

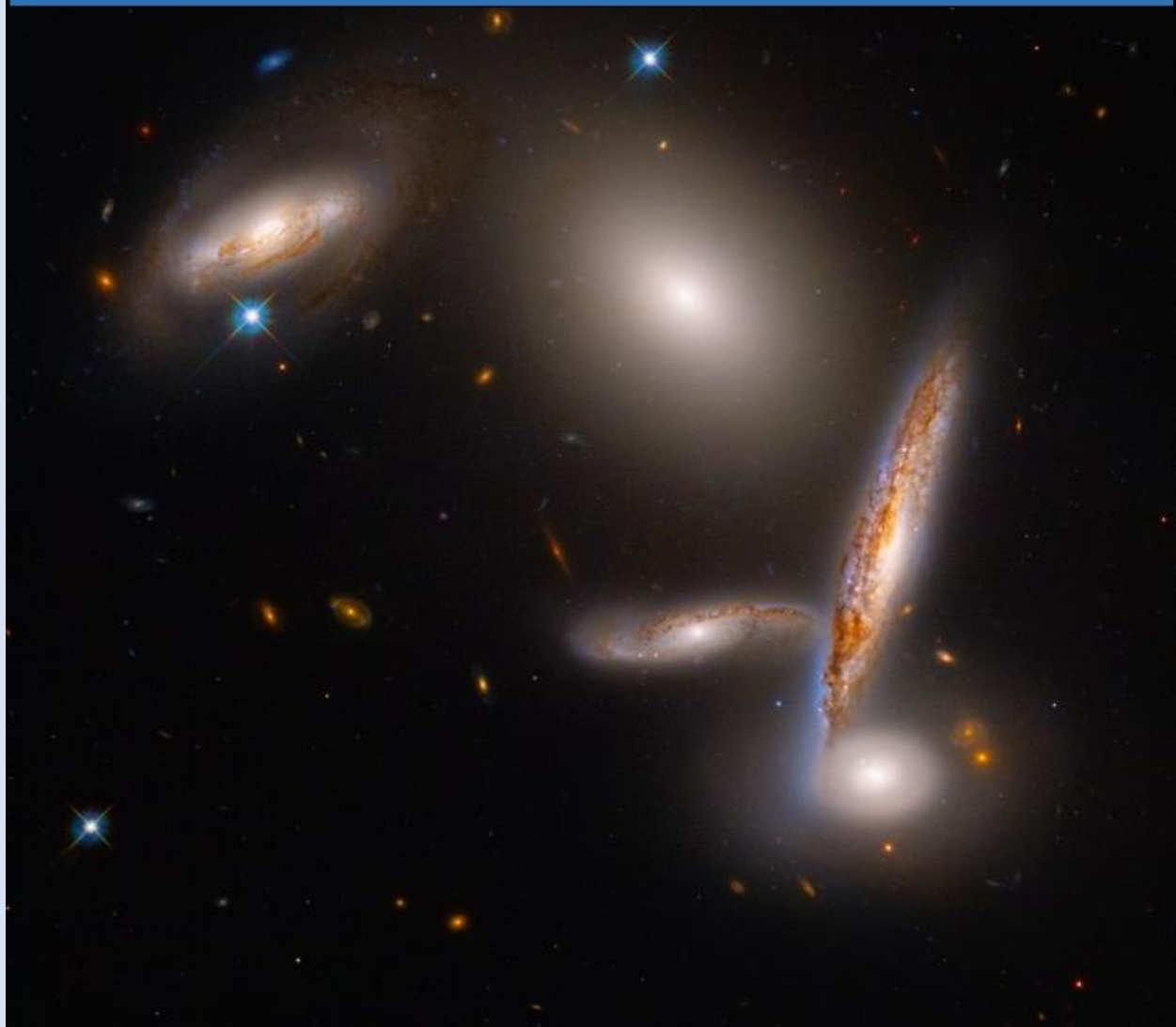


# OBSERVER

May 2022

*Bringing Stars to the eyes of Tulsa*

*since 1937 Editor - John Land*



## **Hubble Space Telescope Celebrates its 32nd Birthday**

The Hubble Space Telescope was launched April 24, 1990. It has now been orbiting Earth for more than 1 billion seconds returning stunning images revealing new insights to the mysteries of our universe. This year NASA celebrated the occasion by releasing this stunning look at a close-knit collection of five galaxies known as The Hickson Compact Group 40 in Hydra

RA 09h 38m 54s Dec -04 51.1 degrees

This video link will help you learn more about this unusual grouping.

<https://www.news18.com/.../nasa-celebrates-hubbles-32nd...>

- 1 Cover - Hubble Space Telescope - 32<sup>nd</sup> Birthday
- 2 Upcoming Observing Night & Meeting Events
- 3 President's Message - by John Land  
May 13 program - Dragonfly Mission to Titan
- 4 Observing Chair - Survey of Members interests - Brad Young
- 5 What's Up in April Skies - by John Land  
Earn the 20 Brightest Galaxy Observing Award
- 6 Total Eclipse of Flower Moon May 15
- 7 MidStates Convention June 3-5 -- National AstroLeague Convention July 28 - 30
- 8 Cake Pan bearings for a 10" Dob - Justin Faulk
- 9 - 14 *The Objects that Changed Astronomy* by Brad Young
- 15 Treasurer's Report and New Members -
- 16 Gallery of Club activity images
- 17 - 18 *Aurora, Noctilucent Clouds & Zodiacal Light* - NSN - David Prosper
- 19 Club Contacts - and some Astro Humor

### **Astronomy Club Events**

Check our website [AstroTulsa.com](http://AstroTulsa.com) events section for updates  
Observatory ONLY OPEN for SCHEDULED EVENTS. [Click for Observatory Map](#)

During Warmer months a light jacket may still be needed.  
Please use insect repellants at home or away from telescopes.

**Astronomy Club Meeting - Friday May 13 - 7:00 PM - IN PERSON** club meetings.  
At Jenks High School planetarium 105 E B Jenks OK - Guests Welcome

Now that Sunset is later OBSERVING NIGHTS will be scheduled on  
Friday with Saturday as a backup night for weather cancellations.

**Friday** May 20 7:50 PM **Guest and** Members Night - Guest requested to RSVP

**Friday** May 27 8:00 PM **Members Only** night Weather back up night April 30  
Open to members and their immediate family

**MidStates Astronomy Convention** June 3 - 4 - 5 in St Louis Details on page 7

**Friday** June 17 8:00 PM **Guest and** Members Night - Guest requested to RSVP

**Friday** June 24 8:15 PM **Members Only** night Weather back up night April 30  
Open to members and their immediate family

NOTE: Please check our website for Weather Cancellations before heading out.

