M111

September 2025

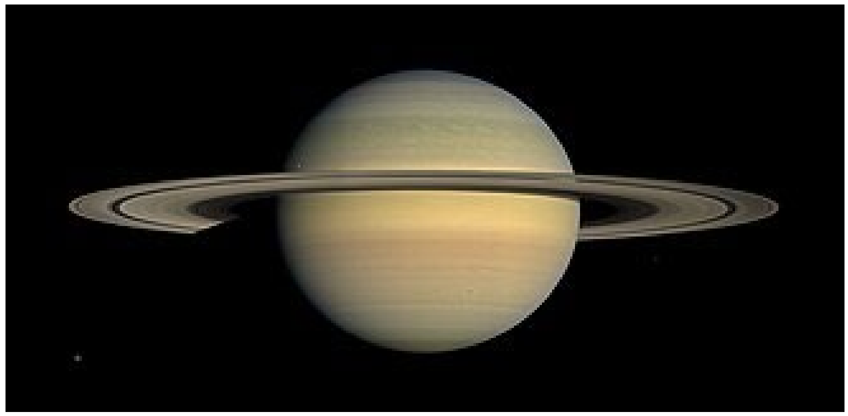
The newsletter of the Richland Astronomical Society and Warren Rupp Observatory

Hidden Hollow 2025

We hope to have a longer article about Hidden Hollow 2025 in the next issue. In the meantime, here are the winners of the Imaging and Sketching Awards sponsored by the Astronomical League. From left to right: Bob Rossiter, Craig Freeman, Alex McCarthy, Kim Balliett, Lena Olson, and Jason Wallace.

Big Blue Targets for October

Saturn



1Imaged by Cassini

Saturn is the sixth planet from the Sun and the second largest in the Solar System, after Jupiter. It is a gas giant, with an average radius of about 9 times that of Earth. It has an eighth of the average density of Earth but is over 95 times more massive. Even though Saturn is almost as big as Jupiter, Saturn has less than a third of its mass. Saturn orbits the Sun at a distance of 9.59 AU (1,434 million km), with an orbital period of 29.45 years.

Saturn's interior is thought to be composed of a rocky core, surrounded by a deep layer of metallic hydrogen, an intermediate layer of liquid hydrogen and liquid helium, and an outer layer of gas. Saturn has a pale yellow hue, due to ammonia crystals in its upper atmosphere. An electrical current in the metallic hydrogen layer is thought to give rise to Saturn's planetary magnetic field, which is weaker than Earth's, but has a magnetic moment 580 times that of Earth because of Saturn's greater size. Saturn's magnetic field strength is about a twentieth that of Jupiter. The outer atmosphere is generally bland and lacking in contrast, although long-lived features can appear. Wind speeds on Saturn can reach 1,800 kilometres per hour (1,100 miles per hour).

The planet has a bright and extensive system of rings, composed mainly of ice particles, with a smaller amount of rocky debris and dust. At least 274 moons orbit the planet, of which 63 are officially named; these do not include the hundreds of moonlets in the rings. Titan, Saturn's largest moon and the second largest in the Solar System, is larger (but less massive) than the planet Mercury and is the only moon in the Solar System that has a substantial atmosphere. (Wikipedia)

