ASTRONOMY CLUB OF TULSA

OBSERVER

October 2023

Bringing Stars to the eyes of Tulsa

since 1937 *Editor – John Land*

Double Cluster NGC 869 & NGC 884 Perseus
By Mike Blaylock

Image taken July 18, 2015 with a Williams Optics GT102 Refractor
Imaging Cameras Canon EOS 600D / Rebel T3i / Kiss X5 25 images of 180 sec each
Software Open PHD Guiding Project PHD2 · PixInsinght 1.8

The double cluster is a popular sight in telescopes and binoculars. It lies about halfway between Perseus and Cassiopia. The two clusters fit nicely in the same low power view telescopic view. Both clusters are about 7,000 light-years away and contain stars much younger and hotter than the Sun. Separated by only a few hundred light-years, the clusters are both 13 million years young based on the ages of their individual stars,

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

Observatory Stargazing Nights

Our GUESTS & Members nights are open to anyone. We do ask guests to try to RSVP.
Large groups need to make separate arrangements.

Members Only Nights are Open to members and their family
Details, Times and Direction Maps are posted on our Website

https://www.astrotulsa.com/events

Observatory Stargazing Nights

Saturday Oct 7 7:00 PM Guest and Members Night –
Guest requested to RSVP -

Friday Oct 13 7:00 PM Members Only night - Event will end early due to Eclipse on 14th
Open to our members and their immediate family

Astronomy Club Meeting - THURSDAY Sept 28 - 7:00 PM - IN PERSON club meetings.
At Jenks High School planetarium 105 E B Jenks OK - Guests Welcome
Note: We are meeting on a Thursday due to schedule conflicts on all September Fridays

SATURDAY Oct 7 6:30 PM Guest and Members Night –
Guest requested to RSVP -

Friday Oct 13 6:30 PM Members Only night
Open to our members and their immediate family

Saturday Oct 14 we have a 71 % Partial Solar eclipse in Tulsa
Eclipse begins 10: 25 AM Maximum 11:51 AM Ends 1:24 PM

Our club is planning two locations for the public to come enjoy the eclipse.
Eclipse Location and Times Details and Tips to Safely Observe a Solar Eclipse

Friday Oct 20 - 5:45 PM Keystone Ancient Forest, 160 Ancient Frst Dr, Sand Springs, OK 74063
Take Highway 412 west from Sand Springs Exit at PRUE Rd (209th W Ave) then 2 miles N
Parking is limited – so car pool and arrive early

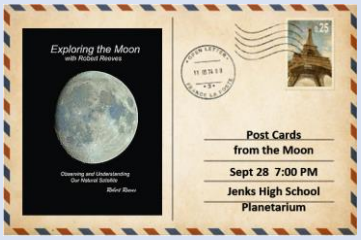
Astronomy Club Meeting - FRIDAY OCT 27 - 7:00 PM - IN PERSON club meetings.
At Jenks High School planetarium 105 E B Jenks OK - Guests Welcome

Join us at the Jenks High School Planetarium
105 E B St Jenks, OK 3rd floor

Thursday Sept 28 at 7:00 PM

Post Cards from the Moon

by Robert Reeves



Our guest speaker on Zoom is Robert Reeves is an accomplished deep sky astrophotographer, having written numerous articles on the subject. His current passion is re-popularizing the Moon within the amateur astronomy community by explaining the origin of the Moon, the evolution of its face, and introducing its geology to Moon lovers everywhere. He has just released his book on Amazon **"Exploring the Moon" Observing and Exploring our Natural Satellite** featuring 300 pages and 422 photographs of lunar features to share his many decades of experience observing and learning about the moon.

Robert Reeves enjoys speaking about astronomy and spreading his passion for the Moon and photographing the heavens. He took his first photos of the moon in 1959. In addition to appearances and Zoom presentations to interested groups, Reeves has been a keynote speaker at the Winter Star Party, Apollo Rendezvous , the Advanced Imaging Conference, the Okie-Tex and Texas Star Party and several more. His recent activities include a five-city speaking tour in China where Reeves was the first westerner to address the Chinese astronomy community about the Moon.

Check out Robert's Facebook page featuring a different lunar photo each day with descriptive text at 365 Days of the Moon

Available now! Immediate delivery!

