ASTRONOMY CLUB 88 Yrs OF TULSA

OBSERVER

OCTOBER 2025

Bringing Stars to the eyes of Tulsa since 1937

Editor – John Land

Images of M 51 Whirlpool Galaxy and M 27 Dumbbell Nebula

By Keith Millslagle

Keith took these images at our Sept 19 Members Observing night.

For the Whirlpool galaxy, he used a Svbony SV305 Pro camera mounted on a SVBONY SV165 guide scope. 50 thirty second subs at ISO 12800

For Dumbbell he used his Canon EOS 80D camera mounted on a Sky-watcher Evostar 80ED refractor, on a Sky-watcher EQM-35 PRO equatorial mount
50 thirty second subs at ISO 2500

In Town Astronomy Club meetings at Jenks High School planetarium

Meetings are Open to Guests and Members

Friday Oct 3 – 7:00 PM Jenks High School Planetarium

Located at 105 East B St, Jenks, OK

Guests are welcome to come and learn more about our club

Our Guest speaker will be Mike Grogan certified meteorologist on FOX 23 Severe Weather Team. Mike will be sharing insights on the weather and how it impacts our astronomy observing. Mike is also an astronomy enthusiast. He has a weekly FOX 23 SKYWATCH special telling about events in the sky and often promotes our Astronomy Club events. See more details and directions at Oct 3 Club Meeting Event

OCTOBER is loaded with SPECIAL OBSERVING EVENTS

Volunteers we need you to come share your love of the stars

Come enjoy a fun family night
October 17 6:00 to 8:00 PM
Case Community Center
in Sand Springs

1050 W Wekiwa Rd, Sand Springs See details at Falloween Family Fest

Keystone Ancient Forest Astronomy Night
Saturday Oct 25 – starting at 5:30 PM
See details and directions in event posting below

See details and directions at Keystone Ancient Forest

Astronomy Club Dinner
Sat Nov 1 – 6:00 PM
Jenks Planetarium

Make your RESERVATIONS in ADVANCE
By Friday OCT 24
To astrotulsa.tres@gmail.com

Cost $ 20 each - If possible, pay at our Oct 3 meeting in Jenks or PAY at the Door
(Exact cash preferred)

Members and their family welcome

Stargazing Nights and Observatory 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

Guest and member Observatory nights

Come enjoy an evening of star gazing at our observatory located in darker rural skies.

See details and directions on our Website Events Page Guests are requested to RSVP

Saturday Oct 11 - 6:15 PM Guest & Members Observatory Night
Saturday Nov 15 - 4:45 PM Guest & Members Observatory Night
Saturday Dec 13 - 4:30 PM Guest & Members Observatory Night

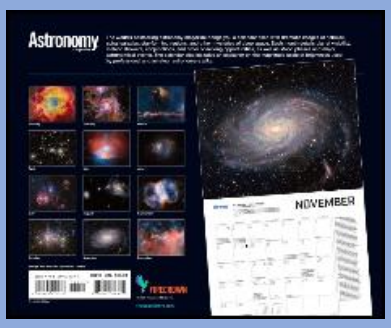
Astronomy Club Members Nights

Our members are invited to come work on their observing goals, do some Astro imaging and share ideas.

Saturday Oct 18 - 6:15 PM Members Observatory Night
Saturday Nov 22 - 4:30 PM Members Observatory Night
Saturday Dec 20 - 4:30 PM Members Observatory Night

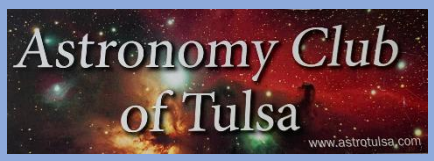
If a Friday event must be cancelled due to weather, we will try on Saturday at the same time
- Always check the website for event updates

See full Event details and directions at https://www.astrotulsa.com/events



2026 Astronomy Calendars $ 12 each

The 2026 Calendars have arrived. Each month has tips on sky events and historical highlights along with stunning monthly photo. They will be available while supplies last on a First Come basis at our fall club meetings. **Please bring exact cash**



Astronomy Club Window sticker $ 1.00
Limited number available to Jenks meetings.

Salutations all,

What an incredible month it's been for our club. Several of our members — myself included — had the chance to head out west for the annual Okie-Tex Star Party near Black Mesa State Park. There's truly nothing like those dark skies. It was an amazing weekend full of stargazing, shared stories, and unforgettable views of the cosmos. Personally, I'm already counting down the days until next year's event!

Looking ahead, October is shaping up to be an exciting month for the Astronomy Club. We're building momentum with new projects, events, and opportunities for members to connect. And don't forget — our annual Club Dinner is right around the corner! Mark your calendars for Friday, November 1st at 6:00 p.m. And join us for a night dedicated to celebrating us — our shared passion for the night sky, our community, and all we've accomplished this year. Plus, there will be plenty of great BBQ to enjoy.

