



CLUB NEWS AND EVENTS

MONTHLY MEETINGS

Board Meeting: October 6 @ 7:00 p.m.
Members Meeting: October 6 @ 8:00 p.m.
Held at Schoonover Observatory

Program: Terry Mann will present *Solar Cycle 25 and the Aurora*. Terry has been a leader in the International Dark Sky Association Ohio Chapter since its founding. She is a past President of the Astronomical League and the current Chair of the Great Lakes Region of the Astronomical League.

Her passion for astrophotography has brought her around the world, and her work has been displayed in multiple publications and venues including the Smithsonian Institution. Terry's dedication to astronomy outreach has earned her multiple accolades, and we are excited to welcome her to Schoonover Observatory.

UPCOMING EVENTS

October 14 - Partial Solar Eclipse

Schoonover Observatory will be open starting at 10:00am to observe the partial solar eclipse. An annual solar eclipse will occur over the Southwest US that will be visible as a partial solar eclipse in Ohio

Lima Astro has eclipse glasses in stock! Get yours today so you have them for this eclipse, and the upcoming Total Solar Eclipse in April next year.

The eclipse occurs from 11:03am–4:55pm EDT, and will peak at 1:59pm EDT. The eclipse will be live-streamed if skies are cloudy. This is a rain or shine event.

October 21 - International Observe the Moon night

Held at Kendrick Woods with Johnny Appleseed Metropolitan Parks District staff. Beginning at 6:00pm, the club will have programs on the Moon and astronomy, and telescopes on the field. This event may be canceled due to inclement weather.

UNDER THE DOME

The 2023 Summer Viewing Program came to a close at the end of September. We hope everyone who attended had some great views of the cosmos and enjoyed the programming!

Schoonover Observatory will continue to be open for monthly public observing and programs through the remainder of the year on the first Friday of each month.

September Events Summary

Last month the club hosted or attended several events in addition to weekly Friday night observing.

The club was invited to the Lima Memorial Foundation fundraiser gala at 19 Hawthorne on September 21, where stargazing opportunities were provided for guests.

On September 23 the club opened Schoonover Observatory during the day for Astronomy Day #2, where we did some daytime observing of the Sun and Venus and discussed a wide variety of astronomy topics with members and guests.

On September 24, the LAS was one of many organizations at STEAM on the Quad at the OSU Lima campus. This is a great event for K-12 audiences to help youth discover the sciences.

Notes

The Astronomical League has the 2024 edition of the *Observer's Handbook* on sale. This book is the resource for annual astronomical events. You can order yours today at the [Astronomical League store](#).

As a reminder, if you could use some training on using your telescope or want recommendations on where to start, come to a meeting where we can talk shop and help you out. You are welcome to bring your equipment with you!

