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ASTRONOMY CLUB OF TULSA

OBSERVER

JANUARY 2016



HAPPY NEW YEAR!

Above: a photo of Capricornus, the zodiacal constellation that shines in the January night sky. Photo taken at the Okie-Tex Star Party, Sep 2015.

Below: a photo of some of the Christmas lights at Guthrie Green, taken Dec 23, 2015.

Both photos by Tamara Green.









THE ASTRONOMY CLUB TULSA
IS A PROUD MEMBER OF



THE ASTRONOMICAL LEAGUE

JANUARY 2016

MOON PHASES AND HOLIDAYS:

SUN	MON	TUE	WED	THU	FRI	SAT
					1 	2
3	4	5	6	7	8	9 
10	11	12	13	14	15	16 
17	18	19	20	21	22	23 
24	25	26	27	28	29	30 
31 						



NEW YEAR'S DAY	FRI JAN 1
LAST QUARTER	FRI JAN 1
NEW MOON	SAT JAN 9
FIRST QUARTER	SAT JAN 16
FULL (Wolf) MOON	SAT JAN 23
LAST QUARTER	SUN JAN 31




UPCOMING EVENTS:

MEMBERS' NIGHT**	FRI JAN 8	5:30 PM	ACT OBSERVATORY
SIDEWALK ASTRONOMY	SAT JAN 16	5:30 PM	BASS PRO
GENERAL MEETING	FRI JAN 22	7:00 PM	JENKS HS PLANETARIUM
PUBLIC STAR PARTY	SAT JAN 30	5:45 PM	ACT OBSERVATORY
MEMBERS' NIGHT**	FRI FEB 5	6:00 PM	ACT OBSERVATORY
GENERAL MEETING	FRI FEB 12	7:00 PM	JENKS HS PLANETARIUM
SIDEWALK ASTRONOMY	SAT FEB 13	6:00 PM	BASS PRO
PUBLIC STAR PARTY	SAT FEB 27	6:15 PM	ACT OBSERVATORY

****MEMBERS AND FAMILY ONLY PLEASE.**

FEBRUARY 2016

MOON PHASES & HOLIDAYS:

SUN	MON	TUE	WED	THU	FRI	SAT
	1	2	3	4	5	6
7	8 	9	10	11	12	13
14	15 	16	17	18	19	20
21	22 	23	24	25	26	27
28	29					



GROUNDHOG DAY	TUES FEB 2
NEW MOON	MON FEB 8
VALENTINE'S DAY	SUN FEB 14
PRESIDENTS' DAY	MON FEB 15
FIRST QUARTER	MON FEB 15
FULL (Snow) MOON	MON FEB 22

PRESIDENT'S MESSAGE

BY RICHARD BRADY



Hi everyone!

I hope everyone had a good Christmas and New Years, and didn't get flooded away by our third monsoon of the year.

If you got your first telescope, bring it out to Members night or Public night. We will be happy to help you get set up and viewing the stars. For anyone with for a first telescope, there is a nice article on the Sky & Telescope website News tab you might want to check out, "What to See with Your New Telescope" (<http://www.skyandtelescope.com/astronomy-news/observing-news/what-to-see-with-your-new-telescope-122520158/>). We also have an article written by our own John Land, "Telescopes...Your Window to the Universe" on our website (<http://www.astrotulsa.com/page.aspx?pageid=30>).

Another of the items on the survey we had at the annual dinner suggested many would like to learn how to get started on an observing program. (The first was the above, how to use a telescope.) If you are interested, come out to Members night in February (or any other month afterwards) and we will help you get started on one. You can check out the different programs offered by the Astronomical League at <https://www.astroleague.org/al/obsclubs/AlphabeticObservingClubs.html>.

The Messier Marathon is scheduled for the weekend of March 5, with the weekend of April 9 as back-up. Hopefully we will not be clouded out both nights like we were last year. Tamara Green will lead us down to TUVA again this year. Ron Wood of TUVA will speak at our February General Meeting.

Did you know there is a transit of Mercury coming up this year? I didn't until I saw it in Sky & Telescope. It is coming May 9. Unfortunately, that is a Monday. Hopefully you can get off work that day. It starts at 6:12 AM (9 minutes before sunrise in Tulsa) and ends at 1:42 PM. Search for "Transit of Mercury" on Wiki or Google for more information. I have already spoken to Dan Zielinski at the Jenks Planetarium and he would love to host the event there. We were there for the partial solar eclipse in Fall 2013 and had a huge turnout. So anyone who can come and help out will be greatly appreciated.

