

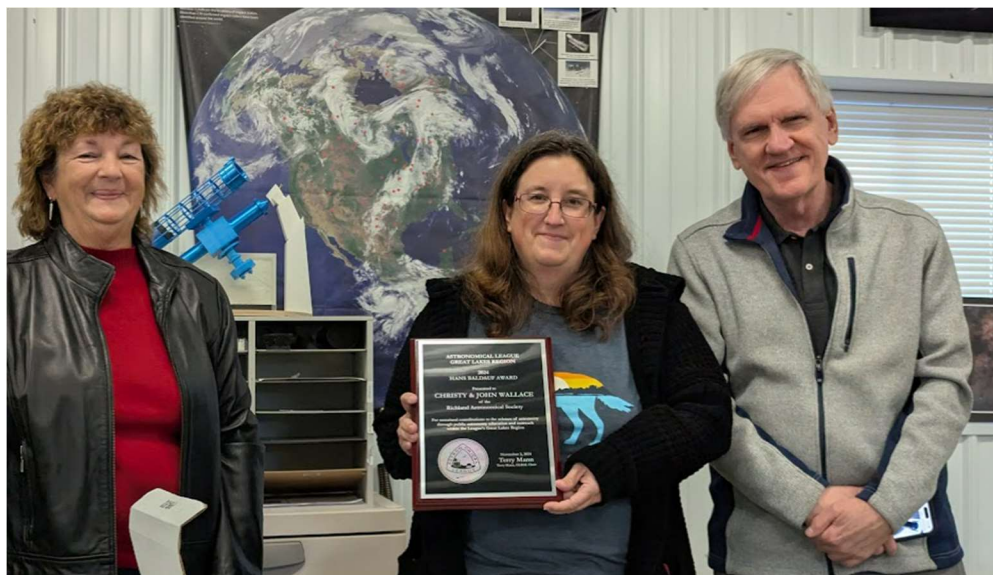


№111

December 2024

The newsletter of the Richland Astronomical Society and Warren Rupp Observatory

Christy and Jason Wallace Receive the 2024 Astronomical League Great Lakes Region Hans Baldauf Award



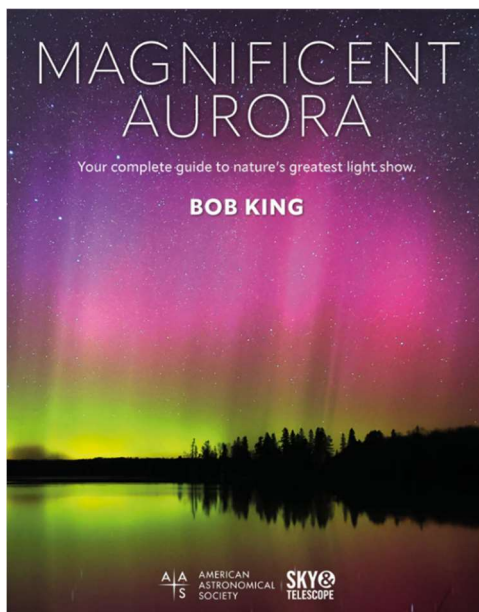
Chuck Allen and Terry Mann from the Astronomical League presented Christy and Jason Wallace with the Great Lakes Region's 2024 Hans Baldauf award for all their work supporting outreach and Hidden Hollow. The award is the highest honor given by the GLRAL and recognizes contributions to astronomy and to astronomy education and public outreach.

Astronomical League Solar System Observing Program – Mars

The two Martian projects necessary for the Astronomical League's Solar System Observing Program can be completed in the next two months. The first is to observe and plot the retrograde motion of Mars before and after opposition. This project is suitable for the naked eye and binocular certificates in addition to the full program using a telescope. The other project is to sketch the red planet and note the features you can see which does require a telescope. The detailed requirements can be found at the following link to the Solar System program's Inner Solar System list of project requirements: <https://www.astroleague.org/solar-system-observing-program-inner-solar-system/>

