ASTRONOMY CLUB OF TULSA

OBSERVER

NOVEBER 2018

Bringing Stars to the eyes of Tulsa since 1937

M 17 The Omega (Swan) Nebula by William Collier M 17 is located in Sagittarius and lies about 4,200 Light years away. It spans about 15 LY across and hold 800 Solar masses of gas.

William reports "*These edits are from a master that resulted from 9 stacked images of 2 minutes each. The telescope was a Meade 6 inch F4 Newtonian, with a GSO coma corrector, on a Canon T3i shooting in raw mode, 1600 ISO. The camera was mounted at prime focus and run by BackyardEOS. The mount was an ORION Skyview Pro with a two axis drive, user modified for guiding with PHD 2, The guide scope is an Orion ST80. The images were stacked in DeepSkyStacker 64 bit after treatment and conversion to .tif form with Raw Therapee and then finished with GIMP 2.0.*"

In this Issue

RAFFLE TICKET GRAND PRIZE
Details below

Astronomy Club Events

Details at **http://astrotulsa.com/Events.aspx**

NOVEMBER			
ANNUAL DINNER MEETING	SAT NOV 10	5:30 PM	JENKS PLANETARIUM
PUBLIC NIGHT	SAT NOV 3	6:00 PM	ACT OBSERVATORY
DAYLIGHT SAVING TIME ENDS SUNDAY, NOVEMBER 4.			
MEMBERS' NIGHT	FRI NOV 9	5:30 PM	ACT OBSERVATORY
SIDEWALK ASTRONOMY	SAT NOV 17	4:15 PM	BASS PRO
THANKSGIVING DAY	THU NOV 22		
DECEMBER			
PUBLIC NIGHT	SAT DEC 1	4:30 PM	ACT OBSERVATORY
MEMBERS' NIGHT	FRI DEC 7	5:00 PM	ACT OBSERVATORY
MEMBERS' BACKUP NIGHT	SAT DEC 8	5:00 PM	ACT OBSERVATORY
GENERAL MEETING	FRI DEC 14	7:00 PM	JENKS PLANETARIUM
SIDEWALK ASTRONOMY	SAT DEC 15	4:00 PM	BASS PRO
WINTER SOLSTICE	FRI DEC 21		
CHRISTMAS DAY	TUE DEC 25		
PUBLIC NIGHT	SAT DEC 29	4:45 PM	ACT OBSERVATORY

Friday Nov 10 @ 5:30 is our Annual Club Membership dinner
At the Jenks High School Planetarium building 205 East B Street, Jenks
This event is for Club membership and their guests
TICKETS are $ 12 each PLEASE RSVP by Nov 5 to **astrotusla.tres@gmail.com**
The dinner will be catered by the Carrabba's Italian Restaurant

Raffle Tickets will be sold to raise funds to buy the club a quality Solar Telescope.
There will be several nice door prizes at the dinner.
The GRAND PRIZE is a 400mm f14 telescope from Explore Scientific (see above)
Tickets are 1 for $2 -- 3 for $5 or 7 for $10
You do not have to be a member or present at the dinner to win the Grand Prize.

PRESIDENT'S MESSAGE

BY TAMARA GREEN

Hey Y'all!

I want to thank everyone who came to our October General Meeting and participated in the Officers and Board elections. We had a quorum, so we were able to have our vote! Again, thank you for that! I look forward to serving you as your President again next year! Thank you so much for your support!

I also want to thank everyone who came out and volunteered and participated in our events this summer, especially our group events. Your help and participation mean a great deal not only to me, but also to our club. Let's keep this good momentum going!

