L.A.S.
Lima Astronomical Society

STAR GAZER

Night Sky Network
Astronomy clubs bringing the wonders of the universe to the public

Member of the Astronomical League and the NASA Night Sky Network

February 2023

Lima Astronomical Society • PO Box 201 • Lima, OH 45802
Schoonover Observatory • 670 N. Jefferson St. • Lima, OH 45801

CLUB NEWS AND EVENTS

MONTHLY MEETINGS

Board Meeting – February 3 @ 7:00 p.m.
Members Meeting – February 3 @ 800 p.m.
Held at Schoonover Observatory

Program

A program will be presented by a Lima Astronomical Society member after the meeting.

UNDER THE DOME

January meeting snippets:

Members discussed various business topics covering club continuity and operations, and finalized officer transitions. Equipment replacement held a large part of the discussion.

Another major topic centered around event planning and member involvement. Overall, we want to know how we can help members become more involved. We have some ideas, but we'd like to hear your's. Stop by Schoonover Observatory for this Friday's meeting to join the conversation, or send us an email at limaastronomicalsociety@gmail.com.

January Program

Member, Mark Casazza hosted a great presentation covering right ascension and declination, the coordinate system utilized by equatorial mount telescopes. It can be very confusing for beginners, and even advanced astronomers to wrap their heads around. Mark did an excellent job explaining to the group what made it click him, as well as providing interaction that made us all think a bit harder than we were expecting! Check out Mark's slideshow at: bit.ly/3X1HPuM

ASTRONOMY NEWS

ASTRONOMERS FIND A DOZEN MORE MOONS FOR JUPITER

The biggest planet in the solar system now has the largest family of moons. Since December 20th, the Minor Planet Center (MPC) has published orbits for 12 previously unreported moons of Jupiter. The discoveries bring the list of Jovian moons to 92, a hefty 15% increase from the previous tally of 80.

LIGHT POLLUTION IS INCREASING EVEN FASTER THAN WE REALIZED

The average brightness of the night sky is increasing 10% every year, making the stars less visible. Until now, our best global view of light pollution came from satellite measurements of the Earth at night. They indicated that the amount of light emitted on the ground grew at an average rate of 2% per year between 2012 and 2016. But the new result from citizen scientists on the ground hint that satellites have underestimated the increase in a big way.

LUCY SPACECRAFT TO VISIT AN ASTEROID THIS YEAR

NASA's Lucy spacecraft is in the midst of three Earth flybys that ultimately will fling it to the main asteroid belt and Jupiter's Trojan asteroids. In October 2022, a year after the spacecraft's launch, Lucy made its first flyby of Earth. On January 24, 2023, Lucy's team added a new target to its mission: the tiny asteroid (152830) 1999 VD57. With a small maneuver, Lucy will be able to get a close look at this asteroid by late 2023, two years ahead of its originally planned rendezvous with a main-belt asteroid.