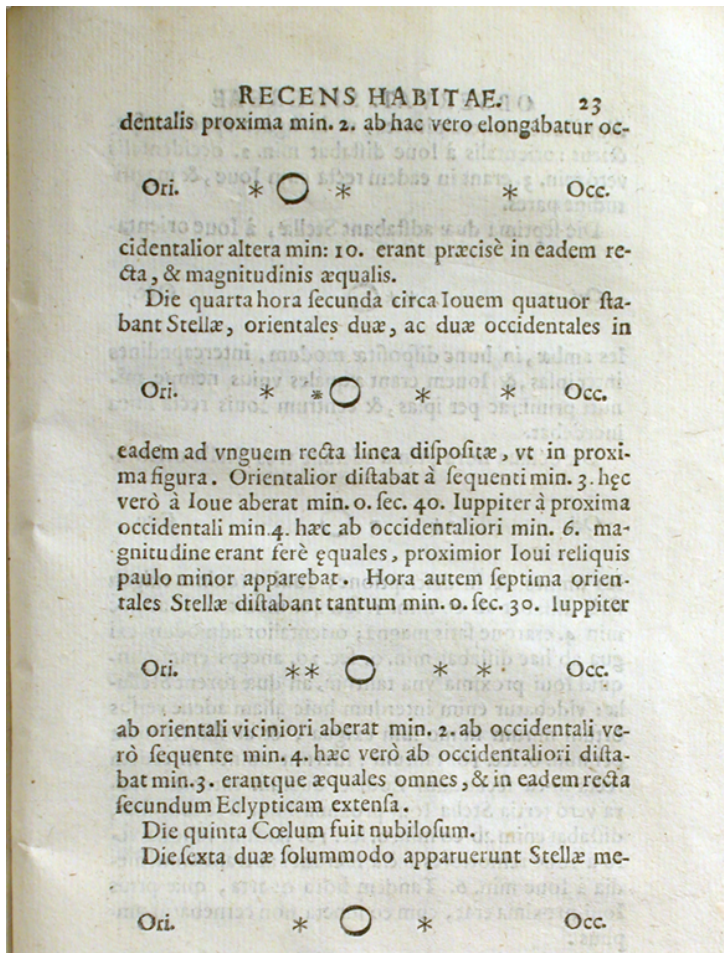


FROM GALILEO TO CLIPPER, EXPLORING JUPITER'S MOONS

VIVIAN WHITE - NIGHT SKY NETWORK



As autumn begins, if you're up late, you may notice a bright point of light rising in the east. Look a bit closer, with a pair of binoculars, and you'll notice it's not a star at all. While stars look point-like no matter how big your backyard telescope, this light appears as a circle under closer examination. Even more curious, you will likely see a line of smaller dots on one or both sides. Congratulations! You've rediscovered the king of the planets - majestic Jupiter - and its four largest moons.



Galileo's drawings of Jupiter and its Medicean Stars from *Sidereus Nuncius*. Image courtesy of the History of Science Collections, University of Oklahoma Libraries.

Galileo famously chronicled the four moving dots near Jupiter and surmised that they were orbiting the distant world. While Jupiter has well over 80 discovered moons as of September 2023, these brightest four are called the "Galilean Moons" - Io, Europa, Ganymede, and Callisto. (Great mnemonics exist to remember these in order of distance from Jupiter, such as "I Eat Green Caterpillars") You can follow these like Galileo did, using stargazing apps or the handy image below. A favorite beginning observing challenge is to track the movement of the Galilean Moons over the course of many nights. Even within a few hours, you will notice them moving in relation to Jupiter, just as Galileo did.

Fast forward 414 years, and NASA will be sending a robotic mission to investigate the surface of one of these distant worlds. The Europa Clipper Mission is launching to the cold, icy moon in 2024, to begin orbiting in 2030. With its salty oceans covered by ice, Europa was chosen as an excellent location to continue the search for life outside of Earth. Clipper will be the largest spacecraft ever sent to another planet, designed to withstand Jupiter's punishing radiation. Once it arrives at Jupiter in 2030, NASA plans to do about 50 flybys of Europa, mapping almost the entire surface of this watery world.

What was once only dreamed of in the small telescope of Galileo, or in great works of fiction, NASA is turning our wildest imagination into reality. One of the celebrated quotes from the classic 2010: *Odyssey Two* warns, "All these worlds are yours, except Europa. Attempt no landing there." Science fiction fans can feel relieved knowing that writer Arthur C. Clarke gave his blessing for the Europa Clipper mission.

Join the Europa Message in a Bottle Campaign to send your name with the spacecraft, hear the rest of the poem by the US Poet Laureate, and learn more about the wonders of space travel with the Clipper Mission:

<https://europa.nasa.gov/participate>.

Watch a wonderful Clipper webinar with Dr. Cynthia Phillips, planetary geologist with the mission:

<https://www.youtube.com/live/RnnLJBLRBCA?feature=shared&t=269>.

Eclipse glasses are available NOW!