### **OBSERVING NIGHT GUIDELINES**

While Covid cases are down, Schools and Urgent Cares are seeing a spike of Flu cases. We want to keep our guests and members safe. We ask you to please be thoughtful of the health safety of others around you. If you or a person in your household is showing signs of illness, please postpone your visit for another date.

Personal Hygiene, Social Distancing and Mask wearing are effective means of preventing spread. Please respect each individual's choices about how they interact with others. Ask permission when approaching a person with a telescope if you want to share a view.



## NASA's Dragonfly Mission to Saturn's moon Titan

**Our May 13 program will feature an interview with Dr. Melissa Trainer** has been a Research Space Scientist in the Planetary Environments Laboratory at NASA Goddard Space Flight Center since 2009. Her research interests include the composition of planetary atmospheres and the production of organic molecules and aerosols via atmospheric synthesis. Dr. Trainer is a Deputy Principal Investigator for the Dragonfly mission to Saturn's moon. Dragonfly is a proposed helicopter like flying robotic scientific platform to explore Saturn's moon Titan. Titan has a thick nitrogen - methane atmosphere which would allow a craft to fly from place to place exploring its surface. The feasibility of flight on other planets has been dramatically proven by the tiny helicopter Ingenuity which is a companion of the Mars Perseverance explorer. It has now completed over 24 flights and traveled nearly a mile in the past year



**Greetings to all our Astronomy Club of Tulsa Members and Guests.**

**Spring has definitely arrived! The Oklahoma weather Mesonet confirmed that April 2022 has been the windiest on record since it began in 1994! Hopefully you have gotten in a few nights of observing along the way. Our April 2nd Messier Marathon was a great success. Clear skies greeted about 20 participants who enjoyed searching for the many galaxies, nebula and star clusters in the canopy of the heavens above. A big thanks to our VP, Bryan Kyle, for filling in at our April 8 Jenks meeting featuring Dr Robert Zelle on a NSN video "EXOPLANETS, FINDING LIFE IN THE GALAXY"**

**Our April 30 members night featured pristine skies and calm winds. It was an evening of enjoyed by several members Big Dob telescopes and a couple of people doing imaging. Mercury and the Pleiades were visible in the same field of view in the club's 100 mm binoculars. Michael Blaylock treated us to a view of a new 12<sup>th</sup> mag supernova in a small galaxy adjacent to M 60. Don Bradford was busy stacking multiple images of Markarian's Chain of galaxies in Virgo. We were joined by two enthusiastic new members that are eager to learn everything about astronomy.**

**I hope you had an opportunity to catch at least one morning viewing the close conjunction of Venus and Jupiter. If you missed it, you will get another chance on the evening of March 2, 2023.**

**In other news, the survey of our new property should begin this month. Also our Website host, [Seed Technologies Inc](#) , is working on a new website design which will be easier for us to manage and friendly to Mobile devices. The plan is to have it up and running by mid-summer.**

**I hope to see many of you at our Summer observing sessions.**

**Let us continue our 85 years of *"Bringing Stars to the Eyes of Tulsa since 1937"***

***John Land - President***

## Observing Chairman Brad Young



I am pleased to introduce our new Observing Chairman.  
[allenb\\_young@yahoo.com](mailto:allenb_young@yahoo.com)

### Observing Sessions Survey Results

I would like to thank all of you who responded to the recent survey. We've had 33 responses as of April 21, and the results are clear. You can see the results in a pdf file on my website at [Observing Sessions results](#). There is also a link to the survey in case you lost the email and would like to add your input.

As you can see, there is interest in a broad range of subjects, especially how the sky works and how to find deep sky objects. It was interesting to me that 48% of you consider yourself novices. You may find observing sessions will help you move into more challenging, but still enjoyable projects.

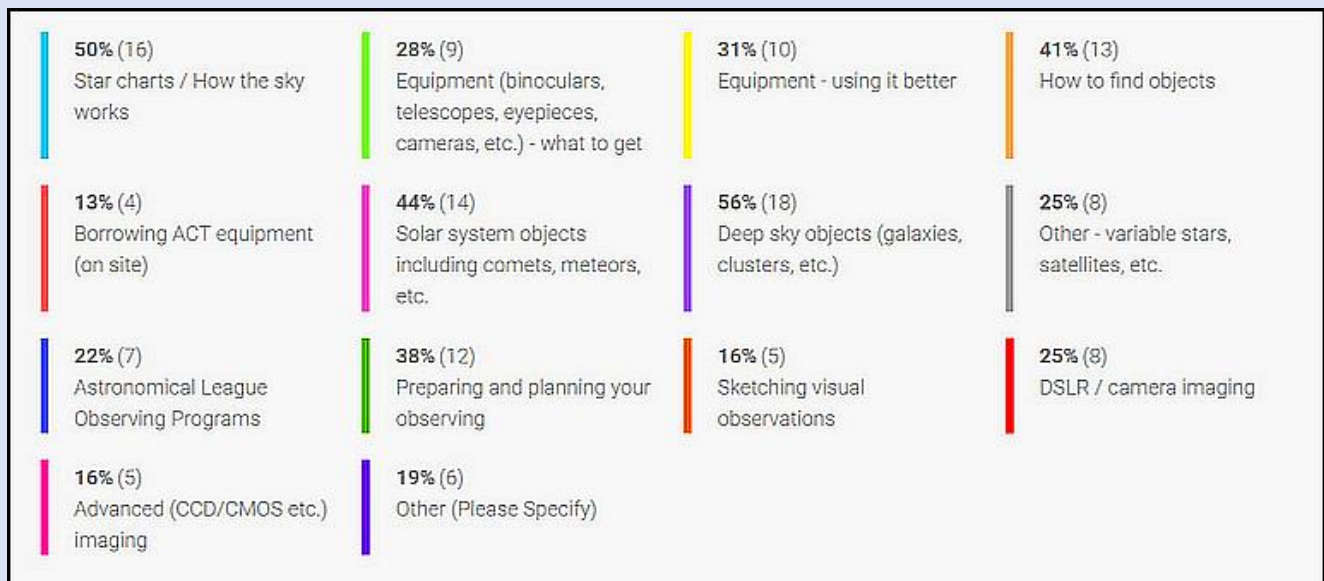
More people were interested in doing online training, but this will be dependent on the subject involved. For instance, using star charts and discussing how the sky works would best be accomplished by doing it outside in person. Several of the other subjects such as image processing would fit better with an online presentation. With each in real life "IRL" session I will include a list of online resources in case you are unable to attend.

The split among equipment is still quite even between visual and imaging at this point, but that may shift as time goes by. So, with this article on asking for *anyone who can help lead sessions* online or in person about imaging and processing.