Exploring the Moon with Robert Reeves

Observing and Understanding our Natural satellite

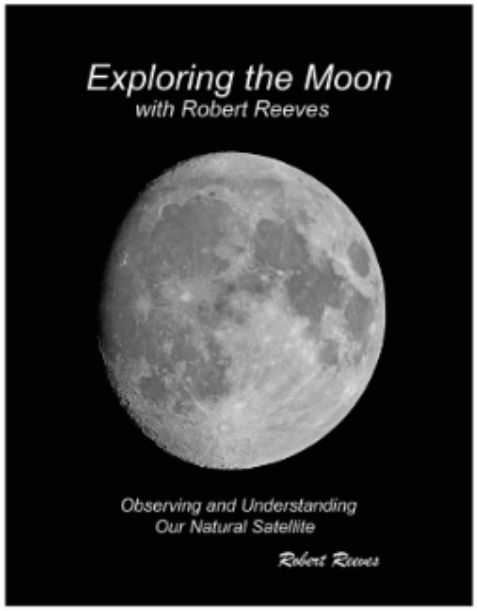
Written and illustrated by *Robert Reeves*

The Moon is a perfect urban backyard target for your telescope, visible most of the month and unaffected by light pollution. Through dozens of issues of Amateur Astronomy Magazine, Robert Reeves showed us that a look at the Moon through a telescope is much an exercise in cosmic art as it is science.
In his new book *Exploring the Moon with Robert Reeves*, Robert helps the reader appreciate the Moon's beauty as well as the science of the Moon. Robert helps us see the Moon as both a mysterious world puzzled over in the past and a world full of promise for future exploration. Robert explains the nuances of the Moon and its varied geology to bring context to its face and give the Moon a personality, and making the Moon a valued nighttime friend.

300 pages, 422 illustrations, 44 full page illustrations

Available in Kindle $17.99, paperback $39.95 or hardback $54.95 from Amazon at: https://www.amazon.com/dp/B0CGL3RN5F
(Note the second alphanumeric character is a "zero")

Contact robertreeves400@gmail.com for information about signed copies



President's Message
John Land

I hope you are all looking forward to the cooler weather of autumn. Our astronomy club had a successful summer and a busy autumn ahead. We have an excellent speaker lined up for September 28 to open our schedule on in town club meetings at the Jenks High School planetarium. I hope many of you will come join us. We have had 37 new people join our club since May. With a solar eclipse coming up Saturday Oct 14th there will be an increased interest among the public and hopefully more people to join our club. We have TWO Excellent location for pulbic viewing of the eclipse. One at the Sand Springs Case Community center and the other at the Broken Arrow Voyage Solar Walkway in front of Creekwood Elementary. Notices of the eclipse viewing sites have gone out to schools, commuinity groups and will be on the media outlets So we are expecting large groups. We still need club members to volunteer to help at those locations.

On Oct 20 we have a new stargazing opportunity at the Keystone Ancient Forest. Oct 27 is our club meeing in Jenks and our Annual Club Dinner is Saturday Nov 11. Along with that we have our scheduled Observtory nights and a couple of request to bring our telescopes to other events.

OFFICER and BOARD ELECTIONS - will take place at our Oct 27th meeting.
The success of our Astronomy Club since 1937 is a testimony to the dedication of generations volunteers who happily took on responsibilities necessary to keep it a vibrant organization. If you have been a member in good standing for at least one year, you are eligible be a candidate for a club officer or board member.

If you would like to get more involved in shaping the future of the Astronomy Club of Tulsa, I encourage you to contact our President and Secretary. Let them them know what office or board position you would like to serve in. Please send us your name, a short bio of yourself – your inerest in astronomy. Also a picture of yourself to put in the newsletter prior to the elections.
Please sent these by Oct 13 so there will be time to get the newsletter ready.
For More information see Qualifications for Astronomy Club Officers and Board
Send to astrotulsa.pres@gmail.com AND astrotulsa.secy@gmail.com

We also have a number of appointive positions open to volunteers willing to invest their time and talents in making our club a success. **See Page 18** **I would like to encourage our members both or existing members and new members to become involved in helping with our events. The best way to learn is by doing and being mentored by others. Helpers are always welcome at our observatory nights. We have a need for young people with social media skills to help with our Public Facebook. I am told that the best way to reach the younger generation is by InstaGram. We can connnect with the public better making regular postings of club events and interesting sky events, astronomy news.**

Finally I would like to thank you for allowing me to serve as your club president that past two years. Its been a challenging time finding ways to continue to be vibrant through the pandemic time. But we have adapted to new ways of doing things and are moving forward to the future. I will not be running for president this fall. Its time to let new leadership bring in new ideas and talents to insure our future. Organizations which don't mentor and encourage new talent rarely succeed in the long view of things. I will seek to serve on the board to mentor the new talent and pray the good Lord will grant me more years to rejoice with my astronomy friends at the wonders of the night sky.

Let us continue our 85+ years of

"Bringing Stars to the Eyes of Tulsa since 1937"

John Land - President

Click on these images to links on the Internet

CLEAR OUTSIDE

Tulsa National Weather Service

*** The NEW CLEAR OUTSIDE icon above is a link to an extensive site showing cloud cover %, Seeing, Transparency, Moon Phase, Temp in ^{O} C and many other useful tools

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
kyandtelescope.org/astronomy-news/what-to-know-before-buying-a-telescope/

See Website Observation Station for a collection of Interactive Sky Watching Tools
Moon phases - Sun rise & Set - Make your own custom interactive sky chart and more
Great website for printable Finder Charts of Solar System objects https://in-the-sky.org/

October - Moon Phases - - 3rd Q Oct 6 - - New Oct 14 - - 1st Q Oct 21 - - Full Oct 28

OCTOBER PLANETS – As we move into Autumn the sunsets earlier each night giving us more time for observing. On Oct 1st Sunset is 7:06 PM by Oct 31st it sets at 6:27 PM SATURN is already up in the SE ready for observing as it gets dark. . Due to it location in Aquarius it only reaches a maximum altitude of 41^{O} when it transits. Since Saturn's rings will be edge on in 2025, in 2023 we view them at a shallow angle.

