



OBSERVER

April 2023

*Bringing Stars to the eyes of Tulsa
since 1937 Editor - John Land*



It's been a busy Spring for Astronomy Club members.

Telescope Workshop at Tulsa Air & Space Museum Feb 25

Messier Marathon at the observatory March 25

Observatory workday April 1 - More images at end of newsletter

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Astronomy Club Events Check our website AstroTulsa.com events section for updates

Astronomy Club Meeting - Friday April 14 - 7:00 PM - IN PERSON club meetings.
At Jenks High School planetarium 105 E B Jenks OK - Guests Welcome

Our featured program is a Night Sky Network webinar
Expanding Our View with NASA's Nancy Grace Roman Space Telescope
See more program description on page 4

Also Observing Chair Brad Young will also present a PowerPoint titled
Trainsitioning - Adapting to the Spring Deep Sky -
Sharing tips for observing the fainter more distant galaxies and objects in the Spring sky.

Observatory Stargazing Nights

Astronomy Club Meeting - Friday April 14 - 7:00 PM - IN PERSON club meetings.
At Jenks High School planetarium 105 E B Jenks OK - Guests Welcome

Saturday April 15 7:30 PM **Guest and Members Night** –
Guest requested to RSVP - Gates Open near sunset

Friday April 21 7:30 PM **Members Only night**
Open to members and their immediate family

Astronomy Club Meeting - Friday May 5 - 7:00 PM - IN PERSON club meetings.
At Jenks High School planetarium 105 E B Jenks OK - Guests Welcome

Friday May 12 7:45 PM **Guest and Members Night** –
Guest requested to RSVP - Gates Open near sunset

Friday May 19 8:00 PM **Members Only night**
Open to members and their immediate family

Registration is now open – Get yours in early !

**2023 MidStates Regional
Astronomical Conference
June 9 – 10 – 11**

<http://www.msral2023.org>



2023 MidStates Regional Astronomical Conference June 9 – 10 – 11 www.msral2023.org



The Astronomy Club of Tulsa invites you to join us as we host the 2023 MidStates Conference. The conference will be held in the Jenks, OK high school science building. The conference area features a well-equipped 120 seat planetarium, a spacious glass walled lobby and large banquet room. For our out-of-town guests we have arranged discounted rates at two nearby hotels. Use the active “Book Now” links to get the discount rate. Registration information, maps links and schedule information can be found at www.MSRAL2023.org.

On Friday evening we will gather for a delicious Star-B-Que and brief welcome. Then we will proceed to our observatory located on a rural hilltop about 35 minutes SW of town. The observatory includes a classroom, a 20-foot dome with a Meade 14” RCX 400 telescope as well as an outside area of telescope viewing.

Daytime Saturday will feature presentations on a variety of astronomical topics. Time to visit with fellow astronomy enthusiasts from other clubs and peruse the visiting vendor displays. Also, you will have the opportunity to see the newly completed Mobile Observatory project for advancing STEM education. There will be door prize drawings during the presentation times and a grand prize drawing at the Keynote Speaker banquet.

Saturday evening is our Keynote Speaker Banquet featuring Dr Daniel Kennefick speaking on *Multi-Messenger Astronomy: A History of this still-dawning field* about the emerging window of discoveries revealed by Gravitational Waves.

On Sunday morning, we will finish up the conference with a few more presentations and an excellent planetarium show created by students from the Jenks system.



Jenks has several family friendly attractions- the Oklahoma Aquarium, an attractive pedestrian bridge over the Arkansas river and numerous shops. It is just a few minutes’ drive to the many attractions in Tulsa.



See our new [Telescopes & Astro Equipment Sales](#) Page

Our club frequently gets inquiries from members or the public who have astronomical equipment they would like to sell. I am trying an experiment to create a page that can be updated occasionally as new offers come in. If you have items to sell, send a picture, contact information and information to Tulsaastrobiz@gmail.com If you have a particular item, you are looking for you might try our page. This page is intended for equipment that can be acquired in or near the Tulsa area.



Our April 14 program will feature a NSN Webinar - **Expanding Our View with NASA's Nancy Grace Roman Space Telescope**

NASA's next flagship astrophysics mission, the Nancy Grace Roman Space Telescope, aims to expand our view of the cosmos. Scheduled to launch by May 2027, the Roman Space Telescope will enable new science thanks to its unique combination of a large field-of-view, Hubble-like resolution at near-infrared wavelengths, and the ability to rapidly survey

large portions of the sky. Join us as we explore what makes the Roman Space Telescope so special and the amazing science to come from this unique space-based mission.

The webinar is narrated by Brandon Lawton a Ph.D. scientist with more than 10 years of experience in the astronomy communications and outreach field. He is a Project Scientist for Nancy Grace Roman Space Telescope science communications at the Space Telescope Science Institute (STScI). STScI is the Science Operations Center for the Roman mission and is located on Johns Hopkins University Homewood campus in Baltimore, Maryland. Brandon manages the portfolio of STScI public outreach projects for the Roman mission, in addition to leading several NASA data and authentic experiences efforts for NASA's Universe of Learning Science Activation program. Brandon has a research background in studying the interstellar medium of galaxies near and far, including star formation processes. Brandon earned his Ph.D. in 2008 from New Mexico State University, in Las Cruces, NM.

President's Message *John Land*



As you can see from the cover page, there has been lots of activity in the club the past few weeks. In addition to all those activities our MidStates Astronomy Conference team has been busy preparing for a interesting and fun event in June. I am hoping many of our members will plan to attend. As we get close to event we will need lots of helpers to make everything run smoothly. We've already had people from Texas, Illinois and Missouri say they are eager to come to Tulsa. We will want to "Put our best foot forward" for our visitors.

Work on the new rotation system for the observatory dome is coming along nicely. The new metal flashing installed around the lip of the dome has gotten a real test lately with all the wind and rain. It has greatly improved the weather encroachment situation. We had a great observatory work day April 1st. There is still more work to do to show off our observatory to our guests.

Tulsa will experience two deep solar eclipses in the coming months. On Saturday Oct 14, 2023 the sun will be 78% covered. This will be a great opportunity for public events to safely view the eclipse. On Monday April 8, 2024 a Total Solar Eclipse passes over SE Oklahoma and central Arkansas. Many of our members will be making plans to go see it. Here in Tulsa the sun will be 95% eclipsed.

