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THE ASTRONOMY CLUB TULSA IS A PROUD MEMBER OF



THE ASTRONOMICAL LEAGUE



ASTRONOMY CLUB OF TULSA

OBSERVER

DECEMBER 2015

PHOTO: The Veil Nebula (NGC 6960) in Cygnus, taken at the ACT Observatory on Tues, Oct 6, using an 8-inch, f3.9 Orion Astrograph; 10 exposures ranging from 150 to 600 seconds. The bright star in the image is 4.2 mag 52 Cygni.

Photo is by Frank Newby.




PHOTO: The Rosette Nebula (NGC 2237) in Monoceros, taken at Okie-Tex Star Party using the same instrument as the above photo.

Photo is by Frank Newby.

EDITOR'S NOTE: I decided to run these photos on the front cover again this month, because I thought they were really neat!

DECEMBER 2015

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		

LAST QUARTER	THUR DEC 3
NEW MOON	FRI DEC 11
FIRST QUARTER	FRI DEC 18
CHRISTMAS EVE	THUR DEC 24
CHRISTMAS DAY	FRI DEC 25
FULL (Full Cold Moon)	FRI DEC 25
NEW YEAR'S EVE	THUR DEC 31



UPCOMING EVENTS:






GENERAL MEETING	FRI DEC 4	7:00 PM	JENKS HS PLANETARIUM
MEMBERS' NIGHT**	FRI DEC 11	5:15 PM	ACT OBSERVATORY
PUBLIC STAR PARTY	SAT DEC 19	7:00 PM	ACT OBSERVATORY
WINTER SOLSTICE	SUN DEC 21	6:03 PM	
SIDEWALK ASTRONOMY	SAT DEC 26	5:00 PM	BASS PRO

JANUARY 2016 EVENTS TBA

**MEMBERS AND FAMILY ONLY PLEASE.

JANUARY 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	30
31 						

NEW YEAR'S DAY	FRI JAN 1
LAST QUARTER	FRI JAN 1
NEW MOON	SAT JAN 9
FIRST QUARTER	SAT JAN 16
MARTIN LUTHER KING DAY	MON JAN 18
FULL (Full Wolf Moon)	SAT JAN 23
LAST QUARTER	SUN JAN 31



ANNUAL DINNER MEETING AT JENKS PLANETARIUM AND ELECTION OF OFFICERS AND BOARD FOR 2016



On Saturday, Nov. 7, we had a huge turnout for our Annual Dinner Meeting. We had good food from Mangiamo's, a planetarium show about the Sistine Chapel, a group photo and the election of Officers and Board for 2016.

The Officers and Board for 2016 are:

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



Thank you to all who attended. You all helped make it fun!

PRESIDENT'S MESSAGE

BY RICHARD BRADY



Hi everyone!

I hope everyone had a good Thanksgiving and didn't get flooded away by our second monsoon of the year. Now after Santa has come in the Macy's Thanksgiving Day parade, it's Christmas shopping season. For anyone looking for a first telescope, there is an article on the Sky & Telescope website you might want to check out, "How to Choose Your First Telescope" (<http://www.skyandtelescope.com/astronomy-news/types-of-telescopes/>). We also have an article written by our own John Land, found later in this newsletter.

We had our annual club dinner last November 7th. I hope everyone enjoyed visiting all their astronomical friends. This year again we had good Italian cuisine from Mangiamos.

Since we didn't have a quorum (20 members) at the October meeting, we held the election at the dinner again this year. I was re-elected President, Tamara Green as Vice-President, Teresa Davis as Secretary, and Tim Davis as Treasurer. All of the board members, John Land, Chris Proctor, Skip Whitehurst, and James Taggart, who ran were re-elected. Ed Underhill decided not to run. (Thank you Ed for being on the board this past year.) Our new board member is James Liley.

If you have any questions or suggestions for the officers or board, send them to us. Our email addresses are at the end of the newsletter, or you can send them to us through the contact page on the website.

We also had everyone there fill out a short survey. Teresa has the results later in the newsletter.

We are working on the calendar for next year. One thing we are doing is moving Public Nights back to around the 3rd quarter moon. Also, to keep the observing events scheduled around the moon phases (Member Night around new moon and Sidewalk Astronomy around full moon) the General Meetings at Jenks Planetarium will be moving to the middle of each month.

Merry Christmas!
Happy New Year!
and hopefully Clear Skies!
Richard Brady

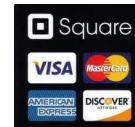
TREASURER'S AND MEMBERSHIP REPORT

BY TIM DAVIS



Astronomy Club of Tulsa: 151 members, including 61 new members in 2015.

