Prescott Astronomy Club

Ephemeris

The Official Newsletter of the Prescott Astronomy Club (PAC)
e-phem-er-is: a time-based listing of future positions of solar system objects.

December 2023

Original Photo: Lucas Pezeta

It's Time to Renew Your Club Membership for 2024

As 2023 draws to a close, it's now time to renew your Prescott Astronomy Club membership for 2024. We have another exciting year planned, & all current members are encouraged to renew before the end of December. Individual club membership is still only $25 for the year, & a family membership is still only $35 for the year. New members are also invited to join. Membership is open to anyone with an interest in astronomy, & you do not need to own a telescope to become a member.

You can easily renew by going online and following these steps:

- Go to https://prescottastronomyclub.org/membership/
- Under the "Payments" section, use the "Type" drop-down box to select either an Individual or Family membership.
- Use the "Duration" drop-down box to select "JAN-DEC ANNUAL/RENEWALS".
- Click on the "Select" button.
- Click on the "Add to Cart" button.
- A box containing the items in your cart should appear. Click on "Checkout with PayPal". You should then be redirected to a PayPal log-in. You can pay with PayPal or use the "Pay with Debit or Credit Card" button to pay by credit card.
- If your contact information has changed, complete the "Tell Us About You" section and click on "Email Enrollment".

If you don't like using online payment systems, you can instead send us a check using the form attached to the end of this newsletter.
Don't delay and renew today! We look forward to seeing you at our 2024 club meetings, star parties, outreach events, and social activities.

Results in the Election for Officers and Directors-at-Large 2024

The following candidates were approved by the Prescott Astronomy Club:

President- Art Arnold-Roksandich — Member since 2019. He has served as Treasurer and as the President for the last 2 years. He is running for a third term.

Vice President- Brian Blau — Member since 2021. He is running for a third term as Vice President.

Treasurer- Roland Albers — Member since 2021. He has served as Secretary and as Treasurer for the past year. He is running for a second term as treasurer.

Secretary- Jack Evans — Member since 2022. He is running for a second term as Secretary.

Directors-at-Large serve two year terms.

Lisa Anderson is running to replace EJ Van Horne. EJ will stay on as a webmaster. Lisa has a lot of previous club management experience. She currently has responsibility for arranging speakers and will pick up the field trip for 2024. Member since 2023.

Ken Olson is running for another 2 year term. He oversees Astro League coordination. Member since 2021.

Susanne Vaughn will serve the second year of her term. She plans events. Member since 2021.

Doug Tilley will serve the second year of his term. He oversees the picnic and as advisor. Member since 2014.

Need More kNights in Shining Armor

Wow! The Prescott Astronomy Club has come a long way in the last couple of years.

- Membership has grown from 43 memberships to over 80 (100 if you count family members).
- The speaker program has grown in popularity and our meeting attendance is larger than ever.
- New webmaster and new website
- New Editor updated the look of our newsletter.
- Our Starry nights and Outreach programs have increased, and public awareness has grown.
- METASIG has been restarted.

This is due to the hard work of the club's board and volunteers. I want to thank all of you for your enthusiasm and generosity.

Before the pandemic, membership and volunteer participation were declining which left the club ill-prepared to deal with the challenges of such a blow. In the meantime, our webmaster and newsletter editor retired after years of service. We have been able to fill the board again, replace our respected predecessors, grow our volunteer pool, and overcome the challenges we faced over the last two years.

Moving forward, we need more volunteers. Right now, we have 8 board members and 5 other volunteers that bear much of the load. There are another 5 or 6 people who regularly volunteer their time, telescopes, binoculars, and knowledge of the sky for Starry Nights and Outreach. To continue and grow our mission, the club needs more members to help. **Come and help with the Prescott Astronomy Club and spread the love of our hobby!**

LIST OF CURRENT NEEDS. Contact info is included or you can talk to the person or board member at the meeting.

