Snake River Skies

The Newsletter of the Magic Valley Astronomical Society

October 2021

Membership Meeting
October 9th at the Herrett Center
CSI main campus at 7:00pm

Centennial Observatory
See Inside for Details

Faulkner Planetarium
See Inside for Details

www.mvastro.org

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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

Colleagues;

If you were a watcher of space news, you weren't too happy the last week of September. After all, you had just learned the Roman Space Telescope had been delayed by the pandemic, and the Mars Ingenuity Space Helicopter's next flight had been put off because of concerns with rotors.

However, as astronomers know, as long as you're persistent, you can find something good. For example, a man in Louisiana was looking for wood to replace some gunstocks, only to stumble on a plaque that held the state's Apollo 17 moon rock sample.

Locally, our own astronomers are showing how that persistence pays off. At the time of this writing, we are preparing for our first MVAS star party in more than a year. We have permission to set up at the Hagerman Fossil Beds National Monument's Oregon Trail Overlook on Saturday, Oct. 2. I look forward to seeing you there!

Gary Leavitt's recent work on deep sky Sharpless nebulae is also another example of persistence. You can see that image as well as other images from your colleagues at this month's meeting on Saturday, Oct. 8. the annual MVAS Year-in-Pictures. If you have taken pictures and haven't submitted them, please send to me via E-mail by Friday, Oct. 8.

Lastly, and after some thought, we are going to hold Officer Elections for the November meeting. After separate stints as president, I am going to have to step down this year, so if you are interesting in helping out, or know of someone willing, please feel free to let a member of the board know. Nominations will be taken until the Friday before the November meeting.

Until then

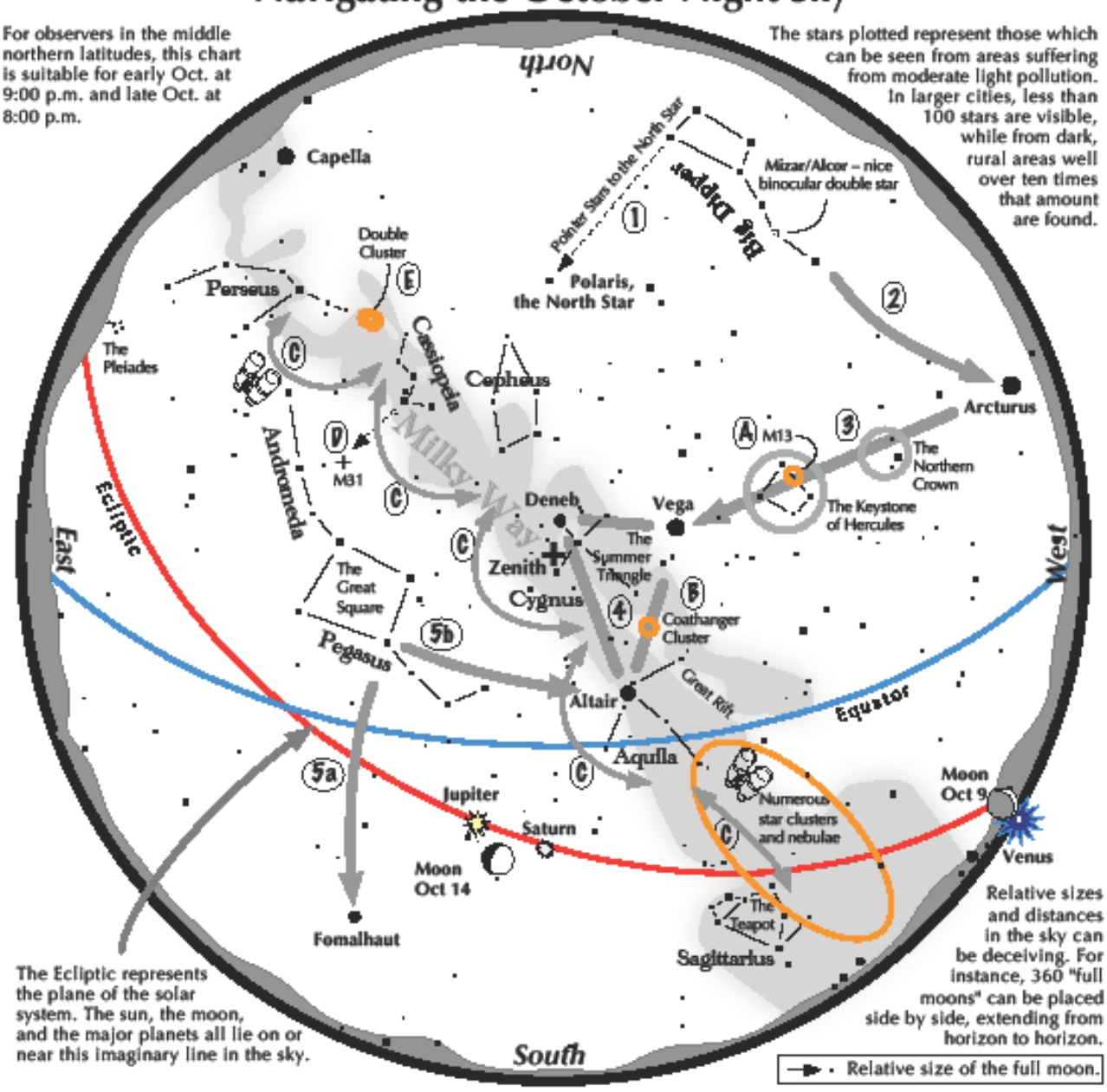
Clear Views,

Rob Mayer

October 2021 Calendar

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	2
3	4	5	6 New Moon  Lunation 1222	7	8	9 MVAS General Meeting 7:00pm at the Herrett Center Centennial Observatory Public Star Party 8:45p – 10:45p
10	11 Columbus Day Thanksgiving Day - Canada 	12	13 First Quarter Moon 	14	15	16
17	18	19	20 Full Ice Moon*  * Haida Tribe	21	22	23
24	25	26	27	28 Last Quarter Moon 	29	30
31 Halloween 						

Navigating the October Night Sky



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.

The Night Sky This Month – October 2021

The Zodiacal Light as seen from La Silla, Chile (credit: ESO).

