ASTRONOMY CLUB OF TULSA

OBSERVER

February 2024

Bringing Stars to the eyes of Tulsa since 1937

Editor – John Land

Heart Nebula IC 1805 by Tim Gilliland

Telescope - Stellarvue SV60EDS 330 mm, f5.5 Camera SBIG ST-8300M
Filters Astrodon OIII 3 nm · Astrodon Ha 5 nm · Astrodon Tru-Balance SII 3 nm
Twelve – 30 minute exposures with each filter
Software Pixinsight 1.8 · photoshop · PHD2 Guiding

The Heart Nebula IC 1805, is an emission nebula, 7500 light years away from Earth and located in the Perseus Arm of the Galaxy in the constellation Cassiopeia. It was discovered by William Herschel on 3 November 1787. The shape of the nebula is driven by stellar winds from the hot stars in its core. The nebula also spans almost 2 degrees in the sky, covering an area four times that of the diameter of the full moon

Observatory Stargazing Nights

Our GUESTS & Members nights are open to anyone. We do ask guests to try to RSVP.
Large groups need to make separate arrangements.

Members Only Nights are Open to members and their family
Details, Times and Direction Maps are posted on our Website
https://www.astrotulsa.com/events

Observatory Visitation Star Nights

SATURDAY Feb 3 5:15 PM Guest and Members Night –
Guest requested to RSVP -

FRIDAY Feb 9 5:30 PM Members Only night
Open to our members and their immediate family

SATURDAY Feb 17 10:30 AM to 1:30 PM Telescope Workshop at TASM
Details at https://www.astrotulsa.com/event/2024-Telescope-Workshop

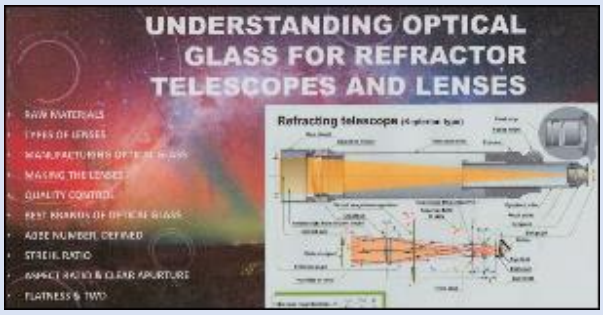
SATURDAY Mar 2 5:45 PM Guest and Members Night –
Guest requested to RSVP -

FRIDAY March 9 5:30 PM Members Messier Marathon Dusk to dawn
See details later in the newsletter

SUNDAY MARCH 10 DAYLIGHT SAVINGS TIME BEGINS

SATURDAY March 16 7:00 PM Daylight Time
Public Sidewalk Telescope night at Sand Springs Case Community Center
Details will be posted on Website later.

Friday Feb 16 - 7:00 PM Jenks High Planetarium 105 E B St, Jenks, OK
We invite both members and guests to join us for our In Person meeting.



This month's presentation will be given by Byron Labadie. He went to Springdale, Arkansas and met with Scott Roberts, owner of Explore Scientific in Springdale, Arkansas.
Byron did extensive research into the detailed process of making the glass optics used for telescopes and lenses, as well as the demanding specifications and tests needed to make the very finest glass. This will be an informative as well as comprehensive look at what goes into making high quality optics.

Saturday Feb 17, 2024
from 10:30 AM to 1:30 PM
Pre-Registration Required

Got a New Telescope ? (Or an old one gathering dust) Want some help learning to use it? Bring your telescope and let us help you. The Astronomy Club of Tulsa & Tulsa Air & Space Museum are hosting a Telescope Workshop. Participants can sign up for a 30 min individualized hands-on help session. See our events section for registration details.

https://www.astrotulsa.com/event/2024-Telescope-Workshop

Continuing our quest to create more opportunities for interaction and dialogue with members, we will be fielding your questions and comments at our public meeting on February 16. At our last meeting our Observing Chairman, Brad Young, addressed questions about the Astronomical League's many observing programs and about "Glint Evader" to predict and avoid satellite trails in Astro-photographs. So, keep your questions and comments coming through the contacts page on the club website, and we will respond to them at the next meeting or by email.

In that connection, at our next meeting, we plan to address questions about the club's annual "Messier Marathon" to be held for members on March 9, 2024. You will be seeing information on our website and in the Newsletter as well. The early spring skies offer the opportunity to view all 110 Messier Objects in one night – sunset to sunrise. Our Messier Marathon offers members this viewing opportunity at the observatory along with potluck eating and friendly conversation. Don't miss this opportunity to whatever extent your schedule and sleep patterns permit.

Also, at our February meeting we will address any other questions or comments you submit as well as plans for separate smaller daytime meetings where members can discuss special interest topics such as observatory upgrades, telescope equipment, science projects, observing techniques, astrophotography, 2024 solar eclipse, etc. We will be using the first 30 minutes or so of each meeting to address your questions and make important announcements. And the next 30 to 45 minutes of each meeting will be devoted to a featured speaker presentation. For February's meeting that will be an interesting presentation by Byron Labadie on Understanding Optical Glass In Refractor Telescopes And Lenses.

I hope to see you at the February 16 meeting, and I look forward to seeing your questions and comments.

"Bringing Stars to the Eyes of Tulsa since 1937"

Don Bradford - President

Vice President Message
Jonathan Fussell

Closer to Contact by Jonathan Fussell

With the success of the **J**ames **W**ebb **S**pace **T**elescope (JWST) firmly established, NASA is setting its sights on the next frontier of space exploration. The anticipation for the next generation of telescopes is palpable, fueled by the triumph of the JWST and the promise it holds for unravelling the mysteries of the cosmos. Among the ambitious projects in the pipeline, NASA is crafting an optical telescope of monumental proportions, poised to match the scale of the JWST. This upcoming telescope, known as the **H**abitable **W**orlds **O**bservatory (HWO), is not merely a technological successor but a visionary instrument with a grand mission—scouring the universe for signs of life on planets akin to our own, a quest slated to commence as early as the 2040s.

While the Nancy Grace Roman Observatory, scheduled for launch in 2027, and other contemporaries are poised to contribute significantly to our understanding of the cosmos, the HWO stands out with its distinctive goal. It represents a pivotal step forward in humanity's quest to explore the potential habitability of exoplanets. The success of the JWST, with its intricate technology and scientific discoveries, has not only validated NASA's capabilities but has also instilled a new level of confidence in pushing the boundaries of space exploration.

In the grand tapestry of astronomical instruments, the HWO is envisioned to play a unique role. Unlike its predecessors, this optical telescope is designed not only for groundbreaking observations but also for longevity and adaptability. Drawing inspiration from the success of the JWST, along with the technological advancements of the future Nancy Grace Roman telescope, and **L**arge **U**ltraviolet **O**ptical **I**nfrared **S**urveyor (LUVOIR), the HWO is planned to be stationed at the Lagrange Point 2 (L2), a gravitational equilibrium point about 1.5 million kilometers from Earth. What sets it apart is its emphasis on robotic servicing and upgrades, a feature that could potentially extend its operational lifespan for decades. This innovative approach, enabling a telescope to evolve with time, holds the promise of enhancing its scientific capabilities as technology advances.

While the specifics of the HWO are still taking shape, it is already capturing the imagination of the astronomical community as these telescopes primary mission will be to observe 25 confirmed exoplanets. It would then use spectroscopy to search for chemical “biosignatures” in these planets’ atmospheres, including gasses such as oxygen and methane which could serve as critical evidence for life. Although many details are yet to be finalized, the tantalizing prospect of a telescope dedicated to probing the atmospheres of Earth-like exoplanets and searching for signs of life has set the scientific community abuzz with excitement.

As the HWO emerges on the horizon of NASA's ambitious projects, it aligns with the broader aspirations outlined in astronomy's decadal survey. This community-led initiative serves as a compass, guiding funding agencies and policymakers in determining the trajectory of future astronomical endeavors. The decadal survey's endorsement of a new Great Observatories program, featuring a telescope capable of detecting signs of life on nearby Earth-like exoplanets, finds resonance in the HWO's mission.

