# Snake River Skies

*The Newsletter of the Magic Valley Astronomical Society*

**September 2021**

**Membership Meeting**
September 11th at the Herrett Center
CSI main campus at 7:00pm

**Centennial Observatory**
See Schedule inside

**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,

With the smoke and the heat and COVID-19, it has been daunting for many to even think of getting out to do astronomy. In many cases, we just want it all to go away. In some cases, there are many who are just trying to *get* away. Yes, we've heard about Blue Origin and Virgin Galactic, but the European Space Agency, a major player in space exploration today, has let us know that others are looking for even other routes to do this getting away. ESA put out an invitation for applications for astronauts – and even put out a set of podcast programming describing the missions in hopes of getting applicants. Now we've learned that ESA is overwhelmed by the numbers and is asking people for patience as they process them.

We, too, like ESA, have tried to adapt. Paul Verhage came down and gave a presentation on the Stellina Observation Station at our Aug. 12 meeting. That meeting was not only live in the Herrett Center, but also played over Zoom, allowing Tim Frazier to tune in and giving Paul the chance to compare Stellina with Tim's eVScope. It was great to see the future of astronomy; if you missed it, we've even uploaded a recording of the meeting here: https://youtu.be/rAFZR0aTyaA

We, like ESA, also ask you to be patient as we all try to find ways of getting out and away. As of this date, the Idaho Star Party sponsored by the Boise Astronomical Society is still on for Sept. 10-11 at Bruneau Sand Dunes State Park, and MVAS is looking into holding a MVAS-members only party for the second Friday of October. Right now, we are looking to keep it close to Twin Falls, but obviously away from the lights. Please keep in touch.

I do want to thank you for all you do, especially the presentations you give. I had the chance to watch the annual Association of Lunar and Planetary Observers Conference in early August, and I found that MVAS meetings had easily readied me for the concepts covered in the presentations at this conference.

For our own meeting on Sept. 11, we're going to hold a board meeting about a half hour before the main meeting. At 6:30 p.m., we want to finalize plans for the October Star Party. After that, at 7 p.m., I will be giving a presentation on a unique piece of space technology that has proved surprising successful, Carl Sagan's dream, the light sail. In addition to my presentation, there will also be accompanying videos to discuss current light sail activity.

We look forward to seeing you.

Clear Views,
Rob Mayer

# September 2021 Calendar

| Sun | Mon | Tue | Wed | Thu | Fri | Sat |
|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3<br>Boise State University Physics Dept. First Friday Event 7:30pm see page 10 | 4 |
| 5 | 6<br>Labor Day<br>  | 7<br>New Moon<br>  <br>Lunation 1221 | 8 | 9 | 10<br>Idaho Star Party at Bruneau Dunes 10 – 12 Details online https://www.boiseastro.org/isp.html | 11<br>MVAS General Meeting 7:00pm at the Herrett Center<br><br>Centennial Observatory Public Star Party 8:45p – 10:45p |
| 12 | 13<br>First Quarter Moon<br>  | 14 | 15 | 16 | 17 | 18 |
| 19 | 20<br>Full Harvest Moon<br>  | 21 | 22 | 23 | 24 | 25 |
| 26 | 27 | 28 | 29<br>Last Quarter Moon<br>  | 30 | | |

# The Night Sky This Month – September 2021

The Milky Way as seen in late summer and early autumn from the northern hemisphere.

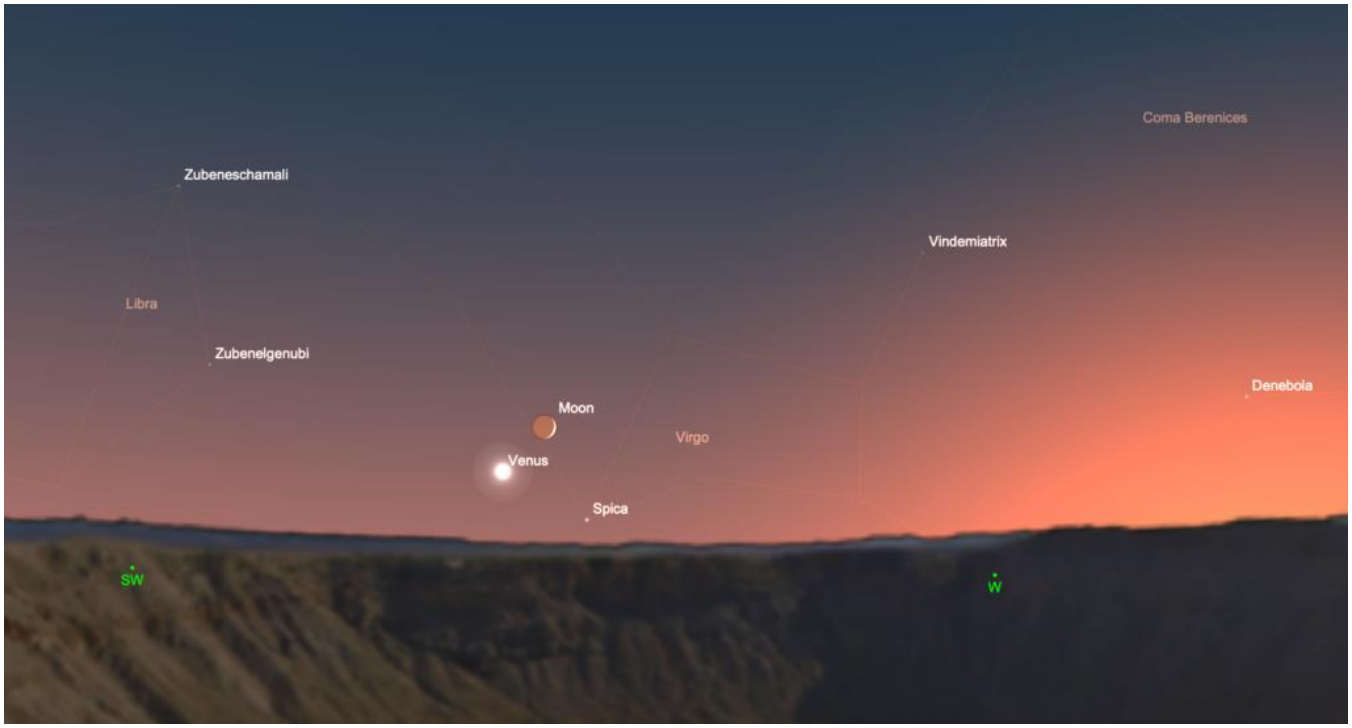
September offers stargazers a last chance to see the long, starry arc of the Milky Way and all its attendant splendor. The rich constellations of Scorpius and Sagittarius are moving westward, but the lengthening nights keep these stars accessible for a little longer, at least for observers in the northern hemisphere. In the east, the relatively star-poor constellations of Pegasus, Capricornus, and Piscis Austrinus are moving into view along with hundreds of galaxies accessible with a small telescope. Also this month, Jupiter and Saturn liven up the southwestern sky, the planet Neptune reaches opposition, and Venus remains low but bright in the west after sunset. Here's what to see in the night sky this month…

**1-30 September 2021.** The arc of the Milky Way splits the sky in half in the mid-evening hours, making for a great photo opportunity or old-fashioned visual observing in dark sky. The plane of the galaxy appears to thrust at a right angle from the southwestern horizon in Sagittarius, passes overhead through the constellation Cygnus, then arcs again down to the northeastern horizon into the rising constellation Auriga.

