



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.

March 2024



Original Photo: Lucas Pezeta

Prescott Astronomy Club Meeting

Wednesday, March 6th, 2024, at 6:00pm
Prescott Public Library, Founder's Room

Speaker: Charity Woodrum from University of Arizona Steward Observatory, *JWST & NIRCam*

Topic: She will discuss humanity's most powerful telescope, the James Webb Space Telescope (JWST). The mission of JWST is to study the first stars and galaxies in the early Universe, the formation and evolution of galaxies across cosmic time, the birth of stars and protoplanetary systems, and the atmospheres of exoplanets. In her talk, she will discuss these science goals, as well as JWST's journey to space, some of her favorite images that have been released, and some of the most exciting scientific results that have been submitted for publication thus far.

Bio: Charity Woodrum is a Doctoral Candidate and National Science Foundation Graduate Research Fellow at the University of Arizona's Steward Observatory working under the supervision of Professor Marcia Rieke. She is also a member of NASA's James Webb Space Telescope Near Infrared Camera (NIRCam) science team and the JADES collaboration. She earned her B.S. in Physics at the University of Oregon.

ABSIC

Thursday, March 21st, 2024, at 6:00pm
Art's Residence, 2675 W. Rainmaker, Prescott

Topic: Star types and evolution.

Observation after discussion, weather permitting

Prescott Astronomy Club Meeting

Wednesday, April 3rd, 2024, at 6:00pm
Prescott Public Library, Founder's Room

Speaker: Dr. Jason Barnes of the University of Idaho, *NASA's Rotorcraft Lander Mission to Saturn's Moon Titan*

Topic: Dragonfly is a robotic octocopter space mission heading to Titan, the giant moon of Saturn. Dragonfly will land on the surface of the hazy moon to explore prebiotic chemistry, to evaluate its habitability, and to look for chemical biosignatures.

Bio: Dr. Barnes studies the physics of planets and planetary systems. He uses NASA spacecraft data to study planets that orbit stars other than the Sun and the composition and nature of the surface of Saturn's moon Titan. He is Deputy Principal Investigator on the Dragonfly NASA space mission, which will land a robotic rotorcraft on Titan in 2034.

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

Constant Companions: Circumpolar Constellations Part II

By Kat Troche

As the seasons shift from Winter to Spring, heralding in the promise of warmer weather here in the northern hemisphere, our circumpolar constellations remain the same. Depending on your latitude, you will be able to see up to nine circumpolar constellations. This month, we'll focus on: **Lynx, Camelopardalis, and Perseus**. The objects within these constellations can all be spotted with a pair