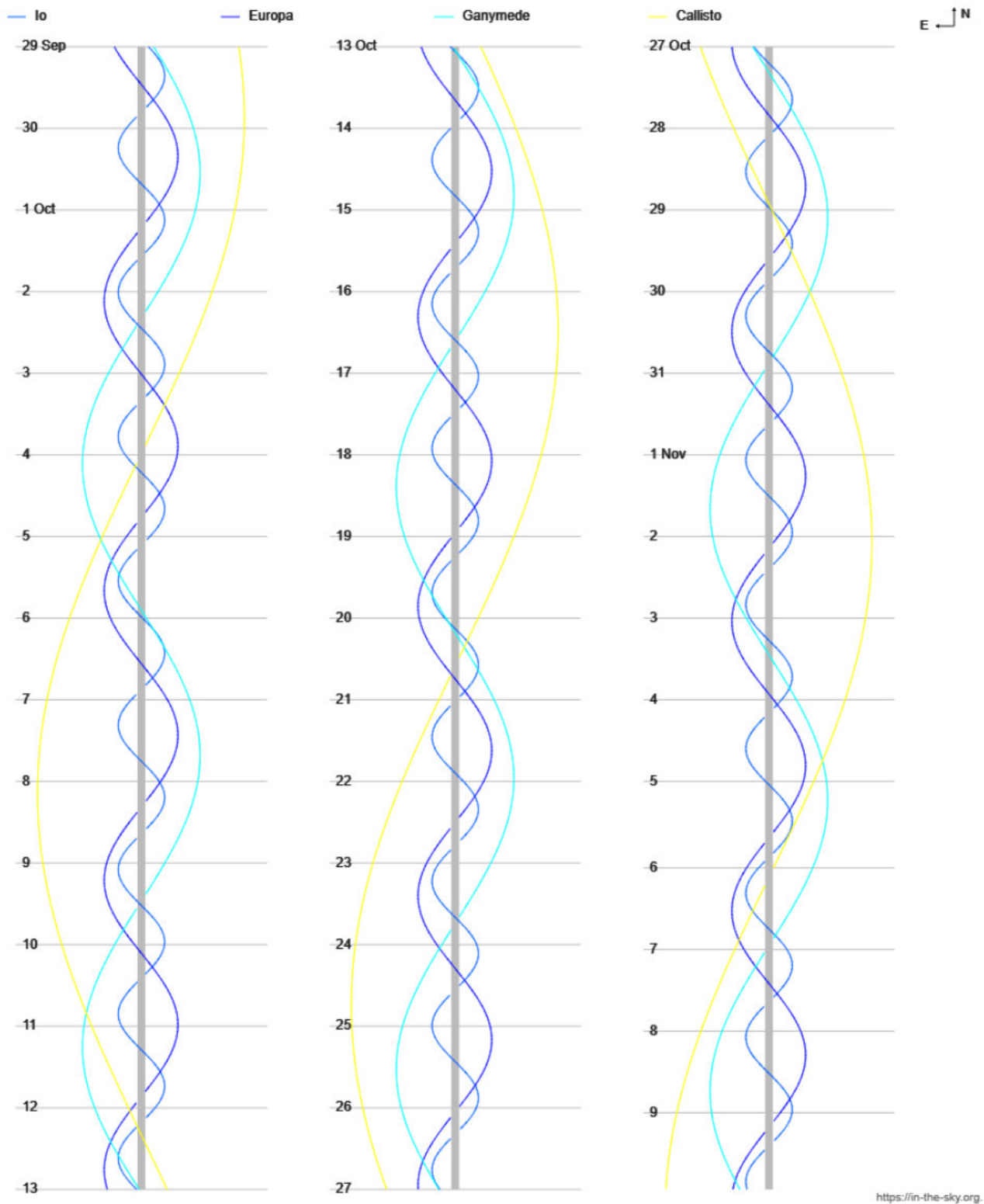
Stop by a Lima Astro meeting or event to get yours!



