






# ASTRONOMICAL DIARY

PREPARED BY ASTRONOMICAL PUBLICATION AND PLANETARIUM UNIT, SPACE SCIENCE AND ASTRONOMY SECTION

## ASTRONOMICAL EVENTS, NOVEMBER 2022

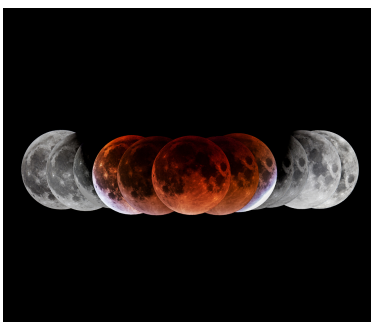
DATE	EVENT	TIME
02	Close Approach of Moon and Saturn	---
05	Close Approach of Moon and Jupiter	---
08	Total Lunar Eclipse	06:59 PM
08	Lunar Occultation of Uranus (visible in the Northern parts of the Philippines)	07:00 PM
11	Close Approach of Moon and Mars	---
14	Moon at Apogee (Distance = 404,853.732 km)	02:40 PM
18	Leonids (ZHR = 15)	05:00 AM
26	Moon at Perigee (Distance = 362,905.895 km)	09:31 AM
29	Close Approach of Moon and Saturn	---

## PHASES OF THE MOON

	<b>First Quarter</b> Nov 01 02:37 PM
	<b>Full Moon</b> Nov 08 07:02 PM
	<b>Last Quarter</b> Nov 16 09:27 PM
	<b>New Moon</b> Nov 24 06:57 AM
	<b>First Quarter</b> Nov 30 10:37 PM

## RISE AND SET TIMES OF PLANETS

DATE	MERCURY		VENUS		MARS		JUPITER		SATURN	
	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set
Nov 01	05:32 AM	05:13 PM	06:03 AM	05:37 PM	08:25 PM	*09:25 AM	03:14 PM	*03:18 AM	12:56 PM	*12:27 AM
Nov 11	06:02 AM	05:29 PM	06:17 AM	05:43 PM	07:40 PM	*08:42 AM	02:33 PM	*02:36 AM	12:17 PM	*11:45 PM
Nov 21	06:32 AM	05:49 PM	06:33 AM	05:52 PM	06:50 PM	*07:53 AM	01:53 PM	*01:56 AM	11:39 AM	*11:07 PM
Nov 30	07:00 AM	06:10 PM	06:48 AM	06:03 PM	06:01 PM	*07:04 AM	01:17 PM	*01:20 AM	11:05 AM	*10:34 PM



## TOTAL LUNAR ECLIPSE

### ASTRONOMY EVENT OF THE MONTH

A Total Lunar Eclipse will occur on 08 November and it will be visible in the Philippines. This eclipse is also visible in different parts of the world where the Moon is above the horizon including Asia, Australia, North America, Parts of Northern and Eastern Europe and most of South America.

On 08 November in Manila, the eclipse will begin at 05:19 PM (moonrise), with the totality of the eclipse beginning at 06:16 PM. Greatest eclipse (maximum) or the peak stage of the eclipse at 06:59 PM. The Moon will remain in totality until 07:42 PM. It will then go into a partial eclipse until 08:49 PM and comes to an end at 09:58 PM.

Image Credit: Mendoza, L.P.

Notes:

[1] \* following day

[2] All times displayed are in Philippine Standard Time (PhST)

"tracking the sky...helping the country"

PAGASA Science Garden Complex, BIR Road,  
Brgy. Central, Quezon City, Metro Manila, Philippines

Telephone Number: 8-284-0800 loc 116, 107, 106  
Website: <https://bagong.pagasa.dost.gov.ph>

# Stars and Constellations

The constellations best observed in November are Andromeda, Cassiopeia, Cepheus, Pegasus, Camelopardalis, Lacerta, Lyra, Cygnus, Perseus, Triangulum, Auriga, Taurus, Aries, Pisces, Equuleus, Delphinus, Sagitta, Vulpecula and Orion in the northern sky, while Lepus, Eridanus, Fornax, Cetus, Aquarius, Capricornus, Microscopium, Piscis Austrinus, Sculptor, Phoenix, Grus, Fornax, Tucana, Horologium, Caelum, Indus, and Hydrus are located in the southern sky. Figure 1 shows the view of the sky on 15 November at around 09:00 PM when the November constellations are situated overhead [1].