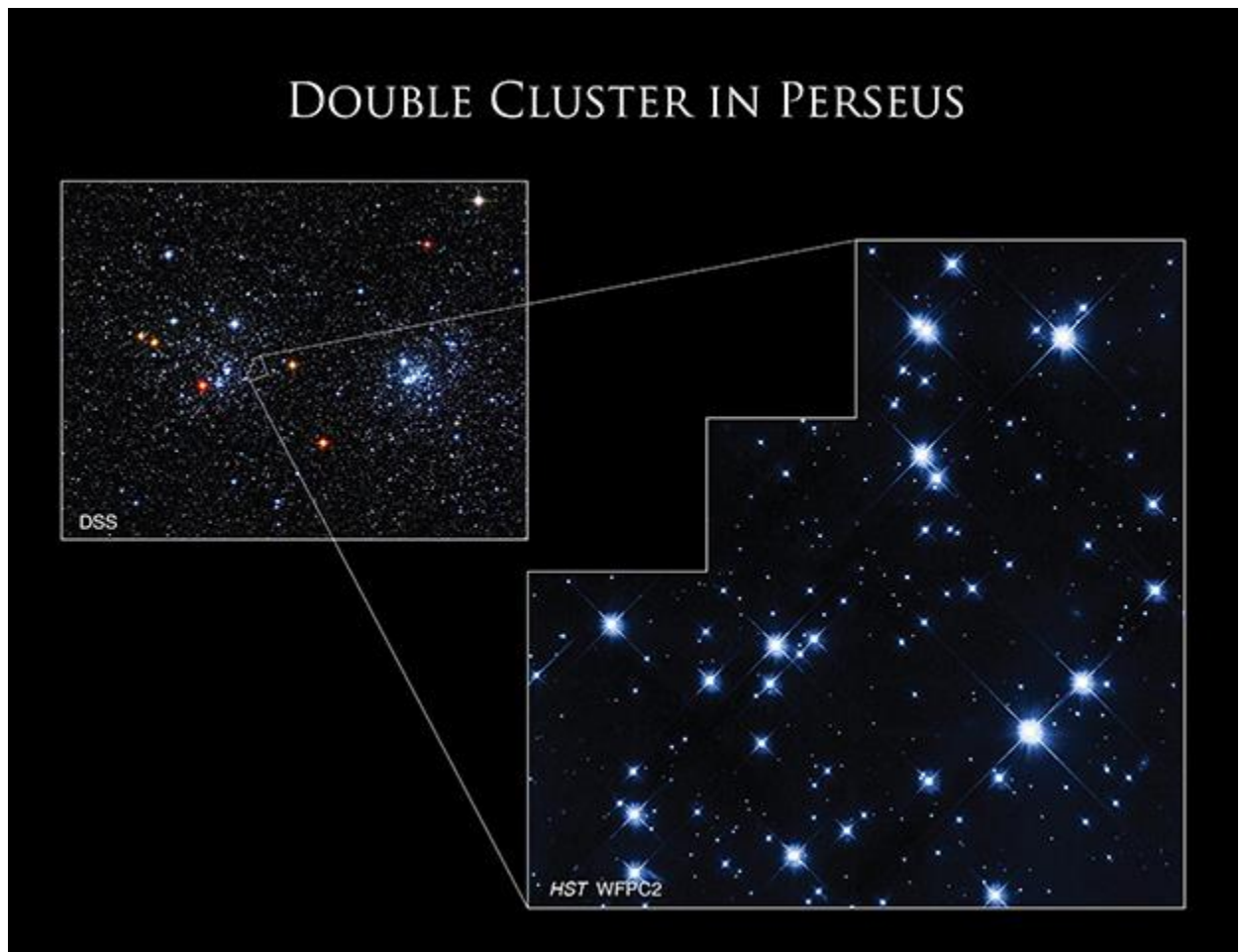


In the appearance of left to right: constellations Perseus, Camelopardalis, and Lynx in the night sky. Also featured: Cassiopeia as a guide constellation, and various guide stars.

Credit: Stellarium Web

- **Double Stars:** The area that comprises the constellation Lynx is famous for its multiple star systems, all of which can be separated with a telescope under dark skies. Some of the notable stars in Lynx are the following:
 - **12 Lyncis** – a triple star that can be resolved with a medium-sized telescope.
 - **10 Ursae Majoris** – a double star that was once a part of Ursa Major.
 - **38 Lyncis** – a double star that is described as blue-white and lilac.

Kemble's Cascade: This [asterism](#) located in Camelopardalis, has over 20 stars, ranging in visible magnitude (brightness) and temperature. The stars give the appearance of flowing in a straight line leading to the Jolly Roger Cluster (NGC 1502). On the opposite side of this constellation, you find the asterism **Kemble's Kite**. All three objects can be spotted with a pair of binoculars or a telescope and require moderate dark skies.



A ground-based image from the Digitized Sky Survey (DSS) in the upper left shows Caldwell 14, the Double Cluster in Perseus, with an outline of the region imaged by Hubble's Wide Field and Planetary Camera 2 (WFPC2).