Clear skies,

Astronomy Club of Tulsa

"Bringing Stars to the Eyes of Tulsa since 1937"

Jonathan Fussell - President

Click on these images to links on the Internet

ASTRONOMY TOOLS

Tulsa National Weather Service

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/

Planets - Saturn reached Opposition on Sept 21 and Neptune on Sept 23. So both planets are visible almost all night in October. Saturn's rings are still a thin line as we view them almost edge on. Jupiter is in Gemini about 11:30 pm by mid-October Venus is our bright morning star in the East before dawn. It is moving from Leo into Virgo this month. It rises about 5:00 AM Mercury is moving to the evening sky but it will be a difficult target in the bright twilight. It has a close conjunction with Mars on the 18th Your best bet for finding the pair will be right after sunset on October 23 when the pair will form a line with a 2-day old thin crescent moon. Uranus rises a bit after 8:00 PM and lies about 4 degrees below the Pleiades in Taurus.

Moon Phases - -
Full Mon Oct 6 - - 3rd Q Mon Oct 13 - - New Tues Oct 21 - - 1st Q Weds Oct 29

Lunar conjunctions –
The moon rises near Saturn & Neptune - Oct 5 - Pleiades on Oct 9 After midnight on Mon Sept 16 the moon is near Jupiter on October 23 Venus on Oct 19

The Orionid Meteor shower will be active from October 2 to November 12, 2025. NASA
The consensus peak period falls between October 20 and 23, with many sources favoring the night of October 22–23 as the most intense. Under ideal, moonless and dark-sky conditions, observers might see 10–20 meteors per hour, though peak rates can vary depending on local conditions. The Orionids have their origin from debris left in the orbit of Comet Halley and can be seen raining through planet Earth's skies twice a year during two annual meteor showers, the Eta Aquarids in May and the Orionids in October.

The lesser known Draconids Meteor Shower peaks Oct 8-9
To explore other annual meteor showers, go to
Meteor Shower Calendar

Comet TRIFECTA in October Skies **by John Land**

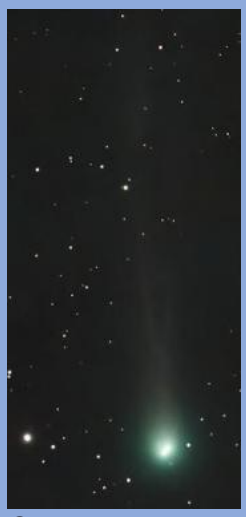
Three comets are accessible in our October skies. **Comet C/2025 A6 (Lemmon)** is putting on a good show in the morning sky. It's at 7th magnitude as October begins. At its nearest approach to Earth Oct 21 at 0.6 AU, it should be an easy binocular object at mag 3.3 and possibly naked eye in darker sky. It is moving toward the lower part of the Dipper in Ursa Major and may actually be observable in both the early evening and morning sky. It reaches perihelion Nov. 8th just inside the orbit of Mercury.

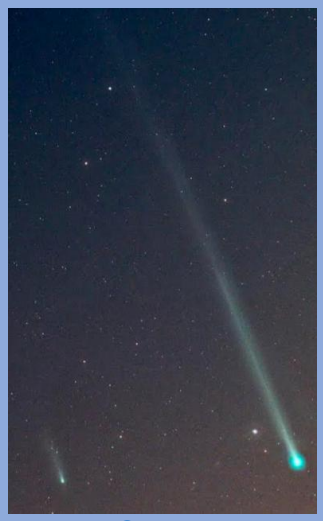
Newly discovered **C/2025 R2 (SWAN)** - The unexpectedly bright comet was discovered by amateur astronomer Vladimir Bezugly on 11 September 2025 in images of the SWAN instrument on NASA's SOHO satellite. During September it has mainly been accessible observers in more southern latitudes. However, it is now moving to our early evening sky. The comet was at perihelion on Sept 12 and is now outward bound. It will pass 0.26 AU from Earth on Oct 20 at predicted 7th magnitude. Nighttime sky gazers will also be watching for a spawned meteor shower around October 5 when our Earth passes through the plane of the comet's orbit.