Figure 1: The view of the night sky featuring the prominent November constellations showing the Northern and the Southern Hemisphere on 15 November at 09:00 PM using the Stellarium software

**Cetus, the Whale**, the fourth largest constellation in the sky, is located in the region of the sky where several other constellations with names that allude to water, including Eridanus, the River, Aquarius, the Water Bearer, and Pisces, the Fish, are also located. Found in Cetus is the barred spiral galaxy Messier 77, along with the well-known stars Dipdha, Cetus' brightest star and an orange giant star; Menkar, a red giant star; and Mira, the first variable star to be discovered. The earliest and most distant star known, Earandel, can also be found in this constellation (Figure 2) [2].



(a) Cetus constellation

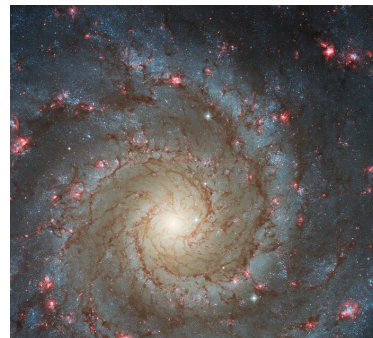


(b) M77

Figure 2: (a) The view of eastern sky on 01 November at 07:00 PM showing the location of M77 in the constellation Cetus, using the Stellarium software; (b) the Hubble Telescope has captured this vivid image of M77's center using visible and infrared observations (image credits: NASA, ESA A. van der Hoesen)



(a) Pisces constellation



(b) M74

Figure 3: (a) The view of eastern sky on 01 November at 06:30 PM showing the location of M74 in the constellation Pisces, using the Stellarium software; (b) the Hubble Telescope image of M74 or Phantom Galaxy (image credits: NASA, ESA and the Hubble Heritage (STScI/AURA)-ESA/Hubble Collaboration; Acknowledgment: R. Chandar (University of Toledo) and J. Miller (University of Michigan))

The zodiacal constellation **Pisces, the Fish**, lies in the northern-eastern sky, is one of the largest constellations in the sky. Located in Pisces is the stunning spiral galaxy M74, known as the Phantom Galaxy, which is home to about 100 billion stars, making it slightly smaller than our Milky Way (Figure 3) [3]. The large elliptical galaxy NGC 474, known for its tidal tails, the spiral galaxy NGC 488, and the interacting pairs catalogue as NGC 520 and Arp 284 are among the other noteworthy deep-sky objects in this constellation. There are nine named stars in Pisces. Alpherq, Alrescha, Bélénos, Citadelle, Ebla, Fumalsamakah, Parumleo, Revati, and Torcular are the star names approved by the International Astronomical Union (IAU) [4].

The constellation **Perseus**, named after the hero Perseus in Greek Mythology, is located in the northern sky. Its neighboring famous constellations are Cassiopeia, Andromeda, Aries, Taurus, and Auriga. Two Messier objects can be found in Perseus: M34, an open cluster, and M76, also known as the Little Dumb Nebula, is a planetary nebula. Its brightest star, Mirfak is a supergiant star about 7 times more massive than our Sun, and Algol, the second brightest star, is the first eclipsing binary star discovered and one of the first variable stars to be found (Figure 4) [5, 6]. Perseus constellation is also best known for its annual meteor shower, the Perseids.

