



OBSERVER

February 2022

Bringing Stars to the eyes of Tulsa

since 1937 Editor - John Land



A magnificent image of the Andromeda Galaxy M 31 taken by Ben Staton.

Ben is a senior at Edison High School and very enthusiastic about astronomy. He is a regular at the observatory nights and volunteer at several of our club's outreach events.

He used his Canon 650D camera attached to a William Optics Zenithstar 61 telescope. The image is composed of Sixty 30 second exposures stacked with Photoshop. It was taken in dark skies about 50 miles west of Tulsa.

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Astronomy Club Events

Check our website AstroTulsa.com events section for updates

Observatory ONLY OPEN for SCHEDULED EVENTS. [Click for Observatory Map](#)

During Winter Months Dress in layers with hat and gloves

Our rural site is cooler than in town - there is a classroom to warm up

Saturday Feb 19 10:30 to 1:30 PM Telescope 101 Workshop
Designed to help novice telescope owners learn the basics of using their telescope
Registration Required - see https://astrotulsa.com/Events_Details.aspx?id=3214

Saturday Feb. 19 5:30 PM **Guest and** Members night Guest Requested to RSVP

Saturday March 5 5:45 PM Members Only night
Open to members and their immediate family

Saturday March 12 6:00 PM Oxley Nature Center Star Gazing night Details Later

NOTE: If weather conditions are unfavorable or hazardous forecasts predictions
our events may be postponed or cancelled. Please check our website before heading out.

Astronomy Club Meeting - Friday Feb 4 - 7:00 PM - IN PERSON club meetings.

At Jenks High School planetarium 105 E B Jenks OK

For our program some of our club members will be giving a "Show & Tell" of some new astronomy equipment or techniques they have are enjoying. As time allows at the we will also watch a Night Sky Network program featuring some of the best Astronomy Pictures of the Day from 2021. Dr Jerry Bonnell, author, editor, and cofounder of APOD will describe some of his best picks of the year.

OBSERVING NIGHT GUIDELINES

With the post-holiday spike in Covid and 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.

- 1 At observing sessions, please observe social distancing when not with persons of your group.
- 2 Ask if you may join others at their telescope.
- 3 Observe spacing in the classroom and respect those who choose to wear a mask for protection.
- 4 If you or a person in your household is showing signs of illness, please postpone your visit for another date.

When at the Jenks High School, we need to observe their guidelines. The Current Policy states *All Jenks Public School staff members, visitors, and students in grades 3-12 will be required to wear face coverings. Any exceptions require the approval of the site principal.*

These policies are for the protection of the students who use the buildings as well as yourself.

President's Message John Land



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

Well, we are already a whole month into the year 2022 ! We had a good turnout at Jenks High School for our Jan 7th General Club meeting. The topic of the evening was the James Webb Infrared space telescope. I am happy to report that the JWT telescope now has its sun shields and mirrors fully deployed. It has reached its orbit destination at the L2 Lagrange point a million miles for Earth. All this was accomplished with far less fuel than had been allocated which should allow the telescope to be operational several more years past its planned operational life.

For our first Guest night at the observatory Jan 22, we had over 20 guests and 3 bright youngsters brave a cold night of star gazing. As I write this newsletter the weather forecast predicts a warm day for our first members observing night of the year Jan 29.

February is shaping up to be a busy month for astronomy outreach. We have been invited to bring our telescopes to two schools to energize young people to become curious about our universe. On Saturday Feb 19, 2022 we will be partnering with the Tulsa Air and Space Museum for our Telescope 101 Workshop. This has been a very popular event in past years. Novice telescope owners get to register for a 30-minute one of one session to help understand the basics of setup and using their telescope. [Registration is required !](#) See our events page of the website for registration details.

A sneak preview for the Spring includes an observing night at Oxley Nature Center. We also have hopes for a successful Messier Marathon Observing run Saturday April 2nd. Participants challenge their observing skills to locate and log as many of the 110 Deep Sky objects in the popular Messier catalogue in a single night. Get a head start on locating these night sky treasures by earning you own [Messier Certificate here](#).

