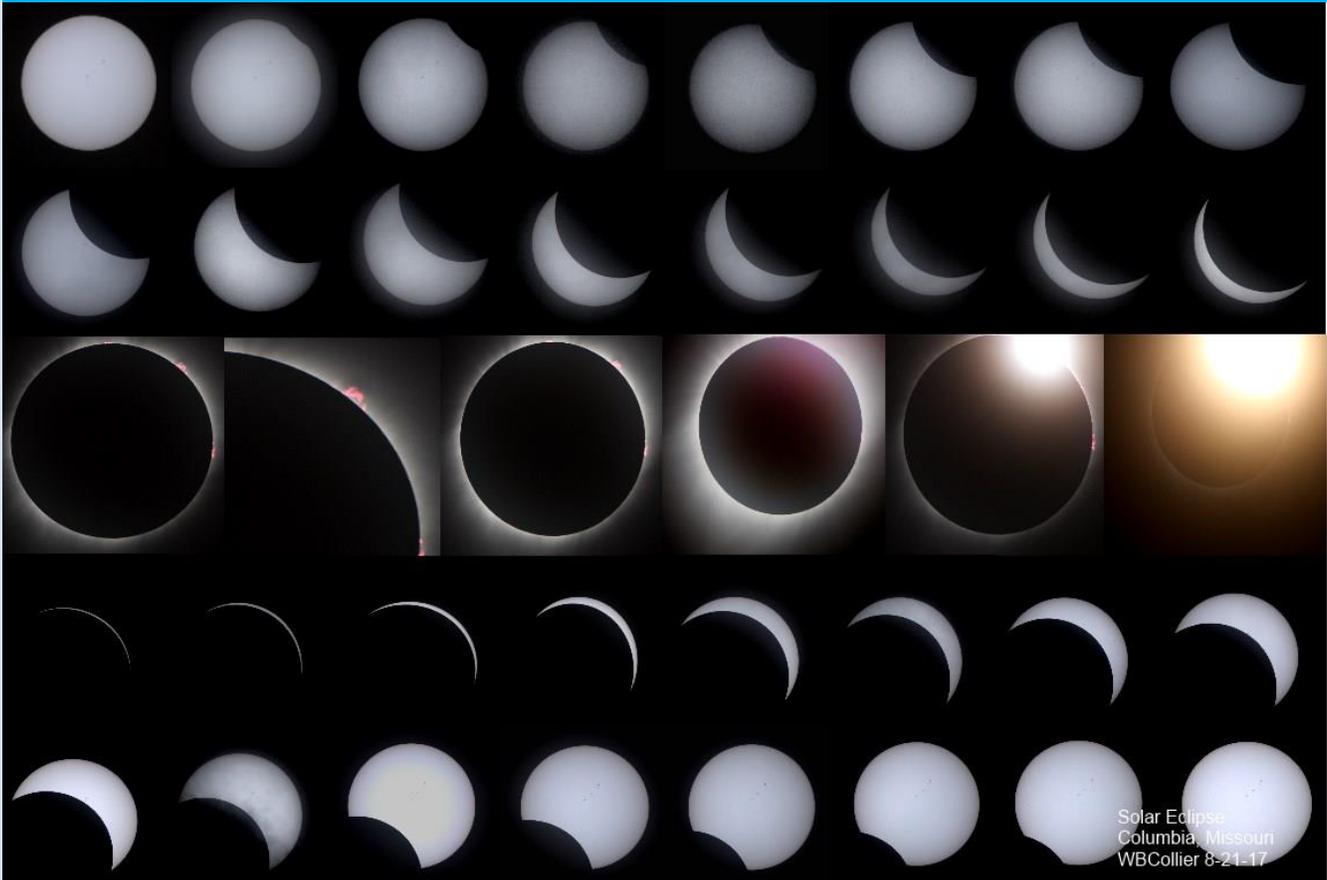




# OBSERVER

September 2017

*Bringing Stars to the eyes of Tulsa since 1937*



Credit: Bill Collier - Aug 21, 2017 eclipse taken with a Meade 6 inch Newtonian equipped with a Baader solar filter just south of Columbia, Missouri