The ACT online forum is (?) the Members Only Facebook page, but many people like me don't use Facebook. I'll discuss this with the board and see what we can do. And I also saw many comments related to variable stars, radio astronomy etc., all of which we will try to work in somewhere.

I plan to discuss how the training sessions will work and describe the first one at the next general meeting. Again, thanks for taking the time to fill out the survey, it will definitely help me find the best way forward.

#### Some survey results based on 38 respondents





Click on these images to links on the Internet



See our [website observing page](#) for a collection of [Interactive Sky Watching Tools](#) Moon phases - Sun rise & Set - [Make your own custom interactive sky chart](#) and more

### April Skies. -

Moon Phases - - 1<sup>st</sup> Q Apr 8 - - Full Apr 15 - - 3<sup>rd</sup> Q Apr 22 - - New Apr 30

Look for **Mercury** in low the west soon after sunset. It passes inferior conjunction May 21st The other bright planets are still in the morning sky. Mid-month **Saturn** rises at 2:30 AM. **Mars** lies between Saturn and Jupiter. **Jupiter** rises at 4:00 AM The moon passes south of Saturn on the 22nd. It then joins Mars and Jupiter on May 24th then on to Venus May 26 & 27. Jupiter & Mars are in conjunction the morning of May 28. The Eta Aquarid Meteor shower peaks the morning of May 07 but remain active through mid-May. The nearby gibbous moon will limit is peak rate of 60 per hour. If you do see a few meteors, you can get a peak ahead of time at fragments of it parent comet. The famous Halley's Comet that will return again in December 2062.



The Astronomical League has a set of observing challenge awards featuring types of objects observable each three-month season.

The Springtime Challenge is to observe the [TWENTY BRIGHTEST GALAXIES](#) It began March 1 and must be completed by June 30, 2022. Click the link above for details for to earn the award. Here is a PDF of the [LIST of GALAXIES](#) You will also want to review details about [Rating Seeing and Transparency](#) Learn more about other [Astronomical League Observing Certificates](#) available



Tired of Cloudy nights? Enjoy the Stars Indoors by taking in a show at the spacious Jenks High School Planetarium. Most shows are on Tuesday evenings. Check the schedule of shows and make your reservation at <https://www.jenkscommunityed.com/jenks-planetarium>

## Total Eclipse of the Flower Moon - All times are in Central Daylight Time

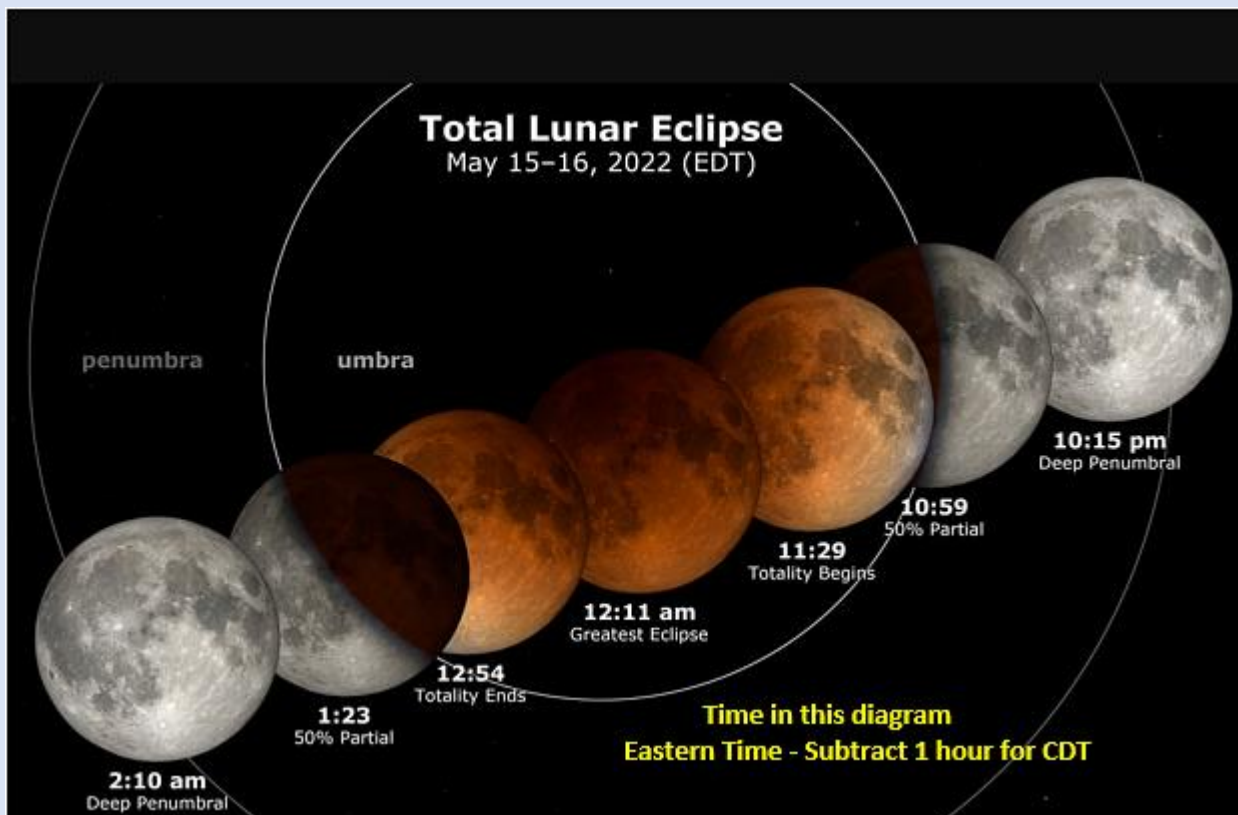
On the evening of Sunday May 15<sup>th</sup> extending past midnight on the 16<sup>th</sup> all viewers in the Western Hemisphere will have the opportunity to view a Total Lunar Eclipse. No special equipment is needed to watch the Full Flower Moon as it slips through the Earth's shadow. Binoculars or a low power telescope will enhance your view but are not needed. It will be visible simultaneously across the US, but the local clock time will change with your time zone. The eclipse will be already under the way in the western states as the moon rises

The full moon rises in the SE about 8:11 PM By **8:32 PM** the moon will begin slipping into the Earth's outer shadow called the Penumbra. By **9:15** or so the left side of the moon will appear noticeably shaded. At **9:27** look for the Earth's inner shadow, the Umbra, as it makes first contact at about the 7 O'clock position.

**Totality begins at 10:29 PM - Mid Eclipse is 11:11 - Totality ends at 11:54.**

Be sure to locate the moon before totality begins as the moon is much dimmer during totality. As totality begins look for the eclipsed moon in the SE about 20 degrees above the horizon. During totality the moon's color appears as a diminished orange or even a dull red. The only light reaching the moon is the result of the Earth's atmosphere bending the combined light of all the sunsets and sunrises along the Earth's limb. The color of the eclipse varies depending on how much dust and smoke is in the upper atmosphere.