The HWO, with its working name and visionary goals, represents a continuation of the legacy established by iconic telescopes like the Hubble Space Telescope and the JWST. By fusing cutting-edge technology with a commitment to serviceability, NASA aims to navigate the challenges of cost and efficiency that have sometimes shadowed previous endeavors. The telescope's technological foundations, drawn from established and developing technologies, reflect a prudent approach to ensure a smoother development process.

As Congress becomes a crucial player in determining the fate of the HWO, its success hinges on securing the necessary funds to turn this visionary project into a reality. The astronomical community, inspired by the strides made with the JWST, is eager to witness the HWO's journey from concept to deployment, envisioning it as a key player in unraveling the profound mysteries of the universe. The stage is set for the HWO to become a beacon of space exploration, pushing the boundaries of our cosmic understanding and, perhaps, bringing us closer to contact.

Clear skies and Godspeed,

Together, Let's reach for the Stars!

Jonathan Fussell - Vice President

This article is distributed by NASA's Night Sky Network (NSN).
The NSN program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, and more!

Constant Companions: Circumpolar Constellations Part 1

By Kat Troche via Night Sky Network (edited by Jonathan Fussell)

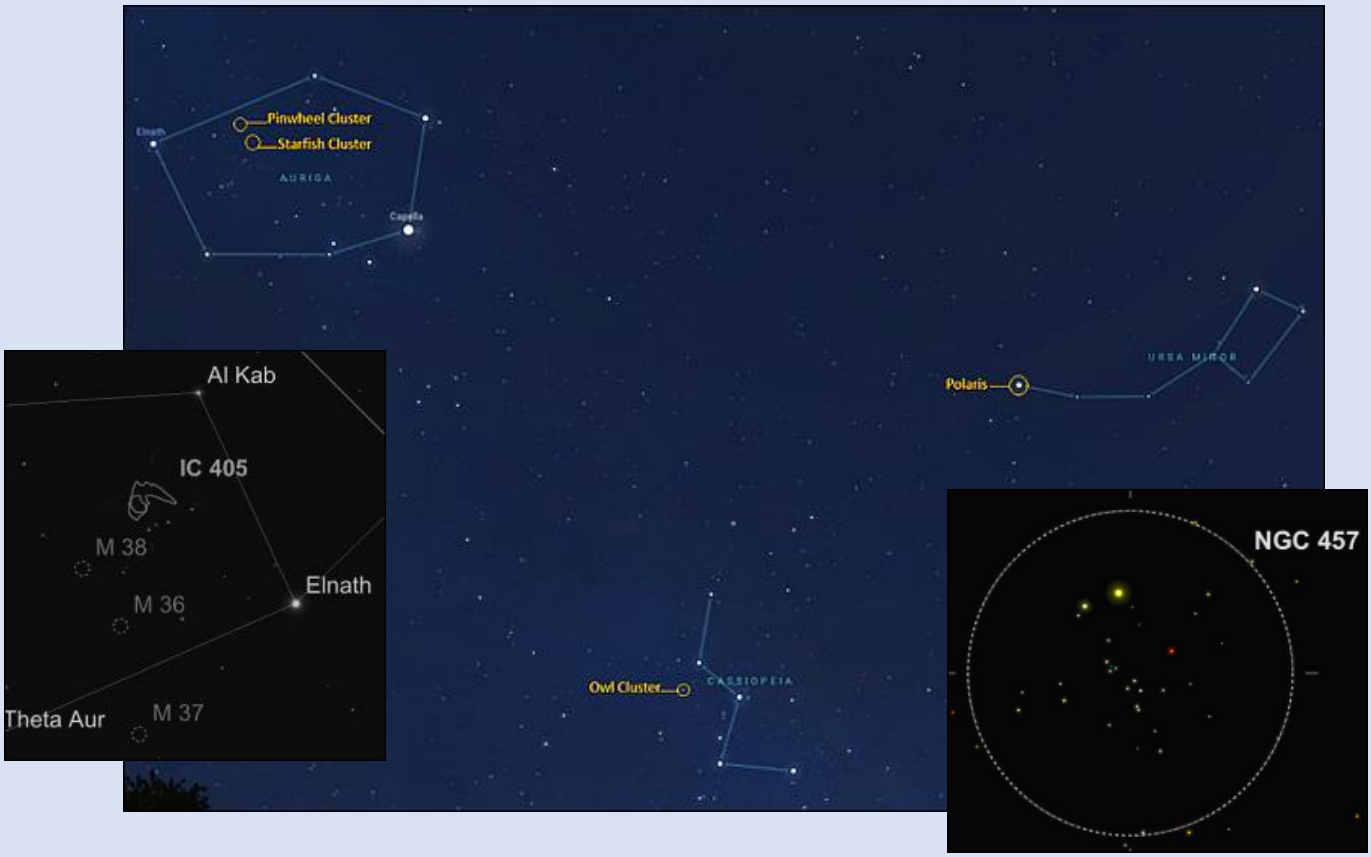
Winter in the northern hemisphere offers crisp, clear (and cold!) nights to stargazers, along with better views of several circumpolar constellations. What does circumpolar mean when referring to constellations? This word refers to constellations that surround the north and south celestial poles without ever falling below the horizon. Depending on your latitude, and your sky's **Bortle Scale** rating (*a measure of* ***how dark your sky appears***) you will be able to see up to nine circumpolar constellations in the northern hemisphere. Today, we'll focus on three that have gems within: Auriga, Cassiopeia, and Ursa Minor. These objects can all be spotted with a pair of binoculars or a small to medium-sized telescope.

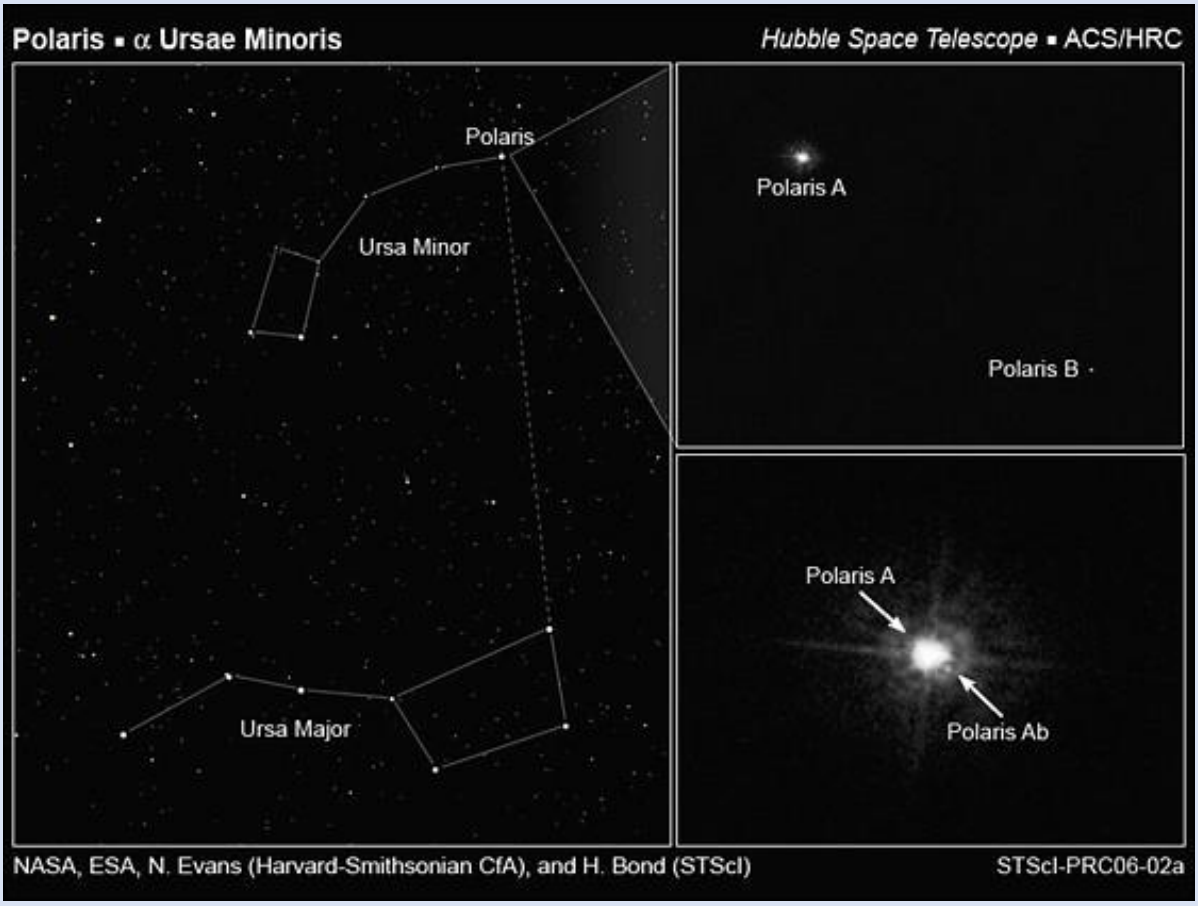
The Pinwheel Cluster - M36: Located near the edge of Auriga, this open star cluster is easy to spot with a pair of binoculars or small telescope. At just 25 million years old, it contains no red giant stars and looks similar to the Pleiades. To find this, draw a line between the stars Elnath in Taurus and Menkalinan in Auriga. You will also find the **Starfish Cluster – M38** nearby. Also look for the open cluster **M 37** in line with the other two.