**5 Sept.** Look for brilliant Venus low in the southwestern sky after sunset. Today, the planet lies just 1.5$^{o}$ from the first-magnitude star Spica. Find the pair with binoculars after sunset, then try to spot them without optics as the sky darkens. Venus shines at a brilliant magnitude -4.1 and continues as the 'Evening Star' for another few months. It's relatively low over the horizon for northern hemisphere observers, while southern hemisphere observers see it at a much higher altitude as a result of the angle of the ecliptic with the horizon.

**5 Sept.** 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.

**7 Sept.** New Moon, 00:52 UT

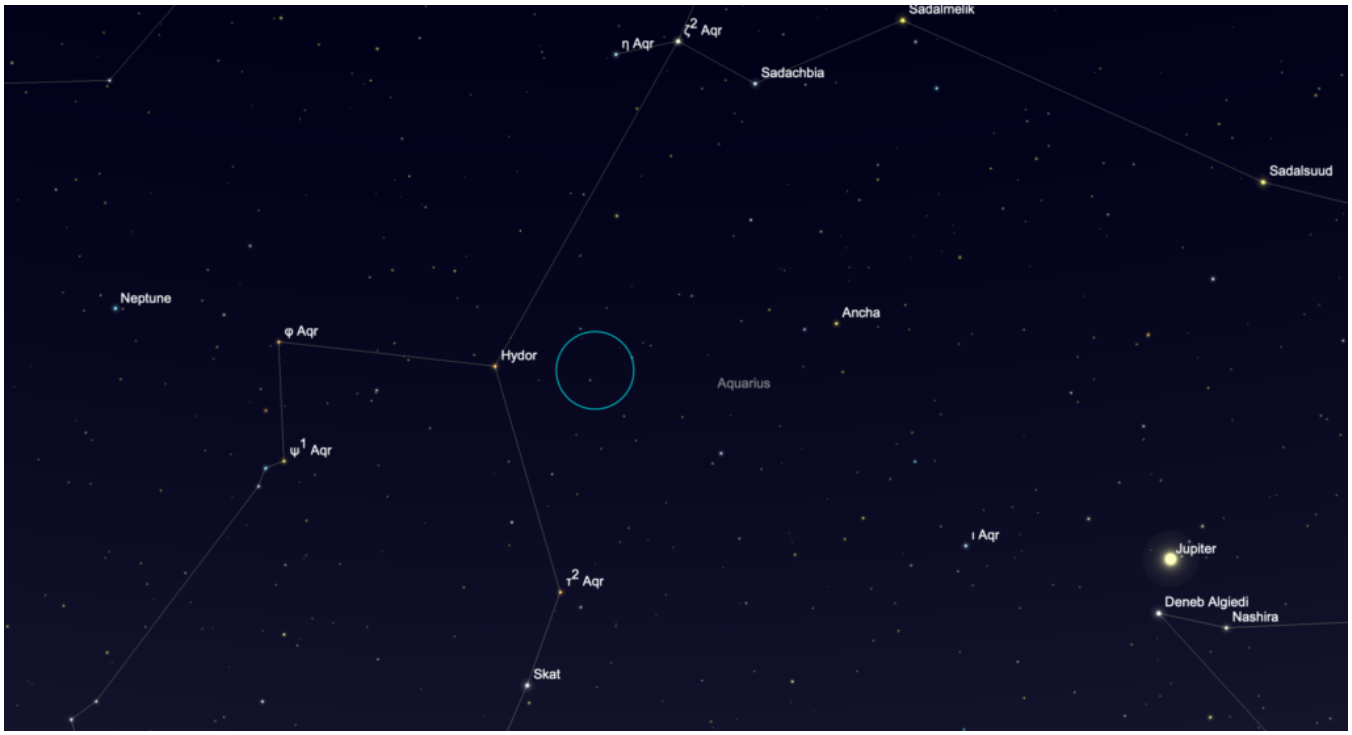


The crescent Moon, Venus, and Spica low in the southwestern sky at twilight on September 9, 2021.

**9 Sept.** A good photo-op arrives as a thin waxing crescent Moon lies about four degrees from Venus after sunset low over the southwestern horizon.

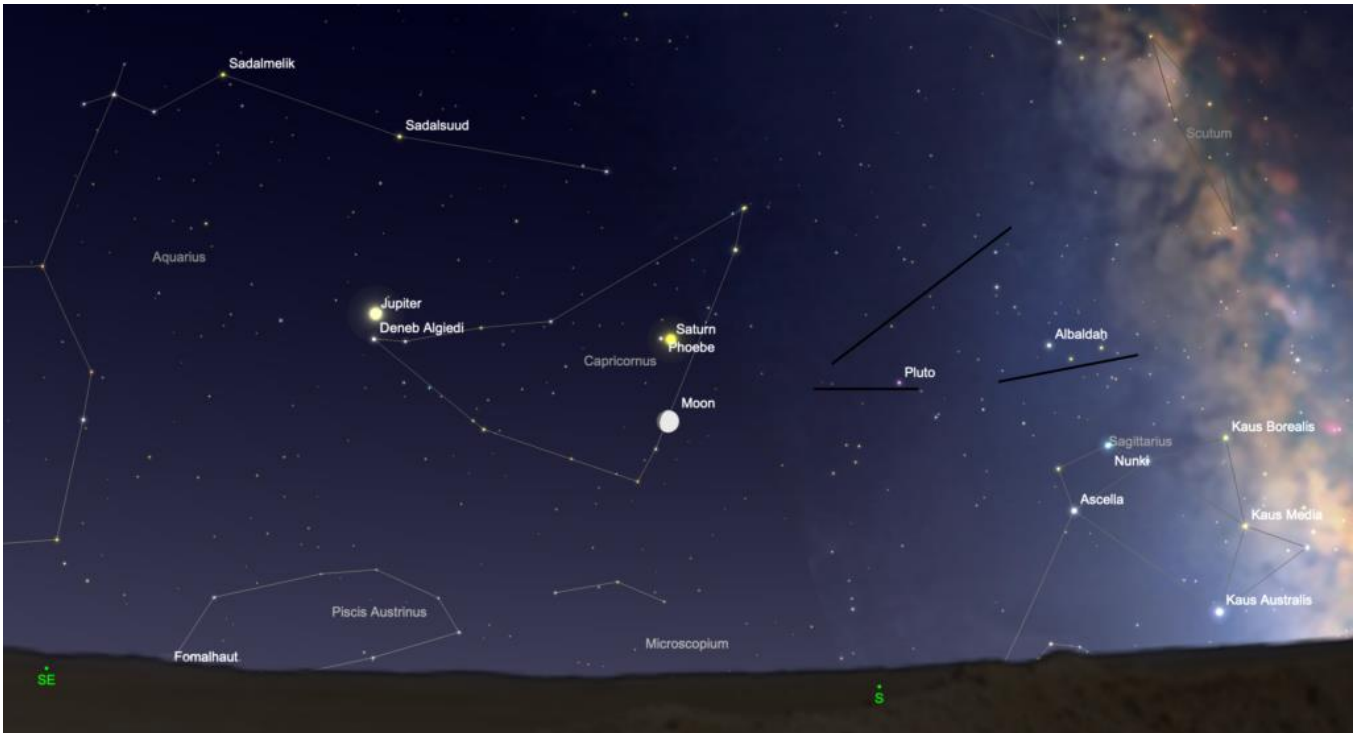
**12 Sept.** The thick crescent Moon sits about three degrees north of the bright star Antares in the southwestern sky as darkness falls.