The first three months of the calendar have been published on our website and soon on our Facebook page. Members night will still be around new moon this year on Fridays. Sidewalk Astronomy will be near first quarter on Saturdays. Public night will be near third quarter also on Saturdays. After January, the General Meetings will be the day before Sidewalk Astronomy on Fridays. (This way we will have a weekend free each month after January. The January Friday we wanted was already booked at the planetarium.)

Clear Skies!
Richard Brady

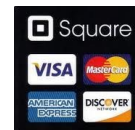
TREASURER'S AND MEMBERSHIP REPORT

BY TIM DAVIS



Astronomy Club of Tulsa: 155 members, including 68 new members in 2015.

Welcome to our new members this month: Richard Petricek, Marissa Starkey, Amanda Thompson, Renner Howell, John Moore, Thomas Murrell and Mike Harris



Club Accounts as of December 30, 2015 :

Checking: \$6,304.02; Savings: \$3,774.96; Investment accounts: \$18,226.34 (*Value Fluctuates with Market*); PayPal: \$ 0.00

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 2016 are as follows:

Adults: \$45.00 per year, includes Astronomical League Membership.

Sr. Adult: \$35.00 per year for those 65 or older, includes Astro League Membership.

Students: \$30.00 with League membership; **Students: \$25.00** without League membership.

Additional Family membership: \$20.00 with voting rights and League membership, **\$15.00** 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.

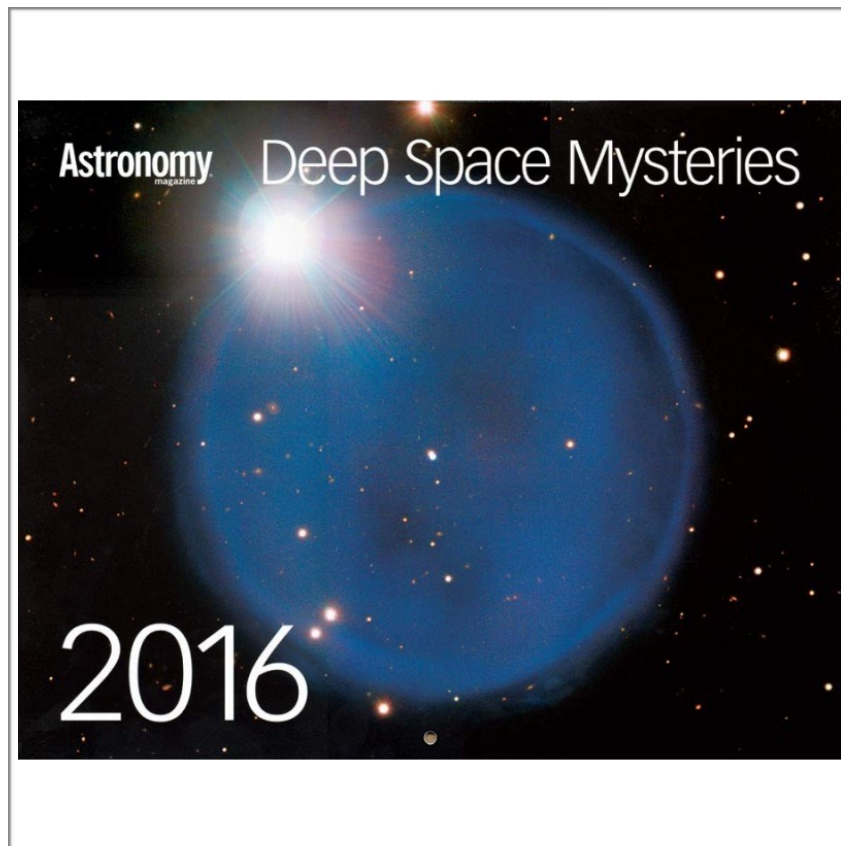
NEW SUBSCRIPTIONS must still be sent to the club

2016 Wall Calendar

The 2016 Astronomy Magazine Wall Calendars are here and are now available. If you would like to reserve one, send me an email at astrotulsa.tres@gmail.com, or call me at 918-665-8134 and let me know how many you would like. Otherwise, they will be available on a first come, first served basis at our upcoming events. We have 50 available this year for \$10.00 each, cash, check or credit cards accepted. That is a 23% savings off the regular retail price.

Calendars must be picked up in person at a club event, we can not ship these to you. If you reserve one, just let me know at which event you will pick it up.

Get yours while they last!



Tim Davis

Act Treasurer

SECRETARY'S CORNER

BY TERESA DAVIS



This month the board members had a meeting to set our calendar of events for 2016, discuss last month's annual dinner meeting for noting any changes needed, and set up a committee to start working on grant writing. I have included the minutes below.

12-12-15

ACT Board Meeting at Skip Whitehurst's home.

