Snake River Skies

The Newsletter of the Magic Valley Astronomical Society

February 2023

Membership Meeting

Saturday, February 11th, at 6:30 pm at the Herrett Center for Arts and Science

Centennial Observatory

See Inside for Details

Faulkner Planetarium

See inside for Details

www.mvastro.org

Club Officers

Gary Leavitt, President
garysastrolabs@gmail.com

Dr. Jay Hartwell,, Vice President
drhartwellod8@gmail.com

Secretary, Rick Hull

Jim Tubbs, Treasurer, AL-Cor
jtubbs015@msn.com
208-404-2999

David Olsen, Newsletter Editor

Rick Widmer, Webmaster
rick@developersdesk.com

Magic Valley Astronomical Society is a member of the Astronomical League

M-51 imaged by
Rick Widmer & Ken Thomason
Herrett Telescope - Shotwell Camera

President's Message

MVAS Astro members and friends…Now that the Holiday Season is over time to get back astronomy. Our scheduled meeting on the 11th will feature Gary Leavitt presenting a program on Comets, Trackers and the Milky Way

Whereas February will create a chilling background to observe and/or image, some of the best skies for Astro can be experienced. Last week Chris Anderson had a successful viewing of the comet C/2022 E3 (ZTF) with over 20 people in attendance. You can check cometchasing.skyhound.com for a daily track.

Dr. Candace Wright will speak to us in March with an update on the James Webb Telescope. Our own David Olsen will talk in April and Gary Leavitt will talk about iPhone astrophotography in May. I hope that everyone will be at the February meeting. I would enjoy seeing all of our members.

Best to you all;

Gary Leavitt, President
MVAS

February Calendar

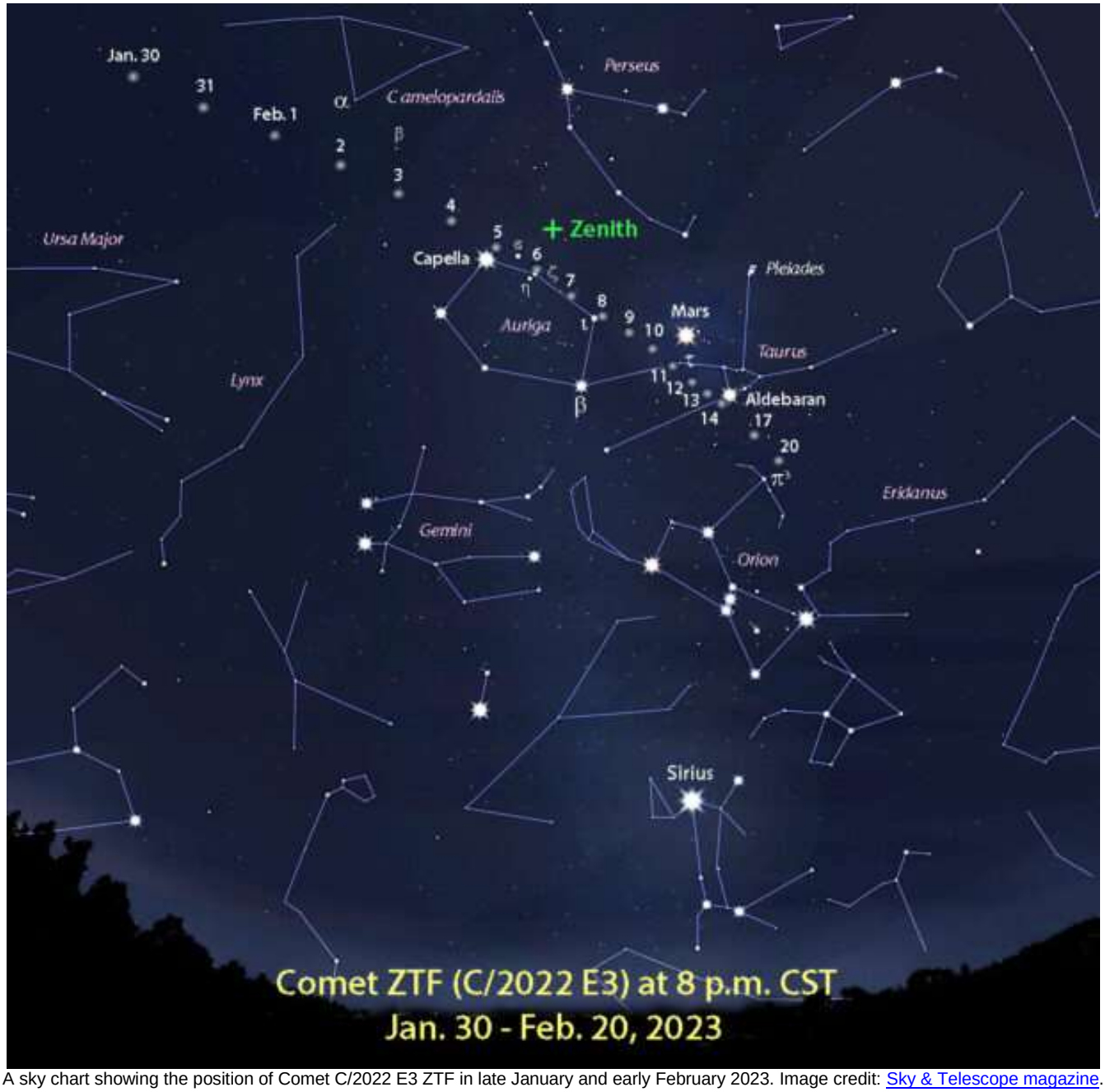
Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2 Groundhog Day 	3	4
5 Full Snow Moon  Visible: 100% Age: 14.52 days	6	7	8	9	10	11 MVAS General Meeting Herrett Center 6:30p Centennial Obs. Monthly Star Party 7:00p – 9:00p
12 Lincoln's Birthday 	13 Last Quarter Moon  Visible: 52% ↓ Age: 21.99 days	14 Valentine's Day 	15 Telescope Tuesday 7:15 - 9:00p  Centennial Observatory Section	16	17	18
19 New Moon  Visible: 1%↑ Age: 0.23 days Lunation 1238	20 President's Day 	21	22 Washington's Birthday 	23	24	25
26	27 First Quarter Moon  First quarter Visible: 52% ↑ Age: 7.53 day	28 Telescope Tuesday 7:15p - 9:00p Details in the Centennial Observatory Section				

The Night Sky This Month – February 2023

The zodiacal light as seen from La Silla, Chile (credit: ESO).