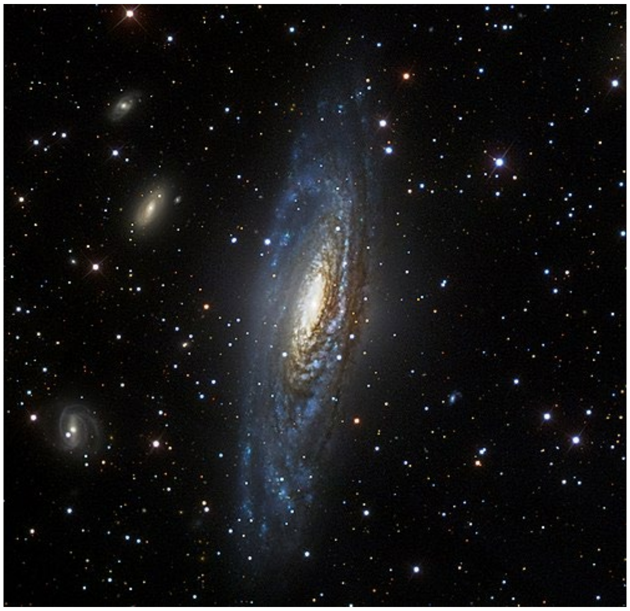
Neptune

Neptune is the eighth and farthest known planet orbiting the Sun. It is the fourth-largest planet in the Solar System by diameter, the third-most-massive planet, and the densest giant planet. It is 17 times the mass of Earth. Compared to Uranus, its neighboring ice giant, Neptune is slightly smaller, but more massive and denser. Being composed primarily of gases and liquids,[21] it has no well-defined solid surface. Neptune orbits the Sun once every 164.8 years at an orbital distance of 30.1 astronomical units (4.5 billion kilometers; 2.8 billion miles). It is named after the Roman god of the sea and has the astronomical symbol ♆, representing Neptune's trident. (Wikipedia)

1Imaged by Voyager 2

NGC 7331, The Deer Lick Group

NGC 7331 Group is a visual grouping of galaxies in the constellation Pegasus. Spiral galaxy NGC 7331 is a foreground galaxy in the same field as the collection, which is also called the Deer Lick Group.[1] It contains four other members, affectionately referred to as the "fleas": the lenticular or unbarred spirals NGC 7335 and NGC 7336, the barred spiral galaxy NGC 7337 and the elliptical galaxy NGC 7340. These galaxies lie at distances of approximately 332, 365, 348 and 294 million light years, respectively.[2] Although adjacent on the sky, this collection is not a galaxy group, as NGC 7331 itself is not gravitationally associated with the far more distant "fleas"; indeed, even they are separated by far more than the normal distances (~2 Mly) of a galaxy group. (Wikipedia)



2Image courtesy of the SDSS

Deadline for submission: November 11, 2025

International Observe the Moon Night Observing Challenge – 2025

October 2 through October 11, 2025

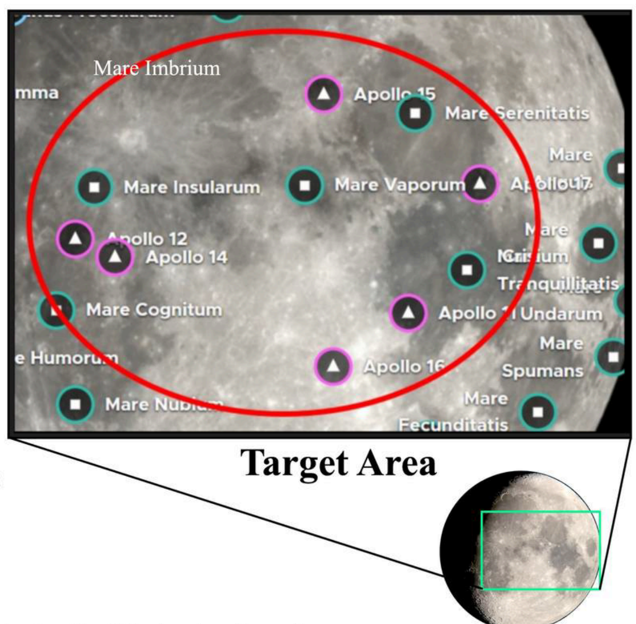
The Astronomical League is once again partnering with NASA for the
2025 International Observe the Moon Night.
We are bringing you another Observing Challenge.