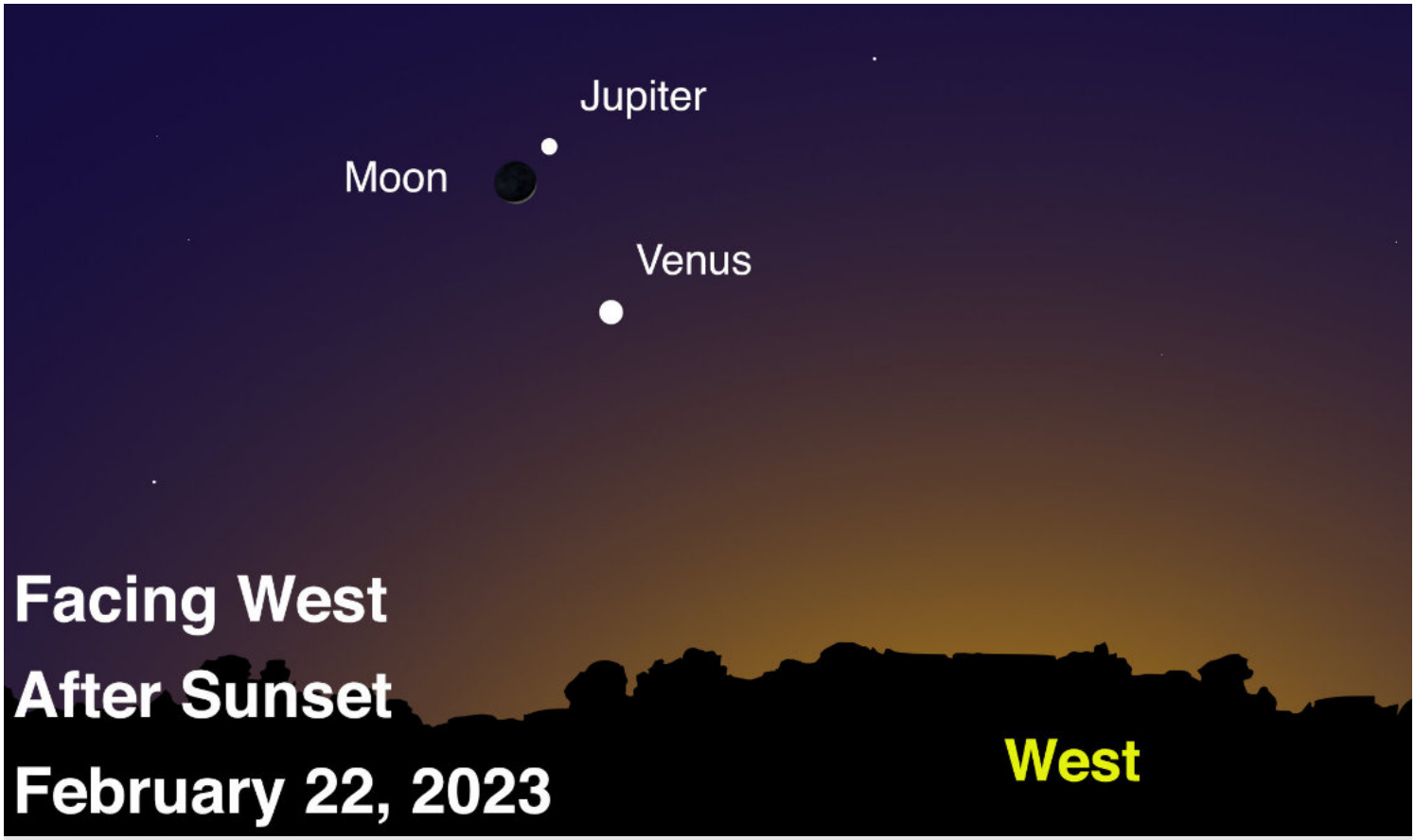
SPOT THE KING OF PLANETS: OBSERVE JUPITER

DAVID PROSPER - NIGHT SKY NETWORK

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.

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 awesome 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 observers back on Earth!

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



Look for Jupiter as it forms one of the points of a celestial triangle, along with Venus and a very thin crescent Moon, the evening of February 22, 2023. This trio consists of the brightest objects in the sky – until the Sun rises! 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? Keep watching Jupiter and Venus as the two planets will continue to get closer together each night until they form a close conjunction the night of March 1. *Image created with assistance from Stellarium.*

million km)! While the King of Planets has a coterie of around 75 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

NASA's Juno mission currently orbits Jupiter, one of just nine spacecraft to have visited this awesome 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. In 2024 NASA will launch the Europa Clipper mission to study this world and its potential to host life inside its deep subsurface oceans in much more detail. Find the latest discoveries from Juno and NASA's missions at nasa.gov.