The Owl Cluster – NGC 457: Located in the 'W' or 'M' shaped constellation Cassiopeia, is the open star cluster known as the **Owl Cluster**. Sometimes referred to as the E.T. Cluster or Dragonfly Cluster, this group of stars never sets below the horizon and can be spotted with binoculars or a small telescope.

Polaris: Did you know that **Polaris is a triple star system**? Look for the North Star on the edge of Ursa Minor, and with a medium-sized telescope, you should be able to separate two of the three stars. This star is also known as a *Cepheid variable star*, meaning that it varies in brightness, temperature and diameter. It's the closest one of its kind to Earth, making it a great target for study and **conceptual art**.

See Sky Charts on the next page.


Pinwheel Cluster
Starfish Cluster
AURIGA
Capella
Elnath
Polaris
URSA MINOR
Al Kab
IC 405
M 38
M 36
Elnath
Theta Aur
M 37
Ovil Cluster
CASSIOPEIA
NGC 457


Polaris ▪ α Ursae Minoris
Hubble Space Telescope ▪ ACS/HRC
Polaris
Ursa Minor
Ursa Major
Polaris A
Polaris B
Polaris A
Polaris Ab
NASA, ESA, N. Evans (Harvard-Smithsonian CfA), and H. Bond (STScI)
STScI-PRC06-02a

Click on these images to links on the Internet

CLEAR OUTSIDE

Tulsa National Weather Service

https://www.astroleague.org/observing-program-selector-grid/

***** The NEW CLEAR OUTSIDE icon above is a link to an extensive site showing cloud cover %, Seeing, Transparency, Moon Phase, Temp in ^{O} C and many other useful tools**

GOT A NEW TELESCOPE? Here are some sites to help you get started with you telescope.

Getting Started with Your New Telescope
https://skyandtelescope.org/astronomy-news/getting-started-with-your-new-telescope-2/

Astronomy for Beginners | Night Sky Facts, FAQs & Resources
https://skyandtelescope.org/astronomy-information/

What to Know Before Buying a Telescope
https://skyandtelescope.org/astronomy-news/what-to-know-before-buying-a-telescope/

See Website Observation Station for a collection of Interactive Sky Watching Tools
Moon phases - Sun rise & Set - Make your own custom interactive sky chart and more
Great website for printable Finder Charts of Solar System objects https://in-the-sky.org/

February - Moon Phases - -
3rd Q Fri Feb 2 - - New Fri Feb 9 - - 1st Q Fri Feb 16 - - Full Sat Feb 24

FEBRUARY PLANETS – VENUS is still our bright morning "star" but is much lower in the SE as dawn begins. easily visible in the SE well into the brightening dawn. It reaches its greatest elongation from the Sun on Jan 9th. It will remain in the morning sky until June. MARS begins to slowly climb away from the sun in morning sky. It is still quite dim due to his location on the far side of the sun. Venus and Mars have a close conjunction on February 22 about 1/2 degree apart. MERCURY is slipping lower each morning. It reaches superior conjunction on Feb 28 as it passes behind the sun.

JUPITER is still well placed of evening observation in the SW. Watch its four Galilean moons dance around it from night to night. Even small telescopes will show them along with its bands of clouds. At higher magnifications you may even catch the shadow of a moon transiting the planet. Our evening observing window for SATURN is about to close. Early in February you'll find it near the SW horizon as the sky darkens. Look for it 2 degrees above a thin crescent moon on Feb 10. Saturn reaches superior conjunction on Feb 28. NEPTUNE is nestled just below the circlet of the western fish in Pisces. Look for it as a pale bluish 8th magnitude "star" about 18 degrees above Saturn. A star chart will help. URANUS can be found about 10 degrees east of Jupiter in Aries. This 6th magnitude greenish planet can be seen in binoculars or a low power eyepiece.

The Moon is near Venus the morning of Feb. 7. Saturn the evening of Feb. 10, and Jupiter on Feb. 10

Chart of Uranus positions Chart of Neptune positions Calculator for Jupiter's moons

Comet 12P / Pons-Brooks is continuing its dive toward the sun. It reaches perihelion on April 21st 0.78 AU's from the sun at which time it may reach 4th magnitude.Its closest approach to Earth occurs on June 21 at 1.09 AU's It continues to have periodic outbursts boosting it 3 to 5 magnitudes.

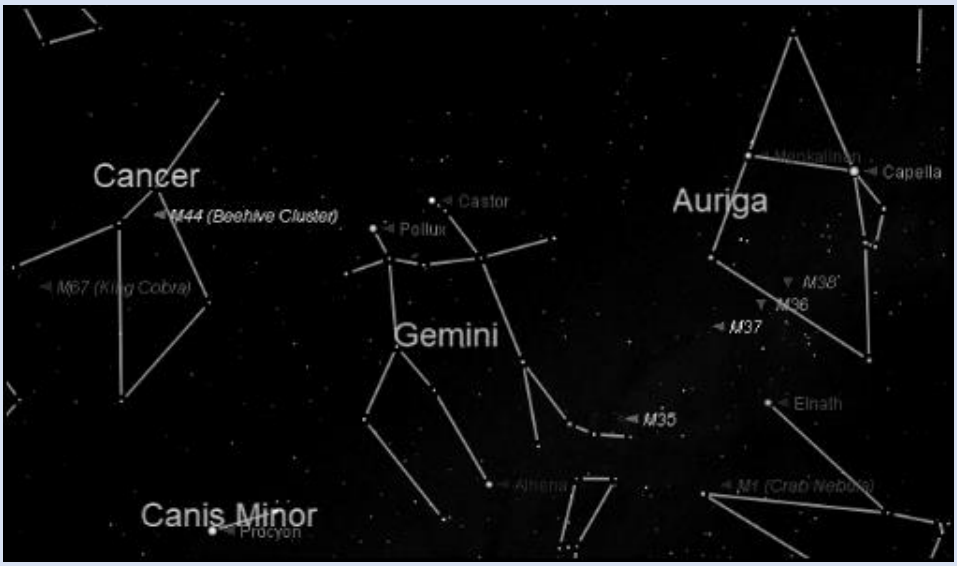
The comet is expected to reach at least 4th magnitude in April and may even be visible near Jupiter during the April 8 Solar Eclipse.