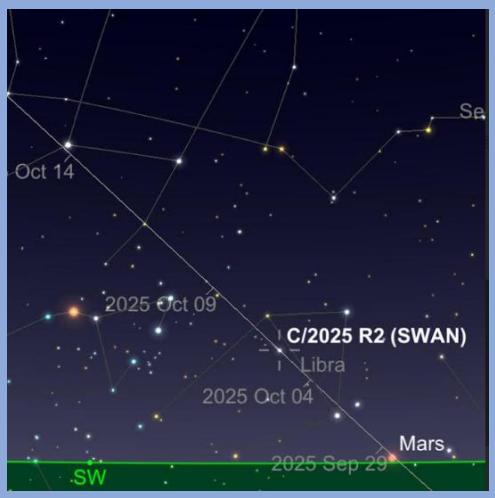
Fainter comet **C/2025 K1 (ATLAS)** is headed for it perihelion on Oct 8th. As it returns to deep space with will pass within 0.4 AU of Earth on Nov. 24th The comet is presently about 10th magnitude but may become brighter than 9th later in the month.

But Wait – That's not ALL the Comet News !!! An Interstellar comet from a distance star system is currently passing through our solar system. Comet 3I/ATLAS was discovered on July 1, by the NASA-funded ATLAS (Asteroid Terrestrial-impact Last Alert System) survey telescope in Rio Hurtado, Chile, arriving from the direction of the constellation Sagittarius. This comet hurtling by at 130,000 mph – the fastest ever recorded with an orbital eccentricity of nearly 5 ! Any eccentricity beyond 1.0 exceeds the sun's gravitational ability to hold it in orbit. Both the Hubble and James Webb telescope have been imaging the comet's behavior. I've been monitoring updates. The early images showed higher levels of carbon in its coma compared to typical solar system comets and less water. Presumably because it was extremely cold so that Carbon Dioxide or Methane ices were the first to sublimate and form gases. You can explore its continued journey at the 3I/ATLAS Interstellar Comet Tracker Unfortunately it will be on the opposite side of the Sun from Earth when it reaches perihelion in early October. However, it will pass near Mars on Oct 3rd and NASA plans to image the comet with several of our Mars orbiting satellites. So, keep an eye out for developing news. https://spaceweather.com/ frequently posts updates on observations.

Note of caution: Be judicious when seeing stories on social media. There's already been far flung speculation about this being a Alien craft exploring our system. Plus, the regular media tends to use a lot of hyperbole to glamorize their article and AI generated images.







Comet Lemmon Sept 26 – J Land

Comets 2025 K1 & R2 - Sept 20

You know you're a deep sky observer- IF: By K. C. Lobrecht

Our Communion with the dark sky must begin with the distractions at the Mounds Observatory of passing lights, social chatter and laser lights, that turn into the sublime.

There are a couple thousand nights of clouds and wind. Relish those gooey nights and lens condensation. But it's the cold nights that turn to black ink and stars so white you're agog. As you settle in, the sounds remind you are still on the Earth. Katydids' dinge of *erson erson*. Was that a bat that whistled by my head? Many nights of coyote's chorus, and lone wolf howls are quite rare. Driving home, owls dive bombing the truck. Goofy raccoons in a conga line of family members. A lone silhouette max size of a beaver. Deer running next to the truck, not in front. A limping bobcat looking at me pissed, glad the window is rolled up.

Driving to Kenton near Okie-Tex on Hwy 412, just past at the four-way stop in the panhandle, a rare lynx with long ear tuffs and rosette pattern, surely too tall to be a bobcat.

I have learned we are still enveloped in the Universe and it's smiling back. Now my woods and wild pastures hold my gaze at the wildflowers, and half-globe spider webs, worlds within the World.

K.C. Lobrecht is a long-term member of our club who lives in a rural setting a few miles from the Observatory. She has completed 12 Astronomy League Observing programs and was the 17th person to achieve the coveted Master Observing Award in December 2002. She was also the first female in the nation to complete the Masters. In 2003 she was chosen as the MidStates Amateur Astronomer of the year.

Her Observing programs include: Messier Objects certiicate, Herschel 400, Herschel II, Northern Arp Peculiar Galaxies, Caldwell, Meteor Observing, Lunar Observing, Binocular Messier, Double Star Observing, Sunspotters, Master Observer Award, Mentor Award

She has used a number of telescopes over her long observing career. Her first scope was a simple Edmund Scientific 3" reflector. She then moved up to an 8" f7 Dobsonian, an 11" SCT, a 3" " TeleVue refractor and her beloved 13.2" F4 Dobsonian.

FOR SALE: 13.2" F4 Dobsonian –
K.C. says she is ready to downsize her collection a bit.
The 13.2" Dobsonian mirror was reconfigured by John Hall Pegasus Optics. Secondary mirror enhanced. 2" reducer Starlite, 15mag ability. Fast set up and break down. Fits in the back seat.

Editor Note: I have personally enjoyed superbly sharp views in this scope.