For those of you who missed SOAKIE-Tex, a/k/a "The Okie-Tex That Wasn't", sadly, you did not miss much. It was cloudy and rainy for the whole week, and the OKC Astronomy Club, despite keeping the star party open for its normal duration for those who wanted to stay, tried to encourage everyone to leave on Saturday due to the forecast for snow and ice in the area that Sunday. They even stopped meal service on Saturday afternoon so the caterers could safely get home. There were still some fun things like the swap meet, the giveaway, a couple of really cool rainbows, and an impromptu live concert from V, one of Jody's catering crew, and Dave from Canada in the vendors' hall. Jody's husband, who works for Cimarron County, even had to bring out a road dredger to pull people's vehicles out of the mud! But, sadly, no observing. It will be in September next year, so hopefully the weather will be more conducive to a star party!

I hope that you will be attending our Annual Dinner Meeting, which will be on Saturday, November 10. It will be in the big meeting room just down the hall from the Planetarium at Jenks. (Jenks High School, 205 E. B St., Math and Science Building, 3rd Floor, Room 301). Start time is 5:30 PM. Our caterer will be arriving at 5:30 PM to get food set up.

The dinner is being catered this year by Carrabba's, a wonderful Italian restaurant. I am confident you will like the food. Owen and I have eaten there a couple of times, and they are wonderful! The menu will be Penne Carrabba, which is a Fettucine Alfredo with chicken, mushrooms and peas, and Penne Pomo, which is a Penne Pomodoro with meat sauce. Foccacia, Herbs, Oil and Romano will also be provided. The club is providing drinks, napkins, plastic ware, etc.

There will also be a dessert pot-luck, so if you want to bring a dessert to share, that will be great!

There will be a drawing for prizes as well. We will be selling raffle tickets at our events before and during the dinner meeting. They are $2 each, or 3 for $5, or 7 for $10. The grand prize will be really nice telescope, so you will definitely want to come out for that! The proceeds will go towards purchasing a solar telescope for the club. At least that is what the goal is.

SECRETARY'S MESSAGE

BY JESS CAGNOLLATI

Hello All,

Hope everyone's October went well. We had a very exciting general meeting on October 19th. Elections for the 2019 officers and board members took place. 28 ballots were collected with 22 of them unanimous for the candidates, 6 ballots with no for some of the candidates, 1 fouled ballot and 1 blank ballot. The officers and board members are as follows:

Tamara Green- President

Jerry Cassity- Vice President – Outreach Coordinator

Jess Cagnolatti – Secretary

John Newton – Treasurer

Richard Brady - Board Member

Tony Cagnolatti – Board Member

John Land - Board Member - Newsletter Editor

Sheldon Padawer- Board Member

Jacob Shepherd- Board Member

James Taggart - Board Member & Observatory manager

Skip Whitehurst- Board Member

Congratulations to all the candidates!

There was also a fantastic presentation on the Parker Solar Probe, provided by Dr. Nicola Fox, head of the Heliophysics Department at NASA. Dr. Fox was also the project scientist for the probe. She explained how Dr. Parker and his contributions to heliophysics helped to bring this expedition to fruition. Dr. Fox discussed how the probe was constructed and how it was launched into space, including how it will orbit around Venus to help slow it down as it approaches the sun. The link to the presentation is available here:

https://nightsky.jpl.nasa.gov/download-view.cfm?Doc_ID=617

Members are invited to the annual dinner on Saturday November 10th at 5:30 PM. Dinner will be catered by Carrabba's Italian restaurant. There will also be a raffle for door prizes with the grand prize being an Explore Scientific 100mm Maksutov-Cassegrain telescope. Proceeds from the raffle will be used toward the purchase of a solar telescope for the club. Tickets are $2 each, 3 for $5 or 7 for $10. There will also be other fantastic door prizes at the dinner, so we hope to see you there!

Personal Note from the Editor - by John Land

I would like to say a personal thank you to Tim and Teresa Davis for their many years of faithful service to our astronomy club. Tim has served the past five years as our club treasurer devoting many hours to managing the club's accounts and keeping track of our membership.
Since joining the club in 2003 has served many of those years on the board, held to offices of President, Vice President and Treasurer. Along with Teresa he has volunteered many hours to help with group visits to the observatory and been the ever present face of welcome to those who come to our club meetings and observatory events.