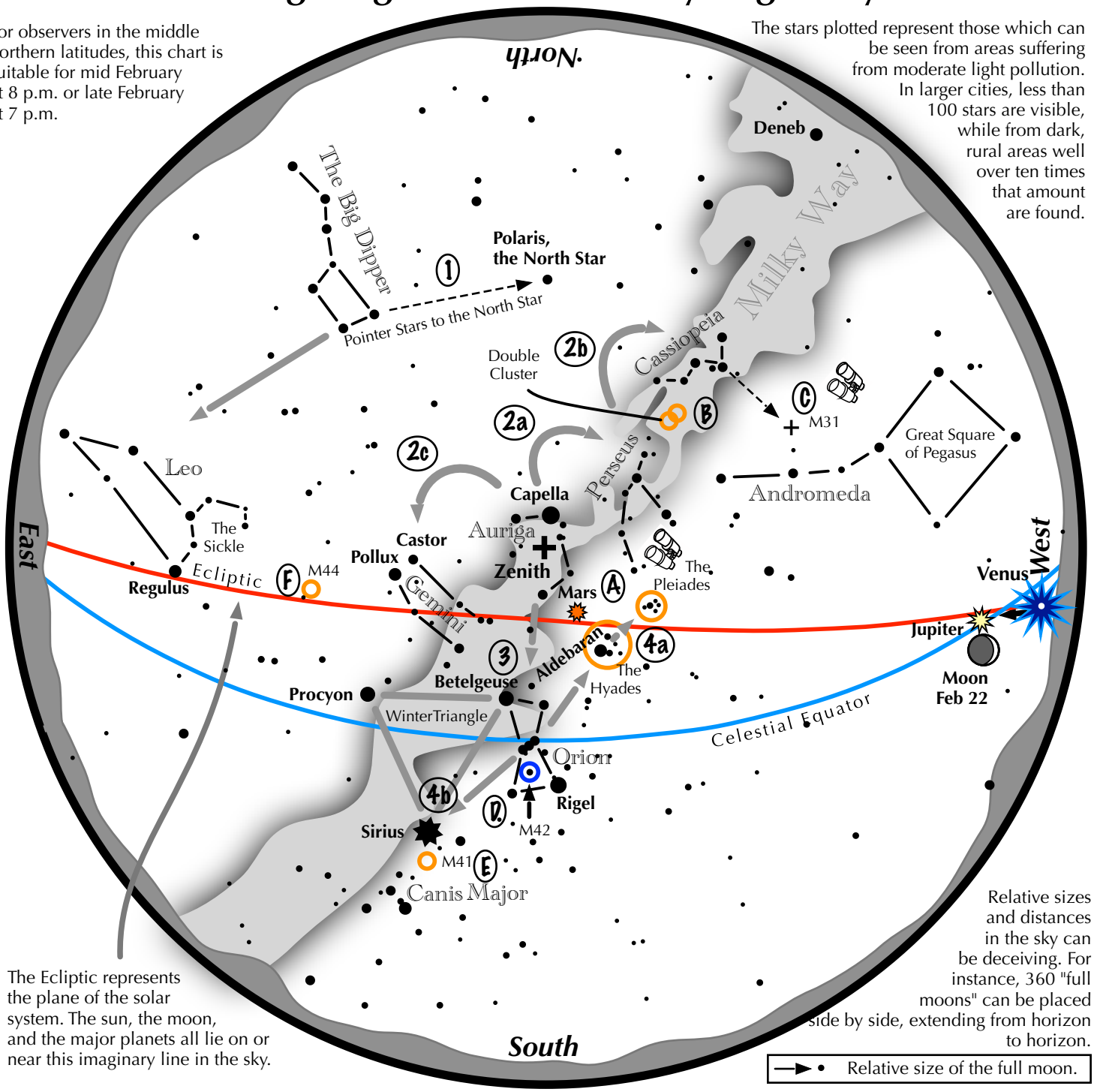
This stunning image of Jupiter's cloud tops was taken by NASA's Juno mission and processed by Kevin M. Gill. You too can create amazing images like this, all with publicly available data from Juno. Go to missionjuno.swri.edu/junocam to begin your image procession journey – and get creative!

