

Elusive gravity

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Simulation of gravitational waves produced by merging black holes / credit : NASA

The most violent phenomena such as The formation of a black hole, the explosion of a supernova, the collision of two neutron stars, all shake the space-time. As an echo, the gravitational waves generated should flood the entire Universe. Listening to these almost imperceptible vibrations, some ultra-sensitive instruments capable of recording a fluctuation as tiny as a billionth of the diameter of an atom, tirelessly watch the sky to identify these upheavals in the Universe.

Artist's view of the Einstein Telescope project / credit: ASPERA/G.Toma/A.Saftoiu

According to Einstein's general relativity, the presence of matter bends space-time. For instance, the variations of space-time caused by the explosion of a star should produce gravitational waves that move at the speed of light. One way to detect them is to place (in space, on the Earth's surface or underground) laser interferometers of extreme sensitivity, such as ET, the Einstein Telescope project seen here. They try to measure with high precision the infinitesimal displacement of free masses, which would betray the existence of ripples in space-time caused by some distant cosmic catastrophe or, even, by the primordial great shock: the Big-Bang.