## In this Issue

- 2 Club Events and Calendar
- 3 President's message – Richard Brady
- 4 Planets this month – Richard Brady
- 5 Montage of Eclipse Images – club members
- 6 -7 Eclipse adventure stories – club members
- 8 More Eclipse stories and Future Eclipse events
- 9 On PBS - Cassini – Death Dive into Saturn & Voyager celebrates 40 years in space
- 10 Treasurer Report
- 11 Astronomy Club Meeting and Observing venues
- 12 Club Officers – and Sidewalk Astronomy Photos

# Astronomy Club Events

Details at <http://astrotulsa.com/Events.aspx>

PUBLIC STAR PARTY      SAT Sept 9      7:00 PM ACT OBSERVATORY  
 MEMBERS' NIGHT\*\*      FRI Sept 15      7:30 PM ACT OBSERVATORY  
 ASTRO CLUB MEETING      FRI 7:00 PM      JENKS High School Planetarium  
 SIDEWALK ASTRONOMY      SAT Sept 30      6:30 PM BASS PRO  
 HIGH FRONTIER SAT      SEP 30      SUN OCT 1 PAWHUSKA AIRPORT  
 PUBLIC STAR PARTY      SAT Oct 14      6:15 PM ACT OBSERVATORY  
 MEMBERS' NIGHT\*\*      FRI Oct 20      6:00 PM ACT OBSERVATORY

Members Appreciation Picnic - Details to follow

ASTRO CLUB MEETING      FRI Oct 27      7:00 PM      JENKS High School Planetarium  
 SIDEWALK ASTRONOMY      SAT Sept 30      6:00 PM BASS PRO

\*\*MEMBERS AND FAMILY ONLY PLEASE.

	SUN	MON	TUE	WED	THU	FRI	SAT
2017 SEPTEMBER	27	28	29	30	31	1	2
	3	Labor Day	Neptune opposition	Full Moon	7	8	Public Observing night 7:00 PM
	Sunset 19:36	11	12	Last Quarter	14	Members Observing night 7:30 PM	Dawn conjunction of Mercury & Mars 0.06 deg
	17	Predawn conjunction of Moon, Regulus, Mars & Mercury	19	New Moon	21	Autumnal Equinox 3:02 PM	23
	Sunset 19:16	25	Saturn - south of moon	First Quarter	28	Club meeting @ Jenks HS 7:00 PM	Sidewalk Astronomy @ Bass Pro 6:30 PM
2017 OCTOBER	1	2	3	4	Full Moon Venus & Mars Conjunction	6	7
	Sunset 18:56	Columbus Day	10	11	Last Quarter	13	Public Observing night 6:15 PM
	15	16	Conjunction of Moon with Mars & Venus	18	New Moon Uranus opposition	Members Club Picnic 6:45 PM Orionid Meteors	Orionid Meteors
	Sunset 18:37	23	Saturn - south of moon	25	26	Club meeting @ Jenks HS 7:00 PM First Quarter	Sidewalk Astronomy @ Bass Pro 6:00 PM
	29	30	Halloween	1	2	3	4

# PRESIDENT'S MESSAGE

BY RICHARD BRADY



## Upcoming events

Many of you went up north to view the total solar eclipse. If you have pictures, we want to show them, including pictures of people and things around you then. There are several in this newsletter. Also I want to show them at the **General Meeting this September 29<sup>th</sup>**. So if you haven't done so already, send them to Tamara ([astrotulsa.vp@gmail.com](mailto:astrotulsa.vp@gmail.com)) or me ([astrotulsa.pres@gmail.com](mailto:astrotulsa.pres@gmail.com)).

**Okie-Tex is almost here!!** If you want to observe under some of the darkest skies in the continental states, this is the place to be. Okie-Tex star party is held every year out at the very western end of the Oklahoma panhandle. This year it is from Saturday, September 16 to Sunday, September 24. Tamara Green will be leading a convoy out there for anyone who hasn't been before. Look elsewhere in the newsletter for more information.

