






ASTRONOMICAL DIARY

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

ASTRONOMICAL EVENTS, DECEMBER 2024

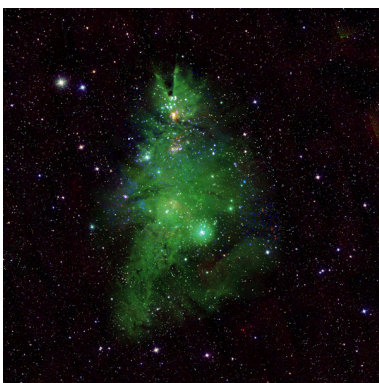
DATE	EVENT	TIME
05	Conjunction of the Moon and Venus	06:40 a.m.
05	Close approach of the Moon and Venus	07:44 a.m.
08	Close approach of Waxing Gibbous Moon and Saturn	04:41 p.m.
08	Conjunction of Waxing Gibbous Moon and Saturn	04:56 p.m.
12	Moon at Perigee (Distance = 365,427.966 km)	09:20 p.m.
14	Geminid meteor shower (ZHR = 120)	---
15	Close approach of Waxing Gibbous Moon and Jupiter	02:28 a.m.
15	Conjunction of Waxing Gibbous Moon and Jupiter	03:42 a.m.
18	Conjunction of the Moon and Mars	04:49 p.m.
18	Close approach of the Moon and Mars	05:17 p.m.
20	Mercury at dichotomy	10:51 p.m.
21	December solstice	05:21 p.m.
22	Ursid meteor shower (ZHR = 10)	---
24	Moon at Apogee (Distance = 404,414.302 km)	03:25 p.m.
24	Mercury at Highest Altitude in the Morning Sky	---
25	Mercury at Greatest Elongation West	10:30 a.m.

PHASES OF THE MOON

	New Moon Dec 01 02:21 p.m.
	First Quarter Dec 08 11:27 p.m.
	Full Moon Dec 15 05:02 p.m.
	Last Quarter Dec 23 06:18 a.m.
	New Moon Dec 31 06:27 a.m.

RISE AND SET TIMES OF PLANETS

DATE	MERCURY		VENUS		MARS		JUPITER		SATURN	
	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set
Dec 01	06:57 am	06:07 pm	09:19 am	08:31 pm	09:23 pm	10:16 am*	05:51 pm	06:46 am*	12:21 pm	12:09 am*
Dec 11	05:23 am	04:43 pm	09:25 am	08:44 pm	08:44 pm	09:38 am*	05:06 pm	06:01 am*	11:43 am	11:28 pm
Dec 21	04:42 am	04:05 pm	09:28 am	08:54 pm	07:58 pm	08:55 am*	04:21 pm	05:16 am*	11:05 am	10:51 pm
Dec 31	04:48 am	04:06 pm	09:26 am	09:02 pm	07:07 pm	08:07 am*	03:37 pm	04:32 am*	10:28 am	10:14 pm



CHRISTMAS TREE CLUSTER

Astronomy Picture of the Month

This view of NGC 2264, also referred to as the "**Christmas Tree Cluster**," gets its name from the triangular shape, formed by a cluster of relatively young stars that, in visible light, resembles a tree. Comparatively small and massive stars are present in the cluster, with masses ranging from a tenth to seven times that of our Sun. The cluster is in the Milky Way galaxy and at about 2,500 light-years distant from Earth.

Notes:

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

[2] *following day

"tracking the sky...helping the country"

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Stars and Constellations

December is the best time to observe the constellations **Perseus**, **Triangulum**, and **Aries** lying in the northern celestial hemisphere, while **Eridanus**, **Fornax**, and **Horologium** are in the south. The outstanding constellations are placed directly overhead at 09:00 p.m. on 15 December 2024 as shown in Figure 1. [1,2]