Contact details - kclobrecht@yahoo.com

Observing Chairman
Brad Young

Observer Safety

I think it's important to mention safety and astronomy. Part of observing visually is finding the darkest skies you can which is becoming harder. So, we are forced to drive to remote areas that are sometimes not improved and do so even in cold weather. Obviously, such conditions and locations can lead to significant risk. Not surprisingly, so can other people who don't understand what you're doing or are just untrustworthy. The first thing to consider is the buddy system. I have always tried to observe at our dark sky sites either at a scheduled event or with one or two observing buddies. They're simply safety in numbers, and if someone finds two or three men or women together, they may think twice before messing with them. We've had that happen at the Tulsa Observatory and the fact that there were three of us I think made the difference.

There's also the chance that one of you may get sick and need assistance from the others, if nothing else they can call for police or ambulance. It's just a good policy to always try to have another person there with you, especially in cold weather when things can creep up on you fast. Another important part of the buddy system is letting someone at home or one of your friends know where you are at. That way, if you don't show up to work the next day or something, they will at least know where to start looking. If it is possible let them know the path you plan to take there unless it is already well established.

Another real problem is sleep deprivation. We always try to see as much as we can and stay up as late as we can when the sky is nice and the views may not come again for months. This is great, but it also leads to a sleepy person driving back for quite a while sometimes on very iffy roads. I know about this problem very well. Although I had not observed that night and was just getting my telescope ready to go to a star party, on the way home I fell asleep and ran headlong into a tree after leaving the road. I totaled my car and lay there by the road until I could get my wife on the phone to come and get me. Somehow due to the airbag I was uninjured, but sore from head to toe. I left the telescope back at the observatory. Otherwise, it would have been destroyed too and some of its parts were in the car and were lost.

Unfortunately, that was nowhere near the first time I had been sleepy and driving. We used to have Adam's ranch, and even darker site that was three hours from my home. Even though it had a great bunkhouse, sometimes I would observe there and then drive back home. There were many times when if there hadn't been an upbeat song on the radio or some other stimulus, I don't know what would have happened. We are not bulletproof if you're tired, stay at the observatory or site or pull over and take a little nap you can always start home later after you have a little rest.

Speaking of roads, I just had a fantastic blowout on one of our freeways coming home when a piece of debris in the road tore an inch wide hole in my tire. If there had been more traffic my severe turn to the right trying to get off the highway onto the shoulder might have been resulting in an accident. Luckily, I was unhurt again. And, luckily, I had a good spare. Unfortunately, the trucker stopped after seeing all this and tried to help me could not figure out the jack either. So, I called my road assistance service through my insurance, and they were able to come help me.

That's not the first time something like that happened either. One time I went to see the Capulin Volcano in New Mexico while I was at Okie-Tex in the Oklahoma Panhandle. It's about a 3-hour drive there and back and there are modern highways to take you the entire way. Of course, I didn't want to do something that simple, so I took my rental car down extremely worn-out roads that were apparently U.S. 66 at one time. They were horrible and then on the way back I was late for dinner, so I ran along them as fast as a hundred miles an hour. Sure enough, by the time I got back to the campsite I had a flat. Once again, I called roadside assistance and was fine but just imagine if it had gone flat about a hundred miles earlier. I don't even know if I had cell service at that point. So not only do you have to be careful you have to be careful not to be an idiot who drives too fast on terrible roads. If you think it's just because I'm a lousy driver, one of our local weathermen just had the same thing happen here in 2025. He made it back to camp also, barely.

Another good reason to think about your safety and well-being is because if you do suffer an injury, you may not be able to observe for a while or become incapacitated enough that it may affect what you can do in the future. My actual greatest fear is falling off ladders observing in big telescopes. I have balance problems due to early earaches and hate ladders. I try to use my little step ladder as least as possible with my 22 inch scope, but on occasion there are bigger telescopes with bigger ladders. I try to avoid those as much as possible. And again, if you're sleepy you may fall off the ladder which I have done more than once. My rule about that is the same as at the bar if I fall off the stool, it's time to go home.

Finally, the weather is not our friend. Even though it may be very clear and nice when you start, winter can lead to storms and cold fronts coming in faster than predicted, leading to all kinds of problems if you're out too far. It's always tempting to try to go and look when it's crystal clear and very cold, but even just the cold still night can be dangerous if you fall asleep or are not properly dressed. And don't forget summer, when you can become dehydrated and overheated, especially setting up during twilight, which may be the hottest and most humid part of the day if you live in a hot climate like I do.

Another thing to mention is the site that you are using to observe. Most of the time as I've grown older, I've been smart enough to go to our observatory which has a double gate, or to an established star party or where we have planned to observe like Adam's Ranch. The one I was younger I would often just go out to the middle of nowhere, find the end of a road and set my telescope up. Obviously, this is not a good idea. Whoever owns the land may not understand what you're doing and see it as simple trespassing with possible bad results for you.

