



PAStimes

A Publication of the Phoenix Astronomical Society

Stu's Views • Stu Brackney, President PAS

Talk about heat. We desert rats are getting our share, but it doesn't stop some of us from venturing out at night to enjoy the night sky view. Speaking of which, a few reminders about our summer star parties.

1. Our regular events at Apache for June, July and August are cancelled due to weather, summer monsoons, etc.
2. We do have two Dark Sky events scheduled for July and August. These events require some additional travel, so when you go to our homepage link: www.pasaz.org to review the schedule, PLEASE read carefully the locations so you can plan accordingly. As usual we request you register so we can notify you of any changes.

Our sale and free telescope program is going rather well. Each week we notify members of telescopes we either have for sale or are available for free. Please see the rules and of course keep an eye out for announcements each week for this unique program. Proceeds are deposited into our "Sam Insana PAS Student Scholarship Fund".

RULES:

An email will be sent to all members announcing a free scope or very low-cost scope.

You, as a member, can then respond by emailing me stuartbrackney@pasaz.org that you want in on the offer.

You have until midnight of the day to jump in with your request.

The following day a name will be drawn out of the hat for the winner of the freebie or the low-cost scope.

All scopes are "as is" and no returns. You pick up the scope at Stu's house, NE Phoenix.

Did you go to the Grand Canyon Annual Star Party? If not, make sure you try to attend next year. It is held every June, with over a hundred telescopes, lectures and pure fun looking at a Bortel 1 night sky filled with stars. Your PAS had members presenting.

PAS is sponsoring a field trip to Lowell Observatory. July 21. We are working on reducing entrance tickets and providing half the cost of bus transportation. Fingers crossed, we can seal the deal. Keep an eye out and set aside 21 July if you are interested.

Cheers everyone.

Stu



[Lecture: Summer Recess](#)

[ASIG: StarParty Weekend 18-21st](#)

[Book Club : July 12th](#)

[Field Trip: July 21st to Lowell Observatory](#)

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Upcoming Events

Don't forget to register—spots fill up fast!



July 2025

12th - Book Club

18th-21st - ASIG StarParty Weekend

21st- Lowell Observatory Field Trip

26th-Dark Site Star Party Flagstaff AZ

For more information and to register for these events, go to the [PAS Event Calendar and Registration Site](#). It is important to register for all events. In case of an event change or cancellation, you will be notified via email.



Book Club

The Book Club is a community or group dedicated to reading and discussing books about astronomy, space, and related scientific topics.

Book: Quantum Supremacy by Michio Kaku

Please reach out to: saeidmousavi@yahoo.com

First Book: Quanta and Fields introduces quantum field theory in an approachable way, making it ideal for readers eager to grapple with the universe's fundamental ideas. Starter questions like "How does Carroll make quantum concepts relatable?" or "What's surprising about fields in physics?"

Now Forming: Astroimaging Special Interest Group(ASIG)!

Are you passionate about capturing the beauty of the cosmos? Whether you're a beginner or an experienced astrophotographer, now is the perfect time to join The Phoenix Astronomical Society's Astroimaging Special Interest Group as we launch this exciting new group!

Astroimaging, also known as astrophotography, is the practice of capturing images of celestial objects like stars, planets, galaxies, and nebulae. It combines photography and astronomy, allowing you to create stunning visuals of the universe while exploring its mysteries.

Our mission is to:

Advance the art and science of astroimaging.

Provide educational opportunities, mentorship, and technical Q&A.

Inspire growth through shared experiences, monthly challenges, and interactive discussions.

This is your chance to join a collaborative community of like-minded enthusiasts, explore new techniques, and uncover the wonders of the universe through imaging!

Interested? Drop us an email to sign up for notifications of future events!

SIGN UP



EMAIL: editor@pasaz.org subject: "Astroimaging" Join the Astroimaging Adventure—Email Us Today!

Here's a recap of last month's Meeting



In the NEWS

New Interstellar Visitor Spotted: 3I/ATLAS

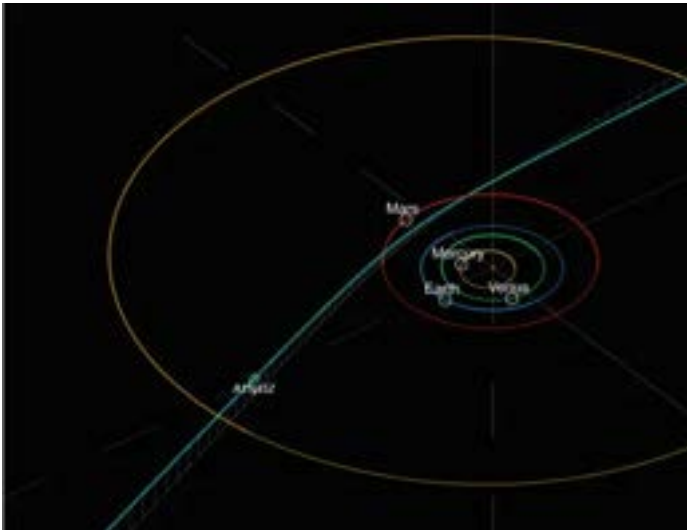
NASA has confirmed the discovery of a rare cosmic traveler—3I/ATLAS, the third interstellar object ever detected passing through our solar system. First observed on July 1, 2025, by the ATLAS telescope in Chile, this fast-moving object is on a path that clearly originates from beyond our Sun's influence.

Unlike the enigmatic 'Oumuamua or the icy comet Borisov, 3I/ATLAS shows signs of cometary activity, including a faint tail and glowing coma. It's currently traveling at over 150,000 mph, and while it will get closer to the Sun this October, it will remain safely over 150 million miles from Earth.

Why It Matters:

This discovery gives scientists a rare and valuable chance to study material from another planetary system. Thanks to its brightness and early detection, 3I/ATLAS will be a target for telescopes around the world in the months ahead. Keep looking up — the universe just sent us another message from the stars.

(Source: livescience.com)



Andromeda's Satellite Galaxies Are Pointing Right at Us — And That's Weird

Astronomers have found something strange in our galactic neighborhood: most of the 37 known dwarf galaxies orbiting the Andromeda Galaxy are clustered on one side — and that side is pointing directly toward the Milky Way.

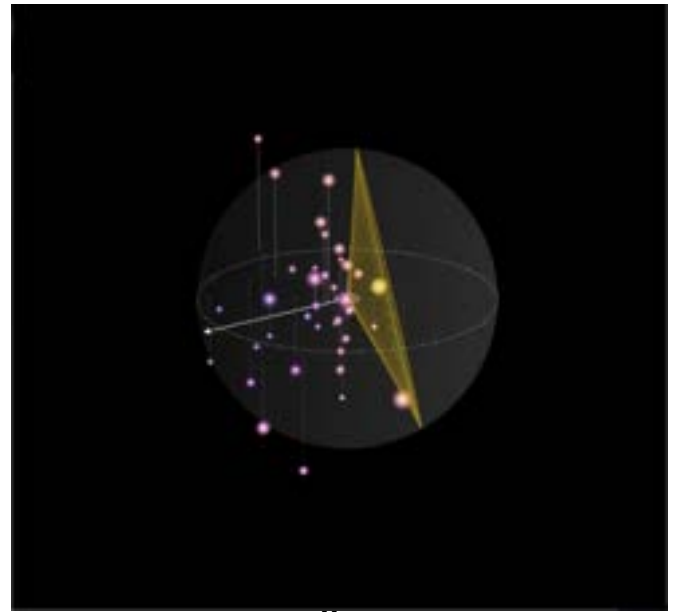
Even weirder? Many of them appear to lie in a thin, rotating disk, something that defies current models of how galaxies and their satellites should behave.