Eclipse glasses will start going **FAST** now that we are less than a year away from the April 2024 Total Solar Eclipse!

Lima Astro's glasses are ISO certified safe for solar observing.

Funds received from the sale of eclipse glasses go towards programming, outreach, and future projects such as the proposed Dark Sky Observatory at Kendrick Woods.



The position of the Galilean Moons of Jupiter in October 2023: <https://in-the-sky.org/jupiter.php>

The chart above shows the changing positions of Jupiter's four largest Moons, which are easily visible through a pair of modest binoculars or a small telescope as a series of pinpoints of light around Jupiter.

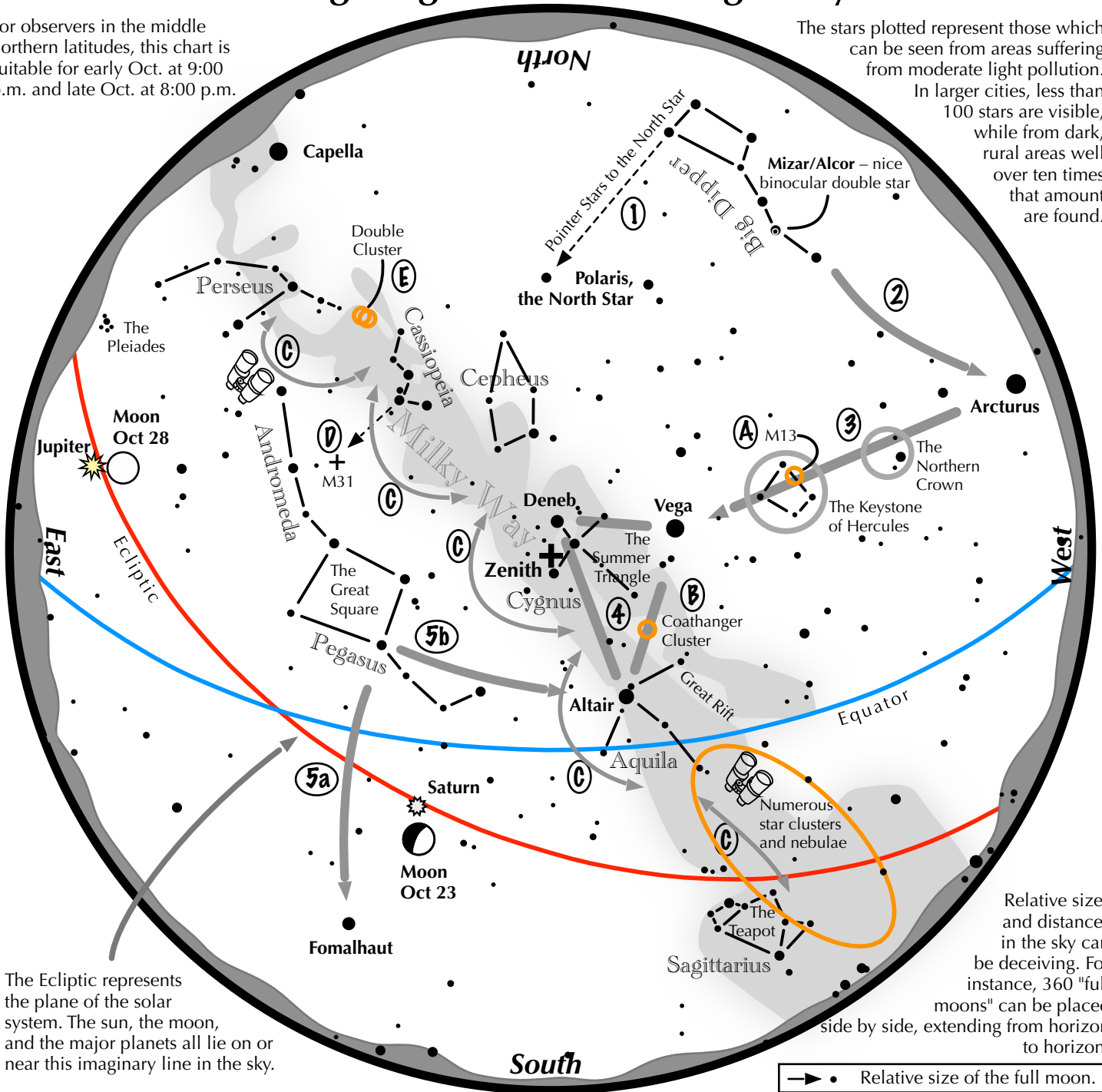
The east-west position of each moon relative to Jupiter is shown by a colored line. The planet's disk is represented by the gray strip that runs down the center of each column, which the moons pass in front of when traveling from east to west (left to right), and behind when traveling from west to east (right to left).