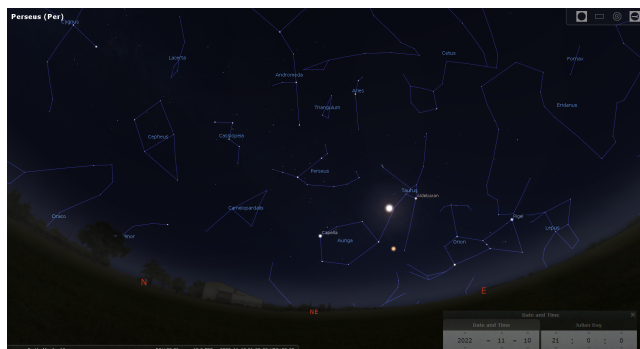


Figure 4: The view of the northeastern sky showing the constellation Perseus at 10 November at 09:00 PM, with its neighboring famous constellations are Cassiopeia, Andromeda, Aries, Taurus, and Auriga, using a Stellarium software.

## Planetary Location

**Mercury** and **Venus** will not be readily observable due to their proximity to the Sun.

**Mars** will be visible in the night sky throughout the month. On 11 November at 09:46 PM, among the background stars of the constellation Taurus, the Bull, the Waning Gibbous Moon and Mars will make a close approach, passing  $2^{\circ}27'$  to each other (Figure 5). They will be widely separated to fit within the field of view of a telescope, but will be visible to the naked eye or through a pair of binoculars [7].

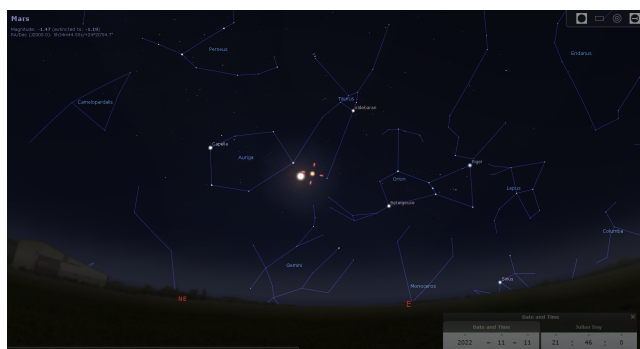


Figure 5: The view of the northeastern sky on 11 November at 09:46 PM during the close approach of Moon and Mars, using a Stellarium software

**Jupiter** and **Saturn** are already above the eastern horizon after sunset, becoming visible as dusk fades to darkness. These two celestial objects can be found among the background stars of the constellation Pisces, the Fish, and Capricornus, the Sea Goat, respectively. On 29 November, catch a glimpse of a waxing crescent Moon and Saturn as they can be observed together on the southwestern horizon after sunset [8, 9].

**A lunar occultation of Uranus will occur on 08 November.** It will be observable from Asia and Northern America areas as the Moon passes in front of Uranus. In the Philippines, the occultation will occur during the time of the total eclipse and it will be visible and best observed in the northern parts of the country [10].



# Meteor Shower

The **Leonid Meteor Shower**, produced by comet 55P/Tempel-Tuttle is active from 06 November to 30 November, with peak activity occurring on 18 November. The meteor shower is expected to produce 15 meteors per hour and will be active once the radiant, Leo, rises in the northeastern sky around 12:00 AM until before sunrise. The number of visible meteors increases as the radiant ascends to its highest point in the sky around 05:00 AM. The presence of a waning crescent Moon presents minimal interference with the meteor shower observation (Figure 6) [11].

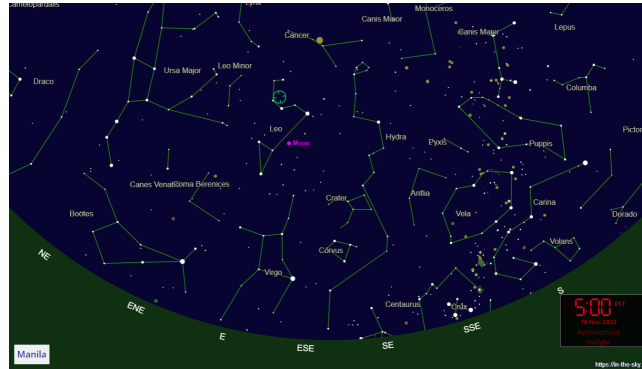


Figure 6: The view of the southeaster sky during the peak of Leonids on 18 November at 05:00 AM when the shower’s radiant represented by the green solid circle.