On **Saturday, September 30 and Sunday, October 1 is High Frontier 14 hosted by the Tulsa Rocketry club**. The rocketry club shoots off rockets that go as high as 25,000 feet (the FAA limit for the event) during Saturday and Sunday, and the astronomy club hosts a star party there Saturday evening. The club has gone out to Pawhuska previously, but we have been unable to go the past couple of years since High Frontier was scheduled during Okie-Tex. They actually rescheduled their event so our members could be there, so I would like to see a large turnout of club members to thank them. More info can be found at <http://tulsarocketry.org/high-frontier/>.

In October, we are going to have a **picnic for our members on Friday, October 20** (with a backup date of Saturday, October 21). These are the same nights as our Member Observing Nights. We plan to be there early around 5:30-6:00 PM to eat before observing. The club will provide soft drinks, hamburgers and hot dogs.

Also in October we will be holding **elections for officers and board members** at the October General Meeting on Friday, October 27<sup>th</sup>. I will be stepping down as president after holding the office for 3 years. If you want to run for an office or board member, please let our secretary, John Newton, know. His email address is [astrotulsa.secy@gmail.com](mailto:astrotulsa.secy@gmail.com). To be an officer or board member you must be a member in good standing for at least a year.

Then on **Saturday, November 18<sup>th</sup> we will be having our annual club dinner**. More details coming soon.



### **The planets this month**

In the sky this month, Jupiter is getting very low in the southwest as the month goes on, Saturn is the only planet well placed in the evening this month, Venus is the bright morning star all month, and Mercury and Mars are too close to the sun to be seen well (if at all) this month.

**Jupiter** is getting lower in the southwest as the month goes by. It is down to magnitude -1.7. It is only 10° high at sunset at the beginning of the month and getting lower as the month goes by, heading toward superior conjunction next month.

**Saturn** stays around magnitude +0.4 all month. The rings are tilted about as far as they can be, so now is a good time to look. They are a wondrous sight even a small telescope. (It probably gets the most “oohh”s and “aahh”s at Public Night and Sidewalk Astronomy of anything.) It sets just before 1 AM at the beginning of the month and 11 PM at the end.

**Venus** is the bright morning star around magnitude -4.0. It comes up around 4 AM at the start of September and around 5 PM at months end.

**Mars** comes up only about an hour before sunrise on September 1<sup>st</sup> but 1¾ hours before sunrise on September 30<sup>th</sup>, making it very difficult to see.

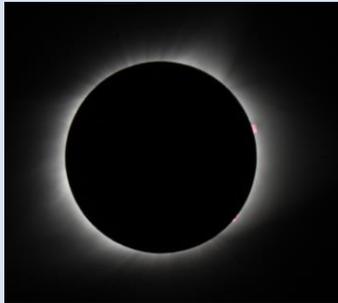
**Mercury** comes up only about an hour before sunrise on September 1<sup>st</sup> and only about ½ an hour before sunrise on September 30<sup>th</sup> so if you are going to try to see it, try early in the month.

Also, **Mercury**, **Mars**, and the star **Regulus** form a tight grouping early in the month before dawn on Sept 18<sup>th</sup>, but they are all quite low at sunrise. Try finding them with binoculars or a small telescope. Mercury will be the brightest at magnitude 0.0, followed by Regulus at +1.4 and Mars at +1.8. On the 10<sup>th</sup> Mercury and Regulus will only be about 36' apart, about the diameter of the Moon.

Clear skies!  
Richard Brady



Astronomy Club members traveled far and wide to catch a glimpse of Solar Eclipse Totality. Below are a few images they wish to share with you.



John Moore  
Lingle, WY



Robbin Jones -Tulsa – Solar Scope



Bill Goswick  
Holts Summit, MO.



Bob & Marcia Boston



James Callens @ Sullivan, MO.  
Sullivan, MO.