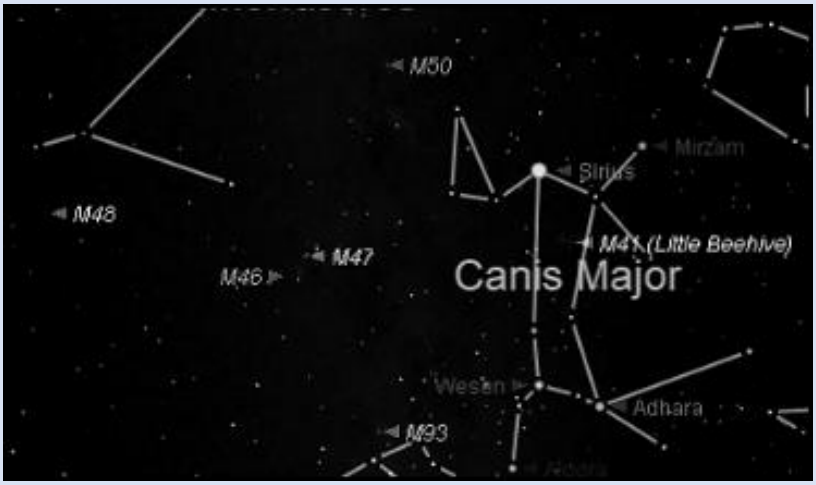
You can keep up with the latest magnitude and sky locations at https://theskylive.com/12p-info

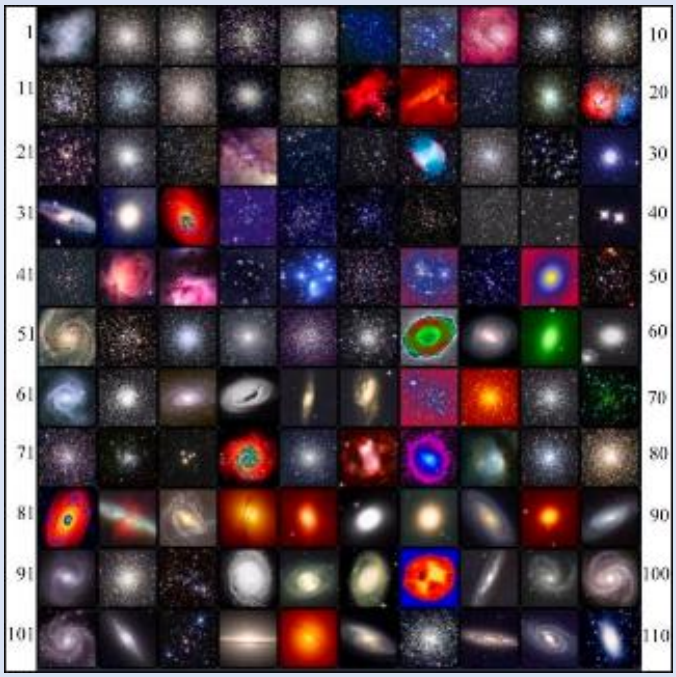
http://astro.vanbuitenen.nl/comet/12

Take a Dive into the Deep Sky

Our 2024 Messier Marathon is on Saturday March 9, when we challenge ourselves to try to find as many as possible of the 110 Messier objects in a single all night marathon. Start earning your own Messier Certificate with these Winter Dozen of M objects.
Cancer M 67-44 Gemini M 35 Auriga M 37–36–38 Canis Major area M 41-50-93
Monoceros 46-47-48 and don't forget Orion's M42 and Taurus's M45 and M 1







Are you up for the challenge of the

Messier Marathon March 18

Each spring 100's of amateur astronomers are drawn into the darkness in a quest to observe all 110 objects in Charles Messier's Catalogue of Deep Sky Treasures. They turn their telescopes eagerly toward the vast denizens of Virgo cluster galaxies. Staving off drowsiness with numerous cups of coffee they welcome the Summer Milky Way as it rises in the east after midnight. Then desperately fight onward to catch the Autumn sky and the Andromeda Galaxy before it is swallowed up by the dawning Sun. Hold on there! I must be suffering from excessive starlight exposure.

Seriously, the Messier Marathon is a night that club members get together to encourage each other to find as many of the Messier Objects as they can in a single night. Whether you find a few dozen or nearly 100 it's an experience all will enjoy.

The first 10 days in March are great time to get started and hone your observing skills. Choose a couple of the charts in the links below and try to locate all the objects on that chart. Many of them can be found from suburban skies. Turn off those fancy GoTo features and find them yourself using the star charts. Our **April 2021 Newsletter** has a good article explaining how to find the Field of View in your telescope eyepieces. They "Star Hop" from a know star to locate your desired object. Just manually use your controls to move the scope until you find the Deep Sky object. Take a bit of time to look at it. Maybe even make a sketch of it. If you've never done the **Messier Certificate program** this is good time to start.
Print Off Charts 3,4 & 5 in the link below and see how many you can find.

FOR OUR MEMBERS - THERE WILL BE A SIGN UP FOR THE MESSIER MARATHON LATER IN FEBRUARY.

Messier Marathon Packet - Made in 2016 - its good in 2024 as well
https://okmcd.com/pub/MessierMarathonCharts.pdf
Printable PDF charts or ones that can be stored on a computer.

7 pages of Log sheets to check off your progress arranged by sequence and Suggested times for conducting your search.
17 pages of detailed charts showing the location of each object. Identified by sequence number.

Excellent Explanation and strategy for planning your observation Sequence

- **Note- The resources at the end can now be found online.**

http://www.richardbell.net/marathon.html

Single Page printout of the Sequence search list
http://www.richardbell.net/files/messier_list.pdf

Three Page Log sheets -
http://www.astunit.com/tonkinsastro/messier/messmara.pdf
For observers using different instruments during the night - this one has columns to identify which instrument

Messier Marathon 2023
http://www.messier.seds.org/xtra/marathon/mm2024.html Notes specifically for 2024

USA TOTAL SOLAR ECLIPSE – MONDAY APRIL 8, 2024

This page is a collection of resources about the eclipse from several sources.
I plan to add to this page and have a link posted on our club website home page soon.

April 8, 2024 is the last Total Solar Eclipse in the USA until August 12, 2045.

The path of Totality sweeps a long path from SW Texas, across the SE tip of Oklahoma, through central Arkansas and on to Maine.

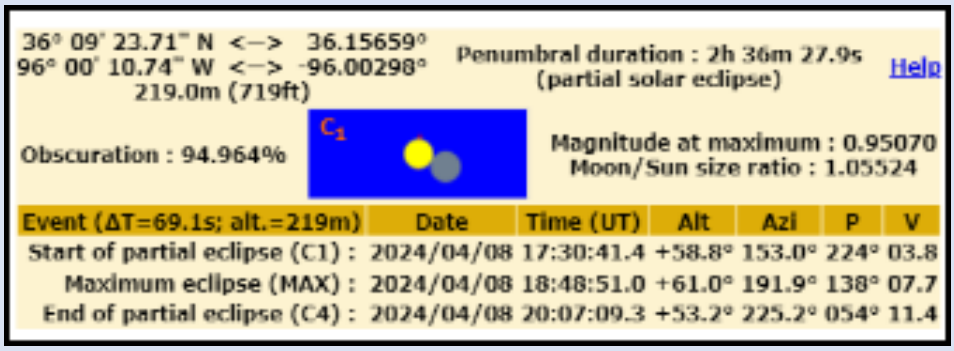
Click on this Google Map style or link below to choose a viewing location.

http://xjubier.free.fr/en/site_pages/solar_eclipses/TSE_2024_GoogleMapFull.html

You can Zoom in to any location on the map and then click on the spot to get a detailed Times and Duration of the eclipse at that location. Works for sites both inside and outside of the path of totality. You'll probably want to save it in your favorites on your phone, computer and other devices as you may need to be mobile on eclipse day.

For the Tulsa area the map shows this data.

The Times are given in UT - Universal Time
So, for Central Daylight **subtract 5 hours**



The **Tulsa area will experience a 95% partial solar eclipse.** Tulsa Times are:
Begins at 12:30 PM Reaches **Maximum at 1:49 PM** and ends at 3:07 PM
At Maximum eclipse it shows the Sun's Altitude 61^{o} up just west of South - Azimuth 192^{o}

The **HELP LINK** in the top right corner explains all the features and data information. It even has a geolocation feature for active navigation to your eclipse viewing spot.

The link below shows maps for eclipse events for the next 20 years
Scroll down to a **section on how to use your phone to navigate on eclipse day.**
http://xjubier.free.fr/en/site_pages/SolarEclipsesGoogleMaps.html

Consider the Weather Outlook in April. Take into account the regional cloud cover possibility. Plan well in advance where you want to go. Many locations are already sold out and camp sites as well. If you plan to drive on Eclipse Day allow at least triple your driving time. During the 2017 eclipse major highways in the eclipse zone experienced heavy traffic especially after the eclipse as everyone was headed home at the same time.