JUPITER won't reach opposition until Nov 2nd, so we'll have to wait until after 9:00 PM for it to be high enough for good viewing. The planet Uranus is just east of Jupiter and reaches opposition on Nov 13. It can be seen in small telescopes and even binoculars if you know where to look. MARS is too close to the Sun to observe. VENUS is passing through Leo as our bright morning star. MERCURY – you may catch it on the horizon at dawn early in the month but most of us will have to wait until November for it to appear in the west after sunset.

The Moon is near is only 3 degrees from Jupiter on Oct 1st. Then look for it near Venus in the eastern morning sky Oct 9 & 10. By Oct 23rd it will join Saturn in the evening sky.

Lastly I hope you will all take the opportunity to share with your family, friends and neighbors your enthusiasm for exploring the wonders of the night sky.

Join us for a Solar Eclipse Watch Saturday Oct 14
10:23 AM to 1:25 PM Maximum 11:51 AM
Case Community Center 1050 W Wekiwa Rd Sand Springs

Creekwood Elementary School
1301 E Albany St Broken Arrow **Eclipse Event Printable Flyer**

Young Astrophotographer, Ethan Franklin, who will turn 16 in November, tells of his start in night sky imaging.

I first became interested in astrophotography in early July. I knew we had a camera somewhere, and I liked staying up late, so I figured I'd give it a try. We were going to see some fireworks, and I wanted to take some pictures. I dug out the camera and picked up a simple tripod from the store. After the fireworks were over, I tried taking a picture of the stars. Looking back, it wasn't all that great. I only used a single exposure, and I definitely underexposed it, but it was fun and it got me started.

Along with astrophotography, I also enjoy parkour and gaming as my other main hobbies. I also like hiking and camping. Ethan along with his Mom and younger siblings have been attending our observatory sessions this summer. Ethan is now a youth member of our club, and we look forward to sharing his enthusiasm as he discovers the wonders of the night sky.

Olympus EM-10 mirrorless camera with a M.ZUIKO 14-42mm f/3.5-5.6 lens set to 14mm Images of Milky Way at ISO 3200 using 100 or 200 Ten second exposures stacked with program called Seguator.

Moonshadow

By Brad Young - ACT Observing Chair

A Question

So, my Dad asked me a question, “How long will it take before the entire Earth has been under the shadow of the Moon?” With the annular eclipse coming up, it seemed like a great subject for an article. As I got deeper into it and found the complexity of the solution, I decided he must have wanted to get me back for something I did as a kid.

Scope of Coverage

There is no dark side in the moon, really
Matter of fact, it's all dark
“Eclipse” by George Roger Waters

We decided not to include hybrid or annular eclipses. Annular “shadow” is a nice thing to experience, but it is ultimately a central partial eclipse and does not have the same appeal or effect of a total eclipse. Hybrid eclipses do include a total component, but these are always total for a short time, at the ends of the track. The duration during the total phase is also short, so these events are therefore difficult both to observe and estimate for this study.

You must then decide the area of coverage included in the problem. At most eclipses, much of the track is out over open ocean, and may not be seen by anyone. However, to be fair to sailors and albatrosses, we decided to look at the entire surface of the Earth.

The Moon is Leaving Us Behind

Another quirk would be if there were no **T**otal **S**olar **E**clipses **(TSEs)** to be had. Because the Earth's spin is faster than the Moon's orbit, the tidal bulge raised on the Earth pulls on the lagging moon, gradually raising its orbit and slowing our day. Every year the Moon's orbit grows by some 3.8 centimeters and our day lengthens by about 0.000015 seconds.

At this present rate, in about 50 million years the Moon will never completely eclipse the Sun, it will simply appear too small on the sky. So, our attempt to shadow everywhere must happen within 50 million years.

Area of the Shadow

Then you flew your Lear jet up to Nova Scotia
To see the total eclipse of the sun
“You’re So Vain” by Carly E. Simon

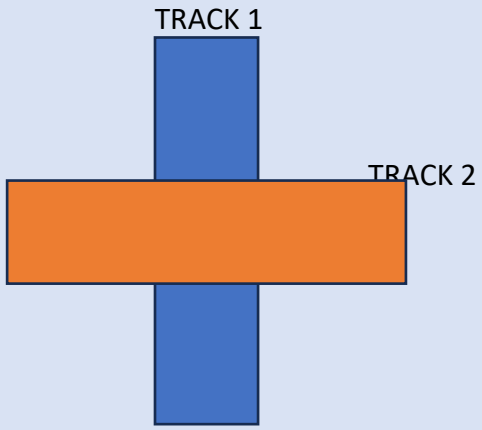
Now things get interesting, and a lot of it must be estimated or use average values. The width of the eclipse track of a TSE on Earth is at most 267 km. (166 miles) Of course, it can be much less, down to 0, so the average would be 134 km. (83 mi) Another consideration is that the duration is variable across the width of the track, but we will stipulate that an eclipse of any length counts as coverage.