So far, I haven't been approached by anyone about observing, but I was scared out of my mind by a deer coming up behind me in the woods a long time ago. Try to stay within the bounds of acceptable observing sites. If you do need to go to a new site, try to contact the landowner or the park service or whoever oversees it and make sure they know ahead of time and agree that you can observe there.

While the trucker and I were working on my tire, the people on the highway were not getting over in the other lane or giving us any room to work at all. Many people have been injured trying to change a tire on a highway and luckily, we weren't part of that count. But it was risky because it

was Friday night around midnight, when many people have been out and may have also been drinking. This is another risk that amateur astronomers take, they often go to dark sites on the weekends and return at say one to 2:00 a.m. this is a rotten time to be out on the road because a lot of other people are going home about that time and they're not tired from observing. So, beware of the people around you on the road and try to anticipate that all of them are drunk and that you're going to have to adjust your driving to suit.

And it's half past four and I'm shifting gears. "Radar Love", Golden Earring

Another thing that's hard to accept is getting older. As we grow older our responses slow and sometimes our ability to stay awake in boring situations like long expressway drives can occur. Again, don't think of yourself as bulletproof. Turn up the radio, drink some coffee or pull over and take a little nap if you have to it's not worth getting home 30 minutes earlier if you're going to risk running off the road or having some other kind of accident or mishap. And again, of course, if possible, stay overnight at the facility so there's no risk at all of driving home tired. Gene Shoemaker is the most famous example of an noted astronomer that has been lost due to an accident on a long, lonely road, but I'm sure there are many more that we just haven't heard of. Don't add yourself to the list.

Editor Notes: J Land

When visiting the observatory, we have a **Safety Policy** that there should be **at least two people left to lock up and not leave an observer alone**. Over the years we've had a few incidents to reinforce the wisdom of this policy.

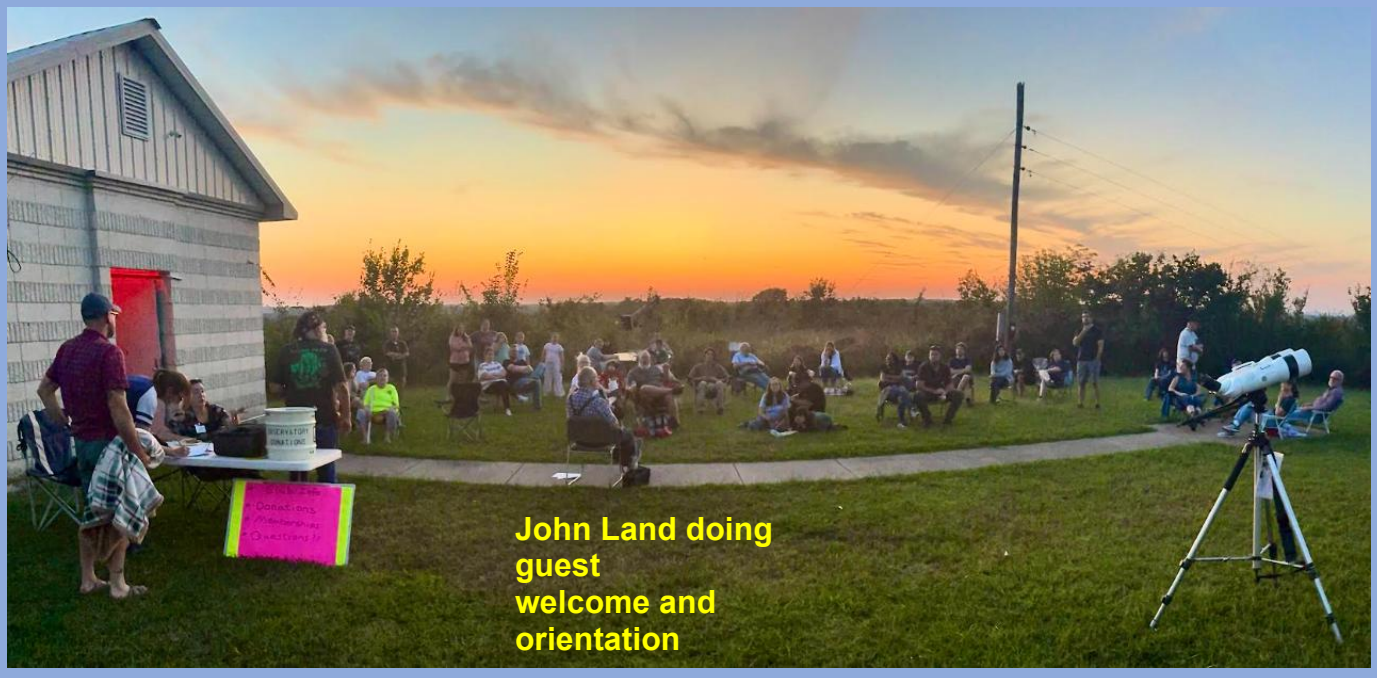
1. More than once a person's car would not start and had to get assistance from a friend.
2. An "Unwise" observer alone, locked his keys in the car and had to break out a car window.
3. Once as we were leaving at 2:00 AM a member in a LARGE FORD EXPEDITON had a tire go completely flat just as he was turning out of the top gate. The car was sitting sideways at an odd angle, and the spare tire was UNDER THE CAR which was nearly flat to the ground. It took three of us most of an hour to get to the spare and change the tire.
4. As K.C. mentioned in her observing adventures section, occasionally the *"Wild Creatures of the night"* can be a bit disconcerting if they wander too close.
5 A couple of funny incidents-