The horizontal lines are drawn at midnight each day

Navigating the October Night Sky

For observers in the middle northern latitudes, this chart is suitable for early Oct. at 9:00 p.m. and late Oct. at 8:00 p.m.

The stars plotted represent those which can be seen from areas suffering from moderate light pollution. In larger cities, less than 100 stars are visible, while from dark, rural areas well over ten times that amount are found.



Relative sizes and distances in the sky can be deceiving. For instance, 360 "full moons" can be placed side by side, extending from horizon to horizon.

→ • Relative size of the full moon.

Navigating the October night sky: Simply start with what you know or with what you can easily find.

- 1** Extend a line north from the two stars at the tip of the Big Dipper's bowl. It passes by Polaris, the North Star.
- 2** Follow the arc of the Dipper's handle. It intersects Arcturus, the brightest star in the early October evening sky.
- 3** To the northeast of Arcturus shines another star of the same brightness, Vega. Draw a line from Arcturus to Vega. It first meets "The Northern Crown," then the "Keystone of Hercules." A dark sky is needed to see these two dim stellar configurations.
- 4** Nearly overhead lie the summer triangle stars of Vega, Altair, and Deneb.
- 5** High in the east are the four moderately bright stars of the Great Square. Its two southern stars point west to Altair. Its two western stars point south to Fomalhaut.

Binocular Highlights

A: On the western side of the Keystone glows the Great Hercules Cluster, a ball of 500,000 stars. **B:** 40% of the way between Altair and Vega, twinkles the "Coathanger," a group of stars outlining a coathanger. **C:** Sweep along the Milky Way for an astounding number of fuzzy star clusters and nebulae amid many faint glows and dark bays, including the Great Rift. **D:** The three westernmost stars of Cassiopeia's "W" point south to M31, the Andromeda Galaxy, a "fuzzy" oval. **E:** Between the "W" of Cassiopeia and Perseus lies the Double Cluster.



Observing Lists

Top ten deep-sky objects for October

K 12	NGC 7332
M 52	NGC 7339
NGC 7209	NGC 7640
NGC 7293	NGC 7662
NGC 7331	NGC 7789

Top ten binocular objects for October

M 52	NGC 7510
NGC 7209	NGC 7686
NGC 7235	NGC 7789
NGC 7243	NGC 7790
NGC 7293	ST 12

Challenge deep-sky object for October

Jones 1 (PK104-29.1)

Jones 1 is a very faint, ghostlike planetary nebula in the constellation of Pegasus. It has its somewhat unusual name because it was discovered by Rebecca Jones of Harvard College Observatory in 1941.

Apparent Magnitude: 15.6

Surface Brightness: 19.0

The Planets in October

Mercury: Visible with difficulty in bright morning twilight early in the month. Falls within 10° elongation on the 7th and remains within that range for the rest of the month, achieving superior conjunction on the 20th.

Venus: Now in "morning star" mode, its splendid 2023 display continues to favor Northern Hemisphere observers. Passes 2° south of Regulus on the 10th and 6° south of the Moon on the same date. Achieves greatest western elongation of 46° on the 23rd, it's phase transforming from crescent to half to gibbous in the surrounding days.