And like most of our Observing Challenges, **you do not need to be a member of the Astronomical League to participate. It is open to everyone.**

- The NASA web page for the International Observe the Moon Night is: https://moon.nasa.gov/observe-the-moon-night/
  https://moon.nasa.gov/observe-the-moon-night/
- The downloadable certificate for participants can be found at
  https://www.astroleague.org/wp-content/uploads/2025/05/IOMN-Participation-Certificates-2025.pdf

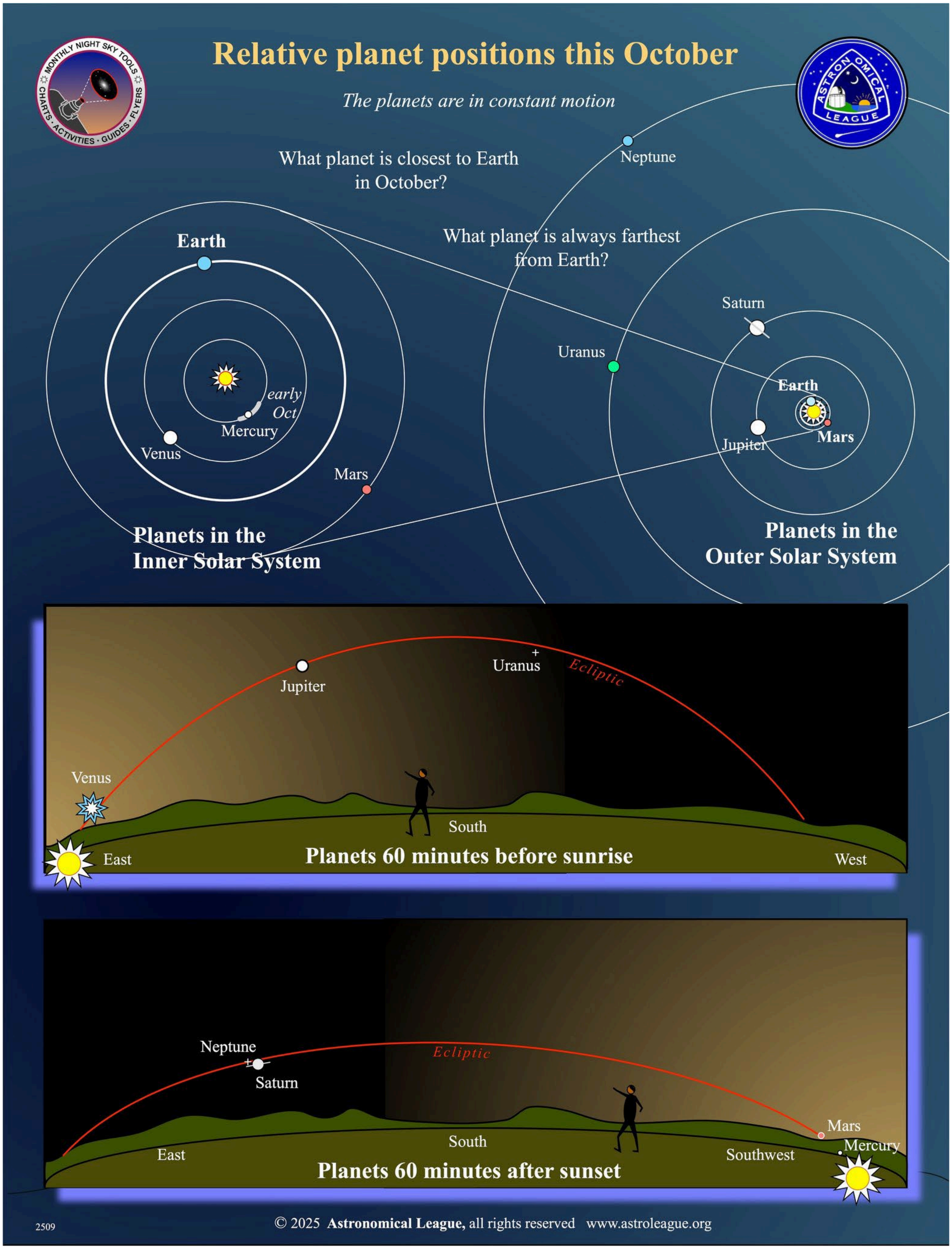
Requirements:

1. Do an observation of the Moon with either binoculars or a telescope. It may be done "Eyes Only," but the details will be very small and somewhat difficult to see.
2. The observation must be done between October 2, 2025 and October 11, 2025 to be able to see the four required Maria.
3. The observation may be done visually or through imaging. Include information on the equipment used.



