

March 2026

Monthly Newsletter



PAStimes

A Publication of the Phoenix Astronomical Society

In this newsletter
you can expect:

Message From the
President

Messier Marathon

When Stars Go Out

Eclipse Party
Fountain Hills Dark
Sky Festival
International
Science Fair

Navigating the
Night Sky

High Magnification
Viewing
of the Galilean
Moons

Member Images ,
Book Review and
much more

RICHARD MEYERS-STAR TOURS-PHOENIX COUNTRY DAY SCHOOL

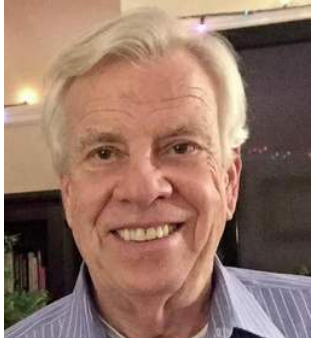


**EVENT
REMINDER**

5 – Monthly Lecture Series: Social Night Pizza

| 12– Telescope Workshop

| 14 – Book Club | 14-Public Star Party | 24 – ASIG Meeting



March, a very busy month for PAS and of course you. The winter night sky is overflowing with beautiful targets. I strongly recommend that you keep an eye on your emails and the www.pasaz.org web site events section for updates.

Did you observe the lunar eclipse in the early morning hours of March 3th? If you did, and were able to grab some pictures, yep, send them to our PASTimes editor richardmeyers@pasaz.org.

Bright Stars...that is the name of a new volunteer group here at PAS. They lend a hand at various events, helping set up signs, hand out literature, answer questions and even direct traffic at our star parties. Interested in helping? Contact Ruzasabelja@pasaz.org. Thanks.

Our donor telescope program is going well. We accept donated telescopes, then sell them to you, PAS members, at one half the current market price, with proceeds funding our Sam Insana PAS Student Scholarship Fund. If you know of someone who wants to donate a scope, or eyepieces, have them contact me.

Speaking of donors. Our web site allows members of the public to donate to our cause. If you know of someone who wishes to do so, they can use this link: <https://www.pasaz.org/for-sale-donations>. We are a 501c3 non-profit organization, thus the donor will receive a receipt with our IRS number.

We are going back to Kitt Peak National Observatory. As you know, our last trip was hindered by foul weather. We are going back on April 25th. More information is coming your way. <https://kpno.noirlab.edu>

Need help learning the night sky? We strongly suggest you get an app for your cell phone. A few suggestions: Skyview and Stellarium. Also let us know your thoughts of the pizza social we had this month. Email: ruzasabelja@pasaz.org

Stuart Brachney



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MARCH 2026 UPCOMING EVENTS



5

THUR

MONTHLY LECTURE SERIES

Social Night Pizza-How You Got Into Astronomy & Your Current Interests"



12

THUR

TELESCOPE WORKSHOP

101/201

101 What to buy
201 How to operate your telescope\$.



14

SATURDAY

BOOK CLUB

The Secret Lives of Planets: Order, Chaos, and Uniqueness in the Solar System-Paul Murdin



14

SATURDAY

PUBLIC STAR PARTY

Our Star Parties are held at one of our public star party sites which have an excellent view of the night sky. Parties begin before sunset so equipment setup may be completed in the daylight.



24

MON

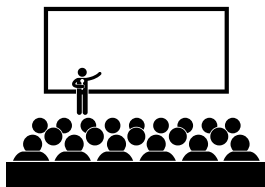
ASIG/ASTROIMAGING -

MEMBERS ONLY

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

**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.



March Lecture: Social Night

Topics of the evening:

“How You Got Into Astronomy & Your Current Interests”

Whether you're into astrophotography, visual observing, planetary imaging, outreach, dark-sky trips, equipment tinkering, or just getting started — we'd love to hear your story. This will be a relaxed, informal evening of sharing experiences and connecting with fellow members.

What to Expect:

Complementary pizza and drinks

Silent auction for telescopes

Great conversation with fellow members and their families

A welcoming environment for new and long-time members alike

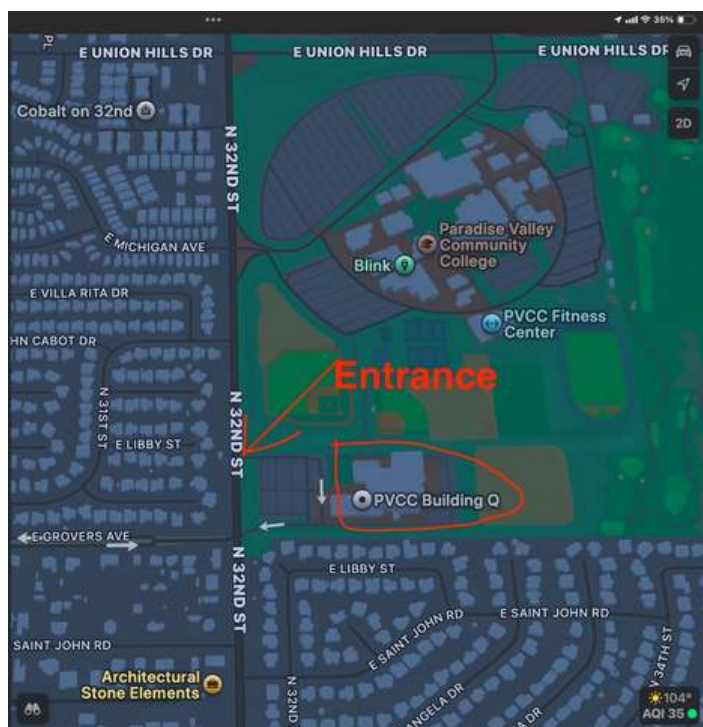
This event is exclusively for PAS members and their families. Come ready to share a little about your journey — or simply come to listen and enjoy the camaraderie.

We look forward to seeing everyone on March 5th for a fun and inspiring evening together!



NEW LOCATION

All of our PAS events at Paradise Valley Community College are now being held in **Building Q room 120A**. This is the former Maricopa County Library building south of the PVCC athletic fields on 32nd street.