   On a winter observing night one of the guys was wearing a sock hat with a big fuzzy tuft on top. An owl swooped down and snatched it right off his head.

   Another time my friend Jerry had a racoon climb into his open window and steal his hamburger right off the car seat.

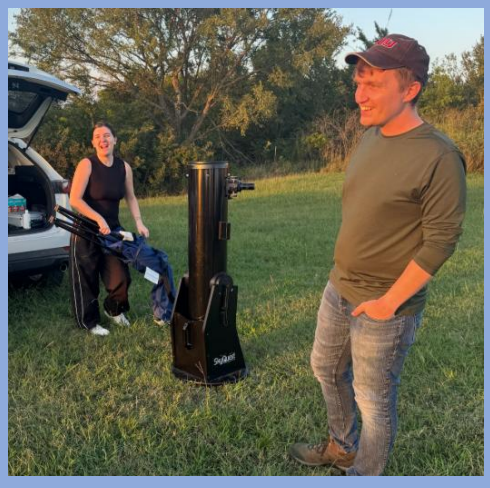
Guest Astronomy Nights – Sept 2025

We had a great turnout for our Sept 12 Guest night at the Observatory! Mike Grogan of Fox 23 weather has been including us as a part of his weekly Fox 23 SkyWatch segment. Between 80 and 100 people were present to enjoy our darker skies. Several expressed interest in learning more about our club. Cathy reports that the club took in about $300 in donations and sales. Kit Bratt set up her new solar telescope to let early arrivals see some solar prominences. As it got dark guest enjoyed a constellation sky tour by John Land. The International Space Station did a nice flyover. Many Nebula, Star Clusters and Galaxies were seen and the evening finished off with Saturn and its edge on rings rising in the east.



John Land doing guest welcome and orientation

Eagerly awaiting a night of star gazing



Scott & Kit Bratt's set up

Kit's New Solar H-Alpha scope

Cathy & Jaydyn picnic

Mike Bebeau's
custom scope mount
with Azimuth ring

Milky Way over Observatory

September 27 Case Community Center Public Telescope night

We had a good turnout in Sand Springs of guests eager to look through our telescopes. The 5-day old waxing crescent moon was visible as guests arrived. As it got darker, we focused on brighter stars and objects. When Saturn made its appearance in the east people were eager to see it. The rings are very thin this fall as we view them nearly edge on. We will be back Friday Oct 17 when we expect a large crowd of guests coming for the Community Center's FALLOWEEN FAMILY FEST with lots of fun activities and costume contest.

Treasurer Report
Cathy Grounds

As of Sept 16, 2025, we have 171 members and 40 new members so far this year!
Please welcome our newest members Stephen Lassiter, Steve Ellis, Ryan Clark, Don Chappel and Michael Schultz!

2026 Deep Space Mysteries Calendar will be on sale for $12.00 each at our Sept. 5th Jenks HS meeting Please bring exact CASH

Don't forget these easy methods to join or renew your membership:
https://www.astrotulsa.com/join – see the "join" tab at the upper right

FAQ: How do I know when to pay my dues? You will receive a notice by email that it is time to renew your membership. Look for it on or around the 1st of the month in which your membership expires. If you are not sure you are always welcome to check with the treasurer.

1. PayPal (click "join/renew" on the website) and follow the prompts, there is small fee.
   (You can use any major credit card - you don't need a PayPal account)
2. Mail in a check or money order to Astronomy Club of Tulsa,
   PO Box 470611, Tulsa, OK 74147.
3. Direct your bank's bill pay service to send payment to our PO Box address above.
4. Pay cash at any club event or swipe a credit card (there is roughly a 3% service charge).

As always if you have any questions or concerns or if your email, phone, or postal address has changed please email me at: AstroTulsa.Tres@gmail.com

Membership rates for 2024 - 2025 are as follows:
All include an Astronomical League Membership, and you will receive their magazine *The Reflector* each quarter.

