



PAStimes

A Publication of the Phoenix Astronomical Society



Chris Mahar—Kitt Peak(see page 4)

In this newsletter
you can expect:

Message From
the President

Cosmic
Microwave
Background
Radiation/Texas
Star Party 2026

Stacking

See One Event

Navigating the
Night Sky

Phases of Venus



Stu's Views



Summer has arrived and we Arizonians know what that means. Warm nights and hot days, but neither should stop us from gazing at the art above.

As mentioned at our May Pizza Social/Lecture last month, summer is also the time we experience our monsoon storms, another hazard for us star gazers. That being the case, plus PVCC is not available to us during the summer months, we take a mini break from our events.

You can still take it upon yourself to use your equipment (or our loaner equipment) to gaze at the summer skies. A few words of warning if you are heading into the wild outdoors:

1. If at all possible, don't venture into the wild alone.
2. Tell others where you are going and your time schedule
3. Use a check list to ensure you have ALL of your equipment.
4. NOT a bad idea to have a mini first aid kit.
5. Insect repellent is a must.
6. Wearing shorts might be cool, but the bugs see dinner!
7. Army trick, tucking your trousers into your socks or a large rubber band at the bottom of them keeps critters out.
8. If you have lived in AZ for at least a year...you already know...take plenty of water.
9. Before you head out, check your equipment to ensure all is working properly.
10. Not a bad idea to clean your eyepieces and that front glass (on some, called a corrector plate) before heading out.
11. Use an app like Stellarium to see what targets are available on the nights you plan on viewing.
12. Weather can be your worst enemy (besides forgetting key equipment) so check the weather for those nights.
13. Not a bad idea to have a waterproof cover for your scope in case of unforeseen rain.
14. No matter how old or young you are, taking a chair is a very good idea.
15. If you are doing solar viewing, a solar filter (that you checked has no major holes or cuts) is a must, placed on the front of the scope...not on the eye piece.
16. Finally, take notes... of your sightings: what you saw, using what lenses and on some scopes record the focus settings.



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Stuart Brachney

JUNE 2026 UPCOMING EVENTS



4
THUR

MONTHLY LECTURE SERIES

(ZOOM ONLY) From Launch to Legacy:
How OSIRIS-REx Changed Our
Understanding of Asteroids



X
THUR

TELESCOPE WORKSHOP

101/201

Summer break



20
SATURDAY

BOOK CLUB

Sean Carroll's Something Deeply
Hidden: Quantum Worlds and the
Emergence of Spacetime (2019)



X
THUR

PUBLIC STAR PARTY

TBD



22
MON

ASIG/ASTROIMAGING -

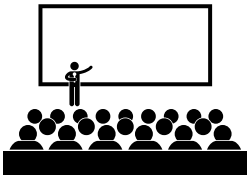
MEMBERS ONLY

ASIG Lunch and Learn

1- AstroBin 2-DarkSkySites

**MORE
INFORMATION**

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.



June Lecture

Speaker : Daniella DellaGiustina

Topic: From Launch to Legacy: How OSIRIS-REx Changed Our Understanding of Asteroids

Abstract: NASA's OSIRIS-REx mission became the first U.S. spacecraft to collect and return a sample from an asteroid, delivering over 120 g of material from (101955) Bennu to Earth in 2023. Early analyses reveal that Bennu's rocks are rich in carbon, nitrogen, and water-bearing minerals, as well as unexpected magnesium-sodium phosphates—evidence that its parent body once hosted liquid water and complex chemistry. These findings illuminate the processes that shaped the early solar system and supplied the ingredients for life to Earth. Building on this success, the spacecraft has begun a new journey as OSIRIS-APEX to study asteroid (99942) Apophis when it passes extraordinarily close to Earth in 2029. Lessons from Bennu will guide this next encounter, offering a rare opportunity to watch an asteroid's surface respond to strong tidal forces—and to deepen our understanding of how planetary bodies evolve and interact across the solar system.



Visit Kitt Peak — Where the Universe Is Being Remapped

On Saturday, April 25th, PAS members had the opportunity to visit Kitt Peak National Observatory — just two hours from Scottsdale and home to one of the most scientifically significant telescopes on Earth.

Kitt Peak hosts the Dark Energy Spectroscopic Instrument (DESI), which completed its five-year survey earlier this month — ahead of schedule and 40% beyond its original goals, mapping over 47 million galaxies and quasars in the largest 3D map of the universe ever made. DESI's latest results suggest that dark energy — the mysterious force driving the universe's accelerating expansion — may not be the fixed constant Einstein proposed. It may be changing. If confirmed, this would be the biggest shift in our understanding of the cosmos since dark energy was first discovered in 1998.

Kitt Peak's evening and nighttime programs put you at the eyepiece of research-grade telescopes under some of Arizona's darkest skies — on the very mountain where this history is being made. Thanks to all who attended:

Susan Ballesteros

Amy Beisser
Ralph Bennett
Stuart Brackney
Dan Dalton
Luke Douglas
Joseph Faulkner
Noreen Faulkner
Mercy Garza
Dan Gehret
Jodi Knittel

Jud Knittel
Chris Mahar
Pearl Mahar
Mike Marron
Kathleen Mueller
Richard Mueller
Richard Schmidt
Calvin Vance
Ofelia Waters
George Zukauckas

Here's a recap of last month's Meeting by Richard Meyers

Chris Ford announced the Election results 2026-2027

- President: Stuart Brackney
- Vice President: Mark Johnston
- Secretary: Chris Ford
- Treasurer: Richard Sauerbrun
- Newsletter Editor: Richard Meyers
- Member at Large #1: Ruza Sabelja
- Member at Large #2: Andrew Stone

Richard Meyers covered NEAIC/NEAF/TSP

NEAIC (North East Astro Imaging Conference) is a focused astrophotography event that runs alongside NEAF and brings together advanced imagers, vendors, and software developers. The emphasis is on deep-sky imaging techniques, processing workflows, and the latest camera and telescope technology rather than visual observing. Talks tend to be highly technical, often featuring real-world data sets, processing demonstrations, and practical imaging strategies. The overall tone is very "imager-centric," with strong engagement between attendees and equipment manufacturers.