Welcome to our new member this month: Les Weston.



Club Accounts as of November 30, 2015 :

Checking: \$5,482.10; Savings: \$3,774.96; Investment accounts: \$18,600.84 (*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 2015 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.

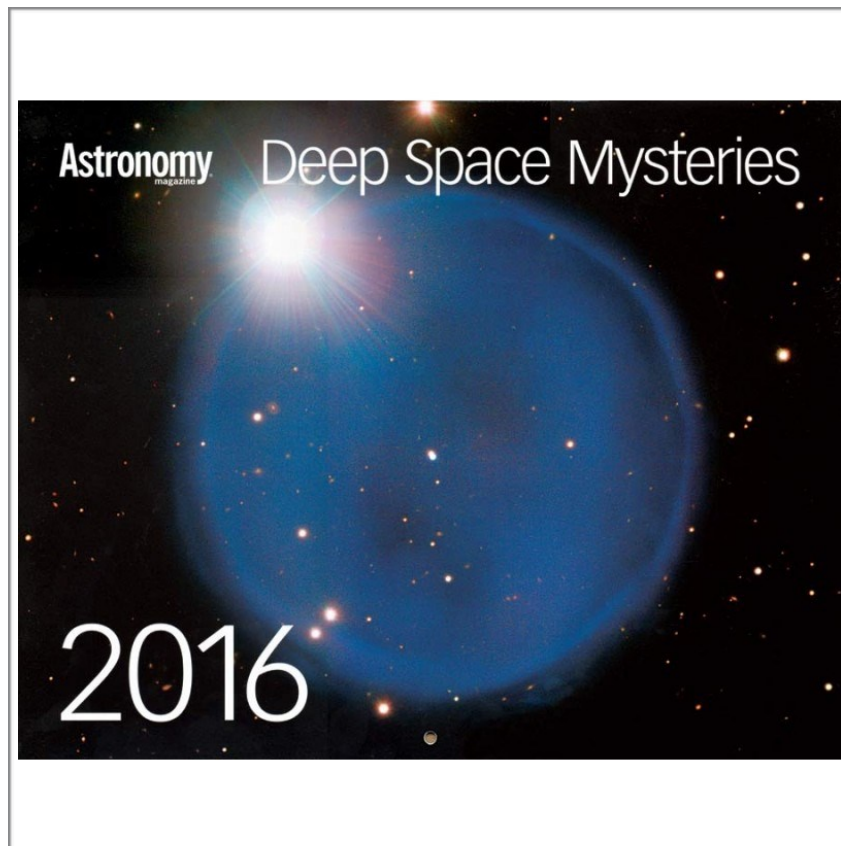
NEW SUBSCRIPTIONS must still be sent to the club

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



ACT Annual Dinner Meeting with election of officers and board of directors.

Saturday, November 7, 2015

@ Jenks High School Dining area across from the planetarium.

At 5:30pm many of the board members arrived to set up the tables and receive the food from Mangiamo's Italian food truck service. The meeting was to begin at 6:30pm. Tom McDonough was present with Linen table clothes and he and his wife covered and assisted with preparing the room. Richard brought the new planet and moon globes to use as center pieces and give the members an opportunity to view. Door prizes were given out with a drawing. James Taggart's daughter Scout did the drawing. They were donated by John Land, Skip Whitehurst, Richard Brady and ACT donated club calendars.

By 6:30pm several of the members and their guest arrived and Richard Brady, ACT President, began an introduction with a slide show which included a variety of astronomical images from the Hubble Space Shuttle. Tim Davis, our treasurer, sat at a table at the door and accepted donations for the event. The evening agenda included a meal, an election meeting, and a planetarium show. Teresa Davis, ACT Secretary, accompanied Tim for the purpose of handing out ballots for the annual election that would take place.

Once the RSVP guests arrived, Richard called attention to the ballots for the elections asking for any write in nominations from the floor. No one was nominated from the floor. Richard proceeded to direct members to make their choices on the ballot after introducing each nominee printed on the ballot. Richard then explained the Survey for our club. Each table had several copies of a survey for all present to give the board of directors their ideas for the club in the up and coming year. There were 34 voting members present and 21 guests for a total of 56 people for this election evening. As our by-laws explain, we need 20 voting members to make a quorum.

Next, everyone was directed to return their ballots and surveys to the secretary and join in for the dinner. The cafeteria style line up included a spinach and tomato salad, two pasta dishes, stacked sandwiches, sliced bread, and chocolate chip cookies. During the dinner a continuous slide show of the clubs history in building the observatory entertained us all.