Why it matters:

This alignment is so unlikely that computer simulations suggest it has less than a 1-in-300 chance of happening by accident. Scientists think a major ancient collision might be responsible, or it could mean our understanding of galaxy formation needs a rethink.

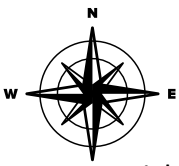
What's next:

Future surveys and space telescopes will search for more satellite galaxies and better track their motion — potentially rewriting part of our cosmic story.



(Source: Space.com)





Summary of Outreach Events

PAS Treasurer Richard Sauerbrun spent his Saturday morning at Westminster Village senior living facility, working inside their dome on the facility's 11" Schmidt-Cassegrain telescope.

Phoenix Astronomical Society (PAS) is proud to contribute time and expertise to help bring this telescope back into full operation—another example of our ongoing mission to support the community and inspire a deeper understanding of the cosmos.

Despite the heat, Richard and fellow PAS member Mark were hard at work inspecting cables, lenses, spacers—every detail that might bring this instrument back to life.

Stay tuned as we help Westminster Village explore the universe, one stargazing session at a time!



Vera C. Rubin Observatory: Ushering in a New Era of Cosmic Discovery

By Richard Meyers

High in the Chilean Andes, on the summit of Cerro Pachón, a revolutionary scientific instrument is preparing to change the way we see the universe. The Vera C. Rubin Observatory, a joint project funded by the National Science Foundation (NSF) and the U.S. Department of Energy (DOE), is poised to launch the most ambitious astronomical survey ever attempted: the Legacy Survey of Space and Time (LSST). Over the next decade, this observatory will capture a dynamic, high-resolution time-lapse of the southern sky, revealing the universe in motion and unlocking answers to some of the most profound questions in astrophysics.

Named in honor of Dr. Vera Cooper Rubin, the pioneering astronomer whose work in the 1970s provided the first compelling evidence for the existence of dark matter, the observatory is a tribute to her legacy and a bold step forward in the quest to understand the cosmos. Rubin's research on galaxy rotation curves fundamentally reshaped modern cosmology, and the observatory that bears her name is designed to continue that tradition of groundbreaking discovery.

A Telescope Like No Other

At the heart of the Rubin Observatory is the Simonyi Survey Telescope, an 8.4-meter optical marvel featuring a unique three-mirror design. This configuration allows for an exceptionally wide field of view—10 square degrees, or about 40 times the size of the full moon. Paired with the largest digital camera ever built for astronomy, boasting an astonishing 3.2 billion pixels, the telescope will scan the entire visible southern sky every three to four nights.

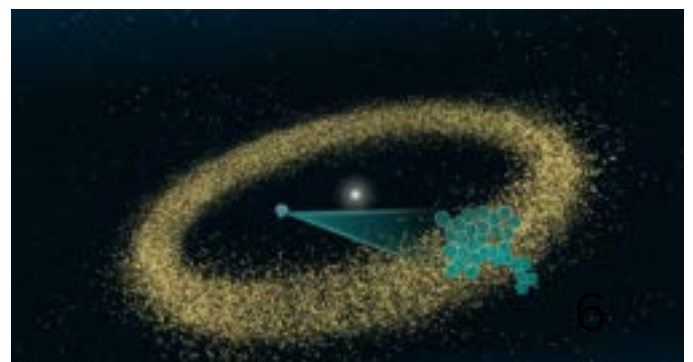


This rapid cadence and wide coverage will generate an unprecedented volume of data—approximately 20 terabytes per night, totaling over 60 petabytes by the end of the 10-year survey. The observatory's data management system, supported by high-speed fiber-optic links and distributed computing centers in the U.S., France, and the U.K., will process this torrent of information in near real-time, issuing up to 10 million alerts per night for transient events such as supernovae, asteroid flybys, and other cosmic phenomena.

The Four Pillars of Discovery

The LSST is structured around four core science goals, each addressing a fundamental mystery of the universe:

1. **Probing Dark Matter and Dark Energy-** Despite accounting for 95 percent of the universe's mass-energy content, dark matter and dark energy remain largely unexplained. Rubin will use techniques such as weak gravitational lensing, baryon acoustic oscillations, and observations of Type Ia supernovae to map the distribution of dark matter and measure the expansion of the universe. These data will help refine cosmological models and may even point toward new physics beyond the Standard Model.
2. **Exploring the Dynamic Universe-** The Rubin Observatory will be the most powerful time-domain surveyor ever constructed. Its ability to detect changes in the sky on timescales ranging from seconds to years will enable the discovery of rare and fleeting events, including supernovae, tidal disruption events (where black holes tear apart stars), microlensing events that may reveal rogue planets, and fast radio bursts. This real-time monitoring will open new windows into the life cycles of stars, the behavior of black holes, and the nature of transient cosmic phenomena.
3. **Mapping the Milky Way-** By measuring the positions, motions, and brightness of billions of stars, Rubin will reconstruct the formation history of our galaxy. It will identify stellar streams from past galactic mergers, map the structure of the Milky Way's halo and disk in three dimensions, and discover a wide variety of stellar remnants and exoplanetary systems. This "galactic archaeology" will provide unprecedented insight into how galaxies like ours form and evolve over cosmic time.
4. **Taking a Census of the Solar System-** Rubin will dramatically expand our knowledge of the Solar System by discovering millions of new asteroids and comets, tracking near-Earth objects (NEOs) for planetary defense, and studying distant Kuiper Belt Objects (KBOs) to understand the early history of the solar system. The observatory may even help locate the hypothetical Planet Nine, a massive, unseen planet believed to exist beyond Neptune.



Early Successes and Engineering Feats

Even before full operations begin, the Rubin Observatory has already demonstrated its potential. Early test images have revealed over 10 million galaxies in the Virgo Cluster, captured intricate details of star-forming regions like the Lagoon and Trifid Nebulae, and identified more than 2,000 new asteroids in a single night. These early results underscore the observatory's sensitivity, resolution, and wide spectral range.

The observatory itself is a marvel of engineering. Its earthquake-resistant dome and mount are designed to withstand the seismic activity of the Andes. The combined primary and tertiary mirror (M1M3) is a single 8.4-meter monolith, and the telescope can slew between targets in under five seconds. The LSST Camera, built at SLAC National Accelerator Laboratory, includes three massive lenses—one of which is the largest ever used in astronomy—and 201 CCD sensors capable of detecting light from the near-ultraviolet to the near-infrared.