**13 Sept.** First Quarter Moon, 20:39 UT



Neptune at opposition on September 14, 2021. The planet is located 4 degrees east of the star Phi Aquarii.

**14 Sept.** Neptune, the most distant major planet from the Sun, reaches opposition tonight in the constellation Aquarius. At a distance of about 4.3 billion km from Earth, Neptune shines at magnitude +7.8 with a disk just 2.4 arc-second across. It's never a spectacular sight, even in a big telescope, but it's worth the effort to glimpse this quiet and beautiful ice giant at the edge of the solar system. At opposition this year, Neptune lies about 4 degrees east-northeast of the 4th-magnitude star Phi Aquarii. It's visible in binoculars, but you need a telescope to perceive its tiny disk and blue-green color. The planet's disk will appear to grow larger as magnification is increased, unlike a star, which offers a good way to ensure you have the planet in your field of view.



Jupiter and Saturn in Capricornus on September 16, 2021.

**16-17 Sept.** The waning gibbous Moon passes south of Saturn and then Jupiter on these nights. The two gas giants are just past last month's opposition, but they're still magnificent in a telescope. At mid-month, Saturn reaches its highest point above the horizon at about 10:30 p.m. local time with Jupiter following about an hour later. The latter shines at a very bright magnitude -2.8. Both planets still move in retrograde (westward) against the background stars, and both lie in the constellation Capricornus. Grab your telescope and have a look at these magnificent worlds.

**20 Sept.** Full Moon, 23:55 UT

**22 Sept.** The September Equinox arrives relatively late this year, at 19:21 UT, marking the beginning of autumn and spring in the northern and southern hemispheres, respectively.

**26 Sept.** The waning gibbous Moon lies between the Pleiades and Hyades star clusters rising in the east in the early-morning sky.

**29 Sept.** Last Quarter Moon, 01:57 UT

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.

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The Moon is 23.3 days old, is illuminated 35.7%, subtends 29.6 arc minutes, and is located in Taurus on September 1st at 00:00 UT. The Moon is at its greatest northern declination on September 2nd (+25.9 degrees) and on September 29th (+26.0 degrees) and its greatest southern declination on September 15th (-26.0 degrees). Longitudinal libration is at a maximum of +5.2 degrees on September 20th and a minimum of -5.3 degrees on September 5th. Latitudinal libration is at a maximum of +6.6 degrees on September 19th and a minimum of -6.5 degrees on September 6th. Favorable librations for the following lunar features occur on the indicated dates: Crater Schickard on September 3rd, Lacus Spei on September 14th, Mare Humboldtianum on September 18th, and Crater Graff on September 30th.

The Moon is at perigee (at a distance of distance 57.77 Earth-radii) on September 11th and at apogee (at a distance 63.44 Earth-radii) on September 26th. New Moon (i.e., the dark of the Moon) occurs on September 7th. Full Moon occurs on September 20th. Browse http://www.lunar-occultations.com/iota/iotandx.htm for information on lunar occultation events. Visit https://saberdoesthestars.wordpress.com/2011/07/05/saber-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://skyandtelescope.org/wp-content/uploads/MoonMap.pdf and https://nightsky.jpl.nasa.gov/docs/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.unitarium.com/moon/where.html for current information on the Moon and https://www.fourmilab.ch/earthview/lunarform/lunarform.html for information on various lunar features. See https://svs.gsfc.nasa.gov/4874 for a lunar phase and libration calculator and https://bit.ly/3tkBJrJ for the Lunar Reconnaissance Orbiter Camera (LROC) Quickmap. Click on https://bit.ly/3kUI89a 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-occultations.com/rlo/rays/rays.htm

The zodiacal light, or the false dawn, is visible about two hours before sunrise from a dark site for two weeks beginning on September 5th. It can be seen in Leo, Cancer, Gemini, and Taurus. Articles on the zodiacal light appear at http://www.atoptics.co.uk/highsky/zod1.htm and http://oneminuteastronomer.com/6645/zodiacal-light/

The Sun is located in Leo on September 1st. It enters Virgo on September 16th. The Sun crosses the celestial equator from north to south at 19:22 UT on September 22nd, the date of the autumnal equinox.

Brightness, apparent size, illumination, distance from the Earth in astronomical units, and location data for the planets and Pluto on September 1st: Mercury (magnitude -0.1, 5.9", 74% illuminated, 1.15 a.u., Virgo), Venus (magnitude -4.0., 15.1", 73% illuminated, 1.11 a.u., Virgo), Mars (magnitude +1.8, 3.6", 100% illuminated, 2.63 a.u., Leo), Jupiter (magnitude -2.9, 48.9", 100% illuminated, 4.03 a.u., Capricornus), Saturn (magnitude +0.3, 18.3", 100% illuminated, 9.06 a.u., Capricornus), Uranus (magnitude +5.7, 3.7", 100% illuminated, 19.09 a.u. on September 16th, Aries), Neptune (magnitude +7.8, 2.4", 100% illuminated, 28.92 a.u. on September 16th, Aquarius), and Pluto (magnitude +14.3, 0.1", 100% illuminated, 33.62 a.u. on September 16th, Sagittarius).

**Asteroids**

Asteroid 89 Julia shines at ninth-magnitude as it heads northwestward through Aquarius. It passes several degrees north of the globular cluster M2 on September 24th and September 25th. Asteroid 2 Pallas reaches opposition in Pisces on September 11th. A finder chart can be found on page 49 of the September 2021 issue of Sky & Telescope. Other asteroids brighter than magnitude +11.0 reaching opposition this month include 532 Herculina on September 19th and 532 Herculina on September 30th. On the morning of September 17th, the dwarf planet/asteroid 1 Ceres passes just four arc minutes south of the fifth-magnitude star Sigma1 Tauri. Data on asteroid occultations taking place this month is available at http://www.asteroidoccultation.com/2021_09_si.htm and http://www.poyntsource.com/New/Global.htm

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**Comets**

Comet C/2020 T2 (Palomar) is predicted to be the brightest comet visible this month. It heads to the southeast through Virgo and into Libra. The periodic comet 15P/Finlay passes northeastward through Taurus and into Gemini. Comet 67P/Churyumov-Gerasimenko is a rather faint target as it travels northeastward through Aries and Taurus. This periodic comet orbits the Sun once every 6.5 years between the orbits of Jupiter and Earth. It was visited by the Rosetta spacecraft and the Philae probe seven years ago. Visit http://cometchasing.skyhound.com/ and http://www.aerith.net/comet/future-n.html and https://cobs.si/ for additional information on comets visible this month.