Those present:

President – Richard Brady
Vice President – Tamara Green
Treasurer – Tim Davis
Secretary – Teresa Davis
Board Member – John Land
Board Member – James Liley
Board Member – Chris Proctor
Board Member – James Taggart
Board Member – Skip Whitehurst

The following numbered items were on a prepared agenda for the purpose of board discussion at this meeting:

- 1) Did everyone get the email from NSN about the Teleconference next week?
- 2) Calendar discussion/approval
 - Public nights back to around 3rd quarter moon
 - Public nights should start around sunset
 - February public meeting shift to Friday, February 12th.
- 3) Messier Marathon – after discussion we agreed Saturday March 5, 2016.
- 4) Results from Annual Dinner meeting. Richard went over the summary of the Dinner night with costs and attendance.
 - 55 attended, total Cost: \$1070, Total Received \$606, Net Loss: \$464.
 - Break even cost per person: \$19.45, we Charged \$12 per person. Also a \$50 donation and 7 more calendars sold. With board discussion we agreed that was a reasonable cost for the evening.
 - Nearly ran out of food (no seconds), (suggest one more tray of salad and one more tray of spaghetti and one less of pasta and maybe another desert)
 - A couple of requests to have the silent auction again next year.

After open discussion over this year's dinner meeting, the board decided to set up a committee for next year's dinner at the dinner meeting: Teresa Davis, Tamara Green, and Chris Proctor

This committee will take care of planning the meal.

- 5) Survey results: Looking at the results we see that the members, associate members, and guests associated with ACT shows support for working on a grant to Grant for new dome, Grant for funding a new building to house club telescopes, A new dark site (Ron Wood at TUVVA has said he would be open to hosting some.), Offering "classes", Receiving emails from the club (suggestion: having current astronomical events published in the newsletter).

SECRETARY'S CORNER

BY TERESA DAVIS, CT'D.

In the discussion several points were considered including the fact that we would be stretching our resources too much to try and purchase a dark site, land, and then pay taxes and insurance on the land.

We would like to work with Ron Wood to get more time for Tuva. We need a committee to make plans for writing a grant.

Discussion continued with what we should do first.

Grants for whole new dome, or a few thousand dollars to make repairs?

James Liley made several good points on taking care of our observatory. We should consider if we want a brand new complete observatory dome or funds to repair what we have.

Reminder: when we started the whole project we had in mind to house the telescope.

When we make a pitch to get grants we need to make sure we do not have exclusions in our club but emphasize the work we do that is open to the public and/or for school and college groups.

The board agreed on a Committee for grant writing. The committee will consist of James Liley, James Taggart, Skip Whitehurst, and Marilyn Leaman, Associate member.

We should plan to merge our efforts with Jenks planetarium, TU physics classes, TCC's astronomy classes, and all of the Tulsa and the metropolitan area groups that we serve.

John Land added: Maybe we could put out something for the public or new people to get in hand, explaining how to find certain things in the sky and what to look for in the sky that particular night.

6) Taggart, Observatory maintenance, gave information on what we need to stop the dome from leaking. The amount of \$500 for the parts should take care of the leak problems. James Taggart will be providing the labor for free. Skip Whitehurst made a motion

"For the club to spend \$500 for repairing the dome. This would include materials for building a new platform to work on the dome, put it together, and replace the rubber skirting around the dome with rubber or fiber glass."

Chris Proctor seconded the motion.

All were in favor.

7) The topic of how to help new members or members that need help with telescopes. Points were made on how we need to just help people as they come out at our star parties. We need the help of our members to come out and work with members, new members, and visitors. We would like to see more of our members taking an active role in helping new people get started.

John wanted to talk about putting a sign up on the bottom gate so people will know where we are. A few people have gotten lost trying to find us. So John would like to put up a sign that is reflective. Chris will be getting an email from James Taggart and find out how much this would cost. Board members will watch for an email to approve.

Discussion on giving directions on getting to the observatory. We considered the condition of 231st, 241st, and 251st.

Discussion on purchasing new eye pieces for the telescopes at the observatory included for the one in the dome as well as the ones that are down stairs. For now we are going to use some of the members' eyepieces and decide which eye pieces we want to purchase.

Mr. Windler, owner of the land for the observatory, has 26 acres at and around the observatory and he has told us that he has the portion of land around the observatory in his will to go to ACT.

Any other items to discuss? None from those present.

We started the meeting at 1:00pm and we continued until 3:15pm.

We will plan for a work day this spring.

ASTRONOMY EQUIPMENT FOR SALE

Message from the AstroTulsa.com Contact Form:

I have an Orion Astroview 120ST EQ mount with additional accessories purchased from Orion Christmas 2013. Seldom used. May I advertise this through your club? Total paid \$954. Will sell \$599. Thanks!

