In [physics](https://en.wikipedia.org/wiki/Physics), **gravitational waves** are ripples in the [curvature](https://en.wikipedia.org/wiki/Curvature) of [spacetime](https://en.wikipedia.org/wiki/Spacetime" \o "Spacetime) which propagate as [waves](https://en.wikipedia.org/wiki/Wave), travelling outward from the source. Predicted in 1916[[1]](https://en.wikipedia.org/wiki/Gravitational_wave#cite_note-1)[[2]](https://en.wikipedia.org/wiki/Gravitational_wave#cite_note-2) by [Albert Einstein](https://en.wikipedia.org/wiki/Albert_Einstein) on the basis of his theory of [general relativity](https://en.wikipedia.org/wiki/General_relativity),[[3]](https://en.wikipedia.org/wiki/Gravitational_wave#cite_note-3)[[4]](https://en.wikipedia.org/wiki/Gravitational_wave#cite_note-4) gravitational waves transport energy as **gravitational radiation**. The existence of gravitational waves is a possible consequence of the [Lorentz invariance](https://en.wikipedia.org/wiki/Lorentz_invariance) of[general relativity](https://en.wikipedia.org/wiki/General_relativity) since it brings the concept of a finite speed of propagation of the physical interactions with it. By contrast, gravitational waves cannot exist in the [Newtonian theory of gravitation](https://en.wikipedia.org/wiki/Newton%27s_law_of_universal_gravitation), which postulates that physical interactions propagate at infinite speed.

Before the direct detection of gravitational waves, there was indirect evidence for their existence. For example, measurements of the[Hulse–Taylor binary](https://en.wikipedia.org/wiki/PSR_B1913%2B16) system suggested that gravitational waves are more than a hypothetical concept. Potential sources of detectable gravitational waves include [binary star](https://en.wikipedia.org/wiki/Binary_star) systems composed of [white dwarfs](https://en.wikipedia.org/wiki/White_dwarf), [neutron stars](https://en.wikipedia.org/wiki/Neutron_star), and [black holes](https://en.wikipedia.org/wiki/Black_hole). Various[gravitational-wave observatories (detectors)](https://en.wikipedia.org/wiki/Gravitational-wave_observatory) are under construction or in operation, such as [Advanced LIGO](https://en.wikipedia.org/wiki/LIGO#Advanced_LIGO) which began observations in September 2015.[[5]](https://en.wikipedia.org/wiki/Gravitational_wave#cite_note-5)

On February 11, 2016, the [LIGO](https://en.wikipedia.org/wiki/LIGO) Scientific Collaboration and [Virgo](https://en.wikipedia.org/wiki/Virgo_interferometer) Collaboration teams announced that they had [directly detected gravitational waves](https://en.wikipedia.org/wiki/First_observation_of_gravitational_waves) from a [pair](https://en.wikipedia.org/wiki/Binary_black_hole) of black holes [merging](https://en.wikipedia.org/wiki/Stellar_collision) using the Advanced LIGO detectors.[[6]](https://en.wikipedia.org/wiki/Gravitational_wave#cite_note-Discovery_2016-6)[[7]](https://en.wikipedia.org/wiki/Gravitational_wave#cite_note-Abbot-7)[[8]](https://en.wikipedia.org/wiki/Gravitational_wave#cite_note-NSF-8)