PRESS RELEASE NOVEMBER 2021

ASTRONOMICAL DIARY

PREPARED BY ASTRONOMICAL PUBLICATION UNIT, SPACE SCIENCE AND ASTRONOMY SECTION

ASTRONOMICAL EVENTS, NOVEMBER 2021

DATE	EVENT	TIME
3	Comet 67P/Churyumov-Gerasimenko at perihelion	
7	Comet 67P/Churyumov-Gerasimenko at its brightest	
8	Moon passing 1°61′ N of Venus	01:20 PM
10	Moon passing 4°06′ S of Saturn	10:24 PM
12	Northern Taurid Meteor Shower (ZHR = 5 meteors)	12:00 AM
12	Moon passing 4°21′ S of Jupiter	01:16 AM
13	Comet 67P/Churyumov-Gerasimenko at perigee	
17-18	Leonid Meteor Shower (ZHR = 10 meteors)	11:47 PM
19	Partial Lunar Eclipse	
20	Venus at its highest altitude in the night sky	05:23 PM
21	α-Monocerotids Meteor Shower	04:00 AM
28	November Orionid Meteor Shower (ZHR = 3 meteors)	02:00 AM

PHASES OF THE MOON

New Moon
Nov 5 05:15 AM

First Quarter
Nov 11 08:46 PM

Full Moon
Nov 19 04:57 PM

Last Quarter
Nov 27 08:28 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	04:45 AM	04:36 PM	09:23 AM	08:27 PM	05:20 AM	05:00 PM	01:08 PM	*00:43 AM	12:11 PM	11:33 PM
Nov 11	05:10 AM	04:49 PM	09:26 AM	08:30 PM	05:09 AM	04:44 PM	12:31 PM	*00:06 AM	11:34 AM	10:55 PM
Nov 21	05:40 AM	05:06 PM	09:23 AM	08:29 PM	04:59 AM	04:29 PM	11:55 AM	11:27 PM	10:56 AM	10:19 PM
Nov 30	06:08 AM	05:25 PM	09:13 AM	08:22 PM	04:50 AM	04:16 PM	11:23 AM	10:57 PM	10:24 AM	09:46 PM

APOM: PAGASA RADIO TELESCOPE

ASTRONOMY PICTURE OF THE MONTH

Did you know that PAGASA acquired the first Radio Telescope in our country? It is located in PAGASA Tanay Station. It was installed last November 2018, but the operation of the telescope is temporarily suspended until further notice. This 5.3-meter radio telescope will be used for solar monitoring, planetary observations, and other astronomical radio sources.

Image credit: Mendoza, L.P.

Notes:
*[1] *following day*
[2] All times displayed are in Philippines Standard Time (PhST)

"tracking the sky…helping the country"
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Stars and Constellations

For the entire month of November, the southern part of the night sky will be dominated by the constellations that are related to water and aquatic life. Figure 1 shows the constellations that are observable in the southern portion of the night sky in Manila City during mid-November at 9:00 P.M [1].