**Meteor Showers**

Only a very minor meteor showers occur this month.

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**Our Sun, the Moon and the Solar System Planets**

**Mercury** continues a poor evening apparition for mid-northern hemisphere observers this month. The speediest planet achieves aphelion on September 6th and greatest eastern elongation on September 14th. A very thin waxing crescent Moon passes almost six degrees north of Mercury on the evening of September 8th. On September 9th, Mercury lies 13 degrees to the lower right of the waxing crescent Moon and just over three degrees above the western horizon. Mercury passes less than two degrees northeast of Spica on September 21st.

**Venus** sets about 30 minutes after Mercury. By month's end, Venus sets about two hours after the Sun. The brightest planet increases in brightness from magnitude -4.0 to magnitude -4.2, increases in apparent size from 15.1 arc second to 18.6 arc seconds, and decreases in illumination from 73% to 63%. Venus passes less than two degrees north of Spica on September 5th. The three-day old waxing crescent Moon passes four degrees north of Venus on September 9th.

**Mars** is too close to the Sun to observe this month.

**Jupiter** decreases in brightness from magnitude -2.9 to magnitude -2.7 and shrinks in angular diameter from 48.9 arc seconds to 46.4 arc seconds over the course of September. Jupiter passes 1.5 degrees north of the third-magnitude star Deneb Algedi on September 12th. The waxing gibbous Moon passes four degrees south of the Jupiter on September 18th. Transits by Europa, Europa's shadow, Ganymede, and eventually Ganymede's shadow take place beginning at 8:59 p.m. EDT on September 5th. This event occurs again on the night of September 12th/13th starting at 8:26 p.m. EDT. Io and Ganymede are less than six arc minutes apart at 10:20 p.m. EDT that night. Information on Great Red Spot transit times and Galilean satellite events is available on pages 50 and 51 of the September 2021 issue of Sky & Telescope and online at http://www.skyandtelescope.com/observing/interactive-sky-watching-tools/ and https://www.projectpluto.com/jeve_grs.htm

During **September**, Saturn fades from magnitude +0.3 to magnitude +0.5 and shrinks in apparent size from 18.3 arc seconds to 17.7 arc seconds. Its rings are tilted 19 degrees with respect to the Earth. The waxing gibbous Moon passes four degrees south of the Ringed Planet on the night of September 16th/17th. Titan, Saturn's largest and brightest satellite, shines at magnitude +8.5. It's due north of the planet on September 3th and September 19th and due south of it on September 11th and September 27th. An eighth-magnitude field star joins Titan to Saturn's southwest on September 12th. The star lies to the southeast of the planet on September 13th. Saturn's peculiar satellite Iapetus glows at eleventh magnitude on September 1st as it is passes 1.5 arc minutes southwest of the planet. By the time Iapetus reaches western elongation nine arc minutes due west of Saturn on September 20th, it will have brightened to about tenth magnitude. For further information on Saturn's satellites, browse http://www.skyandtelescope.com/observing/interactive-sky-watching-tools/

**Uranus** lies halfway between the fifth-magnitude stars Omicron and Sigma Arietis at the beginning of the month. By the final day of September, it is located within 25 arc minutes of Omicron. The waning gibbous Moon passes about one degree southeast of Uranus on September 24th. Visit http://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://skyandtelescope.org/observing/interactive-sky-watching-tools/the-elusive-moons-ofuranus/

**Neptune** is located almost five degrees east of the fourth-magnitude star Phi Aquarii as September begins. The ice giant planet lies less than four degrees east of the star at the end of the month. It passes within 1.5 arc minutes of a sixth-magnitude star on September 23rd. Neptune subtends 2.3 arc seconds, shines at magnitude +7.8, and lies at a distance of 4.0 light hours when it reaches opposition on September 14th. The Full Moon passes less than four degrees southeast of Neptune on September 20th. See http://www.nakedeyeplanets.com/neptune.htm for an online 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://skyandtelescope.org/observing/interactive-sky-watching-tools/sky-telescopes-triton-tracker/

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.

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**Deep Sky Objects**

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

Eighty binary and multiple stars for September: 12 Aquarii, Struve 2809, Struve 2838 (Aquarius); Alpha Capricorni, Sigma Capricorni, Nu Capricorni, Beta Capricorni, Pi Capricorni, Rho Capricorni, Omicron Capricorni, h2973, h2975, Struve 2699, h2995, 24 Capricorni, Xi Capricorni, Epsilon Capricorni, 41 Capricorni, h3065 (Capricornus); Kappa Cephei, Struve 2751, Beta Cephei, Struve 2816, Struve 2819, Struve 2836, Otto Struve 451, Struve 2840, Struve 2873 (Cepheus); Otto Struve 394, 26 Cygni, h1470, h1471, Omicron Cygni, Struve 2657, 29 Cygni, 49 Cygni, 52 Cygni, 59 Cygni, 60 Cygni, 61 Cygni, Struve 2762 (Cygnus); Struve 2665, Struve 2673, Struve 2679, Kappa Delphini, Struve 2715, Struve 2718, Struve 2721, Struve 2722, Struve 2725 (in the same field as Gamma Delphini), Gamma Delphini, 13 Delphini, Struve 2730, 16 Delphini, Struve 2735, Struve 2736, Struve 2738 (Delphinus); 65 Draconis, Struve 2640 (Draco); Epsilon Equulei, Lambda Equulei, Struve 2765, Struve 2786, Struve 2793 (Equuleus); 1 Pegasi, Struve 2797, h1647, Struve 2804, Struve 3112, 3 Pegasi, 4 Pegasi, Kappa Pegasi, h947, Struve 2841, Struve 2848 (Pegasus); h1462, Struve 2653, Burnham 441, Struve 2655, Struve 2769 (Vulpecula)

Notable carbon star for September: LW Cygni

Fifty deep-sky objects for September: M2, M72, M73, NGC 7009 (Aquarius); M30, NGC 6903, NGC 6907 (Capricornus); B150, B169, B170, IC 1396, NGC 6939, NGC 6946, NGC 6951, NGC 7023, NGC 7160, NGC 7142 (Cepheus); B343, B361, Ba6, Be87, Cr 421, Do9, IC 4996, M29, M39, NGC 6866, NGC 6871, NGC 6888, NGC 6894, NGC 6910, NGC 6960, NGC 6992, NGC 6994, NGC 6995, NGC 7000, NGC 7008, NGC 7026, NGC 7027, NGC 7039, NGC 7048, NGC 7063, NGC 7086 (Cygnus); NGC 6891, NGC 6905, NGC 6934, NGC 7006 (Delphinus); NGC 7015 (Equuleus); M15 (Pegasus); NGC 6940 (Vulpecula)

Top ten binocular deep-sky objects for September: IC 1396, LDN 906, M2, M15, M29, M30, M39, NGC 6939, NGC 6871, NGC 7000

Top ten deep-sky objects for September: IC 1396, M2, M15, M30, NGC 6888, NGC 6946, NGC 6960, NGC 6992, NGC 7000, NGC 7009

Challenge deep-sky object for September: Abell 78 (Cygnus)

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Boise State Professor Dr. Brian Jackson's Astronomy Information Website: http://www.astrojack.com/ has past BSU First Fridays may be found here.