If the weather holds, October is a lovely month for stargazing. The Milky Way still lingers in the west along with stars that were prominent in the northern summer. The autumn stars dominate overhead, and the northern winter stars are starting to poke above the eastern horizon. Best of all, you can get in a good night of stargazing without staying up too late. Jupiter and Saturn remain in Aquarius and Capricornus, respectively, both still big enough for promising telescopic observation. Mars finally round the Sun and remains out of sight for the next several weeks. Venus and Mercury make an appearance. The Orionid meteor shower arrives, although under moony conditions, and the zodiacal light emerges for those with dark sky. Here's what to see in the night sky this month…

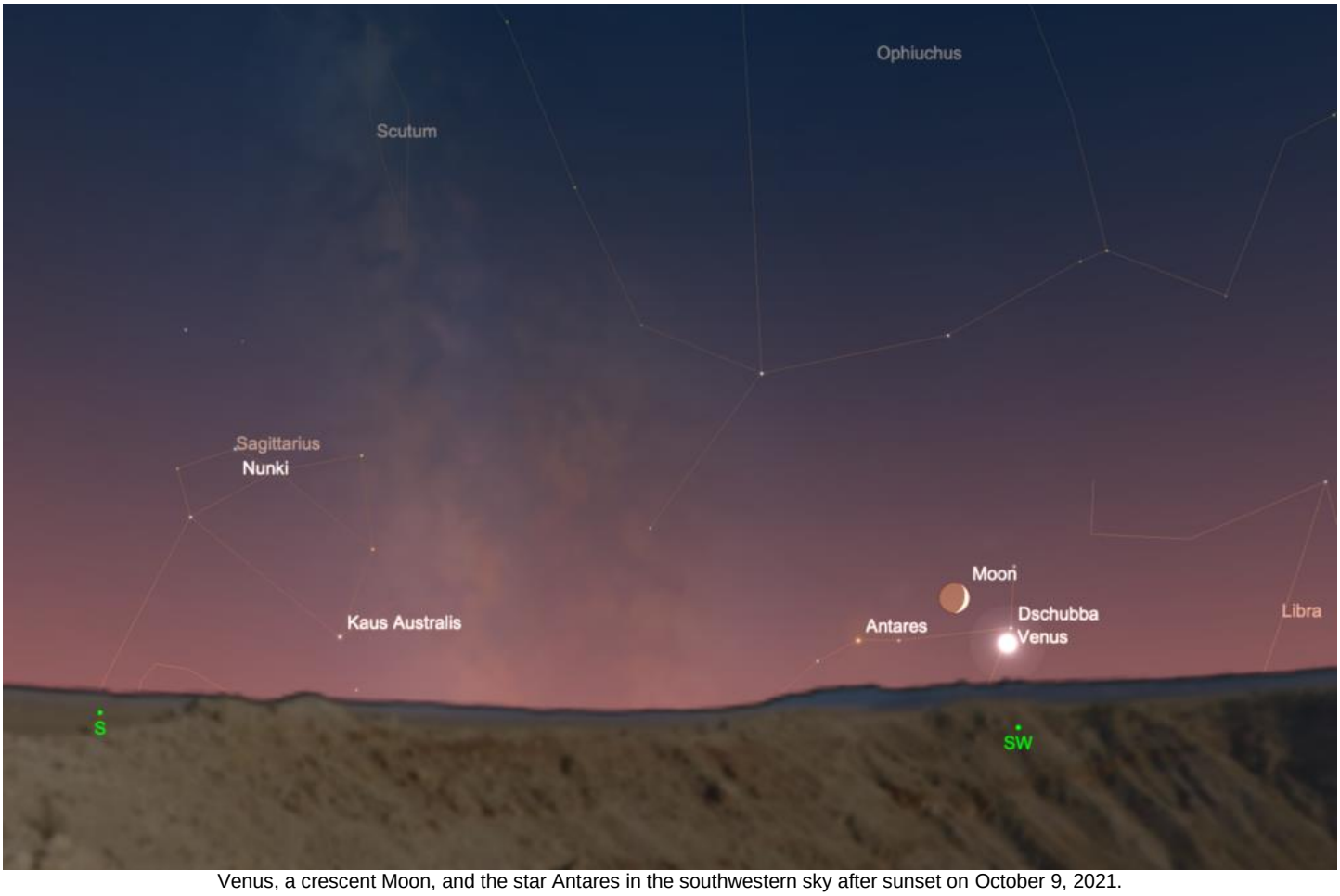
3 Oct. Look for the waning crescent Moon rising with the first-magnitude star Regulus in the eastern sky before dawn.

4 Oct. Over the next couple of weeks, northern-hemisphere observers who have very dark sky can see the zodiacal light in the eastern sky about 90-120 minutes before sunrise in the northern hemisphere. This whitish glowing wedge of light appears to thrust upward from the horizon (see image above). The zodiacal light, sometimes called the "False Dawn", is simply sunlight reflected off tiny dust particles in the inner solar system. The zodiacal light may be visible in the pre-dawn eastern sky from a dark site for roughly the first half of the month. Articles on the zodiacal light appear at www.atoptics.co.uk/highsky/zod1.htm and https://earthsky.org...t-or-false-dawn

8 Oct. The Draconid meteor shower peaks over the next few days. This meteor shower occurs each year when the Earth passes through a stream of debris left from periodic Comet Giacobini-Zinner. While it's usually a spartan meteor shower, with just a handful of meteors visible each hour, the Draconids have flared up from time to time. In 1933 and 1946,

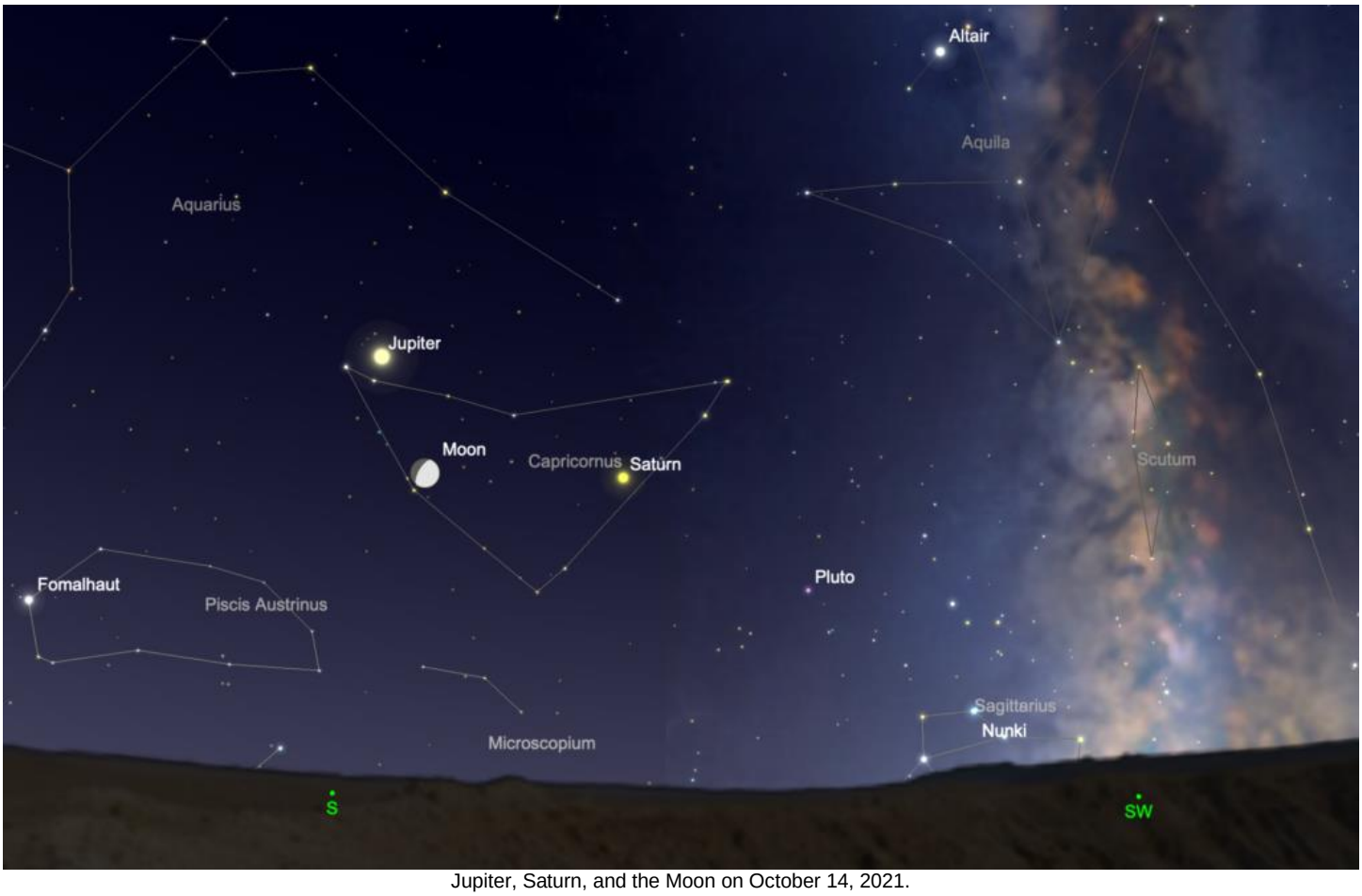
observers reported thousands of meteors per hour, so this modest shower became a meteor storm. There was also a good show in 1988. There's no word of a flare up this year, but if you're out stargazing, take a look. You never know.