If you would like to volunteer to help our club with these or other activities contact our club president. Let us all continue *"Bringing Stars to the Eyes of Tulsa since 1937"*

John Land - President

Click the images below to watch Recordings of our January Meeting on the James Webb Telescope

Zoom Meeting



Interview - Dr John Mather



Insane Engineering of JWT





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

February Skies. -

Moon Phases - - New Jan 31 - - 1st Q Feb 8 - - Full Feb 16 - - 3rd Q Feb 23 - - New Mar 2

The chill nights of early February open with a thin waxing crescent moon low in the SW sky. Weds Feb 2 you may be able to see the 2-day old moon about 4 degrees to the lower left of Jupiter. On Valentine's day a bright waxing gibbous moon will be high overhead near the Beehive star cluster M 44 in Cancer. **Jupiter** is our only visible evening planet but observe it early in the month. Jupiter slips behind the Sun at superior conjunction on March 5th to join the rest of the planets in the morning skies before dawn.

Venus is now our "Morning Star" I was pleasantly surprised to see it already prominent in the SE before dawn Saturday morning Jan 22. Both **Venus** and **Mars** are in Sagittarius before dawn. The two planets race side by side in the morning sky opening the month 9 degrees apart. The pair continue to race side by side closing within 4 degrees of each other on St Patrick's Day March 17th. The waning crescent moon slips below them on Feb 27th and passes near Mercury and Saturn on the 28th. **Mercury** reaches its greatest western elongation from the Sun Feb 16 low in the SE. You'll likely need binoculars to pick it out from the morning twilight. **Saturn** is struggling to crepe into the morning sky after its superior conjunction with the Sun on Feb 4th. On March 2nd Saturn passes just 2/3s degree below Mercury.



Observe a Starlight Eclipse - the scientific name for this is a lunar occultation
On Weds Feb 9th the dark side of the gibbous moon will occult the pair of stars Kappa 1 & 2 in Taurus. Kappa 1 shines at 4.6 mag and lies just 5.6' arc mins from the 5.3 mag star Kappa 2. The pair are bright enough to see in binoculars or small telescopes. Go out about 10:00 PM. and locate the pair to the upper left of the moon's unlit side. Get your phone set to its stopwatch mode and start watching carefully by 10:15 PM The moon will first pass in front of Kappa 1 a bit before 10:25. Start your timer and see how long it takes Kappa 2 to disappear.

February is the best month for observing Orion and the winter circle of bright stars. Eight of the 20 brightest stars all lie in a great ring around Orion. Starting with the brightest -1.4 mag **Sirius** then proceeding to clockwise to **Procyon** Mag +0.4, **Pollux** mag + 1.22, **Castor** mag +1.58. Then high up to **Capella** mag +0.07 back down toward **Aldebaran** mag +0.99 in Taurus and then to **Rigel** mag +0.28 at the foot of Orion. In the center of it all is the red giant star **Betelgeuse** at mag +0.56.

But look carefully there is one more stellar beacon that can be just seen skimming the southern horizon when it transits. **Canopus** Mag -0.62 I've not seen it from Tulsa, but it can be seen from our observatory hill top if you find a clear view straight south when it is highest as it crosses the meridian.



2022 – Do Look Up By Brad Young

The Year to Come (FEBRUARY THROUGH MAY)

A friend asked me to review astronomical events for 2022. Having never written an article quite like this, I tend to get hung up on the details of these amazing events and decided to limit it to only late winter, early spring. You know [When Everybody Goes to Mexico](#). It must also stay true to my oeuvre, and my personal style. I'm not sure what that is, but I think the article below will be typical.

Late to the Party

First let me say that this article is centered around events as seen from the U.S. The friend who suggested the article is in India, but I think most of these are still visible to him, except the eclipses. Also, I missed January, and skipped February and March. There is not much going on, except the [good evening Grandpa!](#) quasi-conjunction with Mercury and Saturn and a nice dance of the planets in the morning sky. It is way too cold here in Oklahoma to get up for those unless my Shiba Inu mix dog needs a walk.

Easter Eggs

But April and May make up for it. April 12th begins a run of close planetary conjunctions. The first one includes Neptune only 6 minutes of an arc (6') from Jupiter. Since Jupiter is nearly one minute of arc wide, this will be a very interesting sight with Neptune standing in as a fifth, albeit a little off kilter, moon of Jupiter. You may be able to make it out in binoculars, though a small scope would be best.

