

INSIDE THIS ISSUE:

CALENDAR AND EVENTS	2
GREAT ECLIPSE AND SOLAR FILTERS, BY JOHN LAND	3
"BUILD A SAFE SOLAR FILTER", BY JOHN LAND	4
ASTRONOMY CONVENTIONS FOR 2017, BY JOHN LAND	5
MESSIER MARATHON AND CARAVAN INFO, BY TAMARA GREEN	6
PRESIDENT'S MESSAGE	8
TREASURER'S AND MEMBERSHIP REPORT	9
NASA'S "THE SPACE PLACE" NEWSLETTER	10
"WHAT IT'S LIKE ON A TRAPPIST-1 PLANET", BY MARCUS WOO	12
WHERE WE MEET	14
OFFICERS, BOARD & STAFF	15

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THE ASTRONOMY CLUB TULSA  
IS A PROUD MEMBER OF



THE ASTRONOMICAL LEAGUE



ASTRONOMY CLUB OF TULSA

OBSERVER

APRIL 2017



PHOTOS: TOP: Saying "So Long" to our Winter stars; BOTTOM: Saying "Hello Again!" to our Spring and Summer Stars. Both photos taken at the ACT Observatory April 2016 by Tamara Green.

# APRIL 2017

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						

## MOON PHASES AND HOLIDAYS:





APRIL FOOLS' DAY	SAT APR 1
FIRST QUARTER	MON APR 3
FULL MOON	TUES APR 11
GOOD FRIDAY	FRI APR 14
EASTER SUNDAY	SUN APR 16
LAST QUARTER	WED APR 19
EARTH DAY	SAT APR 22
NEW MOON	WED APR 26

## UPCOMING EVENTS:

SIDEWALK ASTRONOMY	SAT APR 8	7:30 PM	BASS PRO
GENERAL MEETING	FRI APR 14	7:00 PM	JENKS HS PLANETARIUM
PUBLIC STAR PARTY	SAT APR 15	7:30 PM	ACT OBSERVATORY
MEMBERS' NIGHT**	FRI APR 21	8:00 PM	ACT OBSERVATORY
MESSIER MARATHON**	SAT APR 22	3:00 PM (CARAVAN)	TUVA
GENERAL MEETING	FRI MAY 5	7:00 PM	JENKS HS PLANETARIUM
SIDEWALK ASTRONOMY	SAT MAY 6	7:30 PM	BASS PRO
PUBLIC STAR PARTY	SAT MAY 20	8:00 PM	ACT OBSERVATORY
MEMBERS' NIGHT**	FRI MAY 26	8:15 PM	ACT OBSERVATORY

\*\*MEMBERS AND FAMILY ONLY PLEASE.

# MAY 2017

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			

## MOON PHASES AND HOLIDAYS:

FIRST QUARTER	TUE MAY 2
CINCO DE MAYO	FRI MAY 5
FULL MOON	WED MAY 10
MOTHERS' DAY	SUN MAY 14
LAST QUARTER	THU MAY 18
ARMED FORCES DAY	SAT MAY 20
NEW MOON	THU MAY 25
MEMORIAL DAY	MON MAY 29

## Great American Solar Eclipse and Make your own SAFE SOLAR FILTER—by John Land



Monday Aug 21, 2017 is the date of the long awaited the Great American Solar Eclipse. Everyone continental United States will be able to see at least a partial solar eclipse. Tulsa will experience an 88.6 % partial eclipse.

This is the first Total Solar Eclipse on the continental United States since Feb 1979 and the first eclipse to transverse the entire continent since 1918 ! The central path of Totality makes a 2,500 mile long 70 mile wide path extending diagonally from Oregon to South Carolina. The closest locations to Tulsa extend through Nebraska, far NE Kansas and across Missouri. It will be a 6 to 8 hour drive depending on where you decide to observe. Lodging reservations along the path have been booked for months but areas an hour or two off the path may likely still be open if you act soon.

