

PRESS RELEASE DECEMBER 2021





ASTRONOMICAL DIARY

PREPARED BY ASTRONOMICAL PUBLICATION UNIT, SPACE SCIENCE AND ASTRONOMY SECTION

ASTRONOMICAL EVENTS, DECEMBER 2021

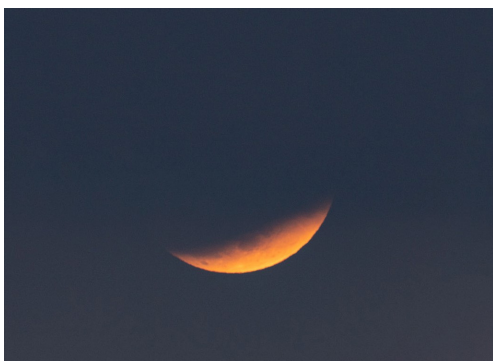
DATE	EVENT	TIME
2	Pheonid Meteor Shower (ZHR = var)	08:00 P.M.
6	December φ -Cassiopeid Meteor Shower (ZHR = var)	09:00 P.M.
7	Puppis-Velid Meteor Shower (ZHR = 10)	03:00 A.M.
7	Moon passing 1°52' S of Venus	08:49 A.M.
8	Venus at greatest brightness	12:09 A.M.
8	Moon passing 4°11' S of Saturn	09:49 A.M.
9	Monocerotid Meteor Shower (ZHR = 2)	01:00 A.M.
9	Moon passing 4°28' S of Jupiter	02:10 P.M.
12	σ -Hydrid Meteor Shower (ZHR = 3)	03:00 A.M.
14	Geminid Meteor Shower (ZHR = 120)	02:00 A.M.
16	Comae Berenid Meteor Shower (ZHR = 3)	before dawn
19	December Leonis Minorid Meteor Shower (ZHR = 5)	05:00 A.M.
21	December Solstice (Winter Solstice)	11:59 P.M.
22	Ursid Meteor Shower (ZHR = 10)	before dawn

PHASES OF THE MOON

	New Moon Dec 4 03:43 PM
	First Quarter Dec 11 09:36 AM
	Full Moon Dec 19 12:35 PM
	Last Quarter Dec 27 10:24 AM

RISE AND SET TIMES OF PLANETS

DATE	MERCURY		VENUS		MARS		JUPITER		SATURN	
	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set
Dec 01	06:11 AM	05:27 PM	09:11 AM	08:21 PM	04:49 AM	04:15 PM	11:20 AM	10:53 PM	10:20 AM	09:42 PM
Dec 11	06:43 AM	05:53 PM	08:49 AM	08:02 PM	04:40 AM	04:01 PM	10:46 AM	10:20 PM	09:44 AM	09:07 PM
Dec 21	07:13 AM	06:23 PM	08:11 AM	07:29 PM	04:31 AM	03:50 PM	10:12 AM	09:48 PM	09:08 AM	08:32 PM
Dec 31	07:37 AM	06:53 PM	07:16 AM	06:38 PM	04:23 AM	03:39 PM	09:39 AM	09:16 PM	08:32 AM	07:57 PM



APOM: PARTIAL LUNAR ECLIPSE

ASTRONOMY PICTURE OF THE MONTH

On 19 November 2021, the Moon partially passed through the umbra of the Earth's shadow, thus a Partial Lunar Eclipse took place. In the Philippine setting, the eclipse was difficult to observe because most of the major eclipse phases occurred below the horizon. This image of the eclipse was taken around 05:43 PM at the PAGASA Astronomical Observatory.

Image credit: Mendoza, L.P.