Global Collaboration and Open Science

The Rubin Observatory is a model of international cooperation. Led by the NSF, DOE, NOIRLab, and SLAC, the project includes contributions from 28 countries and 43 international teams. In-kind support ranges from computing power and telescope time to software development and data analysis tools.

In keeping with its commitment to open science, all LSST data will be made publicly available after a two-year proprietary period. The Rubin Science Platform will provide researchers and citizen scientists alike with access to the observatory's vast data archive. Through platforms like Zooniverse, the public will be able to help classify galaxies, identify transient events, and contribute to real scientific discoveries.

Honoring a Scientific Pioneer

Dr. Vera C. Rubin's legacy is deeply embedded in the observatory's mission. A trailblazer in both science and advocacy, Rubin not only reshaped our understanding of the universe but also championed the inclusion of women in astronomy. In 2019, the U.S. Congress officially named the observatory in her honor. In 2025, she will be featured on a U.S. quarter as part of the American Women Quarters Program—a fitting tribute to a scientist whose work continues to inspire.

"Don't shoot for the stars—we already know what's there. Shoot for the space in between, because that's where the real mystery lies," Rubin once said. The observatory that bears her name is poised to do exactly that.



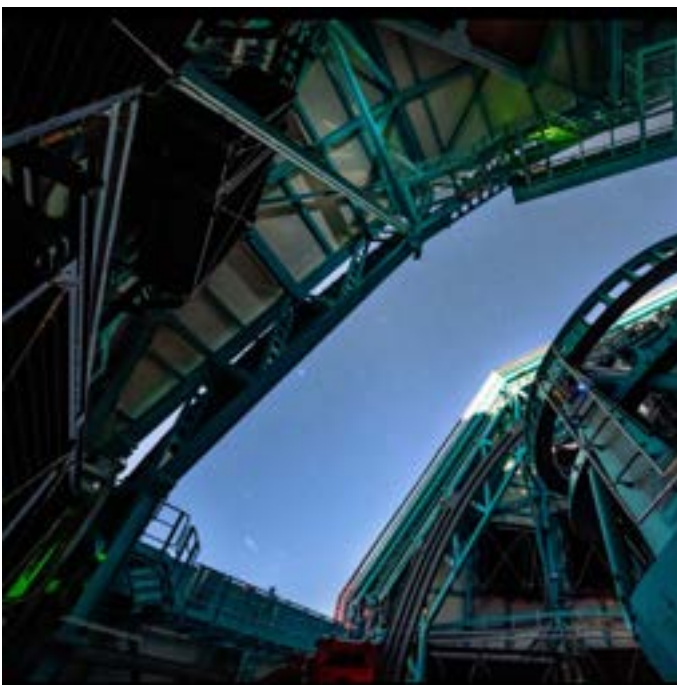
Challenges on the Horizon

One of the most pressing challenges facing the Rubin Observatory is the growing number of satellite megaconstellations, such as SpaceX's Starlink and Amazon's Kuiper. These satellites can leave bright streaks in astronomical images, potentially affecting up to 10 percent of Rubin's exposures. The observatory is working closely with the International Astronomical Union (IAU) and satellite operators to develop brightness mitigation strategies, implement tracking and avoidance algorithms, and advocate for dark-sky protections at national and international levels.

A Revolution in the Making

The Vera C. Rubin Observatory is not just a telescope—it is a scientific revolution. With its unprecedented combination of wide-field imaging, high resolution, rapid cadence, and open data, Rubin will transform our understanding of the universe. From the nature of dark matter to the evolution of galaxies, from planetary defense to citizen science, Rubin will illuminate the cosmos in ways never before possible.

As the observatory prepares to begin full operations, the world watches with anticipation. The greatest astronomical time-lapse in history is about to begin—and everyone is invited to explore the universe like never before.



**VERA RUBIN FIRST LOOK:
CREDIT: NSF—DOE VERA C. RUBIN OBSERVATORY**



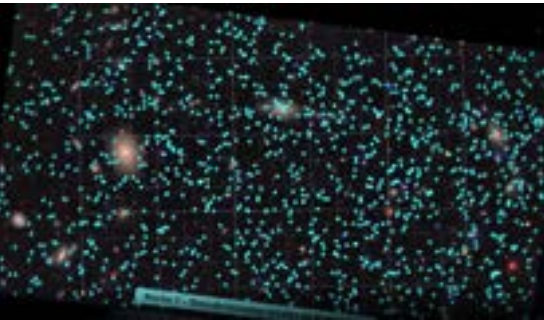
MADE FROM OVER 1100 IMAGES CAPTURED BY NSF—DOE VERA C. RUBIN OBSERVATORY, THIS IMAGE CONTAINS AN IMMENSE VARIETY OF OBJECTS, DEMONSTRATING THE BROAD RANGE OF SCIENCE RUBIN WILL TRANSFORM WITH ITS 10-YEAR LEGACY SURVEY OF SPACE AND TIME. THE IMAGE INCLUDES ABOUT 10 MILLION GALAXIES, ROUGHLY .05% OF THE APPROXIMATELY 20 BILLION GALAXIES RUBIN OBSERVATORY WILL CAPTURE OVER THE NEXT DECADE



THIS ANNOTATED FIRST LOOK IMAGE OF THE VIRGO CLUSTER WAS CAPTURED BY NSF—DOE VERA C. RUBIN OBSERVATORY. FROM SIZABLE STARS TO SPRAWLING GALAXIES, RUBIN TRANSFORMS SEEMINGLY EMPTY POCKETS OF SPACE INTO GLITTERING TAPESTRIES.



THIS IMAGE CAPTURES A SMALL SECTION OF NSF—DOE VERA C. RUBIN OBSERVATORY'S VIEW OF THE VIRGO CLUSTER, REVEALING BOTH THE GRAND SCALE AND THE FAINT DETAILS OF THIS DYNAMIC REGION OF THE COSMOS. BRIGHT STARS FROM OUR OWN MILKY WAY SHINE IN THE FOREGROUND, WHILE A SEA OF DISTANT REDDISH GALAXIES SPECKLE THE BACKGROUND.



IN ABOUT 10 HOURS OF OBSERVATIONS, NSF—DOE VERA C. RUBIN OBSERVATORY DISCOVERED 2104 NEVER-BEFORE-SEEN ASTEROIDS IN OUR SOLAR SYSTEM, INCLUDING SEVEN NEAR-EARTH ASTEROIDS (WHICH POSE NO DANGER). ANNUALLY, ABOUT 20,000 ASTEROIDS ARE DISCOVERED IN TOTAL BY ALL OTHER GROUND AND SPACE-BASED OBSERVATORIES. RUBIN OBSERVATORY ALONE WILL DISCOVER MILLIONS OF NEW ASTEROIDS WITHIN THE FIRST TWO YEARS OF THE LEGACY SURVEY OF SPACE AND TIME. RUBIN WILL ALSO BE THE MOST EFFECTIVE OBSERVATORY AT SPOTTING INTERSTELLAR OBJECTS PASSING THROUGH THE SOLAR SYSTEM.