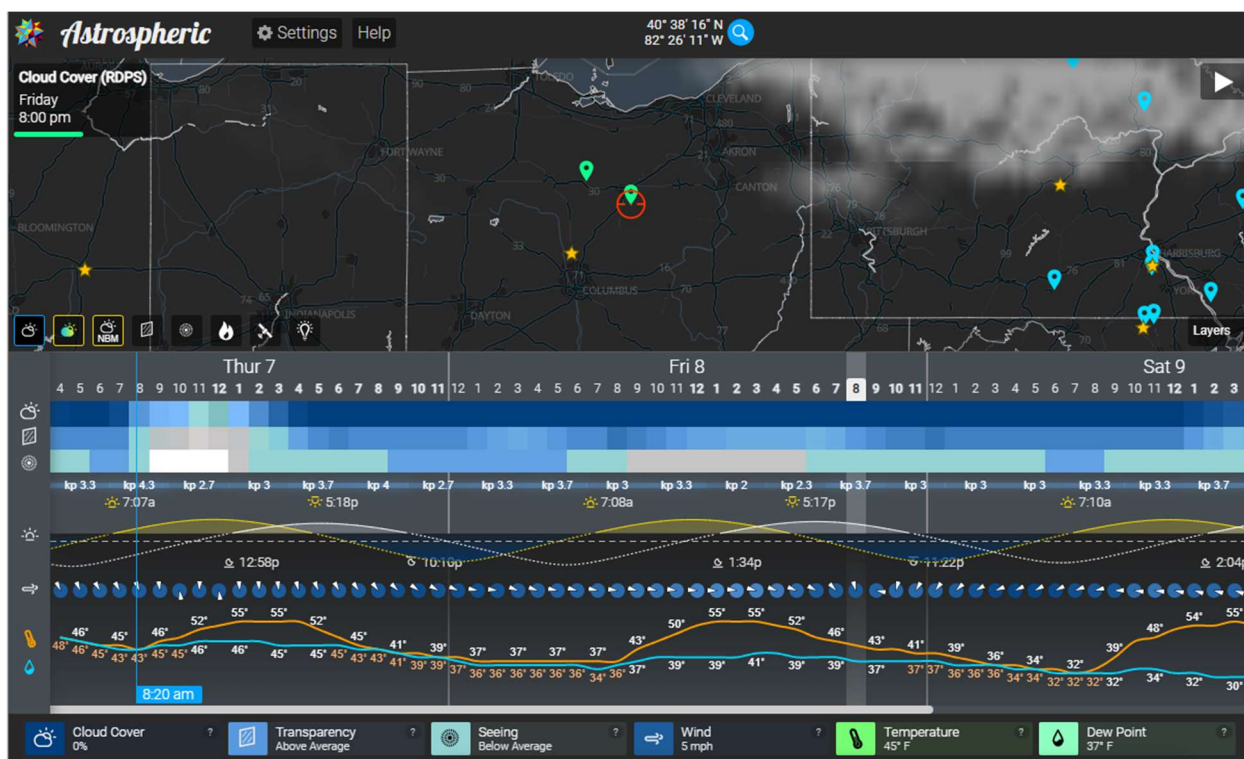
A handout regarding how best to track the retrograde motion of Mars appears later in this issue of the newsletter.

Latest Book by Friend of the Club, Bob King



Bob King, who was the main attraction at Hidden Hollow 2017, has a new book out. In this book he discusses the history, science, and photographic tips for the gorgeous displays the residents of Ohio have had the pleasure of seeing this year. The book is published by Sky and Telescope and is available from their online shop at <https://shopatsky.com/products/magnificent-aurora>

Astrospheric – Astronomical Weather App and Website



Astrospheric (<https://www.astrospheric.com/>) is an astronomical weather app that runs on Androids, iPhones, and desktop browsers. Its basic level is free and has the following features:

- 84 hour, hour-by-hour forecast.
- CMC astronomy data updated every 6 hours
- Extended cloud forecast.
- Kp index for Aurora viewing.
- International Space Station (ISS) flyover paths and times
- The smoke forecast is integrated into the transparency report
- Sky data: cloud, sky transparency, seeing
- Ground data: wind, temperature, and humidity.
- Shows when temperature and dewpoint meet.
- Precise rise and set times for both the sun and moon
- Details Solar and Lunar eclipse data

In comparison with Clear Sky Clock, there is much more data and graphical information. If you download the app or create an account, you can join the RAS group by entering the following Instant Join Code: S_312ec55f

Once there are at least 20 members in the group, we'll request that we be listed as an Astronomy club on their map, and we will be visible to all other users.