Mars: Too close to the Sun to be seen.

Jupiter: Now closing in on its early-November opposition, the brilliant planet dominates the overnight sky, brightening to magnitude -2.9 early in the month. The waning gibbous Moon passes 3° to its north on the 2nd and again when just past full on the 29th. There is a splendid near-simultaneous double shadow transit involving the shadows of Io and Ganymede that lasts for some 104 minutes on the 20th (late on the 19th on the west coast of North America)

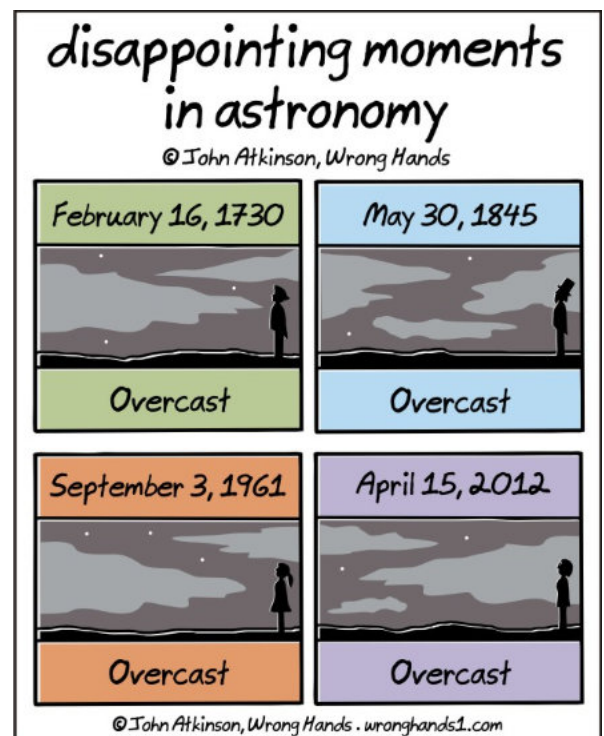
Saturn: Well above the horizon in evening twilight, it remains well-placed for observation. As it moves further from opposition, the shadow of the ball of the planet cast to one side of the ring behind becomes evermore apparent to the careful observer, bringing out the three-dimensional nature of the Ringed Wonder. The first-quarter Moon passes 3° to the south on the 24th.

Uranus: Up most of the night as it approaches its November 13th opposition.

Neptune: Just past opposition, visible most of the night in Pisces.

Astronomy History This Month

- The first recorded solar eclipse took place in 2136 BCE.
- Supernova SN 1604 (Kepler's Supernova) became visible to the naked-eye on October 9, 1604.
- Giovanni Cassini discovered Saturn's odd satellite Iapetus on October 25, 1671.
- M51a (the Whirlpool Galaxy) was discovered by Charles Messier on October 13, 1773.
- William Lassell discovered Triton, Neptune's brightest satellite, on October 10, 1846.
- Maria Mitchell discovered Comet C/1847 T1 (Miss Mitchell's Comet) on October 1, 1847.
- Two of the satellites of Uranus, Ariel and Umbriel, were discovered by William Lassell on October 24, 1851.
- Edwin Hubble discovered Cepheid variable stars in M31 (the Andromeda Galaxy) on October 5, 1923.
- Michel Mayor and Didier Queloz announced the discovery of the exoplanet 51 Pegasi b (Dimidium) on October 6, 1995.