THIS IMAGE COMBINES 678 SEPARATE IMAGES TAKEN BY NSF—DOE VERA C. RUBIN OBSERVATORY IN JUST OVER SEVEN HOURS OF OBSERVING TIME. COMBINING MANY IMAGES IN THIS WAY CLEARLY REVEALS OTHERWISE FAINT OR INVISIBLE DETAILS, SUCH AS THE CLOUDS OF GAS AND DUST THAT COMPRISE THE TRIFID NEBULA (TOP) AND THE LAGOON NEBULA, WHICH ARE SEVERAL THOUSAND LIGHT-YEARS AWAY FROM EARTH. MORE INFORMATION ABOUT THIS IMAGE IS AVAILABLE ON RUBINOBSERVATORY.ORG.

Astroimaging Special Interest Group (ASIG)

Your astroimages have been stunning—each galaxy spiral and nebula glow pushes our group's passion deeper into the cosmos.

June 2nd - Guest Speaker Doug Summers-debate between Mono vs OSC

The debate between mono and one-shot color (OSC) cameras in astrophotography centers on resolution, color accuracy, and efficiency. Mono cameras, often paired with smaller, slower apertures, involve complex workflows, more files, and higher costs due to filter wheels, but they excel in luminance-heavy LRGB imaging for efficiency. OSC cameras, with broader Bayer filter overlaps, capture more signal in dark skies and are simpler to use, though they require interpolation that slightly increases color noise

<https://app.astrobin.com/u/dmsummers#collections>

June 24th- ASIAir – Richard Sauerbrun"Workflow with Tips and Tricks"



July Target Challenge:

Easy (Small Telescopes):

—M8 (Lagoon Nebula): Located in Sagittarius, this bright emission nebula is one of the summer sky's most stunning objects. Even small scopes reveal the glowing gas cloud, embedded star cluster (NGC 6530), and dark dust lanes.

M13 (Great Hercules Cluster): One of the finest globular clusters in the northern sky, M13 in Hercules is a dense ball of hundreds of thousands of stars. Small telescopes easily resolve its outer regions under good seeing conditions.

Challenge (Large Telescopes):

NGC 6826 (Blinking Planetary Nebula): In Cygnus, this planetary nebula appears to "blink" as your eye shifts focus between its central star and surrounding glow. Best seen with larger scopes and high magnification.

NGC 6946 (Fireworks Galaxy): Straddling the border of Cepheus and Cygnus, this face-on spiral galaxy has hosted numerous supernovae. Its low surface brightness and subtle arms make it a challenging but rewarding target for larger instruments.

Best Nights: July 1–5 and July 22–31, 2025, offer dark skies for observing nebulae and faint galaxies, especially after moonset.

Avoid: July 10–16, 2025, when the full moon washes out fainter deep-sky objects.

Helpful YouTube channels

[AstroBackyard](#) – Excellent for beginner and intermediate astrophotographers, covering gear, imaging techniques, and post-processing.

[Nebula Photos](#) – Focuses on budget astrophotography, including DSLR and smartphone imaging.

[Peter Zelinka](#) – Great for nightscape and deep-sky astrophotography techniques.

[Chuck's Astrophotography](#) – Covers deep-sky imaging, processing tutorials, and equipment reviews.

[NSN Webinar Series: JWST: Revealing the Invisible Universe](#) - Principal Science Visuals Developer Joseph DePasquale will provide some background on the observatory and the art and science of image processing that reveals the inherent beauty of the infrared universe.

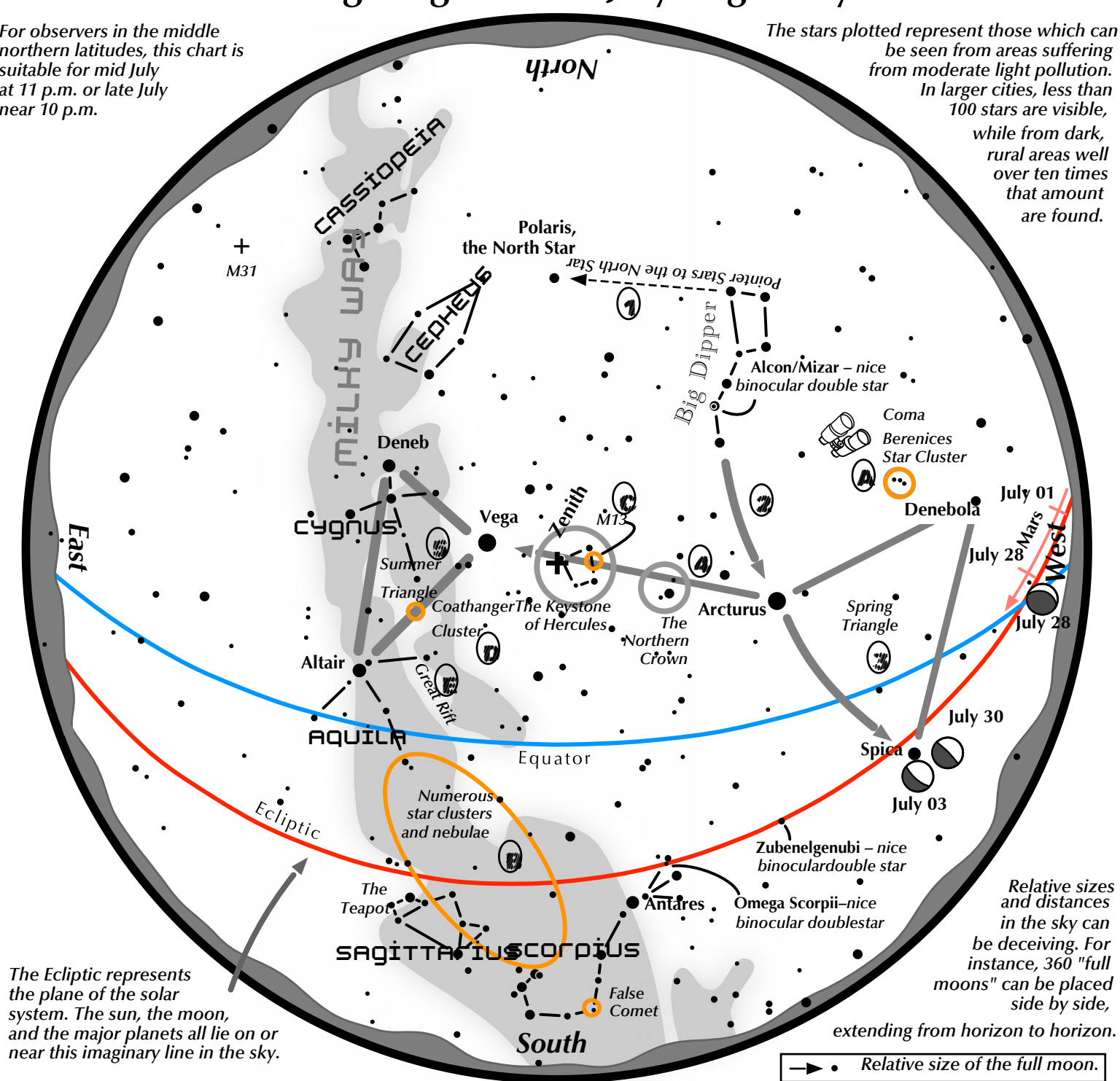
[Masterofpixinsight](#)-Masters of PixInsight is an educational platform dedicated to teaching astrophotographers how to effectively use PixInsight for deep-sky image processing.