The moon will exit the Earth's umbra at 12:54 AM on the morning of May 16<sup>th</sup>. If it's cloudy you likely can search for live feeds of the eclipse online.



**The MSRAL 2022 Conference registration is now OPEN!**

**Here is a PDF introducing the conference:**

[https://www.slasonline.org/images/MSRAL/MSRAL\\_2022R.pdf](https://www.slasonline.org/images/MSRAL/MSRAL_2022R.pdf)

**DATES: FRIDAY, JUNE 3 to SUNDAY, JUNE 5**

Our Tulsa Astronomy Club is part of the MidStates region of the Astronomical League. MidStates includes clubs in Oklahoma, Kansas, Arkansas and Missouri. This year the St Louis Astronomical Society is hosting the MidStates Regional convention. This is a good opportunity to learn what other clubs are doing and to hear some good speakers. In addition to the presentations there are door prizes at each session. Several vendors of astronomical equipment are usually present as well.

The convention is being held on the campus of Washington university. Special rates have been arranged at the Knight Center hotel which is also on campus. Several tourist interest destinations are nearby. Forest Park has the zoo and two museums. The Botanical Garden is also nearby.

**For more details and registration go to <https://www.slasonline.org/events/msral>  
Early registration discount ends May 25th**



**The National Astronomical League convention  
will be held in Albuquerque, NM July 28 - 30**

<https://alcon2022.org/>

The Astronomical League holds an annual national convention that provides an opportunity for amateur astronomers all over the country to gather together to learn and exchange ideas, techniques, and opinions on astronomy. The conventions provide professional astronomers an opportunity to address to attendees about their field of expertise. This allows amateurs to learn about the latest discoveries in astronomy directly from the astronomers making the discoveries.

The 2022 ALCON will feature two special events, an evening presentation on 29 July by Apollo 17 Astronaut Harrison Schmitt and a tour of the Karl Jansky Very Large Array (VLA) on 31 July. Evening field trips to observing sites will be available on 27, 28, and 29 July. Day field trips will be available to the UNM Institute of Meteoritics and the Rio Rancho Rainbow Park.

## Justin Faulk - Cake Pan bearings for a 10" Dob

I wanted to upgrade my homemade 10" Dobsonian bearings, my original design I used for 20 years was a piece of 6" PCV drainpipe with Formica glued to the edge - it worked, but it wasn't the best and a larger bearing would give smoother motion. After giving it some thought, I realized a straight edged cake pan would be perfect - already round, available in many sizes and the machined aluminum edge rides nicely on Teflon. I used American Metalcraft HA5110, which is 10" x 1.5", made of heavy duty 14-gauge aluminum, and has straight edges (critical for this function).

I drilled holes with a drill press and mounted some wood spacers to hold it steady against the sonotube. Foam weather stripping between the plywood and tube keeps it in place better and keeps the wood from scuffing up the sonotube. The pan is attached to the sonotube with two bolts, and four other bolts hold the wood spacers in place.

I also affixed the outdoor temperature probe of an indoor/outdoor thermometer to the back of the mirror, so I can get an idea of what the mirror temperature is compared to the ambient temperature. The thermometer display also sits in the cake pan bearing, since it's right at the balance point, I can add whatever accessories/gadgets I want inside the pans without messing up the balance.

The performance is great - better than I could imagine. The uncoated aluminum rides perfectly on the Teflon pads, and the large bearing diameter make precise small movements a breeze.



In addition to the cake pan bearing upgrade, I also redesigned the primary mirror cell. The new cell is lighter, has a floating mirror design (vs. the silicone that I used before) and has two fans - a fan to force air onto the mirror, and a small boundary layer fan that blows air across the mirror face. The fan wires come out in the center of one of the cake pans, where they go through an adjustable step-up voltage regulator, and individually get switched on and off with a small USB hub (blue LEDs replaced with dim red LEDs). Both fans are powered by one USB backup battery (the adjustable step-up regulator provides up to 12v from the 5v input).

Editor Note: Here is the website for ordering the cake pans. FYI - You may want to team up and make a multiple order to save on the shipping costs.

<https://www.webstaurantstore.com/10375/cake-pans.html?filter=material:aluminum&filter=style:straight-sides&filter=pan-depth:1&filter=shape:round&vendor=American-Metalcraft>



# The Objects That Changed Astronomy

By Brad Young

## (And How to Observe Them)

### Part Two: Galileo to Daguerre

As noted in the previous article, before 1600, humans made our most fundamental discoveries about how the universe works. But, as with any collection of ideas, some of them were wrong. Because people lacked some of the tools that modern scientists have, they arrived at conclusions that only new instruments, technology, and, most crucially, different thinking would correct. In astronomy, the most important invention is the telescope.

### New Tools Require New Thinking

*"Come with me now, pilgrim of the stars, for our time is upon us and our eyes shall see the far country and the shining cities of Infinity which the wise men knew in ages past, and shall know again in ages yet to be." —*

*Robert Burnham Jr., Burnham's Celestial Handbook:*

*An Observer's Guide to the Universe Beyond the Solar System, Volume 1: Andromeda Through Cetus*

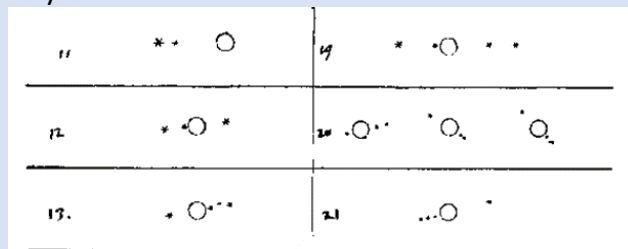
The invention of the telescope, coinciding with and integral to the Scientific Revolution, transformed astrologers and natural philosophers into astronomers. As the use of the instrument spread, the technology improved, with new and better eyepieces, lenses, and mirrors. Better views and careful observations provided data that needed explanations in a world that had not seen anything like these new objects and phenomenon. New scientific methods allowed us to build theories, ruin them, and rebuild them again.