A Charted Collection of Diamonds Rubies and Rings
Hidden in Starlight and Asterisms
By Kim Balliett

A Stellar Ring

Largest of all the asterisms is what I call, "a stellar ring". One third of the brightest stars of the sky cluster here. Eight being of 1st magnitude and covering six constellations. Each having their own name in the constellation as follows, Sirius of Canis Major, Procyon of Canis Minor, Castor and Pollux of Gemini, Capella of Auriga, Aldebaran of Taurus and Rigel and Betelgeuse of Orion. Best seen mid-November - mid March and normally listed as the Winter Circle or Winter Hexagon. Whatever you call it the magnetism of this special ring is electrifying and will hold you star dazed!

Starting with Orion who dominates the longer and cooler nights of fall and winter. Looking like a quadrangle stickman, it is by far the most recognized constellation of the sky. This giant warrior is decorated with seven major bright stars and patches. Large and luminous, its fire-star Betelgeuse is the upper east shoulder and is a distinct red ruby! To its west is Bellatrix known as the amazon star. It shines as the 25th brightest in our night sky. Noted as a variable star ranging from 1.59 - 1.64 in magnitude. Bellatrix is one of the first 4 stars used for celestial navigation. Orion's west foot is Rigel, a blue supergiant and ranks as the 7th brightest star in our celestial sphere. When Orion rises in the east Rigel is its first visible star. Saiph marks the southeastern foot and is another bright supergiant.

Orion's belt is an asterism also known as the "Three Kings" or as "a string of pearls" due to its prominent stars. When these three rise in the east they are most often mistaken as a formation of UFO's!

Alnitak is our 33rd brightest night star and is at the eastern end of the belt. One can find two famous nebulas just south of here. Easternmost is the "Flame" nebula and in the southern mist holds the "Horse Head" nebula. Before leaving Alnitak, move 2.5 degrees northeast to find a somewhat challenging object, unless under dark skies, called the "False Comet" and is listed as M78. Well worth it!

Alnilam is a large blue supergiant burning a glow of ultraviolet fluorescence boldly in the center of the belt. Its brightness is 29th in the night sky and is one of the 58 stars used in celestial navigation.

Mintaka means belt of good fortune. It is the westernmost star of the belt and was found to have a high calcium spectral line proving existence of interstellar matter back in the 1880s.

Orion's sword hangs off his belt as another 3-star asterism. consisting of stars #42 / theta/ iota, entwined in a massive region full of interstellar clouds of beauty known as a reflection nebula. Listed as NGC 1977, NGC 1975, NGC 1973, and an open cluster NGC 1981.

Inside the sword lies the most famous fuzzy spot of all. Labeled M42 the "Great Orion Nebula". It is also the brightest of all the naked eye nebulas. Inside M42 at its center you will find an asterism and the most famous of the multiple stars called the trapezium. Definitely counts as a stellar diamond patch!

Iota is the bright one at the sword's tip and is attractive in a small scope. You can find the "Lost Jewels of Orion" here in an open cluster called NGC 1980.

Dues for 2025

As a reminder, all memberships expire at the end of the year and renewals must be made by January 31st. Treasurer Pat Everly will be able to take payment at the November and December meetings. Individual \$50, Family \$70, and \$25 for students. Please let the secretary know if you have family members that need badges/membership cards. Dues payments can also be sent to the RAS post office box: Richland Astronomical Society, PO Box 700, Bellville, OH 44813

How to submit content and suggestions

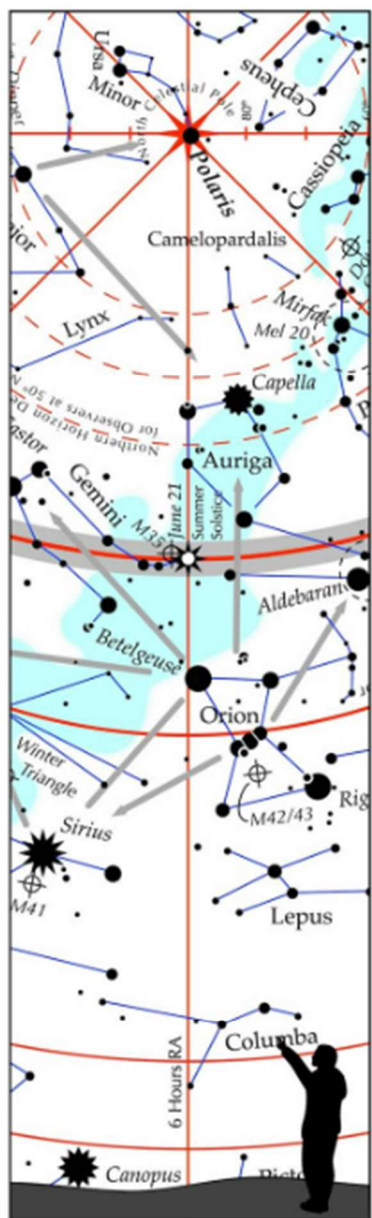
Please send any content submissions, questions, or suggestions to the RAS secretary at secretary@wro.org.