Certified Safe Eclipse Glasses or Viewer Cards are essential to observe the eclipse. These filters block not only Visible light but also Infrared and Ultraviolet light that can damage your eyes. Look for the ISO safety certificate - that block 99.99 % of the sun's various kinds of radiation. Do not attempt to use improvised materials that may make the sun appear darker but do not protect your eyes from the unseen harmful infrared and ultraviolet radiation. The same advice goes for trying to photograph the eclipse with your phone or camera. The sun can quickly damage the sensors in your device. Cameras require a different kind of filter

Be cautious about Ads online even Amazon –
In the 2017 eclipse a number of unsafe "knock off" ones were being sold

Here is an article on reliable sources of Safe Tested Material for viewing the Sun.

Suppliers of Safe Solar Filters & Viewers | Solar Eclipse Across America
https://eclipse.aas.org/resources/solar-filters

One reliable source our club has used several times is Rainbow Symphony
https://www.rainbowsymphony.com/collections/eclipse-glasses-safe-solar-viewers

Making a Safe Solar Filter for your telescope. Only use certified tested materials. Our **August 2023 Newsletter** has a 2-page article about how to make safe filter for use on telescopes or binoculars. (Note the material in eclipse glasses is not the same for scopes)

Other Eclipse Resources - This is a collection of articles I have come across. I haven't read them thoroughly, but they seem to be from reliable sources. J. Land

Eclipses Teaching Resources and Activities for Educators
https://eclipse.aas.org/sites/eclipse.aas.org/files/Eclipse-Activities-for-Educators.pdf

Hands-On Teacher Tested Activities
https://www.exploratorium.edu/eclipse/activities

Total solar eclipse 2024: How to watch online for free | Space
https://www.space.com/watch-total-solar-eclipse-april-8-online-free-livestreams

Sights and Sounds of an Eclipse -- Eclipse Sound Scapes is a national Citizen Science Initiative to observe and record how the world of Nature responds to the mid-day darkening of an eclipse. Look and Listen to the world around you. Observe how the creatures of our natural world respond to the eclipse. Birds began to return to their roosting sites. Nocturnal insects such as crickets and frogs may begin their evening choruses. The temperature often drops several degrees also. Streetlights may come on. You don't have to be in the path of Totality to observe these changes.

Sky and Telescope has an extensive set of links to pages about the eclipse, planning your trip, safety tips, photography tips and more. (Note: some sites have ads)
https://skyandtelescope.org/total-solar-eclipse-2024/

Why you don't need to get to the centerline for April's total solar eclipse — and what will happen at the edge | Space
https://www.space.com/april-2024-total-solar-eclipse-why-to-avoid-the-centerline-of-totality

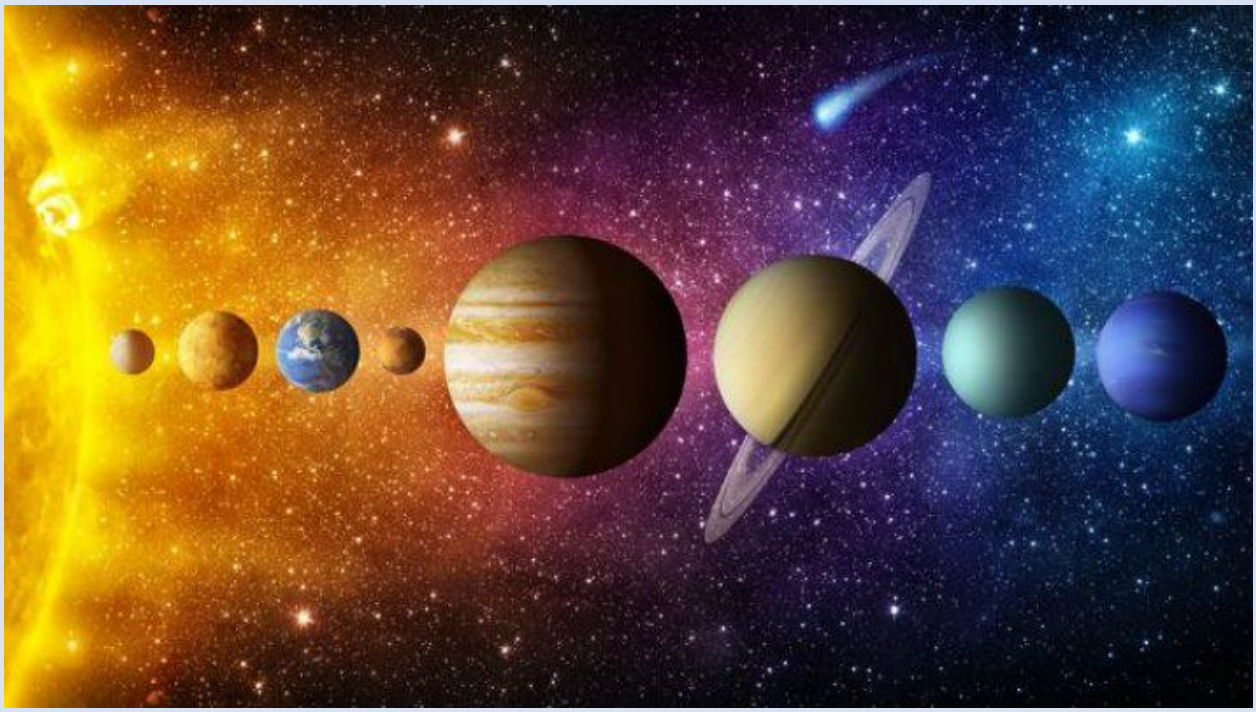
Surreal NASA Footage Reveals **What a Solar Eclipse Looks Like on Mars** : ScienceAlert
https://www.sciencealert.com/surreal-nasa-footage-reveals-what-a-solar-eclipse-looks-like-on-mars

Observing Chairman
Brad Young

AMATEUR ASTRONOMY ON OTHER PLANETS By Brad Young

The Solar System is an amazing thing to consider. A few planets, dozens of moons, millions of asteroids and comets, and a big blazing Sun in the middle of it all, keeping it all in place with gravity. Each object, large and small, has its own orbit, with inclination, tilt, period, etc. And it all flies along with the sun around the Milky Way, which lights up our nights with thousands of stars, which we instinctively relate to direction and time. We name stars, invent constellations, and notice the movements and mechanics of these stars that we live among.

On each solar system object, there is a north and south pole, perpendicular to its unique tilt, that the object rotates around at its equator. North is defined as the pole that, viewed from above, the planet rotates counterclockwise around during its "day". As our species branches out to other planets, either with more unmanned probes, or with human visitors or colonists, we will see the sky differently than we do here at home.



Note: NOT TO SCALE

Colonization of a few of the planets in our solar system is a priority goal of humankind. Although this may not occur during my lifetime, it probably will, and we already have unmanned probes that report back to us what they see in their sky. So, one can imagine being a future amateur astronomer living on Mars or on a dark sky vacation to another planet. Before you go, you would be wise to invest some time to learn how the sky works there. Otherwise, you might get confused and lose time using your personal James Webb size telescope just trying to point it for polar alignment.

Pole Stars *"Which way is up?"* - Richard Pryor

Here on earth, we have a convenient North Pole star that for several thousand years has been close enough to the pole to provide an aid in navigation, and later, a basis for alignment of a telescope in the northern hemisphere. If we don't just let the robots do all the setup work on our imaginary future trip, we should at least know ahead of time how to find directions, if no other reason, to make sure the AI robots aren't playing some prank on us or have nefarious purposes in mind.

You are probably already familiar with Earth's Northern Pole Star Polaris or Alpha Ursa Minoris, a magnitude 2.0 double star that is one of the first objects in the night sky we learn. The Southern Pole star for Earth, Sigma Octanis, is only magnitude 5.5 and barely visible even in a dark sky. This is one of the few situations where the southern sky on Earth loses out to the northern sky on quality of an object.

However, our solar system is really based on the Sun at the center and its equator with the planets lining up closely along that plane. Because of its overwhelming gravity, many of the planets line up in inclination with the Sun also. But not all. We'll start with the ones that do and present a familiar sky to any amateur visiting for a star party, and then move on to the ones that are quite strange in their aspect.