### Wabi-Sabi

*Moving shadows; moonlight streams through the broken window*

*Japanese poem*

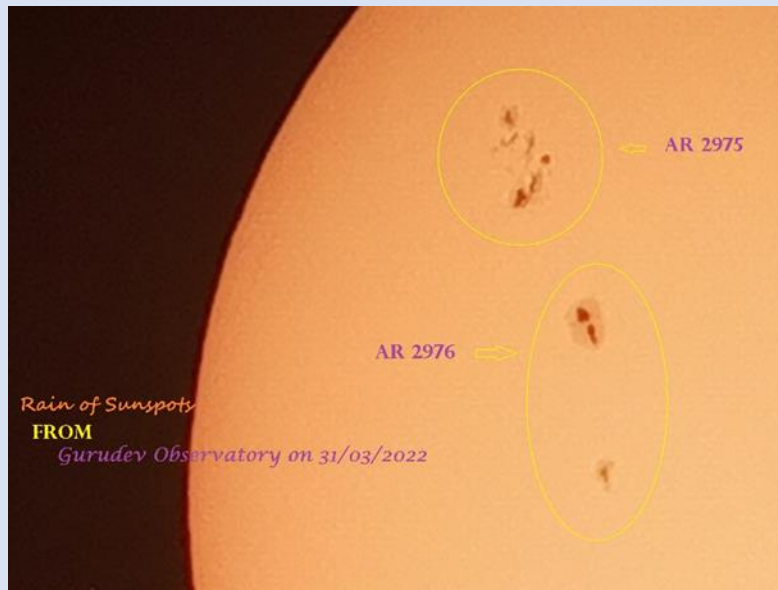
As we all know, Galileo Galilei used the telescope to discover many things about the Solar System and the stars. Seeing the moons of Jupiter revolve around their planet, he argued that Copernicus was right about the Sun centered Solar System.



His report on the phases of Venus further supported Copernicus, showing it to be an inferior planet, orbiting the sun. Seeing sunspots on the Sun and detail in the markings on the moon, he posited that the heavenly bodies were not perfect immutable works but were instead part of a vibrant cosmos. Tracking the spots showed that the Sun rotated about its axis just like planets and moons do. In a way, it was these imperfections inspired astronomers to seek a better understanding of our universe. The Japanese have a philosophy of wabi-sabi, the view of finding beauty in the imperfection of nature.

These earliest telescopic sights are the same that inspire wonder at public star parties and outreach events. The rings of Saturn, the moons of Jupiter or the craters on the Moon through a telescope are sights no one should miss. For the sunspots and other solar phenomena, you can either project the sun's

disc through a telescope onto a piece of cardboard or use a relatively cheap mylar filter to fit over the front of your telescope to see the disc in white light.



There are also more sophisticated filters available to observe in hydrogen alpha and other wavelengths that may bring out other details. As always **never look at the sun directly** and always use approved equipment and methods when looking at the sun in any telescope.

## New Ocean of Discovery

*Then felt I like some watcher of the skies when a new planet swims into his ken;  
Or like stout Cortez when with eagle eyes he star'd at the Pacific—and all his men  
Look'd at each other with a wild surmise— silent, upon a peak in Darien.  
"On First Looking into Chapman's Homer" by John Keats*

The telescope also opened a vast ocean of discovery of objects never seen by human eyes. More comets were discovered, and Edmund Halley proved that one, later named for him, returned every 76 years, the first time the previously terrifying objects became tamed and predictable. Charles Messier made his list of fuzzy deep sky objects that were stationary, so he wouldn't confuse them with comets. His list of "rejects" represents some of the most enticing objects to view in a small telescope. William Herschel also observed thousands of nebulae, clusters, etc., and produced the first deep sky catalog of the entire sky with his sister Caroline's able assistance.

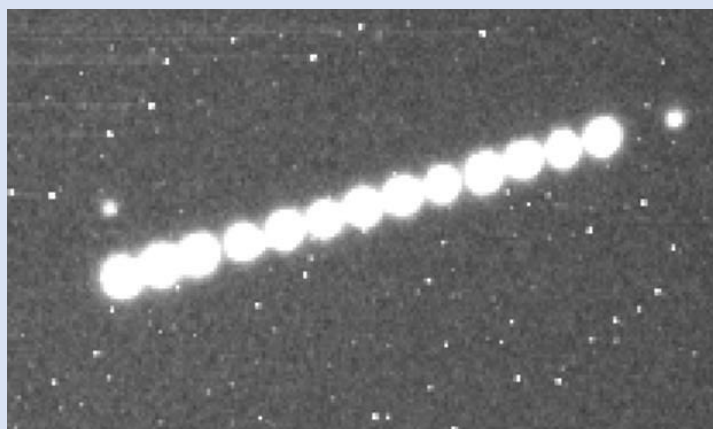


Telescopes of modest to enormous size will show all these objects in varying degrees of clarity and detail. But the most amazing thing discovered in the telescopic age was that there are other planets in our solar system. William Herschel was appointed Court Astronomer and given the money to build his large telescopes because he found the unexpected, a planet beyond the orbit of Saturn. His proof of the planetary nature of Uranus was indeed an epochal discovery, equal in magnitude to Balboa's discovery of the hitherto unimagined Pacific Ocean (Keats had the wrong conquistador).

Throughout human history, it was known that there were five planets other than Earth, and this was considered the final answer. Later review of records as far back as Galileo and perhaps even Hipparchus showed that Uranus had been seen by others before and even given a catalog number (34 Tauris). But Herschel provided scientific proof through diligent observation, and after his discovery came those of Piazzi and others who found dozens of asteroids. The search for what turned out to be the asteroid belt centered on a distance predicted by Bode, who noticed a periodicity in the location of the planets from the sun.

		Mean Distance from Sun in AU (Earth = 1AU)	Mean Distance from Sun by Bode's Law: ( $a = 0.4 + 0.3[2^n]$ )
	$n$	$a$	
Mercury	$-\infty$	0.39	0.4
Venus	0	0.72	0.7
Earth	1	1.00	1.0
Mars	2	1.52	1.6
????	3		2.8
Jupiter	4	5.20	5.2
Saturn	5	9.54	10.0
Uranus	6	19.18	19.6

Later, inconsistencies in Uranus' orbit led to the discovery of Neptune by Le Verrier, Galle, and Adams, all using math and visual telescopes. You can easily repeat these astounding discoveries with binoculars or a small telescope. Uranus, Neptune, and several of the brighter asteroids are visible at some point in the year around their opposition. Check your local astronomy magazine, website, or software to find when they are easily visible. Be sure and bring a chart with you as the only way to identify a planet or asteroid is either noting a star that shouldn't be there or sketching the star field over a few nights to see which one moved.