Second Webmaster	Help with updates and support of website based on WordPress. Contact Brian Blau vp@prescottastronomyclub.org
Telescope Volunteers for Starry Nights and Outreach Star Parties	Expand our pool of telescope volunteers and guides, members who will answer questions and who people around the sky. Big events coming in October - Highland Center, Talking Rock, and Partial Solar Eclipse. Contact Brian Blau. vp@prescottastronomyclub.org
Picnic	Help with setup and clean up. Show up early or stay late.
Christmas Party	Assist with party favors, name cards, door prizes. Contact Susanne Vaughn susanne.vaughan@gmail.com
Refreshments	Help and backup snack table. Contact Jill Albers.

New Programs - programs waiting on volunteers to get started.

School Outreach	Contact and plan astronomical topics/activities with schoolteachers. Contact Art Arnold-Roksandich p@prescottastronomyclub.org
Outreach Coordinator	Private requests especially for young people camps, celestial events, such as eclipses, comets, etc. for public viewing. Contact Art p@prescottastronomyclub.org or Brian vp@prescottastronomyclub.org
Dark Site Committee	New committee for locating and listing dark sites near Prescott for members, possibly locating a permanent site for the club. Dark Sky Promotion - increase public awareness for preserving dark skies. Contact Brian vp@prescottastronomyclub.org
Publicity and Social Media	Notify local media of upcoming events. Establish a social media presence. Contact Art p@prescottastronomyclub.org
Club Merchandise	Design and select vendor to put our logo on mugs, water-bottles, t-shirts, caps, etc. Contact Art p@prescottastronomyclub.org
Videographer/Zoom	Video speakers and handle zoom as needed. Contact Art p@prescottastronomyclub.org

Original Photo: unknown

A Flame in the Sky — the Orion Nebula

By Kat Troche

It's that time of year again: winter! Here in the Northern Hemisphere, the cold, crisp sky offers spectacular views of various objects, the most famous of all being Orion the Hunter.

Photo Credit: *Stellarium Web*

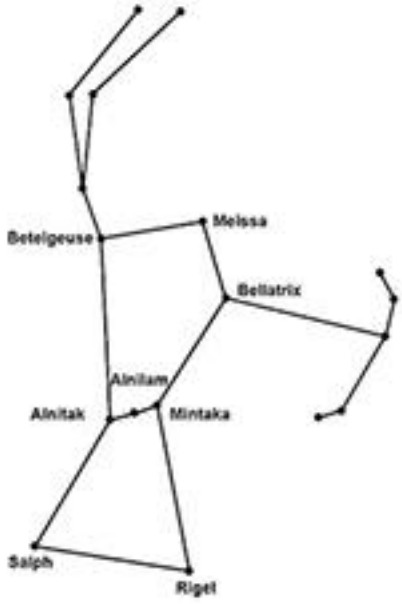
As we've previously mentioned, Orion is a great way to test your sky darkness. With your naked eye, you can easily spot this hourglass-shaped constellation. Known as an epic hunter in Greco-Roman, Orion and all its parts have had many names and meanings across many cultures. In Egyptian mythology, this constellation represented the god *Sah*. The Babylonians referred to it as *The Heavenly Shepard.* In most cultures, it is Orion's Belt that has many stories: *Shen* in Chinese folklore, or *Tayamnicankhu* in Lakota storytelling. But the Maya of Mesoamerica believed that part of Orion contained *The Cosmic Hearth* – the fire of creation.

1,500 light years away from Earth sits the star-forming region and crown jewel of Orion – Messier 42 (M42), the Orion Nebula. Part of the "sword" of Orion, this cloud of dust and gas sits below the first star in Orion's Belt, Alnitak, and can easily be spotted with the naked eye under moderate dark skies. You may also use binoculars or a telescope to resolve even more details, like the Trapezium: four stars in the shape of a baseball diamond. These young stars make up the core of this magnificent object.

Of course, it's not just for looking at! M42 is easily one of the most photographed nebulae around, by astrophotographers here on the ground, large ground-based observatories, and space telescopes alike. It has long been a place of interest for the Hubble, Spitzer, and Chandra X-ray Space Telescopes, with James Webb Space Telescope joining the list in February 2023. Earlier this year, NASA and the European Space Agency released a new photo of the Orion Nebula taken from JWST's NIRCam (Near-Infrared Camera), allowing scientists to image this early star forming region in both short and long wavelengths.