Teresa joined our club in 1994. She has been an active volunteer ever since. As a school science teacher she has a special interest in encouraging students to learn about and experience the wonders of the night sky. Her enthusiasm for teaching and learning is an inspiration to all who get to know her. She served for many years as our group coordinator organizing visit to the observatory. Teresa was also our club secretary faithfully keeping the minutes of board meetings and other club events. She has also served as Vice President and been a member of the board for many years.

As they step aside from active leadership roles, we look forward to their continuing to be a vital part of the comradery that makes up the Astronomy Club of Tulsa. Thank You Tim and Teresa! May God Bless you with many starry nights to share together.

JENKS PLANETARIUM

Jenks High School Campus
205 East B Street, Jenks

TICKETS
$5 online or $7 at the door
Purchase online at **jenkscommunityed.com**
or call 918-298-0340

2018 **Go to Show Schedule**
Then click the Date Column to sort them by show date
Shows take place on Tuesday evenings from 7:00 PM to 8:00 PM

Explore the night sky with engaging, awe-inspiring shows at the Jenks Planetarium. The 50-foot dome provides the ultimate screen for seeing planets up close, flying to distant galaxies, and even rediscovering our own earth in ways never thought possible.

We're all familiar with this bedtime lullaby. Recently while reading my morning devotional I discovered there are several more stanzas to the poem on which it is based. The poem originally appeared in 1806 as a poem titled ***The Star*** as a collaboration with her sister Ann Taylor in a book called "Rhymes for the Nursery" https://www.poetryfoundation.org/poets/jane-taylor

The Star

By Jane Taylor & Ann Taylor

TWINKLE, twinkle, little star,
How I wonder what you are !
Up above the world so high,
Like a diamond in the sky.

When the blazing sun is gone,
When he nothing shines upon,
Then you show your little light,
Twinkle, twinkle, all the night.

Then the trav'ller in the dark,
Thanks you for your tiny spark,
He could not see which way to go,
If you did not twinkle so.

In the dark blue sky you keep,
And often thro' my curtains peep,
For you never shut your eye,
Till the sun is in the sky.

'Tis your bright and tiny spark,
Lights the trav'ller in the dark :
Tho' I know not what you are,
Twinkle, twinkle, little star.

Twinkle, Twinkle, Little Star

By Jane Taylor

Twinkle, twinkle, little star,
How I wonder what you are!
Up above the world so high,
Like a diamond in the sky.

When the blazing sun is gone,
When he nothing shines upon,
Then you show your little light,
Twinkle, twinkle, all the night.

Then the traveler in the dark
Thanks you for your tiny spark,
How could he see where to go,
If you did not twinkle so?

In the dark blue sky you keep,
Often through my curtains peep
For you never shut your eye,
Till the sun is in the sky.

As your bright and tiny spark
Lights the traveler in the dark,
Though I know not what you are,
Twinkle, twinkle, little star.

One of our members, Tom McDonough, made up an astronomers version of the rhyme for his girls.

Twinkle, Twinkle Little Star
How I wonder what you are
Hydrogen and Helium
Combining Now in "Fuse E un"
Twinkle, Twinkle Great Big Star
Now I know just what you are.

I added motions to his version and used to sing it to my kids. They were most confused when they got to school and discovered all the other kids were signing a different version.