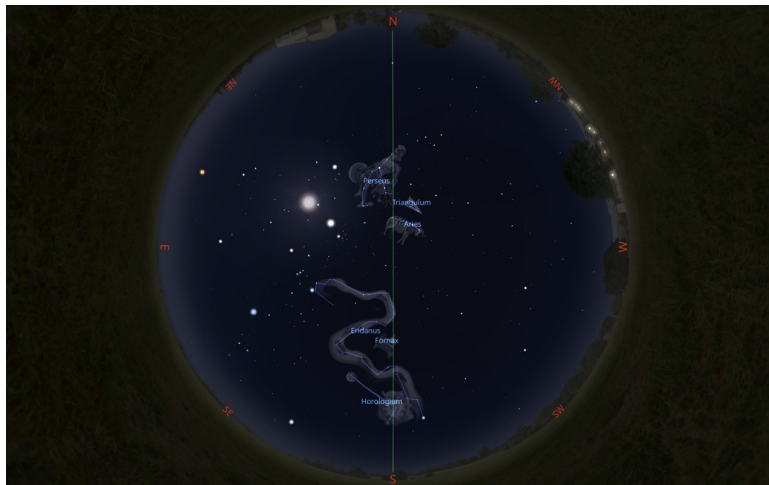


Figure 1: The view of the night sky featuring the prominent December constellations at 09:00 p.m. on 15 December 2024 using the Stellarium software.

Perseus, the Hero, is known for its association with one of the famous annual meteor showers, the Perseids, which peaks around mid-August. The constellation's brightest star, Mirfak or Alpha Persei, is easily visible to the unaided eye due to its apparent magnitude of 1.79. Another notable star in Perseus is Algol or Beta Persei, a multiple-star system renowned for its striking brightness variations. Several fascinating deep-sky objects are positioned in the constellation Perseus, which include the Perseus Cluster of galaxies (Abell 426) [Figure 2a], an enormous group of galaxies situated about 240 million light-years distant. Near the cluster's center is Seyfert galaxy NGC 1275 [Figure 2b], named Perseus A. Another cluster member is galaxy NGC 1260, which hosted the second-brightest supernova recorded. [2,3]

Aries, the Ram, despite having relatively faint stars, with its placement along the ecliptic and its closeness to more prominent astronomical objects, is easily identifiable. Hamal, or Alpha Arietis, is the constellation's brightest star, an orange giant with a magnitude of 2.0, located around 66 light-years away. Noteworthy galaxies are situated in the constellation Aries, including the spiral galaxy NGC 772 [Figure 2c], distinguished by its extended, asymmetrical spiral arms that are caused by the gravitational interaction with its nearby galaxy. [2,4]