The length of the track is tricky; you may have noticed that some are very short at the poles (but are often wide) while those near the equator may span most of that side of the globe. According to my source, typically, the path of a TSE across the globe is around 15,000 km long. (9,320 mi) So, this would give us an area of each track of about 2,000,000 km^2

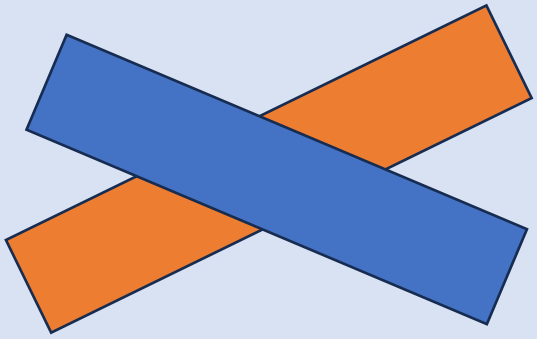
Geographic Likelihood

The average number of TSEs in a century is 66 for Earth as a whole. On average, the same location on Earth only gets to see a solar eclipse for a few minutes about every 375 years! This means that about 248 TSE occur before any spot is revisited.

Now, the definition of this "location" is not given by the source but is crucial. We know how much area is covered by each track, on average, but every 375 years, shadow is wasted covering the same spot again. If two tracks cross at right angles, then the overlap would be one track width:



However, this perfect intersection is rare; normally, the tracks will cross at an angle, resulting in a larger area of "wasted" overlap:



So, to approximate to the worst case, I decided to use the area of 2 times the width of an average track (2 x 134 km) as the location revisited. This results in 72,000 km^2 wasted each time. So, each 375 years, 2,000,000 – 72,000 square kilometers are covered by shadow. This calculates out to 5,170 km^2 per year in shadow, on average.

Results

Ain't no sunshine when she's gone
Only darkness every day
"Ain't No Sunshine When She's Gone" by Bill Withers

The area of the entire surface of the Earth, including the oceans, is an astounding 509,600,000 km^2. Using the criteria discussed above, it takes approximately 100,000 years for the moon shadow to visit every point on Earth. Of course, this is just an average solution – the vagaries of the different eclipse circumstances and tracks may not lead to a cycle exactly this long every time. But the cycle is long enough to ensure that it does happen and will many more times before TSEs stop altogether with the recession of the moon.

A montage of author's images from the last annular eclipse that ran along a very similar path in 2012. Clockwise from upper left, wife Harriet's sketch of the advancing of the moon, the odd appearance of distant mountains and shadows, Crescent sun through a pinhole, son Gus and I observing safely, maximum annularity, Another crescent view with car window reflection. Of course, all of these were much clearer with our own eyes.

Eclipse Challenges Upgraded to Include Pins

The Astronomical League has upgraded the Solar Eclipse Observing Challenges to include the same certificate (Silver Level) and pin (Gold Level) as is used with all their Observing Programs. In case you missed an earlier article, the challenges consist of the requirements listed below.

Solar Eclipse Observing Challenge – Annular Eclipse

An annular eclipse of the sun is a magnificent event in the natural world. It allows you to experience the three-dimensional nature of the universe—events occurring in the cosmos can be experienced directly on Earth. During a total eclipse of the Sun, the Sun, the Moon, and the Earth are all in perfect alignment. The scale is unimaginable, yet here it is happening right on top of you and around you. Only a total eclipse is more amazing. If the Moon had been a little closer to the Earth or the Earth a little further from the Sun, this time, it would have been total, but instead we are treated to the "Ring of Fire" as the outer edge of the Sun remains visible throughout the event.

After what seems like a moment, the moon continues its journey and the annular eclipse is over, marking the end of the ring. It is then you ask, "When is the next one?"

***** WARNING *****

Before you start any solar observing program, make absolutely certain that you have safe filters and a safe set-up. Only use filters from reputable sources, and never use a "solar filter" that screws into an eyepiece. As Richard Hill states in *Observe and Understand the Sun*: "Observing the sun is the only inherently dangerous observing an amateur astronomer can do. Be always aware of this and take all necessary precautions. If you do not know if a filter or procedure is safe, then do not use it! Always err on the side of safety. An eye once damaged is forever damaged. Filters that let too much INFRARED light through can burn an eye if used visually. There is NO PAIN when this happens. Burned retinas can NOT be repaired. Excessive ULTRAVIOLET light has been shown to cause cataracts. So be very careful."
For more information on ways to safely observe the sun, click here.