Let us continue our 85+ years of

"Bringing Stars to the Eyes of Tulsa since 1937"

John Land - President

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/>



Click on these images
to links on the Internet



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/>

March - Moon Phases - - Full April 5 - - 3rd Q Apr 13 - - New Apr 19 - - 1st Q Apr 27

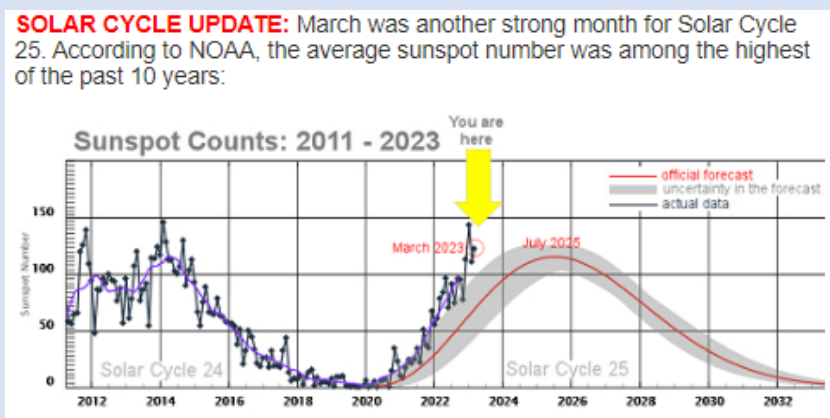
April planets. - **Venus** dominates the western evening sky. Due to its brilliance Venus is best observed during bright twilight. Try to observe it 2 – 3 times per month at higher magnification and you will discover as Galileo did that it has phases like the moon. Venus does a nice photo-op pairing with the Pleiades April 10-12. **Mercury** makes a brief appearance low in the western sky reaching eastern elongation April 11. You'll likely need binoculars and clear horizon to find it. **Mars** is much dimmer now at magnitude + 1.2. It opens the month high in Gemini near the star cluster M 35 and continues to trek along through the constellation toward Pollux. **Jupiter** passes behind the Sun April 11 and will reemerge in the morning sky in late May. **Saturn** rises around 5:00 AM in the morning sky in the SE but is still too low for good viewing. Look for the Moon to pass Saturn April 15, Venus 22nd & 23rd and Mars on the 25th.

The Lyrid Meteor shower peaks a few days around April 22 -23. Its radiant rises in the NE around 11:00 PM near the bright star Vega. But it is best observed after midnight. This is a favorable year as new moon is on April 19th on a typical year the meteor count ranges from 5 to 20 per hour in dark skies.

The Sun is getting very active. On March 23rd Aurora were seen in 32 states INCLUDING OKLAHOMA ! Unfortunately, we were clouded out. On March 13 a gigantic solar flare erupted spewing out particles at 6.7 million miles an hour. Fortunately for Earth it was on the far side of the sun.

Check out <https://spaceweather.com/archive.php?view=1&day=30&month=03&year=2023>

Also <https://spaceweather.com/> April 4, March 14



Annotating your Sky images by Stan Davis shares how he was able to annotate all the objects in his image.- I read an article in Sky & Telescope March 2023 issue about the dwarf planet Ceres. I decided that would be a good target to image. I made a gif file of Ceres and shared it with John. It was not a gif showing the movement, but rather it showed the annotation of all the galaxies in the area on Ceres as it moves through Coma Berenices. I used Astrometry.net to plate solve and get the annotations. After seeing my gif image, John asked if I would do a short article about Astrometry.net.

This my attempt to show how to use Astrometry.net. First disclaimer, I am not an expert at this, and I really don't know a lot about this site. Below is the home screen and it explains their mission. I have only used it a few times. I use it because the annotations are bright and easy to copy in photoshop. You have to be connected to the internet to use it. I have used several other plate solving apps with my imaging software but don't really like the annotations they produce. They are a little harder to copy over Photoshop.

It is actually very easy to use. You do not have to have an account.

1. The site URL is <https://nova.astrometry.net/>
2. First click on the upload tab.
3. It loads the next screen, and you click on the choose file button. A browser opens and you select the file you want annotated. You have multiple choices, but I have only uploaded files.
4. Once you have selected your file location it loads the filename.
5. Next click the upload button. After it finishes the upload, it displays the results.
6. Then I click on the image, and it displays the annotation with lots of good information about that part of sky your image was taken. (Two shots to show the entire page)
7. My final step is I right click on the image and a dialog pops up. I have been just copying image and I paste it into photoshop.

I will not go into the photoshop process. You can do whatever you need the annotations for. As you can see it quite simple to use. Those of you more adventurous than me need to explore all the options this site has to offer.

Astrometry.net

Home Explore **Upload** API Support Search

Home

Explore
Browse images others have been uploading or search for photos of specific astronomical objects.

Calibrate & Share
Upload your own images to get accurate calibrations and share them with the world.

Create
Take advantage of the API of this web service to program your own applications.

About Astrometry.net
If you have astronomical imaging of the sky with celestial coordinates you do not know—or do not trust—then Astrometry.net is for you. Input an image and we'll give you back astrometric calibration meta-data, plus lists of known objects falling inside the field of view.
We have built this astrometric calibration service to create correct, standards-compliant astrometric meta-data for every useful astronomical image ever taken, past and future, in any state of archival disarray. We hope this will help organize, annotate and make searchable all the world's astronomical information.

Recently Submitted Images (See More)

NOTE: signins should be working again... but read about account migration. Not signed in | Sign in

Upload

Select a file or url to upload

Choose File | No file chosen

file
 url

The following file types are supported:

- **JPEG, GIF, PNG, or FITS image**
- **FITS binary table**, containing a BINTABLE of detected objects, with X and Y pixel positions in "D" (double) or "E" (float) columns, with one object per row
- **text list**, containing two columns of digits separated by commas or whitespace, listing the X,Y positions of sources, sorted with the brightest sources first
- **tarball (.tar, .gz)**, containing files of any of the above types

Upload

Upload

Select a file or url to upload


Choose File | L_Ceres_30...-15_6886.fit

file
 url

The following file types are supported:

- **JPEG, GIF, PNG, or FITS image**
- **FITS binary table**, containing a BINTABLE of detected objects, with X and Y pixel positions in "D" (double) or "E" (float) columns, with one object per row
- **text list**, containing two columns of digits separated by commas or whitespace, listing the X,Y positions of sources, sorted with the brightest sources first
- **tarball (.tar, .gz)**, containing files of any of the above types

Upload


 **Astrometry.net**

Home | Explore | Upload | API | Support | Search

Submission 7444610

This page will automatically refresh every 10 seconds. [Stop](#)

Submitter:	anonymous (1)	Upload Settings	
Date Submitted:	2023-03-31T17:06:22Z	Parity:	try both simultaneously
Filename:	L_Ceres_300s_G100__-20C_None_00-53-15_6886.fit	Scale Units:	width of the field (in degrees)
		Scale Type:	bounds
		Scale Lower Bound:	0.1
		Scale Upper Bound:	180.0
		Downsample Factor:	2