Robbin Jones - Leaf shadows

from Tulsa Club Facebook



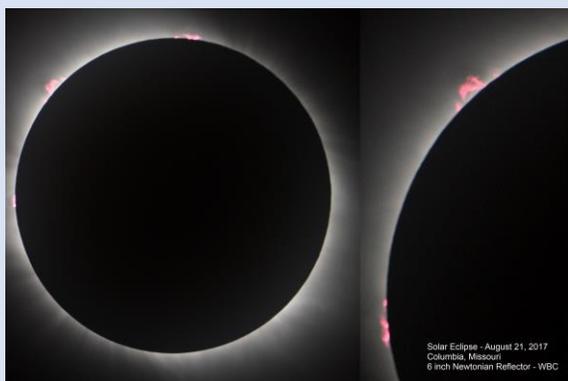
Brad Young Farmington MO



Marilyn Berry Columbia MO



John Land – Humboldt NE



< Bill Collier, Gans Creek park near Columbia, MO



Skip Whitehurst W. of Leavenworth, KS

## ***Our Eclipse Travel Adventures***

**John Moore - Lingle, Wyoming.** I had plans to observe from the fairgrounds in Stapleton, Nebraska which was very near the totality center line. I got spooked by the weather forecast for Nebraska that kept getting downgraded so on Sunday the 20th I drove north of Lingle, Wyoming. I set up beside a county road that was also near the center line and we experienced 2:29 of totality under perfectly clear skies. Later I heard that it was also clear at Stapleton and I'm happy that those nice folks had a good experience. On my way back home I wanted to capture an occultation on the night of the 22nd in the Oklahoma panhandle (Turpin) so I got on the road soon after totality ended. My occultation was successful and it looks like we have identified a new double star from the light curve that I produced.

The entire trip was really a great experience. I met a lot of nice people at the viewing site in eastern Wyoming and we continue to communicate and swap photographs with each other. The only (somewhat) negative experience was after the eclipse as I was still in the epic traffic jam some of my equipment shifted in my van and fell on my deep cycle marine battery that provides power in the field. It created a dead short across the terminals and the battery caught on fire. I had to make an emergency stop and get the battery out of the van before things really got out of hand. I was able to extinguish the fire and was back on the road in short order. It was a great trip and my next adventure will have me attending the national IOTA meeting in Carson City, Nevada on September 9-11

### **Robbin and Rosalind Jones - Tulsa, OK with Solar scope images**

My wife, Rosalind and I traveled to the corner of my office parking lot in Tulsa. I used my solar scope and observed the eclipse for approximately two hours. At the 90% eclipsed mark, which was maximum in Tulsa, it was noticeably cooler. You'll notice in the picture on the left that I captured a solar flare. I took this picture with my iPhone through my solar scope. Another friend took a picture through my scope with his phone and captured a sunspot. I have also included a picture of the shadows made by the leaves from a tree. You can see the partial eclipse in the shadows. It was very unusual. It might not have been a total eclipse here in Tulsa, but it was still very beautiful and a lot of fun to watch.

### **Bill Goswick – Holts Summit, MO**

Totality photo by Bill Goswick using a Nikon P900 - shot through hazy clouds at Holts Summit, Missouri. Sharon and I observed the eclipse with our amateur radio friends who live in Holts Summit. We had a good view of the eclipse in spite of the hazy clouds. The traffic coming back was unbelievable. It took us 3 and one-half hours to get from Holts Summit to Lebanon, Missouri, which normally takes about 1 hour and 25 minutes. The eastbound traffic on I-44 at Lebanon was bumper-to-bumper, going about 10 mph as far as the eye could see. We took a detour on State Hwy 5 to U.S. 60 into Springfield, MO. It was 20 miles longer, but got us to Springfield a lot faster than we could have made it on I-44. The traffic was moving better after we got to Springfield.

### **Marcia and Bob Boston – Sullivan, MO**

We spent the night in Rolla, MO and then drove on to a city park in Sullivan to view the eclipse. The weather was perfect, we met people from Boston, Clarksville AR, and even folks from OK City and Edmond. The city administrator of Sullivan, and police officers came by several times offering eyewear / souvenirs to all. Complete strangers helped with the unloading and loading of our car. The drive from Rolla to Sullivan was about 35 min, but the drive back to Rolla (after the eclipse) was well over 2 hours! The eclipse in totality was a very moving experience and I can't wait to do it again in 2024.

### **Marilyn Berry and husband, Curtis. Columbia, MO**

We observed from the back lawn of our hotel, near a wooded area, with just one other family within sight. There were a few clouds nearby but they didn't cover the sun during the eclipse. It was overcast enough we couldn't see any stars during totality. Cicadas chirped and a mockingbird sang loudly during totality, and automatic lights came on nearby buildings and yards. It was the first TOTAL eclipse I've seen, and it was awesome!