Notes:

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

"tracking the sky...helping the country"

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 Brgy. Central, Quezon City, Metro Manila, Philippines

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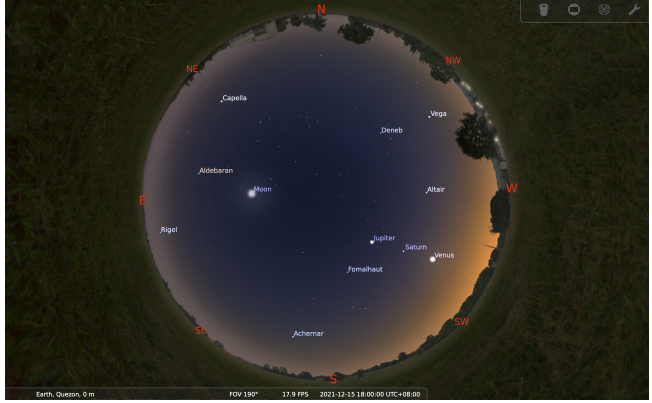
 Website: <https://bagong.pagasa.dost.gov.ph>

Stars and Constellations

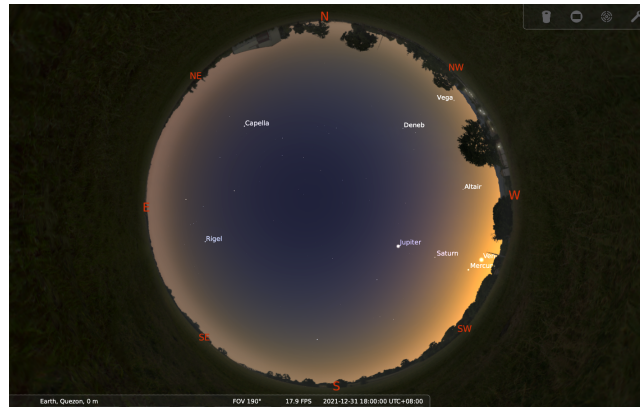
For the whole month of December, the summer constellations can still be observed in the western sky for the first few hours after sunset. The **Summer Triangle asterism** is still located fairly high in the sky during the first half of the month, with **Vega** of the constellation Lyra heading west-northwest, **Deneb** of the constellation Cygnus closest to the zenith, and **Altair** of the constellation Aquila is heading west-southwest (Figures 1a and 1b). The Summer Triangle continues to dive westward and can be observed lying low near the western horizon in late December as seen from Figure 1c[1].



(a) December 1, 2021



(b) December 15, 2021



(c) December 30, 2021

Figure 1: The view of the night sky at 6:00 P.M. on several days of December 2021 using the Stellarium Application

The members of the autumn constellations can be notably observed as it gets high in the eastern sky. The view of the observable constellations after sunset in mid-December is shown in Figure 2.

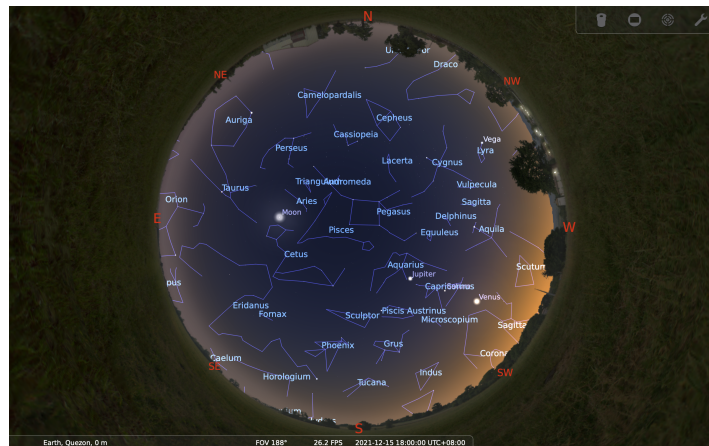


Figure 2: The view of the sky after sunset on mid-December 2021 using the Stellarium Application

Cassiopeia, a “W” shaped constellation is going to be very prominent and can be easily seen in the sky due

to its unique formation and high position in the north-northwestern sky. When the Big Dipper asterism is not visible in the night sky, Cassiopeia may be used as an alternative to find the position of the north star, Polaris. However, when compared to using the Big Dipper, the result achieved using this method may not be as accurate. The star positioned in the middle of the constellation Cassiopeia can be utilized as a pointer star to lead to the approximate position of Polaris, as shown in Figure 3[1].