4. **Observe these Maria (dark areas):**
   - Mare Serenitatis
   - Mare Tranquillitatis
   - Mare Imbrium
   - Mare Cognitum
5. Label these four Maria and also the six Apollo Mission landing sites.
6. Do an outreach activity to share information about the Apollo Missions or the Moon. This may also be the Observe the Moon Night event itself.
7. Submit the required information and the sketch or image to the Coordinator.
8. **Deadline for submission is November 11, 2025. Late entries will not be accepted.**

Complete information:
https://www.astroleague.org/al-observing-challenge-special-observing-award/


Relative planet positions this October
The planets are in constant motion
What planet is closest to Earth in October?
What planet is always farthest from Earth?
Earth
early Oct
Mercury
Venus
Mars
Planets in the Inner Solar System
Neptune
Uranus
Saturn
Earth
Jupiter
Mars
Planets in the Outer Solar System
Uranus
Ecliptic
Jupiter
Venus
South
East
Planets 60 minutes before sunrise
West
Neptune
Saturn
Ecliptic
Mars
Mercury
East
South
Southwest
Planets 60 minutes after sunset
2509
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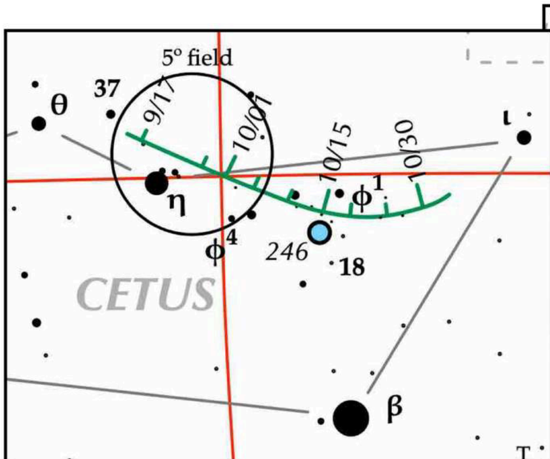
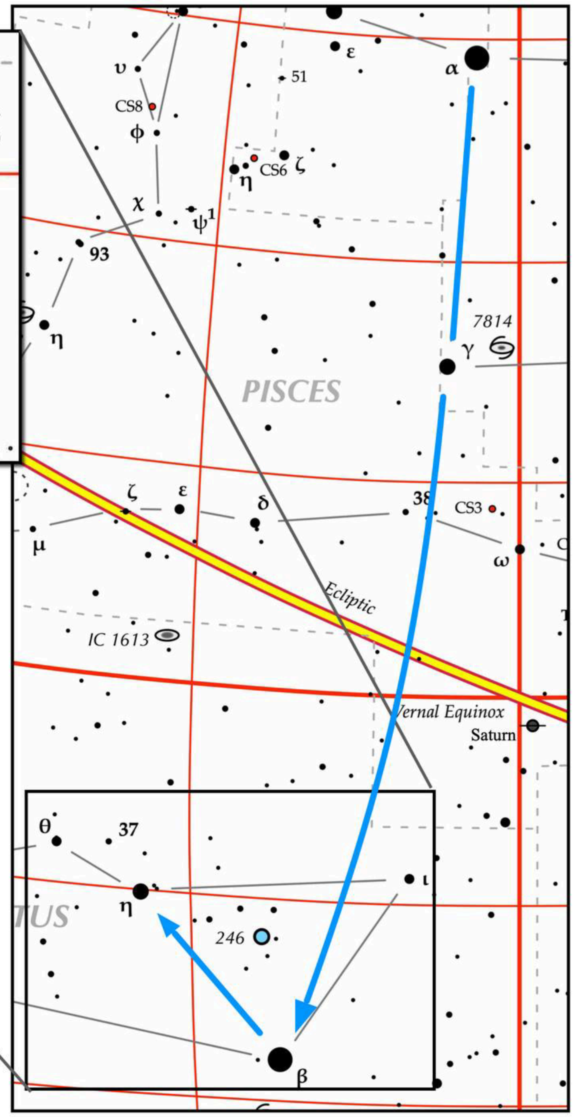
Beyond the orbit of Mars, before the orbit of Jupiter