(Looking for last month's 'Night Sky'? Find it at this link…)

February gets underway with a respectable binocular comet still in the sky near the bowl of the Little Dipper not far from the north celestial pole. Some reports put Comet C/2022 E3 ZTF within reach of the unaided eye in dark sky, and in any case it's worth the effort to spot this little iceball as it enters the solar system for the first time in 50,000 years. Elsewhere, planets abound in the western and southwestern sky with Venus, Jupiter, Mars, Uranus, and Neptune all making an appearance with the Moon nearby. Mercury makes its best morning apparition fo the year for southern-hemisphere stargazers. And the zodiacal light returns in the evening sky for northern observers through the middle of February. Here's what to see in the night sky this month…

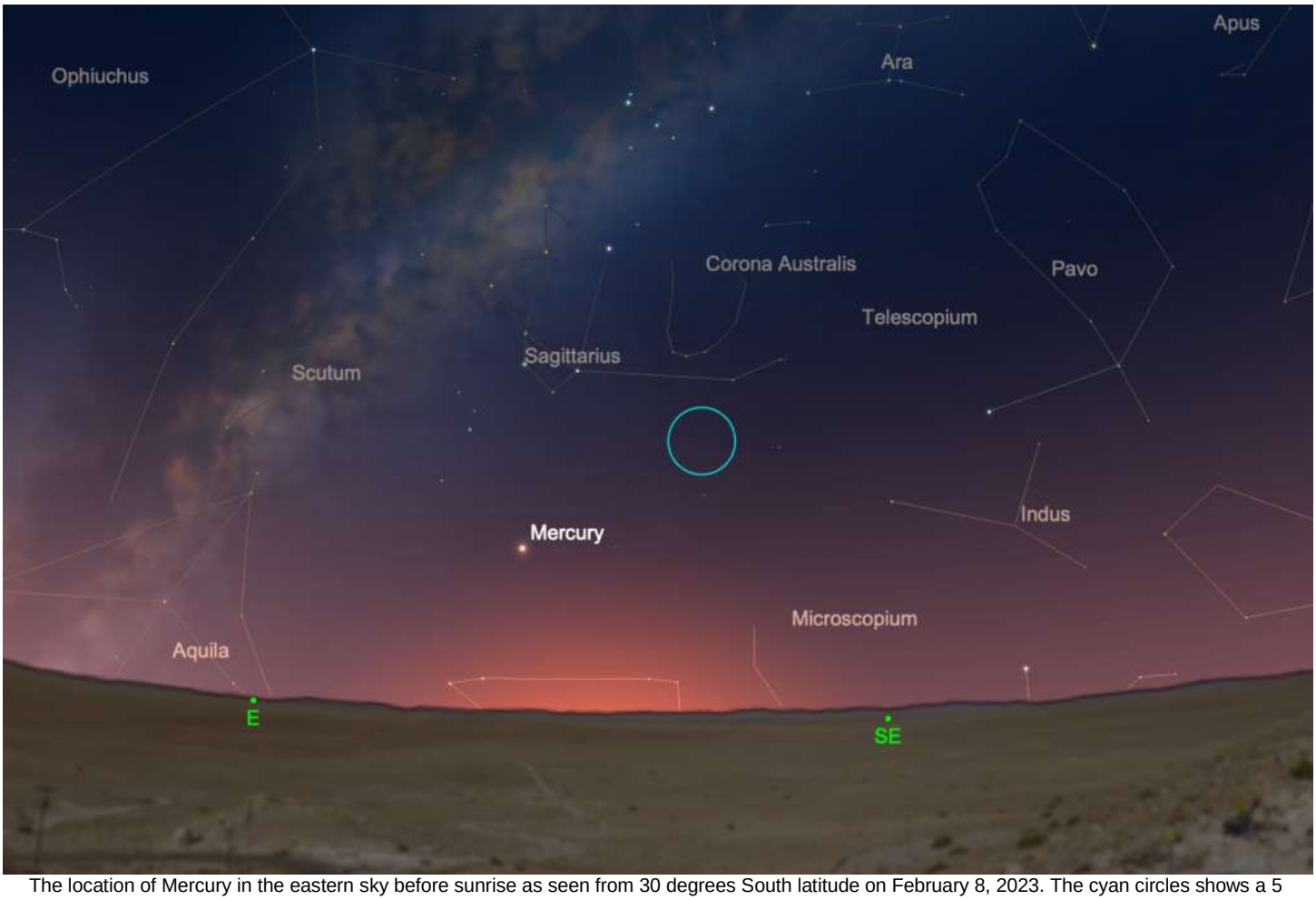


A sky chart showing the position of Comet C/2022 E3 ZTF in late January and early February 2023. Image credit: Sky & Telescope magazine.

1 February 2023. Comet C/2022 E3 ZTF makes its closest approach to Earth at a distance of 0.28 astronomical units. (AU).

1-21 Feb. Southern-hemisphere observers can look for Mercury in the eastern early-morning sky. The planet shines between magnitude 0.0 and -0.5 all month and lies among the dim stars of Capricorn over the eastern horizon.

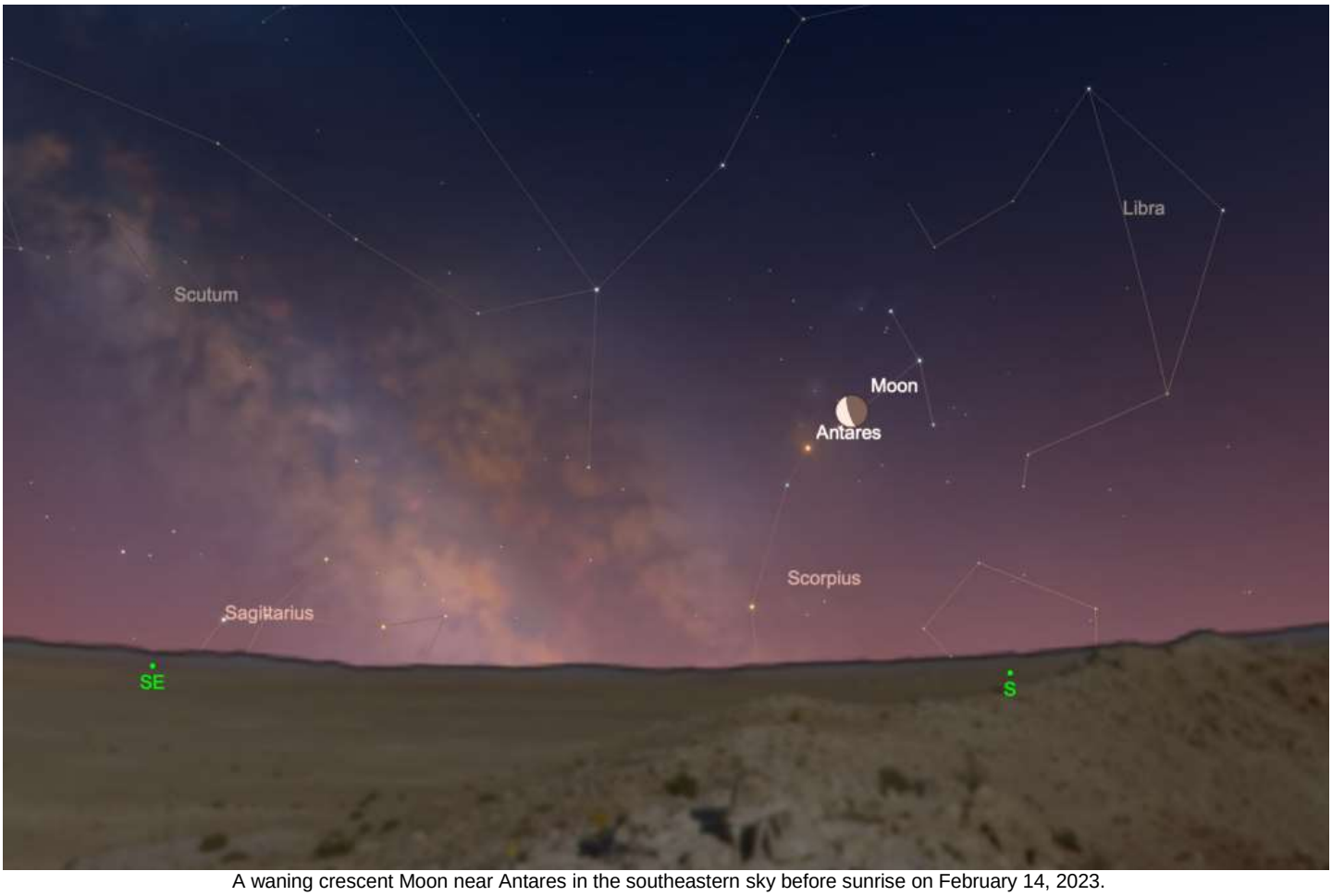
5 Feb. Full Moon, 18:29 UTC. This is the smallest full Moon of 2023 with a diameter about 7% smaller than average.