Pole Stars on Other Planets

	North Polar Star			South Polar Star			Night
Planet	Designation	Mag	Name	Designation	Mag	Name	Hours
Mercury	ο Dra	4.6		α Pic	3.2		
Venus	π_2 Dor	5.4		ϕ Dra	4.2	Zsushi	
Earth	α UMi	2.0	Polaris	σ Oct	5.5		12.0
Mars	μ Cep	4.2	Erakis	κ Vel	2.5		12.4
Jupiter	ζ Dra	3.2	Aldhibah	η_1 Dor	5.7		4.9
Saturn	γ Cep	3.2	Errai	η Aps	4.9		5.4
Uranus	o_2 Ori	4.1		η Oph	2.4	Sabik	367,920
Neptune	δ Cyg	2.9	Fawaris	ζ Pup	2.2	Naos	8.0
Sun	δ Dra	3.1	Altais	α Pic	3.2		

Beginning with the sun, it's not unexpected to see that the North Pole star for the Sun is near the ecliptic North Pole that represents the true north of our entire Solar System. In other words, each planet has a tilt relative to the ecliptic, but the average plane of our Solar System remains fixed, and it is quite nearly aligned with the equator of the sun. The solar Northern Star is Delta Draconis, also known as Altais. If you were to stand at the north pole of the Sun (don't try this at home), you would see that star directly overhead. The South Polar Star of the Sun is Alpha Pictoris. As with all the other southern stars on the lists, it does not have a proper name as it was not discovered until European explorers started charting the southern skies during enlightenment.

Not surprisingly, Mercury shares Alpha Pictoris as its South Polar Star, but a case can be made for Omicron Draconis for its North Pole star. However, that star, which has no proper name, is 5th magnitude and would not be a great guide for Hermean astronomers. Jupiter also is not inclined much to the ecliptic plane. And so, we find Zeta Draconis aka Aldhibah as its North Pole star, and Eta_1 Doradis for the South Pole. This South Pole star is even dimmer than Earth's, at magnitude 5.7.

For the other planets things are a little more interesting. Neptune is tipped enough to have Delta Cygni or Fawaris in the North, and Naos (Zeta Puppis) in the south. These would be quite useful for Neptunian sailors on Triton's seas of methane, with the North Star (mag 2.9) part of what we call the Northern Cross and The Southern Star (mag 2.2) part of our False Cross asterism.

Skipping over Uranus for a minute, we come to Saturn, which has Gamma Cephei, named Errai, and visible at magnitude 3.2 for its North Pole star. Its Southern match is not too bright at magnitude 4.9; Eta Apus does not stand out well.

Mars is tipped more than Earth, which is what gives it its significant seasonal variation in the size of the polar ice caps. If you stood at the Martian North Pole, you would look up at the beautiful deep red star nicknamed Herschel's Garnet star. Its official name is Erakis, and it shines at magnitude 4.2, but is variable. For its Southern Star it has Kappa Velorum, nice and bright at magnitude 2.5.

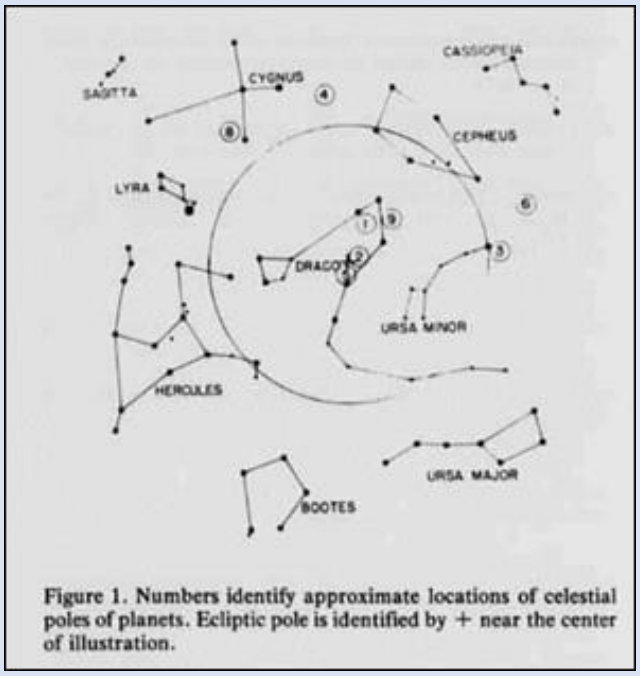


Figure 1. Numbers identify approximate locations of celestial poles of planets. Ecliptic pole is identified by + near the center of illustration.

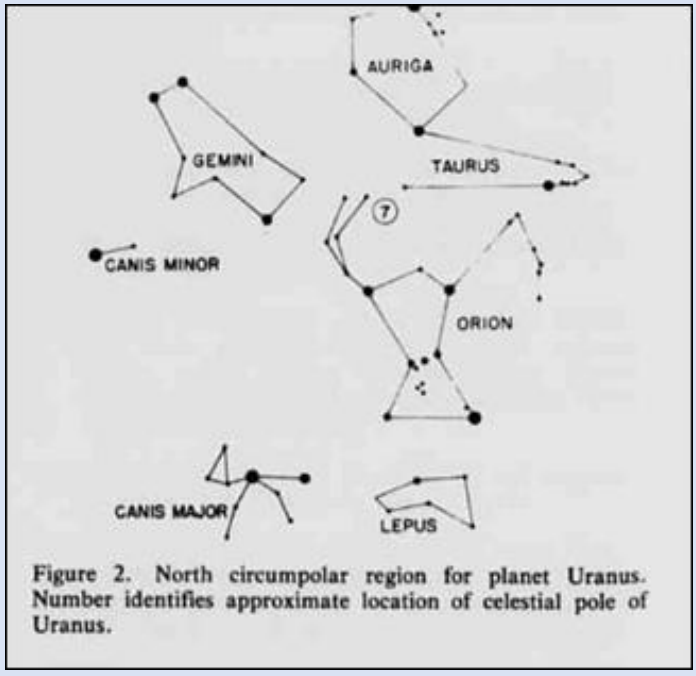


Figure 2. North circumpolar region for planet Uranus. Number identifies approximate location of celestial pole of Uranus.

Now we get into the weird last two objects. Venus, because it rotates opposite of all the other planets, is essentially upside down. If you leave the convention of the north pole of a planet being the one about which the planet is rotating counterclockwise, the Cytherian North Pole star would be Pi_2 Doradis, a dim magnitude 5.4 star deep in what we call the southern sky! So of course, its southern pole star is Phi Draconis, at magnitude 4.2. This star does not have a Arabic or ancient name, but does have a Chinese name, Zsushi.

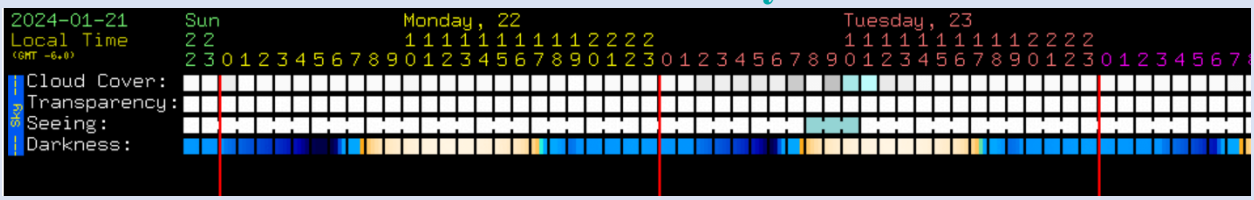
Finally, Uranus. Tipped on its side, Uranus has pole stars that are close to what we would call the equator here on Earth. Its north pole star would be $Omicron_2$ Orionis, located in the shield of Orion and shining at magnitude 4.1. The Uranian southern pole star is remarkable at magnitude 2.4, Sabik, or Eta Ophiuchus. So, on Uranus, the stars we think of as polar would be equatorial. Imagine seeing Polaris as a star located about where Arcturus is for us.

Night Shift *"I bet you pull a crowd, on the night shift"* – Walter Orange [Commodores]

If you factor in the rotational period of the planets, things get even stranger for our planet-hopping amateur astronomer. Here on earth, we may complain that the warm nights are short, and winter nights are long but cold. For this thought experiment I'm also going to have to ignore a whole lot of factors such as the fact that the gas giants don't have a surface. That's okay because they rotate so fast their nights are all much shorter than ours. The obvious exception is Uranus – because it is tipped nearly on its side, you have about ½ of the Uranian year with one hemisphere in darkness, and then they switch at the equinoxes. But **42 *years*** of night might be a bit much, even for me. Just think, a human living a fair lifespan of 84 years could be born to see one day and one night. Which would you prefer first?