Full Image Credit: NASA/JPL-Caltech/SwRI/MSSS; Processing: Kevin M. Gill, license: CC BY 2.0) https://creativecommons.org/licenses/by/2.0/ Source: https://apod.nasa.gov/apod/ap201123.html

Navigating the mid February Night Sky

For observers in the middle northern latitudes, this chart is suitable for mid February at 8 p.m. or late February at 7 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.



The Ecliptic represents the plane of the solar system. The sun, the moon, and the major planets all lie on or near this imaginary line in the sky.

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.

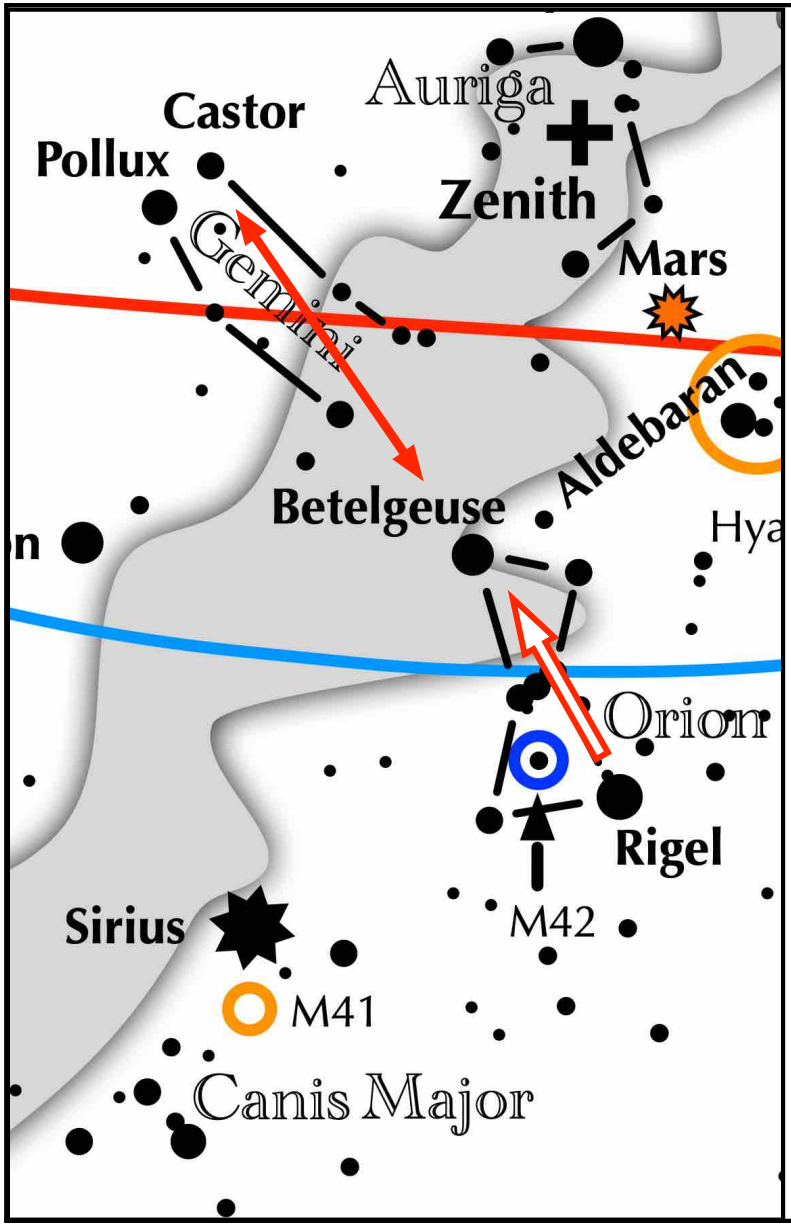
Relative size of the full moon.