The Awards
The program offers two levels of accomplishment (certifications):
SILVER – a certificate of completion will be awarded
Successful submittal will require completion of the Annular Eclipse Experiences Checklist

- Observe the eclipse directly using your eyes or equipment and report the four contact times, and a detailed description of each phase of the eclipse. Remote imaging is allowed.
- If you cannot travel to the eclipse, observe the partial phase that you can see, and report as much data and description as circumstances allow. In addition, you must use images acquired via the internet and report the timings as seen at that location, along the line of annularity, of all four contacts. The substituted images must be submitted and be from a source that can be verified by the administrator. The event must be annular at that location (allowing for all four contact points to be reported). This method may also be used if you are clouded out at your location, even if you traveled to view the eclipse.

GOLD – a certificate of completion and pin will be awarded.

Successful submittal will require completion of the silver level award described above and calculation of the Saros period via the process described in "Determining the Saros". Include with the submittal all moon positions, sketches and images used, and the calculations involved to determine your answer.

Determining the Saros requires a minimum timespan of six (6) months (a longer span is preferred). During that time, a minimum of four (4) moon positions each month, for a minimum of 24 total positions will be needed to accomplish the task. Again, more will lead to greater accuracy. The moon positions can be done before or after the eclipse.

Other Awards
There is also an "I Observed the Eclipse" downloadable certificate available here that may be distributed to anyone attending an observing event.

Requirements and Rules
You do not need to be a member of the Astronomical League to participate in this challenge.
The observer should report all of the following information with submittal:

1. Location of the observer's site, including longitude and latitude*
2. Date and time of the observations (either UT or local time) *
3. Instrument used with aperture and focal length of the telescope and binocular specifications (or state that naked eyes were used [all with proper filter!])
4. Eyepiece and magnification as it applies
5. Filters used (eye protection solar filters are assumed)
6. A detailed description of each phase of the annular eclipse*
7. Reticle devices used for measuring solar features as it applies
8. Imaging equipment as it applies

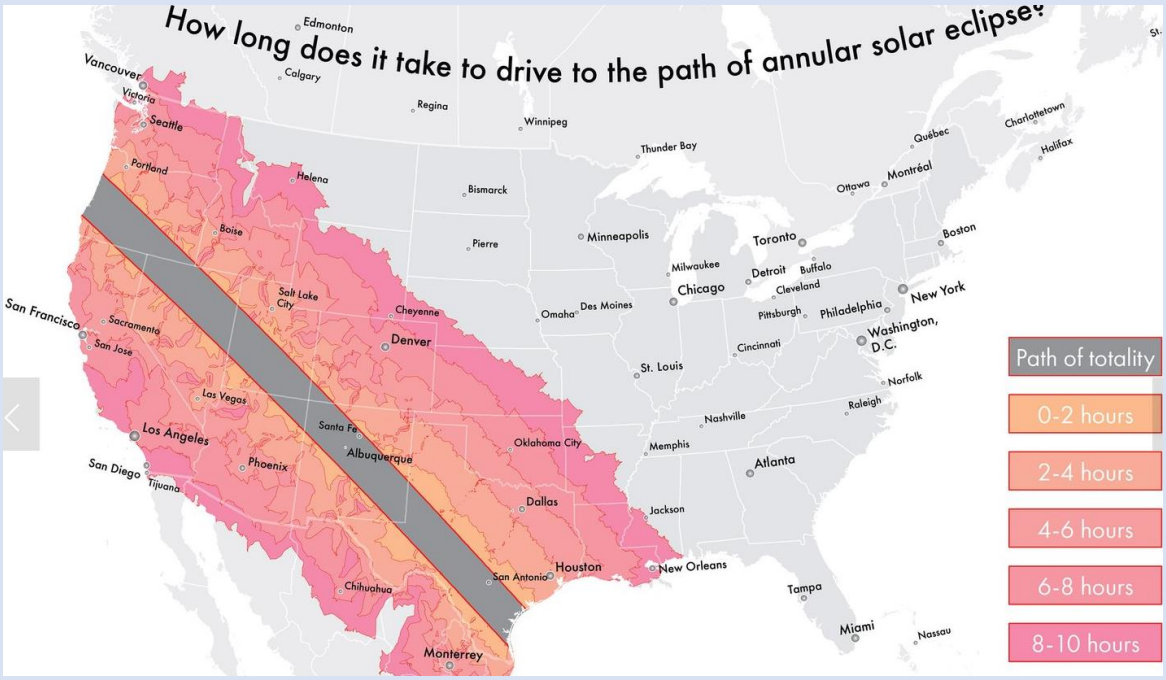
*Completion of the required Experiences Checklist will satisfy these requirements

Submitting for Certification
This Observing Challenge has a deadline for submission: (**deadline for submission: June 30, 2024)**
Observers should submit their observing logs and images along with name, mailing address, phone number, email address, club affiliation, and to whom the certification should be sent, to the League's Solar Eclipse Observing Program Coordinator (the author) either by mail or e-mail (preferred). Only copies of your log and images should be sent; originals will not be returned.