Adults: $ 50 per year
Sr Adult: $ 40 per year (65 or older)
Students: $ 40 per year
Additional Family membership: $ 30 includes voting rights

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 Subscriptions- You can see subscription info on the "Join" tab at www.astrotulsa.com.
You can get a discount rate as an Astronomy Club member. You will need to do so directly using their web 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

☹️ **END of an Era** ☹️ **-** For several years I have included interesting **NIGHT SKY NOTES** articles as a part of our monthly club newsletters. These are created by NIGHT SKY NETWORK and shared with member clubs. They have covered a broad range of topics from observing highlights in the sky, the latest space exploration missions and recent discoveries. Sadly, due to Reductions in NASA Funding these articles will no longer be available. These changes will also affect the availability of Outreach Materials created by NSN. They have included a link of editors to explore past articles I may use some of them occasionally. John Land – ACT Editor

An Important Message from Night Sky Network

Editors: Since 2018, the NASA Night Sky Network has provided articles featuring the latest stargazing and NASA news to share with your organization's readership. As of October 1, 2025, Night Sky Notes will be suspended until further notice, as cuts and restructuring are part of NASA's Fiscal Year 2026 budget. *–Vivian White and Kat Troche*
The NASA Night Sky Network Team

See the full explanation of **Night Sky Network Operational Changes** – October 2025

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!

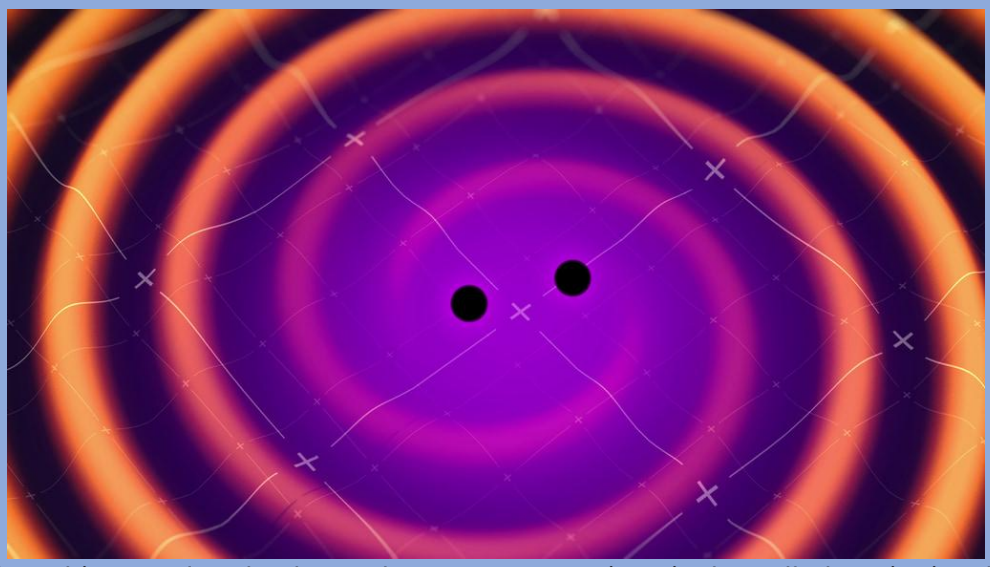
October's Night Sky Notes: Let's Go, LIGO!

By Kat Troche

September 2025 marks ten years since the first direct detection of gravitational waves as predicted by Albert Einstein's 1916 theory of General Relativity. These invisible ripples in space were first directly detected by the **L**aser **I**nterferometer **G**ravitational-Wave **O**bservatory (**LIGO**). Traveling at the speed of light (~186,000 miles per second), these waves stretch and squeeze the fabric of space itself, changing the distance between objects as they pass.