Tom McLain

tmclain100@cox.net

[918-995-2047](tel:918-995-2047)

“JOHN HENRY OWNED A DOBSONIAN”,

BY BRAD YOUNG

Thirty six years into this great hobby, there are fewer amateur astronomers observing outside at all, and more of those who are there are imaging. You can spot the imagers because they are strolling around, telling all the visual observers that the sky looks weak. Or, you don't see them at all as they went to bed at sunset. Every so often, they will hush or wake up to go and check and make sure the tracking system is still on point. A few weeks later, they post a Hubblesque Image of NHI 563 (The 563rd entry in the Never Heard of It catalog). They provide technical details about how they took 100 @ 25 minute exposures and then spent 125 hours in post-production. And then they are not seen during the fuller phases of the moon while they retire to a seedy hotel to sell another organ to afford the newest camera or mount. Forever trapped on the Dark Side, they live, no, exist, chained in front of the computer screen trying to chase the dragon. They just need one more fix, that is, update of Adobe Mirage Maker.

This isn't exactly a new complaint by a star gazer, but there is a serious side to consider. Visual astronomy seems to be dying off quicker than amateur astronomy is declining in general. Again, not news to most of you, but some of the recent trends are troubling.

The Astronomical League provides more than 50 observing programs to give amateur astronomers a structured path to enjoy their hobby more, hone their skills, and perhaps inspire them to try something new. For most of their history, these programs were purely visual, and in fact many of them required you to star hop – no digital setting circles or go to scopes were allowed. Now there are many programs and Observing Challenges that require imaging. For years, many of the programs offered were practically impossible to complete without imaging, but at least they did have the visual option available. This isn't just the usual problem of having to buy a bigger scope or try to find truly dark skies; this is a sea change in the way you observe.

Other amateur opportunities are becoming nonvisual also. A program to watch out for near earth objects, or NEOs, requires imaging for reports to be valid. I don't know about you, but if someone finds one of these objects visually, and we are able to determine a way to avoid disaster, I will be just fine with that. For years now, “serious” amateur involvement has moved away from visual astronomy because it is seen as being too subjective and not worthy of use for real science.

Unfortunately, most amateurs coming into the hobby lack the resources and groundwork to dive directly into imaging. It can be a daunting decision to face.

“JOHN HENRY OWNED A DOBSONIAN”, BY BRAD YOUNG, CT'D.

On the classic path, you can spend your time and money on a reputable beginner's scope or binoculars, learning the sky and how it works. Along the way, you slowly build up a deeper understanding of the universe we inhabit, and what we can practically see and enjoy, along with a lifetime of experience. Later, you may choose to delve into imaging. Using Picasso's approach to art as a model, you learn the sky and how objects appear visually and then change the medium, deconstructing the sky as it were. But, with wisdom and discipline, you can choose to stay true with your interpretation of what's there.

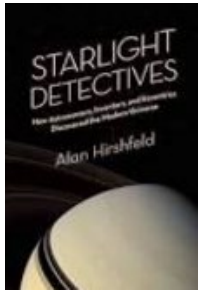
Or, with a more modern outlook, you may spend thousands on equipment you don't know how to use (in a modern extrapolation of the old problem of buying too much aperture first) and try to make realistic images of things you've never seen, except in other images. If the batteries die, you are completely out of luck. You aren't as well equipped mentally to understand the sky, and the subject becomes less important than the method.

What is the driving force in the marginalization of visual astronomy anyway? Is it economic – a struggling industry finds a new twist that is more marketable to a tech savvy younger generation? Is it because the graying population of amateurs can no longer see anything with their yellowed corneas and yellow street lights everywhere? Or is it the natural progression of our civilization, just like the eponymous fable of a man swinging a hammer versus a machine driven by steam?

Whatever the reason may be, I hear more and more from other observers that there is true value in visual astronomy that should not be overlooked, or lost. And that people should not be excluded for not using the newest technology. Instead, they should be celebrated for their harder won achievements.

I can remember when CCD's first came out and film was still the medium of choice for imaging. Those who used film looked down their nose on the new technology and the people who were using it. Only a few years later, film has become nearly impossible as an option because it's hard to get and even harder to process unless you do it yourself. Luckily, the reasons that drove film to extinction don't carry over to visual astronomy. We, as a hobby and community, can elect to give visual astronomers the respect that they are due. Although I am not adept at it, I have seen sketches made by people at the eyepiece that rival images for their beauty and attention to detail. And there are certain aspects of observing that are simply more enjoyable and useful when done visually.

If you share my concerns over this important issue, I would appreciate your feedback.