The last weekend of April better be clear. On April 27th at 20 UT, Venus will be 1' east of Neptune in the morning sky in what's called a quasi-conjunction or appulse. Jupiter will join them less than three degrees away like a spectator since he just had his close approach with Neptune a fortnight before. Again, you will probably have to use a small telescope to make out Neptune that close to bright Venus, but it should be worth it.

On Friday April 29th, Pluto is stationary in its eastward motion and begins to move west towards opposition. Three hours later Mercury is at greatest elongation east of the Sun for this appearance, 21° away in the evening sky and easily visible if you look about 45 minutes after sunset. I mentioned Pluto to discuss what stationary means related to planets, and Mercury to discuss greatest elongation.

Into the Left Field Weeds

Opposition and conjunction with the sun are easy to understand; opposition is when it's as far away from the Sun as it gets, and conjunction as close as it gets. Stationary points and greatest elongations are a little more complicated.

Stationary points appear in the sky just as the name would indicate. The planet stops moving east or west and starts moving the other way, appearing to briefly stop (be stationary) as it turns around. All planets reach a stationary point during their appearances, but the look is different for inferior planets Mercury and Venus, compared to superior planets (all the rest).

Inferior planets reach a stationary point in their motion at the beginning of a good appearance in the morning sky, and the end of their evening sky shows. In between, they go through inferior conjunction where they're close to the Sun and hard to see. In the morning, they stop going west and start going east

again. Their motion east doesn't quite match the sun's speed for a while, so they continue to get higher in the dawn until they reach greatest western elongation. The opposite happens in the evening sky, where they stop going east, having already slowed down in apparent motion since eastern elongation. This is why Mercury got close to Saturn in mid-January, but never closed the gap. Once they pass the stationary point and begin moving west, they approach the setting sun faster and are soon lost in the dusk glare.

See an illustrative animation of Venus's 2021 evening appearance can be seen at <https://www.shadowandsubstance.com/> Scroll down about halfway to view it.

Obligatory "In Real Life" Example

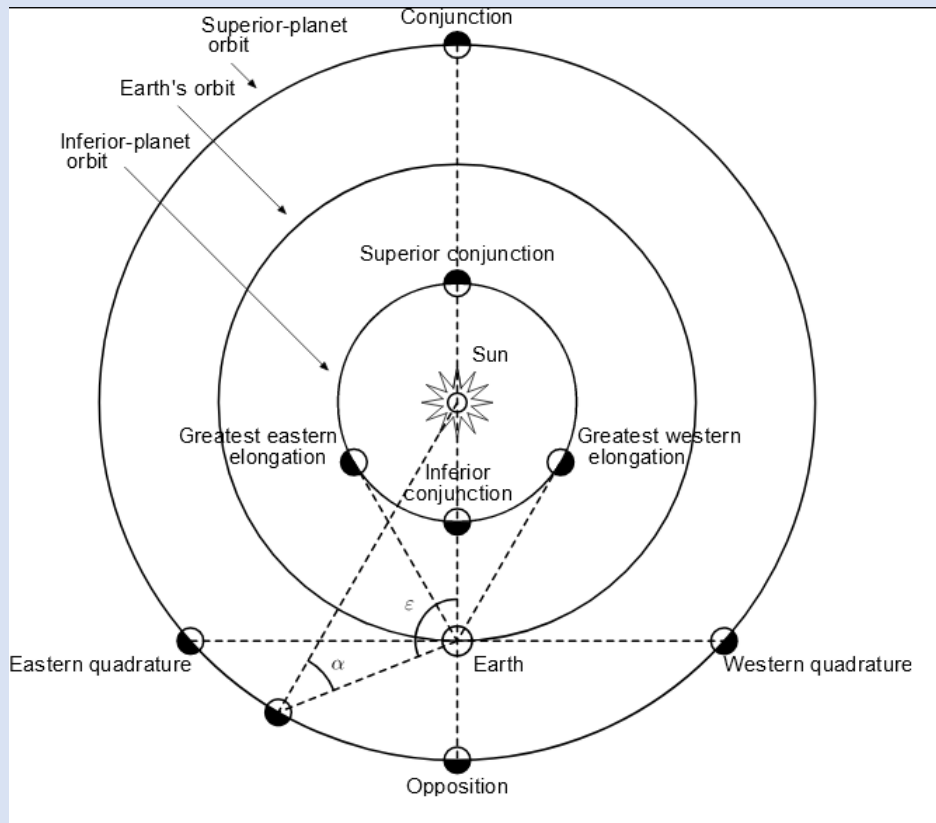
Think of it this way – if a car in the lane next to you but ahead of you matches your speed, they would be at elongation. If they get stuck behind a slower car and must slow down, they will appear to drift back towards you. When they stop (evening or eastern stationary point) and start going in reverse to go around the now stalled car, you will pass them quickly, and soon, they will be behind you. Then they stop again to shift gears (morning or western stationary point). Once they are in forward gear, they will start slowly (so they can yell at the hapless stalled driver), until they match your speed and are at elongation behind you. As they speed up further to pass you, the cycle starts again.



