ASTROFILES

Auburn Astronomical Society Newsletter

January 2023 *Newsletter Editor — John Wingard — jwin1048@gmail.com*

Moon Phases

January 14 — Last Quarter

January 21 — New Moon

January 28 — First Quarter

February 5 — Full Moon

February 13 — Last Quarter

February 20 — New Moon

February 27 — First Quarter

March 7 — Full Moon

Stay in touch with us

http://www.auburnastro.org

https://www.facebook.com/groups/79864233515/

News and events

We hope that the new year has started out well for you and has afforded opportunities to get out and observe the winter sky in spite of a recent string of rain and cloud events. It seems that the weather has been unusually unstable for this time of the year. As far as club events go, we have a stargaze event scheduled for Saturday, February 25th in Prattville, AL for a scout group. We have a number of members in the Montgomery/Prattville area that can hopefully help us with this event. As we get closer to the actual date, an email will be sent out to the membership with details.

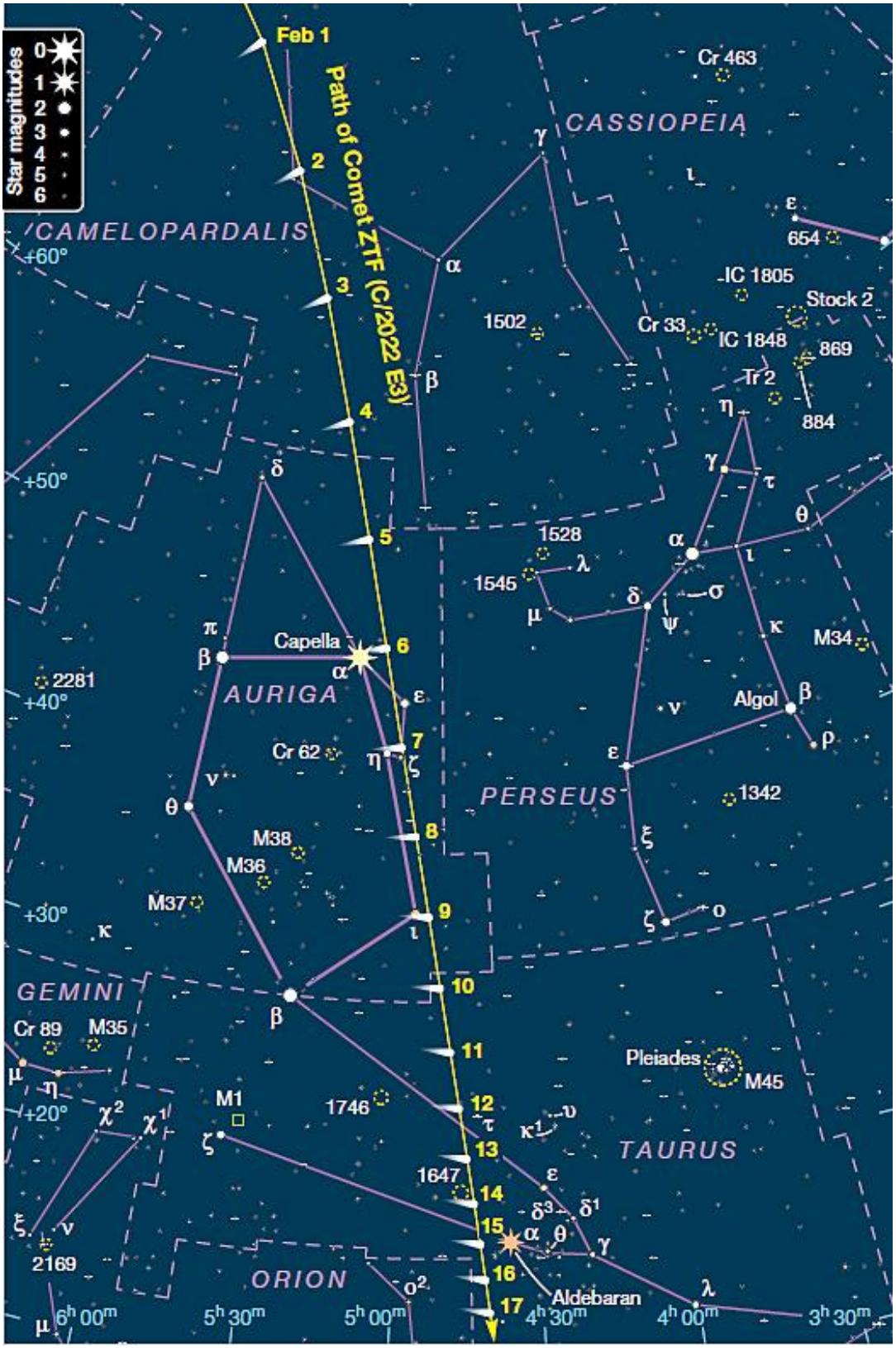
As we begin a new year it also is time to renew your membership dues to the club. Dues are $20.00 annually for existing members. New members joining for the first time pay dues that are prorated based on the month of joining. Please see the membership application at the end of this newsletter or on the club webpage and send in your dues to the address listed on the application. As a reminder, all paid AAS members are also enrolled as members in the Astronomical League, the national organization that represents astronomy clubs throughout the country. As a benefit of this membership, you will get to receive their quarterly publication, *The Reflector*, which has news of other clubs and other items of interest to astronomy enthusiasts.