The NEAF (Northeast Astronomy Forum) is one of the largest astronomy and telescope expos in the United States, held annually in New York. It brings together major telescope manufacturers, accessory makers, and astronomy organizations to showcase the latest gear and technology. Unlike imaging-focused conferences such as NEAIC, NEAF is broader in scope, covering both visual astronomy and astrophotography, with a strong emphasis on hands-on equipment displays.

Attendees can directly compare telescopes, mounts, cameras, and accessories, attend talks from leading astronomers, and connect with vendors in a highly interactive showroom-style environment.

The Texas Star Party (TSP) is one of the premier dark-sky astronomy gatherings in the United States, held in West Texas under exceptionally dark skies. It brings together visual observers, astrophotographers, educators, and vendors for a week of observing, talks, and informal collaboration.

Demo of the club loaner ASKAR 103 APO iOptron AZ Mount Pro.

Andrew Stone presents Star Tours members with the NASA Night Sky Network awards for Recognition of exceptional Outreach.

- Pete Turner
- Richard Meyers
- Richard Sauerbrun
- Mark Johnston
- Stu Brackney
- Roger Anzini
- Andrew Stone





Summary of Outreach Events



Star Tours & Outreach events:

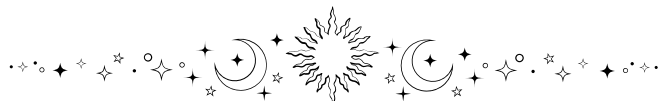
- 4th APEX Finetech Solutions
- 8th Pinnacle Peak Prep
- 15th AZ Creative Events at Desert Ridge
- 23rd Birthday Star Tour
- 23rd Star Party with 19 telescope





StarTours by Andrew Stone

Objects to View in June 2026						
Object Name	Object Type	Constellation	Visual Magnitude	Apparent Size	Rise Time	Set Time
Jupiter	Planet	Gemini	-2.7	45"	9:00 AM	9:45 PM
Venus	Planet	Taurus	-3.9	11.3"	7:30 AM	10:00 PM
M8 The Lagoon Nebula	Emission Nebula	Sagittarius	6	90' x 40'	9:40 PM	7:15 AM
M17 Swan / Omega Nebula	Emission Nebula	Sagittarius	6	40' x 7'	10:00 PM	8:15 AM
NGC 3242 Ghost of Jupiter	Planetary Nebula	Hydra	7.3	25"	12:00 PM	10:00 PM
NGC 6543 Cat's Eye Nebula	Planetary Nebula	Draco	8.1	0.4' x 0.3'	Circumpolar	Circumpolar
NGC 6826 Blinking	Planetary Nebula	Cygnus	8.8	2.1'	5:00 PM	12:00 PM
M57 (Ring Nebula)	Planetary Nebula	Lyra	8.8	1.5' x 1'	8:30 PM	10:30 AM
M104 Sombrero	Galaxy	Virgo	8	9' x 4'	2:00 PM	1:00 AM
M51 Whirlpool	Galaxy	Canes Venatici	8.4	11' x 7'	11:00 AM	5:30 AM
M65, M66, NGC 3628 Leo Triplet	Galaxies	Leo	9.3, 8.9, 10.2	9' x 2' & 9' x 4'	11:30 AM	1:00 AM
M81 & M82 Bode's Galaxy	Galaxies	Ursa Major	6.9 & 8.4	21' x 10' & 11' x 4'	Circumpolar	Circumpolar
M86 Markarian's Chain	Galaxies	Virgo	8.8	11.5' x 8.4'	12:45 PM	2:00 AM
M3	Globular Cluster	Canes Venatici	6.1	18'	1:00 PM	4:00 AM
M5	Globular Cluster	Serpens	5.6	23'	4:00 PM	5:30 AM
M10	Globular Cluster	Ophiuchus	6.4	20'	6:30 PM	6:30 AM
M13 Hercules	Globular Cluster	Hercules	5.8	20'	5:30 PM	7:30 AM
M22	Globular Cluster	Sagittarius	5.1	32'	9:30 PM	7:30 AM
M6 Butterfly Cluster	Open Cluster	Scorpio	4.2	25'	9:00 PM	6:15 AM
M11 Wild Duck Cluster	Open Cluster	Scutum	5.8	14'	9:45 PM	9:00 AM
M44 Beehive Cluster	Open Cluster	Cancer	3.1	95'	8:30 AM	10:30 PM
Albireo	Double Star	Cygnus	3.1 & 5.1	35"	8:45 PM	10:15 AM
Double Double Epsilon Lyrae	Double Star	Lyra	5 & 6	3.5"	8:15 PM	10:30 AM
Mizar & Alcor	Double Star	Ursae Major	2.2 & 4	14.4"	Circumpolar	Circumpolar



NASA's Curious Universe

Come get curious with NASA. As an official NASA podcast, Curious Universe brings you mind-blowing science and space adventures you won't find anywhere else. Explore the cosmos alongside astronauts, scientists, engineers, and other top NASA experts. Learn something new about the wild and wonderful universe we share. All you need to get started is a little curiosity.