**Earth & Miscellaneous**

Information on passes of the ISS, the USAF's X-37B, the HST, StarStink, 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/

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

The famous eclipsing variable star Algol (Beta Persei) is at a minimum, decreasing in brightness from magnitude +2.1 to magnitude +3.4, on September 1st, 4th, 7th, 10th, 13th, 16th, 18th, 21st, 24th, 27th, and 30th. Consult page 50 of the September 2021 issue of Sky & Telescope for the minima times. On the morning of September 8th, Algol shines at minimum brightness (magnitude +3.4) for approximately two hours centered at 2:55 a.m. EDT (6:55 UT). It does the same at 11:44 p.m. EDT (3:44 UT September 13th) on the night of September 12th. For more on Algol, see http://stars.astro.illinois.edu/sow/Algol.html and http://www.solstation.com/stars2/algol3.htm

Free star maps for this month can be downloaded at http://www.skymaps.com/downloads.html and https://www.telescope.com/content.jsp?pageName=Monthly-Star-Chart and www.whatsouttonight.com/

Weather and observing conditions forecasts are available at https://www.cleardarksky.com/csk/index.html

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

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.cambridge.org/turnleft/seasonal_skies_july-september

Telrad finder charts for the Messier Catalog are posted at http://www.custerobservatory.org/docs/messier2.pdf and http://www.star-shine.ch/astro/messiercharts/messierTelrad.htm

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

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

Freeware sky atlases can be downloaded at http://www.deepskywatch.com/files/deepsky-atlas/Deep-Sky-Hunter-atlas-full.pdf and https://www.cloudynights.com/articles/cat/articles/observing-skills/free-mag-7-star-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

## Observatory and Planetarium Events


### Centennial Observatory Upcoming Events

| Event | Place | Date | Time | Admission |
|---|---|---|---|---|
| Summer Solar Session #10 | Centennial Observatory | Wednesday, August 4th, 2021 | 1:30 to 3:30 PM | FREE |
| Summer Solar Session #11 | Centennial Observatory | Wednesday, August 11th, 2021 | 1:30 to 3:30 PM | FREE |
| Monthly Free Star Party | Centennial Observatory | Saturday, August 14th, 2021 | 9:30 to 11:30 PM | FREE |
| Summer Solar Session #12 | Centennial Observatory | Wednesday, August 18th, 2021 | 1:30 to 3:30 PM | FREE |
| Summer Solar Session #13 | Centennial Observatory | Wednesday, August 25th, 2021 | 1:30 to 3:30 PM | FREE |

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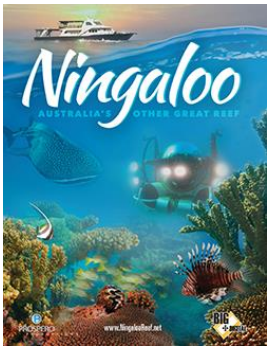
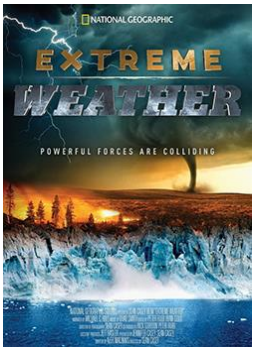
### Faulkner Planetarium

Now Showing!







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Visit the Herrett Center Video Vault

# Boise State Physics First Friday Astronomy

## Friday, Sep 3rd

## How Wind Sculpts a Planetary Surface

Dr. Lori Fenton
SETI Institute

Online lecture begins 7:30pm MT
http://boi.st/astrobroncoslive

Donate at **give.boisestate.edu/astronomy**

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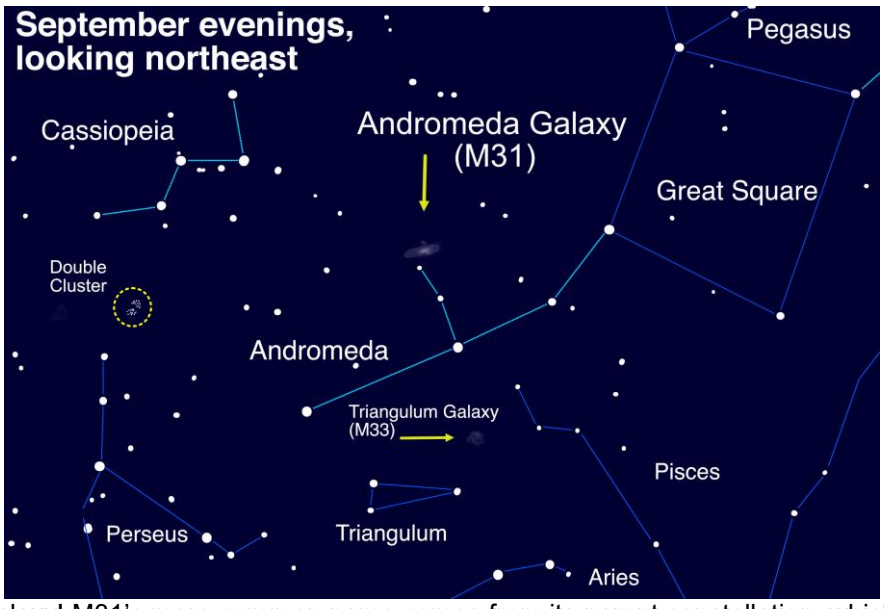
## Catch Andromeda Rising

David Prosper

If you're thinking of a galaxy, the image in your head is probably the Andromeda Galaxy! Studies of this massive neighboring galaxy, also called M31, have played an incredibly important role in shaping modern astronomy. As a bonus for stargazers, the Andromeda Galaxy is also a beautiful sight.