Here's a recap of last month's Meeting

"All About Asteroids" By Tom Polakis

At the February meeting, Tom Polakis delivered a comprehensive and entertaining deep-dive into the world of asteroids — from ancient sky-watchers to cutting-edge-powered discovery software. Here are the highlights.

What Is an Asteroid?

Asteroids are small, rocky bodies orbiting the Sun — also called "minor planets." Even the largest asteroid appears as a mere point of light in our telescopes, with a maximum angular size of just 0.8 arcseconds, smaller than Jupiter's moon Europa. This makes studying them a creative scientific challenge.

A History of Discovery

The story of asteroid discovery spans four centuries:

- 1500s: Johannes Kepler predicted a planet must exist between Mars and Jupiter.
- 1766: The Bode-Titus Law mathematically placed something at 2.8 AU from the Sun.
- 1801: Giuseppe Piazzi accidentally discovered Ceres while cataloguing stars — using only a 75mm telescope!
- 1891: Photography revolutionized discovery. Max Wolf alone found 248 asteroids.
- 2000s onward: CCD sky surveys (LINEAR, Spacewatch, Catalina) exploded the known count into the hundreds of thousands.

Modern Discovery: Synthetic Tracking

Tom highlighted a remarkable new technique called Synthetic Tracking (Tycho software by Daniel Parrott). Instead of spotting a moving dot across four images the traditional way, this method shifts and stacks thousands of image frames in every possible motion direction, dramatically boosting signal-to-noise. In a test using just a 5-inch scope, 281 asteroids were found in a 3°×3° field down to magnitude 20.8. It requires a modern GPU — which many of us already have for gaming or imaging!

Orbits and Types

Asteroids are found throughout the solar system in distinct orbital families: the Main Belt between Mars and Jupiter, Trojan asteroids sharing Jupiter's orbit, Kuiper Belt Objects beyond Neptune, and Near-Earth Objects (NEOs) with perihelia closer than 1.3 AU. Tom walked through key orbital elements — semimajor axis, inclination, and eccentricity — and explained what it means when eccentricity exceeds 1.0 (hint: it's interstellar, and sparked a pointed quip about Avi Loeb). Asteroid types break down as roughly 75% C-type (carbon-rich), 17% S-type (stony), and 7% M-type (metallic).

Brightness, Size, and Famous Asteroids

An asteroid's brightness depends on its size, albedo (reflectivity), and distance. Tom plotted many famous asteroids on opposition magnitude charts, including Ceres, Vesta, 16 Psyche, and even science celebrities like 2709 Sagan, 13123 Tyson, and 7672 Hawking. Of personal note to PAS members: asteroid 4078 Polakis and 146268 Jennipolakis both made an appearance on the chart!



Saturday, March 28, 2026 | 4:00 - 9:00 PM
Fountain Hills Community Center | 13001
N. La Montana, Fountain Hills, AZ
<https://fhdarksky.com/events/festival/>

The **2026 All Arizona Messier Marathon** / Arizona Spring Star Party and Messier Marathon — hosted by the Saguaro Astronomy Club — is scheduled for March 20–21, 2026. It's typically centered around the dark-moon weekend that gives observers the best shot at seeing as many of the 110 Messier objects as possible in one night from a dark sky site in Arizona. Expect to have RV's, camping trailer, car campers, and tent campers attending, as well as day trippers (those only there for a few of the night hours.)

While the event is scheduled for Friday and Saturday night, some will be out as early as possible, Wednesday or Thursday for sure. Also, unless the forecast is for guaranteed storms, the schedule will stand firm for the 20th and 21st!

If you have other questions, please feel free to Tom Curry, President president@saguaroastro.org. Please refer to the SAC webpage at <https://www.saguaroastro.org/all-arizona-messier-marathon/>

Summary of Outreach Events



Photo by Stu Brackney

Star Tours & Outreach events

- 2/5/2026 Sonoran Sky
- 2/5/2026 Open House
- 2/6/2026 BMES
- 2/10/2026 Ameriprise
- 2/12/2026 MacDonalds Ranch
- 2/19/2026 COIL Learning
- 2/19/2026 101/201 Class
- 2/20/2026 Phoenix Country Day School
- 2/21/2026 Star Party
- 2/25/2026 Lake Pleasant Elementary School