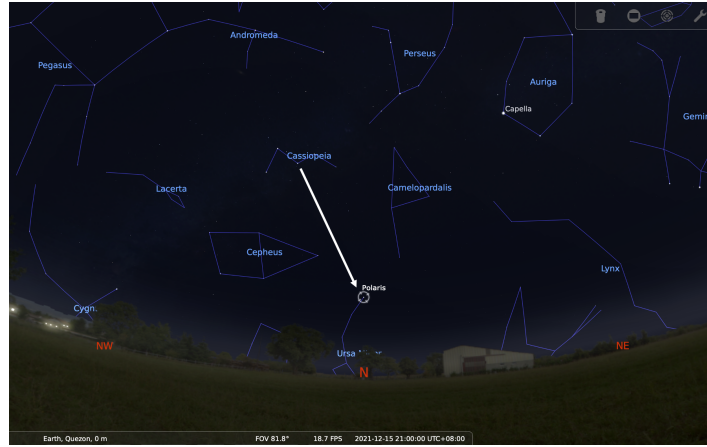


Figure 3: The view of the northern sky on mid-December 2021 at 9:00 P.M. showing how to locate the position of the north star Polaris using the constellation Cassiopeia using the Stellarium application

Throughout the month, the prominent **Great Square of Pegasus** can be seen high in the sky after sunset. The view of **Andromeda** can also be observed nearby in the northeastern part of the sky with **Perseus** just below it. Along the eastern horizon, the winter sky is gradually coming up. The constellation **Taurus** the Bull can now be seen in the east with its bright red star, **Aldebaran**, and the open star cluster **Pleiades** (a.k.a. **seven sisters** or **rosary**). **Auriga** can also be observed in the northeastern horizon with its alpha star **Capella**, the 6th brightest star in the night sky[1].

Planetary Location

For the whole month of December, **Venus** can be observed in the southwestern part of the sky after sunset, however, in late December, Venus may be already difficult to observe as it is just a few degrees above the horizon. **Jupiter** and **Saturn** can also be observed in the southwestern portion of the sky after sunset.



Figure 4: The view of the southwestern sky after sunset on 7 December 2021 showing the Moon-Venus Conjunction using the Stellarium application

The **thin crescent Moon** will pass 1°52' S of **Venus** on 7 December 2021 at 8:49 A.M. The exact moment of the **Moon-Venus Conjunction** cannot be observed since it will occur during the day. However, the close pairing will be visible after sunset at around 5:41 P.M. (Figure 4) at an altitude of 30° above the southwestern horizon. The close pairing may be observed until 8:13 P.M. as the pair sinks towards the horizon. By then, the Moon and Venus will be at mag -10.4 and mag -4.7 and are located both in the constellation **Sagittarius**[2].

On 8 December 2021 at 12:09 A.M., **Venus** will reach its greatest brightness at mag -4.7[3].

On 8 December 2021, at 9:49 A.M., the **4-day old Moon** will pass $4^{\circ}11'$ S of **Saturn** Again, the exact instance of the crescent **Moon-Saturn Conjunction** will not be observed as it will occur during the day. However, the view of the conjunction may still be enjoyed after sunset around 5:42 P.M. as the Moon and Saturn will be observed 44° above the southwestern horizon (Figure 5) until the pair sets at around 9:17 P.M. [4]. The Moon and Saturn will be at mag -11.0 and mag 0.5, respectively, and will be both located in the constellation **Capricornus**[4].



Figure 5: The view of the southwestern sky after sunset on 8 December 2021 showing the Moon-Saturn Conjunction using the Stellarium application

On 9 December 2021, the Moon will be passing $4^{\circ}28'$ S of Jupiter at around 2:10 P.M. The close pairing will be visible after sunset at around 5:42 P.M. at about 57° above the southwestern horizon. The Moon and Jupiter will be at mag -11.5 and mag -2.3, respectively, and will be both located in the constellation **Capricornus**[5].