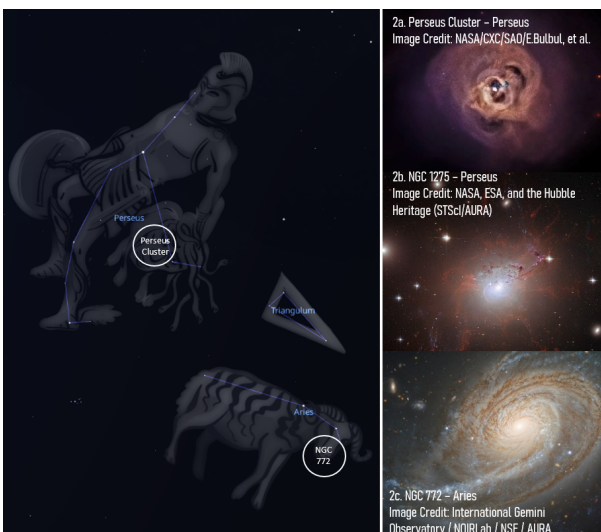


Figure 2: The Northern Constellations

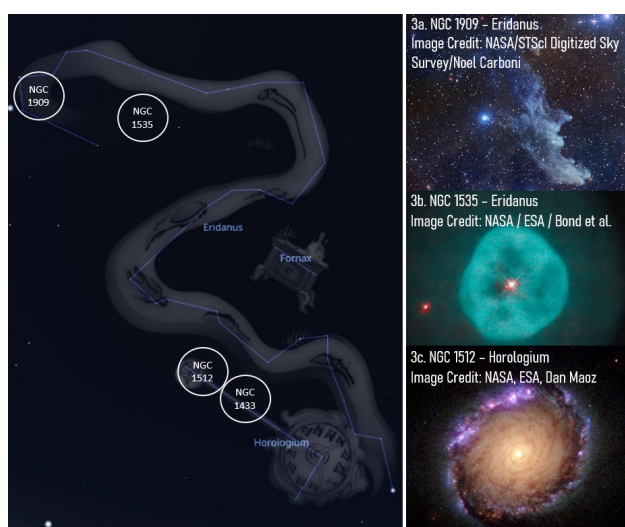


Figure 3: The Southern Constellations

Eridanus, the River, is the sixth (6th) largest and the second (2nd) longest constellation in the sky. It is well known for its collection of celestial objects. Its brightest star, Archernar, is the ninth brightest star in the sky and one of the flattest stars observed due to its rapid rotation. Another noteworthy star in Eridanus is Epsilon Eridani, the third closest star to Earth that is visible to the naked eye and known to have a planetary system. The constellation contains numerous captivating deep-sky attractions. It hosts the Witch Head Nebula (NGC 1909) [Figure 3a], a reflection nebula well-lit by the brilliant star Rigel, and a magnitude 10.5 planetary nebula, the Cleopatra's Eye Nebula (NGC 1535) [Figure 3b]. [2,5,6]

Horologium, the Clock, is a faint constellation in the South with its brightest star, Alpha Horologii, having an apparent magnitude of 3.85. The constellation is a wealth of interesting deep-sky objects, despite its faint stars. It hosts the Horologium Supercluster, one of the largest known clusters of galaxies, approximately 700 million light-years distant. The spiral galaxy NGC 1433, and the barred spiral galaxy NGC 1512 [Figure 3c] are also located in the constellation Horologium. [2,7]

Planetary Location

Mercury is not readily available at the beginning of December but will appear before sunrise lying low on the eastern horizon towards the middle until the end of the month while **Venus** will be visible just after sunset until it dives into the western horizon. **Mars** will be accessible in the evening and will be seen in the night sky until it disappears in the dawn twilight. **Jupiter** and **Saturn** will be observable as dusk fades and will present their visibility for the entire night until they set in the western horizon by early morning and late evening, respectively. [1,8]

The 3-day-old **Moon** and **Venus** will be in conjunction on 05 December at 06:40 a.m., separated by $2^{\circ}15'$. After about an hour, the two will make a close approach, passing within $2^{\circ}11'$ of each other. Both objects lie behind the background stars of Sagittarius. The exact occurrence of these events will not be visible as two objects are still below the horizon. However, their close pairing is best observed at 06:00 p.m. until they set in the southwestern horizon [Figure 4]. [8,9,10]



Figure 4: The view of the southwestern sky showing the close pairing of the Moon and Venus on 05 December at 06:00 p.m. using Stellarium.



Figure 5: The view of the western sky showing the close pairing of the Moon and Saturn on 08 December at 06:00 p.m. using Stellarium.

On 08 December at 04:41 p.m., the **Waxing Gibbous Moon** and **Saturn** will approach closely, passing within 16.3 minutes of each other. At about the same moment, they will share the same right ascension, with the Moon passing $18'$ to the north of Saturn. The exact events will not be observable due to the presence of the Sun, but their close pairing will be visible starting at 06:00 p.m. until the two objects dive on the western horizon [Figure 5]. [11,12]

The **Waxing Gibbous Moon** and **Jupiter** will pass in close proximity on 15 December at 02:28 a.m., passing within $5^{\circ}25'$ of each other. It will be followed by the 13-day-old Moon passing $5^{\circ}28'$ north of Jupiter as they will be in conjunction at 03:42 a.m. The Moon and Jupiter lie behind the background stars of Taurus, shining brightly at magnitudes -12.8 and -2.8, respectively. The exact timing of these events will be visible above the western sky as seen in Figure 6. [13,14]



Figure 6: The view of western sky showing the a) close approach at 02:28 a.m. and b) conjunction at 03:42 a.m. of the Moon and Jupiter on 15 December using Stellarium.