Photo by Richard Sauerbrun



Photo by Stu Brackney

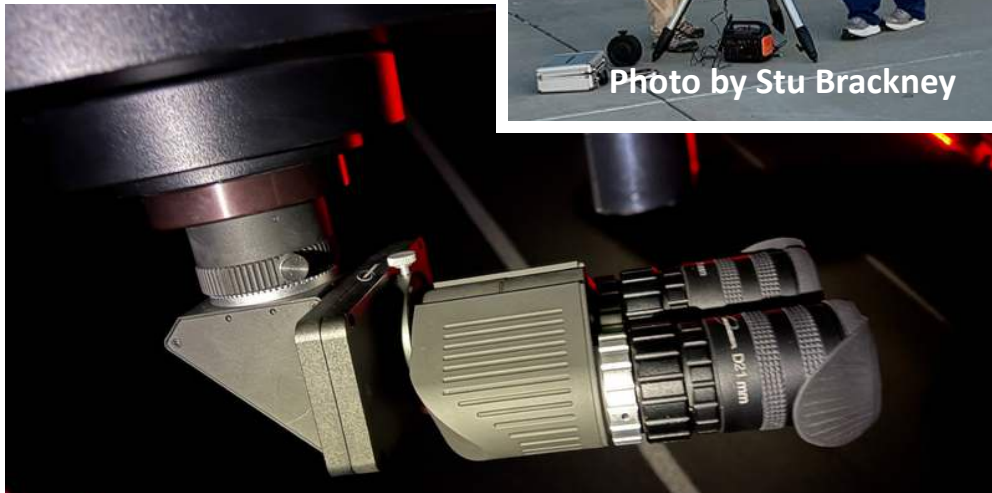


Photo by Stu Brackney



Photo by Stu Brackney



Photo by Stu Brackney



StarTours by Andrew Stone

Objects to View in March 2026						
Object Name	Object Type	Constellation	Visual Magnitude	Apparent Size	Rise Time	Set Time
Uranus	Planet	Taurus	5.7	2.3" (disk)	9:30 AM	11:30 PM
Jupiter	Planet	Gemini	-2.7	45" (disk)	1:00 PM	3:00 AM
M42 (Orion Nebula)	Emission Nebula	Orion	4	60' x 60'	1:00 PM	2:00 AM
NGC 2392 Eskimo Nebula	Planetary Nebula	Gemini	9.2	0.8'	2:00 PM	4:30 AM
NGC 3242 Ghost of Jupiter	Planetary Nebula	Hydra	7.3	25"	7:45 PM	6:30 AM
M31 (Andromeda Galaxy)	Galaxy	Andromeda	3.4	180' x 60'	8:00 AM	9:30 PM
M104 Sombrero	Galaxy	Virgo	8	9' x 4'	10:15 PM	8:30 AM
M51 Whirlpool	Galaxy	Canes Venatici	8.4	11' x 7'	6:30 PM	9:45 AM
M81 & M82 Bode's Galaxy	Galaxy	Ursa Major	6.9 & 8.4	21' x 10' & 11' x 4'	Circumpolar	Circumpolar
M3	Globular Cluster	Canes Venatici	6.1	18'	8:00 PM	10:00 AM
M13 Hercules	Globular Cluster	Hercules	5.8	20'	9:45 PM	11:00 AM
Double Cluster (NGC 869/884)	Open Cluster	Perseus	4.3 & 4.4	30'	Circumpolar	Circumpolar
M35	Open Cluster	Gemini	5.3	28'	1:30 PM	4:00 AM
M37	Open Cluster	Auriga	5.6	24'	11:00 AM	2:30 AM
M41	Open Cluster	Canis Major	4.5	38'	2:00 PM	1:30 AM
M44 Beehive Cluster	Open Cluster	Cancer	3.1	95'	3:30 PM	5:30 AM
M45: Pleiades	Open Cluster	Taurus	1.6	1.5°	10:30 AM	12:45 AM
NGC 457: Owl Cluster	Open Cluster	Cassiopeia	6.4	13'	Circumpolar	Circumpolar
NGC 2362 Tau Canis Majoris Cluster	Open Cluster	Canis Major	3.8	5'	3:30 PM	1:00 AM
Achird Eta Cassiopeiae	Double Star	Cassiopeia	3.5 / 7.5	12'	Circumpolar	Circumpolar
Castor	Double Star	Gemini	1.6	5"	1:00 PM	4:00 AM
Beta Monocerotis	Triple Star	Monocerotis	4.7, 5.2, 6.1	5"	2:00 PM	1:00 AM

HELP NEEDED

Science Judges needed for International Science Fair – Phoenix Weds May 13

Regeneron ISEF 2026 - Phoenix, Arizona: The world's largest STEM conference is in Phoenix this year. The Regeneron International Science and Engineering Fair (ISEF) will be at the Phoenix Convention Center, May 9-15, 2026. The Regeneron International Science and Engineering Fair (Regeneron ISEF) is the world's largest and most prestigious STEM competition for high-school students (5000 students from over 50 countries are expected), bringing together top young researchers from around the globe to present original scientific and engineering projects. More than 1000 judges are needed to determine the winners of the 2026 Regeneron ISEF. The main day judges are needed is Wed May 13. The prize-award day is Thurs May 14. More than 500 general volunteers are needed across a spectrum of activities. Learn more about serving as a Grand Award judge or general volunteer: <https://www.societyforscience.org/isef/>

When Stars Go Out with a Bang (or a Whisper)

By Cyrus Mousavi

When Stars Go Out with a Bang (or a Whisper)

Stars are the ultimate overachievers. They are born from cold, unassuming clouds of hydrogen, spend millions to billions of years fusing atoms in their cores like cosmic chefs, and then, at the end of their lives, go out in styles ranging from polite retirement to apocalyptic fireworks. The twist in this stellar drama? Everything depends on mass. In the universe, as in life, size matters.

Every star begins the same way: gravity gathers gas and dust into a dense clump. As the clump collapses, it heats up until nuclear fusion ignites. Hydrogen atoms begin fusing into helium, releasing energy. This energy pushes outward while gravity pulls inward, creating a delicate balance. The star settles into adulthood, known as the main sequence. Here it will spend most of its life, calmly turning hydrogen into helium and shining steadily.

But the length and intensity of this phase depend entirely on mass. Small stars sip their fuel like careful pensioners. Massive stars gulp it like there's no tomorrow—because, frankly, there isn't.

Take a low-mass star like our Sun. It will spend about ten billion years on the main sequence, quietly converting hydrogen into helium. When the hydrogen in its core runs out, gravity starts to win. The core contracts and heats up, while the outer layers expand dramatically. The star becomes a red giant, swollen and luminous, having a bit of a midlife crisis.

In this red giant phase, helium fusion begins. Helium atoms combine to form carbon and oxygen. But here's the catch: stars like the Sun don't get hot enough to fuse heavier elements. Carbon is about as ambitious as they get. Eventually, the outer layers drift away gently, forming a glowing bubble of gas called a planetary nebula—a name that has nothing to do with planets but stuck anyway. What remains behind is the core: a white dwarf.

A white dwarf is stellar retirement. About the size of Earth but containing roughly the Sun's mass, it is incredibly dense. It no longer fuses anything; it simply cools slowly over billions of years, like a cosmic ember fading into darkness. Low-mass stars enrich the universe modestly, contributing helium, carbon, and oxygen to the interstellar medium. Not flashy, but essential. After all, carbon is the backbone of life.

Now let's talk about the heavyweights.

A massive star—say, more than eight times the mass of the Sun—lives fast and dies young. Its stronger gravity compresses its core to higher temperatures, allowing fusion to proceed through a dazzling sequence of increasingly heavy elements. After hydrogen comes helium. After helium comes carbon. Then neon, oxygen, silicon. Each stage happens faster than the last. While hydrogen burning can last millions of years, silicon burning might last mere days.