The location of Mercury in the eastern sky before sunrise as seen from 30 degrees South latitude on February 8, 2023. The cyan circles shows a 5 degree field of view.

7-21 Feb. As the Moon moves out of the way in the evening sky, northern observers far from city lights can spot the zodiacal light in the western sky after sunset. This whitish wedge-shaped glow emerges at a steep angle to the western horizon this time of year. It's caused by sunlight reflected by fine dust grains along the plane of the solar system. The zodiacal light is brightest closer to the Sun, so look for the zodiacal light about half hour after the end of evening twilight as it extends towards the constellation Taurus.

13 Feb. Last Quarter Moon, 16:01UTC

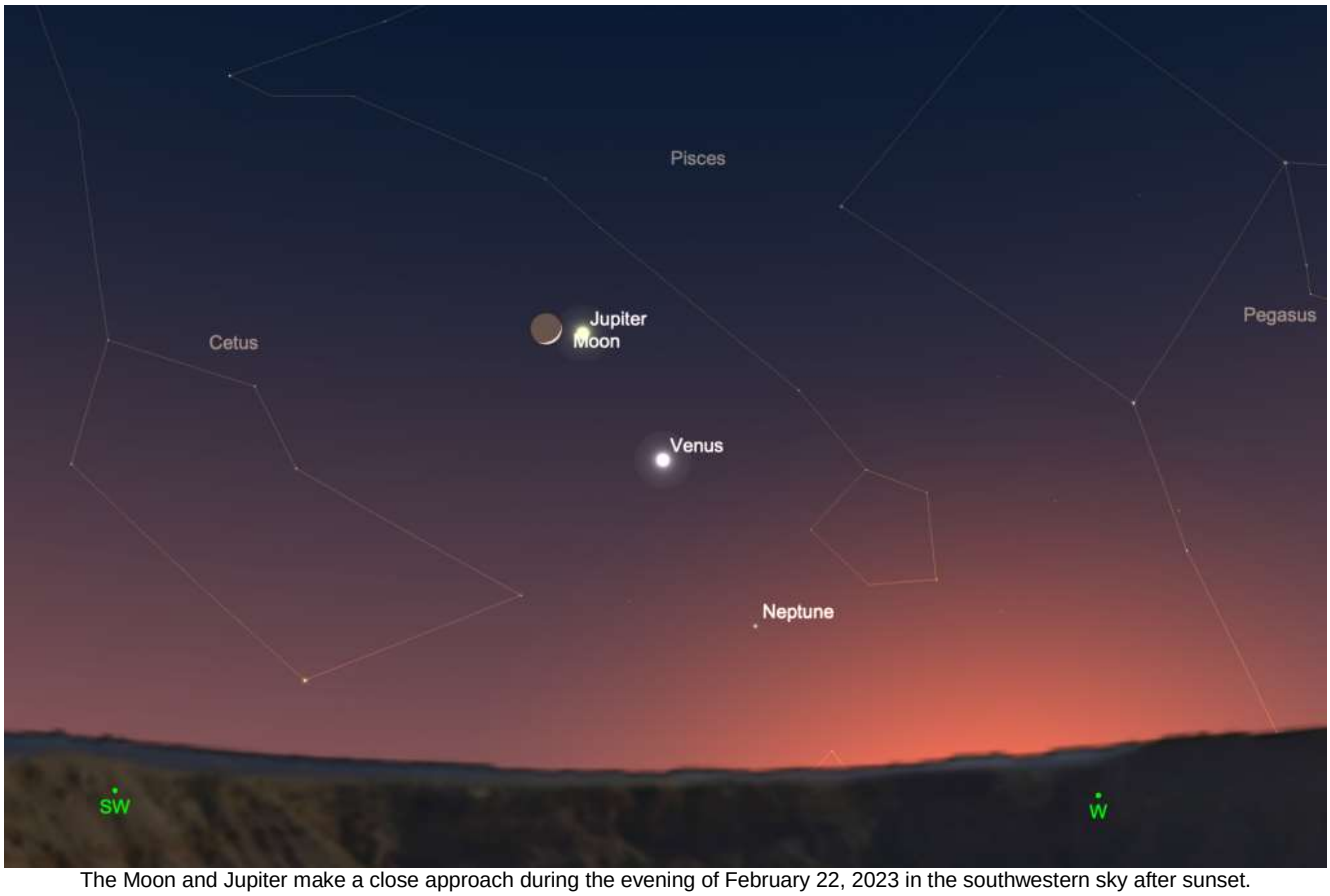


A waning crescent Moon near Antares in the southeastern sky before sunrise on February 14, 2023.

14 Feb. Look to the southeast as dawn arrives to spot the waning crescent Moon less than 2° north of red-orange Antares in Scorpius.

15 Feb. Venus and Neptune pass as close as 1/100 of a degree from each other. The precise separation is location dependent; North American observers see a slightly wider spacing of about 0.7 degrees as the planets appear after sunset. Venus lies west of Neptune, and it outshines the larger and more distant planet by almost 12 full magnitudes which. With lingering twilight, this makes it a challenge to see both planets in a telescope. The disk of Venus spans about 11 arc-seconds while tiny Neptune is just 2.2 arc-seconds across. In the next several days, Venus pulls away from Neptune as the larger planet moves towards conjunction in March.