**Your Astronomical
Cartoon Here**



Beyond Polaris

Acquaint yourself with the night sky.
Learn, Observe, and Share!



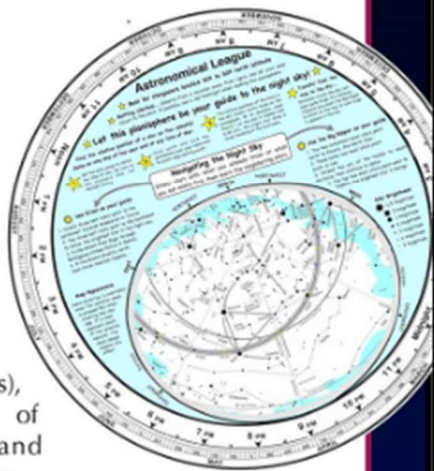
Indoors Session

- ☀ Practice Observing and Star Party Etiquette
- ☀ Assemble needed observing materials,
- ☀ Review bodies of the solar system, and stars and constellations,
- ☀ List important and useful astronomy terms and definitions,
- ☀ Learn about features in the night sky.

Outdoors Session

- ☀ Find the North Star (Polaris),
- ☀ Star hop to a number of constellations, stars, and naked eye celestial features,
- ☀ Discover features in night sky,
- ☀ Observe the moon in its different phases and identify its features,
- ☀ Recognize the planets,
- ☀ Scan the Milky Way,
- ☀ Split double stars,
- ☀ Identify star clusters and nebulae,
- ☀ Enjoy meteor showers,
- ☀ Record what you see,
- ☀ See how light pollution hampers your viewing the night sky.

A **planisphere** is a rotatable dial that shows star positions in the sky at any time during the year.



For complete details ...

<https://www.astroleague.org/beyond-polaris-observing-program/>

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An unusual observing test – no telescope required!



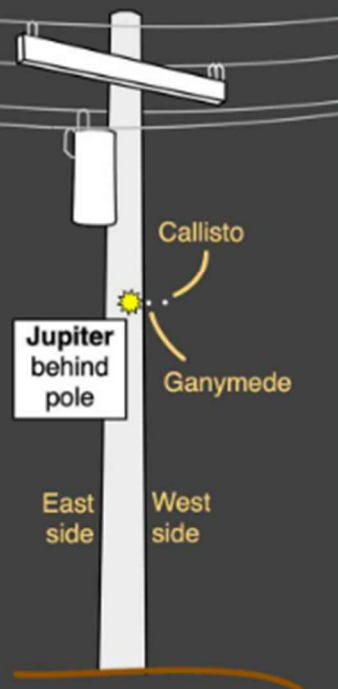
If you have excellent eyesight, and if you observe from a dark area, then try spotting Jupiter's two largest moons, **Ganymede** and **Callisto**, with the unaided eye.

On nights when either of those two moons appears farthest from the glaring planet ...

- Position yourself so that Jupiter is placed behind an occulting structure such as a darkened utility pole.
- If Ganymede and Callisto are west of Jupiter, place Jupiter just out of sight behind the right side of the pole. Do the opposite when the moons are east of the planet.
- Since Ganymede and Callisto are 4.5 and 5.5 magnitude, respectively, they should be barely visible as two dim starlike points.

Ganymede: Best Nights
Nov 15 (East side)
Nov 25 (West side)
Dec 6 (East side)
Dec 31 (West side)

Callisto: Best Nights
Nov 11-14 (East side)
Nov 19-22 (West side)
Nov 27-30 (East side)
Dec 6-9 (West side)
Dec 14-17 (East side)
Dec 22-25 (West side)

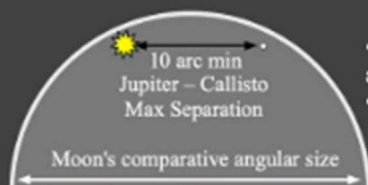


Note

- Callisto can reach twice as far from Jupiter as Ganymede.
- On the night of Nov 15, Ganymede and Callisto appear to merge, forming a brighter point. They will be on the east side of Jupiter.
- Confirm your observations with binoculars.
- Be aware that bright moonlight will interfere with observations.