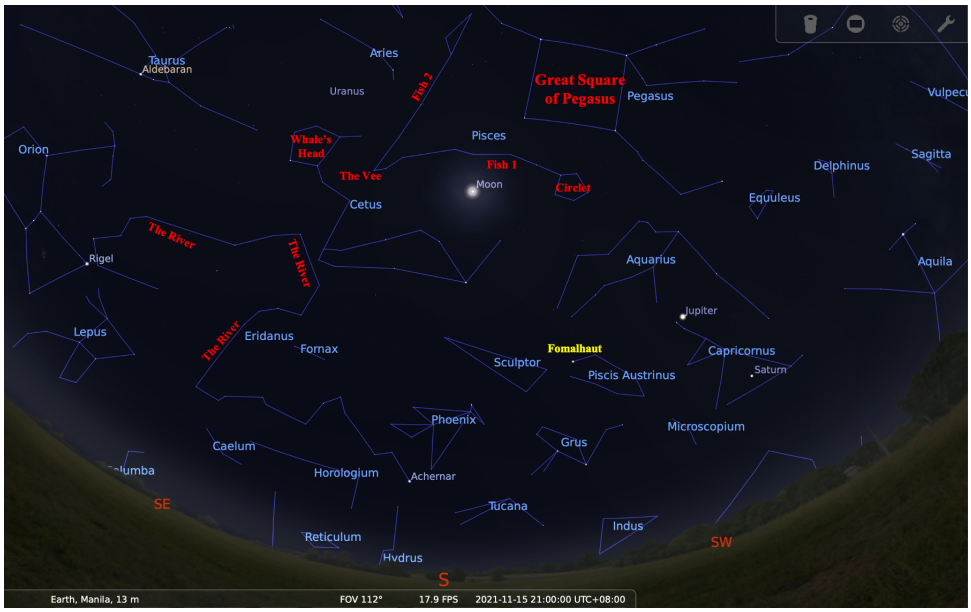

Figure 1: The view of the Southern portion of the sky on mid-November 2021 at 9:00 P.M. using Stellarium Application

The constellatiom **Pegasus**, the **Winged Horse** can be easily spotted high in the south for the entire month due its prominent asterism called the **Great Square of Pegasus**, which comprises his body. Just directly below the **Great Square of Pegasus** lies the small pentagon of dim stars called the **Circlet**, which represents the head of the first fish in the constellation of **Pisces**, **the Fishes**. From the **Circlet,** following the long, dim arc of stars will lead to the point where it will meet the line of dim stars coming down from the second head of the **Pisces.** This intersection point is called **"The Vee"**. Again, having the **Great Square of Pegasus** as the reference, look past down the Circlet, a bright star named **Fomalhaut** can be found. **Fomalhaut** is the brightest star in the dim constellation of **Piscis Austrinus**, the **Southern Fish** and the 18^{th} brightest star in the night sky. Oftentimes, **Fomalhaut** is referred to as the **"the mouth of the Southern Fish"**. Just above **Fomalhaut** lies the constellation **Aquarius**, the **Water Bearer**. To the lower right of Aquarius is where **Capricornus**, **the Sea Goat** is located. Located in the lower left is the stretch of the constellation **Eridanus**, the **River**. Meanwhile, situated above Eridanus is **Cetus**, **the Sea Monster (or Whale)** [1].

Planetary Location

For the entire month of November, the planet **Venus** can be observed in the southwestern horizon at the constellation **Sagittarius** while the planets **Saturn** and **Jupiter** can be observed in the southern part of the sky at the constellation **Capricornus** moments after the sunset.

Several planetary conjunctions can be observed.On 8 November at 1:20 P.M., the waxing crescent Moon will be passing 1°06' to the north of Venus. The exact moment of the Moon-Venus conjunction will not be observe since it will occur in the afternoon. However, the close pairing of the Moon and Venus can still be enjoyed after sunset, at around 5:41 P.M. as the pair will be visible at an altitude of 32° above the southwestern horizon (Figure 2) and will set at around 8:28 P.M. The magnitude of the Moon and Venus will be at mag -10.8 and mag -4.5, respectively. Also, **Venus** will reach its highest point in the evening sky reaching 35° above the horizon on 20 November after sunset at around 5:23 P.M. shining bright at a magnitude of -4.4 [2].

Then on **10 November** at 10:24 P.M., the 6-day old Moon will be passing 4°06' to the south of Saturn (Figure 3). The magnitude of the Moon and Saturn will be at mag -11.7 and mag 0.4, respectively. The exact moment of the Moon-Saturn Conjunction may be difficult to observe since the pair are about to set at around 11:01 P.M., thus, their respective altitudes will be low. However, after sunset, at around 5:41 P.M. the pair will

Figure 2: The view of the southwestern sky after sunset on 8 November showing the Moon-Venus Conjunction using the Stellarium application

be at an altitude of around 55° above the southern horizon, so the view of the conjunction can still be enjoyed [3].

Figure 3: The view of the southern sky after sunset on 10 November showing the Moon-Saturn Conjunction using the Stellarium application

After 2 days, the 7-day old Moon will then pass 4°21' to the south of Jupiter on 12 November at 1:16 A.M. The magnitude of the Moon and Jupiter will be at mag -12 and mag -2.4 respectively. After sunset, the pair will be visible at an altitude of around 59° above the southern horizon at 5:41 P.M. (Figure 3). The pair will reach its highest point in the sky at 60° at 6:13 P.M. However, the exact moment of the conjunction cannot be observed since the pair will set at around 11:23 P.M. [4].

These Moon-planetary conjunctions can be seen through the naked eye or using a pair of binoculars. Please do note that the separation of the above-mentioned conjunctions are too wide to fit in the field of view of a telesope.