You could stand on one of the moons of a gas giant, but you would have the irksome problem of a huge bright planet appearing in your sky just when you wanted to observe. But this is just a thought experiment, so we'll ignore the pesky details. Since the moons of the gas giants are tidally locked (rotate in the same period as their orbit around the planet), find one that is far enough out that you get a few "days" of night in between the sun appearing in the sky as a very bright star and the huge ball of the planet.

Venus Clear Sky Chart



Note: Other predictions on wind speed, acid content, and metal melting temps temporarily unavailable.

Of course, the fact is that Venus would be completely untenable, since the weather forecast for Venus is 100% cloudy with horrible transparency and even worse steadiness for the rest of time. Mercury also would be a bad place to visit, unless you are able to move your equipment, unless that equipment can take the punishing heat of the dayside, at 800 ^{o}F.

So, I'm not sure amateur astronomy will ever be as comfortable and available as it is here on Earth. But, if you do take your scope to another planet, be ready for some strange skies, different pole stars, and odd observing hours (not to mention you'll need some serious long underwear).

References

The general idea of this article was derived from Pole Stars of Other Planets. However, other sources include:

Dark Sky Legacy: The Influence of Astronomy on Culture, George Reed, p 115 etc.
A History of Astronomy, Anton Pannecock, p. 13
Beyond the Observatory, Harlow Shapley p. 54-55
Extraterrestrial Civilizations, Isaac Asimov, p. 43-45
The Stars in Their Courses, Sir James Jeans, p. 17
Astronomy, Fred Hoyle, p.32
Seeing the Solar System: Telescope Projects, Activities & Explorations, Fred Schaaf, Appendices 3-5
Astronomy Made Simple, Meir H. Degani, p. 52
Exploration of the Universe, George Abell, p.232

Earn your **SOLAR ECLIPSE OBSERVING CHALLENGE** certificate

The Astronomical League is offering an Eclipse Observing certificate for any League member who observed the Oct 14, 2023 partial solar eclipse or making plans to observe the April 8, 2024 eclipse.

You can read the requirements for applying for the certificate at https://www.astroleague.org/solar-eclipse-observing-challenges/
Our club Observing Chairman, Brad Young, is coordinator of the Eclipse observing program.

Your Tulsa Astronomy Club membership includes membership in the Astronomical League for all full adult memberships and students who choose the AL option. There are many other observing award programs you can explore at https://www.astroleague.org/alphabeticobserving/
A chart of observing program ranked by difficulty.

Treasurer Report
Cathy Grounds

Treasurer's Remarks: I am still in the process of updating records. You may receive an email asking about your dues status so please don't be alarmed (or offended) if you receive one of these emails-if our records don't match yours just send me an email and I will get it sorted out.

We continue to have a glitch with the PayPal link on our website which is causing problems for new members and renewing members alike. It is primarily associated with the senior membership option and is sometimes charging $0.49 instead of the $35.00. I have sent emails to those affected advising of other payment options. Our web masters are working to correct this.

We are now able to take point-of-sale credit card payments which will be a huge convenience.

If you have any other questions or concerns, please email AstroTulsa.Tres@gmail.com

As of January 17, 2024, we had 246 members, 69 New members in 2023

Hello and welcome to ACT to new members ! Nicole Goshorn and Cody Tabor

Have you changed you Contact Information? Email, Phone, Postal Address ?
Please help us to maintain our records by sending an email to AstroTulsa.Tres@gmail.com

Accounts as of Jan. 17, 2024

Checking:	**$ 3,047.03**
Savings:	**$ 2,794.88**
Investments:	**$ 33,865.03** (Value fluctuates with markets).

You can JOIN or RENEW memberships or magazine subscriptions ONLINE using ANY MAJOR CREDIT CARD or MAILING in your dues with a check. The transactions are processed through PayPal but you DO NOT need a PayPal account. A modest processing fee is added to online transactions.

Fill out the registration form at **https://www.astrotulsa.com/join**

Membership rates for **2024** are as follows:
Adults: $ 45 per year, includes Astronomical League Membership.
Sr. Adult: $ 35 per year for those 65 or older, includes Astro League Membership.
Students: $ 30 with League membership; Students: $ 25 without League membership.
Additional Family membership: $ 20 with voting rights and League membership.
$ 15 with voting rights but without League Membership.
The regular membership allows all members in the family to participate in club events but only ONE Voting Membership and one Astronomical League membership.

MAGAZINE SUBSCRIPTION RATES 2024 updates
A monthly astronomy magazine subscription is a great way to learn more about many aspects of our hobby. - Scientific articles, sky events, equipment reviews, imaging techniques and more
Use the links below to make your subscription

To learn about Sky and Telescope magazine see their home page
Digital $ 37.05 Print & Digital $ 45.75 includes a $ 10 club discount
Use this **Sky & Telescope Subscription Link**

To learn about Astronomy magazine see their home page
Use this **Astronomy Subscription Link** **Digital $ 39.95 Print & Digital $ 49.95** no club discount

2023 Astronomy Account report

By Treasurer Cathy Grounds

2023 ANNUAL REPORT		
REGULAR OPERATING EXPENSES:		
ASTRO LEAGUE DUES	$	1,025.00
CLUB DINNER (CATERER, DRINKS)	$	701.87
CLUB DINNER ROOM RENT	$	250.00
INSURANCE	$	2,425.00
PO BOX	$	248.00
PRINTING COSTS-estimated	$	90.00
PROPERTY TAX	$	30.00
QUICK BOOKS	$	60.00
SAFE DEPOSIT BOX	$	45.00
UTILITIES	$	972.88
WELLS FARGO ANNUAL FEE	$	150.00
ZOOM LICENSE	$	119.32
TOTAL OPERATING EXPENSES	**$**	**6,117.07**
ONE TIME EXPENSES:		
ABEST ROOFING-DOME	$	3,689.00
HAND RAIL DEPOSIT	$	1,300.00
FILING FEES-LAND	$	55.00
SOLAR VIEWERS PURCHASE	$	208.00
HONORARIUM L HERRINGTON	$	50.00
MONITOR & CABLE PURCHASE	$	282.00
TOTAL ONE TIME EXPENSES	**$**	**5,584.00**
TOTAL EXPENSES 2023	**$**	**11,701.07**

	UTILITIES	
2023	OG&E	RWD 6
DEC	$ 43.94	$ 25.00
NOV	$ 44.63	$ 25.67
SEPT	$ 39.44	$ 25.00
AUG	$ 40.96	$ 25.00
JULY	$ 46.93	$ 25.00
JUNE	$ 35.00	$ 24.00
MAY	$ 59.22	$ 24.00
APRIL	$ 63.15	$ 24.00
MARCH	$ 97.23	$ 24.00
FEB	$ 126.52	$ 24.00
JAN	$ 106.19	$ 24.00
ANN.TOTAL	**$ 703.21**	**$ 269.67**
AVERAGE	**$ 58.60**	**$ 22.47**

2023 ANNUAL REPORT		
INCOME		**REMARKS**
DUES PAYMENTS:		
VIA PAYPAL	$ 4,717.00	
VIA CASH &CHECK	$ 627.00	
CALENDAR SALES	$ 90.00	Approximate Net
ECLIPSE VIEWERS	$ 76.00	Approximate Net
MSRAL ACCT CLOSURE	$ 0.78	Transfer of remaining balance.
CLUB DINNER PROCEEDS	$ 585.00	Cost to Club after expenses was $366.87
DONATIONS-CASH	$ 451.00	Donations from all sources
MSRAL PROCEEDS TO CLUB	$ 318.78	Our profit after hosting MSRAL
TOTAL INCOME	**$ 6,865.56**	
TOTAL INCOME	**$ 6,865.56**	
MINUS OPERATING EXPENSES OF.....	**$ 6,117.07**	
NET INCOME 2023	**$ 748.49**	The Club is presently able to just cover its operating expenses with with dues and donations
		We hope to increase revenue in 2024
MINUS TOTAL ONE TIME EXPENSES OF.	**$ 5,584.00**	The Club made major repairs and upgrades to the dome, purchased a
		monitor for use in presentations and other listed expenses
TOTAL DEFICIT 2023	**$ (4,835.51)**	The Club was able to fund major expenses from its bank savings account.
INVESTMENT ACCOUNT DETAILS		ESTIMATED ANNUAL (DIVIDENDS) = $1173.00 (3.45%)
VALUE BALANCE 1/1/2023	**$ 30,333.44**	
VALUE BALANCE 12/31/2023	**$ 34,019.02**	INCREASE IN PORTFOLIO VALUE $3685.58 (+11.98%)
Bank Account balances		
CHECKING BALANCE 12/31/2023	**$ 2,682.00**	
SAVINGS BALANCE 12/31/2023	**$ 2,794.88**	

Secretary Report
Skip Whitehurst

Summary of January 26, 2023 Astronomy Club Board meeting discussions

The Officers and Board of The Astronomy Club of Tulsa met via Zoom call.