8 Oct. Mars, after putting on a lovely show for the past 18 months, reaches conjunction with the Sun today. It will now slowly emerge in the morning sky over the coming weeks.



Venus, a crescent Moon, and the star Antares in the southwestern sky after sunset on October 9, 2021.

9 Oct. Look for a waxing crescent Moon just above brilliant Venus with the bright red-orange star Antares to the left. The pair all lie within about seven degrees of each other over the southwestern horizon in the evening as darkness falls. Venus is well separated from the sun all month and reaches greatest eastern elongation on October 29. But it lies far south on the ecliptic and remains an easier sight for southern-hemisphere stargazers.



Jupiter, Saturn, and the Moon on October 14, 2021.

13-14 Oct. Saturn resumed its prograde motion on Oct. 11 and moves eastward again against the background stars from night to night. On the 13th and 14th, the planet lies just 4° from the first-quarter Moon in the constellation Capricornus.

13 Oct. First Quarter Moon, 03:25 UT

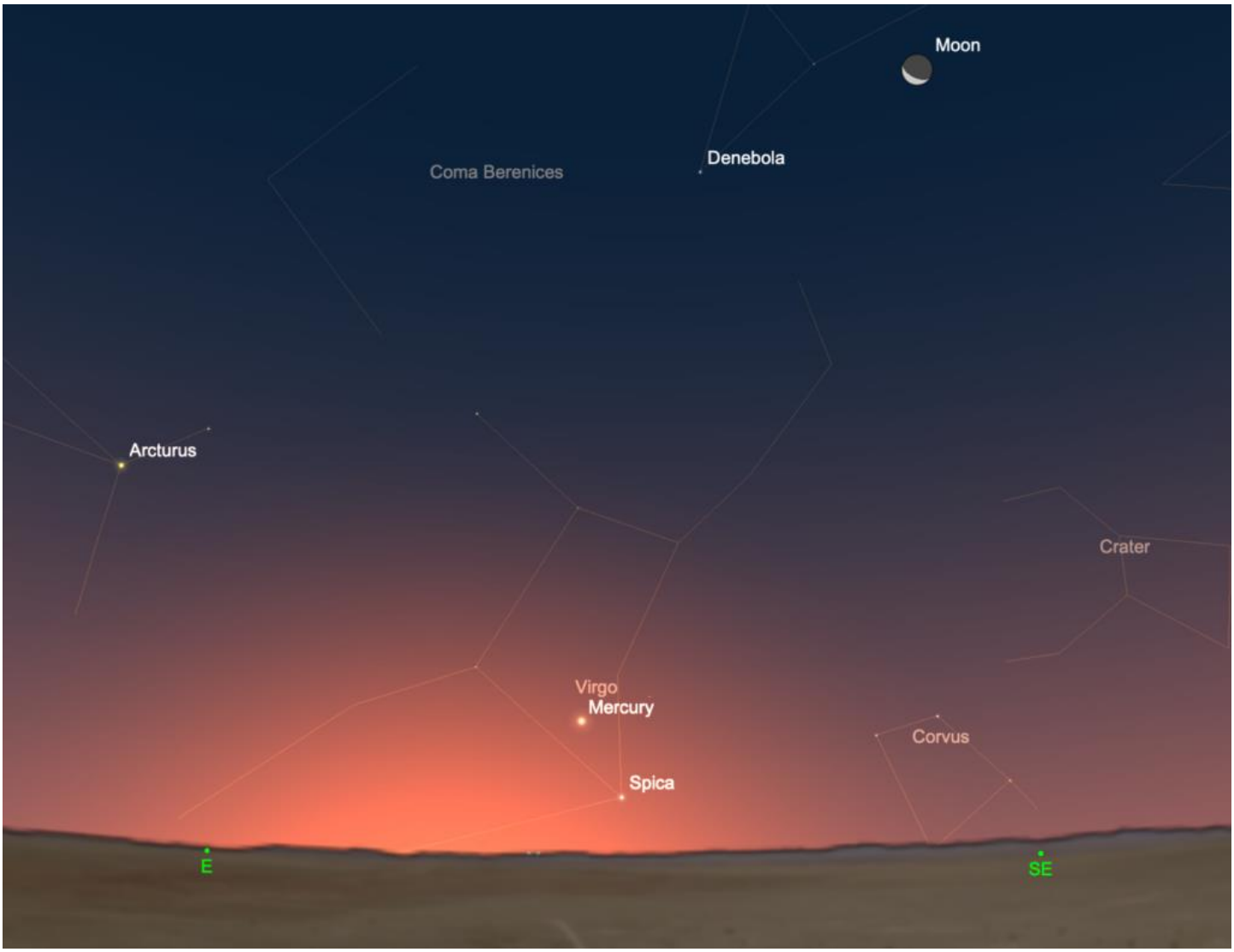
15 Oct. Like Saturn, Jupiter also resumes its prograde motion this month on the 18th in Aquarius. Tonight, the waxing gibbous Moon lies about 4o away from the big planet. It remains bright, at magnitude -2.6, and splendid in a telescope.

20 Oct. Full Moon, 14:57 UT

21 Oct. The Orionid meteor shower peaks in the early morning hours. One of the finest of all meteor showers, the Orionids display about 20-40 fast-moving meteors per hour in dark sky. The radiant lies near the club of Orion, but meteors will be visible anywhere in the sky with the peak likely occurring between midnight and dawn. Like the Eta Aquariid meteor shower in May, the Orionids are tiny pieces of Comet Halley that hit the upper atmosphere as the Earth passes through the comet's debris field. The moon, just past full, alas, gets in the way of the faintest meteors this year.