After dining Richard Brady gave his appreciations for many of the members that contributed much to the club. He began with members from over the years addressing those who have been members since the 60's, 70's, 80's, and 90's. A slide with the names of those members was shown. He continued with current hardworking members that give so much of their time to keep our club running. One of the biggest contributions to the club: James Taggart, our observatory and grounds keeper was recognized for a superb job throughout the year. Next, Richard extended our gratitude to Ed Underhill for being on the board this year, and Dan Zielinski for allowing the club to use the planetarium for our General meetings throughout the year and being such a great host.

The votes were tallied and the secretary gave the message to the president so he could announce the new board of directors. The election of officers and board members were revealed on the screen:

Our new 2016 Astronomy Club of Tulsa Officers

SECRETARY'S CORNER

BY TERESA DAVIS, CT'D.

President – Richard Brady
Vice President – Tamara Green
Treasurer – Tim Davis
Secretary – Teresa Davis

Board members:

John Land
James Liley
Chris Proctor
James Taggart
Skip Whitehurst

After the announcement we all shuffled around to clean the dining area and then gathered for our annual photo session as a club. Tamara Green sat up her camera and Marilyn Land, John's wife, took our pictures. Then we went across the hall to the planetarium for a show: The Sistine Chapel.

Later in an email to the board from Tim Davis, ACT Treasurer:

Final numbers for the dinner meeting: 55 in attendance, Food cost: \$720.00 Room Rent: \$350.00 Total cost: \$1070.00 Total received: \$606.00 Net loss of (\$464.00) per person average to break even would be \$19.45. Also had donations of \$50.00, and sold 7 more calendars.

Let's do it again next year!

A good time was had by all as we exited at 8:30pm.

AND THE SURVEY SAID

BY TERESA DAVIS

And the Survey Said:

There were a total of 35 Surveys turned in from members, associate members, and guests. Those participating in the survey answered the following when asked about the length of time associated with our club:

New members -4

1 to 2 years associated to with the club -9

3-5 years – 10

Longer than 5 years – 12

When asked about improvements through grant writing or looking for a dark site, the survey was set up numerically with 5 expressing strongly agree, down to 3 expressing agree, and 0 expressing strongly disagree. The outcome was counted and averaged with the following results.

0 strongly disagree to 5 strongly agree averaged:

Question:	New member Avg. Said:	1-2 years Avg. Said:	3-5 years Avg. Said:	5+ years Avg. Said:	Total points divided by to- tal surveys (35) Said:
Form a Com- mittee for grant writing to make improvements	3.75	4.5	4.4	3.25	3.97
Grant to fund new dome for existing obser- vatory	3.5	4.4	4.5	3.6	3.97
Grant to fund new building to house existing telescope	4.25	4.3	3.9	2.9	3.88
Form commit- tee to look for dark site	4	3.8	4.3	3.8	4

The rest of the results will be revealed at our December meeting. It certainly looks like this is going to be a busy year for all of us.

SEEING THE SPACE SHUTTLE (Again)

My family and I visit Baltimore on occasion due to family and a music festival my son attends. I also have to fly through Dulles international for business. Several times, I have intended to go to the Stephen F Udvar-Hazy center, which is an offshoot of the national air and space Museum. How was finally able to swing it this summer, and achieve a long-standing goal to see a shuttle in person that I had seen on orbit with my own eyes.

Not only was that an incredible experience, but the whole museum was a wonderful visit. The hanger that the shuttle discovery is housed in is particularly interesting to me, as it includes models or prototypes of several other satellites that many of us have seen from the ground. The main air and space Museum at the Smithsonian them doesn't have more objects, like the Apollo Lander, the Soyuz docking with the American Apollo spacecraft, the Spirit of St. Louis, etc. but this museum is practically on the grounds of the airport and is a nice quick visit if you ever have a layover there or have time to visit before your flight.