Listen on Apple Podcasts: <https://podcasts.apple.com/us/podcast/the-astrophysics-podcast/id1723724928>



Cosmic Microwave Background Radiation by Cyrus Mousavi

CMB The Universe's Baby Picture

There are few things in the universe more humbling than realizing your microwave oven is not the original microwave. That honor belongs to the cosmos itself—specifically, the Cosmic Microwave Background Radiation (CMB)(**Figure 1**), the faint afterglow of creation that has been quietly humming across the universe for nearly 13.8 billion years.

Think of it as the universe's baby picture—only instead of a chubby infant wrapped in a blanket, it's a nearly uniform bath of radiation at a brisk 2.7 Kelvin. Not exactly Instagram material, but for cosmologists, it's pure gold.

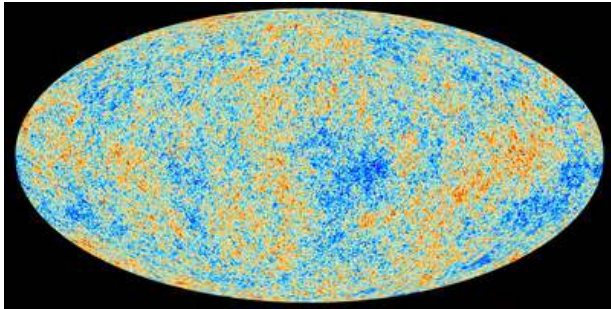


Figure 1) Microwave Background Radiation (CMB)

The Universe, When It Was Still Too Hot to Handle

Let's rewind to the beginning—or at least to about 380,000 years after the Big Bang. Before this point, the universe was essentially an opaque plasma soup: photons bouncing around like hyperactive toddlers in a ball pit, constantly scattering off free electrons. Light couldn't travel freely; it was trapped in a cosmic traffic jam.

Then came the great cooling. As the universe expanded, temperatures dropped enough for protons and electrons to finally settle down into neutral hydrogen atoms.

Photons, no longer harassed at every turn, were suddenly free to roam the cosmos. That moment—called “recombination,” though it was really a first-time combination—released the radiation we now detect as the CMB.

In other words, the universe turned transparent, and the lights came on. Or rather, the lights escaped.

A Discovery by Accident (Naturally)

Fast-forward a few billion years to 1965, when two radio astronomers, Arno Penzias and Robert Wilson, were trying to eliminate noise from a sensitive antenna. They checked everything—electronics, interference, even pigeon droppings (yes, really). Yet the noise persisted: a uniform hiss coming from all directions.

It turned out they weren't dealing with faulty equipment or particularly noisy pigeons. They had stumbled upon the afterglow of the Big Bang itself. Somewhere, the universe was chuckling.

Not Quite Uniform: The Universe's Subtle Imperfections

At first glance, the CMB is astonishingly uniform—like a perfectly painted wall. But zoom in, and you'll notice tiny fluctuations in temperature, on the order of one part in 100,000. These minute variations are the seeds of all structure in the universe: galaxies, clusters, and ultimately, us.

Without these irregularities, matter would have remained evenly distributed, and the universe would be a very dull place—no stars, no planets, no people debating cryptocurrency taxes or writing witty essays about radiation. Just a smooth, featureless expanse. A cosmic screensaver.

These fluctuations have been mapped in exquisite detail by missions like COBE, WMAP, and Planck. Each mission refined our understanding of the universe's age, composition, and geometry—essentially turning the CMB into a precision tool for cosmology.

A Snapshot of the Infant Universe

What makes the CMB particularly fascinating is that it's not just radiation—it's a time capsule. When we observe it, we are seeing the universe as it was nearly 13.8 billion years ago. No telescope can look further back in time using light, because before recombination, light simply couldn't travel freely.

So every direction you look in the sky, you're seeing the same ancient moment, stretched and redshifted into microwaves by the expansion of space. It's like being inside a sphere whose walls are painted with the earliest observable memory of existence.

Philosophically, it's a bit unsettling. Everywhere you look, you're staring at the past—very, very far past. The present, it seems, is overrated.

The Sound of Silence (and Expansion)

The CMB also carries imprints of acoustic waves—yes, sound waves—that rippled through the early universe's plasma. These “baryon acoustic oscillations” left patterns in the temperature fluctuations, giving cosmologists a way to measure distances and the rate of cosmic expansion.

So in a sense, the universe had a soundtrack before it had stars. Not music you'd want on your playlist—more like a low-frequency hum—but still, it's comforting to know the cosmos had rhythm before it had structure.

Why It Still Matters

You might reasonably ask: why should we care about a faint microwave signal from billions of years ago?

Because it answers some of the biggest questions we can ask. The CMB tells us the universe is flat (geometrically speaking)*, that it's composed mostly of dark matter and dark energy, and that it began in a hot, dense state. It also provides strong evidence for cosmic inflation, a rapid expansion in the universe's earliest moments.

In short, the CMB is less like background noise and more like a cosmic instruction manual—if you know how to read it.

Final Thoughts: The Universe's Quiet Whisper

There's something poetic about the CMB. It's not loud or dramatic; it doesn't blaze like a supernova or warp space like a black hole. Instead, it quietly fills the universe, a faint whisper from a time when everything was new.

And perhaps that's fitting. The most profound truths are often the quietest—the ones you have to listen carefully to hear, preferably after checking for pigeons.

So the next time you heat up leftovers, spare a thought for the original microwave: the one that's been running since the dawn of time, patiently illuminating the story of everything.

* flat here means its large-scale geometry follows the rules of Euclidean geometry.

Texas Star Party 2026: Dark Skies, Deep Learning, and the Changing Face of Amateur Astronomy by Richard Meyers

I recently returned from four nights at the Texas Star Party in West Texas — another solid week under genuinely dark skies, followed by a ten-hour drive home and an astronomy podcast to ease the transition back to normal life.