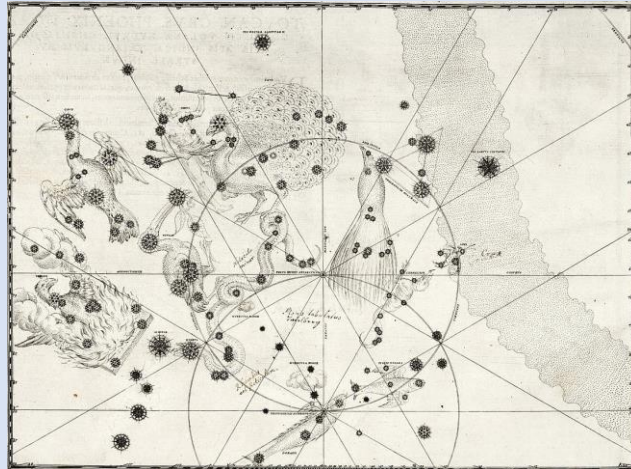
*Hygiea every 20 min 12Apr 2022 by author*

*Note that in May 2022, both Uranus and Neptune are near the sun. Hygiea, an asteroid, is in Virgo, but you'll need a 4-inch telescope.*

The Messier objects provide a great introduction to the deep sky objects observable by modest visual telescopes. Messier's first item (M1), the Crab Nebula in Taurus, is a supernova remnant and it is easy to see how Messier confused it with a comet. Other catalogs, such as Herschel, Caldwell, and books by Rev. Webb, Burnham, and many others will point out the famous, the strange, and the beautiful objects first seen by the pioneers in telescopic astronomy. *In May 2022, M1 is up right after dark but will be hard to see by mid-May. But there are dozens of Messier objects well placed this month.*

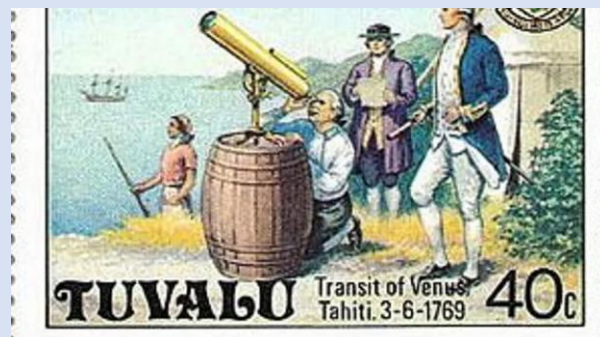
## The Survey Era

*I propose to take such a survey of the Universe that the mind may be able really to receive and to perceive an individual impression.*  
*"Eureka: A Prose Poem", by Edgar Allen Poe*



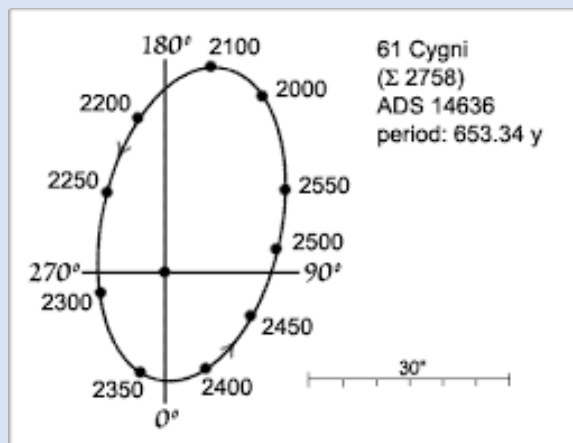
The Age of Discovery opened the southern sky to European eyes, as Halley, John Herschel, and especially Lacaille voyaged to the southern hemisphere and charted the stars and objects seen there. New constellations were devised, although the native peoples there had long had their own star stories. The invention of the micrometer and better achromatic lenses allowed for splitting and measuring double stars. Many of these were seen to be actual pairs, orbiting each other exactly as Newton and Kepler predicted, following the same rules of gravity and elliptical orbital motion devised for objects in our Solar System.

The most important discovery of this period was the fundamental scale of the nearby universe. The relative distances between the sun and planets were known, but it took the careful, scientific method (proposed by Halley) of timing the Transit of Venus in 1769 to provide the scale. Until ocean voyages and harsh overland travel could be mastered, we could not cover the great distances needed to make the needed observations. Jeremiah Horrocks first observed the Transit in 1639 but had no other reports to provide the needed data.



Once the actual distance was known from the Earth to the Sun (the astronomical unit AU), all distances in the solar system could be calculated. Later, Friedrich Bessel used stellar parallax, the change in position of the stars over the course of six months (the extent of Earth's orbit), to provide distances to stars in our region of the Milky Way.

Double and multiple stars can be seen with a telescope, and you can even track their orbital motion, though many take years to show movement. There are many beautiful double stars, but you might visit 61 Cygni later in the summer. Not only is it possible to split it with mounted 10 x 50 binoculars (though a small scope helps), it is also the star that Bessel used stellar parallax to determine the distance of the 61 Cygni system from Earth.



61 Cygni Orbital Motion

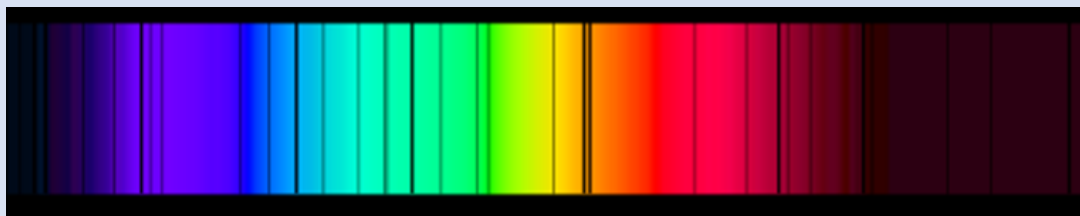
A trip to the tropics or Southern Hemisphere will open a fantastic sky journey also, with the southern constellations and magnificent deep sky objects available you can never see from up north. Hopefully, you just observed one of the Venus transits, as they will not repeat this century. However, Mercury also transits the sun, either in May or November. We will have to wait until 2032 for the next one.

## Other Light

*"What's the frequency Kenneth?"*

*Spoken to newsmen Dan Rather by his assailants; inspired a song by R.E.M.*

Rainbows had been known since recorded history began, and prisms and the splitting of light into its constituent colors were studied by Newton. However, the true beginnings of spectroscopy and studying the entire electromagnetic spectrum began in 1800 with William Herschel. Herschel measured the temperature of each color and noticed there was a large increase beyond the red end of the spectrum, what we now call infrared light.



In 1814, Fraunhofer built the first spectrometer and identified dark (absorption) lines in the solar spectrum, which were later named in his honor. In the 1860's Gustav Kirchoff and Robert Bunsen were able to match these solar lines with known chemical elements and provided a way to determine what stars are made of. Helium, 10% of the visible matter in the universe, was found in the solar spectrum decades before it was identified on Earth. The prominent double line in yellow is the element Sodium.