The result is an onion-like structure: layers of elements stacked inside the star, with iron at the center. And iron is where the fun stops.

Fusing iron does not release energy; it absorbs it. So once the core becomes iron, the star's nuclear furnace shuts down. Without fusion to counteract gravity, the core collapses in less than a second. Imagine something with more mass than the Sun compressing into a city-sized sphere almost instantly. Protons and electrons are crushed together to form neutrons. The collapse halts abruptly when neutron degeneracy pressure kicks in. The star rebounds in a titanic explosion known as a supernova.

The leftover core becomes a neutron star: about 20 kilometers across, yet more massive than the Sun. A teaspoon of neutron star material would weigh billions of tons. These objects spin rapidly, sometimes emitting beams of radiation like cosmic lighthouses. Dense, extreme, and slightly terrifying.

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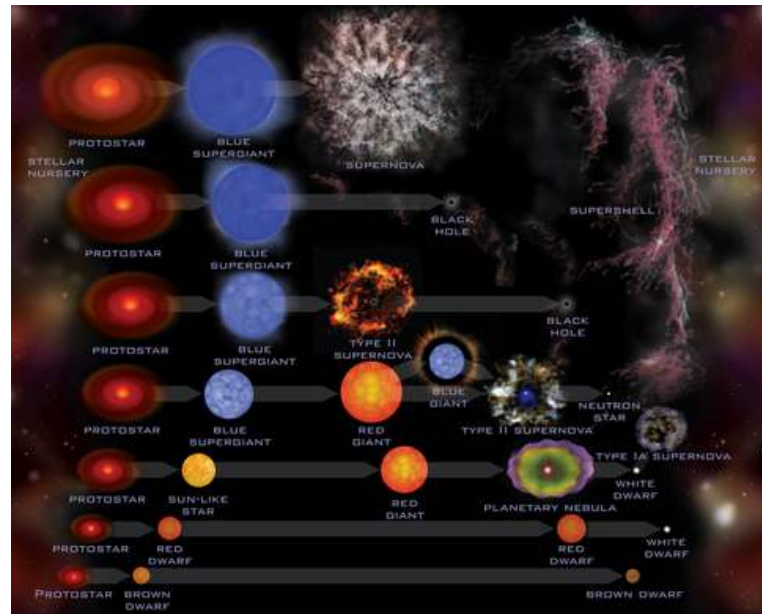
Meanwhile, the supernova itself is busy forging new elements. The explosion is so energetic that atoms heavier than iron are created in moments. Gold, uranium, and many other heavy elements are born in this violence. In other words, your wedding ring owes its existence to a star having a very bad day.

But if the original star is even more massive—perhaps twenty or more times the Sun’s mass—gravity may refuse to be denied. Not even neutron degeneracy pressure can stop the collapse. The core continues shrinking until it forms a black hole, an object so dense that its escape velocity exceeds the speed of light. No light, no information, no second chances. Just gravity ruling supreme.

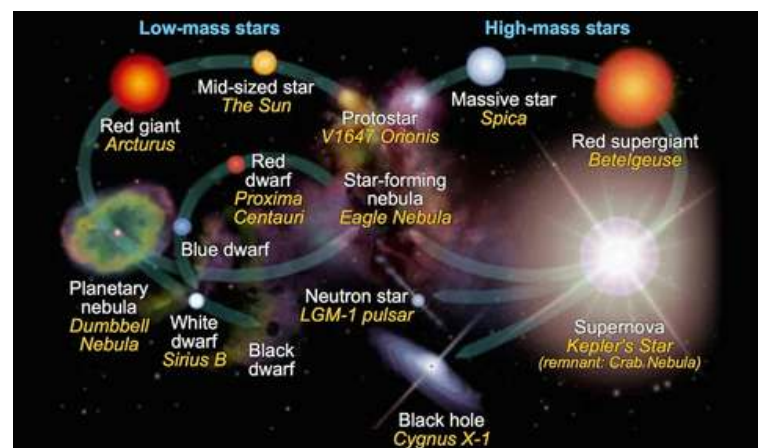
In these cases, the explosion may still scatter heavy elements into space, or the collapse may happen more quietly. Either way, the end product is a black hole: the ultimate minimalist. No surface, no solid structure—just warped spacetime and an appetite.

So what’s the cosmic lesson? Small stars live long, produce lighter elements like carbon and oxygen, and retire as white dwarfs. Massive stars burn brighter, forge elements all the way up to iron, and die spectacularly as supernovae, leaving behind neutron stars or black holes. The heavier the star, the more dramatic the finale—and the richer the chemical gifts it leaves behind.

In the end, stellar death is not a tragedy but a recycling program on a galactic scale. The atoms in your body were forged in ancient stars that lived, fused, exploded, and transformed. Stars may die in different ways—quietly, explosively, or by collapsing into darkness—but in doing so, they make everything else possible. The universe, it turns out, is built on stellar exits.