Meteor showers are observable through the naked eye, and no special equipment such as telescopes or binoculars is needed. Maximize the viewing experience by choosing a dark observation site away from the city lights under clear and moonless sky conditions.

# Total Lunar Eclipse

A **Total Lunar Eclipse** will occur on **08 November** and it will be visible in the Philippines. This eclipse is also visible in different parts of the world where the Moon is above the horizon including Asia, Australia, North America, Parts of Northern and Eastern Europe, and most of South America [12].

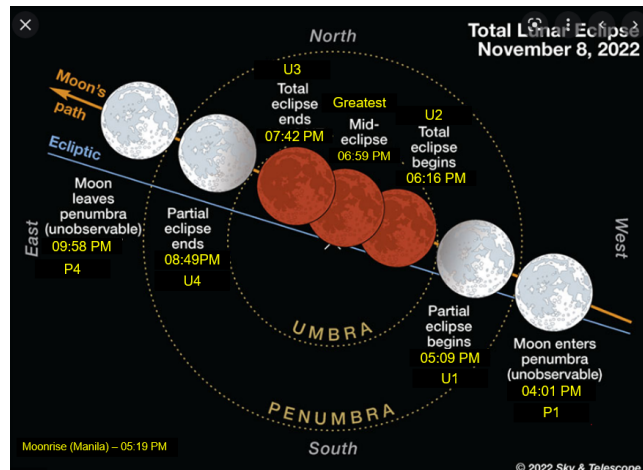


Figure 7: The eclipse contacts of what to observe during the Total Lunar Eclipse on 08 November 2022 as seen from Manila, Philippines

On 08 November in Manila, the eclipse will begin at 05:19 PM (moonrise), with the totality of the eclipse beginning at 06:16 PM. Greatest eclipse (maximum) or the peak stage of the eclipse at 06:59 PM. The Moon will remain in totality until 07:42 PM. It will then go into a partial eclipse until 08:49 PM and comes to an end at 09:58 PM (Figure 7) [13, 14].

The PAGASA Astronomical Observatory will live stream this event via the PAGASA’s Official Facebook Page and PAGASA’s Official YouTube channel.

Table 1: The predicted time of occurrence of the major phases of the eclipse in Manila on 08 November 2022

Phase	Contact	Time	Visible in Manila, Altitude
Penumbral Eclipse Begins	P1	04:00:36 PM	No, below the Horizon
Partial Eclipse Begin	U1	05:08:54 PM	No, Below the Horizon
Moonrise (Manila)	U1 in progress	05:19:00 PM	In the Horizon
Moon Enters Totality	U2	06:16:18 PM	Yes, 12.2°
Greatest Eclipse (Maximum)	Greatest	06:59:12 PM	Yes, 22.0°
Moon Exits Totality	U3	07:42:00 PM	Yes, 31.9°
Partial Eclipse Ends	U4	08:49:24 PM	Yes, 47.6°
Penumbral Eclipse Ends	P4	09:57:48 PM	Yes, 63.7°

## Calendar of Astronomical Events for November 2022

Table 2 shows summary of the astronomical events for the month of November 2022. All times displayed are in Philippines Standard Time (PhST).

Table 2: The summary of astronomical events for the month of November 2022

Date	Event	Time
02	Close Approach of Moon and Saturn	—
05	Close Approach of Moon and Jupiter	—
08	Total Lunar Eclipse	06:59 PM
08	Lunar Occultation of Uranus (visible in the Northern parts of the Philippines)	07:00 PM
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14	Moon at Apogee (Distance = 404,853.732 km)	02:40 PM
18	Leonids (ZHR = 15)	05:00 AM
26	Moon at Perigee (Distance = 362,905.895 km)	09:31 AM
29	Close Approach of Moon and Saturn	—

Approved by:

**Ms. SHIRLEY J. DAVID**

Chief, RDTD

24 October 2022

For more information, call or email:

**Ms. MA. ROSARIO C. RAMOS, RCE**

Chief, SSAS-RDTD

PAGASA-DOST

Quezon City

Trunkline: 8284-0800 local 106, 107, 116

Email address: astronomy@pagasa.dost.gov.ph

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