Now through early February is the best time to view a visitor from the distant Oort Cloud as it darts through the solar system in its 50,000 year orbit. Comet ZTF (C/2022 E3) should reach its peak brightness of Magnitude 5 which should be visible without optical aid in a dark sky and easily visible with binoculars or a small telescope. The chart on the following page plots it's course through the month of February.

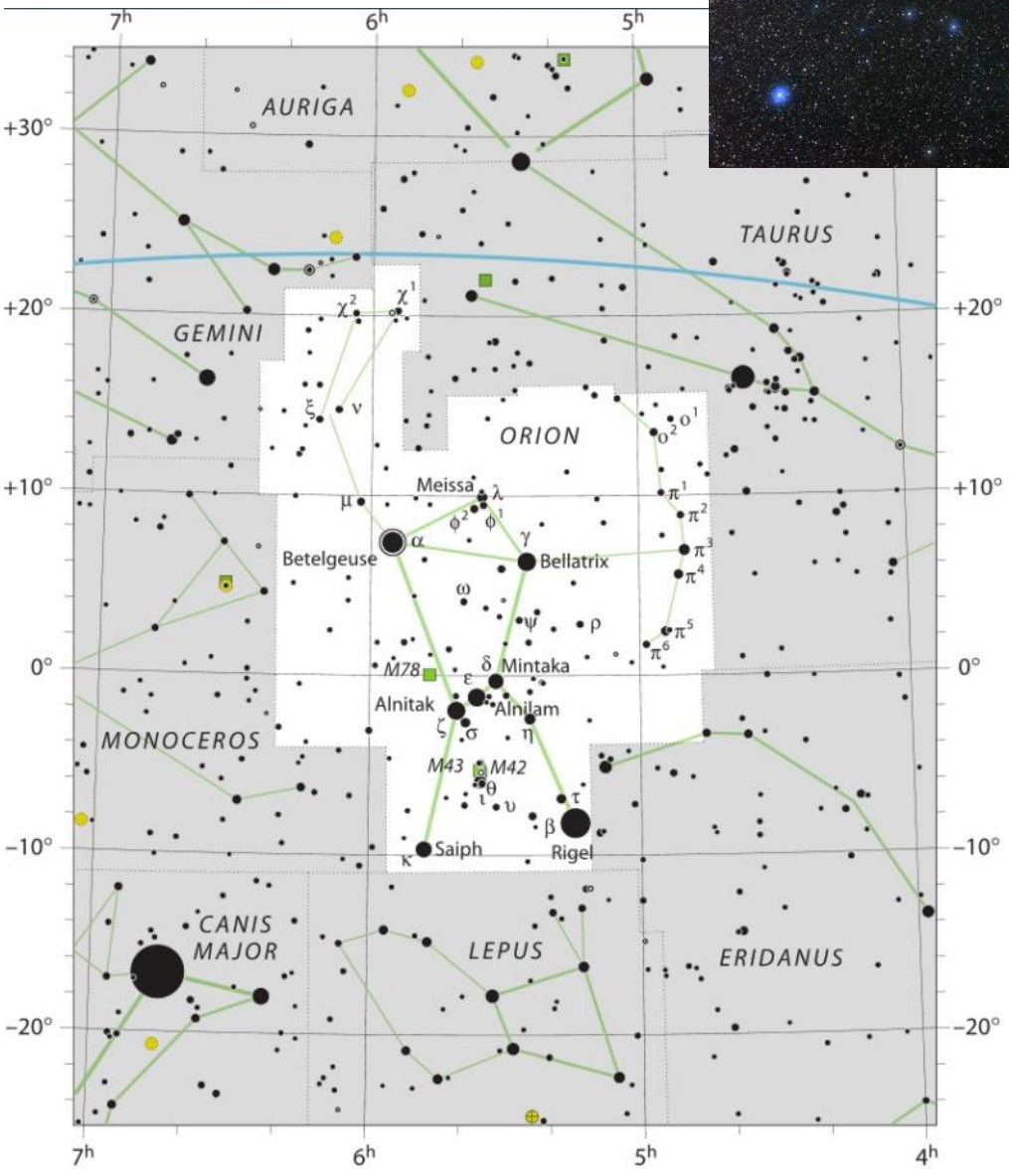
Comet ZTF (C/2022 E3)