20 Feb. New Moon, 07:06 UTC



The Moon and Jupiter make a close approach during the evening of February 22, 2023 in the southwestern sky after sunset.

21-22 Feb. A slender crescent Moon passes near Venus and Jupiter in the west-southwestern sky after sunset. On Feb. 21 the Moon lies 5^{o} below Venus; binoculars may help extract it from the twilight. On Feb. 22, a thicker Moon sits higher, about 2^{o} southeast of Jupiter with brighter Venus some 7^{o} to the west. This event presents a good photo opportunity as all three objects have a similar apparent brightness. Neptune lies about 2^{o} north of the Moon on the 21st.

22 Feb. The crescent Moon passes about 1.2^{o} north of Jupiter this evening in the southwestern sky. The big planet shines at magnitude -2.1 with a disk about 35” across. Much brighter Venus (magnitude -4.0) lies about 8^{o} to the west with a disk 87% illuminated and 12” across.

25 Feb. Uranus sits about a degree south of the fat waxing crescent Moon in the southwest after sunset.

27 Feb. First Quarter Moon, 08:06 UTC.

27 Feb. Look for Mars just over a degree from the first-quarter Moon in Taurus. The planet has faded to magnitude +0.4 with a disk about 8” across, about half its maximum size at opposition in early December. It still slightly outshines Aldebaran and (very slightly) Betelgeuse.

February Celestial Calendar

February Celestial Calendar by Dave Mitsky

All times, unless otherwise noted, are UT (subtract five hours and, when appropriate, one calendar day for EST)

2/1 Comet C/2022 E3 (ZTF) is at perigee (42,000,000 kilometers or 26,000,000 miles from the Earth) today
2/2 The astronomical cross-quarter day (i.e., a day halfway between a solstice and an equinox) known as Imbolc or Candlemas occurs today
2/3 The Moon is 1.9 degrees south of the first-magnitude star Pollux (Beta Geminorum) at 20:00
2/4 The Moon is at apogee, subtending 29' 24" from a distance of 406,476 kilometers (252,573 miles), at 8:55
2/5 Mercury is at the descending node today; Full Moon (known as the Hunger, Snow, or Storm Moon), the smallest of the year, occurs at 18:29
2/8 The dwarf planet/asteroid 1 Ceres is stationary at 20:00
2/11 Comet C/2022 E3 (ZTF) passes near Mars
2/12 The Moon is at the descending node at 7:31; asteroid 2 Pallas is stationary at 20:00
2/13 Last Quarter Moon occurs at 16:01
2/14 The Curtiss Cross, an X-shaped clair-obscur illumination effect located between the craters Parry and Gambart, is predicted to be visible at 4:31; the Moon is 1.8 degrees north of of the first-magnitude star Antares (Alpha Scorpii) at 19:00
2/15 Mercury is at aphelion today; Venus is 0.01 degrees south of Neptune at 12:00
2/16 Saturn is in conjunction with the Sun at 17:00
2/18 The Moon is 4 degrees south of Mercury at 21:00
2/19 The Moon is at perigee, subtending 33' 21" from a distance of 358,267 kilometers (222,617 miles), at 9:06
2/20 New Moon (lunation 1239) occurs at 7:06
2/21 The Moon is 2 degrees south of Neptune at 18:00
2/22 The Moon is 2 degrees south of Venus at 8:00; the Moon is 1.2 degrees south of Jupiter, with an occultation occurring in portions of western Antarctica, the Falkland Islands, and southern South America, at 22:00
2/24 The Moon is at the ascending node at 18:56
2/25 The Moon is 1.3 degrees north of Uranus, with an occultation occurring in the southern half of Greenland and portions of northern Canada, at 13:00
2/27 First Quarter Moon occurs at 8:06; the Lunar X (the Purbach or Werner Cross), an X-shaped clair-obscure illumination effect involving various rims and ridges between the craters La Caille, Blanchinus, and Purbach, is predicted to be visible at 15:15
2/28 The Moon is 1.1 degrees north of Mars, with an occultation occurring in northern Mongolia, central and northwestern Russia, northern Scandinavia, Svalbard, northwestern Greenland, Iceland, and the Faroe Islands, at 5:00

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.

The zodiacal light should be visible in the west after evening twilight from a dark location during the middle two weeks of February. Click on https://www.atoptics...ighsky/zod1.htm for more on the zodiacal light.

The major meteor showers occurring this year are discussed at https://skyandtelesc...howers-in-2023/ and https://amsmeteors.o...hower-calendar/

Information on passes of the ISS, the USAF's X-37B, the Tiangong, the HST, Starlink, and other satellites can be found at http://www.heavens-above.com/

The Moon is 10.5 days old, is illuminated 81.1%, subtends 30.1 arc minutes, and is located in the constellation of Taurus at 0:00 UT on February 1st. The Moon attains its greatest northern declination (+27.4 degrees) for the month on February 2nd and greatest southern declination (-27.5 degrees) on February 17th. Longitudinal libration is at a maximum of +7.3 degrees on February 25th. It's at a minimum of -7.4 degrees on February 17th. Latitudinal libration is at a maximum of +6.5 degrees on February 19th and a minimum of -6.6 degrees on December 5th.Favorable librations for the following lunar features occur on the indicated dates: Mare Australe on February 1st, Crater Malapert on February 5th, Crater Von Braun on February 16th, and Crater Neper on February 24th. New Moon occurs on February 20th. Large tides will take place thereafter. The Moon is at apogee on February 4th and at perigee on February 19th. The Moon passes near the bright open star cluster M35 in Gemini at 1:00 on February 2nd, the first-magnitude star Castor (Alpha Geminorum) at 15:00 on February 3rd, the first-magnitude star Pollux (Beta Geminorum) at 21:00 on February 3rd, the bright open star cluster M44 (the Beehive or Praesepe) in Cancer at 1:00 on February 5th, the first-magnitude star Regulus (Alpha Leonis) at 23:00 on February 6th, the first-magnitude star Spica (Alpha Virginis) at 9:00 on February 11th, the first-magnitude star Antares (Alpha Scorpii) at 20:00 on February 14th, and the bright open cluster M45 (the Pleiades or Subaru) in Taurus at 17:00 on February 26th. See https://astronomy.co...ay--on-the-moon for an article on these and other lunar clair-obscur events. From certain parts of the world, the Moon occults Jupiter on February 22nd, Uranus on February 25th, and Mars on February 28th. Browse http://www.lunar-occ...ota/iotandx.htm for information on these and other lunar occultation events. Visit https://saberdoesthe...does-the-stars/ for tips on spotting extreme crescent Moons and http://www.curtrenz.com/moon06.html for Full Moon data. Go to https://skyandtelesc...ads/MoonMap.pdf and https://celestron-si...RReeves-web.pdf and https://nightsky.jpl...ObserveMoon.pdf for simple lunar maps. Click on https://astrostrona.pl/moon-map/ for an excellent online lunar map. The "daily" lunar maps at https://www.dereksco...telescope-view/ are also very good. Visit http://www.ap-i.net/avl/en/start to download the free Virtual Moon Atlas. Consult http://time.unitariu...moon/where.html for current information on the Moon and https://www.fourmila.../lunarform.html for information on various lunar features. Click on https://svs.gsfc.nas...p_YouTubeHD.mp4 for a remarkable lunar phase, libration, and position angle graphic for 2023. See https://svs.gsfc.nasa.gov/4955 a lunar phase and libration calculator and https://quickmap.lro...2vIBvAXwF1SizSg for the Lunar Reconnaissance Orbiter Camera (LROC) Quickmap. Click on https://www.calendar...r/2023/february for a lunar phase calendar for this month. Times and dates for the lunar crater light rays predicted to occur this month are available at http://www.lunar-occ...o/rays/rays.htm