[20 Top TIPS for Better Astrophotography](#) Dylan O'Donnell Dylan covers both image acquisition as well as processing and provides some great tips for better images.

Navigating the mid July Night Sky

For observers in the middle northern latitudes, this chart is suitable for mid July at 11 p.m. or late July near 10 p.m.

The stars plotted represent those which can be seen from areas suffering from moderate light pollution. In larger cities, less than 100 stars are visible, while from dark, rural areas well over ten times that amount are found.



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

Relative sizes and distances in the sky can be deceiving. For instance, 360 "full moons" can be placed side by side,

extending from horizon to horizon.

→ • Relative size of the full moon.

Navigating the mid July 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 first intersects Arcturus, the brightest star in the July evening sky, then continues to Spica.
- 3 Arcturus, Spica, and Denebola form the Spring Triangle, a large equilateral triangle.
- 4 To the northeast of Arcturus shines another star of similar 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.
- 5 High in the East lies the Summer Triangle stars of Vega, Altair, and Deneb.

Binocular Highlights

- A: Between Denebola and the tip of the Big Dipper's handle, lie the stars of the Coma Berenices Star Cluster.
- B: Between the bright stars Antares and Altair, hides an area containing many star clusters and nebulae.
- C: On the western side of the Keystone glows the Great Hercules Cluster, containing nearly 1 million stars.
- D: 40% of the way between Altair and Vega, twinkles the "Coathanger," a group of stars outlining a coathanger.
- E: Sweep along the Milky Way for an astounding number of faint glows and dark bays, including the Great Rift.



Member Astro Images-Lunar Eclipse

SHREYAS KANETKAR-ROSETTE NEBULA,

ASKAR 71F, SKYWATCHER 150I WAVE MOUNT, OPTOLONG L-ULTIMATE 3 NM DUAL NARROWBAND FILTER, AND ZWO ASI 533MC PRO



RICHARD SAUERBRUN-GAMMA CYGNI NEBULA OR IC 1318

ASI2600MC PRO WITH THE ASKAR 103 APO REFRACTOR ON AN
AM5N MOUNT



CYRUS MOUSAVI-M20, NGC7293, & M8



7 Telescope Targets for This Month

Each month we feature 7 good targets for small telescopes that should be visible in the evening

1. M13: The Great Hercules globular cluster is the brightest GC visible in northern skies. Look for the faint dark 'propeller'!
2. Rasalgethi Alpha Hercules: A blue/yellow binary star.
3. Draco W Cluster Asterism: in Draco that looks like a big W
4. M27: The Dumbbell Nebula is one of the brightest large planetary nebulae in the sky
5. Omicron Ophiuchus Binary Star: in Ophiuchus
6. NGC6231 Open Cluster: called the "Northern Jewelbox" in Scorpius
7. M92: Bright globular cluster in Hercules, often overlooked because of its proximity to M13

If you can observe only one morning celestial event this month, consider this one:

View through 10x50 binoculars

Crescent moon occults the Pleiades

Look to the east-northeast 75-90 minutes before sunrise.

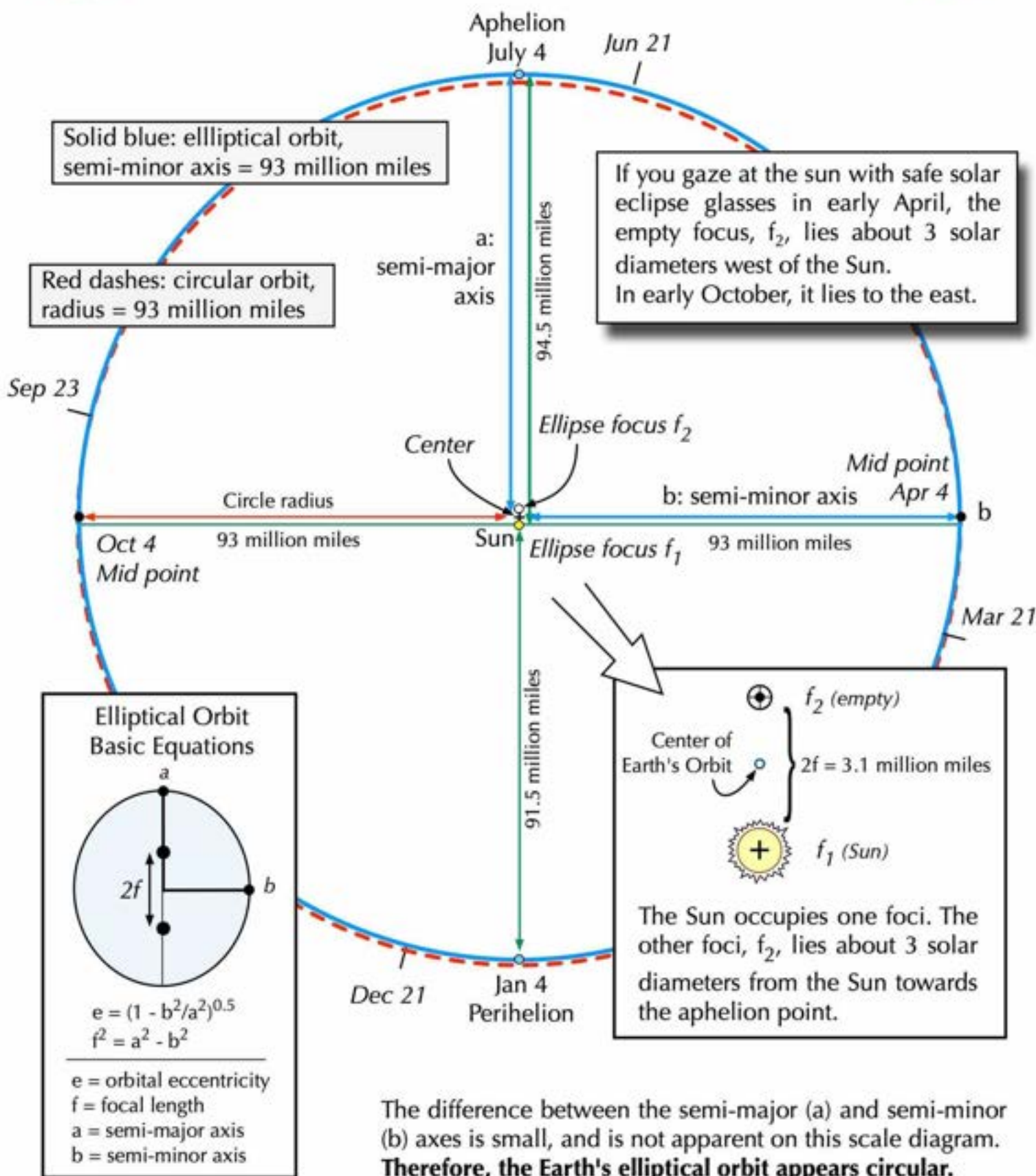
- On July 20 at 4:10 a.m. EDT, look for the crescent moon and the Pleiades low in the east-northeast.
- When the moon rises for West Coast viewers, the event will already be in progress.
- With binoculars, watch Pleiads disappear one-by-one behind the bright leading edge of the moon, and reappear along the moon's dark edge.
- The moon moves eastward about its own diameter every hour.