Ground-based image: Digitized Sky Survey (DSS); Hubble image: NASA, ESA, and S. Casertano (Space Telescope Science Institute); Processing: Gladys Kober (NASA/Catholic University of America)

- **Double Cluster:** The constellation Perseus contains the beautiful Double Cluster, two open star clusters (NGC 869 and 884) approximately 7,500 light-years from Earth. This object can be spotted with a small telescope or binoculars and is photographed by amateur and professional photographers alike. It can even be seen with the naked eye in very dark skies. Also in Perseus lies **Algol, the Demon Star**. Algol is a triple-star system that contains an eclipsing binary, meaning two of its three stars constantly orbit each other. Because of this orbit, you can watch the brightness dim every two days, 20 hours, 49 minutes – for 10-hour periods at a time. For a visual representation of this, revisit [NASA's What's Up: November 2019](#).

From constellations you can see all year to a once in a lifetime event! Up next, find out how you can partner with NASA volunteers for the April 8, 2024, total solar eclipse 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 - March 2024

Vernal Equinox and Spring Beehives

By Adam England, The Backyard Astronomer



Image Credit: Beehive Cluster, Courtesy Stuart Heggie, NASA JPL.

Tuesday, 19 March, at exactly 8:06 PM MST, denotes the moment when the Sun will again be directly over Earth's equator. As viewed from Central Yavapai County at approximately 34.54° N, we will see the Sun appear to rise and set due East and due West, respectively. This is the Vernal Equinox, the rebirth of the Northern Spring, and a day celebrated by cultures around the world as an emergence from the long, cold Winter.



Image Credit: Beehive Cluster, Courtesy Joel Cohen, Prescott Astronomy Club.

Many ancient cultures began their calendar on the equinox, including Babylon, Persia, and even carries through to modern times with the official government Indian National Calendar or Shaka Calendar. The Angkor Wat complex of Cambodia was built nearly a millennium ago, with near perfect alignment to the Equinoxes, including the rising and setting of the sun over the central lotus tower on those dates, as well as sculptures and carvings that depict numerical representations of the number of days between each the Summer and Winter Solstices with the central Equinoxes. Western cultures, heavily influenced by the spread of Christianity, connect the Easter celebration to the equinox. The Paschal full moon, named from the Aramaic word for Passover, denotes the first full moon proceeding the vernal equinox, which this year will illuminate the night skies on March 25th, after which Easter is celebrated on the following Sunday. Due to the celestial mechanics of the equinox and the Lunar cycle, this may place Easter as early as March 22nd in some years or as late as April 25th in others. This pattern of celebrating of death and resurrection is not unique to Christianity and was likewise observed with direct correlation to this celestial event in the Roman festival of Hilaria and the Pagan holiday of Ostara. And throughout the Arab world, Mother's Day is commonly celebrated on the spring equinox.



Image Credit: Beehive Cluster on Vernal Equinox, SkySafari, 3/19/2024.

The 2024 equinox on March 19th will see the waxing gibbous moon spend the evening in the constellation Cancer, the Crab. Lying tangent that night to one leg of a triangle connecting the bright stars Regulus, Pollux, and Procyon, the Moon may guide you to the Beehive Cluster, as

separated by just a few degrees. With over 1,000 stars, and one of the closest open clusters to Earth, this is one of the best objects for a backyard astronomer to find with their small telescope or binoculars. Lying midway between Pollux and Regulus, this stellar nursery was documented by Galileo, Messier, Shur, and many other astronomers over the centuries. Add yourself to that list of astronomers on this night and count how many stars you can discern in this hive of activity, then revisit the Beehive Cluster later in the month when the bright moon has moved away and see if you are able to resolve more of the bees of the Beehive Cluster.

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](https://www.facebook.com/BackyardAstronomerAZ) and [Instagram.com/TheBackyardAstronomerAZ](https://www.instagram.com/TheBackyardAstronomerAZ).



Original Photo: George Desipris

PAC Loaner Telescopes

The Prescott Astronomy Club is pleased to offer to members the ability to borrow club-owned equipment for the purpose of astronomy education and becoming familiar with the operation of telescopes, mounts, and their accessories. The loaner program enables PAC members to use the available equipment as an introduction to amateur astronomy, or to those more advanced who want to try different observation equipment.