## ***More tales of Eclipse Travelers***

### **Brad Young, Farmington MO** near St. Louis

Most amazing sight in 40 years of astronomy. Jaw wide open and staring for 2 minutes, and it could never last long enough. Beautiful "flying v" shaped corona. See my sketch.

### **Bill Collier** - wife Susan kids, Andrew and Tiffany

**Gans Creek Park**, just south of **Columbia, Missouri** – See Cover page of Eclipse Sequence.

Weather clear to thin filmy clouds, we were just south of the storms.

This was my second total eclipse, saw one with my Dad 1970 in NC, (have old photo of that one); first for my family. Photographed it with my Meade 6 inch Newtonian reflector, with Baader solar filter, and uncovered during totality. Incredible experience, like my first one. Temperature dropped about 7° F, beautiful pink/purple corona shown through the very thin clouds, could still see corona lines in telescope photos, cicadas starting singing, and birds started to roost as darkness hit. The inner planets, and the brightest stars came out. A thin dim sunset set in all the way around the horizon. My wife Susan saw a cluster of 3 to 5 Bailey's beads on the upper right edge of the sun as totality left. Was interviewed by Channel 13 KRCG weather reporter after totality. Complicated telescope rigs draw onlookers and reporters like flies. Incredible, we are gifted with a very beautiful universe.

### **John Land – Humboldt NE** with Family and grandkids

We observed near Humboldt's town square with people from 5 other states. It was mixed clouds most of the time but we could see the sun through the clouds on and off. Totality was clouded out. :( Darkness at Totality was eerie quite and still. Birds came in to roost and Cicadas started buzzing. We could see what looked like "sunset" visible to west as the edge of the shadow approached. Was an awesome experience for all. Next stop April 8, 2024

### **Jerry Cassity – Sullivan, MO** ( You can see Jerry on the edge of the Facebook photo )

Myself, my wife Terri and daughter Teri' traveled to **Sullivan, MO** to view the total eclipse of 2017. We were viewing with a Facebook group, Telescope Addicts. ACT member Michael Blaylock and Tulsa area astronomers Tim Gilliland and Dan Wilson were also present. There were also Telescope Addict members present from New York, Florida and the United Kingdom. The forecast kept changing, but in the end we had good skies for totality. The experience was nothing less than awesome. There were several Telescopes with filters and Hydrogen Alpha scopes for viewing. Also, some of the Tulsa members did some photography. As for me, I did not take photographic equipment as I wanted to just enjoy the experience. After experiencing totality, I'm afraid future partial eclipses just won't be as exciting. I am looking forward to April 2024.

### **Skeet Christensen - St Joseph Kansas**

We were bummed. We went to St Joseph Kansas and traveled to 3 other spots trying to avoid the rain. But with the cloud cover and 100% totality where we were, it got really dark. Awesome. 15 minutes later it was back to day light.

### **Bill Steen - Grand Island, NE**

Watched with interest the whole cycle process through a Meade Eclipse 114. Set up in a shopping mall parking lot just east of US 281. Had a nice little shade tree to get under when necessary. Had a dozen or so people come by and look through the scope. At totality, I saw the black disk of the moon, surrounded by a white ring. The solar wind, with the aid of very thin local clouds formed very complete butterfly wings (two upper and two lower) darker than bright ring. Possibly the most beautiful thing I have ever seen in the sky. Got in an evening under dark skies (light/dark grey border area) just south of Red Cloud, before coming home.

## ***A shadow of darkness but hopes for the future.***



### **K.C. Lobrecht – Casper, WY**

With my son Nate & friend Ryan

The experience was the best! Black of the Moon was so much more dramatic than any photograph. The corona was in a three point like star trek or Acura symbol. Bailey's Bead was only seen naked eye. Darkness fell green like a hail storm light. NOVA said the corona's green is iron element stripped of 18 electrons. We were South of Casper on road #402, Old Casper Hwy, now dirt and gravel. Maybe a mile East off Hwy 487.