What a great way to start your day!



Earth's nearly circular orbit

Earth has an elliptical orbit, not a circular one. Its eccentricity is very slight with $e = 0.0167$, near that of a circle's ($e = 0$).



M6 & M7

When these two big, bright, and beautiful open star clusters appear in the early evening in mid June, summer is not far behind.



If you have recently begun your journey under the stars, why not whet your appetite by exploring southeastern Scorpius and its two wonderful open star clusters, M6 & M7. You will return to them year after year!

While they are visible to the unaided eye from a dark location, binoculars help greatly.

1. Identify Scorpius standing low in the south-southeast on a late spring or early summer evening. As summer proceeds, it is found low in the south, then low in the southwest in the early fall.
2. From red Antares, direct your gaze southward down the scorpion's back, then turn eastward.
3. When its tail hooks northward, continue the length of that hook.
4. M6 and M7 should be plainly visible in the binocular field.

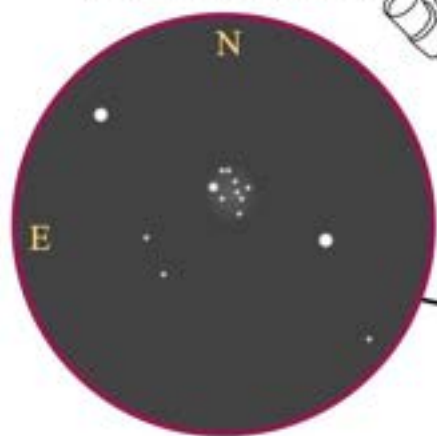
M6:

A faint hazy glow is seen by the unaided eye from a dark, clear site. Two dozen stellar lights can be discerned with 10x50 binoculars.

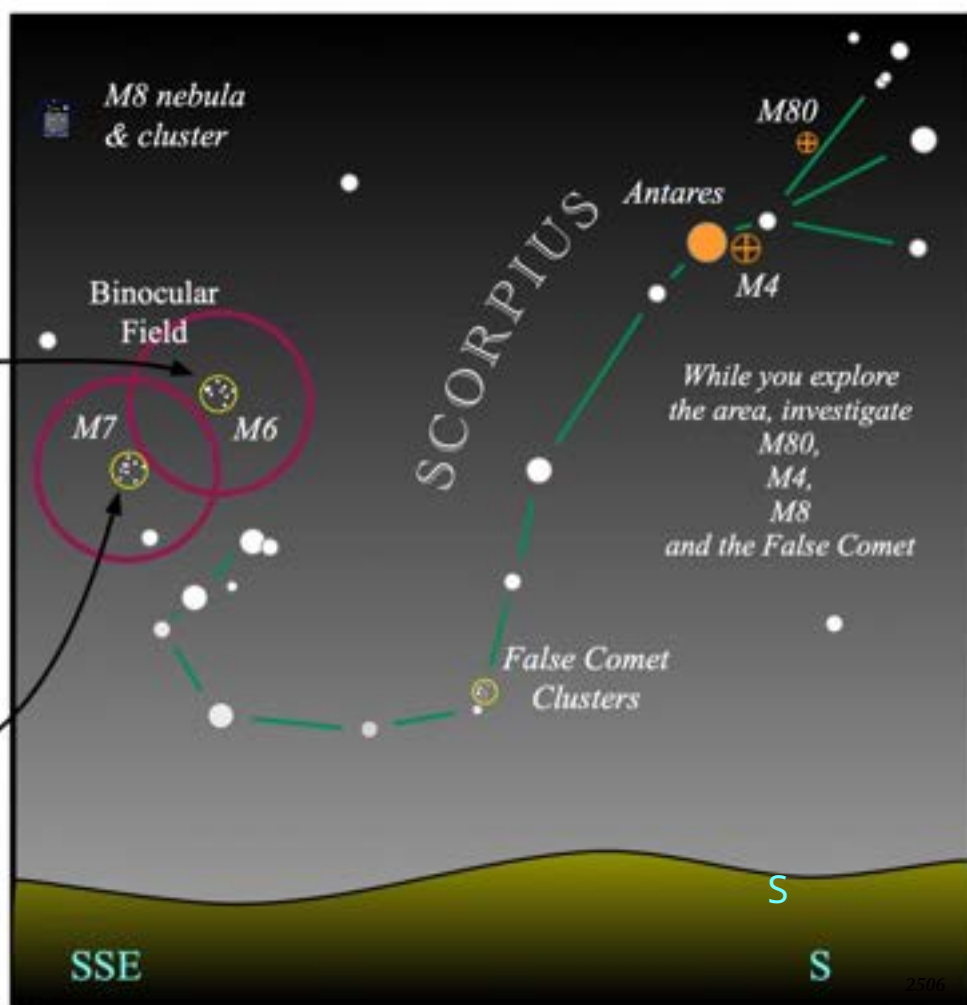
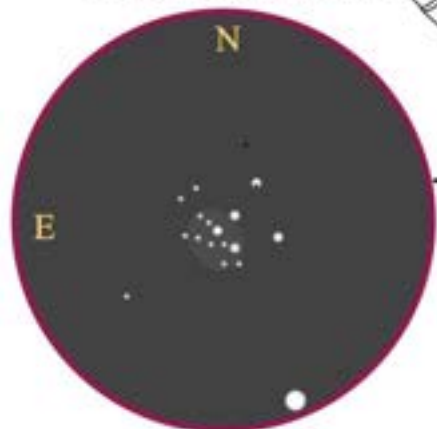
M7:

A glittery glow is easily spotted off the scorpion's tail by the unaided eye. Binoculars reveal many faint stars.

M6 Binocular View



M7 Binocular View





This article is distributed by NASA's Night Sky Network (NSN).

The NSN program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit go.nasa.gov/nightskynetwork to find local clubs, events, and more!

July's Night Sky Notes: Spy the Scorpion

By: Kat Troche

As summer deepens in the Northern Hemisphere, a familiar constellation rises with the galactic core of the Milky Way each evening: Scorpius the Scorpion. One of the twelve zodiacal constellations, Scorpius contains many notable objects, making it an observer's delight during the warmer months. Here are some items to spy in July:



The star map of the Scorpius constellation highlights the star Antares and several notable deep-sky objects like the Rho Ophiuchi Complex, Messier 4, the Cat's Paw Nebula, and Caldwell 76, the Baby Scorpion Cluster. Credit: Stellarium Web

Antares: referred to as “the heart of the scorpion,” this supergiant has a distinct reddish hue and is visible to the naked eye. If you have good skies, try to split this binary star with a medium-sized telescope. Antares is a double star with a white main-sequence companion that comes in at a 5.4 magnitude.