Spectroscopy is indeed a powerful tool. We were beginning to understand that there were other ways to study our universe, using new technology. This would expand enormously in the next 200 years, as we will see in later articles. Doing your own spectroscopy is more difficult than the other telescopic work discussed above. It requires a diffraction grating and is used, in modern times, with imaging equipment. So, we will need to move into astrophotography, and later, Astro imaging. The next article will discuss how we invented those, and how you can use the tools to rediscover the objects that changed astronomy.

You can, however, note the color of stars and from that understand their temperature and other characteristics. Annie Jump Cannon invented the stellar classification system by color, using letters to differentiate the classes. A common mnemonic for the system is “Oh, Be A Fine Girl Kiss Me”. O stars are very hot and blue, and each class gets cooler through white, yellow, orange, and finally red (M). A small telescope or binoculars will help draw out the color, and you can also spot colors in double stars, which may both be the same shade or very different.

## Your Friend the Telescope



Learning how to use a telescope can be a daunting task, but it is well worth the effort. There are many more things to see, and the objects you admire with your eyes often have wonderful detail and deeper beauty through a scope. Man’s grasp of the universe has been increased exponentially by the telescope, and your enjoyment of astronomy can be too. Peering through a telescope is a joy shared by many people, and you can join that community if you like. Attending a star party or outreach event is always a treat, and the wonder observing the planets and stars ignites in children of all ages is amazing. It all began 400 years ago and has been a cornerstone of the Scientific Revolution that has changed human history. Whether a meters wide world class scope or a cheap refractor from a big box store, optical aid has made the universe wider, and our understanding of it deeper.

*“Love looks through a telescope; envy, through a microscope.”*

*Josh Billings*

Sources and links:

<https://getyarn.io/yarn-clip/a5e642ae-5301-4c4d-9f36-0c8e5f45e72c>

<http://www.gurudevobservatory.co.in/>

[http://www.dibonsmith.com/cyg\\_61.gif](http://www.dibonsmith.com/cyg_61.gif)

[https://en.wikipedia.org/wiki/Dan\\_Rather#%22Kenneth, what is the frequency?%22](https://en.wikipedia.org/wiki/Dan_Rather#%22Kenneth,_what_is_the_frequency?%22)

<https://www.youtube.com/watch?v=iWkMhCLkVOg> All other figures public domain

# TREASURER'S and MEMBERSHIP Report

BY JOHN NEWTON



**As of April 24, we had 194 members - 12 New member for 2022**

We welcome this month our newest members - **Daniel Thomas, Bill Nichols, Gary Wayland and Brian Wayland** Hello and welcome to ACT!

In addition, we want to recognize our long-term members who continue to renew their memberships with the club even in these restricted times. Finally, we can breathe easy again soon as restrictions continue to lift. Also, we look forward to seeing everyone at our virtual meetings by Zoom, General Meetings and at club events throughout the year when possible.

## Accounts as of April 24, 2022

Checking: \$ 4,800.76

Savings: \$ 15,787.35

Investments: \$ 31,901.78 (Value tends to fluctuate with markets).

The club now has PayPal available for you to start or renew memberships and subscriptions using your credit or debit cards. Fill out the registration form at <https://astrotulsa.com/page.aspx?pageid=16> Click Submit and you will be given the choice of either mailing in your dues with a check or using PayPal which accepts most major credit cards. A modest processing fee is added to PayPal transactions.

You may also renew your membership or join at one of our club events using your credit card by seeing one of our officers. We can take payments with the Square card reader. A small fee is also added on to these transactions.

**ALSO NOTE:** For our current members who are renewing their memberships, you can now go to a new link on the website to start your renewal process. On the home page, hover over the "Member" tab on the ribbon menu near the top of the page. Then select the "Membership Renewal" link and this will take to a page to fill out your information. Fill this out, submit it, then pay your dues by the method you choose.

**NEWS NOTE:** Both Sky & Telescope and Astronomy have free Digital subscriptions available with print subscriptions, or Digital subscriptions may be purchased separately. Details - Contact their websites

Membership rates for 2021 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.

**Join Online** – Add or renew magazine subscriptions. <https://www.astrotulsa.com/page.aspx?pageid=16>

**Magazine Subscriptions:** If your magazines are coming up for renewal, try to save the mailing label or renewal form you get in the mail. Forms are available on the club website. Both magazine now include online access with paid subscription.

**Astronomy is \$ 34 for 1 year, or \$ 60 for 2 years.** [www.astronomy.com](http://www.astronomy.com)

To get the club discount you must go through the club group rate.

**Sky & Telescope is \$ 33 per year** <https://skyandtelescope.org/>

Sky & Telescope also offers a 10% discount on their products.

You may renew Sky & Telescope subscriptions directly by calling their number -**be sure to ask for the club rate**

## April 2022 Astro Club Activities

On Saturday April 2nd about 20 of our members enjoyed the Messier Marathon. This annual event is a friendly challenge to observe as many of the 110 Deep Sky objects in the Charles Messier Catalogue in a single night. A nice spread of pizza and snacks were on hand to keep their energy up through the evening. All enjoyed the comradery as they shared their passion for the night sky. Congratulations to Don Bradford and Jack Reeder for continuing the quest all night and welcoming the dawn!







This article is distributed by NASA Night Sky Network

The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach.

Visit [nightsky.jpl.nasa.gov](https://nightsky.jpl.nasa.gov) to find local clubs, events, and more!

## Night Lights: Aurora, Noctilucent Clouds, and the Zodiacal Light

David Prosper

Have you spotted any “night lights”? These phenomena brighten dark skies with celestial light ranging from mild to dazzling: the subtle light pyramid of the zodiacal light, the eerie twilight glow of noctilucent clouds, and most famous of all, the wildly unpredictable and mesmerizing aurora.

Aurora, often referred to as the northern lights (aurora borealis) or southern lights (aurora australis), can indeed be a wonderful sight, but the beautiful photos and videos shared online are often misleading. For most observers not near polar latitudes, auroral displays are relatively rare and faint, and without much structure, more gray than colorful, and show up much better in photos. However, geomagnetic storms can create auroras that dance and shift rapidly across the skies with several distinct colors and appear to observers much further away from the poles - on very rare occasions even down to the mid-latitudes of North America! Geomagnetic storms are caused when a magnetic storm on our Sun creates a massive explosion that flings a mass of particles away from its surface, known as a Coronal Mass Ejection (CME). If Earth is in the path of this CME, its particles interact with our planet’s magnetic field and result in auroral displays high up in our ionosphere. As we enter our Sun’s active period of its 11-year solar cycle, CMEs become more common and increase the chance for dazzling displays! If you have seen any aurora, you can report your sighting to the Aurorasaurus citizen science program at [aurorasaurus.org](https://aurorasaurus.org)