Many of us were saddened by the end of the Space shuttle program, and will miss the thrill of seeing it passing overhead. However, it is nice to be able to go and see one up close, and there are other museums that you can visit other shuttles located across the country. These include:

Shuttle	Venue	Location
Enterprise	Intrepid Sea, Air & Space Museum	New York City
Discovery	Udvar-Hazy Center	Washington DC
Endeavour	California Science Center	Los Angeles
Atlantis	Kennedy Space Center Visitor's Complex	Cape Canaveral, Florida

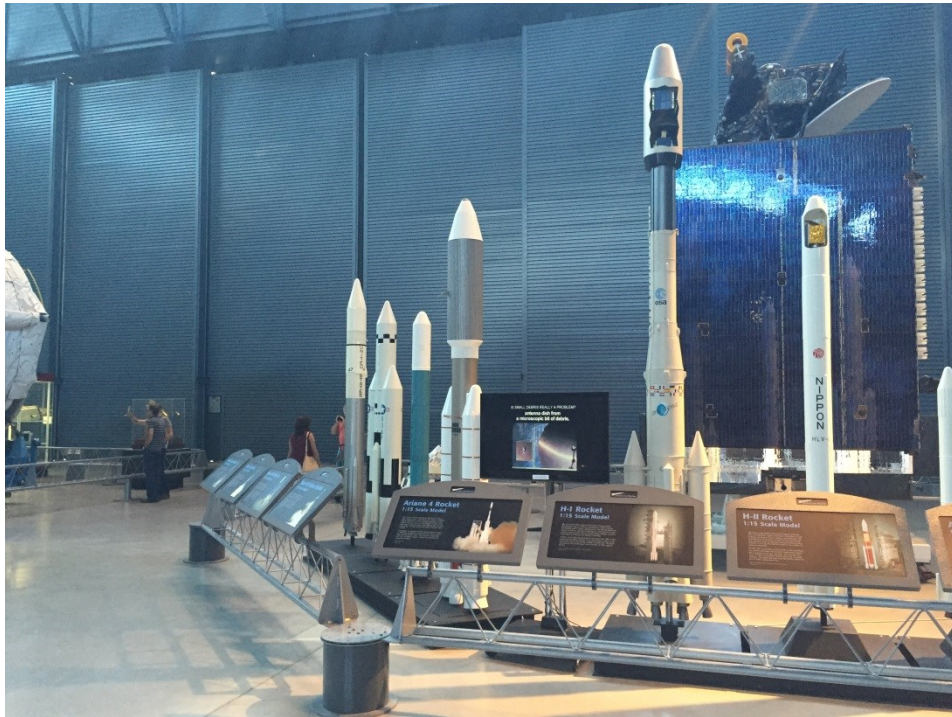
I hope to be able to visit all of them at some point. I had the great fortune of being able to see all of the shuttles at some point during their active life and would enjoy visiting in there now on the ground. If any of you had a chance to do this or do so in the future, please let me know your impressions of this unique experience.

I haven't included much text with this article, instead, here are some photos and links for other information that you might want to follow for yourself. I would highly recommend visiting the museum; it's free to get in but there is a small parking cost.

“SEEING THE SPACE SHUTTLE AGAIN”,
BY BRAD YOUNG, CT'D.



“SEEING THE SPACE SHUTTLE AGAIN”,
BY BRAD YOUNG, CT'D.



<https://airandspace.si.edu/visit/udvar-hazy-center/>

https://en.wikipedia.org/wiki/Space_Shuttle_retirement

<http://framework.latimes.com/2012/10/15/time-lapse-video-space-shuttle-endeavours-trek-across-l-a/>

This time of year we get several inquires about buying telescopes

Don't be fooled by misleading advertising! A 60 mm telescope is not going to produce much more than 120x power magnification, but their boxes are often emblazed with claims of 500x or more. Many young people and novices are turned off to astronomy simply because they unwittingly purchased a poor quality instrument claiming it could produce fantastic magnifications.

The advice I generally give is to come to some of our club events.

Look through and learn about how telescopes work.

Start with a simple scope and you can always upgrade as you gain experience.

As a general rule avoid telescopes sold in Department Stores or Toy stores. (That goes for microscopes too.) You will find better telescopes and good prices going to reliable astronomy online sources. You might find the same scopes on Amazon but will not have knowledgeable staff to answer questions or resolve issues so do your research before buying. See a list of vendors below.

First of all be sure the lenses and eyepieces are made of real glass. Read the specifications on the eyepieces. They should be 1.25 inch in diameter instead of the lesser 0.965 in which tend to be of low quality and have a very restricted field of view.

You'll want a lower power eyepiece 30x to 50x for finding your way around the sky.

100x is sufficient to see most planet details. Around town the seeing rarely allows more than 200x even in large scopes.

Children below 6 or 7 years old often have trouble looking through telescopes. My advice is to get them some astronomy books and take time to learn the stars. Come to some of our club events at Bass Pro or the observatory and see if their interest grows.