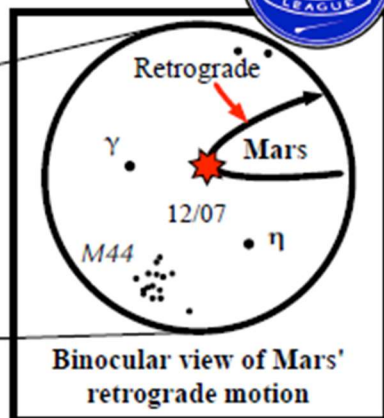
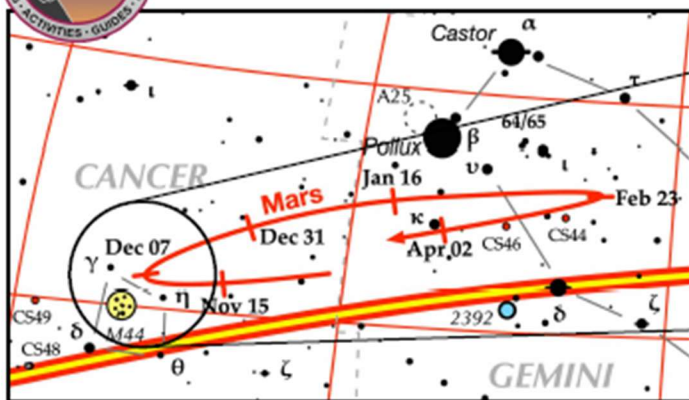
Relative maximum angular distance Callisto is from Jupiter compared to the diameter of our moon.



- Even at Callisto's maximum distance from the planet (10 arc min), it still appears very close – about 1/3 of the moon's angular diameter (30 arc min)!
- Ganymede's maximum angular distance is about half of Callisto's.

Observing Project: Retrograde Motion of Mars

See this for yourself!



Relative apparent size of Mars



94% illuminated

Dec. 7, 2024

Magnitude: -0.6

Diameter: 12 seconds

Distance: 71 million miles



100% illuminated

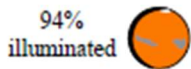
Opposition

Jan. 16, 2025

Magnitude: -1.4

Diameter: 15 seconds

Distance: 60 million miles



94% illuminated

Feb. 23, 2025

Magnitude: -0.4

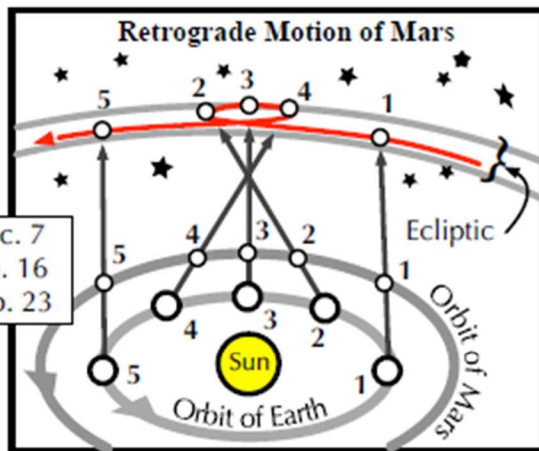
Diameter: 11 seconds

Distance: 76 million miles

Over the next four months, observe Mars using binoculars on every clear night, then plot its changing position among the background stars.

Mars nears M44, the Beehive star cluster, in central Cancer in early December. It reaches its closest point to it on December 7, after which it enters retrograde motion, inching westward each evening until February 23, 2025. Mars then lies in central Gemini.

Mars will also be growing in angular size as Earth slowly overtakes it on January 16, 2025. (Actually, the two planets are closest on January 11. The discrepancy is due to Mars' elliptical orbit.) At this time, it shows its largest angular size – 15 arc seconds – until April 2031. By February 23, the Red Planet ceases moving westward nightly, shifting its direction eastward (called prograde motion).