TSP is held annually at the Prude Ranch near Fort Davis, in the Davis Mountains at around 5,000 feet elevation. The site sits well outside any major light dome, and skies this year were running Bortle 3 to 4 on the better nights — deep enough to show real structure in the Milky Way and pull faint objects well within reach. Even an imperfect week there tends to outperform a good night at most home sites.

Prude Ranch offers on-site lodging for those who want it, but I camped for the week, which suited the pace of late nights and flexible schedules well. A meal plan covering lunch and dinner is available and worth considering — meals are served buffet style in the ranch dining hall, and you end up sharing tables with whoever shows up at the same time. It's one of the more relaxed ways to meet people, and some of the better conversations of the week happened over a plate of food with someone I'd never have crossed paths with otherwise.

One rule that's taken seriously and enforced from the start: red lights only, beginning thirty minutes after sunset. No white light anywhere on the field after that point. It's one of those policies that makes an immediate difference in sky adaptation and keeps the observing environment respectful for everyone. If you haven't spent time at a serious dark-sky event, it's a small adjustment that becomes second nature quickly. Attendance ran around 300 people across the week, with the usual flow of arrivals and departures. The community feel was comfortable and familiar — people catching up, comparing notes, eyeing each other's equipment.

Conditions:

Weather was mixed. The first night was clear enough to get set up and running, which is always the priority after a long drive. The second night was largely lost to clouds. The third offered only intermittent breaks — workable in patches but nothing sustained. The remaining nights were better, and people made the most of the available windows. It's the kind of variability that anyone who attends star parties regularly has learned to take in stride.

Two Days of PixInsight:

A two-day PixInsight class ran alongside the main event and was one of the more useful things I've done at a star party in a while. The sessions focused on advanced processing techniques and workflow, and having an experienced instructor walk through real data in a structured setting is a different thing entirely from piecing it together through online tutorials. Worth the time.

A Hobby in Transition

The balance between visual and imaging astronomy continues to shift. Imaging rigs clearly outnumbered traditional visual setups this year — computerized mounts, guide scopes, dedicated cameras, laptops on every pier. It reflects where the hobby has been heading for a few years now, and TSP's field is a pretty clear snapshot of that trend. Both sides of the hobby were well represented in conversation, even if the hardware count tells its own story.

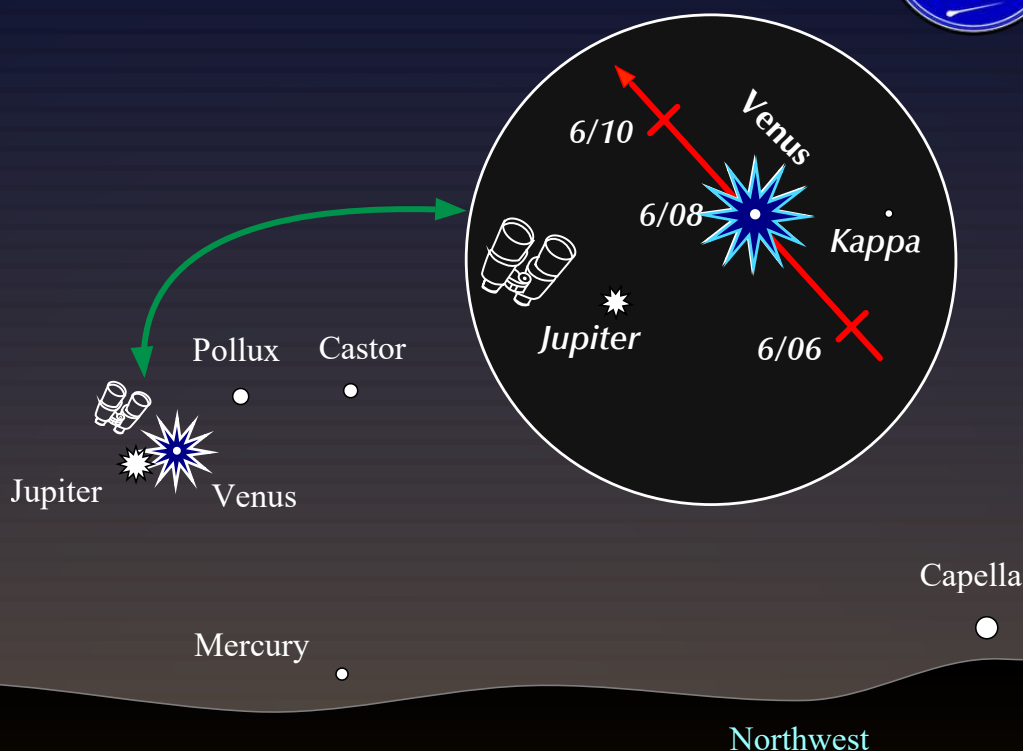
Program and Vendors

Afternoon sessions featured shorter technical talks, with keynote presentations each evening. The vendor area was well placed near the presentation space, which made it easy to move between a talk and a hands-on look at relevant equipment. Programming covered a reasonable range of topics without feeling scattered.

Final Thoughts

Mixed weather and all, it was a worthwhile week. The combination of dark skies, structured learning, and time around people who take the hobby seriously is hard to replicate closer to home. Already thinking about next year.

Regulus



**If you can see only one celestial event this June,
see this one.**

Brilliant Venus passes bright Jupiter

Look to the west-northwest 60 minutes after sunset in early June as the Venus/Jupiter gap narrows.