Below is a sky chart showing the path of the comet for the first part of February. It should reach its peak brightness on February 1 but as we know, comets are notoriously unpredictable. On February 6 it should easy to find since it passes very close to the bright star Capella in the constellation of Auriga.

Star chart courtesy of Sky & Telescope magazine



The month of February is an excellent time to view Orion, one of the most recognizable constellations in the night sky. The entire area in and around Orion is rich with all sorts of interesting objects to study, not the least of which is the Great Orion Nebula (M42). The constellation is well placed in the southern sky in the late evenings in February.




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!

Spot the King of Planets: Observe Jupiter

David Prosper

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!

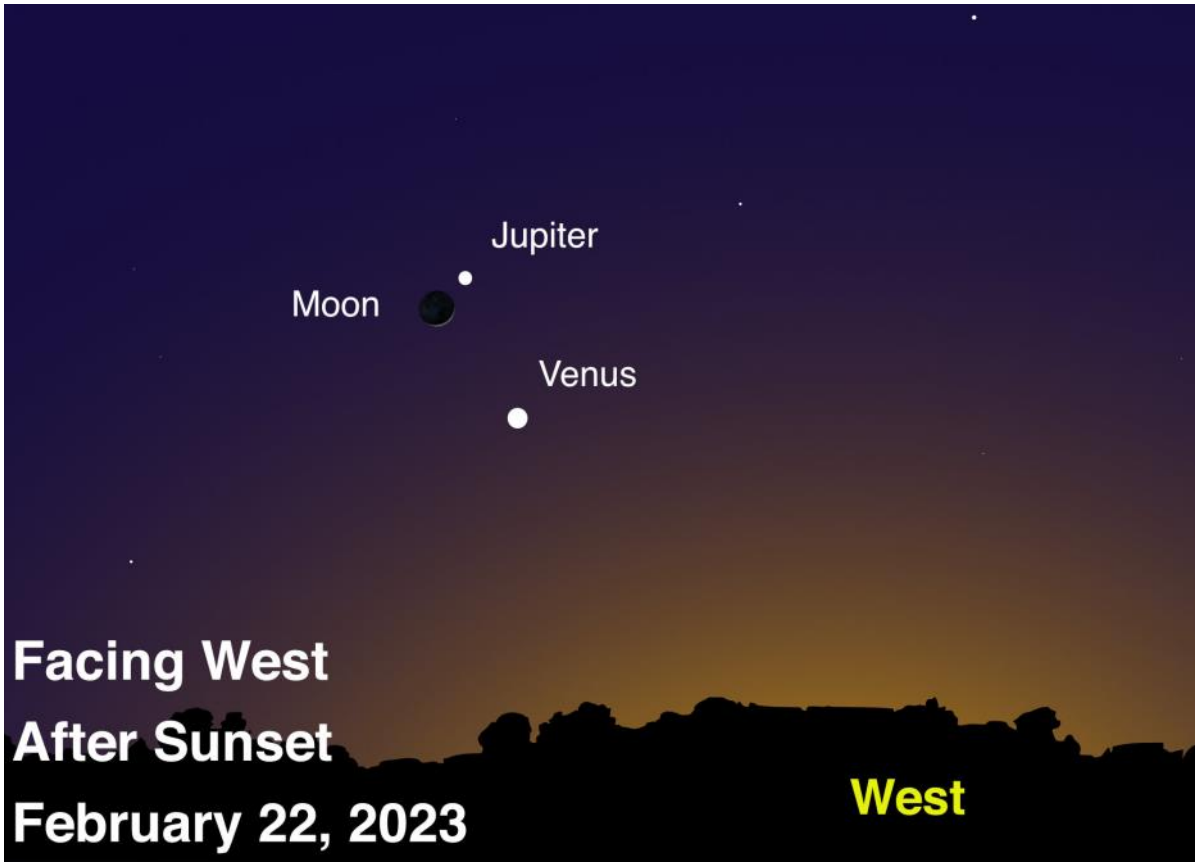
Jupiter is easy to observe at night with our unaided eyes, as well-documented by the ancient astronomers who carefully recorded its slow movements from night to night. It can be one of the brightest objects in our nighttime skies, bested only by the Moon, Venus, and occasionally Mars, when the red planet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