 [Go to results page](#)
Job 8184984:
Processing...
Queued: 2023-03-31 17:06:32
Started: 2023-03-31 17:06:32

[Source extraction image \(fullsize\)](#)
[Log file tail \[-\]](#)
(full)

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Field (processed): 1000 stars
Field (orig): 1000 stars
Limiting search to first 1000 objects
Quad scale range: [417.6, 2.88267e+06] pixels
object 1 of 1000: 0 quads tried, 0 matched.
object 2 of 1000: 0 quads tried, 0 matched.
Got a new best match: logodds 6.55854.
object 3 of 1000: 9 quads tried, 495 matched.
object 4 of 1000: 27 quads tried, 1513 matched.
Got a new best match: logodds 7.32196.
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[Log file 2](#)

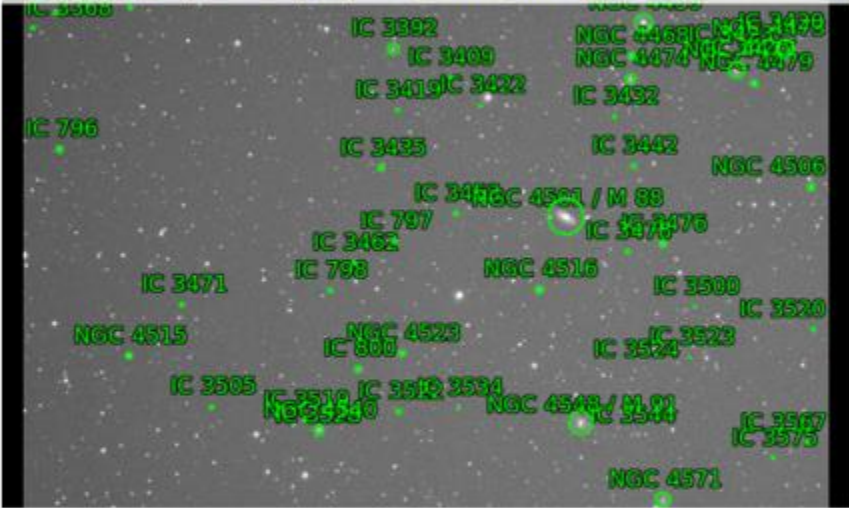
NOTE: signins should be working again... but read about account migration. Not signed in | Sign In



Home Explore Upload API Support Search

Images > L_Ceres_300s_G100_-2...86.fit

original | red-green | **annotated** | grid | SDSS | GALEX | unWISE | LS-DR9 | extraction fullsize



Submitted by anonymous (1)
on 2023-03-31T17:06:22Z
as "L_Ceres_300s_G100_-2...86.fit"
(Submission 7444610)
under Attribution 3.0 Unported

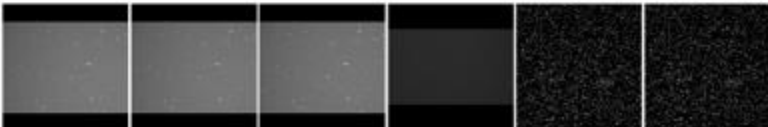
Job Status

Job 8184984:
Success

Calibration

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Center (Dec, dms): +14° 59' 44.926"
Size: 3.28 x 2.19 deg
Radius: 1.970 deg
Pixel scale: 1.89 arcsec/pixel
Orientation: Up is 80.6 degrees E of N
WCS file: [wcs.fits](#)
New FITS image: [new-image.fits](#)
Reference stars nearby (RA,Dec table): [rdls.fits](#)
Stars detected in your images (x,y table): [axy.fits](#)
Correspondences between image and reference stars (table): [corr.fits](#)
Legacy Surveys sky browser: [browse the sky](#)
KMZ (Google Sky): [image.kmz](#)
World Wide [view in](#)
Telescope: [WorldWideTelescope](#)

Nearby Images ([View All](#))



Comments

No comments.

Expand, Flash, Bang Model Davis Taggart, taggardl@mac.com



About the author

EDUCATION

1971-1976 Ph.D. in Analytical Chemistry, Ohio State University
1967-1971 B.A. in Chemistry, Westminster College

EMPLOYMENT

2006 - 2014 Chief Consultant - Natco Research and development, then Cameroon after merger
1975 - 2006 Research Associate – Amoco Production Research, then BP after merger

Most of the thought and writing was done in the quiet of The London Library

NOTE : See Glossary and Diagrams of subatomic particles at the end of the article

Expand, Flash, Bang Model

Davis Taggart, taggardl@mac.com

Abstract

This theory is a product of a thought experiment about the start of the universe that does not rely on a faster than light inflation or dark energy pushing the expansion of the universe (see picture #1 for representation of the standard model). The initial singularity starts as a collapsed structure of mesons and third generation (high energy) neutrons, with a slight excess of matter over antimatter. Both are stabilized by a gravitational compressive force. At time step one all the mesons and neutrons are traveling outward at a near light speed (the expansion). As the universe passes through the first event horizon, the mesons are no longer stabilized and transfer most of their mass/energy and momentum to outwardly moving photons. The universe continues to expand and passes through a second event, where the neutrons are no longer stabilized and therefore, they transfer some of their mass/energy and momentum to outwardly moving photons (both horizons are the flash). The matter/antimatter quarks interact leading to the fermion (mesons, electrons, neutrons, and protons) part of the universe now becoming homogeneous and the beginning of the gradual slowing of the net outward momentum and virtually all matter (the bang). The photonic shell, which contains the vast majority of mass/energy continues to expand bending gravity to the shell and decompressing time/space behind it (see picture #2 for this model).

Assumptions

The initial singularity has mass that is divided almost equally between matter and antimatter (favoring matter by about 4%).

Charge is equally divided between positive and negative.

The universe is 1/3 top quarks and 2/3 bottom quarks. Most of the quarks are in neutrally charged mesons. The small number of remaining quarks are within 3d generation neutrons.

The mesons and neutrons are stabilized by the compressive force within the singularity.

At time Zero the universe is 1 dimensional (out) and gravity is flat.

1. Expand

Starting with the first-time step after zero, the universe was at or exceeded Planck temperature (maximum theoretical temperature). The meson/neutron mixture is traveling at near light speed in the outwardly direction. The gravitational compression maintains the stability of the fermions. This point in time the universe is effectively one dimensional, out, and gravity is flat.

2. Flash

As the universe continues to expand, it passes an event horizon where the gravitational compression is no longer able to stabilize the mesons. The decaying mesons mostly emit gamma rays. These gamma rays because of the conservation of momentum carry all the mass/energy of its parent meson in the outward direction. The small number of other byproducts, start the transition to 3-dimensional travel. The gamma rays start their slow relative move ahead of the slightly slower fermion particles.