- On June 8, brilliant, unmistakable Venus lies slightly below and right of the lesser Jupiter.
- The next evening finds Venus having moved slightly above Jupiter.
- Then on succeeding evenings, Venus pulls above Jupiter, while the mighty planet drops toward the horizon.
- Enhance the view by using binoculars.
- All the while, the much dimmer Mercury lies close to the horizon in the bright twilight.

End your day with this enchanting meet-up!

Astroimaging Special Interest Group (ASIG)

TIP: The Power of Stacking — How Many Frames Make a Great Image? Why adding exposures together reveals the universe in ways a single shot never can.

A single astrophotography frame is mostly noise. Random electrical interference in your camera sensor, thermal heat, sky glow — all of it competes with the faint photons you actually want. Stacking is the process of combining many individual exposures into one master image, and it is the single most powerful technique in deep-sky imaging.

The math is elegant: signal (your target) is consistent across every frame, while noise is random and different each time. When you average or median-combine dozens of frames, the noise partially cancels itself out while the signal accumulates. The improvement follows the square root rule — doubling your frame count does not double quality, but stacking four times as many frames halves the noise floor.

Software like AutoStakkert (for planets) and DeepSkyStacker or PixInsight (for deep sky) align each frame before combining, correcting for atmospheric drift and tracking errors. Rejection algorithms — sigma clipping being the most common — automatically discard outlier pixels caused by satellites, cosmic rays, or passing aircraft.

A 30-frame stack of a galaxy will reveal structure invisible in any single sub — not by luck, but by mathematics. For planetary work the bar is higher still: AutoStakkert routinely processes thousands of video frames, selecting only the sharpest percentage before stacking. That is how amateurs today produce Jupiter images that rival observatory photography from a generation ago.

Before stacking your light frames, calibration frames do the heavy lifting of removing sensor artifacts. Dark frames subtract thermal noise, flat frames correct for vignetting and dust shadows, and bias frames account for the camera's base read noise. Together they give the stacking algorithm clean data to work with.

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.

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

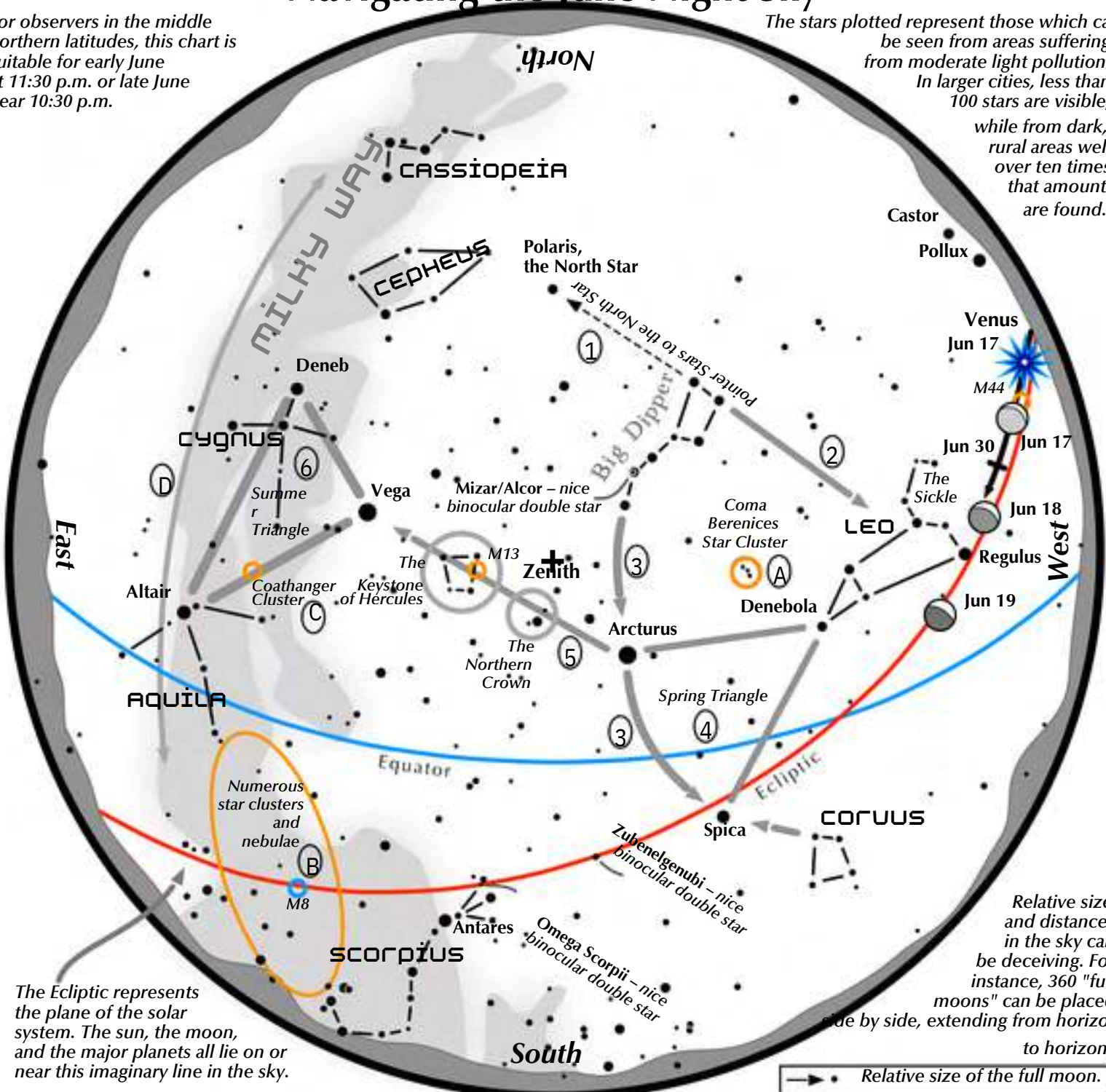
[20 Top TIPS for Better Astrophotography](#) — Dylan O'Donnell Dylan covers both image acquisition as well as processing and provides some great tips for better images.