Starlight Detectives by Alan Hirshfeld -

“How Astronomers, Inventors, and Eccentrics Discovered the Modern Universe”

ISBN 978-1-934137-78-9

Book Review by John Land

This fascinating book traces the long history of the quest to unveil the secrets of the universe. Impassioned amateurs often forged ahead while professional astronomers were preoccupied with their institutionalized agendas and administrative hurdles.

The story begins when a keen eye and the artistic skill of the observer were the only means of recording the discoveries at the eyepiece. A “True Eye and Faithful Hand” were the hallmarks of a skilled astronomer. But a new method of imagery began to emerge in the mid 1840’s. One not written with brush or pen but etched on metal plates by photons of light. Writing with Light – Photography - began to record the world around us. Being a history buff, and having a rudimentary knowledge of early photography from a course in college, I enjoyed reading about the rapid advancement of photographic techniques. Chemistry hobbyists tinkered with all sorts of emulsions and lenses. An advancement in adhesive for bandages during the Civil war lead to portable photographic plates that could be prepared in advance and developed at a later time.

Enterprising astronomers began to dream of taking photographs of the images they saw in the eyepiece. A photograph of the Moon was a hit attraction at a London Exposition in 1851. All sorts of obstacles confronted these early astrophotographers. The telescopes had to be free of flexure with heavy cameras attached. Drive mechanisms had to flawlessly track the stars. Since the crude photo emulsions only recorded the blue violet part of the spectrum even the focal plane for the image had to be moved back several inches.

Along the way you are introduced to a fascinating lineage of resourceful astronomers, chemists and inventors. Some names are well known like Herschel, Fraunhofer, Doppler and Bunsen. Others less so - like Dobbs, Commons, Rutherford, Keeler and a host of others. The author, Hirshfeld, does an excellent job of giving insight into their personal lives in addition to their scientific contributions.

Initially the professionals disregarded the merits of astrophotography considering the crude images of little scientific merit. However as the images improved the photographs began to record details that even a keen eye could not detect. Astrometric measurements that once took days or weeks at the eyepiece could now be made in a few hours. Hundreds of stars on permanent image plates could be measured and stored for future reference.

A cigar box, prism and a couple of small sighting scopes transformed into a spectroscope that could disclose the chemistry of the Sun and distant stars from their fingerprint of light. A new field of Astrophysics was born that unlocked not only the chemistry of the heavens but gave insight into the processes broiling within the heart of stars.

The book concludes in the 1920’s with such astronomical giants as George Ellery Hale, E.E.Barnard and Edmund Hubble. This book is probably not for a novice astronomer. Even having studied astronomy for many years, there were sections I had to re-read to get the full import of what the author was saying. So if you love astronomy and are up for the challenge, give this book a try. It’s available in paperback or on Kindle and even a copy at the Tulsa library.



National Aeronautics and
Space Administration



NASA Space Place

Educator Newsletter

January-February 2016 / Vol. 9, Issue 1

NEWS AND NOTES FOR FORMAL AND INFORMAL EDUCATORS

Space Place is a NASA website for elementary school-aged kids, their teachers, and their parents.

It's colorful!
It's dynamic!
It's fun!

It's rich with science, technology, engineering, and math content!
It's informal.

It's meaty.
It's easy to read and understand.
It's also in Spanish.
And it's free!

It has over 150 separate modules for kids, including hands-on projects, interactive games, animated cartoons, and amazing facts about space and Earth science and technology.

Happy New Year! While you're jotting down those New Year's resolutions, be sure to check out what's happening at NASA Space Place, and to keep up with all the latest, follow us on Facebook and Twitter *@nasaspaceplace*.

New!

Make a pastel aurora

These displays are caused by energy that comes from the sun. You can make your own colorful aurora with oil pastels.

<http://spaceplace.nasa.gov/pastel-aurora>

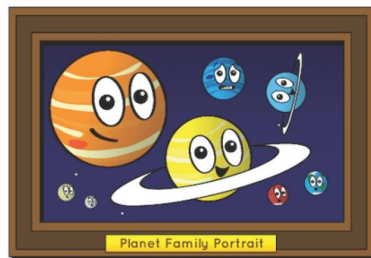


New!

Why are planets round?

And how round are they? Could some be rounder than others?

<http://spaceplace.nasa.gov/planets-round>



New!

All about Earth's atmosphere

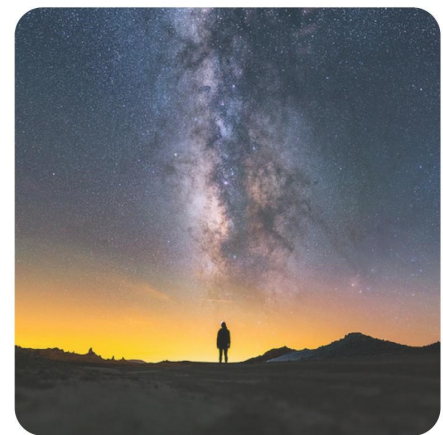
Explore all six layers of Earth's atmosphere in this new series.