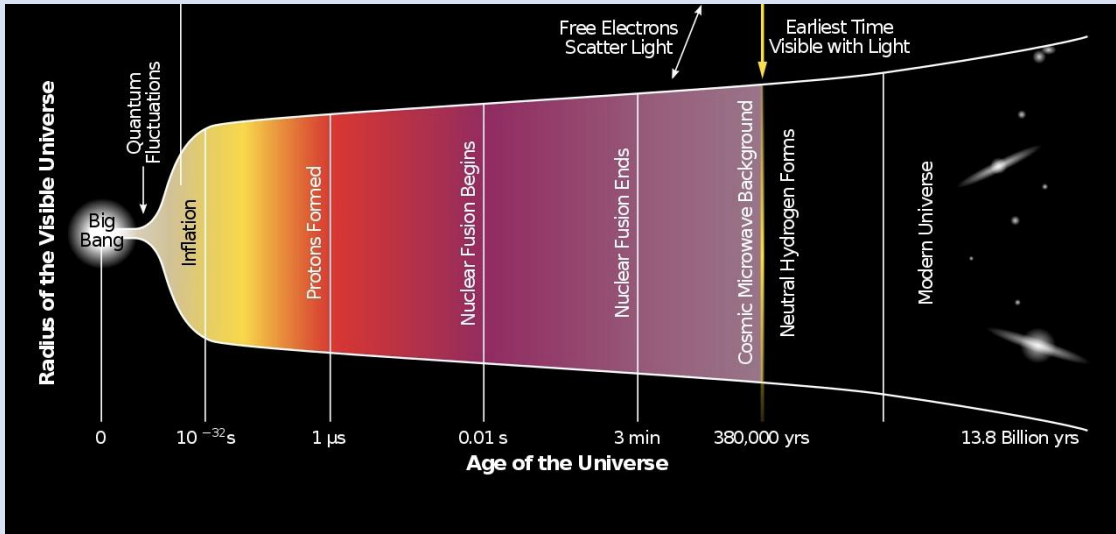
3. Bang

A second event horizon is past when the compressive forces can no longer stabilize the third-generation neutrons. The initial decay passes some of its momentum into outward moving gamma rays. The matter /antimatter begin to interact. While the quarks and antiquarks are still traveling at near light speed, they are now quickly converting from a one-dimensional outward travel to a three-dimensional random walk. This random walk and the energy provided by the annihilation of the remaining antimatter results in the fermionic part of the universe becoming homogeneous with only a small net momentum. Secondly, the moving out of the gamma rays drives the matter / antimatter reaction to completion. As this reaction is driven to completion, the photonic shell contains the vast majority of the residue mass/energy of the annihilation.

Since the photons, gamma rays, in the shell are traveling outward that the speed of light and their gravity wave is also limited to that speed, the opposite sides of the shell do not interact. The vast majority of the mass/energy of the universe resides in this shell. The mass/energy rich shell bends gravity toward it, pulling the fermions in the center outward. The expanding shell is also decompressing time/space behind it.

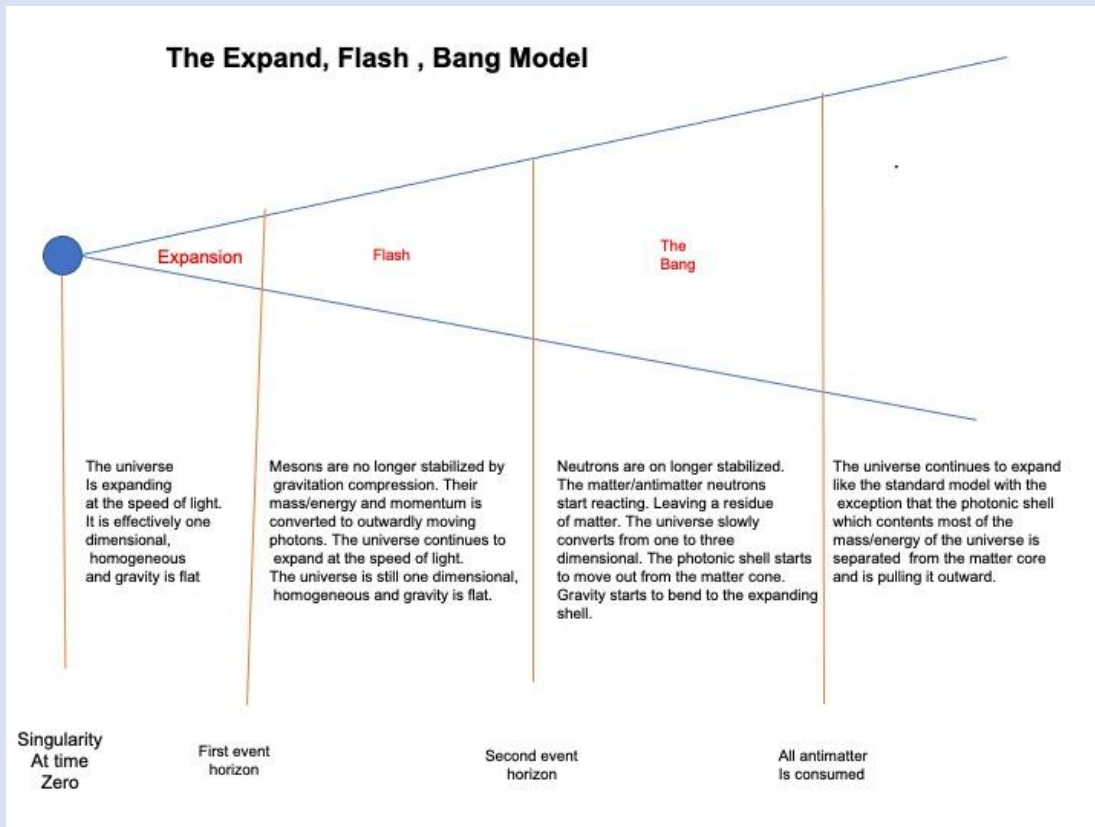
Please email me with comments or questions, Thank you **Davis Taggart**, taggard1@mac.com