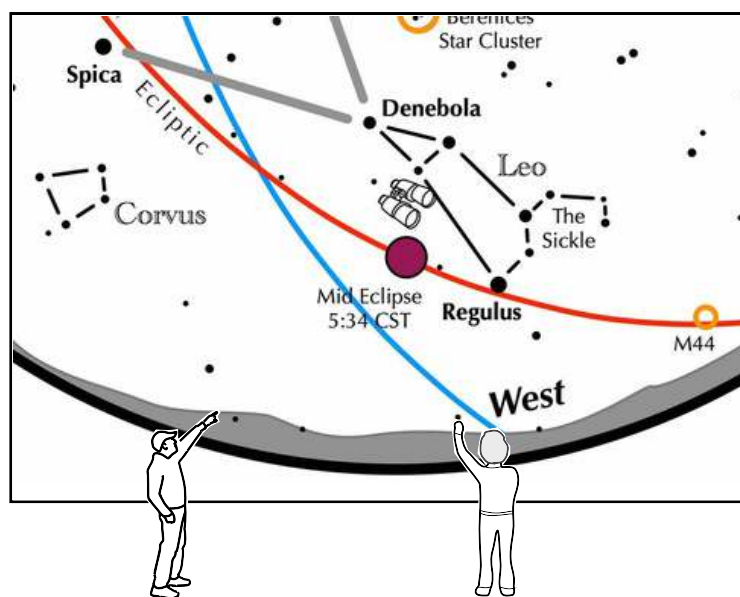


NASA Jet Propulsion Laboratory (JPL) – Stellar Evolution Infographic



cmglee/NASA Goddard Space Flight Center. CC BY-SA 4.0

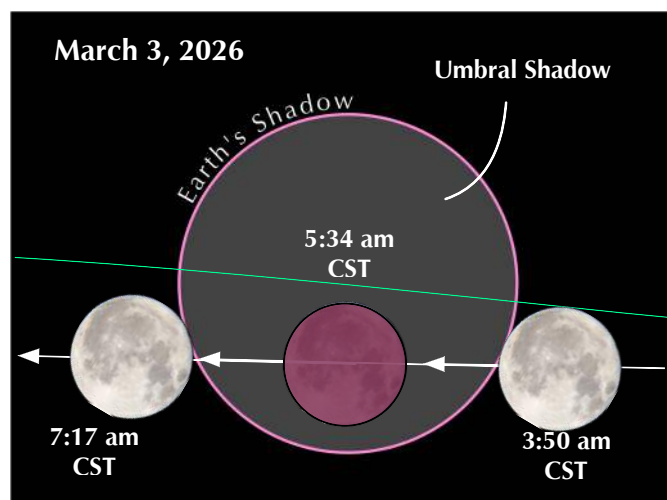
If you can observe only one celestial event in the morning this March, see this one.



**View to the west
on March 3
at 5 am CST**

Eclipse times

Partial eclipse begins: 3:50 a.m. CST
Total eclipse begins: 5:04
Mid eclipse: 5:34
Total eclipse ends: 6:03
Partial eclipse ends: 7:17



The Moon slides through a total eclipse

In the hours before dawn on March 3, the brilliant full moon slides into Earth's shadow.

- Even though the partial umbral eclipse begins at 3:50 a.m. CDT, darkening might not be noticed for another 5 minutes.
- When totality is reached, the full moon's brilliance is gone, allowing the stars to appear. Can you see that the moon lies east of Regulus and below Leo?
- At mid eclipse, what color is the moon? How red is it?
- During the partial phases, can you notice that the shadow's edge is not straight, but curved?

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POTLUCK and Eclipse Viewing

Location: Mike Marron
8030 E Golden Spur Ln, Carefree
(up on the hill not in the wash)
RSVP to primefactory@myctl.net

Date: March 2nd

Time: 6pm till dawn

Totality just before dawn March 3rd. Looking for high resolution videos of the Moon's surface just after the eclipse. Expect Earth's geomagnetic tail to sweep the Moon's surface with millions of volts that electrostatically charge the lunar dust into jumping around. Clouds of dust rising from the craters may become visible 5 to 30 minutes after totality begins depending on the speed of the local solar wind at that time

Time	Phase	Event	Direction	Altitude
1:44 am Tue, Mar 3		<i>Penumbral Eclipse begins</i> <i>The Earth's penumbra start touching the Moon's face.</i>	↙ 215°	↗ 58.6°
2:50 am Tue, Mar 3		<i>Partial Eclipse begins</i> <i>Partial moon eclipse starts - moon is getting red.</i>	↙ 236°	↗ 48.6°
4:04 am Tue, Mar 3		<i>Total Eclipse begins</i> <i>Total moon eclipse starts - completely red moon.</i>	↙ 252°	↗ 34.6°
4:33 am Tue, Mar 3		<i>Maximum Eclipse</i> <i>Moon is closest to the center of the shadow.</i>	↙ 257°	↗ 28.8°
5:02 am Tue, Mar 3		<i>Total Eclipse ends</i> <i>Total moon eclipse ends.</i>	↙ 261°	↗ 22.9°
6:17 am Tue, Mar 3		<i>Partial Eclipse ends</i> <i>Partial moon eclipse ends.</i> <i>Moon close to horizon, so make sure you have free sight to West.</i>	↙ 271°	↗ 7.7°
6:58 am Tue, Mar 3	Setting	<i>Moonset</i> <i>Setting</i>	↙ 276°	↘ -0.2°
7:23 am Tue, Mar 3	Not directly visible	<i>Penumbral Eclipse ends</i> <i>Below horizon</i>	↙ 280°	↘ -5.8°

Astroimaging Special Interest Group (ASIG)

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

Monthly Target Challenge:

✨✨ Easy Targets

M35 – Open Cluster (Gemini) – Mag 5.1

Big, bright, and generous. Resolves beautifully in small scopes, and with steady seeing you'll notice the faint companion cluster NGC 2158 lurking nearby like a distant echo.

M48 – Open Cluster (Hydra) – Mag 5.8

Often overlooked, which is astronomer code for “pleasant surprise.” Wide, loose, and binocular-friendly with a subtle arc pattern.

M3 – Globular Cluster (Canes Venatici) – Mag 6.2

One of the finest globulars in the northern sky. Even modest apertures start to crack it open; larger scopes turn it into a snowstorm of ancient stars.

M81 – Bode's Galaxy (Ursa Major) – Mag 6.9

A bright spiral galaxy and a gateway to spring galaxy season. Shows a concentrated core in small scopes and structure in larger ones. Bonus: M82 is in the same field at low power.

👉 Challenge Targets (Large Telescopes)

NGC 4565 – Needle Galaxy (Coma Berenices) – Mag 10.4

Edge-on perfection. Under dark skies it slices the field with a razor-thin dust lane. Transparency matters more than aperture here.

NGC 3242 – Ghost of Jupiter (Hydra) – Mag 8.6

A bright planetary nebula that tolerates high magnification. Blue-green disk with subtle internal structure; an O-III filter enhances the outer shell.