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

1. Above the northeast horizon rises the Big Dipper. Draw a line from its two end bowl stars upwards to the North Star.
2. Face south. Overhead twinkles the bright star Capella in Auriga. Jump northwestward along the Milky Way first to Perseus, then to the "W" of Cassiopeia. Next jump southeastward from Capella to the twin stars of Castor and Pollux in Gemini.
3. Directly south of Capella stands the constellation of Orion with its three Belt stars, its bright red star Betelgeuse, and its bright blue-white star Rigel.
4. Use Orion's three Belt stars to point northwest to the red star Aldebaran and the Hyades star cluster, then to the Pleiades star cluster. Travel southeast from the Belt stars to the brightest star in the night sky, Sirius, a member of the Winter Triangle.

Binocular Highlights

A: Examine the stars of two naked eye star clusters, the Pleiades and the Hyades.
B: Between the "W" of Cassiopeia and Perseus lies the Double Cluster.
C: The three westernmost stars of Cassiopeia's "W" point south to M31, the Andromeda Galaxy, a "fuzzy" oval.
D: M42 in Orion is a star forming nebula. **E:** Look south of Sirius for the star cluster M41. **F:** M44, a star cluster barely visible to the naked eye, lies southeast of Pollux.



Other Suns: Castor

How to find Castor on a February evening

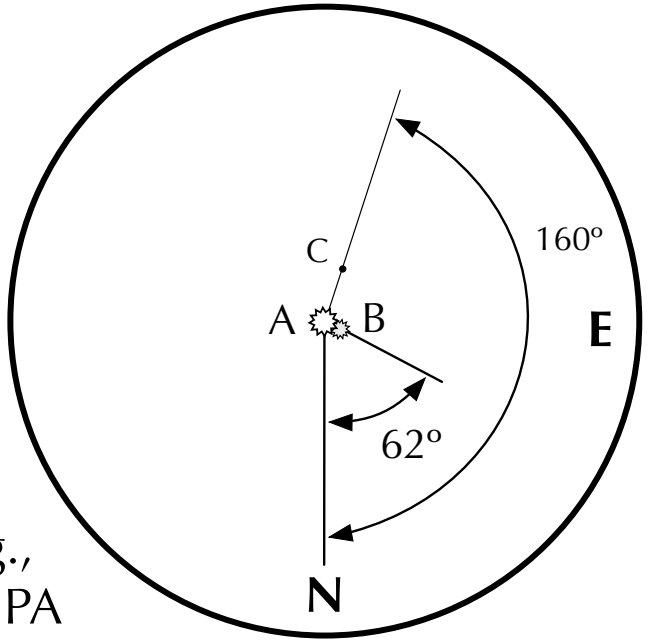
Look south toward Orion. Extend a line northeastward from Rigel through Betelgeuse and continue 1-1/2 times that length. It ends at Castor.

Suggested magnification: >60x
Suggested aperture: >3 inches

Castor

A-B separation: 6 sec
A magnitude: 1.9
B magnitude: 3.0
Position Angle: 62°
A color: white
B color: white

C component: 9.2 mag.,
A-C sep: 71 sec., 160° PA



Observing Lists

Top ten deep-sky objects for February	
M 35	M 93
M 41	NGC 2261
M 46	NGC 2362
M 47	NGC 2392
M 50	NGC 2403

Top ten binocular objects for February	
M 35	M 93
M 41	NGC 2244
M 46	NGC 2264
M 47	NGC 2301
M 50	NGC 2360

Challenge deep-sky object for February
IC 443 (Jellyfish Nebula)
Located in Gemini and approximately 5,000 light years from Earth, IC 443 may be the remains of a supernova that occurred 3,000 - 30,000 years ago. Magnitude: 12.0

The Planets in January

Mercury: Its best morning apparition of the year for Southern Hemisphere observers lasts throughout February, gradually brightening to mag. –0.5 at month end, through its elongation from the Sun recedes from almost 25° on the 1st to 14° on the 28th.. The thin waning crescent Moon passes 4° to its S on the 18th..