28 Oct. Last Quarter Moon, 20:05 UT

29 Oct. Venus reaches greatest eastern elongation about 47° from the Sun. Southern hemisphere observers see the planet high and bright in the western sky after sunset. Northern observers, because of the angle of the ecliptic, need to work a little harder to see the planet over the southwestern horizon as darkness falls.



Mercury and Spica rise in the eastern sky before sunrise on Oct. 31, 2021.

31 Oct. Mercury reached greatest western elongation about 18^{o} from the Sun on the 25th. Today it rises in the eastern sky before dawn with the brilliant white star Spica in the constellation Virgo. The planet is best positioned for northern observers at this apparition, but southern observers with a clear view down to the eastern horizon can also spot the pair.

Source: Brian Ventrudo https://cosmicpursuits.com/ used with permission of the author. If you're not already a subscriber to Cosmic Pursuits, you can sign up here.

The first recorded solar eclipse took place on October 22, 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. Asteroid 8 Flora was discovered by John Russell Hind on October 18, 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. Charles Kowal discovered 2060 Chiron, the first Centaur asteroid, on October 18, 1977. Michel Mayor and Didier Queloz announced the discovery of the exoplanet 51 Pegasi b (Dimidium) on October 6, 1995.

Asteroids

Asteroid 2 Pallas heads southwestward through Aquarius. The ninth-magnitude asteroid passes approximately one degree west of the fourth-magnitude star Lambda Aquarii on October 14th. Asteroid 40 Harmonia shines at magnitude +9.5 when it reaches opposition in Cetus to the southeast of the sixth magnitude binary star HR174 on October 1st. Asteroids brighter than magnitude +11.0 coming to opposition this month include 141 Lumen on October 14th, 50 Virginia on October 15th, and 25 Phocaea on October 18th. Data on asteroid occultations taking place this month is available at https://www.asteroid.../2021_10_si.htm and www.poyntsource.com/New/Global.htm

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Comets

Comet 67P/Churyumov-Gerasimenko passes northeastward through Taurus and into Gemini this month. The periodic comet passes one degree north of M1 (the Crab Nebula) on October 8th, north of the open cluster NGC 2129 on October 14th, and through the northern portion of the bright open cluster M35 on October 16th. An anti-tail may be visible at the end of the month when the comet will be seen edge-on. Another periodic comet, 4P/Faye, heads southeastward about eight degrees to the south of 67P/Churyumov-Gerasimenko. Comet C/2019 L3 (ATLAS) is located a similar distance to the northeast of 67P/Churyumov-Gerasimenko. All three comets are rather faint, shining at tenth to eleventh magnitude. Visit http://cometchasing.skyhound.com/ and http://www.aerith.ne...t/future-n.html and https://cobs.si/ for additional information on comets visible this month.

Meteor Showers

The Draconid (formerly the Giacobinid) meteor shower peaks on the night of October 8th. The Draconids are quite variable and have produced meteor storms in 1933 and 1946. Comet 21P/Giacobini-Zimmer is the parent comet of the Draconids. Consult https://www.timeandd...r/draconid.html and https://earthsky.org...-meteor-shower/ for additional information on the Draconid meteor shower. The Orionid meteor shower peaks on the night of October 21st/22nd and is severely affected by an almost Full Moon. Orionid meteors are fragments of Comet 1P/Halley. For more on the Orionids. Browse www.timeanddate.com/astronomy/meteor-shower/orionid.html and https://earthsky.org...d-meteor-shower

Comet C-2020 Neowise imaged by Dr. J. Hartwell

Our Sun, the Moon and the Solar System Planets

Mercury Due to the favorable tilt of the fall ecliptic, Mercury undergoes the best morning apparition of 2021 for northern hemisphere observers in October. Mercury reaches inferior conjunction on October 9th and is lost in the Sun's glare until the second half of the month. It's at the ascending node on October 15th and at perihelion three days later. Mercury and the third-magnitude binary star Porrima (Gamma Virginis) rise together in the east on October 20th. On October 21st, Mercury attains an altitude of almost five degrees an hour before sunrise and shines at magnitude zero. The speediest planet is at greatest western elongation on October 25th and greatest heliocentric latitude north on October 30th. On the morning of October 31st, Mercury lies less than five degrees above Spica. Mercury brightens to magnitude -0.8 by the end of the month.

Venus Because of its southerly declination, Venus is poorly placed for observers in the northern hemisphere this month. The brightest of the planets is at aphelion on October 3rd. The Moon passes 2.7 degrees north-northeast of Venus on October 9th. Venus is at heliocentric latitude south on October 25th, at dichotomy on October 28th, and at easternmost elongation on October 29th.

Mars is in solar conjunction on October 8th and is too close to the Sun to observe this month.

Jupiter fades slightly from magnitude -2.7 to magnitude -2.5 and decreases in angular diameter from 46.3 arc seconds to 42.3 arc seconds this month. It sets by 1:15 a.m. local time on October 31st. Jupiter's retrograde motion slows during the first half of the month. The largest planet lies 1.8 degrees northwest of the third-magnitude star Deneb Algedi (Delta Capricorni) on October 1st. After reaching its second stationary point on October 18th, the planet's motion becomes prograde or direct. On that date, Jupiter is 2.1 degrees northwest of the star but by the end of October Jupiter is just 1.9 degrees from the Deneb Algedi. The waxing gibbous Moon passes four degrees south of Jupiter on October 15th. The Galilean satellite Io emerges from eclipse at 9:48 p.m. EDT on October 5th. Europa is occulted by Jupiter 26 minutes later. On the night of October 12th/13th, Callisto begins to disappear into eclipse at 11:11 p.m. EDT, Io reappears from eclipse at 11:43 p.m. EDT, and Europa is occulted at 12:40 a.m. EDT. Io reappears from eclipse six arc minutes northwest of Europa at 10:03 p.m. EDT on October 28th. Double Galilean satellite shadow transits take place on October 4th, October 19th, and October 26th. Information on Great Red Spot transit times and Galilean satellite events is available on pages 50 and 51 of the October 2021 issue of Sky & Telescope and online at http://www.skyandtel...watching-tools/ and https://www.projectp....com/jevent.htm

Saturn sets around 2:00 a.m. local time as October begins and shortly before midnight on October 31st. The Ringed Planet's disk is 17 arc seconds in angular diameter and its rings measure 38 arc seconds this month. Titan, Saturn's brightest satellite, shines at magnitude +8.5. It's located north of the planet on October 5th and October 21st and south of it on October 13th and October 29th. Saturn's two-faced satellite Iapetus is in superior conjunction on October 10th and then travels eastward reaching greatest elongation on October 29th, when it will be positioned just eight arc minutes east of the planet. The waxing gibbous Moon passes four degrees south of Saturn on October 14th. For information on Saturn's satellites, browse https://skyandtelesc...script-utility/