For State by State details of viewing locations and planned events go to

[http://www.eclipse2017.org/2017/path\\_through\\_the\\_US.htm](http://www.eclipse2017.org/2017/path_through_the_US.htm)

Also has many helps and suggestions for preparing and viewing the eclipse.

For a Google style map to zoom into any specific location go to

[http://xjubier.free.fr/en/site\\_pages/solar\\_eclipses/TSE\\_2017\\_GoogleMapFull.html](http://xjubier.free.fr/en/site_pages/solar_eclipses/TSE_2017_GoogleMapFull.html)

Note: You'll have to read the map instructions details and click agreed button to see the map.

Once you choose a location Click on that spot and a box will pop up showing times and details for that location. You can even get info for sites not on the eclipse path.

For Tulsa you'll find >

36° 08' 40.30" N <-> 36.14453°	(partial solar eclipse)	<a href="#">Help</a>				
96° 00' 24.39" W <-> -96.00677°						
Obscuration : 88.664%	<b>Max</b>	Magnitude at maximum : 0.90436 Moon/Sun size ratio : 1.03091				
Event ( $\Delta T=68.8s$ )	Date	Time (UT)	Alt	Azi	P	V
Start of partial eclipse (C1) :	2017/08/21	16:39:38.2	+55.7°	128.3°	297°	12.7
Maximum eclipse (MAX) :	2017/08/21	18:08:30.8	+65.4°	169.1°	023°	10.9
End of partial eclipse (C4) :	2017/08/21	19:37:14.1	+61.0°	217.5°	108°	09.4

### CHOOSING SAFE SOLAR FILTERS

TO AVOID THE RISK OF **IRREVERSIBLE EYE DAMAGE** YOU MUST USE SCIENTIFICALLY TESTED SAFE SOLAR FILTERS !! These filters must not only block out excessive Visible light but also prevent eye damage from invisible Ultraviolet and Infrared radiation.

### NAKED EYE OBSERVING

A number of companies sell Eclipse Viewing Glasses. They are made of layers of specially designed material that safely reflect and block 99.9% of the Sun's energy.

Most give a pleasing yellow orange view of the sun's disk.

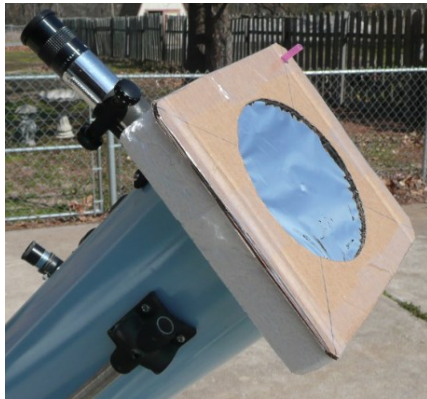
They are **NOT** to be used with binoculars or telescopes!





## BUILD A SAFE SOLAR FILTER

BY JOHN LAND



**BUILD A SAFE SOLAR FILTER** for your telescope, binoculars or camera. You can make your own Safe Solar Filter using a sheet of Mylar Baader coated material from AstroPhysics. This specially designed material gives safe images with excellent resolution. The Astronomy Club of Tulsa has ordered some of the material in bulk.

**25 cm Square ( ~ 9 in ) for \$ 12** available at our club meeting or contact our treasurer Tim Davis. Complete details in our March newsletter [http://astrotulsa.com/CMS\\_Files/201703.pdf](http://astrotulsa.com/CMS_Files/201703.pdf)

Are you ready for the Solar Eclipse August 21st ?

Details about the eclipse are in our March newsletter.

[http://astrotulsa.com/CMS\\_Files/201703.pdf](http://astrotulsa.com/CMS_Files/201703.pdf)



**The Tulsa Astronomy club has individual solar glasses that you can purchase at meeting or events for \$ 2 each** <https://www.rainbowsymphony.com/> has a good prices on Eclipse glasses and viewing cards. You can purchase bulk orders in lots of 25 or more for about \$ 1.00 each. For the younger kids Eclipse Cards are recommend. Mount them taped securely on a larger sheet of stiff cardboard with a cutout section for the viewing area. This allows their face to be covered from the sun when observing. I bought sets of glasses and cards for friends and each of my grandkids' school classes.