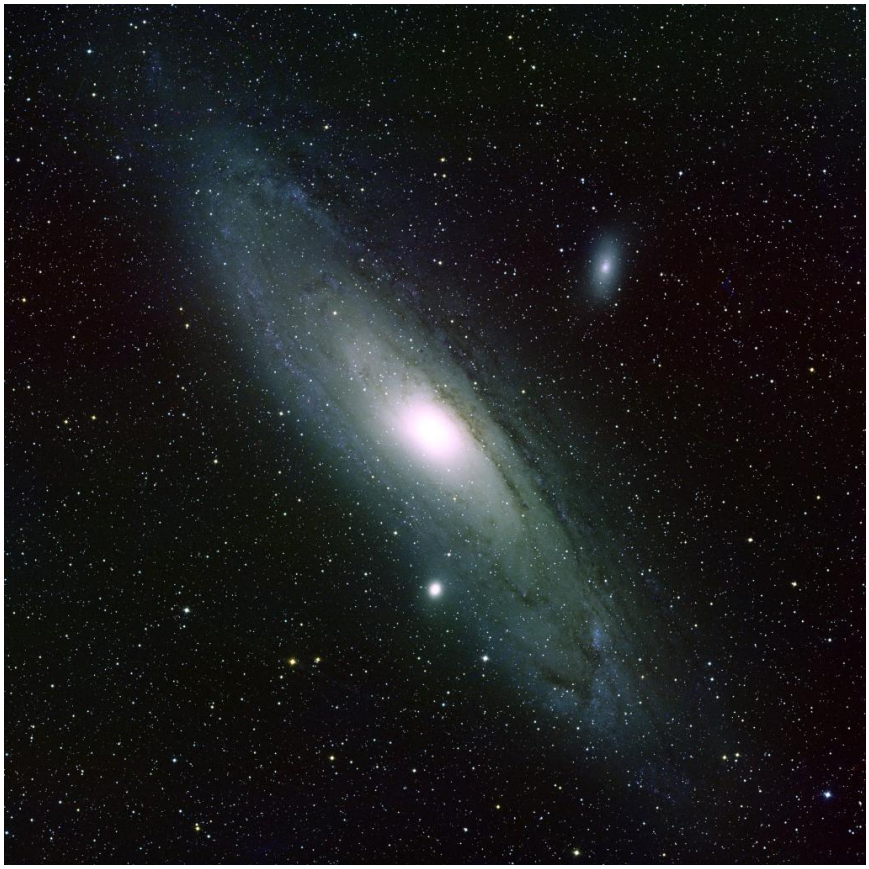
Have you heard that all the stars you see at night are part of our Milky Way galaxy? While that is mostly true, one star-like object located near the border between the constellations of Andromeda and Cassiopeia appears fuzzy to unaided eyes. That's because it's not a star, but the Andromeda Galaxy, its trillion stars appearing to our eyes as a 3.4 magnitude patch of haze. Why so dim? Distance! It's outside our galaxy, around 2.5 million light years distant - so far away that the light you see left M31's stars when our earliest ancestors figured out stone tools. Binoculars show more detail: M31's bright core stands out, along with a bit of its wispy, saucer-shaped disc. Telescopes bring out greater detail but often can't view the entire galaxy at once. Depending on the quality of your skies and your magnification, you may be able to make out individual globular clusters, structure, and at least two of its orbiting dwarf galaxies: M110 and M32. Light pollution and thin clouds, smoke, or haze will severely hamper observing fainter detail, as they will for any "faint fuzzy." Surprisingly, persistent stargazers can still spot M31's core from areas of moderate light pollution as long as skies are otherwise clear.

Modern astronomy was greatly shaped by studies of the Andromeda Galaxy. A hundred years ago, the idea that there were other galaxies beside our own was not widely accepted, and so M31 was called the "Andromeda Nebula." Increasingly detailed observations of M31 caused astronomers to question its place in our universe – was M31 its own "island universe," and not part of our Milky Way? Harlow Shapley and Heber Curtis engaged in the "Great Debate" of 1920 over its nature. Curtis argued forcefully from his observations of dimmer than expected nova, dust lanes, and other oddities that the "nebula" was in fact an entirely different galaxy from our own. A few years later, Edwin Hubble, building on Henrietta Leavitt's work on Cepheid variable stars as a "standard candle" for distance measurement, concluded that M31 was indeed another galaxy after he observed Cepheids in photos of Andromeda, and estimated M31's distance as far outside our galaxy's boundaries. And so, the Andromeda Nebula became known as the Andromeda Galaxy.
These discoveries inspire astronomers to this day, who continue to observe M31 and many other galaxies for hints about the nature of our universe. One of the Hubble Space Telescope's longest-running observing campaigns was a study of M31: the Panchromatic Hubble Andromeda Treasury (PHAT): bit.ly/m31phat . Dig into NASA's latest discoveries about the Andromeda Galaxy, and the cosmos at large, at nasa.gov.




Spot the Andromeda Galaxy! M31's more common name comes from its parent constellation, which becomes prominent as autumn arrives in the Northern Hemisphere. Surprising amounts of detail can be observed with unaided eyes from dark sky sites. Hints of it can even be made out from light polluted areas. *Image created with assistance from Stellarium*


While M31's disc appears larger than you might expect (about 3 Moon widths wide), its "galactic halo" is much, much larger – as you can see here. In fact, it is suspected that its halo is so huge that it may already mingle with our Milky Way's own halo, which makes sense since our galaxies are expected to merge sometime in the next few billion years! The dots are quasars, objects located behind the halo, which are the very energetic cores of distant galaxies powered by black holes at their center. The Hubble team studied the composition of M31's halo by measuring how the quasars' light was absorbed by the halo's material. *Credits: NASA, ESA, and E. Wheatley (STScI) Source: https://bit.ly/m31halo*



The Andromeda galaxy and 2 satellite galaxies as seen through a powerful telescope. To the eye, the galaxy looks like a fuzzy patch. It's an island of stars in space, much like our Milky Way. Image via NOAO.