Uranus is located just 23 arc minutes from the sixth-magnitude star Omicron Arietis on October 1st. Uranus is less than ten arc minutes north of the star on October 10th. By October 24th, the planet's westward motion places Uranus about 30 arc minutes west of Omicron Arietis. The waning gibbous Moon passes a bit more than one degree south of the ice giant on October 21st. Visit www.nakedeyeplanets.com/uranus.htm for a finder chart. Five of the brightest Uranian satellites (Miranda, Ariel, Umbriel, Titania, and Oberon) can be located using the Sky & Telescope interactive observing tool at https://skyandtelesc...moons-ofuranus/

Neptune lies less than four degrees east of the fourth-magnitude star Phi Aquarii at the month begins. It's situated 3.3 degrees from the star on October 31st. The waxing gibbous Moon passes about four degrees south of Neptune on October 17th. Browse www.nakedeyeplanets.com/neptune.htm for a finder chart. An article on Neptune complete with a finder chart appears on pages 48 and 49 of the September 2021 issue of Sky & Telescope. Triton, Neptune's brightest satellite, can be located using the Sky & Telescope interactive observing tool at https://skyandtelesc...triton-tracker/

Finder charts for Uranus and Neptune are also available at https://skyandtelesc...#comment-359616

The dwarf planet **Pluto** is located near the Teaspoon asterism in northeastern Sagittarius at a declination of nearly -23.0 degrees. Finder charts can be found at pages 48 and 49 of the July 2021 issue of Sky & Telescope and on page 243 of the RASC Observer's Handbook 2021.

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

The Distance, Brightness, and Apparent Size of Planets graphic at https://www.timeanddate.com/astronomy/planets/distance displays the apparent and comparative sizes of the planets, along with their magnitudes and distances, on a given date and time.

The daily summary for the planets is available at https://bit.ly/september_2021 The Venus-Spica conjunction; Venus, moon, Spica grouping; Harvest moon effect, solstice are part of the monthly highlights.

The Moon is 23.8 days old, subtends 30.1 arc minutes, is illuminated 33%, and is located in Pisces on October 1st at 0:00 UT. The Moon reaches its greatest northern declination (+26.2 degrees) on October 27th and its greatest southern declination (-26.1 degrees) on October 12th. Longitudinal libration is at a maximum of +6.0 degrees on October 16th and a minimum of -6.2 degrees on October 3rd and -7.1 degrees on October 31st. Latitudinal libration is at a maximum of +6.7 degrees on October 16th and a minimum of -6.6 degrees on October 4th and -6.8 degrees on October 31st. Favorable librations for the following lunar features occur on the indicated dates: Crater Rydberg on October 3rd, Crater Riemann on October 12th, Crater Mercurius on October 16th, and Vallis Baade on October 31st. New Moon occurs on October 6th. The Moon is at perigee (a distance of 56.97 Earth-radii) on October 8th and at apogee (at a distance of 63.60 Earth-radii) on October 24th. Consult http://www.lunar-occ...ota/iotandx.htm for information on lunar occultation events. Visit https://saberdoesthe...does-the-stars/ for tips on spotting extreme crescent Moons and https://curtrenz.com/moon.html for Full Moon and other lunar data. Browse https://skyandtelesc...ads/MoonMap.pdf and https://nightsky.jpl...ObserveMoon.pdf for simple lunar maps. Click on http://astrostrona.pl/moon-map for an excellent online lunar map. 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. See https://svs.gsfc.nasa.gov/4874 for a lunar phase and libration calculator and https://quickmap.lro...2vIBvAXwF1SizSg for the Lunar Reconnaissance Orbiter Camera (LROC) Quickmap. Click on https://www.calendar.../2021/september 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 is located in Virgo on October 1st at 0:00 UT. It enters Libra at 1:00 UT on October 31st.

Brightness, apparent size, illumination, distance from the Earth in astronomical units, and location data for the planets and Pluto on October 1st: Mercury (magnitude +1.5, 9.5", 17%, 0.71 a.u., Virgo), Venus (magnitude -4.3, 18.8", 62%, 0.89 a.u., Libra), Mars (magnitude +1.7, 3.6", 100%, 2.64 a.u., Virgo), Jupiter (magnitude -2.7, 46.3", 99%, 4.26 a.u., Capricornus), Saturn (magnitude +0.5, 17.7", 100%, 9.42 a.u., Capricornus), Uranus (magnitude +5.7, 3.7", 100%, 18.80 a.u. on October 16th, Aries), Neptune (magnitude +7.8, 2.3", 100%, 29.07 a.u. on October 16th, Aquarius), and Pluto (magnitude +14.3, 0.1", 100%, 34.34 a.u. on October 16th, Sagittarius).

A wealth of current information on solar system celestial bodies is posted at www.nineplanets.org/ and www.curtrenz.com/astronomy.html Information on the celestial events transpiring each week can be found at www.astronomy.com/skythisweek and www.skyandtelescope.com/observing/sky-at-a-glance

Online data generators for various astronomical events are available at www.astronomynow.com/almanac/ and www.calsky.com/

The famous eclipsing variable star Algol (Beta Persei) is at a minimum, decreasing in brightness from magnitude +2.1 to magnitude +3.4, on October 3rd, 6th, 8th, 11th, 14th, 17th, 20th, 23rd, 26th, 29th, and 31st. Consult page 50 of the October 2021 issue of Sky & Telescope for the minima times. On the night of October 5th, Algol shines at minimum brightness (magnitude +3.4) for approximately two hours centered at 10:13 p.m. EDT (2:13 UT October 6th). It does the same at 11:54 p.m. EDT (3:54 UT on October 26th) on the night of October 25th, and 8:43 p.m. EDT (0:43 UT October 29th) on October 28th. For more on Algol, see http://stars.astro.i.../sow/Algol.html and www.solstation.com/stars2/algol3.htm

Data on current supernovae can be found at www.rochesterastronomy.org/snimages/

Information pertaining to observing some of the more prominent Messier galaxies can be found at www.cloudynights.com/topic/358295-how-to-locate-some-of-the-major-messier-galaxies-and-helpful-advice-for-novice-amateur-astronomers/

Free star charts for the month can be downloaded at www.skymaps.com/downloads.html and www.whatsouttonight.com/ and https://www.telescop...hly-Star-Chart

Finder charts for the Messier objects and other deep-sky objects are posted at www.freestarcharts.com/messier and www.freestarcharts.com/ngc-ic and www.cambridge.org/features/turnleft/seasonal_skies_october-december.htm

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

Telrad finder charts for the SAC's 110 Best of the NGC are available at http://sao64.free.fr...ataloguesac.pdf

Information pertaining to observing some of the more prominent Messier galaxies can be found at http://www.cloudynig...ur-astronomers/

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/

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

Stellarium and Cartes du Ciel are two excellent 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 https://www.tonights...om/MainPage.php

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Deep Sky Objects

Top ten binocular deep-sky objects for October: M52, NGC 7209, NGC 7235, NGC 7243, NGC 7293, NGC 7510, NGC 7686, NGC 7789, NGC 7790, St12

Top ten deep-sky objects for October: K12, M52, NGC 7209, NGC 7293, NGC 7331, NGC 7332, NGC 7339, NGC 7640, NGC 7662, NGC 7789

Challenge deep-sky object for October: Jones 1 (PK104-29.1) (Pegasus)

The objects listed above are located between 22:00 and 24:00 hours of right ascension.