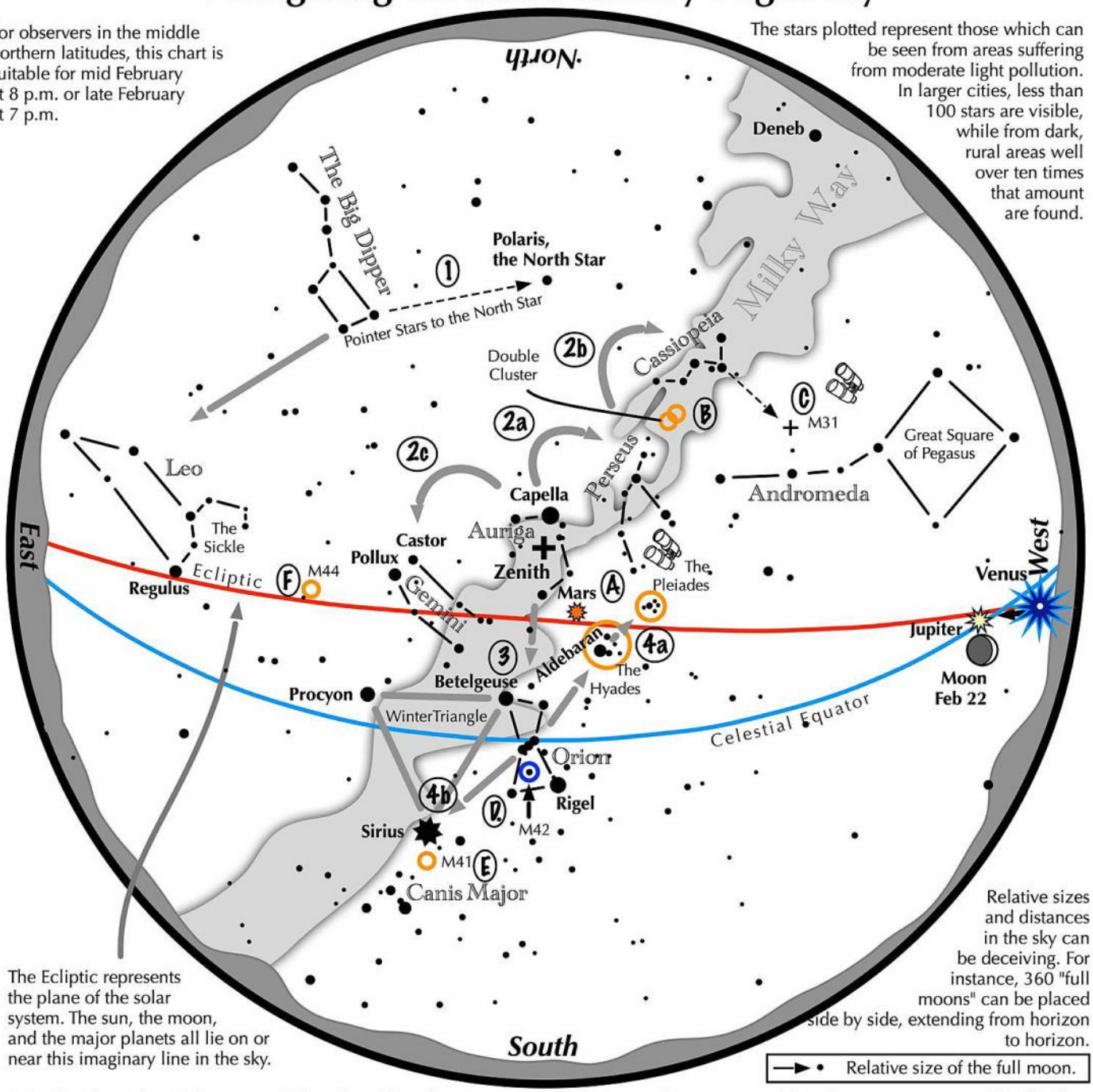
This stunning image of Jupiter's cloud tops was taken by NASA's Juno mission and processed by Kevin M. Gill. You too can create amazing images like this, all with publicly available data from Juno. Go to missionjuno.swri.edu/junocam to begin your image procession journey – and get creative!