For superior planets, it's much the same, as the beginning of stationary motion and moving into retrograde motion means that it is approaching opposition and getting brighter and up all night. Then, it reaches a stationary point on the other side of opposition, begins direct eastward motion again, and gets dimmer and closer to the Sun after that.

Greatest elongation is primarily used referring to the inferior planets, as it's the same as opposition for the superior planets. This is the point where the inferior planet reaches their greatest distance from the Sun either east of it in the evening sky, or west of it in the morning sky. Hopefully the diagram from Wikipedia below will help explain where all these points are. The stationary points are not shown, but they are on the opposition side of quadrature for superior planets and the conjunction side of elongation for inferior planets. They are also different for each planet; the planet shown on the diagram outside Earth's orbit is at about where Mars' stationary point is.

Note: Mercury will be at greatest Western Elongation before dawn on Feb 16, 2022

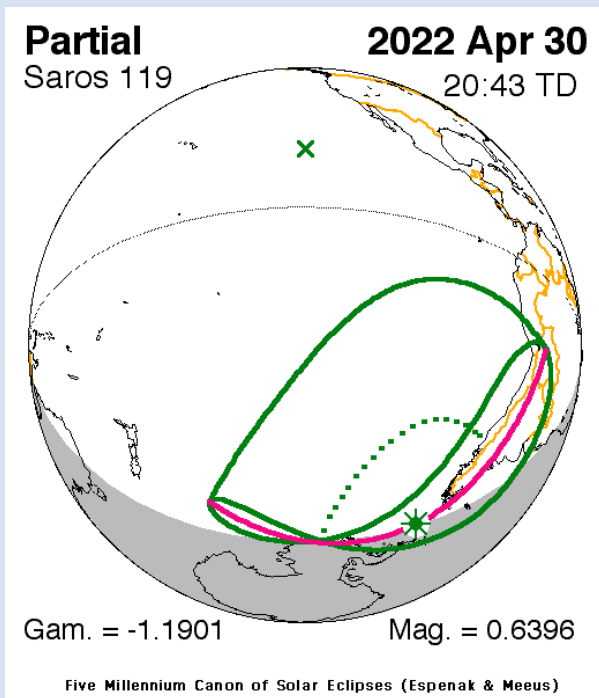


Less Shade

But, back to that great last weekend in April - there is a partial eclipse of the sun on the next day, April 30th. This one will only be visible in the most southern part of South America and Antarctica. But as often happens, a poor eclipse of the sun is followed by a **fantastic total eclipse of the Moon** on May 16th centered around 4 UT. Just as it gets dark here in **Tulsa, at 9:28 p.m. May 15** (2:28 UT May 16), the full Moon will start having a bite taken out of its lower side by the Earth's shadow. Over the next three and a half hours it should be quite a sight, and for once, at a convenient hour for most people.

So why is there such a great total eclipse of the Moon after a so-so partial eclipse barely even striking the Earth on April 30th? The Moon's motion is complicated, but we see the longest eclipses when the Moon is at apogee, furthest from the Earth in its orbit. The Moon is bigger at perigee when it's closest to the Earth, but it moves faster.

Distance from the Earth also affects the angle of its shadow thrown on us or ours thrown on it. The partial eclipse of the sun on April 30th has a gamma rank of -1.19. This means that the axis of the shadow of the Moon passes south of the Earth's center by $1.19 \times$ its radius. So, the axis passes 752 miles south of the Earth. The umbra (dark part) of the Moon's shadow doesn't get any closer than four Earth radii away (15,800 miles). We have an eclipse magnitude of only 0.64, meaning the main shadow doesn't reach Earth, and only 64% of the sun is blocked at the best point on Earth in the Drake Passage. The shadow also isn't pointed right at the Earth but quite a bit below it. This explains why we get a poor partial eclipse, visible only at the southern tip of the world.