1, Standard model



https://commons.wikimedia.org/wiki/File:History_of_the_Universe.svg

#2



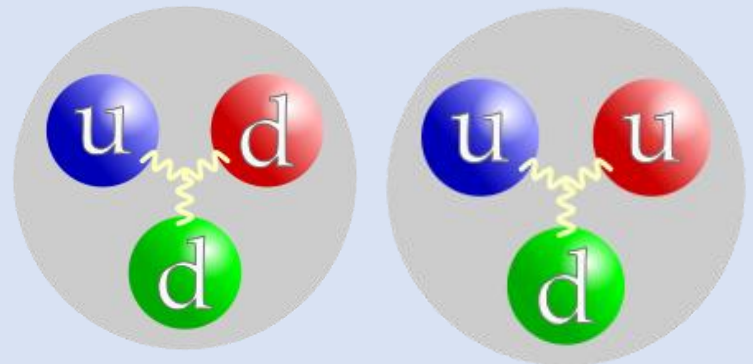
Standard Model of Elementary Particles

three generations of matter (fermions)			interactions / force carriers (bosons)	
	I	II	III	
mass	$\approx 2.2 \text{ MeV}/c^2$	$\approx 1.28 \text{ GeV}/c^2$	$\approx 173.1 \text{ GeV}/c^2$	$\approx 124.97 \text{ GeV}/c^2$
charge	$\frac{2}{3}$	$\frac{2}{3}$	$\frac{2}{3}$	0
spin	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	0
QUARKS	u up	c charm	t top	g gluon
	d down	s strange	b bottom	γ photon
	e electron	μ muon	τ tau	Z Z boson
LEPTONS	ν_e electron neutrino	ν_μ muon neutrino	ν_τ tau neutrino	W W boson

Quarks are one of the subatomic particles which makes up our universe. A chart of the presently known particles is shown at left.

<https://en.wikipedia.org/wiki/Quark>

A meson is a composite particle of one quark and one antiquark. Depending on which quarks and antiquark combine the meson charge can be +1, 0 or -1. All mesons are very unstable with half-life less than 10^{-7} seconds in normal gravity.



Proton

Neutron

Neutrons or protons are made up of three quarks. Protons are stable. Neutrons have a half-life of 879 seconds when they are not in a nucleus or neutron star.

Proton quark structure is 2 up quarks and 1 down quark. Neutron quark structure is 1 up quark and 2 down quarks. The gluon tubes or flux tubes are now known to be Y shaped.

The color assignment of individual quarks is arbitrary, but all three colors must be present.

A singularity is a point in which gravity is so intense that spacetime itself becomes ill defined.

If you are interested all these topics have good review articles in Wikipedia.

TRANSITIONING

Adapting to the Spring Deep Sky

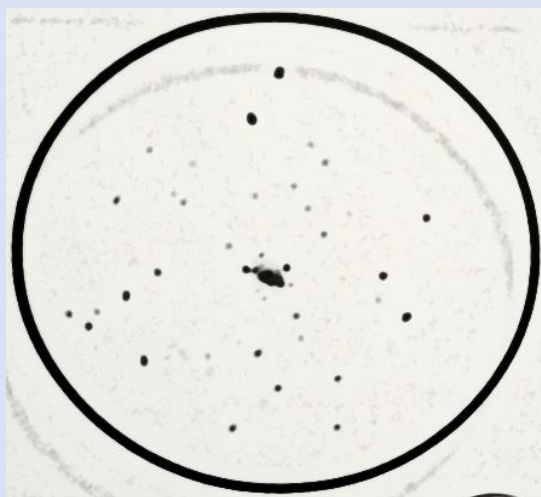
By Brad Young

Spring is a time of transition, on Earth as well as in the sky. It may not be obvious at first but the type of objects we usually look at in the winter are galactic such as open clusters and reflection nebula. But as the year rolls on, we leave the Milky Way and look beyond it at other galaxies in the Virgo Cluster and the other clumps and associations throughout the spring sky. So, as we acclimate to warmer weather, we change our view to faint fuzzies millions of light years away. This requires not only transitioning in selecting magnification, filters, etc., but training our eyes to see faint, low contrast objects more effectively. Or the portmanteau transitioning.

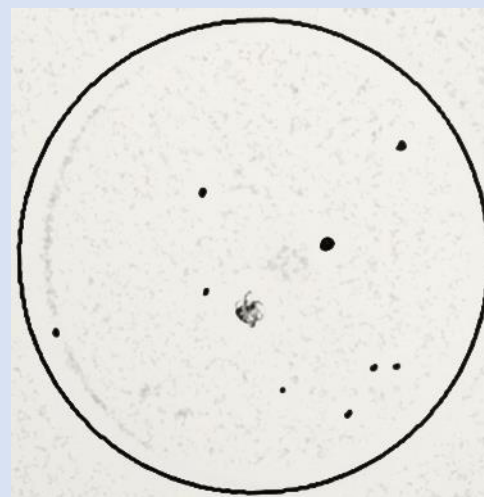
Winter Fence

If I am more fortunate than others, I need to build a longer table not a taller fence - Tamlyn Tomita

There is not a winter fence in the sky, but a traditional line of transition from winter to spring stars. This imaginary line runs from Camelopardalis in the far north, drops between Auriga and Lynx, then Cancer, Monoceros and down to the southern horizon in Pyxis and Puppis. These constellations are considered the most easterly and contain the “suburbs” of the Milky Way and its galactic objects. Groups to the east such as Leo and Hydra are more prevalent in springtime and bring with them the galaxies that will be many people's targets on observing nights. Let's look at the edge of the winter sky and the edge of the winter Milky Way.



Caldwell 7 (NGC 2403)

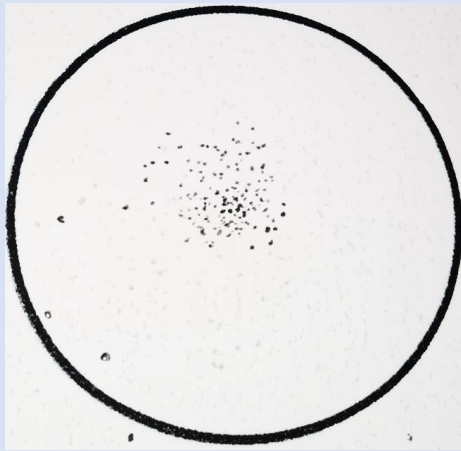


Caldwell 25 (NGC 2419)

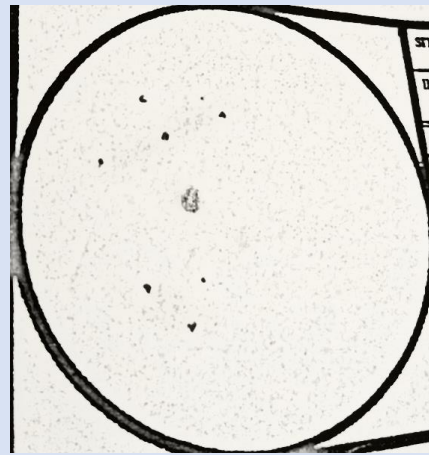
Note: equipment used and other data at end of article

The northernmost object is a galaxy to set the mood for extragalactic views. NGC 2403 (Caldwell 7) is a big spiral galaxy in Camelopardalis. If you star hop, begin with Muscida (omicron Ursa Majoris). Small scopes will see a large, even glow, but maybe not much detail. For moderate to large telescopes in dark skies, you'll find a magnificent spiral, with knots strewn across the field. Though missed by Messier, Caldwell added it to his list of 109 deep sky wonders.