<http://spaceplace.nasa.gov/atmosphere>

What is a galaxy?

We live on a planet called Earth that is part of our solar system. But where is our solar system? It's a small part of the Milky Way Galaxy.

<http://spaceplace.nasa.gov/galaxy>



Explore Earth and space at spaceplace.nasa.gov

New Game!

Play Helios! This game challenges you to keep the fusion reaction going in the sun. It won't be easy. You have to combine protons and neutrons in just the right way to make helium and release energy. Keep the sun shining brightly!



<http://spaceplace.nasa.gov/helios-game>

Interactive Books

NASA Space Place has interactive books about planets, technology, and space. Turn the pages with your mouse or print out a PDF.

<http://spaceplace.nasa.gov/search/books>

Lucy's Planet Hunt

Lucy wonders whether there could be life elsewhere in the universe.



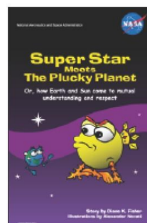
First Annual Planet Awards

We will see which planets are the best in the solar system.



Super Star Meets the Plucky Planet

This is the story of how Earth and the sun come to mutual understanding and respect.



Special Days

Noteworthy days in NASA and space history you can observe in your classroom.

January 7 — In 1610, Galileo discovers Jupiter's four largest moons.

Find out how many moons Jupiter has, as well as the rest of the planets in our solar system.
<http://spaceplace.nasa.gov/how-many-moons>

January 14— The Huygens Probe landed on Saturn's moon Titan in 2005.

Learn more about Saturn, the planet with the most beautiful rings!
<http://spaceplace.nasa.gov/all-about-saturn>

January 31 — On this day in 1958, Explorer 1 was the first U.S. satellite launched into orbit.

Do you know what happens to satellites when they're old and need to be replaced?
<http://spaceplace.nasa.gov/satellite-graveyard>

February 6 — On this day in 1971, astronauts played golf on the moon!

Why is there less gravity on the moon? What is gravity anyway?
<http://spaceplace.nasa.gov/what-is-gravity>

February 18 — Pluto discovered on this day in 1930.

What we now know about this tiny dwarf planet.
<http://spaceplace.nasa.gov/ice-dwarf>

February 20 — First American, John Glenn, orbited Earth in 1962.

See pictures of astronauts in action.
<http://spaceplace.nasa.gov/gallery-technology>



WHERE WE MEET

JENKS HIGH SCHOOL PLANETARIUM

105 E. B ST. JENKS, OK

DIRECTIONS TO THE JENKS HIGH SCHOOL CAMPUS:

FROM THE WEST: (MARKED IN RED ON MAPS)

TAKE US 75 TO THE MAIN ST. - JENKS EXIT

FOLLOW MAIN ST. APPROXIMATELY 2 MILES AND CROSS THE RAILROAD TRACKS

TURN LEFT ON 1ST ST.

FROM CENTRAL PART OF TULSA: (MARKED IN GREEN ON THE MAPS)

TAKE RIVERSIDE DRIVE TO THE 96TH STREET BRIDGE

TURN RIGHT AND GO OVER THE RIVER

FOLLOW A ST. APPROXIMATELY 7 BLOCKS

TURN RIGHT ON 1ST ST.

FROM THE EAST: (MARKED IN BLUE ON THE MAPS))

TAKE THE CREEK TURNPIKE TO S. ELM ST. IN JENKS

FOLLOW ELM ST. NORTH TO MAIN ST.

TURN RIGHT ON MAIN ST. AND CROSS THE RAILROAD TRACKS

TURN LEFT ON 1ST ST.

FOR EACH:

PARK IN THE LOT AT THE END OF 1ST ST.