Navigating the June Night Sky

2026

For observers in the middle northern latitudes, this chart is suitable for early June at 11:30 p.m. or late June near 10:30 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.

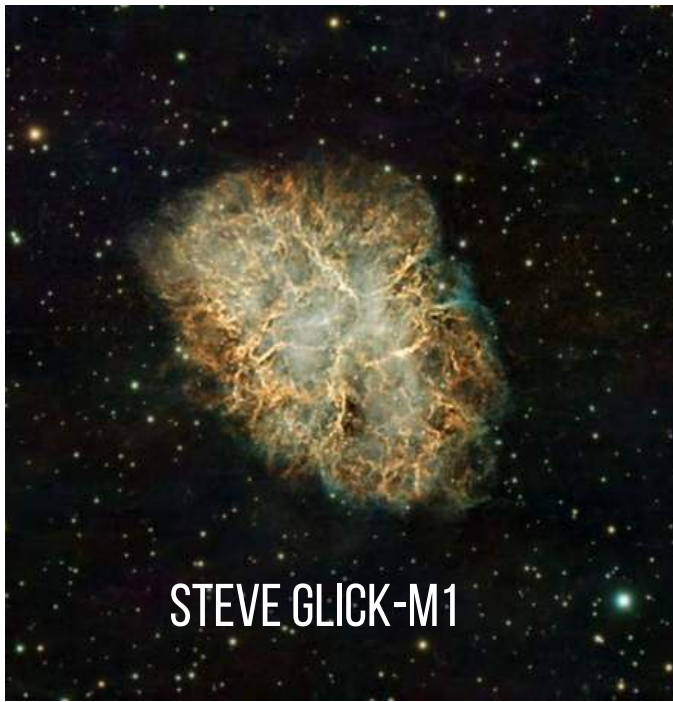
Navigating the June night sky: Simply start with what you know or with what you can easily find.

- 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 Draw another line in the opposite direction. It strikes the constellation Leo high in the west.
- 3 Follow the arc of the Dipper's handle. It first intersects Arcturus, the brightest star in the June evening sky, then Spica.
- 4 Arcturus, Spica, and Denebola form the Spring Triangle, a large equilateral triangle.
- 5 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.
- 6 High in the east are the three bright stars of the Summer Triangle: 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 of Antares and Altair, hides an area containing many star clusters and nebulae.
- C: 40% of the way between Altair and Vega, twinkles the "Coathanger," a group of stars outlining a coathanger.
- D: Sweep along the Milky Way for an astounding number of star clouds and dark bays.