Mars at its brightest, largest & closest:

Jan. 11, 2025

-1.4 mag., 15 arc seconds, 59.8 million miles

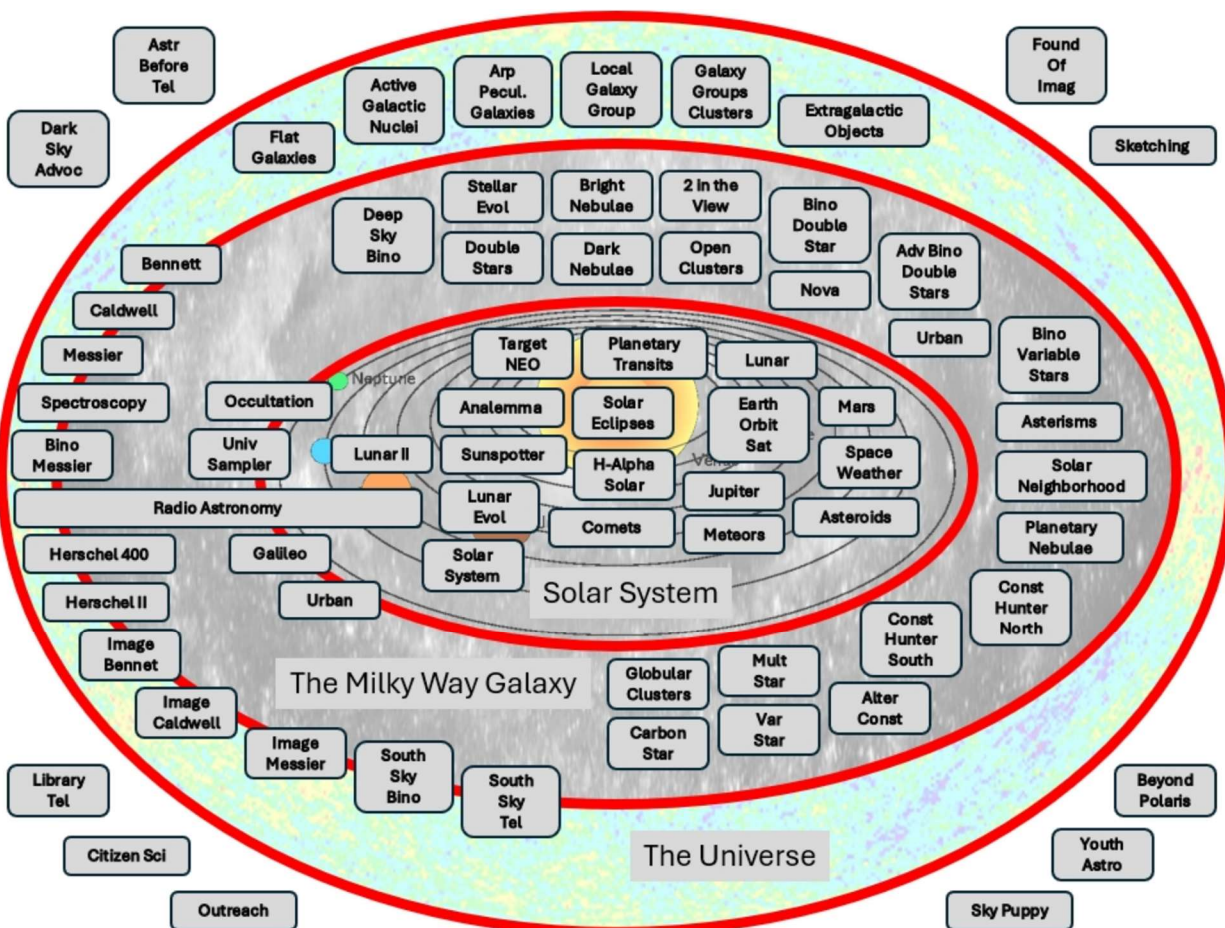
It won't come any closer until Apr 11, 2031.

Why do this activity? This planetary dance can only be explained if both Earth and Mars orbit our sun following definable elliptical paths. Our view from Earth clearly shows this to those people who take the time to look carefully enough.

Astronomical League Observing Programs

Are you wondering what the AL offers for Observing Program and how they all fit together in the Universe? The AL has developed a graphic that shows all of the AL's Observing Programs. There are three red ovals. These are the Universe, the Milky Way Galaxy, and the Solar System. The Observing Programs are superimposed on these ovals and are grouped by:

- Observing Programs that transcend the Universe are in the white space outside of the Universe.
- Observing Programs that focus only on objects beyond our galaxy are in the Universe oval (at the top).
- Observing Programs that focus on objects both inside and outside of our galaxy are on the left and are those that cross the boundary between the galaxy and the Universe.
- The Radio Astronomy Observing Program is a special case. It involves objects inside our solar system, inside our galaxy and also in the Universe. It crosses two of the oval boundaries.
- Observing Programs that focus on objects in the Milky Way galaxy are shown inside the galaxy's oval at the top, right, and left.
- Observing Programs that focus on objects both inside the Solar System and inside the galaxy are shown on the left and cross the solar system's oval.
- Observing Programs that focus on objects within our solar system are shown in the inner oval.