John Land

TREASURER'S AND MEMBERSHIP REPORT

BY TIM DAVIS

Astronomy Club of Tulsa: 175 members, including 44 new members in 2018.
New members for October: Michael Westhoff, James Andrew and Sharon Norton

Accounts as of October 28, 2018
Checking: $4,783.23
Savings: $5,779.71
Investments: $22,300.65 *(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 **2018** 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**
To get the club discount you must go through the club group rate.
Sky & Telescope is $ 33 per year **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

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

NSN Night Sky Planner page has interactive tools to enhance your observing experience.
https://nightsky.jpl.nasa.gov/planner.cfm

November's Dance of the Planets

By Jane Houston Jones and David Prosper

November's crisp autumn skies bring great views of our planetary neighbors. The Moon pairs up with Saturn and Mars in the evenings, and mornings feature eye-catching arrangements with dazzling Venus. Stargazers wanting a challenge can observe a notable opposition by asteroid 3 Juno on the 17th and watch for a few bright Leonid meteors.

Red **Mars** gleams high in the southern sky after sunset. **Saturn** sits westward in the constellation Sagittarius. A young crescent Moon passes near Saturn on the 10th and 11th. On the 15th a first quarter Moon skims by Mars, coming within 1 degree of the planet.

Mars Insight Mission
https://mars.nasa.gov/insight/
The red planet receives a new visitor on **Monday November 26th**, when **NASA's InSight** mission lands and begins its investigation of the planet's interior. News briefings and commentary will be streamed live at: **bit.ly/landsafe**

Two bright planets hang low over the western horizon after sunset as November begins: **Jupiter** and **Mercury**. They may be hard to see, but binoculars and an unobstructed western horizon will help determined observers spot them right after sunset. Both disappear into the Sun's glare by mid-month.

Early risers are treated to brilliant **Venus** sparkling in the eastern sky before dawn, easily outshining everything except the Sun and Moon. On November 6th, find a location with clear view of the eastern horizon to spot Venus next to a thin crescent Moon, making a triangle with the bright star Spica. The following mornings watch Venus move up towards Spica, coming within two degrees of the star by the second full week of November.

Venus will be up three hours before sunrise by month's end – a huge change in just weeks! Telescopic observers are treated to a large, 61" wide, yet razor-thin crescent at November's beginning, shrinking to 41" across by the end of the month as its crescent waxes.

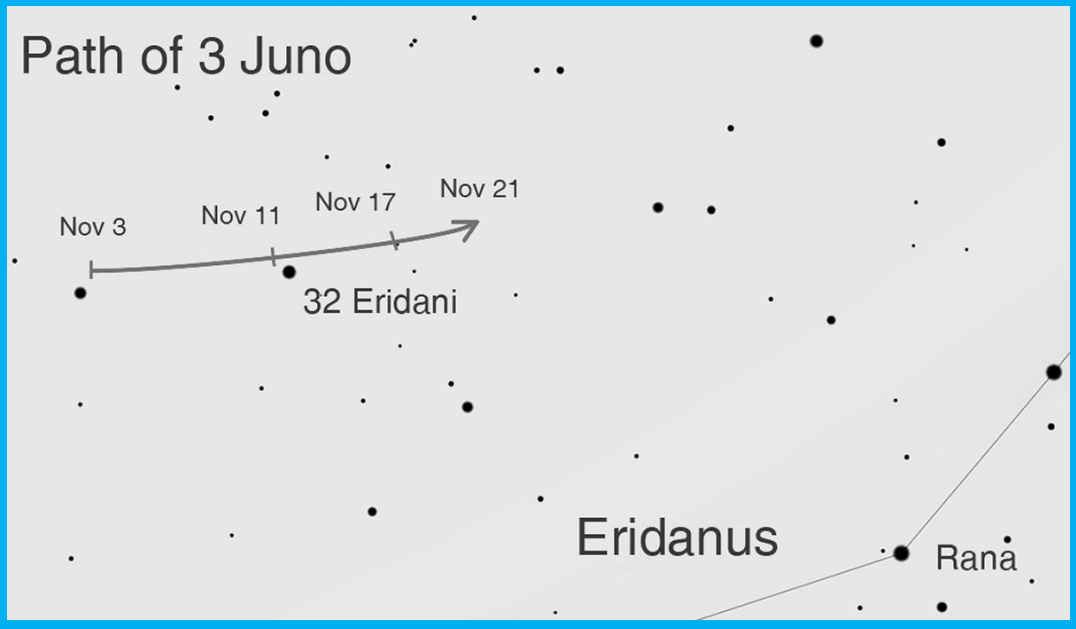
Observers looking for a challenge can hunt **asteroid 3 Juno**, so named because it was the third asteroid discovered. Juno travels through the constellation Eridanus and rises in the east after sunset. On November 17th, Juno is at opposition and shines at magnitude 7.4, its brightest showing since 1983! Look for Juno near the 4.7 magnitude double star 32 Eridani in the nights leading up to opposition. It is bright enough to spot through binoculars, but still appears as a star-like point of light. If you aren't sure if you have identified Juno, try sketching or photographing its star field, then return to the same area over the next several days to spot its movement.