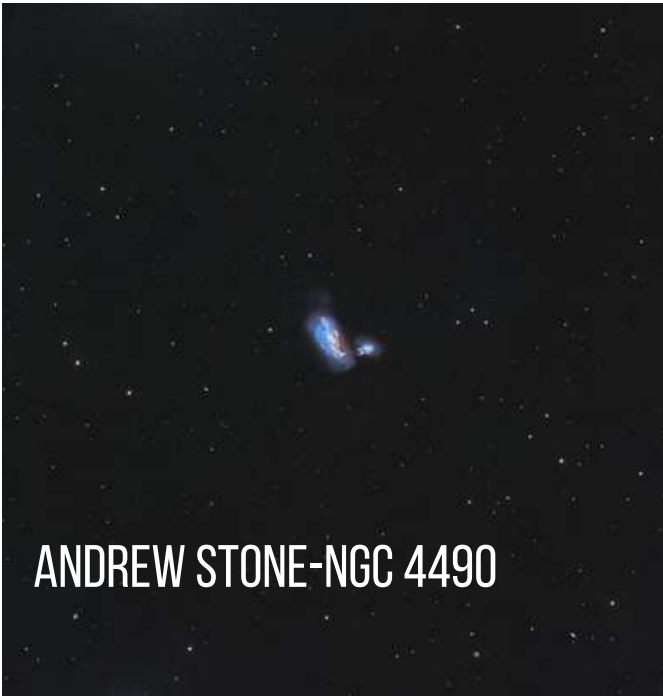
STEVE GLICK-M1



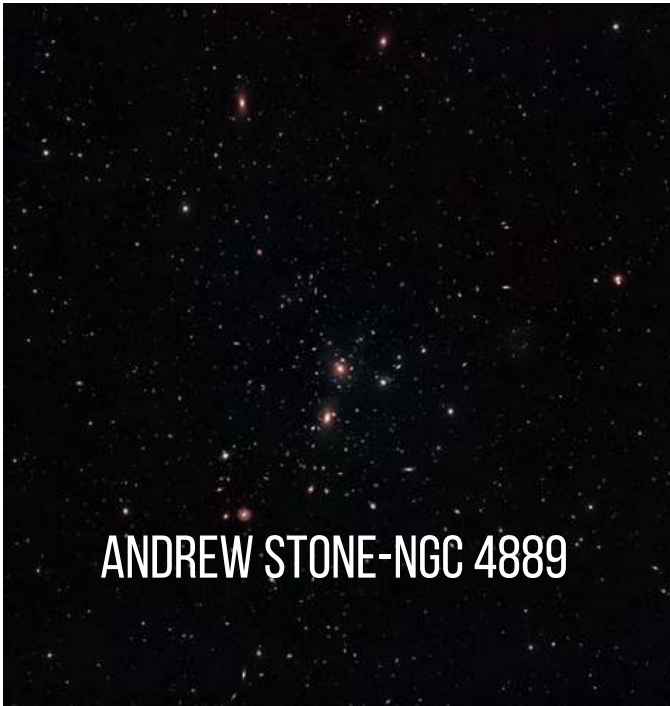
MARK JOHNSTON-SUN



STEVE GLICK-NGC 3628



ANDREW STONE-NGC 4490

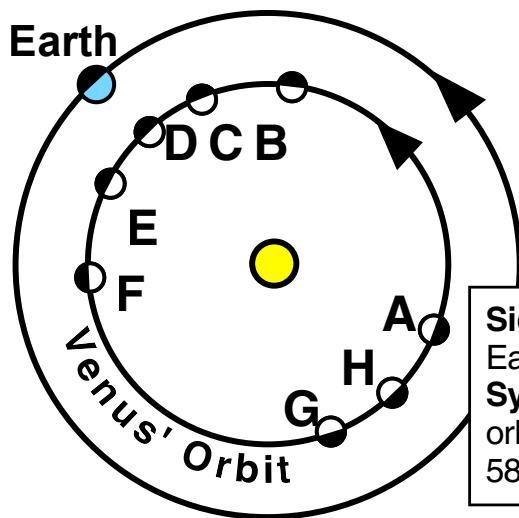


ANDREW STONE-NGC 4889

ASTRONOMICAL LEAGUE PHASES OF VENUS



Orbital positions of Venus with respect to Earth



Venus' position above the horizon ...

- A Gibbous phase low in evening sky.
- ◐ B Half phase high in evening sky, Greatest Eastern Elongation.
- ◑ C Crescent phase low in evening sky.
- D Inferior Conjunction, in front of the sun and can't be seen.
- ◑ E Crescent phase low in morning sky.
- ◐ F Half phase high in morning sky, Greatest Western Elongation.
- G Gibbous phase low in morning sky.
- H Superior Conjunction, behind the sun and can't be seen.

Sidereal orbital period: Time it takes to completely circle the sun.

Earth: 365.25 days; Venus: 224.7 days.

Synodic orbital period: Time it takes Venus to catch Earth as they orbit the Sun (the time between successive inferior conjunctions):
584 days = 19.5 months.

Inferior Conjunction Dates

March 23, 2025

October 24, 2026

June 1, 2028

January 6, 2030

Venus in the evening sky ...

• Points of greatest elongation (B & F) occur 10 weeks before and after inferior conjunction. This is when Venus attains its greatest angle from the Sun. In a telescope, the planet appears to be half illuminated.

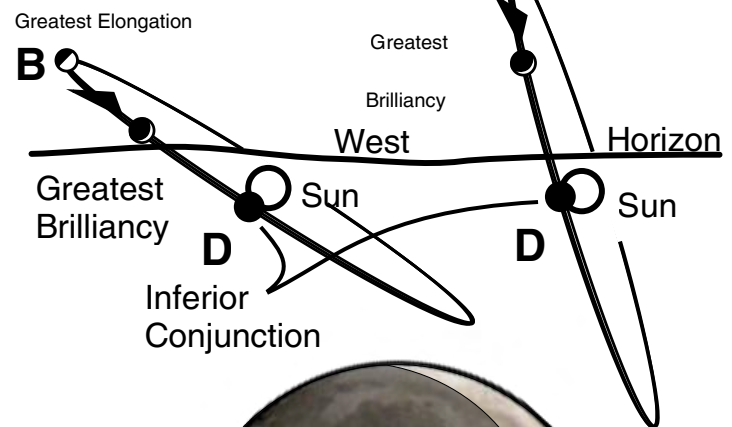
Points of greatest brilliancy (near C & E) occur 4 weeks before and after inferior conjunction. The planet appears as a thin crescent.

For observers in the contiguous US, Venus lies higher above the horizon at sunset when it is in the spring sky than the autumn sky because the angle of the ecliptic with respect to the horizon is greater in the spring months.

Low in the southwest
after sunset in autumn

High in the northwest
after sunset in spring

Greatest Elongation

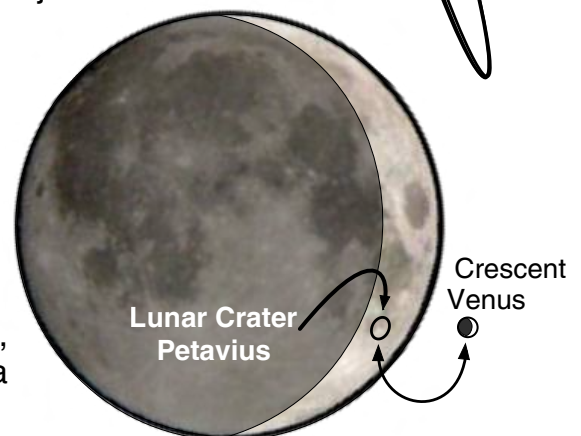


**Venus is bright enough that it can cast a shadow
and, at times, it can be seen in the daytime!**

Venus is very bright because ...

• It presents the largest apparent angular diameter of any planet when it nears its closest point to Earth. At that time, Venus has about the same apparent angular diameter as a large lunar crater.

• Venus's permanent, thick cloud cover reflects 75% of the sunlight that strikes it (called its "albedo"). Compare that to the Moon's albedo of 12%, Mercury's 12% and Mars' 16%!



Relative apparent sizes of the Moon, a large crater (Petavius) & the crescent Venus.

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!

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.