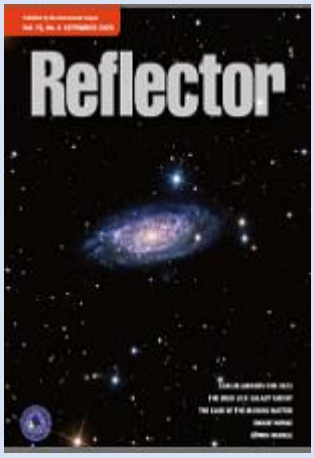
Images in electronic format may be forwarded by any convenient means that accomplishes transfer or makes the images available for review. This may include posting the images on the web.
Certificates and pins will be emailed to the email address provided, either to the observer or to a society officer for presentation at a society event.

It is hoped that this observing challenge will whet your appetite for observing additional eclipses.

Stay tuned for the Total Solar Eclipse Challenge in 2024.
My contact is allenb_young@yahoo.com and website is hafsnt.com



From https://www.greatamericaneclipse.com/october-14-2023



The Astronomical League Reflector magazine

Interesting Articles – News from other astronomy clubs
Astronomical excursions – Observing Awards and more

[Sept 2023 Issue](#) [June 2023 Issue](#) [March 2023 Issue](#)

Tulsa Club Observing Awards earned this year

Ben Staton – Lunar Observing Program
John Land - Mentor Observing Award
Brad Young – Variable Stars Class 5, 6, 7 & 8
Variable Galaxies, observational, bronze
Solar Neighborhood Observing Program - Eyes Only and Binoculars
Globular Cluster Challenge and Solar System Moons Challenge

Associate Treasurer Report
Mike Blaylock

As of Sept 22, we had 231 members 51 New members for 2023
We welcome this month's newest members – **Timothy Hager, Linda Hager, Johny Kroll, Brian Balachowski, Mark Jemmett, Johnna Robinson, Jalen Rideaux, Dennis O'Hearn, Michael Swartz, Michael Swartz Jr, Sandra Laymance, Duane Rachal, Theodore Hill**
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 Sept 22, 2023
Checking: $ 2,117.58
Savings: $ 2,792.06
Investments: $ 31,361 (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 !

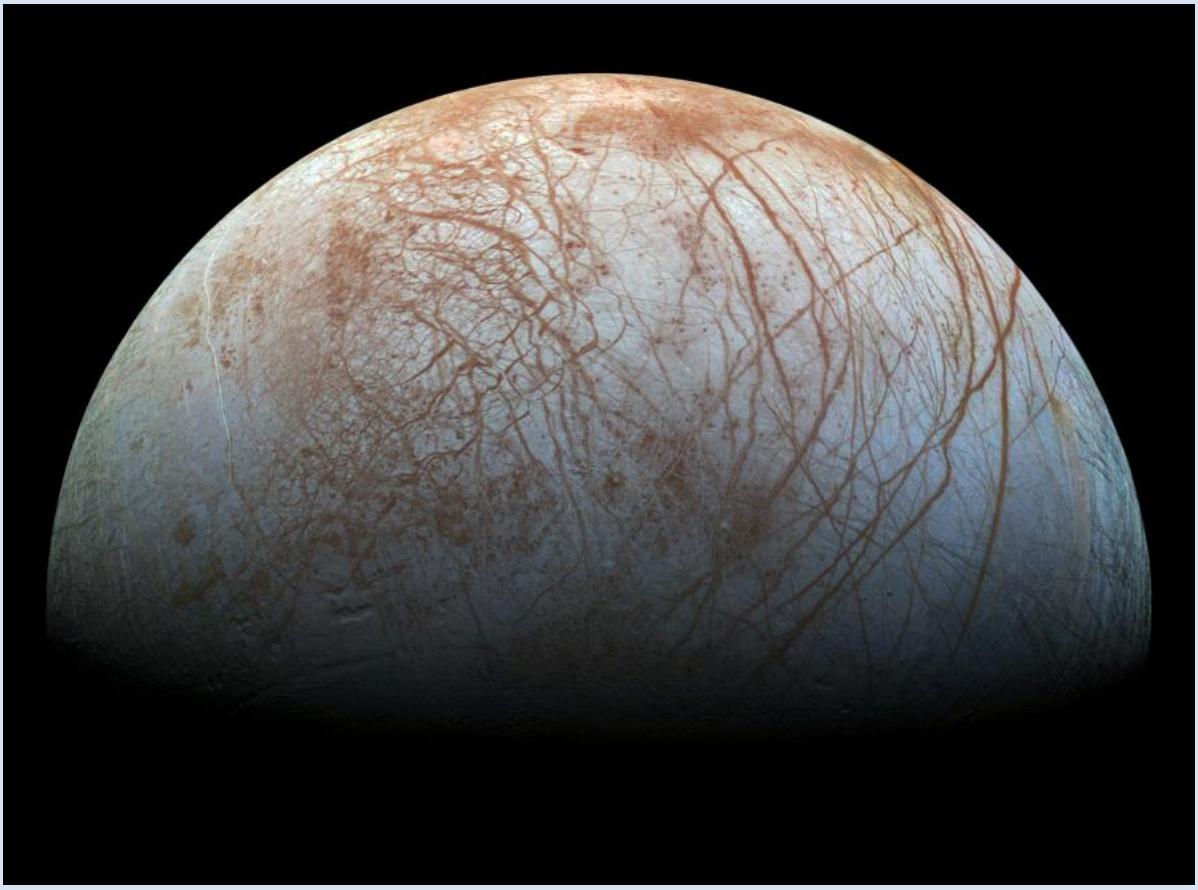
You can get a discount rate as a Astronomy Club member. However, you will need to do so directly using their discount rate web links. Both Sky & Telescope and Astronomy have options for DIGITAL as well as PRINT subscriptions.

