
Astronomy without light
Now, everything
becomes visible…

Gravitational waves

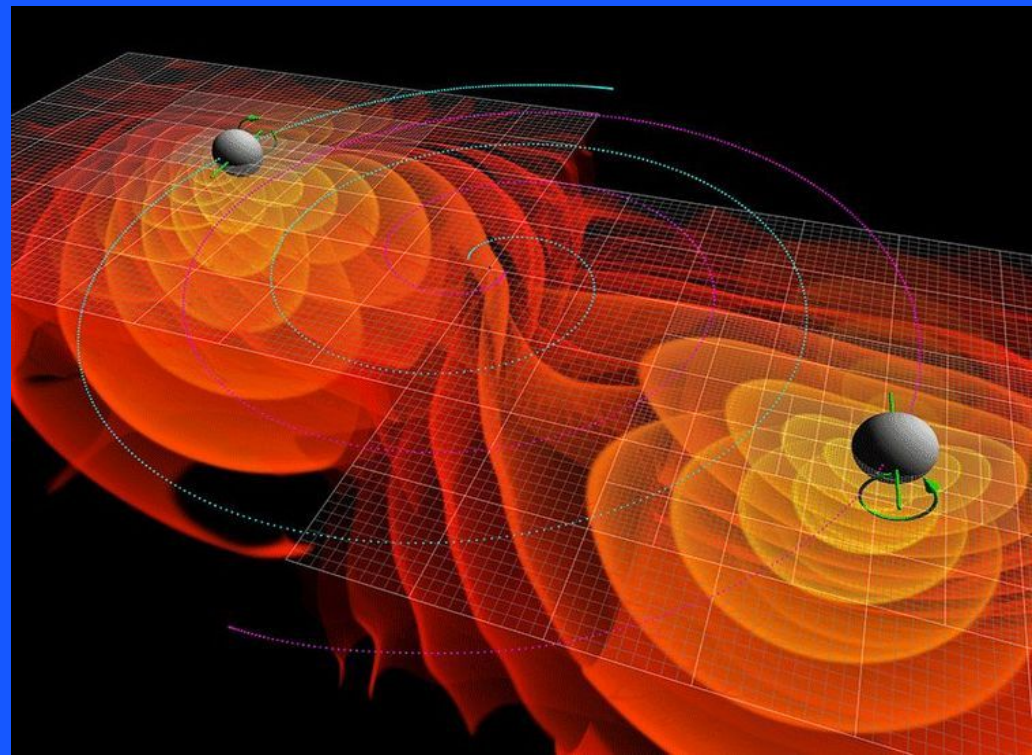
- Gravitational waves are ripples that deform space-time.
- Gravitational waves are weak interactions, so they are very difficult to observe.

They can be created by:

Binary neutron stars,

Supernova explosions,

Black holes' collisions.



New Detectors

LIGO- Laser Interferometer Gravitational-wave Observatory, was designed in 2001 in Livingstone and Hanford, USA.

- **In 2015 the gravitational waves from two black holes' merger were localized and registered.**
- **In the same year, another version of LIGO was launched.**

New Detectors

- VIRGO is French and Italian gravitational -wave detector, which was created in 1993 in Cascina Commune near Piza.
- VIRGO uses the mirrors with the extra reflection capability.
- VIRGO is able to detect all the gravitational waves, produced in our galaxy and in others, lying nearby.