The position of the shadow pointing towards Earth is a function of when the Moon crosses either the ascending or descending node in its orbit. These nodes are the point where the Moon crosses the ecliptic, or path of the sun as it appears to us in the sky. In April, the Moon won't pass its ascending node until 23 hours after the eclipse. It gets to New Moon too early, appears in our sky still nearly a degree south of the ecliptic, and so sweeps its shadow south of the Earth.

More Shade

By comparison, the [Full Moon of May 16-17](#) (see link for all the details) passes its descending node moving south of the ecliptic only 4 hours before the eclipse. This allows our shadow to strike the Moon nearly centrally and of course, Earth's shadow is much bigger on the Moon than vice versa. The Moon is also at perigee - closest to the Earth - the next day on May 17th, so our shadow is larger, mitigated a little by the fact the Moon is moving faster than average. This all adds up to a fine total eclipse of the Moon, with total eclipse visible at least in part from Rome to San Francisco.

NOTE: Tulsa Times for the Eclipse are Sunday May 15 9:28 PM to May 16 12:55 AM CDT

And All the Other Good Stuff

All these many motions of the moon add up to great chances to see very new moons (Feb 1 and Apr 1), if you'd like to try to spot those. Spring has only a few meteor showers, the April Lyrids are mooned out, but the **Eta Aquarids around May 6** should be good with an early moonset. Hopefully, another comet will come along. The only predicted one I found was Comet PANSTARRS C/2021 O3 (Perihelion 2022 April 21), and no one knows how it will act. None of the planets or Big Four asteroids are near opposition in February to May.

Finally on **May 27th** there should be quite a sight in the morning sky as the **Moon, Venus, and the Pleiades** star cluster are all within a circle about three times the Moon's diameter (1.5°). You'll have to get up early, but it should be well worth the sight low in the east-northeast.

And just in case I trip over my German Shepherd dog again and can't finish reviewing 2022, don't miss the [Moon occulting Mars](#), best on December 8 in USA (and southern US January 30, 2023).

- <https://www.youtube.com/watch?v=mKMuEOxir6w>
 - <https://www.universalworkshop.com/2022/01/12/a-quasi-conjunction/#more-13206>
 - <https://www.universalworkshop.com/astronomical-calendar-2022/>
 - <https://eclipse.gsfc.nasa.gov/LEplot/LEplot2001/LE2022May16T.pdf>
 - <http://www.lunar-occultations.com/iota/planets/mars.png>
- Other sources: Wikipedia & iFunny.com



This article is distributed by NASA Night Sky Network

February 2022

The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, and more!

Hang Out with the Twins of Gemini

David Prosper

The night skies of February are filled with beautiful star patterns, and so this month we take a closer look at another famous constellation, now rising high in the east after sunset: Gemini, the Twins!

If you're observing Orion, as discussed in last month's article, then Gemini is easy to find: just look above Orion's "head" to find Gemini's "feet." Or, make a line from brilliant blue-white Rigel in the foot of Orion, through its distinct "Belt," and then on through orange Betelgeuse. Keep going and you will end up in between the bright stars Castor and Pollux, the "heads" of the Gemini Twins. While not actually related – these stars aren't bound to each other, and are almost a magnitude apart in brightness – they do pair up nicely when compared to their surrounding stars. Take note: more than one stargazer has confused Gemini with its next-door neighbor constellation, Auriga. The stars of Auriga rise before Gemini's, and its brightest star, Capella, doesn't pair up as strikingly with its second most brilliant star as Castor and Pollux do. Star-hop to Gemini from Orion using the trick above if you aren't sure which constellation you're looking at.

Pollux is the brighter of Gemini's two "head" stars - imagine it has the head of the "left twin" - and located about 34 light-years away from our Solar System. Pollux even possesses a planet, Pollux b, over twice the mass of Jupiter. Castor - the head of the "right twin" - by contrast, lies about 51 light-years distant and is slightly dimmer. While no planets have been detected, there is still plenty of company as Castor is actually a six-star system! There are several great deep-sky objects to observe as well. You may be able to spot one with your unaided eyes, if you have dark skies and sharp eyes: M35, a large open cluster near the "right foot" of Gemini, about 3,870 light-years away. It's almost the size of a full Moon in our skies! Optical aid like binoculars or a telescope reveals the cluster's brilliant member stars. Once you spot M35, look around to see if you can spot another open cluster, NGC 2158, much smaller and more distant than M35 at 9,000 light-years away. Another notable object is NGC 2392, a planetary nebula created from the remains of a dying star, located about 6,500 light-years distant. You'll want to use a telescope to find this intriguing faint fuzzy, located near the "left hip" star Wasat.