October 2023 Astronomy Events Calendar

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
1	2 Jupiter 3° S of Moon Uranus 3° S of Moon	3 Mercury at greatest heliocentric lat. N Moon 1.1° S of Pleiades (M45)	4	5	6 Meeting, Program and Observing starting @ 8pm Last quarter Moon	7 Pollux 1.4° N of Moon
8	9	10 Moon at apogee Venus 2° S of Regulus Venus 6° S of Moon	11	12 Zodiacal light visible in the East before morning twilight for next two weeks	13	14 New Moon Partial Solar Eclipse Schoonover Observatory open during the day for the eclipse
15 Moon at descending node Mars 1.0° N of Moon	16	17	18 Antares 0.8° S of Moon	19	20 Double Shadows on Jupiter Mercury in superior conjunction	21 Int'l Observe the Moon Night. 6pm @ Kendrick Woods
22 Orionid meteors peak First quarter Moon	23 Venus greatest elongation W (46°)	24 Saturn 3° N of Moon	25 Venus at ascending node	26 Neptune 1.5° N of Moon Moon at perigee	27 Mercury at descending node	28 Moon at ascending node Full Moon
29 Jupiter 3° S of Moon	30 Uranus 3° S of Moon Moon 1.1° S of Pleiades (M45)	31				

ASTRONOMY CALENDAR TERMINOLOGY

Aphelion – The point in the orbit of a planet, asteroid, or comet at which it is furthest from the Sun.

Apogee – The point in the orbit of the Moon, planet, or satellite at which it is furthest from the Earth.

Ascending Node – The point along a planet's orbit where it crosses the ecliptic (Earth's orbital plane) from S to N.

Conjunction – When the Moon or a planet appears especially close to another planet or bright star.

Descending Node – The point along a planet's orbit where it crosses the ecliptic (Earth's orbital plane) from N to S.

Elongation – The angular distance the Moon or a planet is from the Sun. Mercury and Venus are best seen when at "greatest" elongation, and will appear at their highest position above the horizon before sunrise or sunset.

Heliocentric Latitude – The longitude of a heavenly body, as seen from the Sun's center (the Sun is at the center in the heliocentric model of the solar system). Essentially, if you could stand in the center of the Sun and draw a plane straight out in front of you (this would be 0.0°), heliocentric latitude is the number of degrees above or below that plane where the planet appears.

Inferior Conjunction – When a planet (Mercury or Venus) passes between the Earth and the Sun.

Occultation – When the Moon or a planet passes directly in front of a more distant planet or star. (*Occult, as a verb, means to obscure the view of an object.*)

Opposition – When a planet or asteroid is directly *opposite* the Sun in the sky. Just like the Full Moon, a planet will appear brighter and fully lit during this time.

Perigee – the point in the orbit of the Moon, planet, or satellite at which it is nearest to the Earth.

Perihelion – the point in the orbit of a planet, asteroid, or comet at which it is closest to the Sun.

Superior Conjunction – When a planet (Mercury or Venus) passes behind the Sun, out of our view.

Transit – When a smaller object passes in front of a larger object. Such as when Mercury or Venus pass in front of the Sun, silhouetting them against the disc; or when one of Jupiter's Galilean moons pass in front of the planet.

Zodiacal Light – Sunlight that is reflected off celestial dust that is concentrated in the plane of the Solar System. It appears as a faint glow in the sky extending from the horizon visible during certain times of the year, and requires the darkest skies to be observed. In the darkest sky conditions, zodiacal light can cast very faint shadows.

Examples

Mars 1.1° S of Moon, occultation

On this night, Mars would appear in the sky very close to the Moon – only 1.1 degrees away from it. At a point during this night the Moon would pass in front of Mars, hiding it from view.

Double shadow transit on Jupiter

On this night, two of Jupiter's Galilean moons will cast shadows on the surface of Jupiter simultaneously, appearing as two dark discs moving across the face of the planet. If you were standing on the surface of Jupiter as one of these shadows passed over, you would witness a solar eclipse.

Mercury greatest elongation E

On this night, Mercury will be at a point in its orbit where it appears highest in the sky. From our point of view, this is the furthest apart Mercury and the Sun will appear from each other. E or W indicate which side of the Sun the planet appears on in its orbital cycle, and can also tell you when to look for Mercury. The planet can be found in the evening sky during the greatest elongation E, and in the morning sky in the greatest elongation W.