Figure 4: The view of the southern sky after sunset on 12 November showing the Moon-Jupiter Conjunction using the Stellarium application

Meteor Showers

Several meteor showers can be observed for the month of November. The summary of the observable meteor showers is presented in Table 1.

Table 1: The summary of the details of the observable meteor shower for the month of November 2021

Meteor Shower Name	Radiant	Active Date	Peak Date	Zenithal Hourly Rate	Best viewed time
Northern Taurids	Taurus	20 October - 10 December	12 November	5	12:00 A.M.
Leonids	Leo	6 - 30 November	17 - 18 November	10	11:47 P.M.
α-Monocerotids	Canis Minor	15 - 25 November	21 November	variable	4:00 A.M.
November Orionids	Orion	13 - 6 December	28 November	3	2:00 A.M.

Northern Taurids will be visible once the constellation **Taurus** rises in the eastern horizon at around 5:57 P.M. until the dawn breaks at around 5:33 A.M. **Taurids** is best viewed when the constellation **Taurus** reaches about 82° at midnight as shown in Figure 5. During the peak activity, the **First Quarter Moon** will be located in the constellation **Aquarius** and will soon be setting at around 5:25 P.M. Thus, the Moon will not interfere with the meteor shower observation [5].

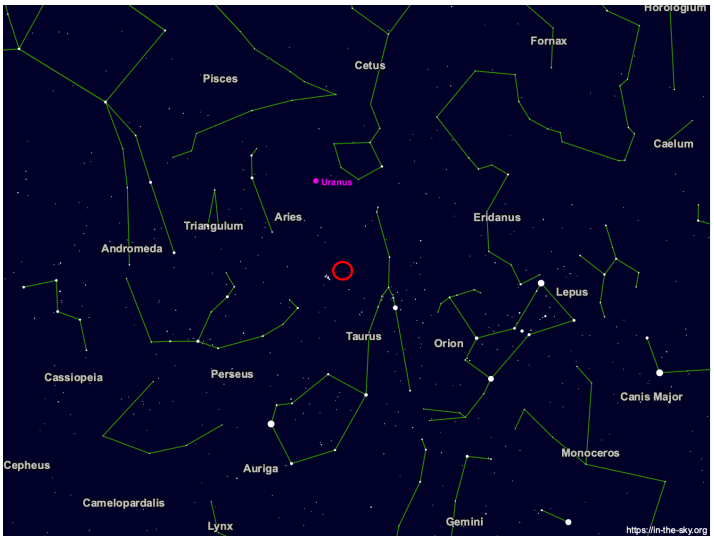

Figure 5: The view of the sky during the peak of Northern Taurid Meteor Shower on 12 November 2021 at 12:00 A.M. The red solid circle represents the location of the meteor shower radiant

Leonids is an annual meteor shower occuring when the Earth pass through the debris left by the **Comet**

Tempel-Tuttle, a comet which takes about 33 years to make a complete revolution around the Sun. The view of the meteor shower can be enjoyed once the constellation Leo rises in the eastern part of the sky on the night of 17 November at around 11:47 P.M. until before sunrise of the following day at around 5:58 A.M. Figure 6 shows the view of the East Northeast portion of the sky on 18 November at around 5:20 A.M. when the constellation Leo is at an altitude of 69.18° [6, 7].

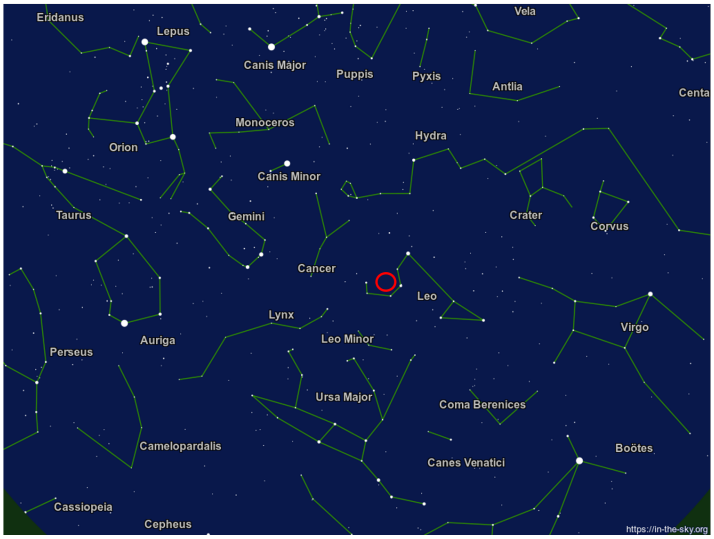

Figure 6: The view of the East Northeast portion of the sky during the peak of Leonids on 18 November 2021 at 5:20 A.M. The red solid circle represents the location of the meteor shower radiant