Sir Patrick Moore also added an example of a galactic object that also has a little "intergalactic wanderer" to it - our next target in Lynx. In fact, that is the nickname of NGC 2419, as it is the globular cluster furthest from the galactic center. It is not difficult to find, requiring only a short star hop 7 deg north from Castor. However, it is not as bright as the summer globular clusters and may require a 6-in telescope for a good view.



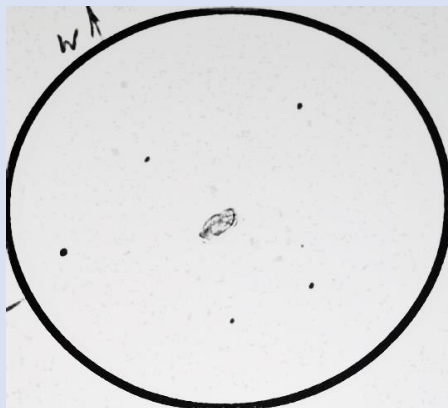
Messier 37



NGC 2387

The open clusters and nebula near Capella are captivating; M 37 is my favorite. Robert Burnham Jr. shared my opinion, writing in his *Celestial Handbook* “usually considered the finest of the three Messier open clusters in Auriga.” The sketch above was made for the Urban Club, using binoculars, and I wrote “awesome, especially with averted vision and patient viewing.”

Finding a galaxy in Auriga is tough, but there are a few, and I have seen NGC 2387. It is “small, medium size and magnitude and no detail.”



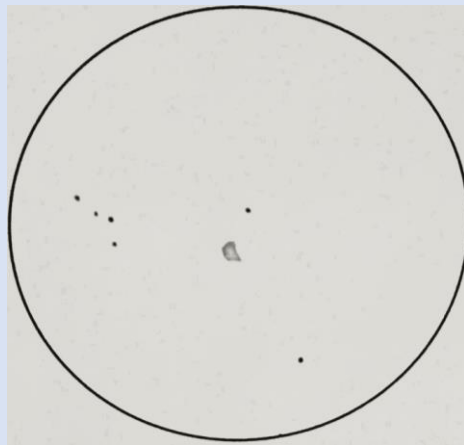
Caldwell 48 (NGC 2775)



Messier 44

You might think Cancer would be another constellation that would be difficult to find a galaxy in and you would be right. NGC 2775 (Caldwell 48) is in the southeast corner and is easier to star hop to from the head of Hydra. This is a moderate target at magnitude 10. I saw it as slightly elongated with some mottling on the edges in my ETX-125 @153x. David Levy listed it as a “round galaxy” in his *Deep Sky Objects*.

I would suggest M44 (the Beehive or Praesepe), to represent a galactic (winter) object. This showpiece will give your eyes a rest from the hard work ahead this spring with dim galaxies. With dark skies, you may see it naked eye.



Caldwell 46 (NGC 2261)

Moving south, Hydra is bordered on the west by both Canis Minor and Monoceros. Canis Minor is singularly lacking in available deep sky objects for small telescopes. So, I'll use Monoceros and the complex field surrounding the variable star S Mon, which lights Hubble's Variable Nebula NGC 2261. The nebula has a "sweeping fan" that becomes faint north of S Mon, and "curves away gently as if fanned by a light breeze." I noted a "comet like glow"; this reiterates that the surfaces of different objects can have a unique look and feel or resemble other kinds. Use as high power as conditions allow for C 46. Before leaving, switch to a low power field, and sweep nearby to visit the Christmas Tree Cluster and the Cone Nebula nearby for more amazing sights.

Finally, look at the Winter Milky Way, whatever dim glow remains for you to see. How is observing our own galaxy different than observing other galaxies? For this part, pick a portion that does not have any discrete objects, just star fields. The Milky Way is a galaxy, but we see it so much closer and from such a different vantage point that we must see it in another way. That's good – I give you the Orion Nebula and Pleiades as proof that being close to stunning objects is best.

New Ways Will Bear Fruit

Everything that's cold and gray is gone – John Denver

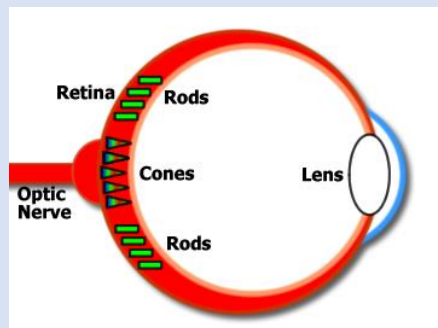
That should be enough list; as you observe a few, you may start to see that as we begin looking at galaxies, our method of observing may change in subtle ways. Galactic objects like those we see in the winter Milky Way on this list tend to be clusters and nebula. Clusters, whether open or globular can often be resolved to stars. Except for monster telescopes, no amateur resolves galaxies into their individual stars. Occasionally, a supernova will erupt in one. Galactic nebula, such as reflection, emission, or planetary nebula, will not resolve but have a different type of appearance compared to a galaxy. With the subtle differences, comes different ways to observe.

Galactic clusters are often large and bright enough to use low power eyepieces. Unless they are involved in a nebula (e.g. the Pleiades), filters are rarely used. Depending on their size, bright nebula may require low or high power and certain filters such as H- β may be helpful in teasing out the details. Planetary nebula often benefit from high power and some are easier to see using an OIII filter.

Usually, galaxies usually benefit from higher power to increase contrast. Because they are such low contrast objects, filters offer little help. Dark skies are much more essential, as is the aperture of your telescope. The reason why large Dobsonians (nicknamed light buckets) are popular is because they provide the most photons for the dollar.

Rods and Cones

Jerry, my rods and cones are all screwed up! - Kramer Cosmo



In addition to your equipment, your method of observing may change with different types of objects. Averted vision is often a must for dim galaxies. But it's usually unnecessary with an open cluster. With bright clusters or nebulae, we may stare directly at the scene, using the six million cones in our eyes, which are sensitive to color. But with dim galaxies and nebulae, we rely on our 120 million rods.

In short, rods are responsible for scotopic vision and cones are responsible for photopic vision. Scotopic vision is also colloquially referred to as night vision. This type of vision is performed with the rods in the eye. As these are mainly located in the peripheral areas of the retina, visual acuity is low. In contrast to cone-based photopic (bright) vision during the day, no colors are perceived. Think of averted vision in this way: go back to when you printed this article. If you think it is bright and colorful, you use high quality colorful ink and stand at the printer, staring as if to hurry it to come out. However, if you see this story, or the author, as dim, you print in greyscale and glance sideways to see if it's done printing.