The Sun subtends 32.5 arc minutes and is located in the constellation of Capricornus at 0:00 UT on February 1st. It enters Aquarius on February 16th.

Brightness, apparent size, illumination, distance from the Earth in astronomical units, and location data for the planets and Pluto on February 1: Mercury (magnitude -0.2, 6.5", 66% illuminated, 1.03 a.u., Sagittarius), Venus (magnitude -3.9, 11.1", 91% illuminated, 1.50 a.u., Aquarius), Mars (magnitude -0.3, 10.7", 92% illuminated, 0.88 a.u., Taurus), Jupiter (magnitude -2.2, 36.1", 99% illuminated, 5.46 a.u., Pisces), Saturn (magnitude +0.8, 15.4", 100% illuminated, 10.78 a.u., Capricornus), Uranus (magnitude +5.8, 3.5", 100% illuminated, 19.83 a.u. on February 15th, Aries), Neptune (magnitude +8.0, 2.2", 100% illuminated, 30.78 a.u. on February 15th, Aquarius), and Pluto (magnitude +14.5, 0.1", 100% illuminated, 35.66 a.u. on February 15th, Sagittarius).

Mars can be seen in the south, Uranus in the southwest, and Venus, Jupiter, Saturn, and Neptune in the evening sky. Mars and Uranus are in the west at midnight. In the morning sky, Mercury lies in the east.

The bright planets in the February sky are discussed at https://earthsky.org...saturn-mercury/

All of the planets are covered in the article at https://skynews.ca/p...-february-2023/

For more on the planets and how to locate them, browse http://www.nakedeyeplanets.com/

The apparent and comparative sizes of the planets, along with their magnitudes and distances, can be determined, for a given date and time, at https://www.timeandd...lanets/distance

The graphic at https://www.astrolea...copes85x 11.pdf compares the apparent sizes of the bright planets to that of the Moon.

The article at https://britastro.or...-size-of-things discusses the sizes and distances of the planets of the solar system and a number of other celestial bodies in terms of a scale model.

Basic astronomical data such as sunrise and sunset times, morning and evening twilight times, moonrise and moonset times, the phase of the Moon, which naked-eye planets are visible in the evening and morning skies, rise and set times for

each of them can be found at https://skyandtelesc...-coms-almanac/#

Another online data generator for various astronomical events is available at https://astronomynow.com/almanac/

A guide to planetary observing for the year by the British magazine The Sky at Night is posted at https://www.skyatnig...nets-night-sky/

An article on the planets that are visible in the morning sky this year can be seen at https://drive.google...09IK7rBkqB/view

Asteroid 2 Pallas shines at magnitude +7.7 as it heads northward through Canis Major this month. The main-belt asteroid passes just to the west of the fourth-magnitude star of Xi1 Canis Majoris on February 7th, to the west of the bright open cluster M41 on February 14th and 15th, less than one degree to the west of Nu1 Canis Majoris on February 20th, and to the west of Sirius on February 25th.See http://asteroidoccul.../2023_01_si.htm for information on asteroid occultation events taking place this month. A list of the best occultations of the year can be found at https://www.asteroid...-BestEvents.htm

Comet C/2022 E3 (ZTF) moves at a very speedy rate of six degrees per night as it passes closest to the Earth in early February. That rate will decrease to about three degrees per night by February 8th and about one degree per night by the end of the month. It travels from Camelopardalis into Orion over the course of the month. The comet is closest to Earth and is at its brightest, about fifth magnitude, on February 1st. It passes to the west of Capella on February 6th, to the east of Mars on February 11th, and to the east of Aldebaran on February 15th. During February, Comet C/2020 V2 (ZTF) heads southward from Cassiopeia into Andromeda. This comet may brighten to magnitude +9.5. Comet 96P/Machholz may be visible in the eastern sky during morning twilight as it glides from Aquarius into Aquila in early February. Click on https://earthsky.org...for-binoculars/ and https://www.skyatnig...-c-2022-e3-ztf/ for online articles on Comet C/2022 E3 (ZTF). Finder charts for C/2022 E3 (ZTF) and Comet C/2020 V2 (ZTF) are available on pages 48 and 49 of the February 2023 issue of Sky & Telescope. Visit https://cobs.si/ and http://cometchasing.skyhound.com/ and http://www.aerith.ne...t/future-n.html for information on the comets that are visible this month.

A list of the closest approaches of comets to the Earth is posted at http://www.cometogra.../nearcomet.html

A wealth of information on solar system celestial bodies is posted http://nineplanets.org/ and http://www.curtrenz.com/astronomy.html

Information on the celestial events transpiring each week can be found at http://astronomy.com/skythisweek and http://www.skyandtel...ky-at-a-glance/

A monthly podcast on various astronomical topics is available at https://www.skyandte...onomy-podcasts/

An article on some of the astronomical events taking place in the coming year can be found at https://www.universe...he-coming-year/

Free star charts for the month can be downloaded at http://www.skymaps.com/downloads.html and http://whatsouttonight.com/

An article on observing the Moon and the visible planets in February is posted at https://earthsky.org...saturn-mercury/

A video on the February night sky can be seen at https://hubblesite.o...es/tonights-sky

Free star charts for the month can be downloaded at http://www.skymaps.com/downloads.html and http://whatsouttonight.com/

A star-hop through this year's mid-February sky can be seen at https://www.facebook...7520000.&type=3

The famous eclipsing variable star Algol (Beta Persei) is at a minimum, decreasing in magnitude from 2.1 to 3.4, on February 2nd, 5th, 8th, 11th, 14th, 17th, 19th, 22nd, 25th, and 28th. Algol is at minimum brightness for observers in North America for about two hours centered at 2:12 a.m. EST on February 10th (7:12 UT on February 11th), 11:02 p.m. EST on February 13th (4:02 UT on February 14th), and 7:51 p.m. EST on February 16th (0:51 UT on February 17th). Consult page 50 of the February 2022 issue of Sky & Telescope for the times of the minima. The chance of seeing Algol at least one magnitude fainter than normal on a random night is about 1 in 30. See http://stars.astro.i.../sow/Algol.html and http://www.solstatio...ars2/algol3.htm for more on Algol.