Two excellent books for learning the constellations and brighter stars are:

Find the Constellations by H.A. Rey for young readers

The Stars, a New Way to see them by H.A. Rey - ages 9 through novice adults

Adding a "GoTo" computer feature to the telescope does not let you see things any better. Unless you already have a fair knowledge of the brighter stars names and locations these "GoTo" telescopes have a steep learning curve to get them aligned and finding things. Except for the higher priced systems, you don't just flip a switch and the telescope magically finds things.

For young inexperienced astronomers an Alta-Azimuth mount is easier to learn how to use. The user only has to point the telescope in the general direction of the object they want to observe. An EQ (equatorial mount) is often heavier and requires balancing and proper alignment with the north pole to work well.

Telescope Tips http://astrotulsa.com/cms_files/TELESCOPES-TIPS.pdf

Gives some basic information about what a telescope can and cannot do.

Astronomy for Beginners <http://www.skyandtelescope.com/astronomy-information/>

Introduction on how to choose a telescope.

<http://www.skyandtelescope.com/astronomy-equipment/how-to-choose-a-telescope/>

How to chose your first telescope.

<http://www.skyandtelescope.com/astronomy-news/types-of-telescopes/>

Try these activities to get started - "Family Fun" for star gazing

<http://www.skyandtelescope.com/letsgo/familyfun>

Family Starwatching Fun <http://www.skyandtelescope.com/astronomy-resources/stargazing-basics/family-projects-and-experiments/>

Stargazing Basics <http://www.skyandtelescope.com/howto/basics>

This features a whole collection of articles from beginner basics – meaning of astronomy terms to reading star charts.

Starting Off Right in Astronomy Pt.1

http://www.cloudynights.com/item.php?item_id=1873

Great Astronomy Website in Spanish Amigos de la Astronomia

<http://www.aaaa.org.ar/>

Here a few reliable vendors. Many are willing to answer your questions.

<https://www.astronomics.com> They have a show room in Norman, OK, but it is being renovated. Call ahead if you plan to go down there.

<http://www.telescope.com/> This is the Orion Telescope site.

<http://www.telescopes.com/>

(note the "S" on the end) has several manufacturer's scopes

<http://www.optcorp.com/> also has a helpful staff willing to answer questions

<http://www.meade.com/> This is the Meade Instruments site.

<http://www.celestron.com/> This is the Celestron Telescope site.

These are certainly not all the reliable vendors but are those I know to be generally reliable and knowledgeable.



National Aeronautics and
Space Administration



NASA Space Place

Educator Newsletter

November-December 2015 / Vol. 8, Issue 4

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.

There are always new and exciting things happening at NASA Space Place. To keep up with all the latest, follow us on Facebook and Twitter @nasaspaceplace. If you'd like to be added to our e-newsletter, email us at info@spaceplace.nasa.gov.

New!

Dark matter... and dark energy too!

This might be a surprise, but we don't know what most of the universe is made of. Seriously, we don't!

<http://spaceplace.nasa.gov/dark-matter>



New!

Why does the sun burn us?

The sun keeps our planet warm enough for living things to thrive. It gives us light so we can see. But it can also burn us. What causes these burns?

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



New!

What is a lunar eclipse?

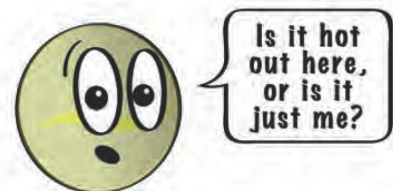
And how is it different from a solar eclipse? And why are these so rare?

There are so many questions!

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

Planet Pages

Learn more about Venus, the hottest planet in our solar system. But don't stop there; explore all of our solar system's eight amazing planets.



Every planet page features planet merit badges that showcase each planet's unique characteristics, as well as beautiful photos.

<http://spaceplace.nasa.gov/all-about-venus>

Explore Earth and space at spaceplace.nasa.gov

Printable Content

Did you know we have **six galleries** with images of space, the sun, Earth, our solar system, and NASA people and technology? These high-resolution images have large captions and are perfect for printing and putting on bulletin boards and other classroom displays.



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

Games for Mobile Devices

Take some NASA Space Place games with you on your iPad, iPhone, iPod touch, or Android device! <http://spaceplace.nasa.gov/ios>

Space Place Prime

Read the latest from NASA Space Place.



OFFSET!

Save the world from carbon emissions!

Satellite Insight

Process all that satellite data, and quick!

Rescue 406

A SARSAT game from NOAA and NASA.

Comet Quest

Control Rosetta as it lands on a comet.

Special Days

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

November 8 — X-rays were discovered in 1895.