Figure 6: The view of the southwestern sky after sunset on 9 December 2021 showing the Moon-Jupiter Conjunction using the Stellarium application

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 is too wide to fit in the field of view of a telescope.

Meteor Showers

Several meteor showers can be observed for December. The summary details of the observable meteor showers are presented in Table 1. The first column of the table is the name of the meteor shower, which is usually derived from the constellation where the shower's radiant is located. The **radiant** of the shower, listed in the second column, is a point in the sky where meteors seem to originate. The position of the meteor shower radiants (enclosed in the green solid circle) of the observable meteor showers for December 2021 during its highest position is presented as follows: **Phenicians** (Figure 7), **December φ -Cassiopeids** (Figure 8), **Puppis-Velids** (Figure 9), **Monocerotids** (Figure 10), **σ -Hydrids** (Figure 11), **Geminids** (Figure 12), **Comae Berenicids**

(Figure 13), **December Leonis Minorids** (Figure 14), and **Ursids** (Figure 15).

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

Meteor Shower Name	Radiant	Active Date	Peak Date	Best viewed time	ZHR	Lunar Phase
Pheonicians	Phoenix	28 Nov- 9 Dec	2 Dec	8:00 P.M.	var	Waning Crescent
December φ -Cassiopeids	Andromeda	1-8 Dec	6 Dec	9:00 P.M.	var	Waxing Crescent
Puppid-Velids	Vela	1-15 Dec	7 Dec	3:00 A.M.	10	Waxing Crescent
Monocerotids	Monoceros	5-20 Dec	9 Dec	1:00 A.M.	2	Waxing Crescent
σ -Hydrids	Hydra	3-15 Dec	12 Dec	3:00 A.M.	3	Waxing Gibbous
Geminids	Gemini	4-17 Dec	14 Dec	2:00 A.M.	120	Waxing Gibbous
Comae Berenicids	Leo	12-23 Dec	16 Dec	before dawn	3	Waxing Gibbous
December Leonis Minorids	Leo Minor	5 Dec-4 Feb	19 Dec	5:00 A.M.	5	Full Moon
Ursids	Ursa Minor	17-26 Dec	22 Dec	before dawn	10	Waning Gibbous

Source: https://www.imo.net/members/imo_showers/working_shower_list

The third column shows the period when the meteor shower is active and can be observed while the **Peak Date** as shown in the fourth column indicates the point in time when the greatest number of meteors can be observed. The **Best viewed time**, listed in the fifth column, represents the time when the radiant point is at its highest point in the sky. The **Zenithal Hourly Rate (ZHR)**, listed in the sixth column, indicates the number of meteors an observer can see in an hour during the peak activity. However, the computation of ZHR assumes that one is observing in a perfectly dark and clear sky and the radiant is located directly overhead. The number of ZHR decreases under certain circumstances. The last column shows the phase of the Moon during the peak date of the shower. Unfortunately, the waxing gibbous phase of the Moon during the peak of Geminids and Comae Berenicids, Full Moon phase during the peak of December Leonis Minorids and waning gibbous phase of the Moon during Ursids will produce a significant interference in the meteor shower observation throughout the night.



Figure 7: The view of the sky during the peak of Pheonicians on 2 December 2021 at 8:00 P.M.

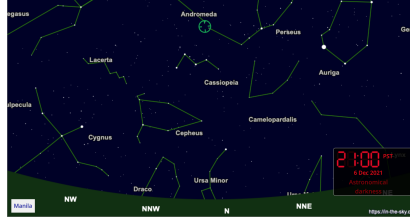


Figure 8: The view of the sky during the peak of December φ -Cassiopeids on 6 December 2021 at 9:00 P.M.



Figure 9: The view of the sky during the peak of Puppid-Velids on 7 December 2021 at 3:00 A.M.



Figure 10: The view of the sky during the peak of Monocerotids on 9 December 2021 at 1:00 A.M.



Figure 11: The view of the sky during the peak of σ -Hydrids on 12 December 2021 at 3:00 A.M.



Figure 12: The view of the sky during the peak of Geminids on 14 December 2021 at 2:00 A.M.