Gemini's stars are referenced quite often in cultures around the world, and even in the history of space exploration. NASA's famed Gemini program took its name from these stars, as do the appropriately named twin Gemini North and South Observatories in Hawaii and Chile. You can discover more about Gemini's namesakes along with the latest observations of its stars and related celestial objects at nasa.gov.



Castor and Pollux are Gemini's most prominent stars, and often referred to as the "heads" of the eponymous twins from Greek myth. In Chinese astronomy, these stars make up two separate patterns: the Vermillion Bird of the South and the White Tiger of the North. What do you see? The Night Sky Network's "Legends in the Sky" activity includes downloadable "Create Your Own Constellation" handouts so you can draw your own star stories: bit.ly/legendsinthesky

Image created with assistance from Stellarium.



Montage of Gemini North, located on Mauna Kea in Hawaii, and Gemini South, located on Cerro Pachón in Chile. These “twin” telescopes work together as the Gemini Observatory to observe the entire sky.

Image Credit: NOIRLab Source: <https://www.gemini.edu/gallery/media/gemini-northsouth-montage>

TREASURER'S and MEMBERSHIP Report

BY JOHN NEWTON



As of Jan 24, we had 208 members - 1 New member for 2022

We welcome this month our newest members - **Sharon McCaig.**

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 Jan 24, 2022

Checking: \$ 5,479.01

Savings: \$ 13,787.00

Investments: \$ 32,173.80 (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

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**

Summary & Comparison of Astronomy Club of Tulsa - Fiscal Accounts (2020 vs. 2021)

Memberships				
	1-Jan-20	155	1-Jan-21	207
	31-Dec-20	207	31-Dec-21	207
	Net Total	52	Net Total	-
Bank Accounts				
Checking:	1-Jan-20	\$ 6,796.87	1-Jan-21	\$ 6,796.87
	31-Dec-20	\$ 5,671.55	31-Dec-21	\$ 5,705.70
		\$ (1,125.32)		\$ (1,091.17)
Savings:	1-Jan-20	\$ 5,783.33	1-Jan-21	\$ 10,785.42
	31-Dec-20	10,785.42	31-Dec-21	\$ 13,787.00
		\$ 5,002.09		\$ 3,001.58
	Net Total	\$ 3,876.77	Net Total	\$ 1,910.41
Investment Funds				
American Balanced (ABALX)	1-Jan-20	\$ 5,848.59	1-Jan-21	\$ 6,442.73
Fund:	31-Dec-20	\$ 6,442.73	31-Dec-21	\$ 7,505.61
		\$ 594.14		\$ 1,062.88
Franklin Income (FKIQX)	1-Jan-20	\$ 13,296.77	1-Jan-21	\$ 13,636.81
Fund:	31-Dec-20	\$ 13,636.81	31-Dec-21	\$ 16,174.19
		\$ 340.04		\$ 2,537.38
Washington Mutual (AWSHX)	1-Jan-20	\$ 6,683.74	1-Jan-21	\$ 7,101.81
Investment Fund:	31-Dec-20	\$ 7,101.81	31-Dec-21	\$ 9,252.97
		\$ 418.07		\$ 2,151.16
Cash Balance:	1-Jan-20	\$ (236.57)	1-Jan-21	\$ 0.01
	31-Dec-20	\$ 0.01	31-Dec-21	\$ 150.01
Annual Fee		\$ 236.58		\$ 150.00
Total Investment Balance	1-Jan-20	\$ 25,592.53	1-Jan-21	\$ 27,181.36
	31-Dec-20	\$ 27,181.36	31-Dec-21	\$ 33,082.78
		\$ 1,588.83		\$ 5,901.42
	Increase/Decrease:	6.21%	Increase/Decrease:	21.71%
	Market Fluctuation		Market Fluctuation	
Total Assets				
	1-Jan-20	\$ 38,172.73	1-Jan-21	\$ 44,763.65
	31-Dec-20	\$ 43,638.33	31-Dec-21	\$ 52,575.48
		\$ 5,465.60		\$ 7,811.83

