



Occultation in Astronomy

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Why in News?

Recently, the [Indian Institute of Astrophysics \(IIA\)](#) has released a video capturing the occultation of the moon passing in front of the **bright red star Antares (Jyeshtha)**.

Note:

- Since the moon is relatively close to the Earth, such **occultations will be visible only from some locations on the globe**, similar to why a [solar eclipse](#) is seen only from a particular part of the globe.

What is an Occultation in Astronomy?

▪ About:

- An occultation in astronomy occurs when **one celestial body passes in front of another, obscuring it from view.**
 - Occultations can also be artificially produced to take a look at certain phenomena in detail. Perhaps the **best-known use is blocking the light of the sun or a star to see what is nearby.**
- In the case of lunar occultations, the Moon appears to move in front of other objects in the sky, such as stars, planets, or asteroids.

▪ Lunar Occultations of Stars:

- The Moon regularly occults bright stars as it moves along its apparent path in the sky.
- Approximately 850 naked-eye stars, including prominent ones like **Aldebaran** (reddish giant star in the constellation Taurus), **Regulus** (constellation Leo), Spica (constellation of Virgo), **and Antares**, may be occulted by the Moon in a year.
- During a lunar occultation of a star, the star appears to abruptly disappear as the Moon moves in front of it, demonstrating the lack of atmosphere on the Moon.

▪ Lunar Occultations of Planets:

- Occultations of planets, such as **Venus, Jupiter, Mars, and Saturn**, by the Moon are notable astronomical events.
- During a lunar occultation, observers can witness phases on both the planet and the Moon, offering unique viewing opportunities.

▪ Asteroid Occultations:

- Asteroids are small, rocky bodies that orbit the Sun. Sometimes, they pass in front of distant stars, causing an occultation.

▪ Planetary Occultations:

- Planetary occultations are rare and intriguing events where one planet passes in front of another from our perspective on Earth, temporarily hiding it from view.
 - These events are similar to asteroid occultations but involve planets instead.
- Historically, **mutual planetary occultations have been extremely rare.** The most

recent one occurred on January 3, 1818, when Venus passed in front of Jupiter.

Antares

- It is the **brightest star in the constellation Scorpio**. The star is a red supergiant about **12 times the mass of the sun, 750 times the diameter of the sun**.
- Antares is part of a **binary star system**. The fainter secondary star is **called Antares B, a main-sequence star with a blue-white hue**.
 - These two stars are projected to be more than 220 Astronomical Units (AU) away from each other.

// The Antares Star



Color: Red (M-type)

Spectral type: M1.5Iab-Ib

Apparent magnitude: 0.6–1.6

Mass: \approx 12 solar masses

Radius: \approx 680 solar radii

Luminosity: 10,000 Suns

Temperature: 3,660 K

Constellation: Scorpius

Distance: \approx 550 light-years from Earth

Indian Institute of Astrophysics (IIA)

- The IIA is a premier institute devoted to research in astronomy, astrophysics and related physics. It originated from an observatory set up in 1786 in Madras, which later moved to Kodaikanal in 1899.
- In 1971, it became the Indian Institute of Astrophysics and shifted its **headquarters to Bengaluru in 1975**.
 - The institute's main observing facilities are located at Kodaikanal, Kavalur, Gauribidanur,

and Hanle.

- It conducts research in physical sciences, engineering sciences, astronomy, and space sciences under the **Department of Science & Technology (DST)**.

UPSC Civil Services Examination Previous Year Question (PYQ)

Prelims

Q. Recently, scientists observed the merger of giant 'blackholes' billions of light-years away from the Earth. What is the significance of this observation? (2019)

- (a) 'Higgs boson particles' were detected.
- (b) 'Gravitational waves' were detected.
- (c) Possibility of inter-galactic space travel through 'wormhole' was confirmed.
- (d) It enabled the scientists to understand 'singularity'.

Ans: (b)

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