The following is a list of available telescopes:

- Bushnell 130mm $f/5$ Dobsonian reflector
- Orion 8" $f/5$ Dobsonian reflector
- Orion 6" $f/8$ Dobsonian reflector
- Skywatcher 10" $f/5$ Dobsonian reflector



Anyone who borrows a telescope must be a current member in good standing and must review and agree to follow the guidelines listed on the club website loaner scope page: <https://prescottastronomyclub.org/loaner/>.

Email your request for a loaner telescope to the PAC Treasurer (t@prescottastronomyclub.org).



Original Photo: Adrian Lang

Historic Radio Antenna Played a Part in the Discovery of Cosmic Microwave Background Radiation

By James Vaughan

In mid-June, 2023, the Holmdel Township, New Jersey committee voted to acquire two parcels of land on Crawford Hill, the site of the Holmdel Horn Antenna. The antenna, which still exists, was constructed in 1959 by Bell Labs as the receiving station for Project Echo, a project to determine if long-distance communication via satellite were possible. (The transmitting site was in Goldstone, California.) Project Echo used two aluminized mylar balloons, much like common party balloons, but 100 and 130 feet in diameter, respectively(!) The success of project Echo led to the existence of today's telecommunications satellites.



In 1965, following the completion of the project, Arno Penzias and Robert Wilson received permission to use the by-then disused antenna for astronomical purposes. Their goal was (after careful calibration and characterization of the equipment) to “make primary measurements of the intensities of several extraterrestrial radio sources. These sources could then be used as secondary standards by other observatories.” It was during the calibration process that, working at a wavelength of 7.35 cm, the two noticed an excess of radiation that could not be explained by the known temperature of the sky or by thermal radiation from the ground. This excess was confirmed to be the cosmic microwave background and it provided major confirmation of the then controversial “Big Bang Theory” of the origin of the Universe. Penzias and Wilson were awarded the Nobel Prize in Physics in 1978 for their discovery.

There is currently a historical marker at the site of the antenna, and the two parcels of land will become a public park to celebrate the structure's place in science history. More information and a map can be found online at: <https://maps.roadtrippers.com/us/holmdel-nj/points-of-interest/holmdel-horn-antenna>.

Sources:

- 1) *The ARRL Letter* (online publication), June 29, 2023
- 2) Robert Wilson, *The Cosmic Microwave Background Radiation*, Nobel lecture December 8, 1978



Original Photo: Zukiman Mohamad

Joel Cohen's Photographs

First Photo is a photo of the Total Eclipse of the Sun taken with a Lunt 80mm APO Refractor (No Filter) & Nikon D750 Full-Frame DSLR in Glendo, Wyoming on August 21, 2017.