Have you ever spotted the dwarf planet Ceres?

Late September through October presents your chance!





Look on the nights of Sep 27 through Oct 31. The map shows the position of Ceres at 10 p.m. EDT.

To locate Ceres:

1 Find Beta Ceti. Draw a line south from the two eastern stars of the Great Square.

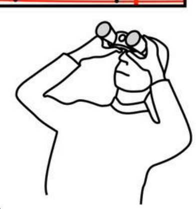
2 It strikes Beta, a second magnitude star.

3 10° northeast of Beta lies the third magnitude Eta Ceti.

4 Use the chart shown above to identify 7th magnitude Ceres. Look again the next night to see if it has moved.

- From Oct 1 through Oct 20, Ceres moves among the four 5th magnitude stars of Phi Ceti.
- Ceres reaches its maximum magnitude on Oct 2: 7.1. By month's end, it is slightly dimmer at mag. 7.3.
- Moon might be too bright before October 10. Observe after moonset.
- On Oct 15, Ceres lies 1° north of the planetary nebula NGC 246.

- Diameter = 588 miles, about 1/4 that of the moon.
- Ceres reaches opposition on Oct 2 when it lies 182 million miles from Earth.



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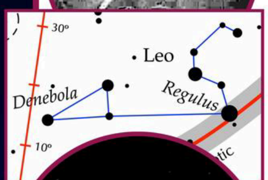
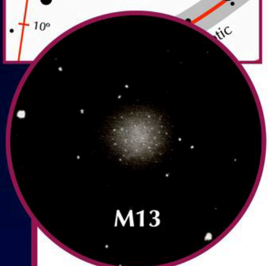
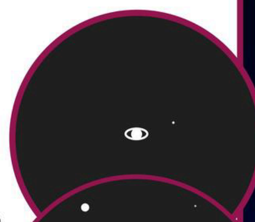
For observers 11 through 17 years of age.

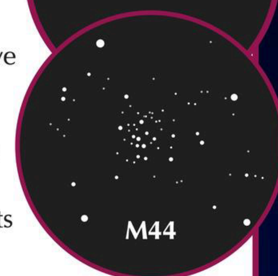
Youth Astronomer
Observing Program

New to Astronomy? Wondering where to start? We have you covered!









Silver Level (certificate only).
You need not be a member of the Astronomical League.

Lunar Observing Program: Observe any five craters.

Solar System Observing Program: Complete any five requirements.

Constellation Hunter Observing Program: Sketch any five constellations.

Binocular Messier Observing Program: Observe any five objects.

Messier Observing Program: Observe any five objects not already observed in the Binocular Messier OP.

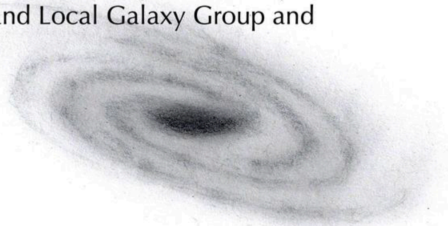
All objects must be found manually.

Gold Level (certificate and pin).