## Phil Harrington's Cosmic Challenge

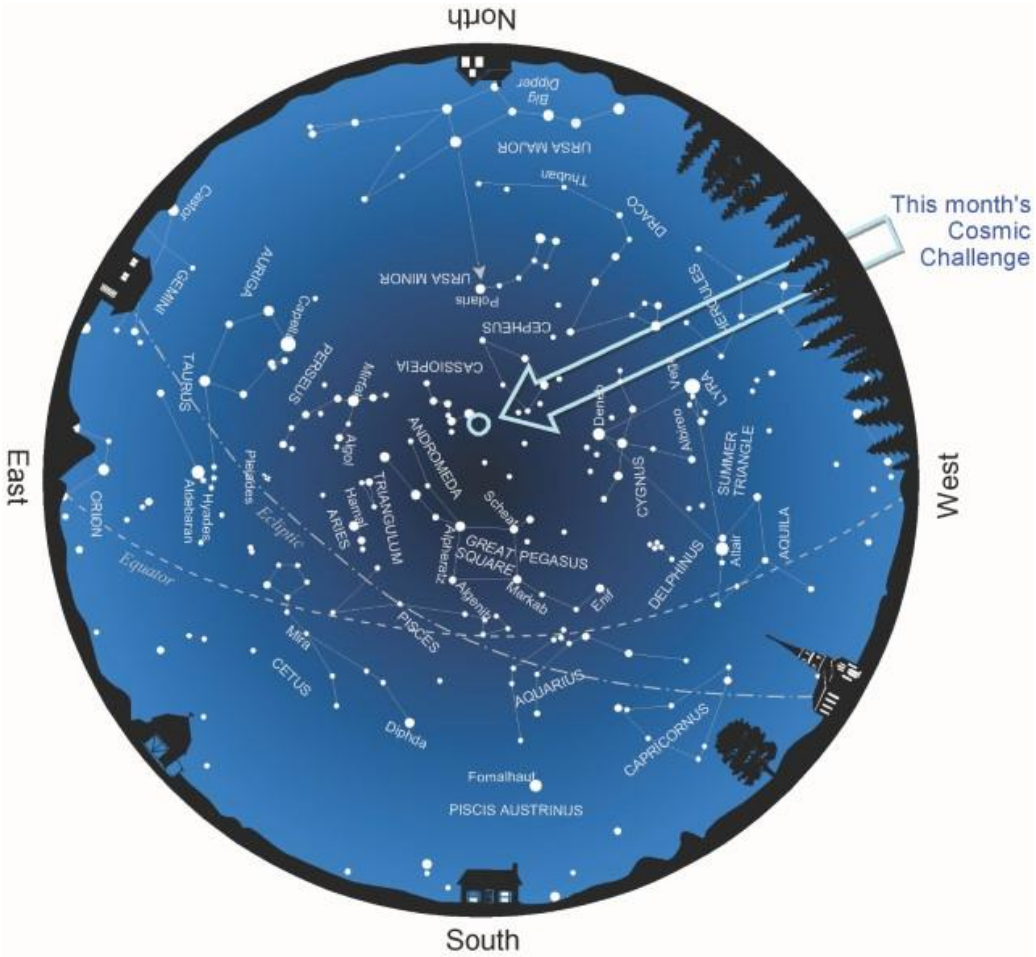
### A Trio of Binaries

**This month's suggested aperture range:**

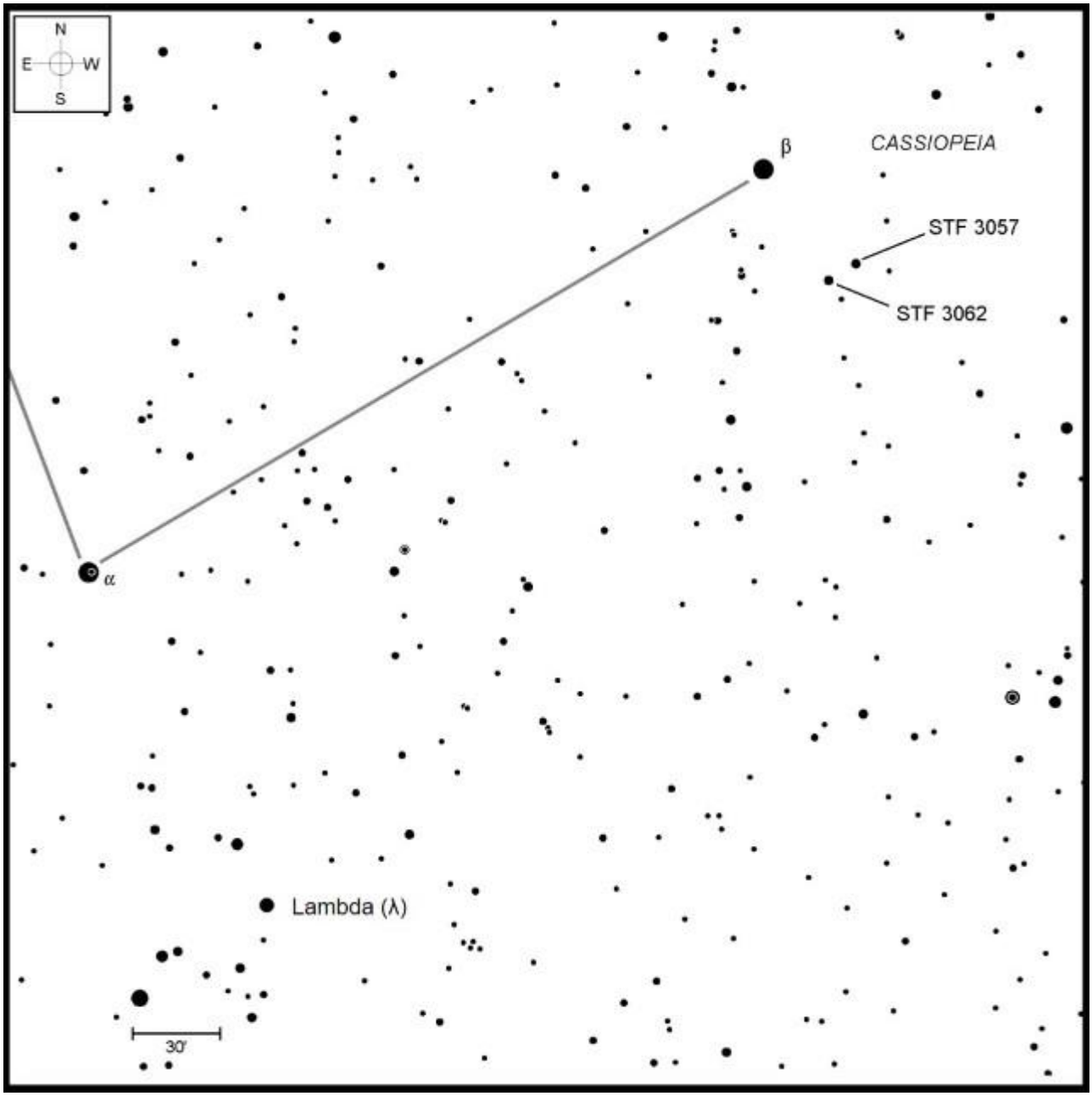
6- to 9.25-inch (15-24 cm) telescopes

| Target | Type | RA | DEC | Const. | Mag. | Separation |
|---|---|---|---|---|---|---|
| STF 3057 | Binary star | 00h 04.9m | +58° 32.0' | Cassiopeia | 6.7/9.3 | 3.9" |
| STF 3062 | Binary star | 00h 06.3m | +58° 26.2' | Cassiopeia | 6.4/7.3 | 1.3" |
| Lambda Cas | Binary star | 00h 31.8m | +54° 31.3' | Cassiopeia | 5.3/5.6 | 0.3" |

How close can two stars appear and still be resolvable as two? The single most important factor that influences the result is a telescope's aperture. All other things being equal, the larger the aperture, the finer the level of detail resolved. Of the many observational experiments that have been conducted to determine the resolution limits of telescopes, the two most often cited are the Rayleigh Criterion and the Dawes Limit.