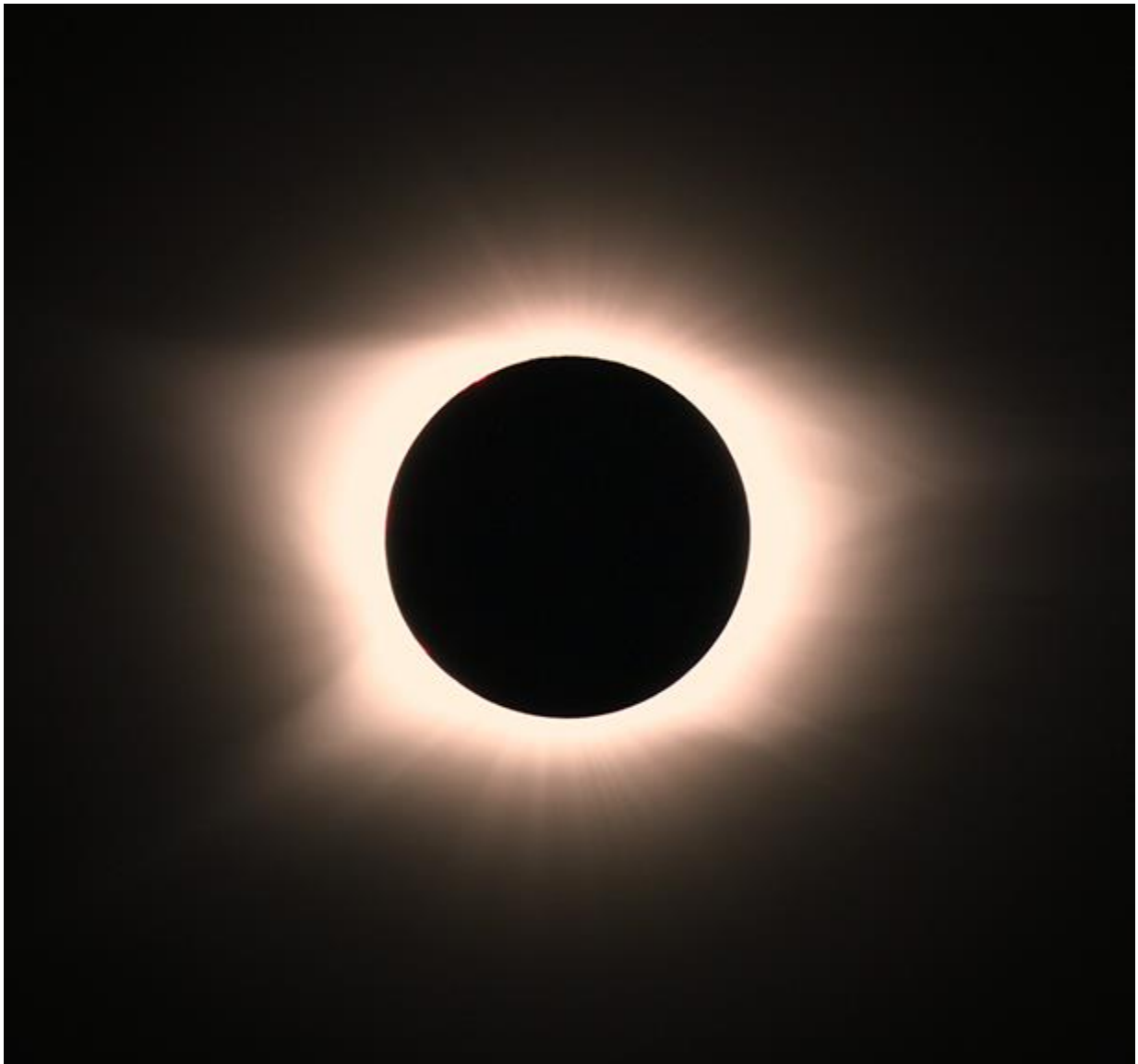


Photo Credit: Joel Cohen

Second Photo is a photo of the Moon at Half Phase taken with my TEC 200FL f/8 Fluorite APO Refractor & QHY 128 Pro CMOS Full-Frame Camera on my Astro-Physics 1200GTO mount from my backyard in Prescott Valley on July 8, 2019.



Photo Credit: Joel Cohen

Third Photo is a photo of the Planet Mercury Transit on May 9, 2016 taken with my Coronado 60mm Hydrogen-Alpha filter Telescope on and a Mallincam SLP CCD Camera on a Celestron AVX Mount from my backyard in Prescott Valley.