Photo Credit: *ESA/Webb, NASA, CSA, M. Zamani (ESA/Webb), PDRs4ALL ERS Team*

But stars aren't the only items photographed here. In June 2023, JWST's NIRCam and MIRI (mid-infrared instrument) imaged a developing star system with a planetary disk forming around it. That's right – a solar system happening in real time – located within the edges of a section called the Orion Bar. Scientists have named this planet-forming disk **d203-506**, and you can learn more about the chemistry found here. By capturing these objects in multiple wavelengths of light, we now have even greater insight into what other objects may be hiding within these hazy hydrogen regions of our night sky.



In addition to our Dark Sky Wheel, a fun presentation you can share with your astronomy club would be our *Universe Discovery Guide: Orion Nebula, Nursery of Newborn Stars* activity. This will allow you to explain to audiences how infrared astronomy, like JWST, helps to reveal the secrets of nebulae. Or, you can use public projects like the NASA-funded MicroObservatory to capture M42 and other objects.

Learn more about what to spy in the winter sky with our upcoming mid-month article on the Night Sky Network page through NASA's website!

Backyard Astronomer

Original Photo: Eberhard Grossgasteiger

The Backyard Astronomer – December 2023

Geminids Meteor Shower

By Adam England, The Backyard Astronomer

Meteor showers are generally produced when the Earth passes through the remnant tail of a comet, often long after it has visited our inner Solar System. July's Perseids are a gift from Comet Swift Tuttle (last close approach in 1995), the Eta Aquariids in May and Orionids in October come from the path Halley's Comet (1986), and each November we see the Leonids courtesy of comet Tempel-Tuttle (1998). Only two major meteor showers are the product of something other than a comet, the Geminids being the most active, and visible throughout mid-December.

Photo Credit: Geminids, Asim Patel, courtesy Wikimedia Commons.

NASA's Parker Solar Probe has been studying the sun since 2018 and holds the record of fastest human-made object, with a maximum speed of about 690,000 km/h or 430,000 mph. Its study of the sun has also provided valuable data on objects that orbit the sun, including the asteroid 3200 Phaeton. Classified as an Apollo asteroid for its Earth-crossing orbit, it is the largest and most studied asteroid passing closest to our Sun. The data from the Parker Solar Probe lends credence to the hypothesis that a much larger body was catastrophically torn apart by the Sun's immense gravity, leaving behind 3200 Phaeton and at least two other large asteroids, and a debris field stretching for millions of miles through space.

The tails of comets leave behind icy dust particles that may create a meteor shower on Earth. By comparison, the detritus remaining from the cataclysmic event that created 3200 Phaeton is more rocky and often larger in diameter, offering bright, multi-colored meteoroids for your viewing pleasure. Peaking on the early morning hours of December 13th through 15th, this rubble collides with our atmosphere at speeds of 35 km/s or 22 miles per second, which while seemingly fast, is slower than many other meteor showers, allowing for long, bright streaks across the sky. The fireballs will mostly appear to emanate from the Gemini constellation, with this point of origin called the radiant.

