

# Gravitational Waves

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A gravitational wave is a ripple in the fabric of space and time.

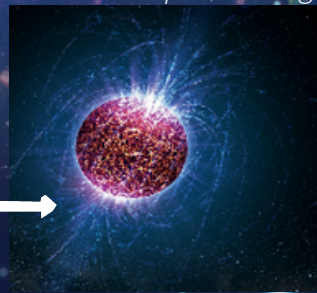
First indirect evidence: observed orbital decay of the Hulse-Taylor binary pulsar (1993 Nobel Prize).

First direct observation: merger of two black holes (LIGO, 2015)

<https://www.ligo.caltech.edu/page/gw-sources>

## TYPES AND SOURCES

- Continuous gravitational waves (neutron stars) →
- Compact binary inspiral waves (black holes; neutron stars) →
- Stochastic gravitational waves →
- Burst gravitational waves



<https://www.quora.com/Where-was-all-of-the-energy-in-the-universe-originated-from-How>

# FACILITIES

**LIGO** is a large-scale physics experiment and observatory to detect cosmic gravitational waves and to develop gravitational-wave observations as an astronomical tool.



[https://www.ligo.caltech.edu/system/media\\_files/binaries/271/original/Dual\\_detectors\\_with\\_arrow\\_and\\_stns\\_labeled.jpg?1453424757](https://www.ligo.caltech.edu/system/media_files/binaries/271/original/Dual_detectors_with_arrow_and_stns_labeled.jpg?1453424757)

**Virgo** is located in Italy, in Cascina, near the city of Pisa, on the site of the European Gravitational Observatory (EGO). Virgo works together with Ligo and they have given birth to a collaboration for the analysis of data, making a single large observatory, which extends from Europe to Pacific.



[https://it.wikipedia.org/wiki/Interferometro\\_VIRGO#/media/File:VirgoDetectorAerialView.jpg](https://it.wikipedia.org/wiki/Interferometro_VIRGO#/media/File:VirgoDetectorAerialView.jpg)