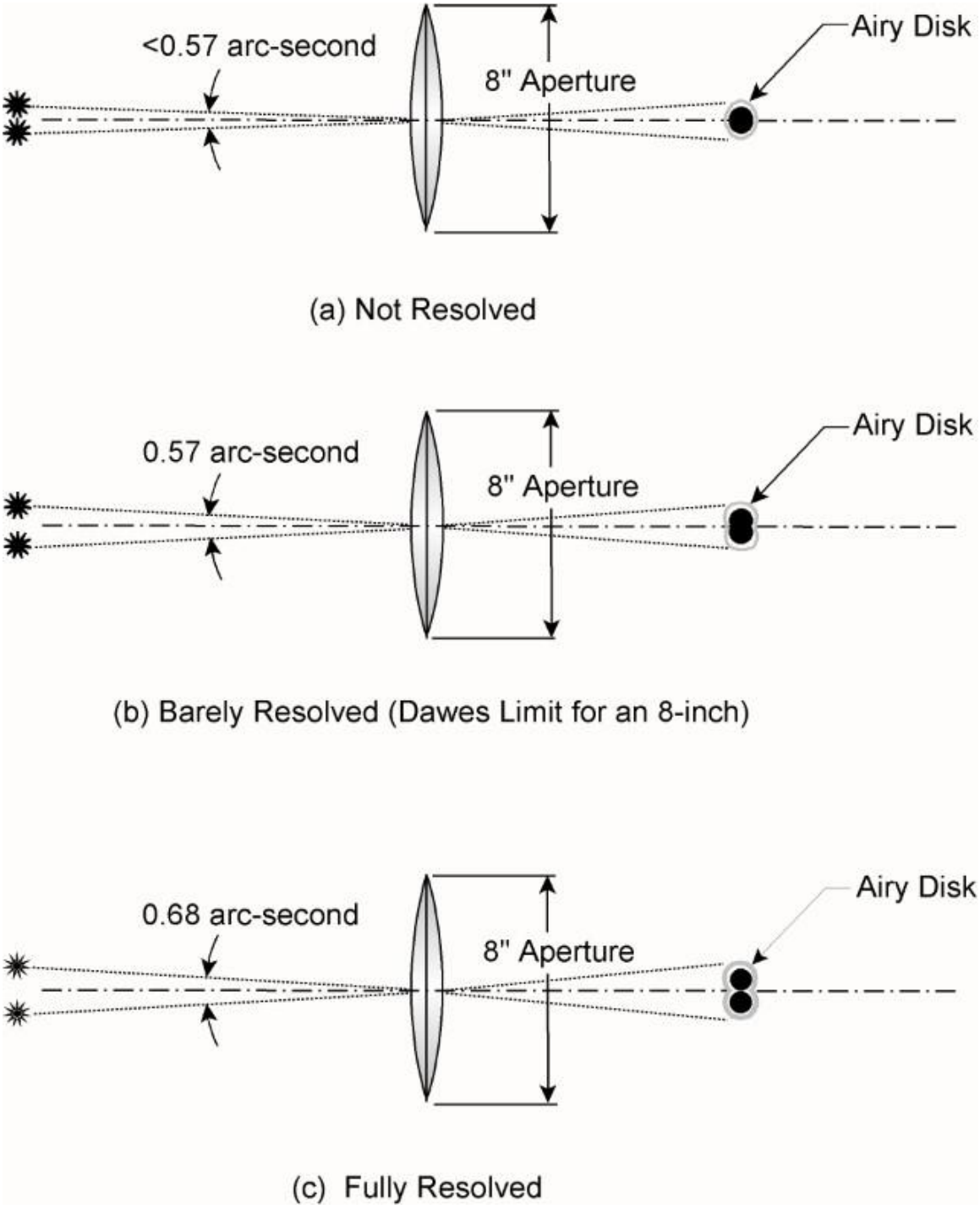

*Above: Late evening star map showing the location of this month's Cosmic Challenge.*
***Credit:*** *Map adapted from* ***Star Watch*** *by Phil Harrington*




*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*

The Rayleigh Criterion, devised by John William Strutt, the third Baron Rayleigh, in 1878, predicts how close two stars can be to each other and still be distinguishable as two separate points. Based on empirical data, the Rayleigh Criterion for any telescope can be calculated using the formula: **Rayleigh Criterion = 138 ÷ D**, where D = aperture in millimeters, and the result is expressed in arc-seconds.

The 19th-century English astronomer William Dawes derived a formula for calculating just how close a pair of 6th-magnitude yellow stars can be to each other, and appear elongated, but not separately resolved (see diagram below). His formula, known as Dawes Limit, is: **Dawes Limit = 114 ÷ D**. Again, D = aperture in millimeters and the result is in arc-seconds.




*Above: Dawes Limit. The resolving power of an 8-inch telescope. (a) Not resolved, (b) Barely resolved, or the Dawes Limit for the aperture, © Fully resolved.*

***Credit:*** *Diagram adapted from* ***Cosmic Challenge*** *by Phil Harrington*

Based on these formulas, a 6-inch (15-cm) aperture should be able to discern the duality of a binary star with components separated by 0.91" (Rayleigh) and 0.76" (Dawes). At the other end of this challenge's aperture range, a 9.25-inch (24-cm) instrument should be able to resolve, at least partially, a pair of stars separated by 0.59" and 0.49", respectively. These are ideal numbers based a pair of 6th-magnitude yellow stars. In the case of Dawes Limit, these values predict how close those stars can be to each other, and appear elongated, but not necessarily resolved separately.

Can your telescope meet the Rayleigh and Dawes challenge? Here are three pairs of stars that will prove worthy adversaries for 6- to 9.25-inch telescopes. All lie in fairly close proximity to each other and offer a broad range of separation distances. Let's see how well you do.

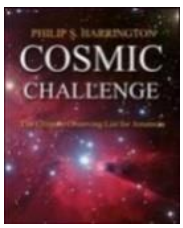
First up are Struve 3057 (often abbreviated as Σ 3057 or STF 3057) and Struve 3062 (STF 3062), both discovered by Friedrich Georg Wilhelm von Struve. Von Struve was the first astronomer to search for and study binary stars. He compiled those studies into a catalog published in 1827 entitled Catalogus Novus Stellarum Duplicium, or simply the Dorpat Catalogue, for the Tartu Observatory at the Imperial University of Dorpat in Estonia where the discoveries were made. Both lie 50' southwest of Caph [Beta (β) Cassiopeiae], the westernmost star in the constellation's familiar 5-star W pattern. Together, Caph and the two doubles form a prominent isosceles triangle that's easy to find through finderscopes.

STF 3057, at the triangle's northwestern corner, presents a challenge not because of its close-set stars -- they are separated by nearly 4 arc-seconds -- but rather by the disparity in their magnitudes. The primary sun shines at magnitude 6.7, but its companion shines at only magnitude 9.3.

Marking the triangle's southern corner, STF 3062 presents a different sort of test, one more in line with Dawes' original concept. Here, we find two stars shining at magnitudes 6.4 and 7.3, and separated by 1.3". Given reasonably good seeing conditions and optical quality, a 6-inch should be able to resolve STF 3062 fairly handily; indeed, STF 3057 might prove more difficult.


*Above: Sketch of STF 3062 as seen through the author's 8-inch (20-cm) Newtonian reflector.*

Looking for tougher game? Take aim at Lambda (λ) Cassiopeiae (STT 12, for its listing in Otto Wilhelm von Struve's catalog). Otto Struve was the son of Friedrich Georg Wilhelm von Struve, and created the Pulkowo Catalog of binary stars as an expansion of Friedrich's earlier work. Lambda's components shine at magnitudes 5.3 and 5.8, a little brighter than Dawes' ideal test star. The resulting glare makes this test all the harder. These two blue-white main sequence stars orbit a common center of mass once every 640 years and are currently separated by only 0.5 arc-seconds. If you own an 8-inch or larger scope, Lambda Cas is a formidable opponent indeed.




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.