waveform predicted by general relativity for the inspiral and merger of a pair of black holes (also observed for the first time) and marks the beginning of the Gravitational Wave Astronomy.

After a bit of history, gravitational waves will be presented as an entirely new way of experiencing the universe - much like listening is completely different from seeing. Their study will give unique information on the existence and nature of dark compact objects, like black holes and neutron stars, and on gravitational physics at extreme conditions. Also, the study of primordial gravitational waves would uniquely allow the investigation of processes in the very early universe.

The importance of multimessenger astronomy with gravitational waves and the future observatories will also be discussed.