This article is distributed by NASA's Night Sky Network (NSN).

The NSN program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, and more!

December's Night Sky Notes: Spot the King of Planets

By Dave Prosper

Updated by Kat Troche

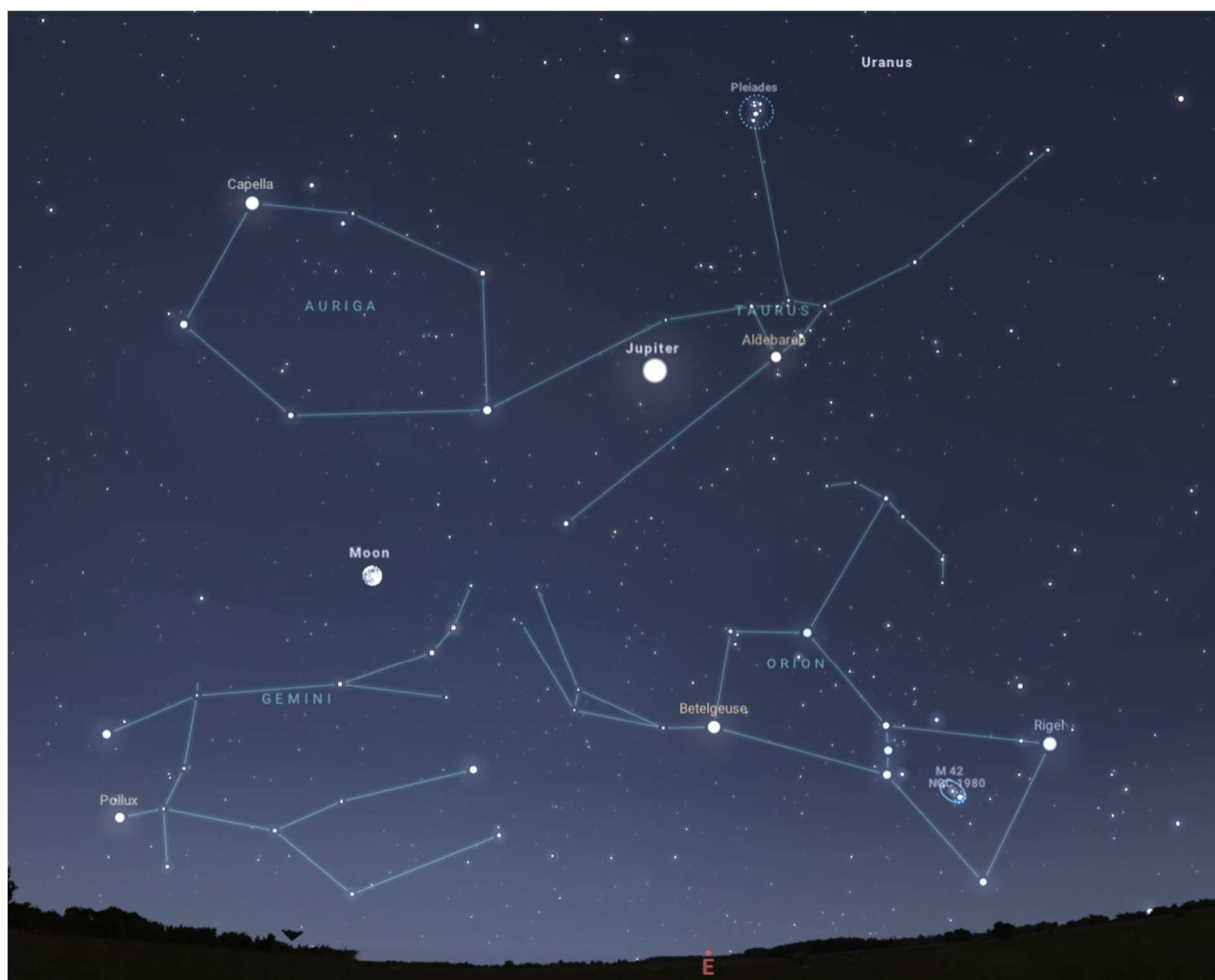
Jupiter is our solar system's undisputed king of the planets! Jupiter is bright and easy to spot from our vantage point on Earth, helped by its massive size and banded, reflective cloud tops. Jupiter even possesses moons the size of planets: Ganymede, its largest, is bigger than the planet Mercury. What's more, you can easily observe Jupiter and its moons with a modest instrument, just like Galileo did over 400 years ago.