USE THE DOORS AT THE NORTH SIDE OF THE BUILDING

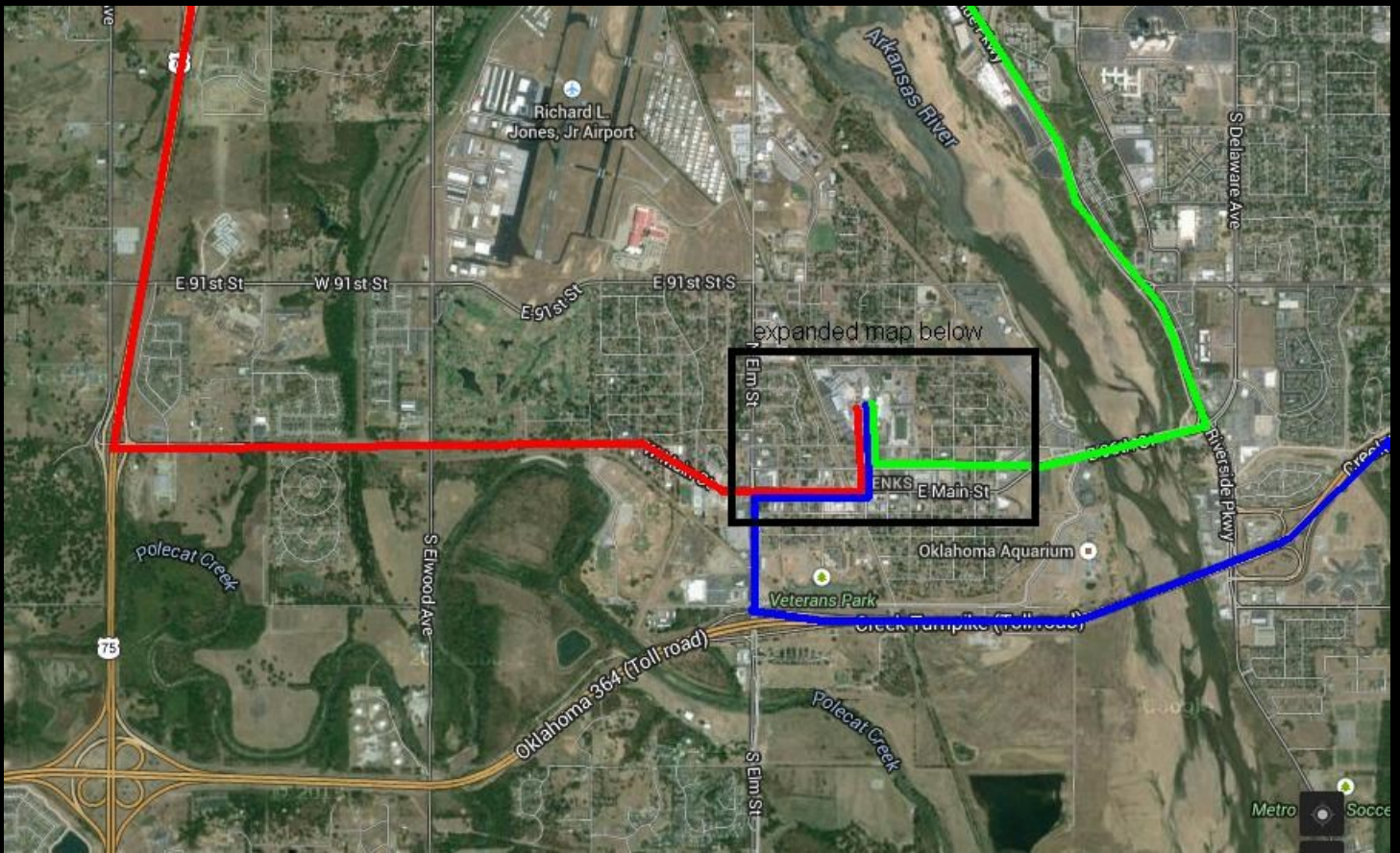
GO UP THE STAIRS TO THE 3RD FLOOR (THERE IS AN ELEVATOR FOR THOSE WHO NEED IT)

TURN RIGHT AND GO DOWN THE HALLWAY TO EITHER SIDE OF THE PLANETARIUM

MAPS ON NEXT PAGE

THE GENERAL MEETINGS ARE FREE AND OPEN TO THE PUBLIC.

WE HOPE TO SEE YOU THERE!



ABOVE: DIRECTIONS TO JENKS HIGH SCHOOL FROM CENTRAL TULSA, WEST OF TULSA AND EAST OF TULSA

BELOW: MAP SHOWING ROUTE INTO PARKING LOT



MEMBERSHIP INFORMATION

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MEMBERSHIP RATES FOR 2016 WILL BE AS FOLLOWS:

ADULTS - \$45 PER YEAR. INCLUDES ASTRONOMICAL LEAGUE MEMBERSHIP.

SENIOR ADULTS - \$35 PER YEAR. **FOR THOSE AGED 65 AND OLDER.** INCLUDES ASTRONOMICAL LEAGUE MEMBERSHIP.

STUDENTS - \$30 PER YEAR. INCLUDES ASTRONOMICAL LEAGUE MEMBERSHIP.