It's time to transition from nebulas and clusters to galaxies. Exchange your hand warmers for bug spray, your Carhartt's for T-shirts and put away thermos bottles while you clean out the ice chests. Get ready for the hordes of galaxies in Leo, Ursa Major, Coma Berenices, not to mention Virgo. And get out and see Orion, or the Eskimo, or M35 one more time before the sun overwhelms them in the evening sky.

Objects Discussed *You can't have discussion without cussin'*

OBJECT	CONST	My Sketch	TYPE	AL PROGRAM	MIN EQUIP
NGC 2419 (C25)	Lynx	ETX-125 153x	Glob Cluster	Glob Clusters	4 in scope
NGC 2403 (C7)	Camelopardalis	ETX-125 47x see note below	Galaxy	Caldwell Silver	4 in scope
Messier 37	Auriga	ETX-125 47x	Open Cluster	Urban Club	8x40 binocs
NGC 2387	Auriga	22" Dob 240x	Galaxy	Herschel Society	10 in scope
NGC 2775	Cancer	ETX-125 153x	Galaxy	Herschel 1	4 in scope
Messier 44	Cancer	8x25 finder scope	Open Cluster	Urban Club	Eye
Milky Way	Many	Eye	Galaxy	?	Eye
NGC 2261	Monoceros	ETX-125 153x	Bright Nebula	Caldwell Silver	10 in scope

Note: NGC 2403 (C7) best seen that night in ETX-125 at 153x, w/o filter
Unless noted, all images and sketches are by the Author

Bibliography

Burnham's Celestial Handbook, Vol. 1-3, Robert Burnham Jr.

Webb Society Deep-Sky Observer's Handbook, Vol. 2, 3, 4, edited by Kenneth Glyn Jones

Celestial Objects for Common Telescopes, Vol. 2: The Stars, Rev. T. W. Webb

Deep Sky Objects, David Levy

Deep Sky Companions: The Caldwell Objects, Stephen James O'Meara

Telescope Workshop at Tulsa Air & Space Museum

On February 25th we had a good turnout of new or novice telescope owners coming to get one on one tips on how to use their telescopes from our Astronomy Club Volunteers. You can see from the smiling faces that many are eager to explore the joys of astronomy.



Messier Marathon 2023

On Saturday March 25, Eight hardy souls set forth on a quest to search out the galaxies, nebula and star clusters in Charles Messier catalogue.

Steve & Deb Chapman , Cathy Ground & Dennis Sprague,
Jack Reeder & Don Bradford, Tamara & Owen Green.

Tasty Snacks and a “power nap” helped continue the quest into the night.



Observaory Workday Saturday April 1st

The Magnificent Seven volunteers did a lot of work at the observatory. Jim and Jack cleared out all the brush from the main gate to nearly the observatory. Dennis and Don hauled off at least 4 pickup loads of brush. Cathy did a wonderful job sanding and repainting the picnic table. James, Don and John cleaned up and rearranged the classroom & rest room.

John Land, Jack Reeder, Jim Boyers, Cathy Grounds, Dennis Sprague, Don Bradford, James Taggart



Associate Treasurer Report

Mike Blaylock



As March 30, we had 198 members 16 New members for 2023

We welcome this month's newest members – Michael Strakal, Richard Morgan, Adam Nemec, Tom Rendon, and Keifer Cox Hello and welcome to ACT !

Have you changed you Contact Information? Email, Phone, Postal Address ?

Please help us to maintain our records by sending an email to AstroTulsa.Tres@gmail.com

Accounts as of March 23, 2023

Checking: \$ 1,390

Savings: \$ 5,789

Investments: \$ 30,371 (Value tends to fluctuate with markets).

You can JOIN or RENEW memberships or magazine subscriptions ONLINE using ANY MAJOR CREDIT CARD.

The transactions are processed through PayPal but you Do Not need a PayPal account.

Fill out the registration form at <https://www.astrotulsa.com/join>

Click Submit and you will be given the choice of either MAILING in your dues with a check or paying online with most major credit cards. A modest processing fee is added to online transactions.

Membership rates for 2023 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/join>

MAGAZINE SUBSCRIPTION RATES and PROCESS has CHANGED !

You can get a discount rate as a Astronomy Club member. **However, you will need to do so directly using their discount rate web links.** Both Sky & Telescope and Astronomy have options for DIGITAL as well as PRINT subscriptions.

For club member's Discount subscription rates to [Sky and Telescope magazine](#) go to [this page](#)

For club member's Discount subscription rates to [Astronomy magazine](#) go to [this page](#)

Use the DISCOUNT RATE LINKS above instead of their regular subscription pages to MAKE or RENEW your subscription.

If you need assistance, contact our club treasurer at astrotulsa.tres@gmail.com

dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, and more!



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!

Solar Eclipses Are Coming! David Prosper

Tulsa – Oct 14, 2023 78 % coverage

April 8, 2024 95 % coverage - Total in SE Oklahoma and Central Arkansas

Have you ever witnessed a total solar eclipse? What about an annular solar eclipse? If not, then you are in luck if you live in North America: the next twelve months will see two solar eclipses darken the skies for observers in the continental United States, Mexico, and Canada!