NASA's Juno mission captured this look at the southern hemisphere of Jupiter on Feb. 17, 2020, during one of the spacecraft's close approaches to the giant planet. This high-resolution view is a composite of four images captured by the JunoCam imager and assembled by citizen scientist Kevin M. Gill. Credit: NASA, JPL-Caltech, SwRI, MSSS | Image processing by Kevin M. Gill, © CC BY

Jupiter's position as our solar system's largest planet is truly earned; you could fit 11 Earths along Jupiter's diameter, and in case you were looking to fill up Jupiter with some Earth-size

marbles, you would need over 1300 Earths to fill it up – and that would still not be quite enough! However, despite its formidable size, Jupiter’s true rule over the outer solar system comes from its enormous mass. If you took all of the planets in our solar system and put them together, they would still only be half as massive as Jupiter all by itself. Jupiter’s mighty mass has shaped the orbits of countless comets and asteroids. Its gravity can fling these tiny objects towards our inner solar system and also draw them into itself, as famously observed in 1994 when Comet Shoemaker-Levy 9, drawn towards Jupiter in previous orbits, smashed into the gas giant’s atmosphere. Its multiple fragments slammed into Jupiter’s cloud tops with such violence that the fireballs and dark impact spots were not only seen by NASA’s orbiting Galileo probe but also by observers back on Earth!



Look for Jupiter near the Eye of the Bull, Aldebaran, in the Taurus constellation on the evening of December 15, 2024. Binoculars may help you spot Jupiter’s moons as small bright star-like objects on either side of the planet. A small telescope will show them easily, along with Jupiter’s famed cloud bands. How many can you count? Credit: Stellarium Web

Jupiter is easy to observe at night with our unaided eyes, as well-documented by the ancient astronomers who carefully recorded its slow movements from night to night. It can be one of the brightest objects in our nighttime skies, bested only by the Moon, Venus, and occasionally Mars, when the red planet is at opposition. That’s impressive for a planet that, at its closest to

Earth, is still over 365 million miles (587 million km) away. It's even more impressive that the giant world remains very bright to Earthbound observers at its furthest distance: 600 million miles (968 million km)! While the King of Planets has a coterie of 95 known moons, only the four large moons that Galileo originally observed in 1610 – Io, Europa, Ganymede, and Calisto – can be easily observed by Earth-based observers with very modest equipment. These are called, appropriately enough, the Galilean moons. Most telescopes will show the moons as faint star-like objects neatly lined up close to bright Jupiter. Most binoculars will show at least one or two moons orbiting the planet. Small telescopes will show all four of the Galilean moons if they are all visible, but sometimes they can pass behind or in front of Jupiter or even each other. Telescopes will also show details like Jupiter's cloud bands and, if powerful enough, large storms like its famous Great Red Spot, and the shadows of the Galilean moons passing between the Sun and Jupiter. Sketching the positions of Jupiter's moons during the course of an evening – and night to night – can be a rewarding project! You can download an activity guide from the Astronomical Society of the Pacific at bit.ly/drawjupitermoons

Now in its eighth year, NASA's Juno mission is one of just nine spacecraft to have visited this impressive world. Juno entered Jupiter's orbit in 2016 to begin its initial mission to study this giant world's mysterious interior. The years have proven Juno's mission a success, with data from the probe revolutionizing our understanding of this gassy world's guts. Juno's mission has since been extended to include the study of its large moons, and since 2021 the plucky probe, increasingly battered by Jupiter's powerful radiation belts, has made close flybys of the icy moons Ganymede and Europa, along with volcanic Io. What else will we potentially learn in 2030 with the Europa Clipper mission?

Find the latest discoveries from Juno and NASA's missions to Jupiter at science.nasa.gov/jupiter/

Originally posted by Dave Prosper: February 2023

Last Updated by Kat Troche: November 2024