Boise State Professor Dr. Brian Jackson's Astronomy Information Website: http://www.astrojack.com/ has past BSU First Friday's events and other information.

Earth & Miscellaneous

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

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

Information on the celestial events transpiring each week can be found at https://stardate.org/nightsky and http://astronomy.com/skythisweek and http://www.skyandtelescope.com/observing/sky-at-a-glance/

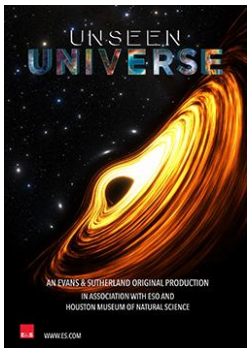
Observatory and Planetarium Events

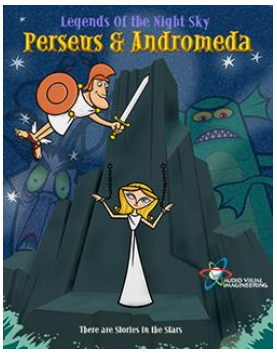
Centennial Observatory Upcoming Events

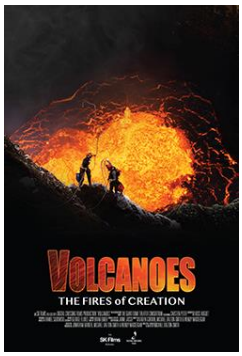
Event	Place	Date	Time	Admission
Monthly Free Star Party	Centennial Observatory	Saturday, October 9th, 2021	7:45 PM to 9:45 AM	FREE
International Observe the Moon Night	Centennial Observatory	Saturday, October 16th, 2020	7:30 to 9:30 PM	FREE

Faulkner Planetarium

Now Showing!







Visit the Herrett Center Video Vault

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!

Weird Ways to Observe the Moon

David Prosper

International Observe the Moon Night is on October 16 this year– but you can observe the Moon whenever it's up, day or night! While binoculars and telescopes certainly reveal incredible details of our neighbor's surface, bringing out dark seas, bright craters, and numerous odd fissures and cracks, these tools are not the only way to observe details about our Moon. There are more ways to observe the Moon than you might expect, just using common household materials.
Put on a pair of sunglasses, especially **polarized sunglasses**! You may think this is a joke, but the point of polarized sunglasses is to dramatically reduce glare, and so they allow your eyes to pick out some lunar details! Surprisingly, wearing sunglasses even helps during daytime observations of the Moon.

One unlikely tool is the humble **plastic bottle cap**! John Goss from the Roanoke Valley Astronomical Society shared these directions on how to make your own bottle cap lunar viewer, which was also suggested to him by Fred Schaaf many years ago as a way to also view the thin crescent of Venus when close to the Sun: "The full Moon is very bright, so much that details are overwhelmed by the glare. Here is an easy way to see more! Start by drilling a 1/16-inch (1.5 mm) diameter hole in a plastic soft drink bottle cap. Make sure it is an unobstructed, round hole. Now look through the hole at the bright Moon. The image brightness will be much dimmer than normal – over 90% dimmer – reducing or eliminating any lunar glare. The image should also be much sharper because the bottle cap blocks light from entering the outer portion of your pupil, where imperfections of the eye's curving optical path likely lie." Many report seeing a startling amount of lunar detail!

You can **project the Moon!** Have you heard of a "Sun Funnel"? It's a way to safely view the Sun by projecting the image from an eyepiece to fabric stretched across a funnel mounted on top. It's easy to make at home, too – directions are here: bit.ly/sunfunnel. Depending on your equipment, a Sun Funnel can view the Moon as well as the Sun– a full Moon gives off more than enough light to project from even relatively small telescopes. Large telescopes will project the full Moon and its phases, with varying levels of detail; while not as crisp as direct eyepiece viewing, it's still an impressive sight! You can also mount your smartphone or tablet to your eyepiece for a similar Moon-viewing experience, but the funnel doesn't need batteries.

Of course, you can join folks in person or online for a celebration of our Moon on October 16, with International Observe the Moon Night – find details at moon.nasa.gov/observe. NASA has big plans for a return to the Moon with the Artemis program, and you can find the latest news on their upcoming lunar explorations at nasa.gov.

3-D Printed Sun Funnels at Adler Planetarium: Image courtesy of Mike Smail.

Sun Funnels in action! Starting clockwise from the bottom left, a standalone Sun Funnel; attached to a small refractor to observe the transit of Mercury in 2019; attached to a large telescope in preparation for evening lunar observing; projection of the Moon onto a funnel from a medium-size scope 5".

Safety tip: *NEVER use a large telescope with a Sun Funnel to observe the Sun, as they are designed to project the Sun using small telescopes only. Some eager astronomers have melted their Sun Funnels, and parts of their own telescopes, by pointing them at the Sun - large telescopes create far too much heat, sometimes within seconds! However, large instruments are safe and ideal for projecting the much dimmer Moon. Small telescopes can't gather enough light to decently project the Moon, but larger scopes will work.*

You can download and print NASA's observer's map of the Moon for International Observe the Moon Night! This map shows the view from the Northern Hemisphere on October 16 with the seas labeled, but you can download both this map and one of for Southern Hemisphere observers, at: bit.ly/moonmap2021 The maps contain multiple pages of observing tips, not just this one.