Data on current supernovae can be found at http://www.rochester...y.org/snimages/

Information on observing some of the more prominent Messier galaxies is available at http://www.cloudynig...ur-astronomers/

Finder charts for the Messier objects and other deep-sky objects are posted at https://freestarcharts.com/messier and https://freestarcharts.com/ngc-ic and https://www.cambridg...s_january-march

Telrad finder charts for the Messier Catalog are posted at http://www.custerobs...cs/messier2.pdf and http://www.star-shin...ssierTelrad.htm

Telrad finder charts for the SAC's 110 Best of the NGC are available at https://www.saguaroa...k110BestNGC.pdf

Author Phil Harrington offers an excellent freeware planetarium program for binocular observers known as TUBA (Touring the Universe through Binoculars Atlas) at http://www.philharrington.net/tuba.htm

Stellarium and Cartes du Ciel are useful freeware planetarium programs that are available at http://stellarium.org/ and https://www.ap-i.net/skychart/en/start

Deep-sky object list generators can be found at http://www.virtualcolony.com/sac/ and https://telescopius.com/ and http://tonightssky.com/MainPage.php

Freeware sky atlases can be downloaded at http://www.deepskywa...-atlas-full.pdf and https://www.cloudyni...ar-charts-r1021 and https://allans-stuff.com/triatlas/

Forty binary and multiple stars for February: 41 Aurigae, Struve 872, Otto Struve 147, Struve 929, 56 Aurigae (Auriga); Nu-1 Canis Majoris, 17 Canis Majoris, Pi Canis Majoris, Mu Canis Majoris, h3945, Tau Canis Majoris (Canis Major); Struve 1095, Struve 1103, Struve 1149, 14 Canis Minoris (Canis Minor); 20 Geminorum, 38 Geminorum, Alpha Geminorum (Castor), 15 Geminorum, Lambda Geminorum, Delta Geminorum, Struve 1108, Kappa Geminorum (Gemini); 5 Lyncis, 12 Lyncis, 19 Lyncis, Struve 968, Struve 1025 (Lynx); Epsilon Monocerotis, Beta Monocerotis, 15 (S) Monocerotis (Monoceros); Struve 855 (Orion); Struve 1104, k Puppis, 5 Puppis (Puppis)

Notable carbon star for February: BL Orionis (Orion)

Fifty deep-sky objects for February: NGC 2146, NGC 2403 (Camelopardalis); M41, NGC 2345, NGC 2359, NGC 2360, NGC 2362, NGC 2367, NGC 2383 (Canis Major); M35, NGC 2129, NGC 2158, NGC 2266, NGC 2355, NGC 2371-72, NGC 2392, NGC 2420 (Gemini); NGC 2419 (Lynx); M50, NGC 2232, NGC 2237, NGC 2238, NGC 2244, NGC 2245, NGC 2251, NGC 2261, NGC 2264, NGC 2286, NGC 2301, NGC 2311, NGC 2324, NGC 2335, NGC 2345, NGC 2346, NGC 2353 (Monoceros); NGC 2169, NGC 2174, NGC 2194 (Orion); M46, M47, M93, Mel 71, NGC 2421, NGC 2423, NGC 2438, NGC 2439, NGC 2440, NGC 2467, NGC 2506, NGC 2509 (Puppis)

Top ten binocular deep-sky objects for February: M35, M41, M46, M47, M50, M93, NGC 2244, NGC 2264, NGC 2301, NGC 2360

Top ten deep-sky objects for February: M35, M41, M46, M47, M50, M93, NGC 2261, NGC 2362, NGC 2392, NGC 2403

Challenge deep-sky object for February: IC 443 (Gemini)

The objects listed above are located between 6:00 and 8:00 hours of right ascension.

NASA Night Sky Notes

This article is distributed by NASA Night Sky Network
The Night Sky Network 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. 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.

Phil Harrington's Cosmic Challenge

Cosmic Challenge: Palomar 2

This month's suggested aperture range:
15-inch (38cm) and up
(featured telescope JMI 18")

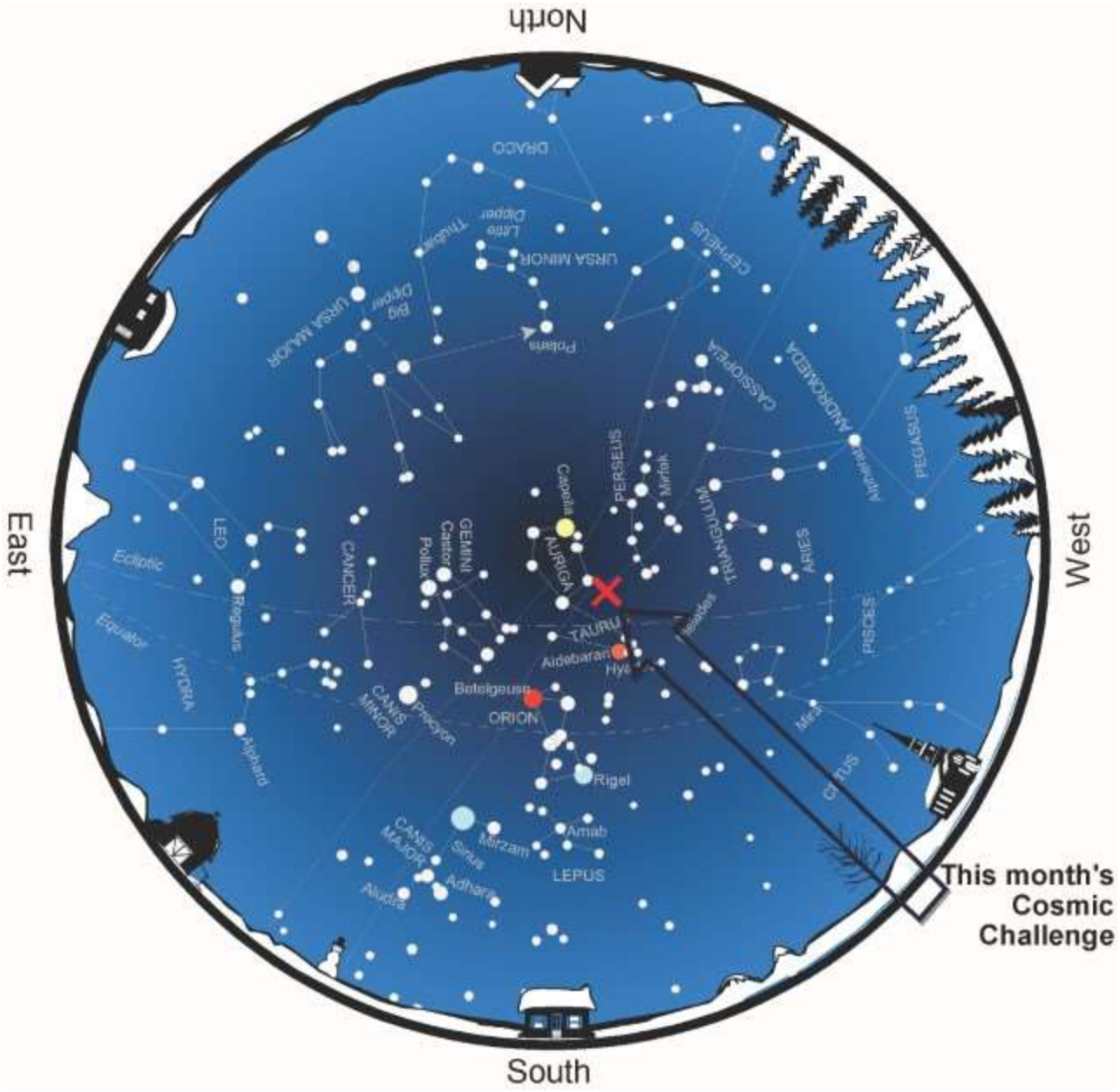
Target	Type	RA	DEC	Constellation	Magnitude	Size
Palomar 2	Globular Cluster	04h 46.1m	+31° 22.9'	Auriga	12	2"