The **Leonids** are expected to peak on the night of the 17th through the morning of the 18th. This meteor shower has brought "meteor storms" as recently as 2002, but a storm is not expected this year. All but the brightest meteors will be drowned out by a waxing gibbous Moon.
Stay warm and enjoy this month's dance of the planets!

Note: The Leonid shower is noted for its "Meteor Storms" that occur in about a 33 year cycle. The 1966 and 1999 showers produced outburst of over 10,000 per hour. There were good display a couple of years before or after. However the intervening years generally produce around 20 per hour in dark skies.

You can catch up on all of NASA's current and future missions at nasa.gov

With articles, activities and games **NASA Space Place** encourages everyone to get excited about science and technology. Visit spaceplace.nasa.gov to explore space and Earth science!



Caption: This finder chart shows the path of the asteroid 3 Juno as it glides past 32 Eridani in November 2018. The asteroid's position is highlighted for selected dates, including its opposition on the 17th. Image created in Stellarium for NASA Night Sky Network.

LINK to Interactive **Juno Finder Chart**
Stellarium Free Open Source Planetarium Software

STOP THE CLOCK ! The government is about to "pull the plug" on 50 million radio-controlled clocks, wristwatches and appliances."

November is here and we will be setting our clocks back an hour for CST. I like to think **CST** stands for Central **STARLIGHT** Time because it means we can start observing earlier in the evening. You'll surely hear some news person doing a story on how the time change causes all sorts of confusion and even blaming health issues on the time change. Politicians will propose just staying on Daylight Time ALL YEAR because it supposedly is more energy efficient. Our modern technological lifestyles are all obsessed with what time it is. An Old African Proverb says *"Westerners have watches, Africans have Time"* a poignant observation of our hurried lifestyles. CLICK HERE to set your Westerner's Clock accurately.

In Tulsa our latest Sunrise occurs about 7:35 AM CST (that would be 8:35 AM CDT) Most people would be at work or school well before sunrise. Roads would be dark and possibly icy, Kids waiting at bus stops an hour and a half or more before sunrise. Even now the bus comes to my neighborhood a half hour before sunrise CDT. To see a **Table of Sunrise / Sunset times** for your town go to: http://aa.usno.navy.mil/data/docs/RS_OneYear.php

In Astronomy measuring time accurately is very important. Our planet is racing around the Sun at 66,600 mph and whirling toward the eastern horizon at 839 mph at Latitude 36 N. We have to plan our observing time for when objects are well placed for viewing. Modern GoTo telescopes have to be set to the correct time in order to locate their target. Observing Eclipses and Occultations require time calculations with accuracies of a second or less. Our GPS systems relay on time measured in billionths of seconds using Einstein's Theory of Relativity to triangulate our exact position on our planet.