In attendance:	**Officers**	**Board members at Large**
	Don Bradford, President, presiding.	Bryan Kyle
	Jonathan Fussell, Vice President	Jerry Cassity
	Cathy Grounds, Treasurer	John Land
	Bryan (Skip) Whitehurst, Secretary	Jack Reeder
		James Taggart

Items related to scheduling:

Event Requests - The board discussed requests by several local groups to provide volunteers for their events in late January or early February through June or July. The burden on our volunteers is a concern and was discussed.

Eclipse April 8 - Availability of volunteers to man public gatherings to view the April 8 eclipse looks like it will be a problem. Many of the club's active members are planning to travel out of town to see totality. Our Vice President Jonathan Fussell is planning on stay in town. A call for volunteers will be made to see how many more volunteers may be available in Tulsa.

Observatory Workday March 23 - The board was unanimously in favor of scheduling a workday at the observatory on Saturday, March 23 starting at 10 AM. Work to be done includes removal of trees blocking views toward the SW horizon from the observatory dome, among other tasks.

Messier Marathon Saturday March 9 will be held at the observatory. Gates will be open by 5:30 PM. This is an all-night event, but people can come and go as desired. A short presentation about Messier Marathon will be scheduled for the next general meeting.

Sidewalk Astronomy Dates for public astronomy outreach. Volunteers are needed to set up telescopes and welcome guests. Spring Dates are March 16 and April 13 Details, location, and contact information will be published later.

Telescopes 101 Workshop event will be at TASM on **Saturday, February 17** starting at 10:30 AM. Volunteers should arrive by 10 AM. Additional volunteers may be needed if there are a lot of sign-ups. Our board members have distributed publicity flyers to several Tulsa City-County Libraries

Other business:

Club Investment Account has been transferred from Wells Fargo to Schwab. This will facilitate the ease of managing our accounts. Schwab charges no annual fee and has a local office. For now, funds remain invested in the same mutual funds, but these may be reviewed for performance to see if better choices may be available.

Online Registration Issue - A problem has occurred with the system to pay membership dues through PayPal on our website is causing some dues payments to be processed incorrectly. Payees are being charged only a $0.49 PayPal fee instead of the actual dues + fee. This appears to be an issue on our website and is being worked by our web host.

Treasurer Cathy Grounds recommended reducing the number of membership categories and Astronomical League options to simplify management of the membership roster. Membership and AL categories are stipulated in our bylaws, so a review and possible bylaw changes should be considered.

Website Video The video on our website's home page has been shortened to work better on phones and to freshen it up. Additional changes to the website are needed.

Observatory Dome projects
The new dome rotation drive system is functional. The change from friction drive to gear drive is working well with only occasional glitches where the dome sticks causing the drive gear to jump. Additional improvements are in progress. Replacement of two of the guide wheels has been successful, and four additional wheels will be ordered at about $33/pair to replace the remaining three and provide a spare.

A new control system that will allow the dome position to be synchronized with telescope position is being developed and showing promise. A safety interlock to disable the drive system while any of the three hold-down hooks are in place, and also to remind the operator to re-install the hold downs as the system is being shut down, is also in development.

Observation Pads Options for additional telescope observing pads and AC power distribution in the observing field provoked lively discussion. The consensus was to determine proposed pad locations during the workday. The location of electrical outlets for the observing field will also be investigated during the workday

Mission Well Done! Mars Ingenuity - First to Fly the Skies on Mars

The Mars Helicopter Ingenuity far outperformed all expectations. Like the Wright Brothers flight in 1903 it has paved the way for an entirely new way to explore other worlds. Ingenuity arrived on Mars Feb. 18, 2021 on the Perseverance Mars rover as a demonstration of concept experiment meant to only fly five missions. It performed so well it soon became the aerial scout to imagine the Martain terrain ahead and help scientist choose the course for the rover. Over the course on nearly 3 years, it completed 72 flights. Completing 128.8 flying minutes, covering 10.5 miles, and reaching altitudes as high as 78.7 ft. Its last flight took place on Jan 18, 2024 when it lost communication on its decent. When scientist restored communication, they discovered it had suffered a hard landing that broke one of its rotors. The mission was officially closed on January 25, 2024

NASA's Mars helicopter was much more revolutionary than we knew
https://arstechnica.com/space/2024/01/now-that-weve-flown-on-mars-what-comes-next-in-aerial-planetary-exploration/

NASA Mars Ingenuity website
https://mars.nasa.gov/technology/helicopter/#Helicopter-Highlights

You are invited to come join us to learn more about
Astronomy and view the wonderful sights in the night sky.
Check the EVENTS section at https://www.astrotulsa.com/

During the school year our club holds a
Monthly General Club meetings at
Jenks Public Schools Planetarium
105 East B St, Jenks, OK
Located North of the intersection of
1st and B St

Meetings begin at 7:00 PM

When you enter the building lobby,
take the elevator to the 3rd floor.

Click for Google Map Link

ASTRONOMY CLUB OBSERVATORY
Located on a hilltop about 25 miles SW of Tulsa
Features: classroom, restroom, dome with 14-inch telescope and an acre to set up your telescopes.

Weather permitting, we host two types of observing nights.

GUEST OBSERVING NIGHT – RSVP requested
This event is open to our Guests – both individuals and families as well as our regular members. Several of our club members set up telescopes for public viewing.
***** Groups need to make separate arrangements.

MEMBERS OBSERVING NIGHT usually on a Friday near new moon
Reserved for club members and their families to allow them to pursue observing projects.
The Observatory is ONLY OPEN for SCHEDULED EVENTS.

Check the EVENTS section at https://www.astrotulsa.com/
Follow our map directions DO NOT USE GPS

Two Options for travel to the observatory

MOSTLY PAVED ROADS – Hwy 75 to 201st St S – through Mounds OK

Most DIRECT ROUTE – Hwy 75 to 241st St S – some coarse gravel & dirt roads

ASTRONOMY CLUB OFFICERS:

PRESIDENT – DON BRADFORD
astrotulsa.pres@gmail.com

VICE PRESIDENT – JONATHAN FUSSELL
astrotulsa.vp@gmail.com

SECRETARY – SKIP WHITEHURST
astrotulsa.secy@gmail.com

TREASURER – CATHY GROUNDS
astrotulsa.tres@gmail.com

You may also contact club officers or board members using the CONTACT tab on our website

BOARD MEMBERS-AT-LARGE:
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JERRY CASSITY
BRYAN KYLE
JOHN LAND
JACK REEDER
JAMES TAGGART

STAFF:
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EDITOR - JOHN LAND
tulsaastrobiz@gmail.com

Public FaceBook Page Coordinator – Cathy Grounds

OBSERIVING CHAIR - BRAD YOUNG
allenb_young@yahoo.com

SIDEWALK ASTRONOMY – Open Position

PR AND OUTREACH – Open Position

GROUP DIRECTOR – Open Position

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Jenks High School Campus
205 East B Street, Jenks

TICKETS are $7

Purchase online at
jenkscommunityed.com
or call 918-298-0340

2024 Spring Shows Go to Show Schedule
Click the Date Column to sort them by show date

Most Shows take place on Tuesday evenings from 7:00 PM to 8:00 PM- a few on Saturday