See how telescopes see the universe with X-rays and other energy waves.
<http://spaceplace.nasa.gov/cosmic-colors>

November 15 — First computer microprocessor invented in 1971.

How do we humans talk to machines?
<http://spaceplace.nasa.gov/binary-code3>

November 20 — Edwin Hubble’s birthday

Find out how Hubble noticed that the universe is expanding.
<http://spaceplace.nasa.gov/big-bang>

December 4 — Pioneer 10 flew past Jupiter in 1973.

Learn all about our solar system’s largest planet.
<http://spaceplace.nasa.gov/all-about-jupiter>

December 6 — The microwave oven was invented on this day in 1945.

What are microwaves, though?
<http://spaceplace.nasa.gov/magic-windows>

December 13 — The peak of the Geminid meteor shower.

Why are meteor showers predictable?
<http://spaceplace.nasa.gov/meteor-shower>



NASA Space Place Astronomy Club Article

November 2015

This article is provided by NASA Space Place.

With articles, activities, crafts, games, and lesson plans, NASA Space Place encourages everyone to get excited about science and technology.

Visit spaceplace.nasa.gov to explore space and Earth science!



Our Solar System Is *Almost* Normal, But Not Quite

by Ethan Siegel

It was just over 20 years ago that the very first exoplanet was found and confirmed to be orbiting a star not so different from our own sun. Fast forward to the present day, and the stellar wobble method, wherein the gravitational tug of a planet perturbs a star's motion, has been surpassed in success by the transit method, wherein a planet transits across the disk of its parent star, blocking a portion of its light in a periodic fashion. Thanks to these methods and NASA's Kepler spacecraft, we've identified many thousands of candidate planets, with nearly 2,000 of them having been confirmed, and their masses and densities measured.

The gas giants found in our solar system actually turn out to be remarkably typical: Jupiter-mass planets are very common, with less-massive and more-massive giants both extremely common. Saturn—the least dense world in our solar system—is actually of a fairly typical density for a gas giant world. It turns out that there are many planets out there with Saturn's density or less. The rocky worlds are a little harder to quantify, because our methods and missions are much better at finding higher-mass planets than low-mass ones. Nevertheless, the lowest mass planets found are comparable to Earth and Venus, and range from just as dense to slightly less dense. We also find that we fall right into the middle of the "bell curve" for how old planetary systems are: we're definitely typical in that regard.

But there are a few big surprises, which is to say there are three major ways our solar system is an outlier among the planets we've observed:

- All our solar system's planets are significantly farther out than the average distance for exoplanets around their stars. More than half of the planets we've discovered are closer to their star than Mercury is to ours, which might be a selection effect (closer planets are easier to find), but it might indicate a way our star is unusual: being devoid of very close-in planets.
- All eight of our solar system's planets' orbits are highly circular, with even the eccentric Mars and Mercury only having a few percent deviation from a perfect circle. But most exoplanets have significant eccentricities, which could indicate

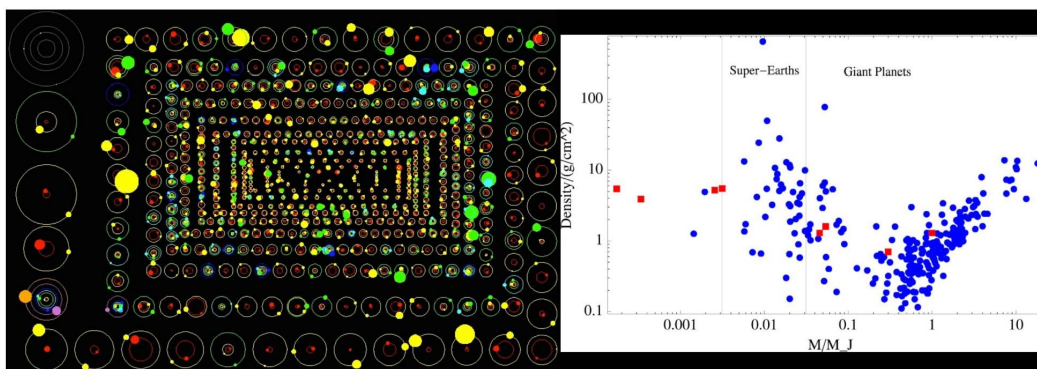
NASA Space Place Astronomy Club Article

November 2015

something unusual about us.

- And finally, one of the most common classes of exoplanet—a super-Earth or mini-Neptune, with 1.5-to-10 times the mass of Earth—is completely missing from our solar system.

Until we develop the technology to probe for lower-mass planets at even greater distances around other star systems, we won't truly know for certain how unusual we really are!