For nearly 100 years the NIST –National Institute of Standards and Technology- has used shortwave radio to broadcast accurate time signals on 2.5, 5.0, 10.0, 15.0, 20.0 MHz
"WWV is the oldest continuously operating radio station in the United States. It's been on the air since 1920. Its signal provides a frequency standard for receivers. The time stamp is regulated by an atomic clock. ***But a 2019 budget proposal for NIST would close WWV, WWVH in Hawaii and WWVB, which syncs up the time for about 50 million radio-controlled clocks, wristwatches and appliances."***
From NPR broadcast Aug 12, 2018
At regular intervals during the hour these stations transmit marine storm warnings from the National Weather Service, GPS satellite health reports, and specific information concerning current solar activity, and radio propagation conditions. These broadcasts are an essential resource to the worldwide communications industry

The argument seems to be that with GPS, Cell Phones and the Internet the old Shortwave system is no longer relevant. Proponents of retaining the system make several arguments for retaining the system as a backup when other systems fail. Or the signal can be used to verify that the high tech instruments are working correctly. All one needs to receive the WWV signals is a battery powered shortwave receiver. Also the signals can be received almost anywhere on sea or land.

The Internet is subject to power and system failures. Cell reception is plagued by dead zones and are non-existent far out at sea and other undeveloped areas of the globe. When broad scale natural disasters strike these forms of communication can be out for weeks. GPS relies on a constellation of satellites all working correctly to pinpoint your position. When satellites fail or signals are blocked due to environmental conditions GPS is unreliable. National Security experts have voiced concerns that GPS can be hacked or mimicked by false signals and in times of conflict the GPS system would be one of the first prime targets.

Further resources:
Concern Rising within Amateur Radio Community
What Closing A Government Radio Station Would Mean For You
If you are concerned about the issue write your national representatives.

Choosing Your First Telescope or Gifting a telescope

* This article is a condensed version of a Nov 2017 article
http://astrotulsa.com/CMS_Files/11-2017.pdf

Every year as Christmas draws near the club gets emails asking about how to select a telescope as a gift. Don't be fooled by Amazon or other claims about "Most Popular Choices" Take time to research your options. Look for vendors who specialize in astronomical products. There are lots of factors to be considered. The first thing to consider is who will be receiving the telescope. The age of the intended recipient.- their experience – whether the telescope will be used in town or traveling to darker skies. Even the physical ability of the person who will be using the telescope. Today telescopes are marketed with lots of technology accessories assist in locating and pointing the telescope. These options are attractive but they don't change what you actually see in the telescope. Sometimes the learning curve to use the technology can frustrate a first time user.

THE BEST TELESCOPE IS THE ONE THAT WILL BE USED THE MOST !

For this article I am going to focus factors that affect what will I be able to *SEE* in the telescope?

LEARN THE BASIC PARTS AND OPERATION OF YOUR TELESCOPE.

A telescope is an instrument to collect and focus light. The **OBJECTIVE is the part of a telescope that gathers and focuses light**. The objective many be a set of lenses, mirrors or a combination of both. The SIZE of a telescope is defined by the diameter of its objective. **Astronomers often use the word APERTURE to describe its diameter**. If someone tells you they own a 6 inch telescope, they mean that its lens or mirrors are 6 inches across. Nowadays most objective sizes are listed in millimeters. Somehow 150 mm sounds way bigger than 6 inches (it's the same size)

THREE PERFORMANCE CRITERIA OF A TELESCOPE.

There are three ways to determine how well a telescope performs.

1. LIGHT GRASP 2. RESOLUTION 3. MAGNIFICATION

The DIAMETER of the OBJECTIVE (Aperture) is the most important factor in judging how well a telescope will perform in each criteria. Typically THE LARGER THE OBJECTIVE THE BETTER ITS OVERALL PERFORMANCE.

LIGHT GRASP is the amount of light that is collected and focused by the telescope. Astronomers often use the slang term "Light Bucket" to refer to their telescopes. You can imagine starlight as a gentle "rain" of photons sprinkling down from the heavens above. Just as a larger bucket will collect more rain water -

The LARGER THE OBJECTIVE THE GREATER IT'S LIGHT GRASP.