### **Skip Whitehurst – Leavenworth, KS**

Some friends from grad school live on a farm within the path of totality west of Leavenworth, KS, about a five-hour drive from here, I'd made arrangements with them more than six years ago to set up and watch the eclipse from their place. My brother from Alabama, sister from Maine, daughter (Tulsa), and our spouses all congregated here Friday afternoon and Saturday morning. The weather predictions for eclipse day were looking pretty iffy for the whole region in the days leading up to it, We set up our gear in the pasture in front of their house Sunday afternoon, set up some temporary fence around the equipment to keep the critters out, and did a quick polar align once it got dark enough to see Polaris.

No dice for Monday, though. It started out mostly clear that morning, but got increasingly cloudy through the morning, and even started to drizzle on us a bit about the time of first contact. We caught a few glimpses of the partial phases, but were completely socked in for totality, and again caught some of the ending partial eclipse. That was disappointing (to put it mildly), but it was interesting watching how quickly it went dark and back to light at the beginning and end of totality, and how dark it got, which I hadn't noticed the two times I'd seen a total solar eclipse previously. Their chickens went to roost, and some of the other farm animals were pretty confused - a flock of geese went marching toward the area they stay for the night, but never got there before the darkness ended, so they turned around.

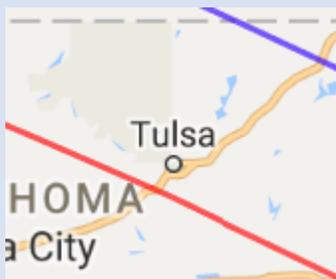
### **Annular Eclipse Oct 14, 2023**

71% in Tulsa

### **Total Eclipse April 8, 2024**

95% in Tulsa

Idabel, OK 100% 4 mins 18 sec



**BUT WAIT FOR AUG 12 !  
100 % TOTAL IN TULSA !  
5 MINS 37 SEC OF TOTALITY 337 seconds !**

Oh did I forget to mention the year? 2045

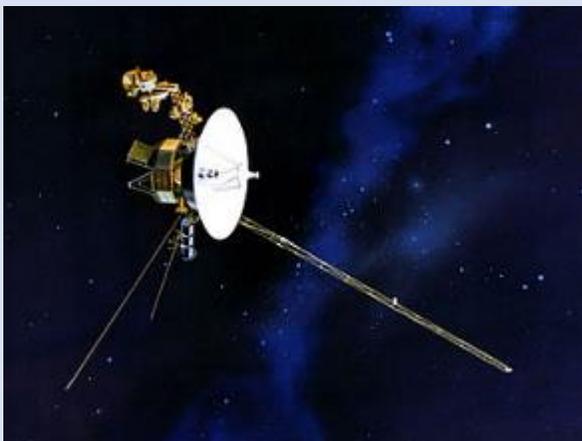


Since July 1, 2004 the Cassini space probe has been sending dazzling images of Saturn's breathtaking rings and mysterious moons. On Sept 15, 2017 Cassini's mission will end as it dives into Saturn's atmosphere at 74,000 mph. Join NOVA on PBS for the suspenseful ride during Cassini's final hours.

Video preview <http://www.oeta.tv/blogs/programming/oetas-favorite-fall-shows-2017/>

Check for other air times to record shows <http://www.oeta.tv/schedule/>

Watch the Cassini The Grand Finale live <https://saturn.jpl.nasa.gov/>



<https://voyager.jpl.nasa.gov/>

40 years ago the Voyager 1 and Voyager 2 spacecraft left Earth to begin the first ever Grand Tour of the Solar System. The images they sent back inspired new generations of space exploration. In 2012, Voyager 1 left our solar system and ushered humanity into the interstellar age. It is now more that 130 AU's away from the Sun.

**The Farthest - Voyager In Space**  
**Weds Sept 13 9:00 PM to 11:00 PM**  
**On your local OETA PBS channel**

Also airs at other times that week for recording.

Check for other air times to record shows. <http://www.oeta.tv/schedule/>

# TREASURER'S AND MEMBERSHIP REPORT

BY TIM DAVIS



**Astronomy Club of Tulsa: 156 members, including 35 new members in 2017.**

**Welcome to our new members this month:**

**Vondale Graham, Mari Migliore and Evan Migliore**

**Club Accounts as of August 31, 2017:**

**Checking: \$ 5,782.37**

**Savings: \$ 6,777.15**

**Investment accounts: \$ 21,764.94** (*Value Fluctuates with Market*)

**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 <http://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 whatever 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. Contact their websites for details.