Images credit: NASA / Kepler Dan Fabricky (L), of a selection of the known Kepler exoplanets; Rebecca G. Martin and Mario Livio (2015) ApJ 810, 105 (R), of 287 confirmed exoplanets relative to our eight solar system planets.

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

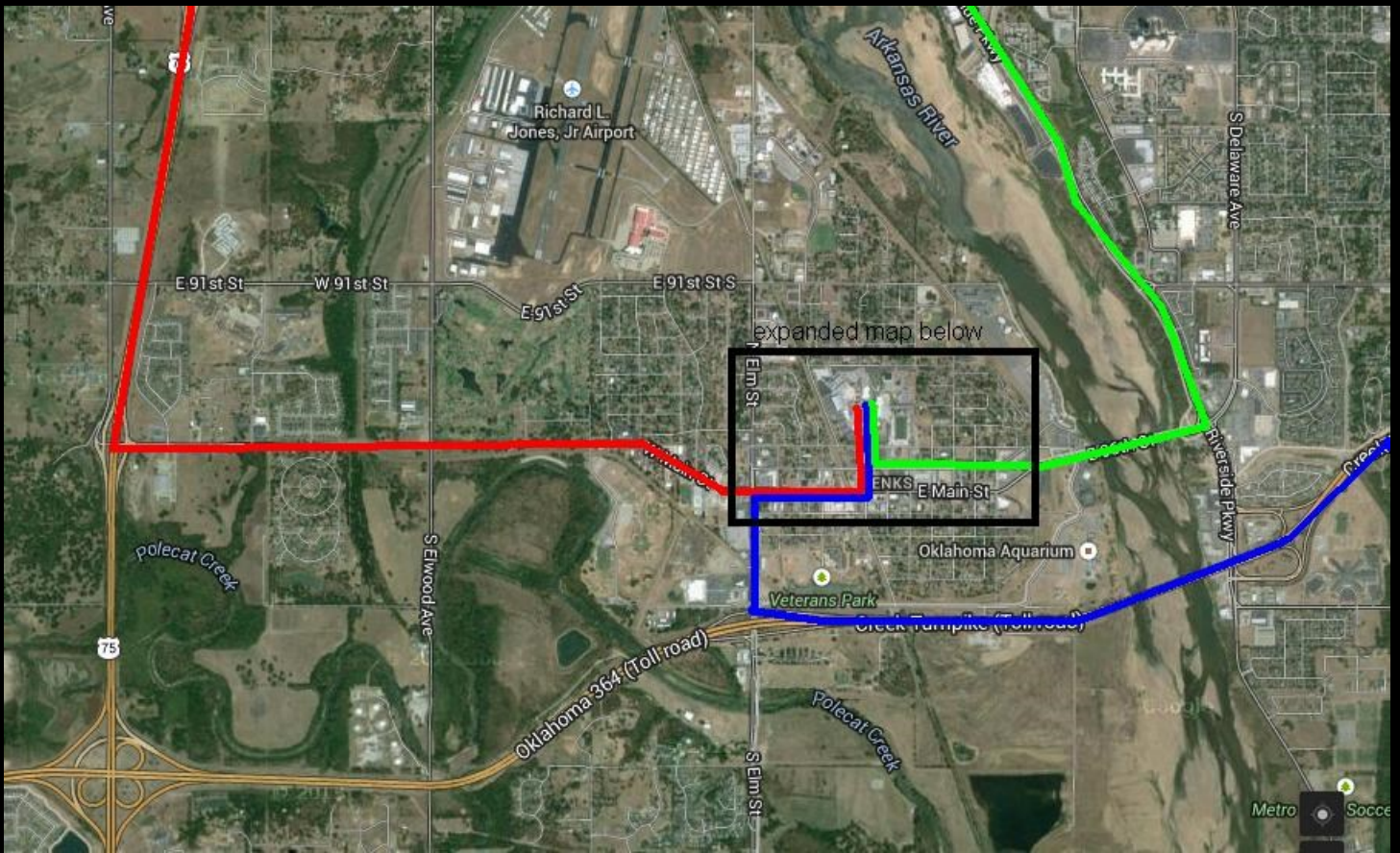
GO UP THE STAIRS TO THE 3RD FLOOR (THERE IS AN ELEVATOR FOR THOSE WHO NEED IT)