Posted 05/2026

MEADE ETX-LS 8" telescope for sale. Have instruction manual and 8X50 Rear Focus Viewfinder. \$1,400.00 or best offer. -Judy Pester (Paradise Valley) , judyloves356@gmail.com

Posted 06/2026

Losmandy G11 Gemini 2 Level 6, OP worm gear, freshly cleaned and serviced, HD nonfolding tripod local pickup PAS member price \$2,250 Andrew Stone andrews@pasaz.org



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. Nothing this month!



Telescope Loan Program

PAS Telescope Loan Program- The PAS Telescope Loan Program gives active PAS members access to a range of donated telescopes and accessories. These instruments are intended to support both visual astronomy and astrophotography learning experiences.

Overview-Members can borrow from the full PAS telescope inventory. Equipment ranges from beginner-friendly setups to higher-value imaging systems, offering opportunities to explore different observing and imaging techniques.

Check-out Requirements

- Some telescopes require completion of a short training program before use
- Higher-value equipment may require credit card information as a security measure against loss or damage
- An accessory kit (eyepieces and supporting gear) is available for all loaner telescopes when needed

Loan Period

- Standard loan duration is up to one month
- Extensions may be granted in special cases upon request

Pickup & Return

- All equipment must be collected from the PAS storage facility
- All items must be returned to the same facility by the agreed end date

How to Request a Telescope

To check out a telescope, email telescope@pasaz.org with the following information:

- Your full name
- PAS membership status
- Preferred telescope (if known)
- Intended use (visual observing or astrophotography)
- Requested loan dates
- Any relevant experience level or training completed

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



Askar 103 APO 103mm f/6.8 Triplet Refractor Telescope, with ioptron AZ Mount Pro and an advanced eyepiece kit

2 x ZWO SeeStar S50

Coronado Personal Solar Telescope (PST)

Orion SkyQuest XT-10 - 10" Dobsonian

Orion Skyquest XT-8 – 8" Dobsonian

Sky-Watcher – 10" Collapsible Motorized Dobsonian

Accessory Kit #4 - Advanced Observing

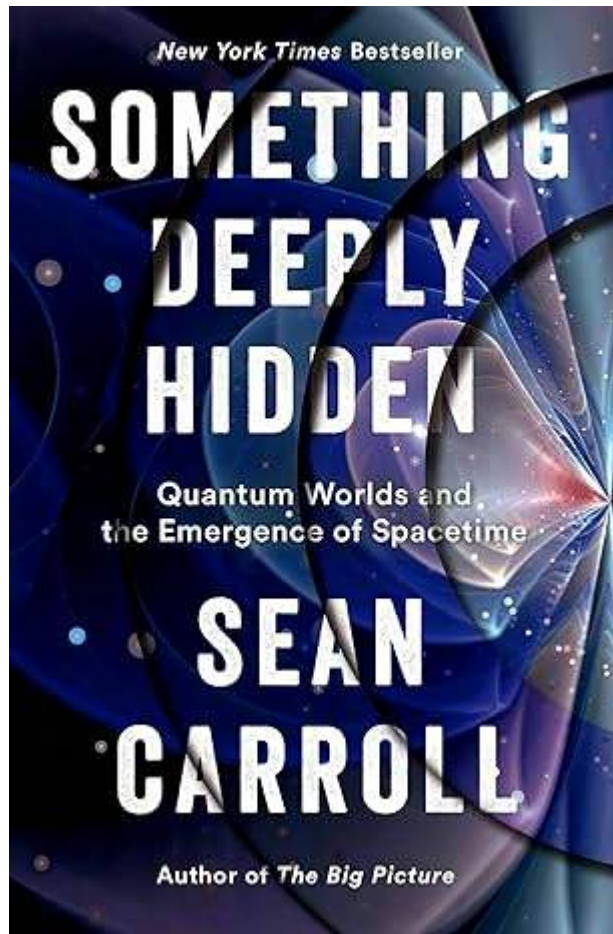
Accessory Kit #5 – 1.25" Eyepieces & filters





The 2026 Book Club

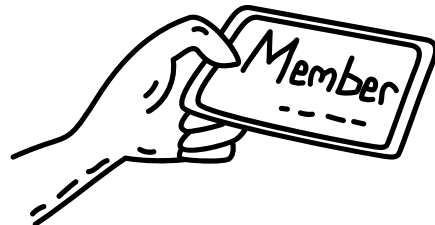
For more information or to join, contact Cyrus at saeidmousavi@yahoo.com



**Sean Carroll's *Something Deeply Hidden*:
Quantum Worlds and the Emergence of Spacetime (2019)**

Sean Carroll reexamines quantum mechanics and argues that its unresolved foundations are central to understanding reality. He challenges the view that these issues are settled or unimportant, claiming they've been largely avoided since the early days of the theory.

The book builds toward a bold interpretation: that quantum mechanics may imply a branching multiverse, where reality consists of many parallel outcomes and versions of observers. Carroll suggests that resolving quantum theory properly could reshape our understanding of space, time, and the structure of the universe itself.



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. Renewing your membership is quick and easy: just visit www.pasaz.org, look in the left index column for “Join Our Society,” click it, and you’re on your way.



We now offer a year-round membership, which means you can join at **any time with no enrollment deadlines**, and you’ll receive a full 12 months of benefits. If you have any questions, our Membership Manager is happy to help at 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

Membership & Outreach

- Ruza Sabelja — Member-at-Large (mal1@pasaz.org)
- Damon Finell — Member-at-Large (mal2@pasaz.org)
- Richard Pipkin — Membership Manager (membership@pasaz.org)

Programs & Events

- Andrew Stone — Star Tours Manager (startours@pasaz.org)
- Ruza Sabelja — Event Manager (events@pasaz.org)

Website & Communications

Ed Skinner — webmaster@pasaz.org

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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

Damon Finell

Luke Douglas

Star Tours Team 2026

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