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



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. cloud bands. How many can you count? .

Navigating the mid February Night Sky



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

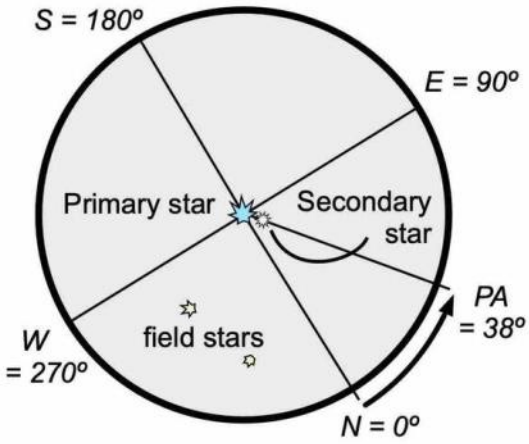
1. Above the northeast horizon rises the Big Dipper. Draw a line from its two end bowl stars upwards to the North Star.
2. Face south. Overhead twinkles the bright star Capella in Auriga. Jump northwestward along the Milky Way first to Perseus, then to the "W" of Cassiopeia. Next jump southeastward from 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.

Observing Double Stars

An estimated 50% – 85% of stars are members of a binary or a multiple star system. For a few of these, their stellar components can be separated - or "split" – using a small telescope.



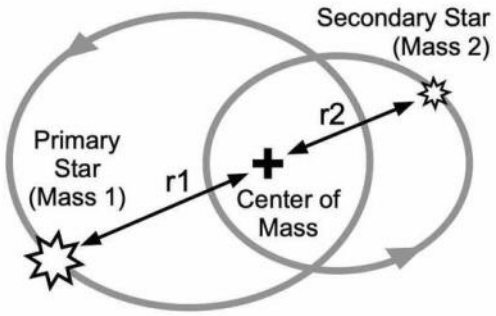
Telescopic View

Factors to consider when observing:

- **The magnitude of each component.** If the magnitude difference is large, the components need to be widely separated to be seen.
- **Their angular separation, r.** Very close binaries are separated by a few seconds of arc and require high magnification and good seeing. Widely separated binaries can be over 1 minute of arc apart and many of these can be split in binoculars.
- **The position angle, PA:** The angle in degrees from North made by the Secondary relative to the Primary in the N-E-S-W direction.
- **The color of each component.** Many are white, while others are red, blue, and yellow.