Banking Summary - FY2020 vs. FY2021 Comparison

Category	Y'2020	Y'2021	Delta (Y21-Y20)	Notes/Comments:
INCOME REPORT				
Bumper Sticker Sales	1.00	-	(1.00)	
Calendar Sales- 2021	296.44	-	(296.44)	28 of 30 Calendars sold (20 break even point)
Calendar Sales- 2022	-	564.16	564.16	55 of 55 Calendars sold (36 break even point)
Calendar Sales	297.44	564.16	266.72	
Donation- General	654.79	348.25	(306.54)	Down due to lack of Public Night events
Donation- Group Event	88.00	113.00	25.00	
Donation- Jerry Mullinnex	-	1,506.33	1,506.33	
Donations	742.79	1,967.58	1,224.79	
Interest	2.09	1.58	(0.51)	Interest on Saving Acct
Bank Interest	2.09	1.58	(0.51)	Interest rate yields down
Magazine- Member payment- Astronomy	732.00	1,028.79	296.79	Increased demand
Magazine- Member payment- Sky & Tel	889.33	924.91	35.58	Demand at par
Magazine Subscriptions (Income)	1,621.33	1,953.70	332.37	
Member Dinner Event	-	485.00	485.00	Annual Dinner Event Cancelled in 2020
Membership- New	3,845.78	3,823.92	(21.86)	New Memberships at par
Membership- Renewal	3,388.66	3,627.90	239.24	Membership renewals up
Memberships	7,234.44	7,936.82	702.38	
Miscellaneous Income	500.00	-	(500.00)	MSRAL-Tulsa Seed Money Recovered
Adjustment	(1.48)	-	1.48	PayPal refund adjustment
Misc. Income	498.52	-	(498.52)	
TOTAL INCOME	10,396.61	12,423.84	2,027.23	

EXPENSES REPORT

Annual Dinner - Food Caterer	-	912.28	912.28	
Annual Dinner - Room Reservation	-	250.00	250.00	
Dinner Expense	-	1,162.28	1,162.28	2020 Annual Dinner Event was Cancelled
Bank Fee	-	27.00	27.00	Request for check books
Bank Fee	-	27.00	27.00	
Magazine- Club Payment to Astronomy	766.00	998.00	232.00	
Magazine Astronomy- Calendars	211.29	356.95	145.66	
Magazine- Club Payment to Sky & Tel	955.55	1,153.25	197.70	
Magazine Subscriptions (Expense)	1,932.84	2,508.20	575.36	
Operating Expense- Astro League dues	760.00	1,095.00	335.00	
Operating Expense- Events	67.39	78.56	11.17	Annual Dinner Expenses
Operating Expense- Insurance	1,823.00	1,988.00	165.00	
Operating Expense- Misc Expense	307.77	539.92	232.15	Road Mtc, Zoom Subscription
Operating Expense- Observatory	203.67	111.81	(91.86)	
Operating Expense- Post Office Box	168.00	204.00	36.00	
Misc. Expenses		200.00	200.00	Door Prize Certificates
PayPal Transfer		46.47	46.47	Membership Fee Refund
Property Taxes	-	179.05	179.05	
Operating and Misc. Expenses	3,381.82	4,494.80	1,112.98	
Investment Fund Expense	386.57	300.00	(86.57)	Annual Fund Admin Expenses
Transfers	-	19.97	19.97	MSRAL Seed Funding
Investments/Transfers	386.57	319.97	(66.60)	
Utilities- Electric Co.	479.16	527.05	47.89	
Utilities- Water Co.	284.30	288.81	4.51	
Utility Bills	763.46	815.86	52.40	
TOTAL EXPENSES	6,464.69	9,328.11	2,863.42	

OVERALL INCOME-EXPENSES TOTAL

3,931.92 3,095.73 (836.19) **Net Gain/Loss 2021 over 2020**

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OWEN AND TAMARA GREEN

SIDEWALK ASTRONOMY – **Open Position**

PR AND OUTREACH – **Open Position**

GROUP DIRECTOR – **Open Position**

NIGHT SKY NETWORK – **Open Position**

WEBMASTER JENNIFER JONES

Teresa Davis posted on Facebook



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

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