When it was released more than half a century ago, the Palomar Observatory Sky Survey showed the universe at a level of detail never before achieved. This major photographic survey covers the sky from the north celestial pole to -30° declination and recorded stars down to an average of magnitude 22.

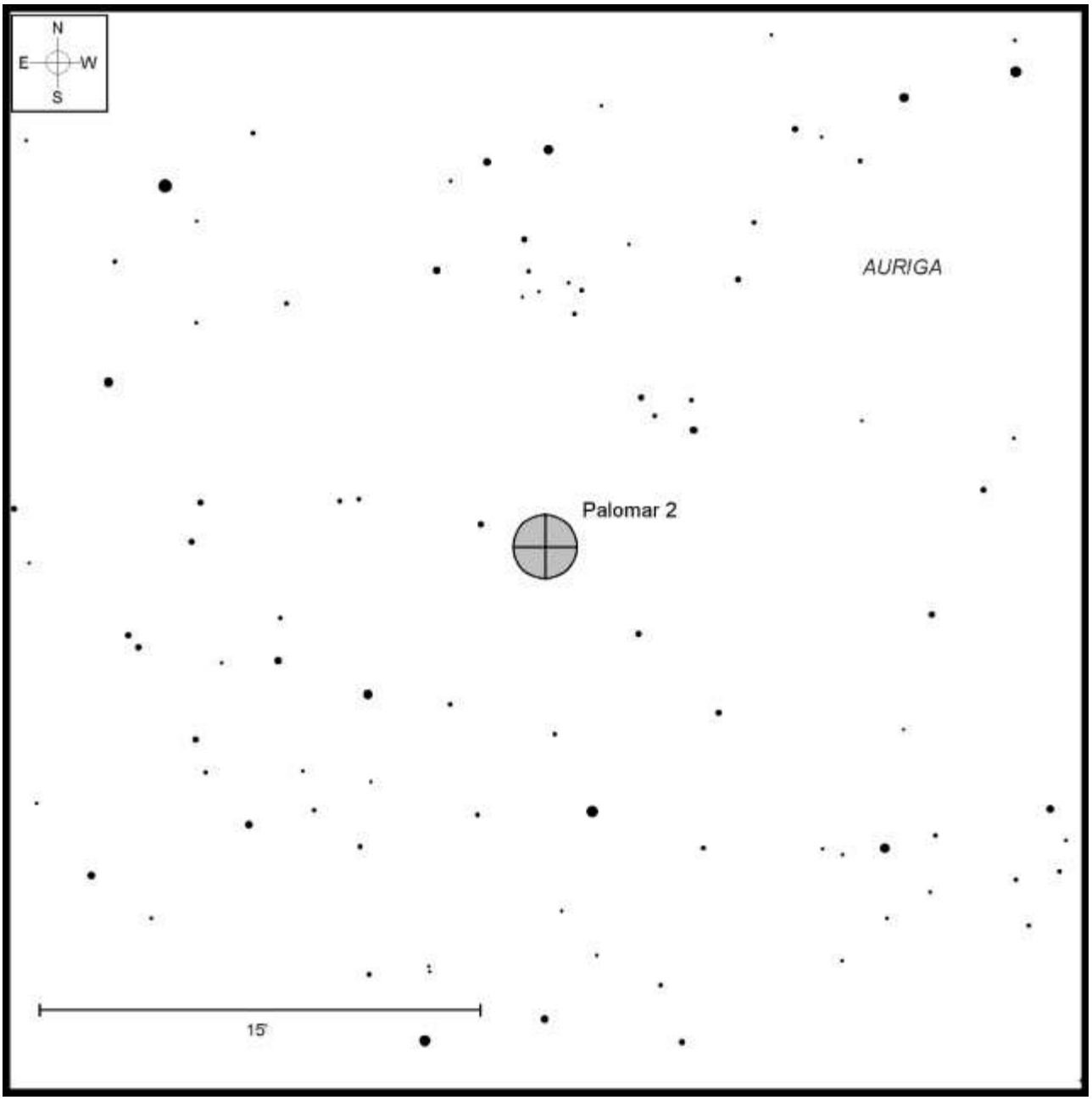
Astronomers at the time immediately turned to the Survey's 900-plus photographic plates to examine known objects in exquisite detail as well as to discover other sights that earlier studies had missed. For instance, 86 planetary nebulae were discovered on the plates by American astronomer George O. Abell. (Footnote: Two of Abell's planetaries were already in the NGC catalog (Abell 50=NGC 6742 and Abell 75=NGC 7076), while another pair were already in the IC catalog (Abell 37=IC 972 and Abell 81=IC 1454.)

During a survey of the Survey, Abell, along with Halton Arp, Walter Baade, Edwin Hubble, Fritz Zwicky, A.G. Wilson, and others, cataloged 15 "unknown" Milky Way globulars. As with four of the planetary nebulae, two Palomar globulars -- Palomar 7 and Palomar 9 -- were previously known. The former is listed as IC 1276, while the latter is NGC 6717. But regardless, each represents a suitably daunting test for today's most diehard deep-sky observers.

Palomar 2, discovered by A.G. Wilson in 1955, is a particularly nasty cluster to spot because it is partially concealed behind a dark nebula in Auriga. Barnard 221 spans ¾° and is centered just 32' northwest of Palomar 2. The dark nebula may not be readily evident by eye, but it has a stifling influence on Palomar 2.