Venus: Continues its ascent in the evening sky for northern observers, rapidly gaining in declination as it separates ever further from the Sun. Has an exceptionally close conjunction just 0.01° from Neptune on the 15th, when both objects are 27° from the Sun. The nearly 12-magnitude difference between the two will make for an extremely challenging observation. Venus will have a fine conjunction just 2° from the waxing crescent Moon on the 22nd, occurring around 1:00pm EST.

Mars: Remains well placed in the evening and overnight sky among the stars of Taurus. Gradually loses brightness as it recedes from Earth and passes through mag 0.0 in mid-month. As it fades from week to week, compare its color to the nearby red-giant stars Aldebaran and Betelgeuse. The waxing gibbous Moon passes just to its north on the 28th, with an occultation visible from many locations near the Arctic Circle.

Jupiter: Passes from Pisces into northwestern Cetus early in the month, then returns to Pisces around mid-month. Is gradually overtaken by faster Venus throughout February, with the crescent Moon joining the scene on the 22nd.

Saturn: Too close to the Sun to be seen. In solar conjunction on the 16th.

Uranus: Visible in the early evening sky in south-central Aries. The waxing crescent Moon makes a close pass on the 25th, with an occultation visible from the Southern half of Greenland and parts of Northern Canada. This is the last of a series of 15 consecutive occultations of Uranus that began in early 2022.

Neptune: Fading into bright evening twilight as it approaches its March 16 solar conjunction.

Historical Astronomical Events This Month

- Nicolas Louis de Lacaille discovered the open cluster NGC 3228 in Vela on February 11, 1752.
- Nicolas Louis de Lacaille discovered the face-on barred spiral galaxy M83 in Hydra on February 23, 1752.
- Johann Bode discovered the globular cluster M53 in Coma Berenices on February 3, 1775.
- The planetary nebula M97 in Ursa Major was discovered by Pierre François André Méchain on February 16, 1781.
- Caroline Herschel discovered the open cluster NGC 2360 in Canis Major on February 26, 1783.
- William Herschel discovered the face-on barred spiral galaxy NGC 4027 in Corvus on February 7, 1785.
- William Herschel's 40-foot-focal-length telescope saw first light on February 19, 1787.
- Clyde Tombaugh discovered Pluto on February 18, 1930.
- James Hey detected radio waves emitted by the Sun on February 27, 1942.
- Gerald Kuiper discovered the Uranian satellite Miranda (magnitude +15.8) on February 16, 1948.
- The first pulsar, PSR B1919+21, was discovered by Jocelyn Bell Burnell and Antony Hewish on February 24, 1967.
- Supernova 1987A was discovered by Ian Shelton, Oscar Duhalde, and Albert Jones on February 23, 1987.

February 2023 Astronomy Events Calendar

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
			1	2	3 **LAS Meeting @ 8pm** Pollux 1.9° N of Moon	4 Moon at apogee
5 Mercury at descending node **Full Moon (smallest in 2023)**	6	7	8 Ceres stationary	9	10	11
12 Moon at descending node Pallas stationary	13 **Last Quarter Moon**	14 **Antares 1.8° S of Moon**	15 Mercury at aphelion **Venus 0.01° S of Neptune**	16 Saturn in conjunction with the Sun	17	18 Mercury 4° N of Moon
19 Moon at perigee **Large tides**	20 **New Moon**	21 **Neptune 2° N of Moon**	22 **Venus 2° N of Moon** **Jupiter 2° N of Moon**	23	24 Moon at ascending node	25 **Uranus 1.3° S of Moon**
26	27 **First Quarter Moon**	28 **Mars 1.1° S of Moon**				

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 in late winter/early spring, 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.