- **1.** Must be a member of the Astronomical League.
- **2.** Complete the 25 requirements of the Silver Level.
- **3.** Complete an additional 75 observations with 5 from any 15 of these 24 listed programs:

Asterisms
Asteroids
Bright Nebulae
Caldwell
Carbon Star
Comet
Dark Nebulae
Deep Sky Binocular
Double Star
EOSOP
Galileo
Globular Cluster
Herschel 400
Meteor
Nova
Open Cluster
Planetary Nebula
Spectroscopy
Stellar Evolution
Target NEO
Two in the View
Universe Sampler
Urban
Variable Star

3a. Also, you may choose up to two of these galaxy-based Observing Programs:
Active Galactic Nuclei, Arp Peculiar Galaxy, Flat Galaxy, Galaxy Groups and Clusters, and Local Galaxy Group and Neighborhood.



For complete details ...

https://www.astroleague.org/youth-astronomer-observing-program/

2507

This article is distributed by NASA's Night Sky Network (NSN).

The NSN program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, and more!

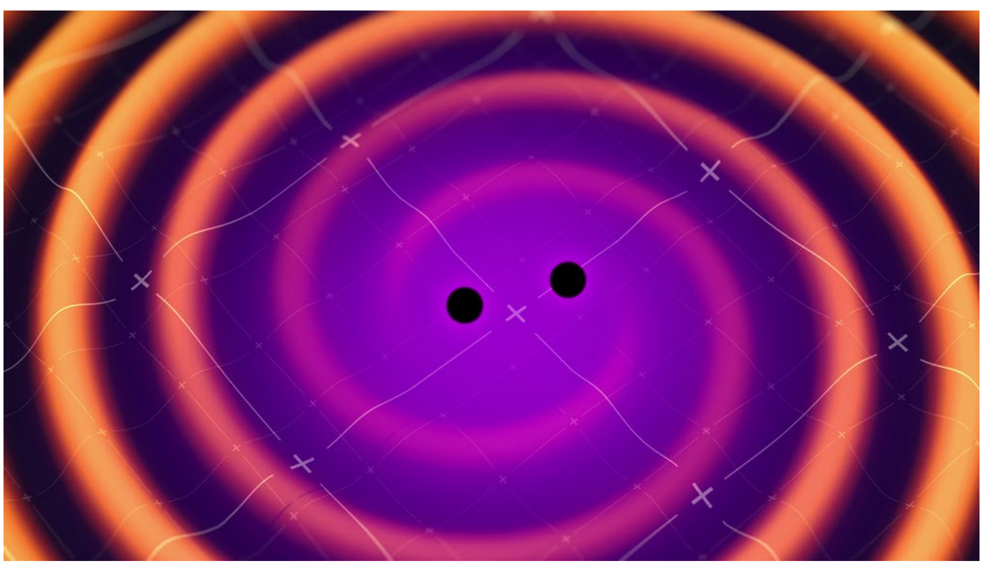
October's Night Sky Notes: Let's Go, LIGO!

By Kat Troche

September 2025 marks ten years since the first direct detection of gravitational waves as predicted by Albert Einstein's 1916 theory of General Relativity. These invisible ripples in space were first directly detected by the Laser Interferometer Gravitational-Wave Observatory (LIGO). Traveling at the speed of light (~186,000 miles per second), these waves stretch and squeeze the fabric of space itself, changing the distance between objects as they pass.