Have you ever seen wispy clouds glowing an eclectic blue after sunset, possibly towards your west or northwest? That wasn’t your imagination; those luminescent clouds are noctilucent clouds (also called Polar Mesospheric Clouds (PMC)). They are thought to form when water vapor condenses around ‘seeds’ of dust from vaporized meteorites - along with other sources that include rocket launches and volcanic eruptions - around 50 miles high in the mesosphere. Their glow is caused by the Sun, whose light still shines at that altitude after sunset from the perspective of ground-based observers. Noctilucent clouds are increasing both in frequency and in how far south they are observed, a development that may be related to climate change. Keeping in mind that observers closer in latitude to the poles have a better chance of spotting them, your best opportunity to spot noctilucent clouds occurs from about half an hour to two hours after sunset during the summer months. NASA’s AIM mission studies these clouds from its orbit high above the North Pole: [go.nasa.gov/3uV3Yj1](https://go.nasa.gov/3uV3Yj1)

You may have seen the zodiacal light without even realizing it; there is a reason it’s nicknamed the “false dawn”! Viewers under dark skies have their best chance of spotting this pyramid of ghostly light a couple of hours after sunset around the spring equinox, or a couple of hours before dawn around the autumnal equinox. Unlike our previous two examples of night lights, observers closer to the equator are best positioned to view the zodiacal light! Long known to be reflected sunlight from interplanetary dust orbiting in the plane of our solar system, these fine particles were thought to originate from comets and asteroids. However, scientists from NASA’s Juno mission recently published a fascinating study indicating a possible alternative origin: dust from Mars! Read more about their serendipitous discovery at: [go.nasa.gov/3Onf3kN](https://go.nasa.gov/3Onf3kN)

Curious about the latest research into these night lights? Find news of NASA’s latest discoveries at [nasa.gov](https://nasa.gov)



Comet NEOWISE flies high above a batch of noctilucent clouds in this photo from Wikimedia contributor Brwynog.

License and source CC BY-SA 4.0

[Link to Picture Credit](#)

The zodiacal light extends into the Pleiades, as seen in the evening of March 1, 2021 above Skull Valley. Utah. The Pleiades star cluster (M45) is visible near the top.

Credit and source:: NASA/Bill Dunford

[.https://www.flickr.com/photos/qsfc/51030289967](https://www.flickr.com/photos/qsfc/51030289967)



A sampling of some of the various patterns created by aurora, as seen from Iceland in 2014. The top row photos were barely visible to the unaided eye and were exposed for 20-30 seconds; in contrast, the bottom row photos were exposed for just 4 seconds- and were clearly visible to the photographer, Wikimedia contributor Shnuffel2022.

License and source: CC BY-SA 4.0 [https://commons.wikimedia.org/wiki/File:Aurora\\_shapes.jpg](https://commons.wikimedia.org/wiki/File:Aurora_shapes.jpg)



## ASTRONOMY CLUB OFFICERS:

PRESIDENT – JOHN

[astrotulsa.pres@gmail.com](mailto:astrotulsa.pres@gmail.com)

VICE PRESIDENT – BRYAN KYLE

[astrotulsa.vp@gmail.com](mailto:astrotulsa.vp@gmail.com)

SECRETARY – JERRY CASSITY

[astrotulsa.secy@gmail.com](mailto:astrotulsa.secy@gmail.com)

TREASURER – JOHN NEWTON

[astrotulsa.tres@gmail.com](mailto:astrotulsa.tres@gmail.com)

## BOARD MEMBERS-AT-LARGE:

MIKE BLAYLOCK

DON BRADFORD

JIM DANFORTH

TAMARA GREEN

ADAM KOLOFF

JAMES TAGGART

SKIP WHITEHURST

## STAFF:

FACILITIES MANAGER –

JAMES TAGGART

[astrotulsa.obs@gmail.com](mailto:astrotulsa.obs@gmail.com)

EDITOR - JOHN LAND

[tulsaastrobiz@gmail.com](mailto:tulsaastrobiz@gmail.com)

PROGRAM CHAIR - JOHN LAND

[tulsaastrobiz@gmail.com](mailto:tulsaastrobiz@gmail.com)

Public FaceBook Page Coordinator

Adam Koloff -

[akoloffuso@gmail.com](mailto:akoloffuso@gmail.com)

OBSERVING CHAIR - BRAD YOUNG

[allenb\\_young@yahoo.com](mailto:allenb_young@yahoo.com)

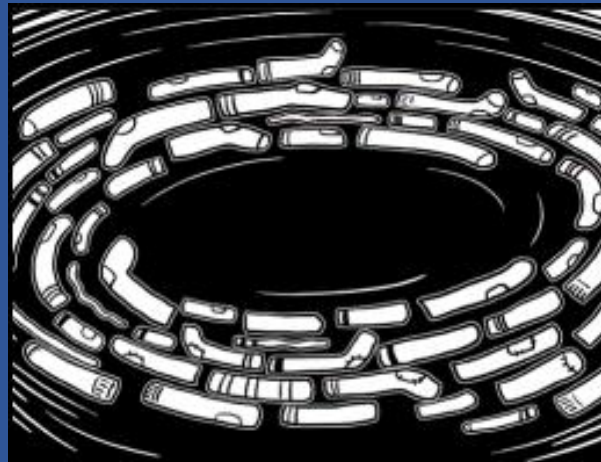
SIDEWALK ASTRONOMY – **Open Position**

PR AND OUTREACH – **Open Position**

GROUP DIRECTOR – **Open Position**

NIGHT SKY NETWORK – **Open Position**

WEBMASTER JENNIFER JONES



MANY THINGS WERE EXPLAINED  
WHEN SCIENTISTS GOT THE  
FIRST DIRECT PHOTOGRAPHIC  
EVIDENCE OF A BLACK HOLE.

### Do you have ideas for our club In Person or ZOOM Meetings?

Want to share an observing experience or astrophoto.  
Know someone willing to be a Guest presenter?

We would also welcome YOU to do a short 5-10  
minute section of interest or new equipment you'd  
like to review.

Create a Cartoon on a Space Theme

**Contact our Editor John Land**

PERMISSION TO REPRINT ANYTHING FROM THIS NEWSLETTER IS GRANTED, **PROVIDED THAT CREDIT IS GIVEN TO THE ORIGINAL AUTHOR AND THAT THE ASTRONOMY CLUB OF TULSA "OBSERVER" IS LISTED AS THE ORIGINAL SOURCE.** FOR ORIGINAL CONTENT CREDITED TO OTHERS AND SO NOTED IN THIS PUBLICATION, YOU SHOULD OBTAIN PERMISSION FROM THAT RESPECTIVE SOURCE PRIOR TO REPRINTING. THANK YOU VERY MUCH FOR YOUR COOPERATION. PLEASE ENJOY THIS EDITION OF THE OBSERVER.