α-Monocerotid meteors may be observed once the constellation **Canis Minor** rises above the eastern horizon. The number of visible meteor increases as the altitude of the radiant point increases in the sky. This meteor shower is best viewed when the radiant point, represented by the red solid line shown in Figure 7, is highest in the sky at 4:00 A.M. This shower will remain visible until the dawn breaks at around 5:36 A.M. On the night of the peak, the view of this shower can be significantly hindered by the presence of the waning gibbous Moon [8].

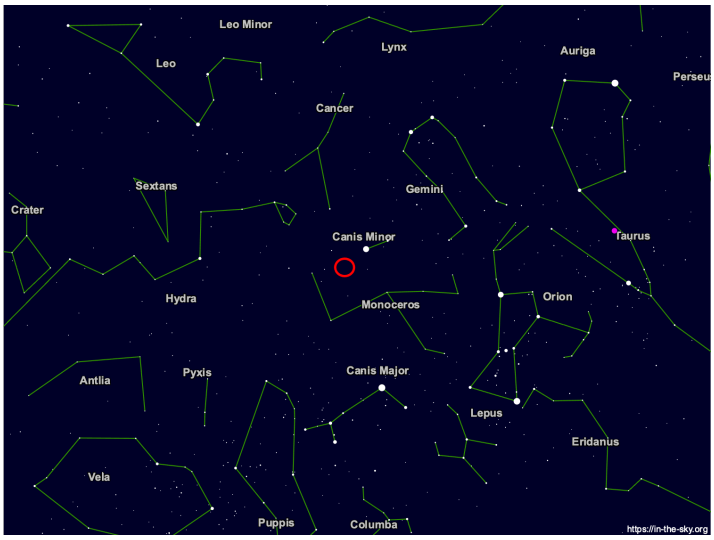

Figure 7: The view of the sky during the peak of the α-Monocerotids on 22 November 2021 at 4:00 A.M. The red solid circle represents the location of the meteor shower radiant

November Orionids is best viewed when the radiant is at its highest in the sky about 88° at around 2:00 A.M. until the dawn breaks at around 5:39 A.M. The red solid circle seen in Figure 8 represents the location of the meteor shower radiant on 28 November, 2:00 A.M. The waning crescent phase of the Moon during the night of the peak will produce minimal interference [9].

Meteor showers can be observed through the naked eyed and there is no need to used special equipment such as telescope or binoculars. However, clear sky condition and dark observation site away from the city lights are necessary to maximize the viewing experience. The altitude of the radiant point in the sky also affects the

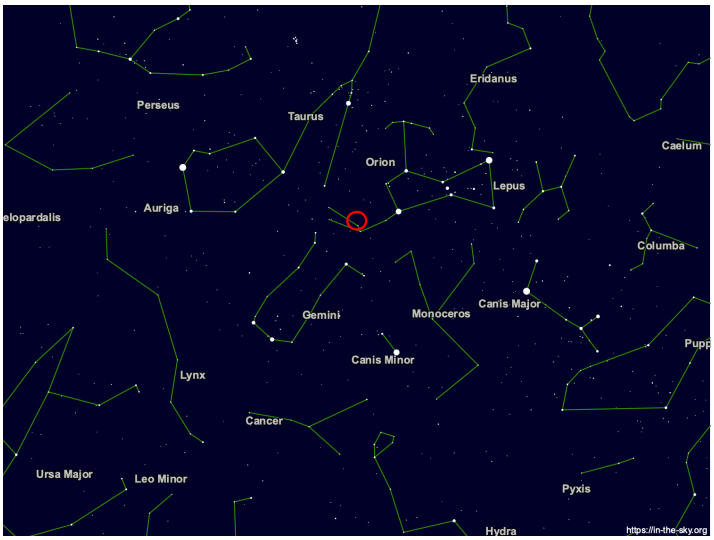

Figure 8: The view of the sky on during the peak of the November Orionids on 28 November 2021 at 2:00 A.M. The red solid circle represents the location of the meteor shower radiant

Zenithal Hourly Rate (ZHR), which corresponds to the number of meteors that can be observed.