Messier 4: one of the easiest globular clusters to find, M4 is the closest of these star clusters to Earth at 5,500 light years. With a magnitude of about 5.6, you can spot this with a small or medium-sized telescope in average skies. Darker skies will reveal the bright core. Use Antares as a guide star for this short trip across the sky.

[Caldwell 76](#): If you prefer open star clusters, locate C76, also known as the Baby Scorpion Cluster, right where the ‘stinger’ of Scorpius starts to curve. At a magnitude of 2.6, it is slightly brighter than M4, albeit smaller, and can be spotted with binoculars and the naked eye under good sky conditions.



A digital map of the Rho Ophiuchi Complex. Credit: Stellarium Web

Lastly, if you have an astrophotography set up, capture the [Cat's Paw Nebula](#) near the stinger of Scorpius. You can also capture the [Rho Ophiuchi cloud complex](#) in the nearby constellation Ophiuchus. Brilliant Antares can be found at the center of this wondrous structure.

Manaiakalani

While many cultures tell tales of a ‘scorpion’ in the sky, several Polynesian cultures see the same stars as the demigod Māui's fishhook, [Manaiakalani](#). It is said that Māui didn't just use his hook for giant fish in the sea, but to pull new islands from the bottom of the ocean. There are many references to the Milky Way representing a fish. As Manaiakalani rises from the southeast, it appears to pull the great celestial fish across a glittering sea of stars.

Measure Your Darkness

While you can use smartphone apps or dedicated devices like a Sky Quality Meter, Scorpius is a great constellation to measure your sky darkness with! On a clear night, can you trail the curve of the tail? Can you see the scorpion's heart? Use our free printable [Dark Sky Wheel](#), featuring the stars of Scorpius on one side and Orion on the other for measurements during cooler months. You can find this resource and more in the [Big Astronomy Toolkit](#).

Helpful Astronomy Websites

by Mark Johnston

The following websites are great free resources to help you plan and enjoy your astronomy adventures

Astromart: astromart.com/

This is one of the top two sites for buying and selling used astronomy gear, product reviews, and forums where you can discuss any aspect of astronomy with other enthusiasts. A small fee is required.

Astrometry.net: <https://nova.astrometry.net/>

This site will take any astronomy image you send it (galaxy, starfield, nebula, etc) and then tell you what it is and where it is in the sky.

Astronomy Tools: astronomy.tools/calculators/field_of_view/

This site has a lot of capabilities but I use it primarily to figure out how a target (e.g. the Helix nebula) will look in my eyepiece or astronomy camera. You pick your scope, camera, eyepiece and target and the site does the rest.

Astrospheric: www.astrospheric.com/

Probably the best short term astronomy weather forecasting tool, providing predictions of clouds, transparency and seeing.

Clear Sky Charts: www.cleardarksky.com/

Excellent source of astronomy seeing conditions forecast. Also a great tool for finding observing sites with lower light pollution.

Cloudynights: www.cloudynights.com/

This is one of the top two sites for buying and selling used astronomy gear, product reviews, and forums where you can discuss any aspect of astronomy with other enthusiasts. Free.

Dark site finder: darksitefinder.com/map/

Great website for finding a dark observing location.

Heavens above: heavens-above.com/

Top site for predicting naked eye observations of satellites. See when the ISS is visible in your neighborhood!

Jupiter transits: shallowsky.com/jupiter/

For anyone with a small telescope, this is a great site. You can find out when the Great Red Spot and Jupiter's satellite transits are visible.

Solar Dynamic Observatory (SDO): <https://sdo.gsfc.nasa.gov/data/>

Find out how the Sun looks right now, at various wavelengths. If you own a solar telescope, this site coupled with Astrospheric is all you need to plan fabulous solar observing!

Starizona: <https://starizona.com/>

Astronomy store located in Tucson, Arizona. They specialize in a wide range of astronomy equipment and accessories, catering to both amateur and professional astronomers. Their offerings include telescopes, cameras, filters, and eyepieces, among other products. Knowledgeable staff and passion for astronomy.

Telescopius: telescopius.com/

This site is very helpful in planning an observing evening. It will tell you when any particular target is rising and setting and when is the best time to observe it. This allows you to sequence your observing in a planned manner.

Used equipment for sale

Duration: Ads run for 3 months and may be renewed if submitted by the deadline and space permits.

Cost: Ads are FREE for members only. Equipment Requirements: All items must be in good working order.

Acceptable items include books, star charts, telescopes, eyepieces, finder scopes, binoculars, lasers, and other astronomy-related gear.

Submission Details: Email the following information to editor@pasaz.org: **Make *Model *Description (Under 100 words-include a link to the manufacturer's site if available) *Price *Contact Information *Preferred Contact Method(Email or phone) *Approximate Location*

PAS is not responsible for the ads and does not guarantee the quality of the items for sale. PAS reminds everyone, you purchase at your own risk, so do your research beforehand.

Description: Obsession 18" f/4 UC with Feather Touch Focuser, Argo Navis (factory installed), Shroud, Telrad

-Purchased the equipment 3 years ago, but have not used the scope in a year having moved from visual to imaging. At 65 years old with the onset of cataracts imaging is a more satisfying pursuit to me now. I also have the Paracorr, 21mm, 13mm Ethos eyepieces which the purchaser may elect to buy as well (priced separately)

Price: \$8,000

Contact Information: Toby Patton

Preferred Contact Method: flyfishman2010@gmail.com

NEW



PAS offer: This is a first come, first served offer. Review the list. Decide what you want. Email president@pasaz.org what you want. He will set up a day/time for you to come to his location to purchase.

Bring your check payable to Phoenix Astronomical Society or cash ... no credit cards please.



Explore Scientific AR102 with Tripod

- 102mm Doublet Refractor
- 2" Eyepiece adapter
- Alt-Az manual mount

Member Price: \$400



Celestron 6" AstroMaster

- 6" Newtonian Telescope – OTA only

Member Price: \$50



Meade ETX-70

- 70mm Refracting Go-To Telescope
- 1.25" Eyepiece adapter
- Battery operated motorized mount
- With carry case

Member Price: \$70



Celestron 6" F/4 Newtonian Astrograph Telescope

- Fast 6"-aperture reflector lets you take short exposures with bright, high-resolution results
- Precise 2" dual-speed (10:1) linear-bearing Crayford focuser lies 7" back in the optical tube to block stray light and boost contrast
- Compact 22.5" length and light 12.7 lb. assembled weight doesn't require an enormous mount
- Includes two heavy-duty hinged tube rings, 8x50 finder scope, dovetail mounting bar, and more

Member Price: \$250



Celestron Powerseeker 127

- 127mm Newtonian Telescope
- 2" Eyepiece adapter
- German equatorial mount
- With tripod

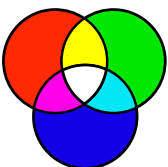
Member Price: \$50



Celestron 8" Schmidt-Cassegrain

- 8" Telescope (classic Orange Tube)
- Alt-Az mount

Member Price: \$50



Various Filters – 1.25"

Red, Yellow, Blue, Green, Multiple O3 filters

Member Price: \$100

Telescope Loan Program

The PAS Telescope Loan Program provides PAS active members access to various donated telescopes and accessories to enhance their learning of visual astronomy as well as astrophotography.