Phil Harrington's Cosmic Challenge

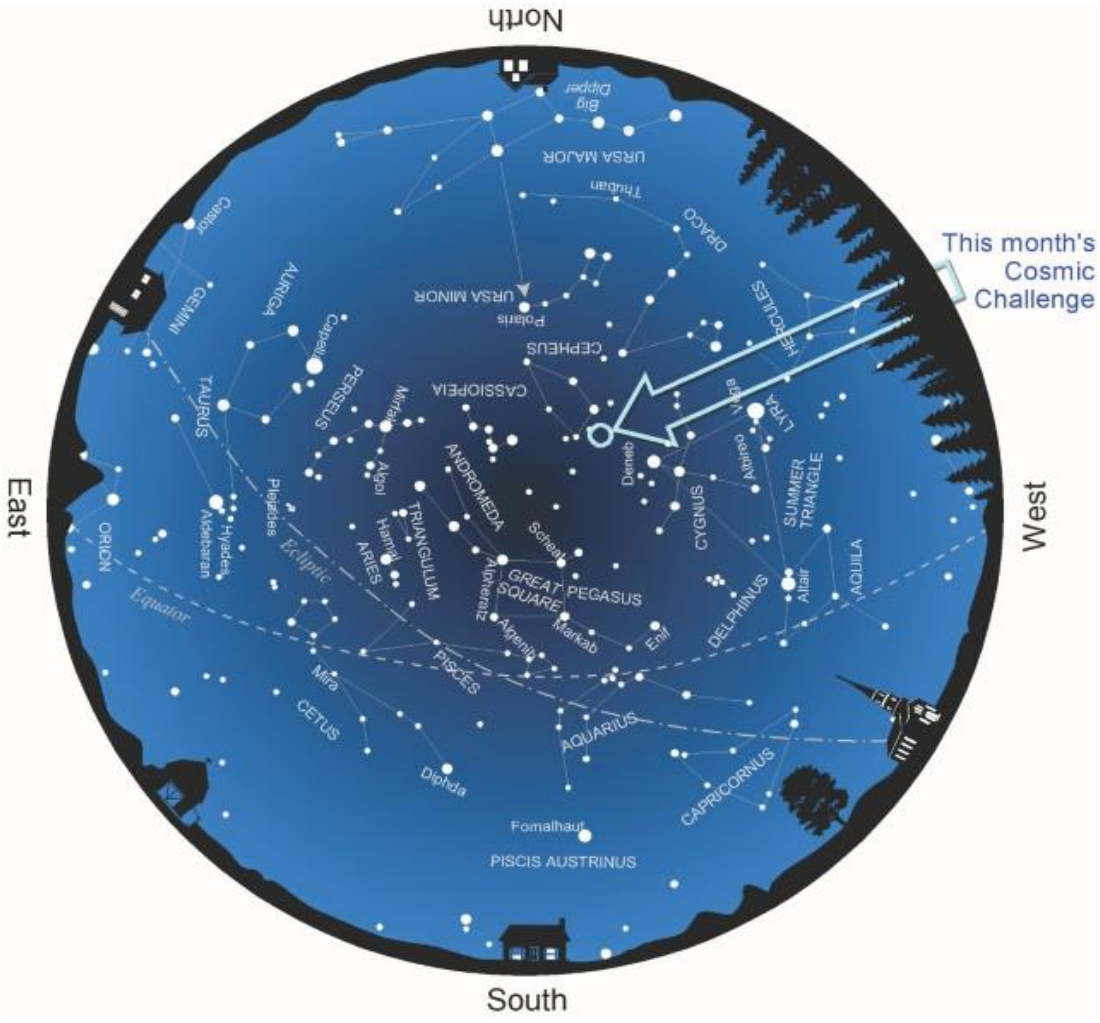
The Elephants Trunk

This month's suggested aperture range:

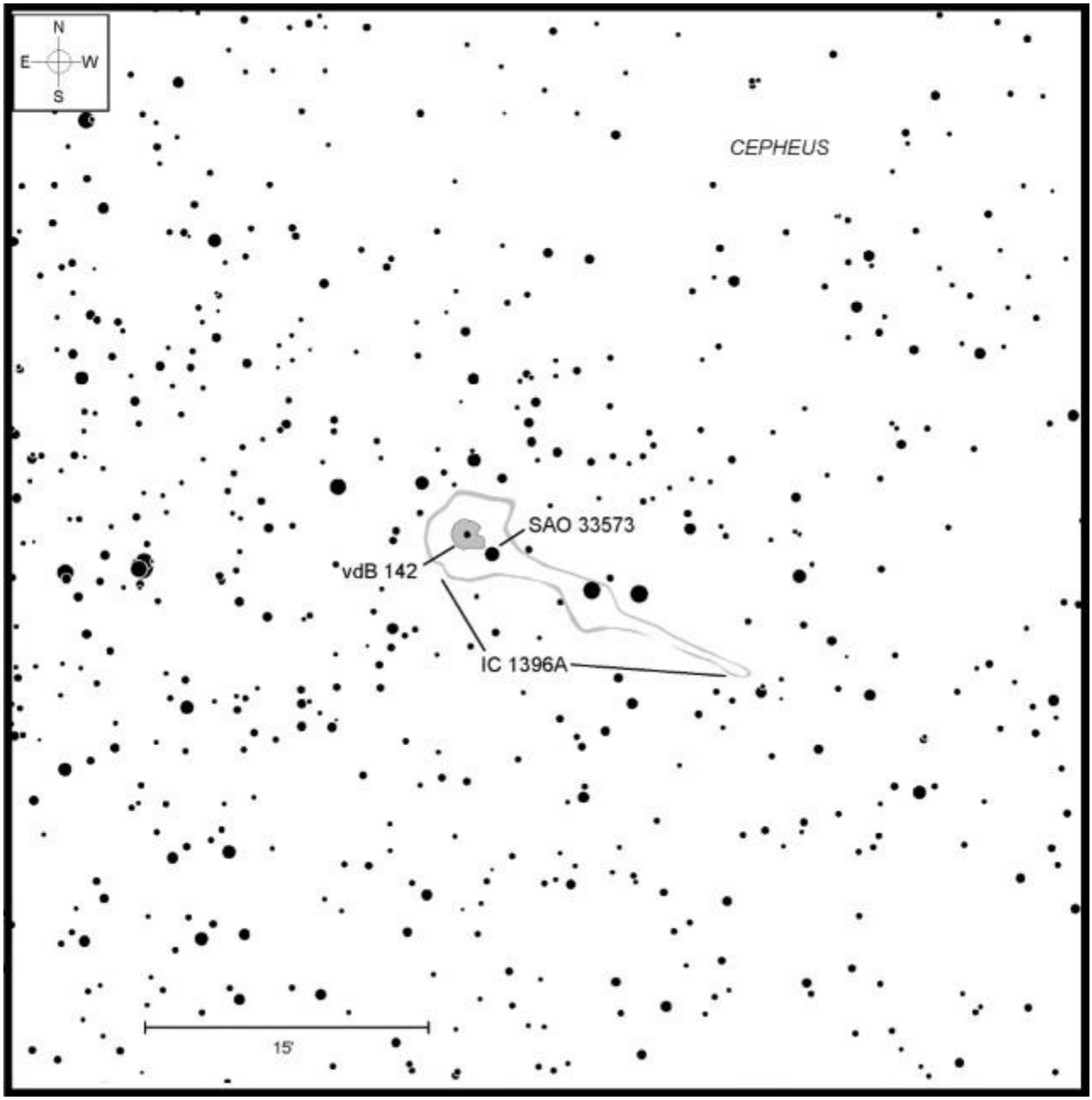
15-inch (38 cm) and larger telescopes

Target	Type	RA	DEC	Constellation	Mag.	Size
Elephant's Trunk Nebula	Bright/dark nebula complex	21h 39.0m	+57 30.0	Cepheus	--	13'x5'

Take a look at just about any star atlas and you will find a huge, irregular cloud of ionized hydrogen suspended to the south of Mu (μ) Cephei, Herschel's Garnet Star. That's IC 1396, one of the largest nebulae in the night sky. Even from a distance of about 2,450 light years, this complex cocktail of bright glowing gas mixed with dark dust clouds spans 3° of our sky. At that distance, 3° translates to a linear diameter of nearly 160 light years, more than three times greater than the Orion Nebula, M42.



Above: Late 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

Seeing IC 1396, however, is a difficult chore owing to its large size and very low surface brightness. Giant binoculars show myriad stars scattered across the region, but actually seeing evidence of the cloud itself is another matter. Small scopes can resolve several double and multiple stars here, notably the triple system Struve (STF) 2816 and binary Struve (STF) 2819. But again, evidence of the cloud proves hard to pin down.