Precisely estimating these factors is very difficult when done visually. Measuring the star system on images is much more reliable.

Optical Double: A chance alignment of stars appearing near each other, but they are actually no where near each other in three dimensional space.
Visual Binary: Gravitationally bound stars, each seen orbiting their center of gravity.
Spectroscopic Binary: Two stars that can not be seen visually, but the spectrum of the system indicates that it consists of two stars orbiting very closely to each other.



M1 x r1 = M2 x r2
r = r1 + r2

Face on View

**Tilted,
nearly Edge on View**

Tilted & Rotated View

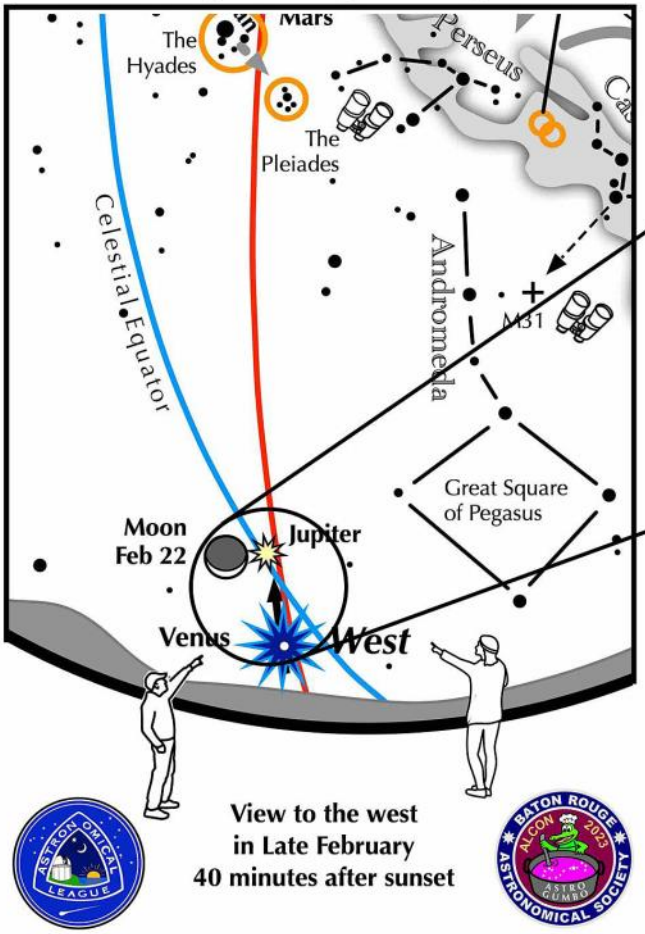
Orbital Orientation:

Because binary stars orbit their center of mass (COM) in elliptical orbits, they constantly change the distance between them (r).

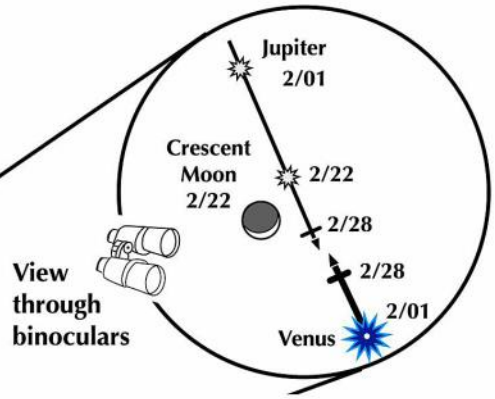
The COM is at the focus that they share. The primary (brighter) star lies on one side of that focus and the secondary (dimmer) star always lies on the opposite side.

If tracked for what often turns out to be many tens or even hundreds of years, their orbits can be determined. Our viewing angle from Earth distorts the true orbital ellipses into a tilted and rotated representation.