Waves In Space

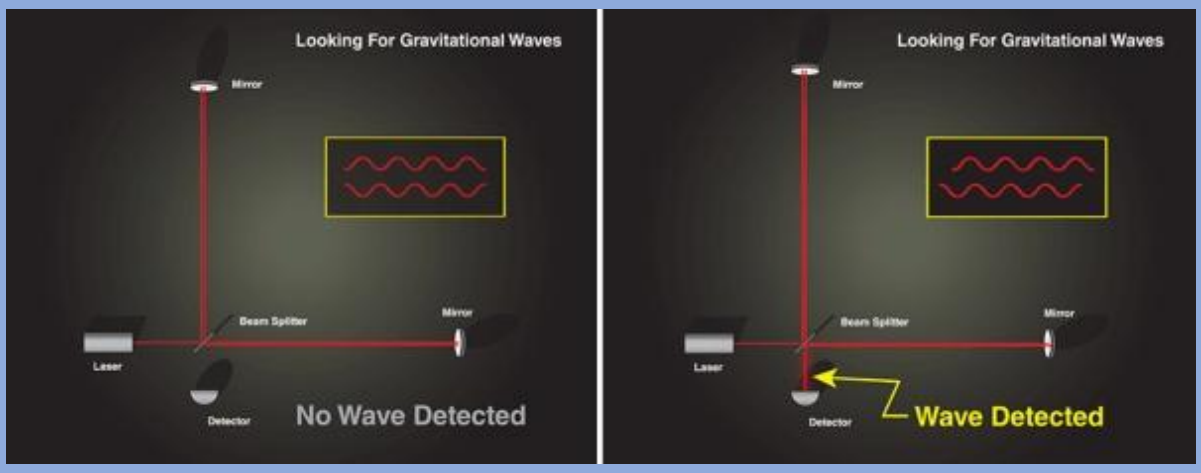
Gravitational waves are created when massive objects accelerate in space, especially in violent events. **LIGO detected the first gravitational waves** when two black holes, orbiting one another, finally merged, creating ripples in space-time. But these waves are not exclusive to black holes. If a star were to go supernova, it could produce the same effect. Neutron stars can also create these waves for various reasons. While these waves are invisible to the human eye, **this animation** from NASA's Science Visualization Studio shows the merger of two black holes and the waves they create in the process.



Two black holes orbit around each other and generate space-time ripples called gravitational waves in this image. Credit: NASA's Goddard Space Flight Center Conceptual Image Lab

How It Works

A gravitational wave observatory, like LIGO, is built with two tunnels, each approximately 2.5 miles long, arranged in an "L" shape. At the end of each tunnel, a highly polished 40 kg mirror (about 16 inches across) is mounted; this will reflect the laser beam that is sent from the observatory. A laser beam is sent from the observatory room and split into two, with equal parts traveling down each tunnel, bouncing off the mirrors at the end. When the beams return, they are recombined. If the arm lengths are perfectly equal, the light waves cancel out in just the right way, producing darkness at the detector. But if a gravitational wave passes, it slightly stretches one arm while squeezing the other, so the returning beams no longer cancel perfectly, creating a flicker of light that reveals the wave's presence.



Still images of how LIGO (Laser Interferometer Gravitational-Wave Observatory) detects gravitational waves using a laser, mirrors, and a detector. You can find the animated version here. Image Credit: NASA

The actual detection happens at the point of recombination, when even a minuscule stretching of one arm and squeezing of the other changes how long it takes the laser beams to return. This difference produces a measurable shift in the interference pattern. To be certain that the signal is real and not local noise, both LIGO observatories — one in Washington State (LIGO Hanford) and the other in Louisiana (LIGO Livingston) — must record the same pattern within milliseconds. When they do, it's confirmation of a gravitational wave rippling through Earth. We don't feel these waves as they pass through our planet, but we now have a method of detecting them!

Get Involved

With the help of two additional gravitational-wave observatories, VIRGO and KAGRA, there have been 300 black hole mergers detected in the past decade; some of which are confirmed, while others await further study.

While the average person may not have a laser interferometer lying around in the backyard, you can help with two projects geared toward detecting gravitational waves and the black holes that contribute to them:

- **Black Hole Hunters:** Using data from the TESS satellite, you would study graphs of how the brightness of stars changes over time, looking for an effect called gravitational microlensing. This lensing effect can indicate that a massive object has passed in front of a star, such as a black hole.

- **Gravity Spy:** You can help LIGO scientists with their gravitational wave research by looking for glitches that may mimic gravitational waves. By sorting out the mimics, we can train algorithms on how to detect the real thing.

You can also use gelatin, magnetic marbles, and a small mirror for a more hands-on demonstration on how gravitational waves move through space-time with JPL's Dropping In With Gravitational Waves activity!

Bonus Animation & Interviews

– **Rapid Black Hole merger**

Discovery of First Gravitational Waves produced by Black Hole merger as told by 2017 Nobel Prize in Physics Researchers Kip Thorne and Barry Barish of Caltech and Rainer Weiss of MIT have been awarded the 2017 Nobel Prize in Physics. Also, a video showing LIGO and how it works.

GW250114: Rotating Black Holes Collide **APOD Sept 24, 2025**
This is the strongest gravitational wave signal yet measured from two massive black holes merging to form a new single Black Hole of 63 solar masses

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
205 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

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PR AND OUTREACH – Open Position
GROUP DIRECTOR – Open Position

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Enjoy at Planetarium Show at Jenks High School

JENKS PLANETARIUM

Jenks High School Campus
205 East B Street, Jenks

TICKETS are $7

See our Current Shows Schedule and ticket purchase links at
Shows and Ticket Link

Shows take place on Tuesday evenings or Saturday mornings
Must purchase tickets online in advance
Shows and Ticket Link