STUDENTS - \$25 PER YEAR. **DOES NOT INCLUDE ASTRONOMICAL LEAGUE MEMBERSHIP.**

THE REGULAR MEMBERSHIP ALLOWS ALL MEMBERS OF THE FAMILY TO PARTICIPATE IN CLUB EVENTS, BUT ONLY ONE VOTING MEMBERSHIP AND ONE ASTRONOMICAL LEAGUE MEMBERSHIP PER FAMILY.

ADDITIONAL FAMILY MEMBERSHIP - \$15 WITH ASTRONOMY CLUB OF TULSA VOTING RIGHTS, \$20 WITH CLUB VOTING RIGHTS AND ASTRONOMICAL LEAGUE MEMBERSHIP.

THOSE WISHING TO EARN ASTRONOMICAL LEAGUE OBSERVING CERTIFICATES NEED TO HAVE A LEAGUE MEMBERSHIP.

MAGAZINE SUBSCRIPTIONS:

ASTRONOMY IS \$34 FOR ONE YEAR OR \$60 FOR 2 YEARS.

WEBSITE: www.astronomy.com

SKY & TELESCOPE IS \$33 PER YEAR.

WEBSITE: www.skyandtelescope.com

SKY & TELESCOPE OFFERS A 10% DISCOUNT ON THEIR PRODUCTS.

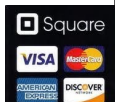
IF YOU ARE AN EXISTING S&T SUBSCRIBER, YOU CAN RENEW DIRECTLY WITH S&T AT THE SAME CLUB RATE. BOTH S&T AND ASTRONOMY NOW HAVE DIGITAL ISSUES FOR COMPUTERS, IPADS AND SMART PHONES.

ONLINE REGISTRATION

WE NOW HAVE AN AUTOMATED ONLINE REGISTRATION FORM ON THE WEBSITE FOR NEW MEMBERSHIPS, MEMBERSHIP RENEWALS AND MAGAZINE SUBSCRIPTIONS. JUST SIMPLY TYPE IN YOUR INFORMATION AND HIT "SEND" TO SUBMIT THE INFORMATION. YOU CAN THEN PRINT A COPY OF THE FORM AND MAIL IT IN WITH YOUR CHECK, OR USE OUR CONVENIENT PAYPAL OPTION. .

LINK: <http://www.astrotulsa.com/Club/join.asp>

OR, IF AT A STAR PARTY OR MEETING, SIMPLY FIND A CLUB OFFICER TO ASK ABOUT JOINING OR RENEWING WITH YOUR DEBIT OR CREDIT CARD THROUGH OUR CONVENIENT SQUARE OPTION!



THE ASTRONOMY CLUB OF
TULSA INVITES YOU TO MAKE
PLANS THIS WINTER TO JOIN US
AT A STAR PARTY!

OPEN TO THE PUBLIC

FOR MORE INFORMATION
PLEASE VISIT
WWW.ASTROTULSA.COM.

THE OBSERVER IS A PUBLICATION BY
THE ASTRONOMY CLUB OF TULSA. THE
ASTRONOMY CLUB OF TULSA IS A 501C
3 NON-PROFIT ORGANIZATION OPEN TO
THE PUBLIC. THE CLUB STARTED IN
1937 WITH THE SINGLE MISSION TO
BRING THE JOY AND KNOWLEDGE OF
ASTRONOMY TO THE COMMUNITY OF
TULSA, OK AND THE SURROUNDING
AREA. TODAY OUR MISSION REMAINS
EXACTLY THE SAME. WE TRAVEL TO
LOCAL SCHOOLS, CHURCHES AND
MANY OTHER VENUES WITH SCOPES
AND PEOPLE TO TEACH. OUR
OBSERVATORY IS LOCATED IN MOUNDS
AND MANY PUBLIC PROGRAMS ARE
OFFERED THERE. TO JOIN THE
ASTRONOMY CLUB OF TULSA, PLEASE
VISIT WWW.ASTROTULSA.COM WHERE
YOU WILL FIND ALL THE INFORMATION
NECESSARY TO BECOME A MEMBER.

 Also find us on Facebook!

<https://www.facebook.com/AstronomyClubofTulsa>



WE ALSO ARE A PROUD PARTICIPANT IN
NASA'S NIGHT SKY NETWORK.

THE EDITOR WISHES TO THANK THE FOLLOWING FOR
THEIR CONTRIBUTIONS TO "THE OBSERVER" FOR
THIS ISSUE:

RICHARD BRADY

TIM DAVIS

TERESA DAVIS

BRAD YOUNG

JOHN LAND

TAMARA GREEN



PHOTOS: More Winter Stars. Top, Orion and Canis Major, taken at the
ACT Observatory; Bottom, Capricornus and other Winter stars, taken at
OTSP 2015.

Both photos by Tamara Green.