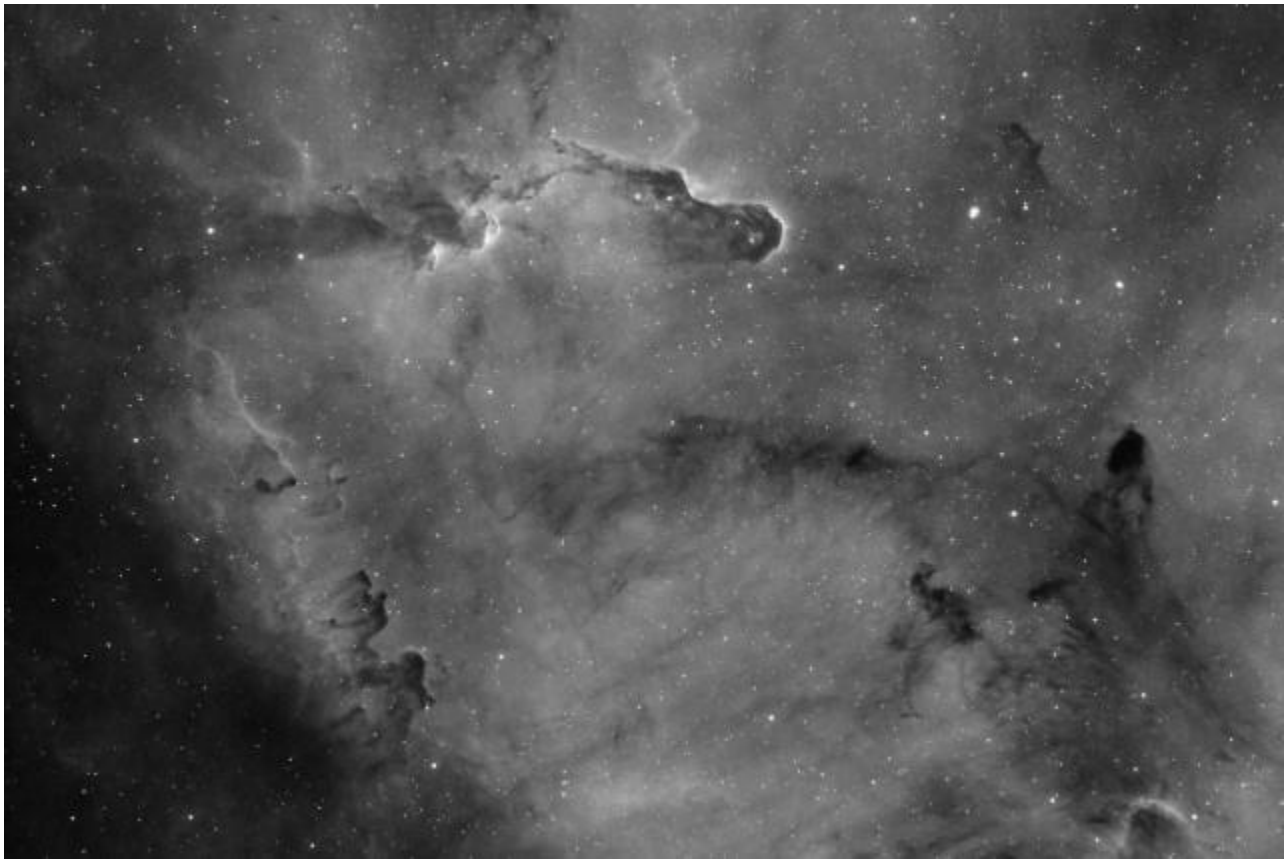
Instead of trying to see the entire HII region, this challenge focuses on a particularly intriguing feature found within. Of the many pockets of dark nebulosity swirling inside IC 1396, the most captivating has to be the twisted globule known as the Elephant's Trunk. The Elephant's Trunk Nebula, set to the east of the cloud's center, is an example of a "composite nebula"; that is, a mix of all three types of intergalactic clouds: emission, reflection, and dark. It spans 13'x5' of sky, which translates to an actual length of more than 20 light years.

The Elephant's Trunk is often misidentified as van den Bergh 142 (vdB 142), from the catalog of reflection nebulae compiled by Canadian astronomer Sidney van den Bergh. The van den Bergh list was originally released in his paper "A Study of Reflection Nebulae" published in 1966 (Astronomical Journal, 71, 990-998). Van den Bergh's aim back then was to create an inventory of "all BD and CD stars [referring to Bonner Durchmusterung and Cordoba Durchmusterung astrometric star catalogs, respectively] north of declination -33° which are surrounded by reflection nebulosity." Using those catalogs, van den Bergh examined the Palomar Sky Survey photographic plates for reflection nebulae surrounding embedded stars. He ultimately found and listed 170 such objects.

But the Elephant's Trunk was not one of them. Number 142 in the van den Bergh list actually refers to a small reflection nebula adjacent to the 9th-magnitude star SAO 33573 that overlaps the Elephant Trunk, not the Trunk itself. Instead, it is correctly cited as IC 1396A.

Regardless of the catalog designation, the Elephant's Trunk certainly lives up to its nickname, with its long, prehensile silhouette stretching for about 17' from east-northeast to west-southwest. The most obvious segment, the rounded eastern end, extends about 4' to the east of SAO 33573. Many comment on its resemblance to one of the famous Pillars of Creation in M16. Here, as there, the nebula appears as a silhouette surrounded by the gentle glow of starlight reflecting off a multitude of cosmic dust grains.

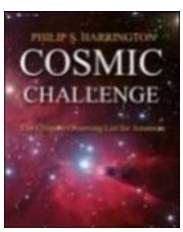
Like the Pillars of Creation, the Elephant's Trunk contains many protostar globules. These regions of dense, cold gas and dust can be thought of as celestial maternity wards. As new stars form from the dust and hydrogen within, radiant pressure will slowly open this stellar womb to reveal a newly formed open cluster. The first signs of birth are already evident in the form of a faint double star implanted 2' east of SAO 33573. Infrared images taken in 2003 also recorded several other young stars that formed within the past 100,000 years.



Above: Photos of the Elephant's Trunk Nebula (above center in each image) as well as the surrounding nebula IC 1396. Both were taken by Steve Bellavia (CN member StevenBellavia). Be sure to visit his Astrobin page for full information on each of these images as well as to see more of his spectacular images.

Despite the Trunk's length, expect to use about 100x to bring out its delicate outline. Even under the darkest skies, the nebula will still require a narrowband filter. Tapping the side of your telescope ever-so-slightly will also help reveal its faint outline. If you see its subtle profile, try to spot some of the subtle structural intricacies that record so beautifully in photographs.

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.



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.

About the Magic Valley Astronomical Society

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 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; public star parties and events open to anyone interested in astronomy, and 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. Donations enable us to continue and 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.
Speakers, public star parties, classes and support for astronomy in schoolrooms, and outreach programs just to name a few of the programs that your membership dues support.

Annual Membership dues will be:
$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.