Partial Lunar Eclipse

On 19 November, the Moon will partially pass through the umbra of the Earth's shadow, thus, creating a Partial Lunar Eclipse. This eclipse will be visible in different parts of the world where the Moon is above the horizon including Oceania, the Americas, Eastern Asia, Northern Europe and Indonesia.

Table 2: The predicted time of occurrence of the major phases of the eclipse on 19 November 2021

Phase	Time	Visible in Manila
Start of Penumbral eclipse	2:03 P.M.	No, below the horizon
Start of Partial eclipse	3:20 P.M.	No, below the horizon
Maximum Eclipse	5:04 P.M.	No, below the horizon
End of Partial eclipse	6:47 P.M.	Yes
End of Penumbral eclipse	8:04 P.M.	Yes

In the Philippine setting, this eclipse will be difficult to observe because most of the major eclipse phases will occur below the horizon. The eclipse will begin at 2:03 PM and will end at 8:04 PM, however, the Moon is about to rise at around 5:22 P.M. This means that by the time the Moon reaches 19° above the horizon, the eclipse has already ended. Table 2 shows the list of times when each major phases of the eclipse will start while Figure 9 shows the simulated view of the eclipse [10, 11].

Unlike solar eclipses, lunar eclipses are safe to watch and does not require the use of any kind of protective filters for the eyes. A pair of binocular may be also used to help magnify the view.

Comet: the Distant Visitors

This month of November, a comet named **67P/Churyumov-Gerasimenko** is forecasted to reach its closest approach to the Sun at the distance of 1.21 AU on 3 November. On 7 November, **Comet 67P/Churyumov-Gerasimenko** will be at its brigthest while on 13 November, it will be at its closest approach to the Earth at a distance of 0.42 AU. The comet will be situated in the constellation **Gemini** during nearly the first half of the month as it gradually progress towards the constellation **Cancer** in the remaining half. The magnitude of this comet is expected to be mag 8.3. Though this comet is relatively dim to be seen by the naked eye, the use of binoculars or small telescopes may help to observe this comet [12, 13, 14].

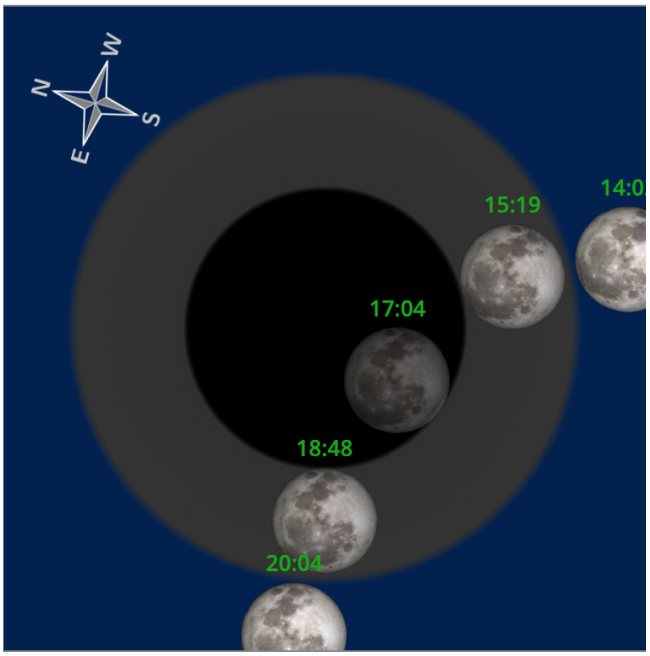

Figure 9: The simultation of what to observe during the Partial Lunar Eclipse on 19 November 2021 as seen from Manila, Philippines

Calendar of Astronomical Events for November 2021

Table 3 shows summary of the anticipated astronomical events for the month of November 2021. All times displayed are in Philippines Standard Time (PhST).

Table 3: The summary of astronomical events for the month of November 2021

Date	Event	Time
3	Comet 67P/Churyumov-Gerasimenko at perihelion	
7	Comet 67P/Churyumov-Gerasimenko at its brightest	
8	Moon passing 1°61' N of Venus	1:20 P.M.
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21	α-Monocerotids Meteor Shower	4:00 A.M.
28	November Orionid Meteor Shower (ZHR = 3 meteors)	2:00 A.M.

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15 October 2021

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