NGC 3628 – Hamburger Galaxy (Leo) – Mag 9.5

The faintest member of the Leo Triplet, but arguably the most dramatic. Look for the dark dust lane bisecting the elongated glow — patience required

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.

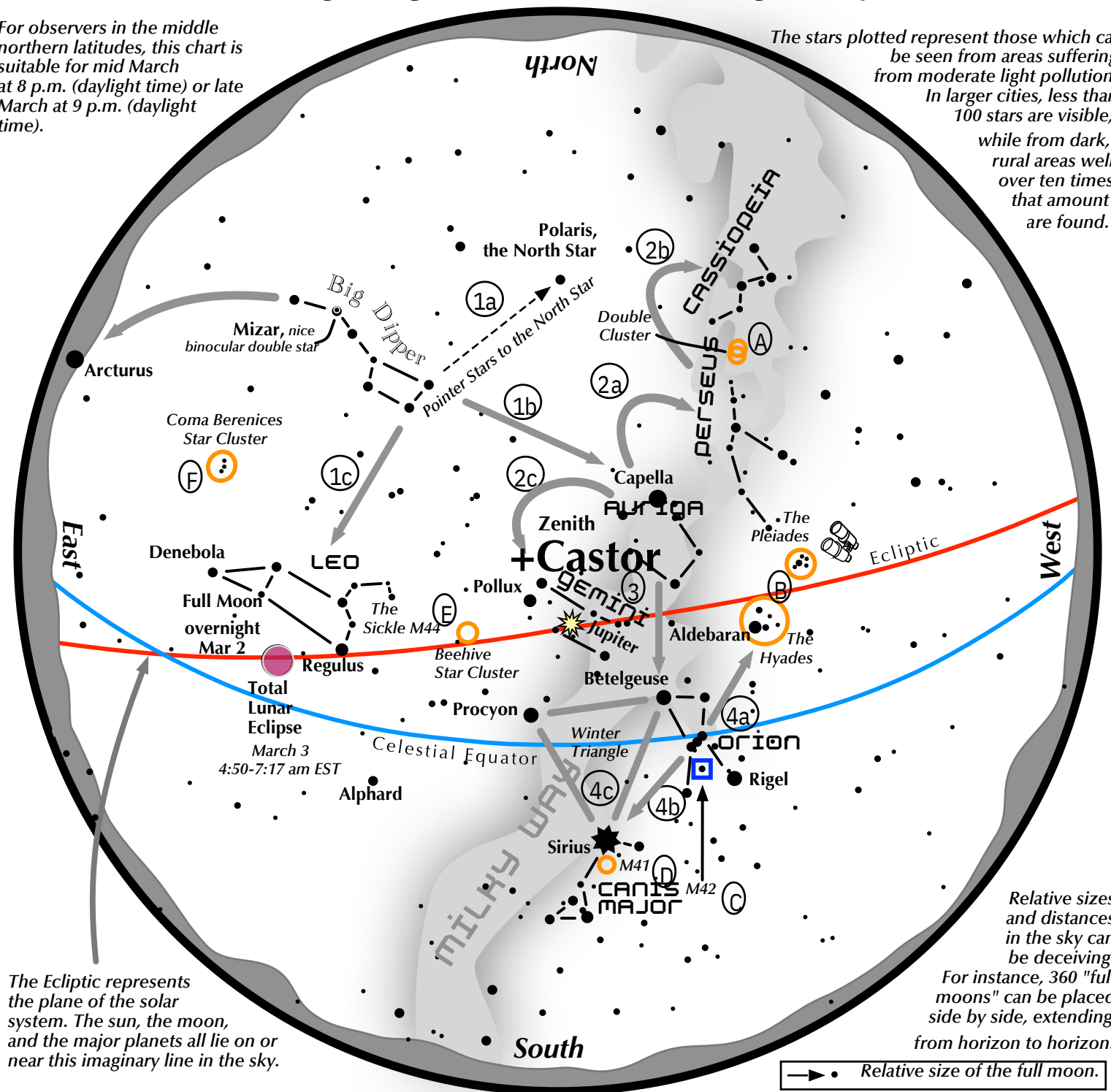
[Mastersofpixinsight](#) - Masters of PixInsight is an educational platform dedicated to teaching astrophotographers how to effectively use PixInsight for deep-sky image processing.

[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 mid March Night Sky

For observers in the middle northern latitudes, this chart is suitable for mid March at 8 p.m. (daylight time) or late March at 9 p.m. (daylight time).

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.

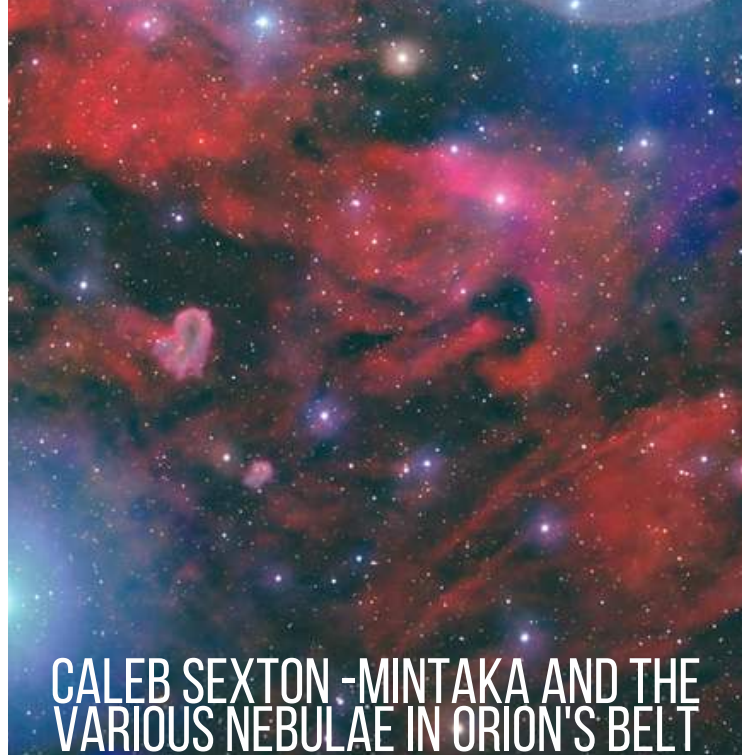
Navigating the March night sky: Simply start with what you know or with what you can easily find.