MAGNITUDE of a star is a numerical measurement of a star's brightness.
LIMITING MAGNITUDE is the dimmest object visible with that telescope.

RESOLUTION is the ability to see fine details or to separate images of closely spaced stars. Resolution is measured by the smallest angle between two objects so that they still appear as separate objects. In astronomy we use the ARCSEC to measure these angles. One ARCSEC (Arc Second) is 1/3600 of a degree. The moon is about 1800 arcsecs in width. Your eye can see objects as close as 60 arcsecs. A 60 mm telescope will resolve 3.2 arcsecs or 20 times more detail. Again the **LARGER THE OBJECTIVE THE BETTER ITS RESOLUTION** but its upper limit is also limited by atmospheric conditions.

Note: High quality objectives of the same size can improve resolution but still have same light grasp.

MAGNIFICATION is the number of times larger or nearer an object appears. The **MAXIMUM USEFUL MAGNIFICATION** of a telescope is limited to about **50 power per inch** of diameter or **2 power per millimeter.** Thus a 60 mm telescope can magnify ONLY up to 120 POWER. Attempting to push a telescope beyond this limit will result in a fuzzy disappointing image.

BEWARE of Misleading Advertising. Many department store telescopes advertise powers of 300 – 400X- far beyond what they can deliver. This doesn't mean that they are bad telescopes as long as they are used within their performance limits.

LIGHT GRASP and RESOLUTION cannot be changed without buying a different telescope. Magnification, however, can be changed depending on the type of object you wish to view.
To change magnification one can choose different eyepieces for viewing.

Magnification =
Telescope Focal Length / Eyepiece Focal Length
720 mm fl / 10 mm eyepiece = 72 x magnification

The motion of the Earth's atmosphere often limits magnification on many nights to about 200 X

Note: Low end Department store / online telescopes often have low quality eyepieces. Avoid undersized 0.965 inch eyepieces. An Eyepiece diameter of 1.25 inch is the general standard and will allow you to purchase addition eyepieces in the future. More expensive eyepieces come in 2 inch diameter.

Sky and Telescope magazine's - Guides & Recommendations for Telescopes
Hunting for a good deal on a first telescope for yourself or someone who you care about?
Or are you looking for a fancier upgrade?
http://www.skyandtelescope.com/astronomy-equipment/choosing-astronomy-equipment/telescopes/
A selection of **HOW TO CHOOSE** articles **https://www.astronomics.com/info-library/**

A couple of nearby telescope dealers.
The **STEMcell Science Shop** 2415 E. Admiral Blvd. Tulsa **https://stemcelltulsa.com/**

EXPLORE SCIENTIFIC **Springdale, AR https://explorescientificusa.com/**
Manufacturer of top quality scopes also carries novice scopes and Sports optics.

Some reputable online telescope sites are
www.astronomics.com in Norman OK **http://www.optcorp.com**
Orion scopes at **www.telescope.com** and **www.telescopes.com**
Meade scopes **https://www.meade.com/** Celestron scopes **https://www.celestron.com/**
Vixen **https://www.vixenoptics.com/**
Skywatcher **http://www.skywatcherusa.com/**

Article by John Land – Astronomy Club of Tulsa

TELESCOPES FOR SALE

Meade Starfinder 10 inch F 4.5 Dobsonian - Reduced Price $ 300
With **Telerad finder** and 6x by 30mm finder scope - 1.25 / 2.0 in rack and pinion focuser
Quality Upgraded Eyepieces with a **handy carrying case** and two red light accessories.
Meade 1.25 " Super Wide Angle 24.5 & **13.8 mm Orion** 21mm to 7mm **Zoom Eyepiece**
Meade 2X Telenegative amplifier–and more
Details in February newsletter - http://astrotulsa.com/CMS_Files/02-2018.pdf page 13
Contact John at Tulsaastrobiz@gmail.com

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
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

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 1st 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:

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