Check-out Process: The entire PAS inventory of telescopes is available for active members to use. Some telescopes require completion of a training program, others do not. Several of the loaner telescopes represent a significant dollar value. In certain cases, the PAS member will be asked to provide credit card information as insurance against potential damage or loss.

A kit of eyepieces and accessories is available for all loaner telescopes if needed. There is also a special kit of advanced 2" eyepieces available for loan as well as advanced finder scopes. Laser collimation tools are also available for loan if needed.

Loan periods are for a maximum of one month. However, longer periods may be granted in special cases.

All telescope equipment and accessories must be picked up at the PAS storage facility and delivered back to the facility by the end of the loaner period. If you wish to check out one of PAS's telescopes, send an email to telescope@pasaz.org with the following information:

- Full Name
- Email Address
- Desired Telescope and/or accessory kit
- Check out date
- Check in date
- Additional information as needed

ZWO SeeStar S50

Coronado Personal Solar Telescope (PST)

Orion SkyQuest XT-10 - 10" Dobsonian

Orion Skyquest XT-8 – 8" Dobsonian

Meade ETX-70 Go-To Refractor

Sky-Watcher – 10" Collapsible Motorized Dobsonian

Accessory Kit #4 - Advanced Observing

Accessory Kit #5 – 1.25" Eyepieces & filters





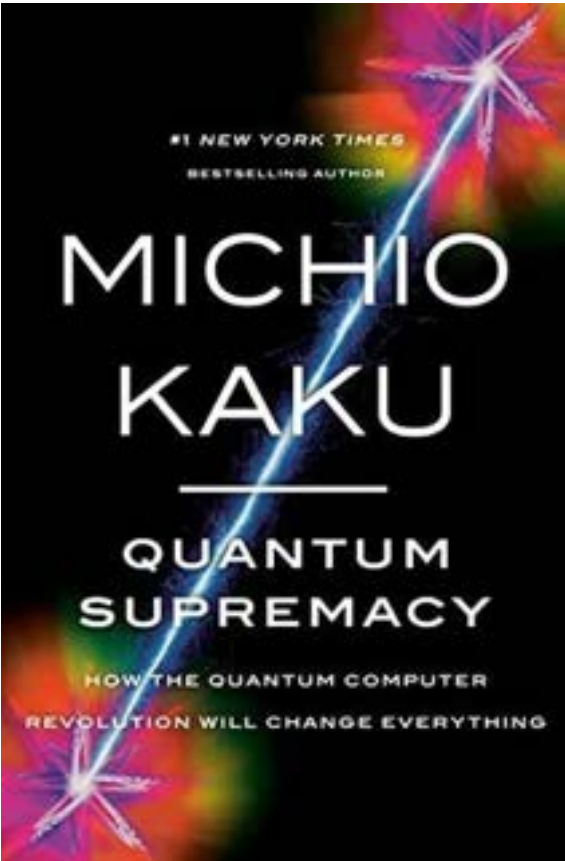
Book Review

Quantum Supremacy, by Michio Kaku

In Quantum Supremacy, physicist Michio Kaku delivers a lively and accessible introduction to the coming age of quantum computing. With his signature clarity, Kaku explains how quantum mechanics—specifically concepts like superposition and entanglement—are being harnessed to build computers that could outpace anything we’ve known.

He explores how quantum computing could transform fields like medicine, climate science, cybersecurity, and AI, painting a future filled with breakthrough possibilities. The book shines in making complex science approachable, and Kaku’s enthusiasm is infectious.

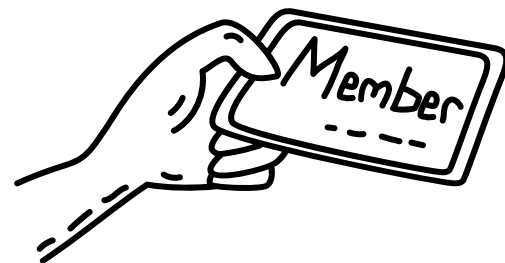
However, the book leans more toward speculation than technical depth, which may leave more advanced readers wanting. Still, for curious minds and fans of science writing, it’s a compelling read.





Sign Up

Are you fascinated by the stars and eager to explore the wonders of the universe? Do you want to connect with like-minded individuals who share your passion for astronomy?



Hi everyone. Great news, your Board of Directors decided not to keep up with inflation. They did not raise your annual dues! More good news is, you can easily renew your membership by going to our public website www.pasaz.org, look on the left index column for the link "Join Our Society," click on that and there ya go. Your membership runs from 1 January to 31 December or the date you sign up to the end of the year. Our new Membership Manager, Mr. Richard Pipkin will assist you with any questions you may have: membership@pasaz.org



Benefits of PAS Membership

- Helping the Society accomplish its mission of astronomy outreach and education
- Contributing toward the Society's ability to provide college scholarships to astronomy students
- Participation on the Society's email distribution list
- Email receipt of the Society's monthly newsletter
- Participation in the Society's telescope loaner program
- Ability to serve as a teacher at the Society's telescope workshops
- Ability to serve as a mentor at the Society's star parties
- Ability to participate in the Astro Imaging Special Interest Group (ASIG)
- Ability to serve as a paid presenter in the Society's Star Tours program
- Opportunity to purchase used astronomical equipment at 50% off current value
- Access to club trips to the darkest Arizona sites and top observatories
- Connections with professional astronomers and researchers through guest lectures or workshops.
- Opportunities to hold leadership positions within the club, such as committee chairs or officers.

By becoming a member of the Phoenix Astronomical Society, you not only enhance your own astronomical journey but also contribute to a vibrant community that shares your passion. Together, let's explore the universe and inspire others to do the same.

Sign Up Now and Start Exploring the Cosmos with Us!



Phoenix Astronomical Society Contact Info

President	Stu Brackney	president@pasaz.org
Vice President	Mark Johnston	vicepresident@pasaz.org
Treasurer	Richard Sauerbrun	treasurer@pasaz.org
Secretary	Chris Ford	secretary@pasaz.org
Newsletter Editor	Richard Meyers	editor@pasaz.org
Member-at-Large	Ruza Sabelja	mal1@pasaz.org
Member-at-Large	Damon Finell	mal2@pasaz.org
Membership Manager	Richard Pipkin	membership@pasaz.org
Star Tours Manager	Andrew Stone	startours@pasaz.org
Event Manager	Ruza Sabelja	events@pasaz.org
Website Manager	Ed Skinner	webmaster@pasaz.org

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Star Tours Team 2025

These individuals have successfully met the qualifications to participate in Star Tours Events and receive compensation for their services.

Mark Johnston
Ted Blank
Mark Savan
Andrew Stone-Star Tours Manager
Richard Sauerbrun
Stu Brackney
Roger Anzini
Peter Turner
Chris Ford
Scott Adams
Ryder David
Alessandro Cavallaro
Richard Meyers