Figure 13: The view of the sky during the peak of Comae Berenicids on 16 December 2021 at 2:00 A.M.



Figure 14: The view of the sky during the peak of December Leonis Minorids on 19 December 2021 at 5:00 A.M.

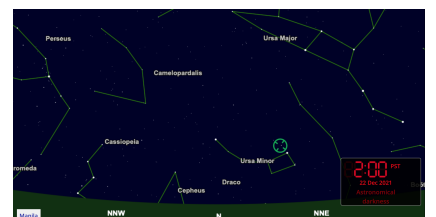


Figure 15: The view of the sky during the peak of Ursids on 22 December 2021 at 2:00 A.M.

Meteor showers are can be observed through the naked eyed and there is no need to use special equipment such as telescopes or binoculars. To maximize the viewing experience, it is ideal to observe in a dark site away from the city lights under clear and moonless sky conditions.

Total Solar Eclipse

On 4 December 2021 from 1:29 P.M. to 5:36 P.M., the Moon will be passing in front of the Sun, thus, creating a rare astronomical phenomenon called **Total Solar Eclipse**. Unfortunately, the Total Solar Eclipse will only be visible in Antarctica and not in the Philippines[6].

Comet: the Distant Visitors

On the 12th of December 2021, another comet named **C/2021 A1 (Leonard)** will make its closest approach to the Earth at a distance of 0.23 AU. The comet, however, will not be visible during its perigee since it will be below the horizon after sunset. Luckily, there are other chances to see the comet on different day of the month. The position of Comet C/2021 A1 (Leonard) every other night for the whole month of December 2021 is shown in Table 2 [7].

Table 2: The position of Comet C/2021 A1 (Leonard) for the entire month of December 2021

Date	Constellation	Observable Time	Highest position in the sky
1 Dec	Canes Venatici	3:42 A.M. - 5:09 A.M.	37° above NE horizon (at 5:09 A.M.)
3 Dec	Bootes	3:57 A.M. - 5:10 A.M.	34° above NE horizon (at 5:10 A.M.)
5 Dec	Bootes	4:15 A.M. - 5:11 A.M.	29° above NE horizon (at 5:11 A.M.)
7 Dec	Bootes	4:50 A.M. - 5:13 A.M.	23° above NE horizon (at 5:13 A.M.)
9 Dec	Serpens Caput		Not observable
11 Dec	Ophiuchus		Not observable
13 Dec	Serpens Cauda		Not observable
15 Dec	Sagittarius		Not observable
17 Dec	Sagittarius		Not observable
19 Dec	Sagittarius		Not observable
21 Dec	Microscopium	6:28 P.M. - 6:33 P.M.	18° above SW horizon (at 6:28 P.M.)
23 Dec	Microscopium	6:30 P.M. - 6:42 P.M.	19° above SW horizon (at 6:30 P.M.)
25 Dec	Microscopium	6:28 P.M. - 6:42 P.M.	20° above SW horizon (at 6:28 P.M.)
27 Dec	Microscopium	6:30 P.M. - 6:43 P.M.	20° above SW horizon (at 6:30 P.M.)
29 Dec	Piscis Austrinus	6:31 P.M. - 6:39 P.M.	18° above SW horizon (at 6:31 P.M.)
31 Dec	Piscis Austrinus	6:33 P.M. - 6:36 P.M.	18° above SW horizon (at 6:33 P.M.)

Source: https://in-the-sky.org/news.php?id=20211212_19_100

December Solstice

The **December Solstice** will be on 21 December 2021. By then, the Sun will reach its most southerly point in the sky, in the constellation Capricornus, at a declination of 23.5°S. During the December Solstice, the northern hemisphere will experience the shortest day and this day also marks the first day of winter. Consequently, in the southern hemisphere, this day marks the first day of summer[8].

Calendar of Astronomical Events for December 2021

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

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

Date	Event	Time
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16	Comae Berenicid Meteor Shower (ZHR = 3)	before dawn
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22 November 2021

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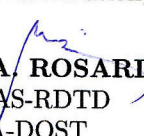
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