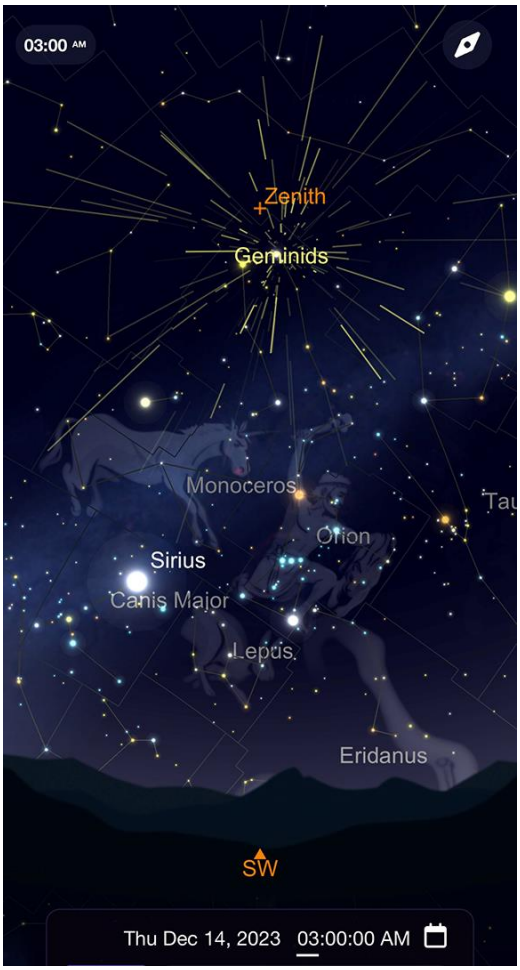


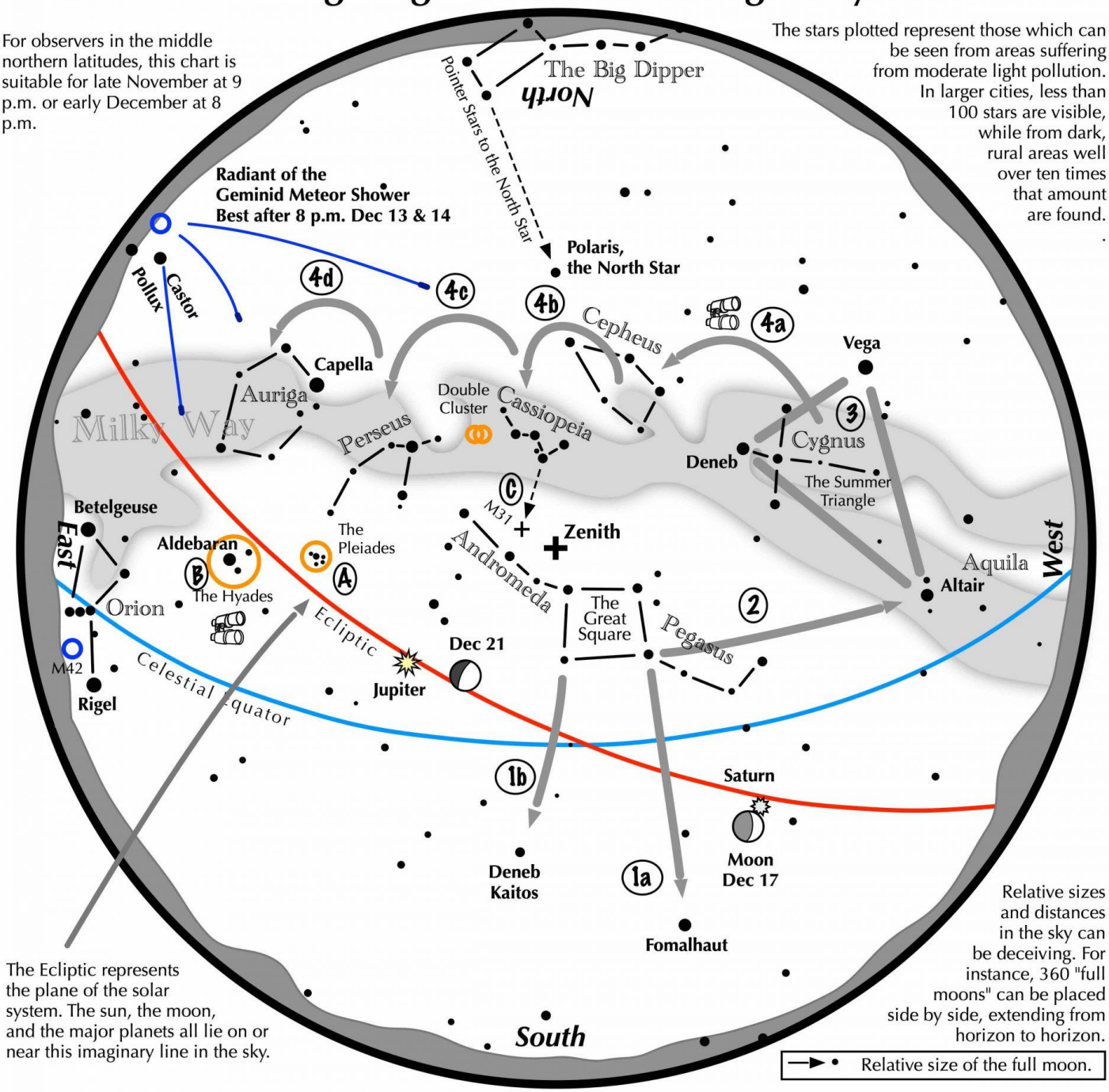
Photo Credit: Geminids, 12/14/2023 at 3AM MST, SkySafari.