On 18 December at 04:49 p.m., the **Moon** and **Mars** will be in conjunction, separated by $54'$. The two objects will then make a close approach at 05:17 p.m., passing within 52 arcminutes of each other. The exact events will not be observable as the two objects are still below the horizon, located in the constellation Cancer. The best time to view their close pairings is at 10:00 p.m. on the same day until they get lost in the glare of the Sun [Figure 7], with the Moon shining brightly at magnitude -12.6 and Mars at magnitude -0.9 . [8,15,16]

Mercury will undergo **dichotomy** or in its half-phase on 20 December at 10:51 p.m. It will then be at its highest point in the morning sky on 24 December, shining brightly at magnitude -0.4 . The following day at 10:30 a.m., the planet will be at its farthest distance from the Sun by 22° in its morning apparition, also referred to as the **Greatest Elongation West**. [8,17,18,19]



Figure 7: The view of the eastern sky showing the close pairing of the Moon and Mars on 18 December at 10:00 p.m. using Stellarium.

All the conjunctions and near approaches mentioned between the planet and the moon, or planet to planet, will be visible enough to fit within the field of view of a telescope and can also be viewed with the naked eye or using a pair of binoculars.

December Solstice

The **December solstice**, or **Winter solstice**, will occur on 21 December at 05:21 p.m. This day marks the shortest day and the longest night in the northern hemisphere, when the Sun reaches its southernmost position in the sky, in the constellation of Capricornus at a declination of 23.5°S . Astronomers consider this day as the start of winter in the northern hemisphere, and summer in the southern hemisphere. [8,20]

Meteor Shower

Geminids is an annual major meteor shower active from **04-17 December**, with an expected peak of activity on **14 December**. It is estimated to produce 120 meteors per hour if viewed in a clear dark moonless location. The *asteroid 3200 Phaethon* is the parent body responsible for generating the meteor shower. The view of the meteor shower can be enjoyed once the shower's radiant, in the constellation Gemini, rises around 07:10 p.m. above the eastern horizon. The radiant point will be at its highest in the sky at 02:00 a.m. producing its best display [Figure 8]. The presence of the waxing gibbous Moon will present significant interference during the observation of the meteor shower. [21]



Figure 8: The view of the northern sky during the peak of Geminid meteor shower on 14 December 2024 at 02:00 a.m. when the shower's radiant is represented by the green solid circle.

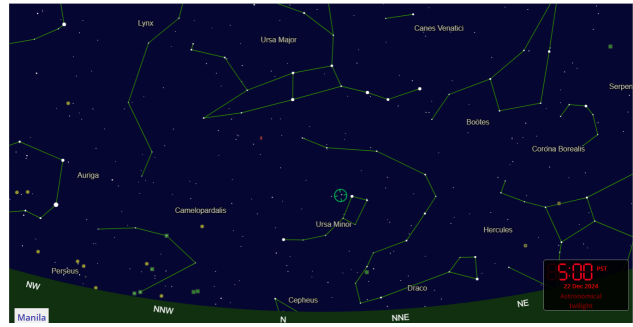


Figure 9: The view of the north northeastern sky during the peak of Ursid meteor shower on 22 December 2024 at 05:00 a.m. when the shower's radiant is represented by the green solid circle.

The **Ursid meteor shower**, produced by *Comet 8P/Tuttle*, is a meteor shower observable from **17-26 December**, producing its peak rate of meteors around **22 December**. The radiant point, in the constellation Ursa Minor, is highest in the sky at around 08:00 a.m., and so the shower will be producing its best display before dawn around 05:00 a.m., with up to 10 meteors per hour [Figure 9]. The radiant point is circumpolar and is always above the horizon, thus the shower will be active throughout the night. The Moon, in its waning gibbous phase, will present a significant impact with the meteor shower viewing. [22]

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.

Calendar of Astronomical Events for December 2024

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22 November 2024

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