

Title: Gravitational Wave Astronomy: from 2nd generation detectors toward 3rd generation observatories

Recent observations made by LIGO and Virgo of Gravitational Waves from binary black hole mergers are the heralds of the Gravitational Wave astronomy, while the last gravitational wave detection of a binary Neutron Star merger, followed by EM observations of the source, finally started the era of the multimessenger astronomy.

The current Advanced detectors will be upgraded in the next months to improve their sensitivity, increasing the detection rates in the next observation run in 2018-2019. In the following years Advanced detectors will be pushed to the highest sensitivity achievable with the current infrastructures,

while the Japanese gravitational wave antenna KAGRA will join the global network of detectors: this underground and cryogenic detector will anticipate many features of Third Generation Gravitational Wave observatories.

The Einstein Telescope is the European project of a third generation GW observatory, aiming to improve the antenna pattern and the detector sensitivity by a factor 10 compared to that of Advanced detectors, and is expected to start observations in the 2030s.

In this seminar I will discuss the R&D ongoing in the path from Advanced detectors to Third generation gravitational wave observatories, especially in the field of seismic/Newtonian, thermal and quantum noises mitigation.