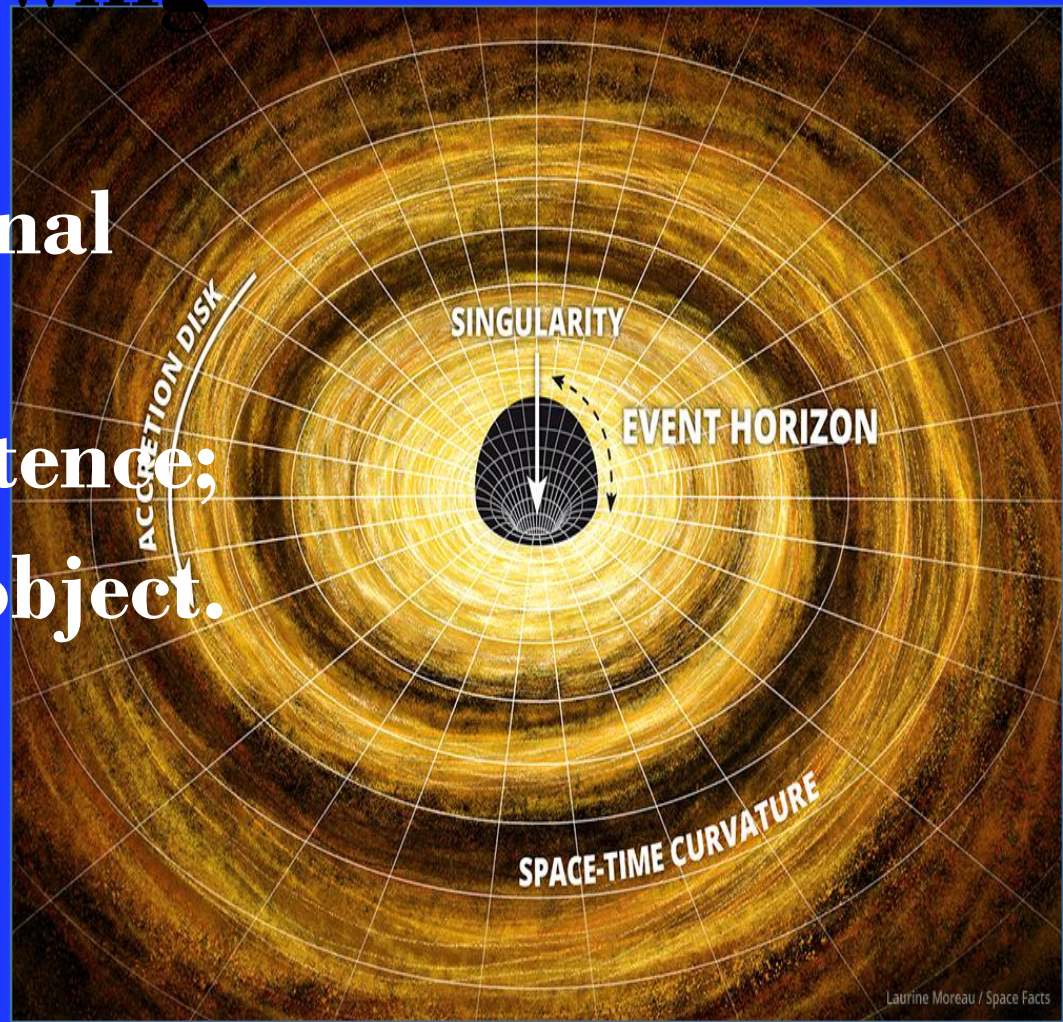
Marvellous Discovery

On the 11th of February,2016 the collaboration of VIRGO and LIGO declared the discovery of gravitational waves, which were released during the collision of two black holes of 60 stellar masses.

Results of the discovery

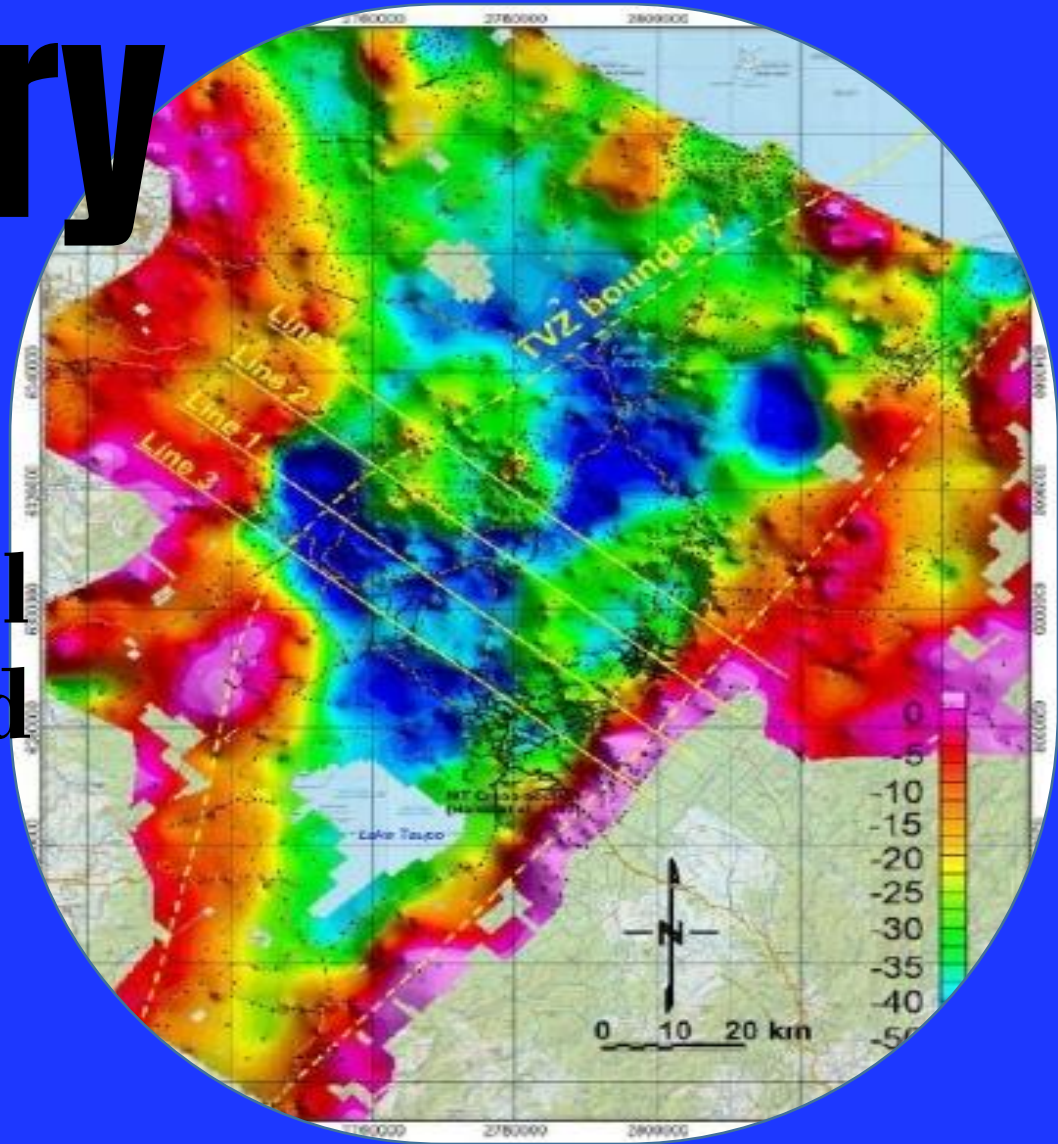
The discovery has led to the following results:

- **The direct observation of gravitational waves;**
- **The direct proof of black holes' existence;**
- **The discovery of the hugest cosmic object.**



New opportunities for the industry

- The technologies, used in new gravitational detectors can be also implemented in gravitational exploration of different fields and improve the accuracy of laser gravimeters.



Thanks for attention