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.

From Galileo to Clipper, Exploring Jupiter's Moons

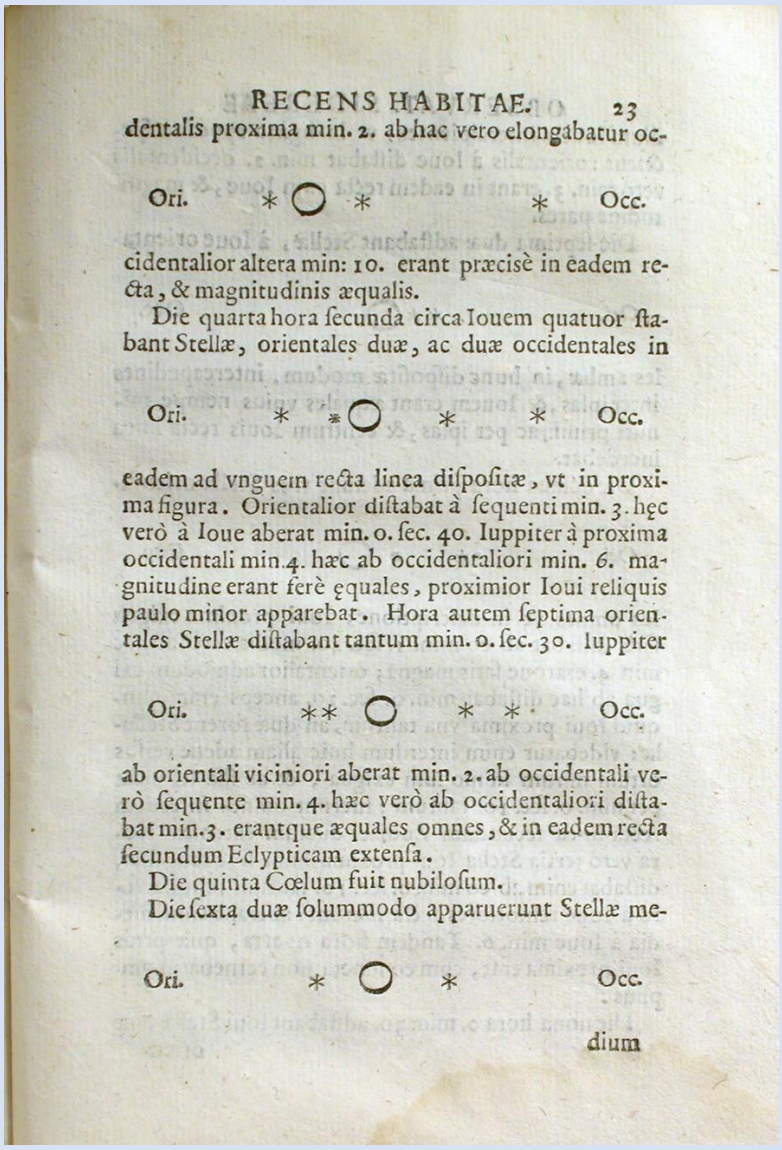
By Vivian White

"…We, too, are made of wonders, of great
and ordinary loves, of small invisible worlds,
of a need to call out through the dark."
From *In Praise of Mystery: A Poem for Europa* by Ada Limon



As autumn begins, if you're up late, you may notice a bright point of light rising in the east. Look a bit closer, with a pair of binoculars, and you'll notice it's not a star at all. While stars look point-like no matter how big your backyard telescope, this light appears as a circle under closer examination. Even more curious, you will likely see a line of smaller dots on one or both sides. Congratulations! You've rediscovered the king of the planets - majestic Jupiter - and its four largest moons.

October is an excellent month to begin observing Jupiter and its moons. It reaches opposition on November 2, 2023 at which time it will shine brightest and by up all night.



RECENS HABITAE. 23

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Ori. * ○ * * Occ.

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Ori. * * ○ * * Occ.

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Ori. ** ○ * * Occ.

ab orientali viciniori aberat min. 2. ab occidentali verò sequente min. 4. hæc verò ab occidentaliori distabat min. 3. erantque æquales omnes, & in eadem recta secundum Eclypticam extensa.

