

V229a **Search of gravitational waves with the KAGRA detector**

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According to general relativity, gravitational waves are emitted by several astrophysical events. In particular highly energetic astrophysical phenomena such as the coalescence of neutron stars and black holes, the rotation and instabilities of neutron stars and the explosion of supernovae are expected to be sources of gravitational waves detectable on Earth. So far the best proof of gravitational waves emission was provided by the observation of the orbital period decrease of PSR1913+16, which is in perfect agreement with general relativity.

Nowadays the direct detection of gravitational waves is pursued using km long laser interferometers. The LIGO project in the US and the Virgo project in Europe have started running these kind of detectors and are now undergoing an upgrade to improve their sensitivity by a factor of ten. With such an improvement the coalescence of binary neutron stars taking place as far as 200 Mpc from Earth will be detectable.

In Japan the KAGRA project is currently being built. KAGRA is a laser interferometer with arms 3 km long that will be located underground in the Kamioka mine, nearby the SuperKamiokande neutrino detector. In addition to be the first km-scale underground detector, KAGRA will use cryogenic mirrors to reduce the thermal noise. Thanks to the use of these techniques, KAGRA will have a sensitivity as good as the ones of Advanced LIGO and Advanced Virgo, with the potential to improve it further in the future. Once in operation, KAGRA will join the LIGO-Virgo network to perform collaborative searches and to open the field of gravitational wave astronomy.