In the early evenings during the second half of February, try this challenge:



View to the west in Late February 40 minutes after sunset

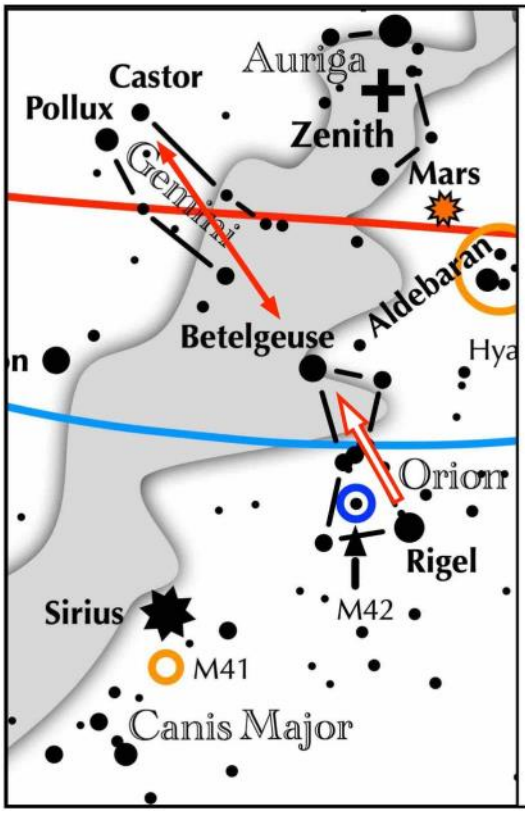


Venus approaches Jupiter

On February 1, Venus appears low above the western horizon 40 minutes after sunset. As the month proceeds, the bright planet climbs higher each evening. Jupiter, on the otherhand, begins the month much higher than Venus, and drops closer to the horizon each evening.

On February 22, the crescent moon joins the scene as it floats left of Jupiter. Look to the west 40 minutes after sunset for the pair. Binoculars allow you to admire the softly glowing earthshine on the night side of the moon. Almost magical!

For the rest of the month, Jupiter approaches Venus. Watch their gap narrow each evening. Finally, on March 1, they nearly bump into each other.



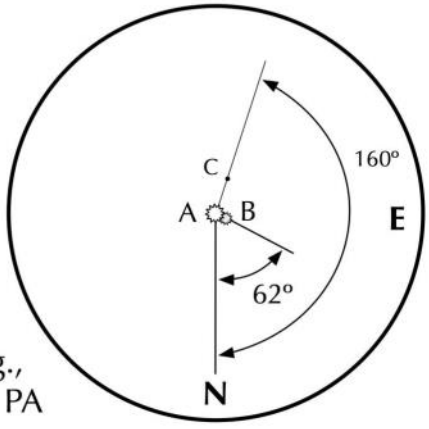
Other Suns: Castor

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

Auburn Astronomical Society

Application for Membership

To insure that our records are accurate, please print information clearly

Name: _____

Address: _____

City: _____ **State:** _____ **ZIP:** _____

Phone: _____ **Date of Application:** ____/____/____

E-Mail: _____

Telescopes owned (if any): _____

_____

Area(s) of special interest: _____

_____

Enclose $20.00 for regular annual membership, payable in January. *Full-time* student membership is $10.00.

For *NEW* members joining after January, refer to the prorated dues table below for the month you are joining:

Jan $20.00	Feb $18.33	Mar $16.66	Apr $14.99	May $13.33	Jun $11.66
Jul $10.00	Aug $8.33	Sep $6.66	Oct $4.99	Nov $2.33	Dec $1.66

☐ New—Just Joining

☐ Renewal

Please make checks payable to: Auburn Astronomical Society and return this application with your payment to:

Auburn Astronomical Society
c/o John Wingard, Sec/Treasurer
5 Wexton Ct.
Columbus, GA 31907

Note: At this time we do not have an option for online payment of dues.

The Auburn Astronomical Society is a member of the Astronomical League, the national organization representing astronomy clubs throughout the United States. As a club benefit, paid members of the Auburn Astronomical Society are eligible to received quarterly issues of *The Reflector*, the official publication of the Astronomical League. It will be mailed to the address that you provided above but could be delayed somewhat until their mailing lists are updated.

For additional information about our club, please go to our website *www.auburnastro.org* . You can also follow us on our Facebook page. Just search for "Auburn Astronomical Society."