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

MAPS ON NEXT PAGE

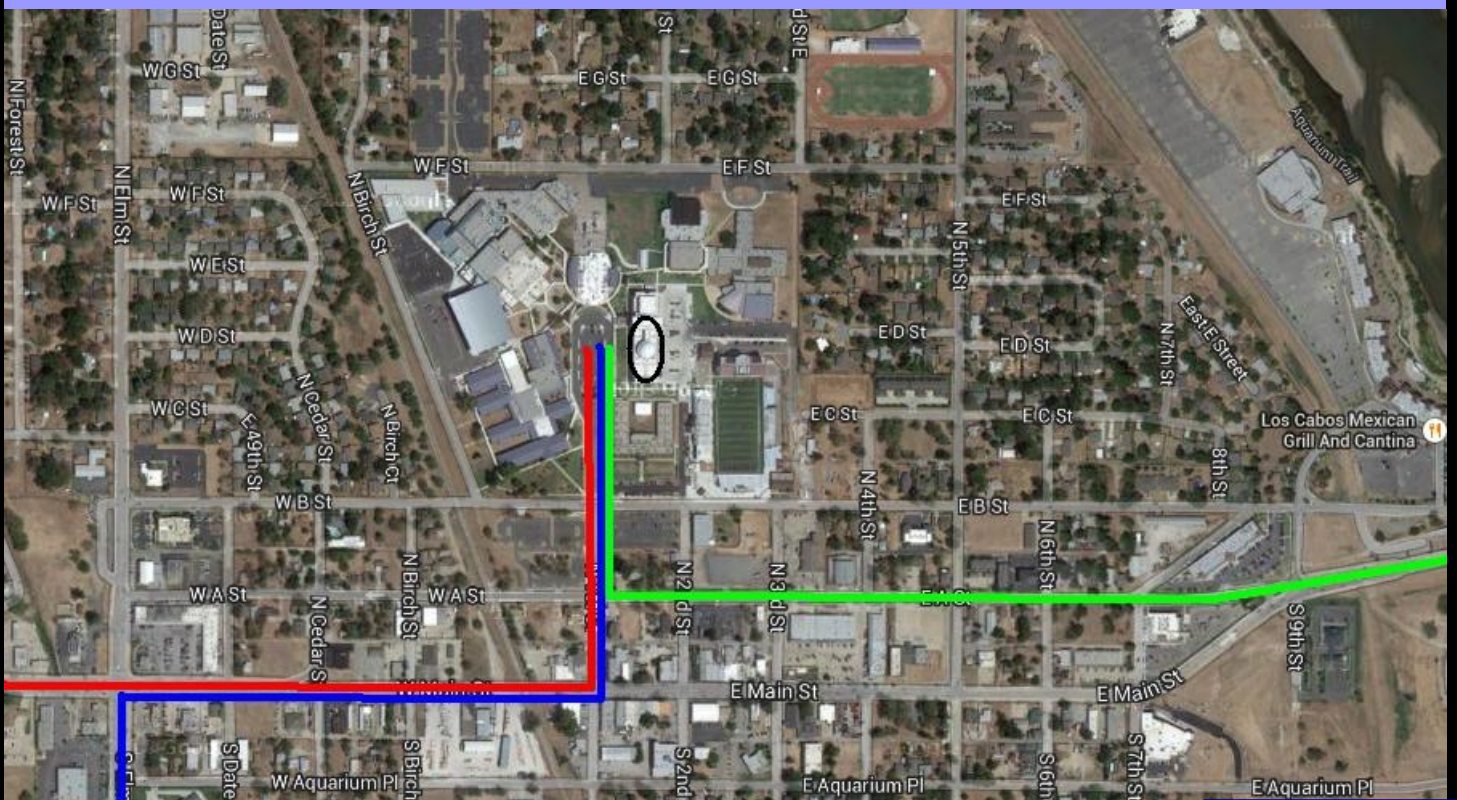
THE GENERAL MEETINGS ARE FREE AND OPEN TO THE PUBLIC.

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 2015 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.

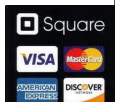
IF YOU ARE AN EXISTING S&T SUBSCRIBER, YOU CAN RENEW DIRECTLY WITH S&T AT THE SAME CLUB RATE. BOTH S&T AND ASTRONOMY NOW HAVE DIGITAL ISSUES FOR COMPUTERS, IPADS AND SMART PHONES.

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!



Wishing you all



Happy Holidays

Image Credit: Hubblesite's Printable Holiday Card Section:

<http://hubblesite.org/gallery/holiday/he017/>

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

DR. ETHAN SIEGEL

RICHARD BRADY

TIM DAVIS

TERESA DAVIS

BRAD YOUNG

JOHN LAND

FRANK NEWBY

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.