Above: Evening star map showing the location of this month's Cosmic Challenge.
Credit: *Map adapted from* ***Star Watch*** *by Phil Harrington*



Above: Finder chart for this month's Cosmic Challenge.
***Credit:** Chart adapted from **Cosmic Challenge** by Phil Harrington*
Click on the chart to open a printable PDF version in a new window

Most globular clusters associated with the Milky Way are positioned around the galactic nucleus, and so are referred to as "inner-halo globulars." There is a second family, however, whose members lie far beyond the Galaxy's center and so are known as "outer-halo globulars." Of all the outer-halo globulars known, Palomar 2 is the most extreme, located almost directly opposite the Galactic center in Sagittarius, separated by 85,400 light years. A 1997 analysis entitled Unveiling Palomar 2: The Most Obscure Globular Cluster in the Outer Halo conducted by Professor William E. Harris and colleagues from McMaster University in Hamilton, Ontario, found that Palomar 2 is it is one of the brightest and most massive clusters in the outer halo.

That distinction goes completely unappreciated through our telescopes, however, because Palomar 2 is also one of the most heavily obscured. As a result, we see only a vague inkling of the cluster's true self. In many images, the dark nebula's presence also reddens the stars' hues.

To find it, scan 2° southwest of Iota (ι) Aurigae, the southwestern star in the Auriga pentagon. Keep an eye out for a triangle of three 6th- to 7th-magnitude stars. The brightest and westernmost star in the triangle, SAO 57441, is 40' due east of the cluster. A close-set pair of 12th- and 13th-magnitude stars lying halfway between the two makes a useful checkpoint along the way. Another close stellar duo, shining faintly at magnitudes 13 and 14.5, is just 2.3' northeast of the cluster.

Above: Palomar 2 through the author's 18-inch (46-cm) reflector.

Below: The view of Palomar 2 as captured by the Hubble Space Telescope.
Credit: ESA/Hubble & NASA

For most readers, see Palomar 2 will take the firepower of at least a 15-inch (38-cm) scope to pull out its tiny glow from the surroundings. Palomar 2 has a listed magnitude of 13, and so may be visible through smaller telescopes if attempted under very dark skies. Through my 18-inch (46-cm) reflector under suburban skies, it is an extremely dim, but doable, smudge measuring no more than 1' across, as shown in the rendering above. Averted vision is a must no matter which eyepiece I use, although I have found the best view was at 171x. The overall impression is more reminiscent of a distant galaxy than a globular cluster. Indeed, it was this vague appearance that led Boris Vorontsov-Velyaminov and V. P. Arkhipova to misclassify Palomar 2 as a galaxy in their Morphological Catalog of Galaxies (MGC) compiled by in the 1960s. Even today some references cross-list Palomar 2 as MCG +05-12-1.

Have a favorite challenge object of your own? I'd love to hear about it, as well as how you did with this month's challenge. Contact me through my website or post to this month's discussion forum.

Remember that half of the fun is the thrill of the chase. Game on!

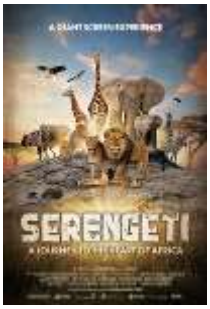
About the Author: Phil Harrington writes the monthly *Binocular Universe* column in Astronomy magazine and is the author of 9 books on astronomy, including Cosmic Challenge: The Ultimate Observing List for Amateurs.

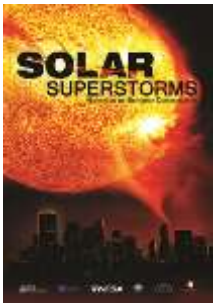
Observatory and Planetarium Events

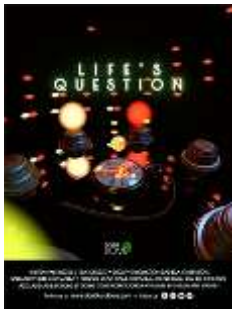
Centennial Observatory Upcoming Events

Event	Place	Date	Time	Admission
Monthly Free Star Party	Centennial Observatory	Saturday, February 11th, 2023	7:00 to 9:00 PM	FREE
Telescope Tuesday	Centennial Observatory	Tuesday, February 14th, 2023	7:15 to 9:00 PM	$1.50 or free with Faulkner Planetarium admission
Telescope Tuesday	Centennial Observatory	Tuesday, February 28th, 2023	7:15 to 9:00 PM	$1.50 or free with Faulkner Planetarium admission

Faulkner Planetarium







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Magic Valley Astronomical Society

550 Sparks St.
Twin Falls, ID

The Magic Valley Astronomical Society (MVAS) was founded in 1976. The Society is a non-profit, 501(c)(3) educational and scientific organization dedicated to bringing together people with an interest in astronomy.

In partnership with the Centennial Observatory, Herrett Center, College of Southern Idaho - Twin Falls, we hold regularly scheduled monthly meetings and observation sessions, at which we share information on current astronomical events, tools and techniques for observation, astrophotography, astronomical computer software, and other topics concerning general astronomy. Members enthusiastically share their telescopes and knowledge of the night sky with all who are interested. In addition to our monthly public star parties we hold members-only star parties at various locations throughout the Magic Valley.

MVAS promotes both the education of astronomy and the exploration of the night sky along with safe solar observing through our public outreach programs. We provide two types of outreach: (a) public star parties and events open to anyone interested in astronomy; (b) outreach programs for individual groups and organizations (e.g., schools, churches, scout troops, company events, etc.), setting up at your location. All of our outreach programs are provided by MVAS volunteers at no cost. However, MVAS will gladly accept donations, which enable us to improve our public outreach programs.

Membership is not just about personal benefits. Your membership dues support the work that the Magic Valley Astronomical Society does in the community to promote the enjoyment and science of astronomy. Among the programs that your membership dues support are speakers, public star parties, classes and support for astronomy in schoolrooms, and outreach programs, just to name a few.

Annual Membership dues are $20.00 for individuals, families, and $10.00 for students.
Contact Treasurer Jim Tubbs for dues information via e-mail: jtubbs015@msn.com

Donations to our club are always welcome and are even tax deductible. Please contact a board member for details.

Lending Telescopes: The society currently has three telescopes for loan and would gladly accept others. Please contact President Robert Mayer for more information on these and other benefits.

Telescopes are an individual thing and not practical for public use. However, everyone should have the experience of a good look at the moon for at least 5 minutes in their life time. It is a dimension and feeling that is unexplainable. Pictures or TV can't give this feeling, awareness, or experience of true dimension. A person will not forget seeing our closest neighbor, the moon.

Norman Herrett in a letter to Dr. J. L. Taylor, president of the College of Southern Idaho, Twin Falls, ID, USA.