Die quinta Cœlum fuit nubilosum.

Die sexta duæ solummodo apparuerunt Stellæ me-

Ori. * ○ * Occ.

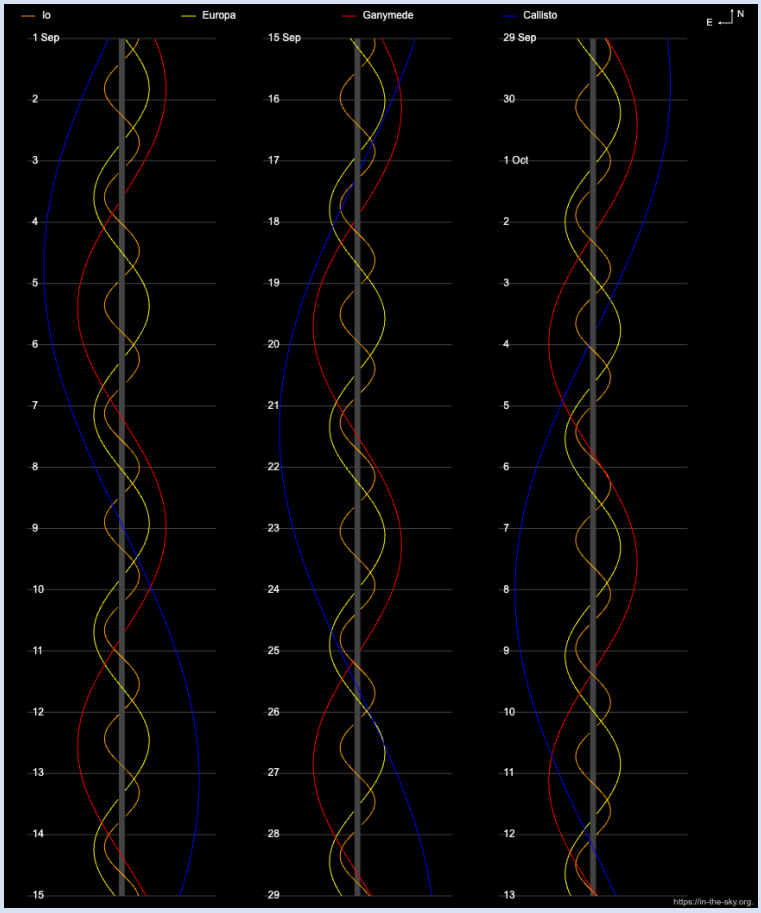
dium

Galileo's drawings of Jupiter and its Medicean Stars from Sidereus Nuncius. Image courtesy of the History of Science Collections, University of Oklahoma Libraries.

Galileo famously chronicled the four moving dots near Jupiter and surmised that they were orbiting the distant world. While Jupiter has well over 80 discovered moons as of September 2023, these brightest four are called the “Galilean Moons” - Io, Europa, Ganymede, and Callisto. (Great mnemonics exist to remember these in order of distance from Jupiter, such as “I Eat Green Caterpillars”) You can follow these like Galileo did, using stargazing apps or the handy image below. A favorite beginning observing challenge is to track the movement of the Galilean Moons over the course of many nights. Even within a few hours, you will notice them moving in relation to Jupiter, just as Galileo did.

Fast forward 414 years, and NASA will be sending a robotic mission to investigate the surface of one of these distant worlds. The **Europa Clipper Mission** is launching to the cold, icy moon in 2024, to begin orbiting in 2030. With its salty oceans covered by ice, Europa was chosen as an excellent location to continue the search for life outside of Earth. Clipper will be the largest spacecraft ever sent to another planet, designed to withstand Jupiter’s punishing radiation. Once

it arrives at Jupiter in 2030, NASA plans to do about 50 flybys of Europa, mapping almost the entire surface of this watery world.



The position of the Galilean Moons of Jupiter in October 2023: https://in-the-sky.org/jupiter.php

What was once only dreamed of in the small telescope of Galileo, or in great works of fiction, NASA is turning our wildest imagination into reality. One of the celebrated quotes from the classic 2010: Odyssey Two warns, “All these worlds are yours, except Europa. Attempt no landing there.” Science fiction fans can feel relieved knowing that writer Arthur C. Clarke gave his blessing for the Europa Clipper mission.

Join the Europa Message in a Bottle Campaign to send your name with the spacecraft, hear the rest of the poem by the US Poet Laureate, and learn more about the wonders of space travel with the Clipper Mission:

Watch a wonderful Clipper webinar with Dr. Cynthia Phillips, planetary geologist with the mission: **https://www.youtube.com/live/RnnLJBLRBCA?feature=shared&t=269**

You too can observe and **track the movement of the Galilean Moons**

To celebrate the 400th year of the telescope in 1609, the Astronomical league introduced an observing certificate to repeat Galileo’s observations use binoculars or a telescope of no more than 20 power. https://www.astroleague.org/galileo-observing-program/

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
105 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

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2023 Fall Shows 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