Step outside in the early hours of Thursday 14 December. Look to the South Southwest, find the belt of Orion, and continue up to the bright twins Castor and Pollux. Bring a blanket for the cool late fall morning, and you could enjoy more than 120 shooting stars per hour on this dark, moonless night.

Adam England is the owner of Manzanita Insurance and Accounting and moonlights as an amateur astronomer, writer, and interplanetary conquest consultant. Follow him @ Facebook.com/BackyardAstronomerAZ and Instagram.com/TheBackyardAstronomerAZ.

Original Photo: George Desipris

Navigating the December Night Sky



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

1. Face south. Almost overhead is the "Great Square" with four stars about the same brightness as those of the Big Dipper. Extend an imaginary line southward following the Square's two westernmost stars. The line strikes Fomalhaut, the brightest star in the southwest. A line extending southward from the two easternmost stars, passes Deneb Kaitos, the second bright star in the south.
2. Draw another line, this time westward following the southern edge of the Square. It strikes Altair, part of the "Summer Triangle."
3. Locate Vega and Deneb, the other two stars of the "Summer Triangle. Vega is its brightest member while Deneb sits in the middle of the Milky Way.
4. Jump along the Milky Way from Deneb to Cepheus, which resembles the outline of a house. Continue jumping to the "W" of Cassiopeia, to Perseus, and finally to Auriga with its bright star Capella.

Binocular Highlights

A and B: Examine the stars of the Pleiades and Hyades, two naked eye star clusters.
C: The three westernmost stars of Cassiopeia's "W" point south to M31, the Andromeda Galaxy, a "fuzzy" oval.
D: Sweep along the Milky Way from Altair, past Deneb, through Cepheus, Cassiopeia and Perseus, then to Auriga for many intriguing star clusters and nebulous areas.

Astronomical League *www.astroleague.org/outreach; duplication is allowed and encouraged for all free distribution.*

AND

For those with access to YouTube or Amazon Prime Video (i.e. just about everyone), there is a documentary film available titled "WOW Signal". It is, of course, about the eponymous August 15, 1977 radio signal from space and the search for extraterrestrial intelligence in general. But it also includes a history of radio astronomy in the US and its importance to the science of astronomy in general.

"WOW Signal" was made in 2017 and was released to streaming media in 2020. It runs 88 minutes and is worth watching if you haven't already seen it.

From James Vaughan

Original Photo: Zukiman Mohamad

IC 1848 Soul Nebula
Emission Nebular Located in Cassiopeia
100 ly across, distance 7500 ly
11/21-22/202

Equipment: William Optics Zenithstar 61 (360mm focal length), 0.8x reducer, ASI533MC Pro camera, ZWO Duo narrowband filter, Celestron AVX mount, 30mm f4 + ASI120MM mini camera guider, on-mount minicomputer for sequencing

Capture info, Prescott AZ on 11/21-22/2023

Image details: 180s x 145 images (7.25 hrs), HOO pallet, AstroPixelProcessor for stacking, Pixinsight for image integration and finishing

Photo Credit: Brian Blau

Orme School Star Party
11/21-22/2023 11/03/2023

Even though there was smoke in the air from a prescribed burn, they managed to impress the students with images of Jupiter, Saturn, and double stars. Lisa Anderson and Fred Oswald were there, too, but I didn't get any photos of them setting up because it got too dark for my camera.