Membership rates for 2017 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.**

<http://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.

**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** [www.skyandtelescope.com](http://www.skyandtelescope.com)

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

**Note:** You may renew your Sky & Telescope subscription directly by calling the number on the renewal form, **be sure to ask for the club rate.**

NEW SUBSCRIPTIONS must still be sent to the club

You are invited to come join us to learn more about Astronomy and view the wonderful sights in the night sky.

Check our Events Page of Dates [Link to Events Page](#)



During the school year our club holds a **Monthly General Club meetings** at **Jenks Public Schools Planetarium**  
105 East B St, Jenks, OK

**Meetings begin at 7:00 PM**

**When you enter the building lobby, take the elevator to the 3<sup>rd</sup> floor.**

[Click for Google Map Link](#)



### Sidewalk Astronomy Night

East side of Bass Pro in Broken Arrow near the lake.  
101 Bass Pro Drive, Broken Arrow, OK

[Click Map Link here](#)

On a Saturday evening near the 1<sup>st</sup> Quarter moon Astronomy Club volunteers set up telescopes to share views of the moon, planets and other bright objects. It's a come and go event where shoppers and restaurant goers get a chance to experience glimpses of the universe with their own eyes.



### 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.

### PUBLIC OBSERVING NIGHT on a Saturday

This event is open to individuals and families.  
Club members set up telescope 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. [Link to Events Page](#)  
[Click for Observatory Map](#)

CAUTION: **DO NOT use GPS** it will likely send you on some nearly impassible back roads.

ASTRONOMY CLUB OFFICERS:

PRESIDENT - RICHARD BRADY  
[astrotulsa.pres@gmail.com](mailto:astrotulsa.pres@gmail.com)  
VICE PRESIDENT - TAMARA GREEN  
[astrotulsa.vp@gmail.com](mailto:astrotulsa.vp@gmail.com)  
SECRETARY - JOHN NEWTON  
[astrotulsa.secy@gmail.com](mailto:astrotulsa.secy@gmail.com)  
TREASURER - TIM DAVIS  
[astrotulsa.tres@gmail.com](mailto:astrotulsa.tres@gmail.com)

BOARD MEMBERS-AT-LARGE:

JOHN LAND  
JAMES TAGGART  
SKIP WHITEHURST  
JAMES LILEY  
JERRY CASSITY  
TERESA DAVIS

STAFF:

EDITOR - JOHN LAND  
[astrotulsa.editor@gmail.com](mailto:astrotulsa.editor@gmail.com)  
MEMBERSHIP CHAIR - JOHN LAND  
[tulsaastrobiz@gmail.com](mailto:tulsaastrobiz@gmail.com)  
OBSERVING CHAIRS  
OWEN AND TAMARA GREEN  
[darthnewo@yahoo.com](mailto:darthnewo@yahoo.com)  
[astrotulsa.vp@gmail.com](mailto:astrotulsa.vp@gmail.com)  
SIDEWALK ASTRONOMY –  
OWEN GREEN  
[darthnewo@yahoo.com](mailto:darthnewo@yahoo.com)  
PR AND OUTREACH –  
OWEN GREEN  
[darthnewo@yahoo.com](mailto:darthnewo@yahoo.com)  
GROUP DIRECTOR - OWEN GREEN  
[darthnewo@yahoo.com](mailto:darthnewo@yahoo.com)  
NIGHT SKY NETWORK –  
RICHARD BRADY  
[astrotulsa.pres@gmail.com](mailto:astrotulsa.pres@gmail.com)  
FACILITIES MANAGER –  
JAMES TAGGART  
[astrotulsa.obs@gmail.com](mailto:astrotulsa.obs@gmail.com)  
WEBMASTER JENNIFER JONES

At our Sidewalk Astronomy nights we have a chance to introduce young people to astronomy for the first time. At our recent Sidewalk event 12 year old Ella viewed Saturn and the moon through Owen's 4 inch telescope. She used her smart phone to take images and shared them with us.

Thank You Ella – may you enjoy many more opportunities to explore the treasures hidden in the night skies!



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.