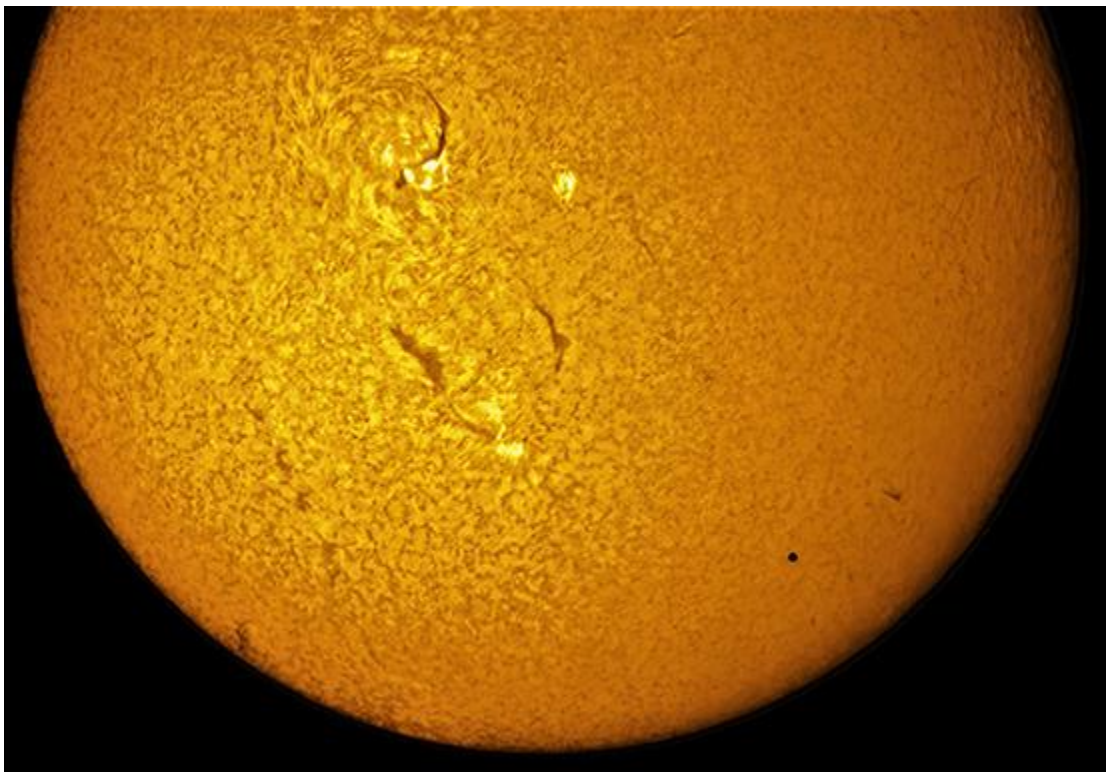


Photo Credit: Joel Cohen

Calendar of Events

Original Photo: Camille Cox

March 2024:

This calendar is from In-the-Sky.org & shows the objects & events visible during March 2024.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1	2 Theta Carinae Cluster is Well-Placed
3 Lunar Occultation of Antares Last Quarter Moon Asteroid 3 Juno at Opposition	4	5	6 PAC Meeting	7 Conjunction of Moon & Mars	8 Moon at Perihelion Conjunction of Moon & Venus Wishing Well Cluster is Well-Placed	9
10 Moon at Perigee New Moon	11 Asteroid 23 Thalia at Opposition	12	13 Close Approach of Moon & Jupiter Conjunction of Moon & Jupiter	14 γ-Normid Meteor Shower 2024 Close Approach of Moon & M45	15	16 Lunar Occultation of Beta Tauri First Quarter Moon
17 Neptune at Solar Conjunction Mercury at Perihelion	18	19 Venus at Perihelion March Equinox	20	21 Close Approach of Venus & Saturn Conjunction of Venus & Saturn	22 Mercury at Dichotomy	23 Moon at Apogee
24 Mercury at Highest Altitude in Evening Sky Mercury at Greatest Elongation East	25 Full Worm Moon Mercury at Greatest Elongation East	26	27 Moon at Aphelion	28	29	30 1362472 MakeMake at Opposition Lunar Occultation of Antares
31						

Call for Images & Ideas

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.



Observing Lists

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.

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](#)



PAC Business

Original Photo: Tobias Björkli

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

Lisa Anderson

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



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.