Waves In Space

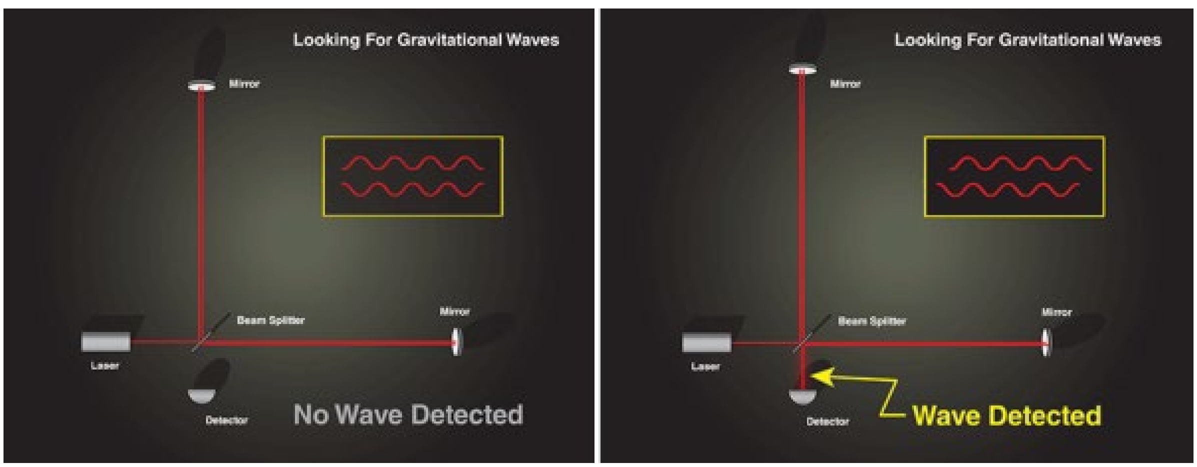
Gravitational waves are created when massive objects accelerate in space, especially in violent events. LIGO detected the first gravitational waves when two black holes, orbiting one another, finally merged, creating ripples in space-time. But these waves are not exclusive to black holes. If a star were to go supernova, it could produce the same effect. Neutron stars can also create these waves for various reasons. While these waves are invisible to the human eye, this animation from NASA's Science Visualization Studio shows the merger of two black holes and the waves they create in the process.



Still images of how LIGO (Laser Interferometer Gravitational-Wave Observatory) detects gravitational waves using a laser, mirrors, and a detector. You can find the animated version [here](). Image Credit: NASA

How It Works

A gravitational wave observatory, like LIGO, is built with two tunnels, each approximately 2.5 miles long, arranged in an "L" shape. At the end of each tunnel, a highly polished 40 kg mirror (about 16 inches across) is mounted; this will reflect the laser beam that is sent from the observatory. A laser beam is sent from the observatory room and split into two, with equal parts traveling down each tunnel, bouncing off the mirrors at the end. When the beams return, they are recombined. If the arm lengths are perfectly equal, the light waves cancel out in just the right way, producing darkness at the detector. But if a gravitational wave passes, it slightly stretches one arm while squeezing the other, so the returning beams no longer cancel perfectly, creating a flicker of light that reveals the wave's presence.



Still images of how LIGO (Laser Interferometer Gravitational-Wave Observatory) detects gravitational waves using a laser, mirrors, and a detector. You can find the animated version [here](). Image Credit: NASA

The actual detection happens at the point of recombination, when even a minuscule stretching of one arm and squeezing of the other changes how long it takes the laser beams to return. This difference produces a measurable shift in the interference pattern. To be certain that the signal is real and not local noise, both LIGO observatories — one in Washington State (LIGO Hanford) and the other in Louisiana (LIGO Livingston) — must record the same pattern within milliseconds. When they do, it's confirmation of a gravitational wave rippling through Earth. We don't feel these waves as they pass through our planet, but we now have a method of detecting them!

Get Involved

With the help of two additional gravitational-wave observatories, VIRGO and KAGRA, there have been 300 black hole mergers detected in the past decade; some of which are confirmed, while others await further study.

While the average person may not have a laser interferometer lying around in the backyard, you can help with two projects geared toward detecting gravitational waves and the black holes that contribute to them:

- **Black Hole Hunters:** Using data from the TESS satellite, you would study graphs of how the brightness of stars changes over time, looking for an effect called gravitational microlensing. This lensing effect can indicate that a massive object has passed in front of a star, such as a black hole.
- **Gravity Spy:** You can help LIGO scientists with their gravitational wave research by looking for glitches that may mimic gravitational waves. By sorting out the mimics, we can train algorithms on how to detect the real thing.

You can also use gelatin, magnetic marbles, and a small mirror for a more hands-on demonstration on how gravitational waves move through space-time with JPL's Dropping In With Gravitational Waves activity!