Photo Credit: Susanne Vaughan

Original Photo: Camille Cox

December 2023:

This calendar is from In-the-Sky.org & shows the objects & events visible during December 2023.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1	2 Pheonicid Meteor Shower 2023
3	4 Mercury at Greatest Elongation East Moon at Apogee	5 Last Quarter Moon	6 Neptune Ends Retrograde December Cassiopeid Meteor Shower 2023	7 Puppid-Velid Meteor Shower 2023	8 Mercury at Dichotomy Mercury at Highest Altitude in Evening Sky	9 Close Approach of Moon & Venus Monocerotid Meteor Shower 2023

						Conjunction of Moon & Venus
10	11	12 α-Hydrid Meteor Shower 2023 New Moon Large Megellanic Cloud is Well-Placed	13 Moon at Perihelion	14 Conjunction of Moon & Mercury Geminid Meteor Shower 2023	15 Running Man Cluster is Well-Placed Orion Nebula is Well-Placed	16 Comae Berenicid Meteor Shower 2023 Moon at Perigee
17 Conjunction of Moon & Saturn Close Approach of Moon & Saturn	18	19 Lunar Occultation of Neptune First Quarter Moon	20 December Leonis Meteor Shower 2023 Mercury at Perihelion	21 Asteroid 4 at Opposition Winter Solstice	22 Close Approach of Moon & Jupiter Conjunction of Moon & Jupiter Mercury at Inferior Solar Conjunction Asteroid 9 Metis at Opposition	23 Ursid Meteor Shower 2023
24 Close Approach of Moon & M45	25 Comet 62P/ Tsucchinshan Passes Perihelion Lunar Occultation of Beta Tauri	26 Full X Moon Moon at Apehelion	27 Asteroid Astraea at Opposition	28	29 Cluster NGC-2232 is Well-Placed	30 Rosette Nebula is Well-Placed Jupiter Ends Retrograde
31						

Original Photo: Egil Sjøholt

We'd Love Your Photos & Ideas for the Newsletter!

I am requesting any & all photographer members of PAC to submit astronomical &/or sky photographs to share with all the members by their inclusion in Ephemeris. Images can be sent to Hilary Legacy at ed@prescottastronomyclub.org. Please include descriptions of equipment, cameras, image capture parameters & processing, as well as what's in the image, & when & where you took it. Or, for anyone who likes to photo edit or make their own images, I'd love to hear from you too. Thanks!

I'm also asking for anyone with ideas of things we could put in our newsletter to contact me. If there's something you'd like to see here, then tell me about it. Email Hilary Legacy at ed@prescottastronomyclub.org.

Original Photo: Joonas Kääriäinen

Observing lists are available in PDF format on the PAC website to provide guidance & goals for visual & astrophotography programs. This list These lists graciously provided by Past President David Viscio to assist in planning your observation activities. The lists are in PDF format and may be viewed, downloaded or printed with the permission of David Viscio.

Astroleague Lunar 100
Bright Nebulae Dunlop 100.
Globular Clusters
Messier
Planet Maps
Binocular Showpieces Caldwell
Face-On Spiral Galaxies
Herschel II
Herschel 400
Royal Astronomical Society of Canada Finest NGC Saguaro Astronomy Club Best NGC S&T

SCAVENGER HUNTS IN THE SKY
Lists for Any Occasion

Need ideas for your visual or astrophotography program? We have you covered with observing lists for your personal exploration or use at a star party.

Click on the links below to open an observation list in another window to view or print it.

Astroleague Lunar 100
Astroleague Urban
Binocular Showpieces
Bright Nebulae
Caldwell Objects
Double Stars
Dunlop 100 (Southern Hemisphere)
Face-On Spiral Galaxies
Globular Clusters
Herschel 400
Herschel II
Hidden Treasures
Messier Objects
Open Clusters
Planet Maps
Planetary Nebulae
RAS of Canada Finest NGC
Saguaro Astronomy Club Best NGC
Secret Deep
Space & Telescope Lunar 100
Telescope Showpieces by Month

Original Photo: Tobias Bjørkli

PAC Board of Directors:

President: Art Arnold-Roksandich
Vice-President: Brian Blau
Secretary: Jack Evans
Treasurer: Roland Albers

PAC Directors-at-Large:

Ken Olson
Doug Tilley
Susanne Vaughan
EJ Van Horne

PAC Coordinators:

Astronomical League Coordinator: Ken Olson
Christmas Party: Susanne Vaughan
Equipment Loans: Roland Albers
Membership: Roland Albers
METASIC: John Dwan
Newsletter: Hilary Legacy
Night Sky Network: Open

Outreach Coordinator: Brian Blau
Refreshments: Jill Albers
Speakers: Lisa Anderson
Starry Nights Coordinator: Brian Blau
Summer Picnic: Doug Tilley
Webmaster: EJ Van Horne

PAC Contact Information:

Website: https://www.prescottastronomyclub.org
Email: pacinfo@prescottastronomyclub.org

PAC Mentors:

If you need advice on the purchase of astronomy equipment, setting up equipment, astrophotography, etc., contact a PAC mentor.