- 1 Above the northeast horizon rises the Big Dipper. Draw a line from its two end bowl stars upwards to the North Star. Its top bowl stars point west to Capella in Auriga, nearly overhead. Leo reclines below the Dipper's bowl.
- 2 From Capella jump northwestward along the Milky Way to Perseus, then to the "W" of Cassiopeia. Next jump southeastward from Capella to the twin stars of Castor and Pollux in Gemini.
- 3 Directly south of Capella stands the constellation of Orion with its three Belt Stars, its bright red star Betelgeuse, and its bright blue-white star Rigel.
- 4 Use Orion's three Belt stars to point northwest to the red star Aldebaran and the Hyades star cluster, then to the Pleiades star cluster. Travel southeast from the Belt stars to the brightest star in the night sky, Sirius. It is a member of the Winter Triangle.

Binocular Highlights

A: Between the "W" of Cassiopeia and Perseus lies the Double Cluster. B: Examine the stars of the Pleiades and Hyades, two naked eye star clusters. C: M42 in Orion is a star forming nebula. D: Look south of Sirius for the star cluster M41. E: M44, a star cluster barely visible to the naked eye, lies to the southeast of Pollux. F: Look high in the east for the loose star cluster of Coma Berenices.





CALEB SEXTON -MINTAKA AND THE
VARIOUS NEBULAE IN ORION'S BELT



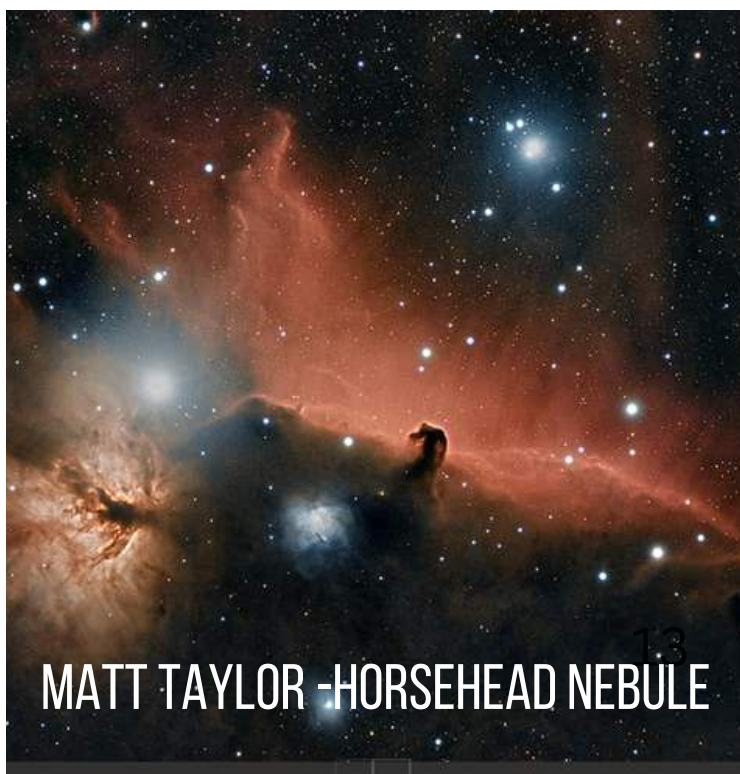
ANDREW STONE -IC443 JELLYFISH



ANDREW STONE -NGC2264



KRIS MLAK-M45



MATT TAYLOR -HORSEHEAD NEBULE



An "Oh! Wow!" moment

High magnification viewing of the Galilean moons



Are you ready for a solar system observing activity?
Try viewing the tiny disks of the Galilean moons of Jupiter!

- Attempt on a night with good seeing. You need to resolve 1.1 arc seconds.
- Best when Jupiter is in Taurus or Gemini, and reaches its nightly culmination. This places it high above the horizon for minimal atmospheric distortion.
- Best when Jupiter is near opposition. This gives the greatest disk diameter of the moons.
- Use at least 300 magnification. This gives a magnified diameter for Ganymede of 300 times its true angular diameter.
- Polar alignment is very helpful, and tracking is a plus.

If you have resolved the disk of Neptune, you likely will be able to discern the disks of the Galilean moons at high magnification (>300x).

Note:

Is Ganymede noticeably wider than Io and Europa?

Are there any apparent color differences among the four moons?

Are there albedo differences among the moons?

Moon	Magnitude	Diameter (miles)	Angular Diameter (arc sec)	Albedo
<i>Io</i>	4.9	2264	1.2	0.63
<i>Europa</i>	5.2	1940	1.1	0.67
<i>Ganymede</i>	4.5	3274	1.8	0.43
<i>Callisto</i>	5.5	2995	1.6	0.22

Relative angular diameters of various bodies in the solar system

Near Opposition						Near Conjunction
<i>Europa</i> , 1.1 sec	<i>Io</i> , 1.2 sec	<i>Callisto</i> , 1.6 sec	<i>Ganymede</i> , 1.8sec	<i>Neptune</i> , 2.3 sec	<i>Uranus</i> , 3.8sec	<i>Mars</i> , 3.9sec

Jupiter, near Opposition
Angular diameter: 48 arcsec
Diameter: 86881 miles

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.