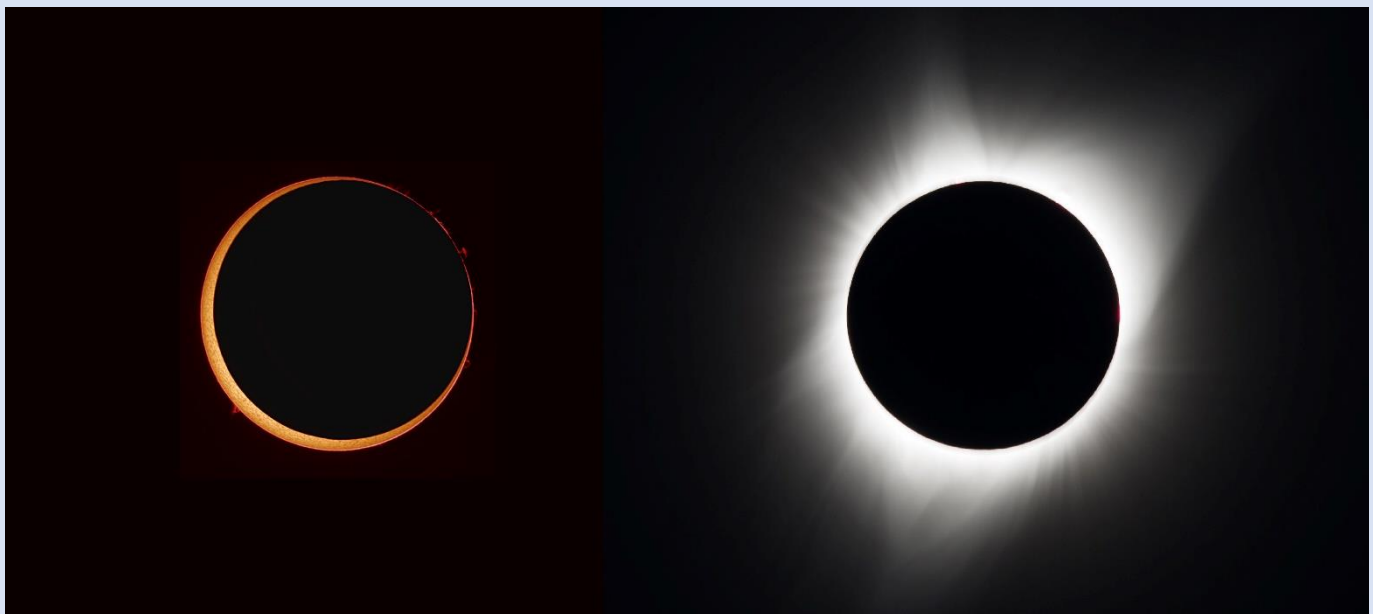
Solar eclipse fans get a chance to witness an **annular eclipse** this fall. On **Saturday, October 14, 2023**, the Moon will move exactly in front of the Sun from the point of view of observers along a narrow strip of land stretching across the United States from Oregon to Texas and continuing on to Central and South America. Since the Moon will be at its furthest point in its orbit from Earth at that time (known as *apogee*), it won't completely block the Sun; instead, a dramatic "ring" effect will be seen as the bright edge of the Sun will be visible around the black silhouette of the Moon. The distinct appearance of this style of eclipse is why it's called an annular eclipse, as *annular* means *ring-like*. If you are standing under a tree or behind a screen you will see thousands of ring-like shadows projected everywhere during maximum eclipse, and the light may take on a wan note, but it won't actually get dark outside; it will be similar to the brightness of a cloudy day. This eclipse must only be observed with properly certified eclipse glasses, or other safe observation methods like pinhole projection or shielded solar telescopes. Even during the peak of the eclipse, the tiny bit of the Sun seen via the "ring" can damage your retinas and even blind you.

Just six months later, a dramatic **total solar eclipse** will darken the skies from Mexico to northeast Canada, casting its shadow across the USA in a strip approximately 124 miles (200 km) wide, on **Monday, April 8, 2024**. While protection must be worn to safely observe most of this eclipse, it's not needed to witness totality itself, the brief amount of time when the Moon blocks the entire surface of the Sun from view. And if you try to view totality through your eclipse viewer, you won't actually be able to see anything! The Moon's shadow will dramatically darken the skies into something resembling early evening, confusing animals and delighting human observers. You will even be able to see bright stars and planets - provided you are able to take your eyes off the majesty of the total eclipse! While the darkness and accompanying chilly breeze will be a thrill, the most spectacular observation of all will be the Sun's magnificent *corona*! Totality is the only time you can observe the corona, which is actually the beautiful outer fringes of the Sun's atmosphere. For observers in the middle of the path, they will get to experience the deepest portion of the eclipse, which will last over four minutes - twice as long as 2017's total solar eclipse over North America.

While some folks may be lucky enough to witness both eclipses in full – especially the residents of San Antonio, Texas, whose city lies at the crossroads of both paths – everyone off the paths of maximum eclipse can still catch sight of beautiful partial eclipses if the skies are clear. The Eclipse Ambassadors program is recruiting volunteers across the USA to prepare communities off the central paths in advance of this amazing cosmic ballet. Find more information and apply to share the excitement at eclipseambassadors.org. NASA has published a fantastic Solar Eclipse Safety Guide which can help you plan your viewing at bit.ly/nasaecipsesafety. And you can find a large collection of solar eclipse resources, activities, visualizations, photos, and more from NASA at solarsystem.nasa.gov/eclipses



This detailed solar eclipse map shows the paths of where and when the Moon's shadow will cross the USA for the upcoming 2023 annular solar eclipse and 2024 total solar eclipse, made using data compiled from multiple NASA missions. Where will you be? This map is very detailed, so if you would like to download a larger copy of the image, you can do so and find out more about its features at: <https://svs.gsfc.nasa.gov/5073> Credits: NASA/Scientific Visualization Studio/Michala Garrison; eclipse calculations by Ernie Wright, NASA Goddard Space Flight Center.



Photos of an annular total solar eclipse (left) and a total solar eclipse (right). Note that the annular eclipse is shown with a dark background, as it is only safe to view with protection – you can see how a small portion of the Sun is still visible as the ring around the Moon. On the right, you can see the Sun's wispy corona, visible only during totality itself, when the Moon completely – or totally - hides the Sun from view. A total solar eclipse is only safe to view without protection during totality itself; it is absolutely necessary to protect your eyes throughout the rest of the eclipse!

Credits: Left, Annular Eclipse: Stefan Seip (Oct 3, 2005).
 Right, Total Eclipse, NASA/Aubrey Gemignani (August 21, 2017)

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 Guest – both individuals and families as well as our regular members.

Several of our 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**.

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

ASTRONOMY CLUB OFFICERS:

PRESIDENT – JOHN LAND

astrotulsa.pres@gmail.com

VICE PRESIDENT – DON BRADFORD

astrotulsa.vp@gmail.com

SECRETARY – SKIP WHITEHURST

astrotulsa.secy@gmail.com

TREASURER – MIKE BLAYLOCK

astrotulsa.tres@gmail.com

BOARD MEMBERS-AT-LARGE:

JERRY CASSITY

TAMARA GREEN

CATHY GROUNDS

BRYAN KYLE

JACK REEDER

DANA SWIFT

JAMES TAGGART

STAFF:

FACILITIES MANAGER –

JAMES TAGGART

astrotulsa.obs@gmail.com

EDITOR - JOHN LAND

tulsaastrobiz@gmail.com

PROGRAM CHAIR - JOHN LAND

tulsaastrobiz@gmail.com

Public FaceBook Page Coordinator

OBSERVING CHAIR - BRAD YOUNG

allenb_young@yahoo.com

SIDEWALK ASTRONOMY – **Open Position**

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2023 [Go to Show Schedule](#)

Click the Date Column to sort them by show date

Most Shows take place on

Tuesday evenings from 7:00 PM to 8:00 PM
a few on Saturday

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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