Astrophotography: Brian Blau
General & Astrophotography: David Viscio
Visual Observation: Greg Lutes

Original Photo: Jeremy Müller

Ask a Member!

A 15-minute segment is being added to the regular general meetings where members can have their burning questions answered by other knowledgeable members. If you have an astronomy-related question you would like answered, submit it to Art Arnold-Roksandich at p@prescottastronomyclub.org. You can also bring up the question at the meeting.

Prescott Astronomy Club Membership Form

☐ New Member ☐ Renewing Member ☐ Change of Info

Please print legibly!
(DO NOT LEAVE DATES AND NAMES BLANK)

Name: _____ Today's Date: _____

(If renewing and there is a change in contact information, enter info only in fields with a change.)

Mailing Address:

City: _____ State: _____ Zip: _____

Home Phone: (____) ____—_____ Day Phone: (____) ____—_____-

E-Mail: _____

Additional Family Members: _____

_____

Name As to appear on Badge: _____ Caption: _____
Name As to appear on Badge: _____ Caption: _____
Name As to appear on Badge: _____ Caption: _____
Name As to appear on Badge: _____ Caption: _____

(Caption is a nick name or Club position and is optional)

(CIRCLEONE)

MEMBERSHIPTYPE:	SINGLE	FAMILY	JUNIOR	
Jan - Dec (new and renewals)	$25.00	$35.00	$15.00	
Apr - Dec (new members only)	$18.75	$26.25	$11.25	
Jul - Dec (new members only)	$12.50	$17.50	$7.50	
Oct - Dec (new members only)	$25.00	$35.00	$15.00	(Full year price for 15 months)

PAC Newsletter will be available online and by e-mail.

Do you wish to receive your Reflector magazine by: ☐ Mail or ☐ E-mail (Please check one or both) ☐ Neither.

Do you want to OPT-IN for advertising and notices from the Astronomical League? ☐ Yes ☐ No (Please check one)

For new applications or renewals, make a check payable to: **Prescott Astronomy Club**

Send to: Prescott Astronomy Club, 186 E. Sheldon St. #1122, Prescott, AZ 86301

E-mail questions to: t@prescottastronomyclub.org

Prescott Astronomy Club Membership Form

Name: _____ Today's Date: _____

Please tell us something about yourself and your interest in astronomy. This will assist us in planning programs and activities which you will find the most beneficial.

1. How would you classify yourself as an amateur astronomer? ☐ Beginner ☐ Intermediate ☐ Advanced
2. Do you own a telescope? ☐ Yes ☐ No Type/Size _____
3. Are you looking for assistance in choosing a telescope? ☐ Yes ☐ No
4. Would you like assistance working with a telescope or astrophotography? ☐ Yes ☐ No
5. Which aspects of the Astronomy Club and astronomy are you most interested in: (*Check as many as you wish*)

☐ Social
☐ Observing
☐ Computing
☐ Access to professional quality equipment
☐ Sidewalk Astronomy
☐ Meetings
☐ Astrophotography/imaging
☐ Speaker program
☐ Amateur Telescope Making (ATM)
☐ Other (specify)

_____

6. Do you have any special skills/job/occupation that might benefit the club? _____

_____

7. Would you volunteer for committee work assisting or leading one or more of the following?

☐ Board of Directors
☐ Trip planning
☐ Astronomical League Coordinator
☐ Highlands Center Coordinator
☐ META SIG*
☐ Night Sky Network
☐ Publicity Coordinator
☐ Starry Nights Coordinator
☐ Brochure planning
☐ Facebook Administrator
☐ Greeter
☐ Hospitality (refreshments)
☐ Newsletter
☐ PAC Store Sales
☐ School and Camp Outreach
☐ Website Administrator

*META SIG (Meet, Eat, and Talk Astronomy Special Interest Group) is a monthly social event at a local restaurant

PAC also has a Special Interest Group for Astrophotography.