Posted 12/2025 Thinning the herd a little bit more. 41MM Panoptic, body is in great condition. Optics are clean with no blemishes. Includes paperwork on features and design. Price on the Panoptic is \$450, Price includes PayPal and shipping to the lower 48. Any questions? Please get in touch. m42astronomer@gmail.com



Posted 1/2026 Maxvision EXOS-2/EQ5 GOTO Mount w/1.5-inch steel tripod w/Bresser ASCOM SW&Cable \$449.95 <https://www.ebay.com/itm/167985261719> NIKON D5100 DSLR Astronomy Camera /Full-Spectrum Astro Modified \$289.95 <https://www.ebay.com/itm/167989296026> Explore Scientific iEXOS-100 Go To Equatorial Mount w/Tripod & Azimuth Adjuster \$249.95 <https://www.ebay.com/itm/168021245863> Contact : Mathew A. Taylor mathewallantaylor@gmail.com

NEW

Posted 2/2026 Used Celestron Nexstar 6SE Schmidt -Cassegrain Go-To telescope bundle with extra Celestron FirstScope telescope as extra. Both telescopes in great condition. Come with the following items.

NexStar 6SE telescope with tripod,StarSense Auto align,SkySync GPS,NexImage Solar System Imager, EZ Finder red dot scope X2, Celestron phone mount, Celestron Solar filter,Celestron 3x Barlow,Orion 2x Barlow,Celestron 32mm Plossl 1.25" eyepiece,Celestron 25mm Plossl 1.25" eyepiece, Celestron 5mm X-Cel 1.25" eyepiece, Celestron 1.25" Star Diagonal, Celestron Firstscope telescope Contact Kristen Morris for more photos and information.

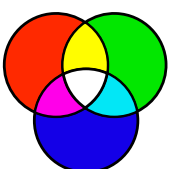
kristen.lee.morris@gmail.com



SPECIAL OFFER

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.



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

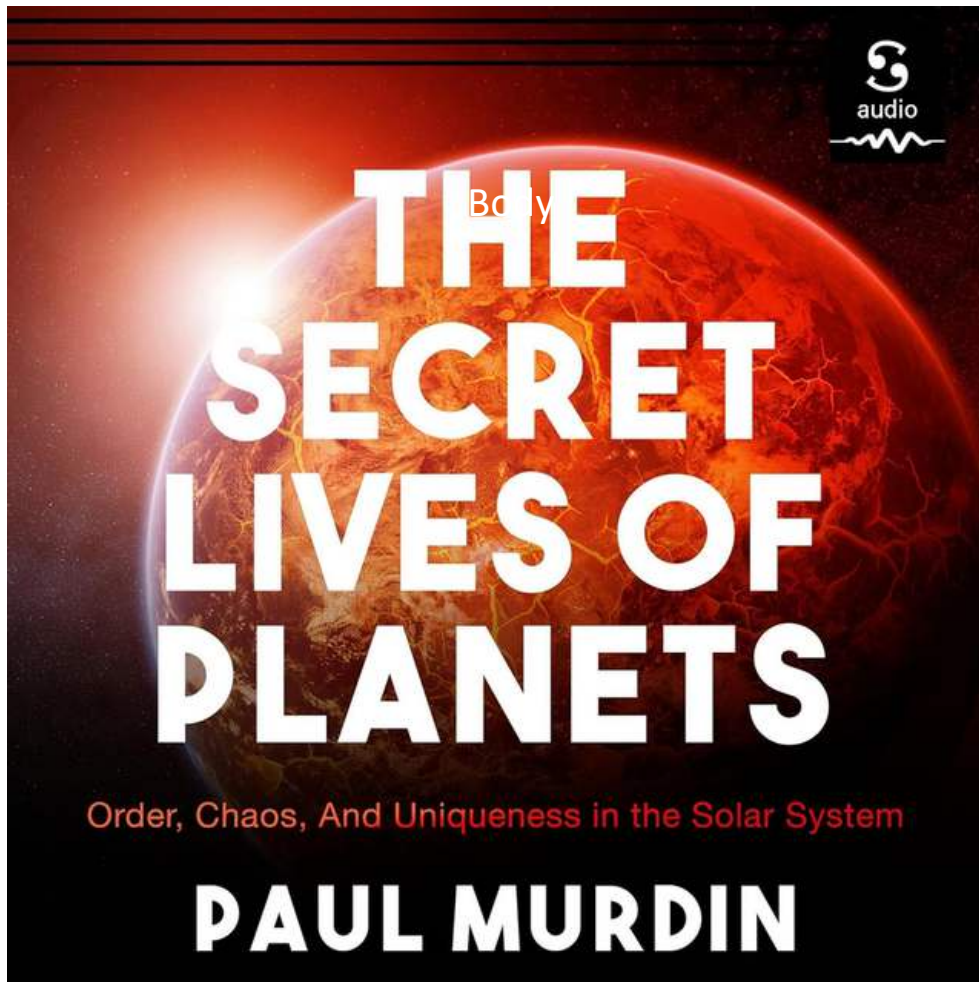
Accessory Kit #5 – 1.25" Eyepieces & filters





The 2026 Book Club

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



The Secret Lives of Planets: Order, Chaos, and Uniqueness in the Solar System by Paul Murdin.

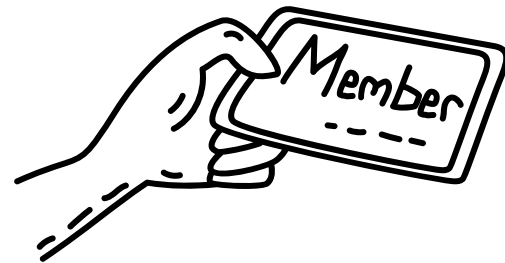
In insider's guide to astronomy reveals everything you need to know about the planets, their satellites, and our place in the solar system.

We have the impression that the solar system is perfectly regular like a clock or a planetarium instrument. On a short timescale it is. But, seen in a longer perspective, the planets, and their satellites, have exciting lives, full of events. For example, did you know that Saturn's moon Titan boasts lakes that contain liquid methane surrounded by soaring hills and valleys, exactly as the earth did before life evolved on our fragile planet?

Or that Mercury is the shyest planet? Or that Mars's biggest volcano is 100 times the size of Earth's, or that its biggest canyon is 10 times the depth of the Grand Canyon, or that it wasn't always red, but blue? The culmination of a lifetime of astronomy and wonder, Paul Murdin's enchanting new book reveals everything you ever wanted to know about the planets, their satellites, and our place in the solar system.



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. 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!



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Star Tours Team 2026

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

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