# ASTRONOMY CONVENTIONS FOR 2017

BY JOHN LAND

## ASTRONOMY CONVENTIONS FOR 2017

Looking for an opportunity to meet other astronomy enthusiasts and learn what area clubs are doing. Consider attending an astronomy convention. You'll meet interesting people, hear some great presentations and guest speakers and even browse the products of invited vendors.

### Mid States Region of The Astronomical League



The Mid-States Region of the Astronomical League (MSRAL) convention will be held at Missouri State University in Springfield, MO.

### Friday June 9 through Sunday June 11.

This event will be cohosted by the Springfield Astronomical Society and the Ozarks Amateur Astronomers Club. Attractions will include a tour of the University's Baker Observatory near Marshfield, Missouri (birthplace of Edwin Hubble) (<https://physics.missouristate.edu/BakerObservatory.htm> )

Friday evening features a "Star-B-Q" Saturday will have a variety of guest speakers.

Sat Night has a banquet and the keynote speaker will be Dr. Peter Plavchan, Assistant Professor in the Department of Physics, Astronomy, and Material Science at Missouri State University.

Details and registration available at

<https://missouristate.collegiatelink.net/organization/ozarks-amateur-astronomers-club/calendar/details/1277692>

Accommodations available on campus and also in area hotels.

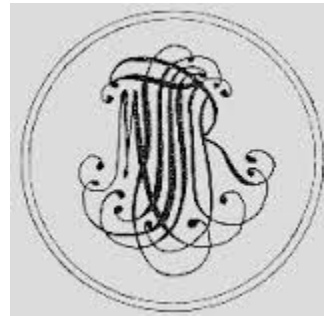
Located just a 3 hour drive from Tulsa, Springfield, Mo. also has many tourist attractions.

The birthplace of President Harry Truman, the city has several historical sites including a National Park at the Wilson's Creek Civil War battlefield which features restored buildings and guided tours of the extensive area. The Fantastic Cavern Cave tours are always a favorite as you can ride through this an ancient limestone cave. Home of the original Bass Pro shop you can tour the adjoining "Wonders of Wildlife" National museum and aquarium.

Other area attractions at <https://www.springfieldmo.org/museums-and-historical-attractions>

# MESSIER MARATHON TAKE TWO!! Saturday, April 22

BY TAMARA GREEN



Hello All!

Our Annual Messier Marathon will be on Saturday, April 22. (The March 24 date was postponed due to weather.) We will be going to TUVVA again to have us a marathon!

There will be a caravan to the marathon, and I will be leading it again this year. Details on next page of this article.

There will be a pot-luck dinner at TUVVA before the marathon begins, so if you wish to, you are welcome to bring a dish, dessert or beverage to share.

We realize that we will not have a chance at all 110 objects, considering how late in the Spring this is, but a partial marathon is better than none at all! And we should still get the vast majority of them!

**PLEASE NOTE THAT DUE TO THE LIMITED ROOM AT TUVVA, AND THE FACT THAT PARTICIPANTS WILL WANT TO CONCENTRATE ON THEIR MARATHONING, THE MESSIER MARATHON IS FOR CLUB MEMBERS AND THEIR FAMILY MEMBERS ONLY (OUR MEMBERS AND TUVVA MEMBERS). THANK YOU FOR YOUR COOPERATION.**

Hope to see you there!

Tamara





## CARAVAN TO THE MESSIER MARATHON:

The caravan will meet on Saturday, Apr. 22 at the parking lot of the Burger King, located at 1600 N. Elm Pl., Broken Arrow, OK. This will be just south of the BA on the west side of the street (across from the Ferguson dealership). The caravan will leave Burger King PROMPTLY at 3:00 PM. This is because it takes a little over an hour to get to TUVA and we want to have plenty of time to set our telescopes and gear up, and then enjoy a pot-luck dinner and socializing before the marathoning begins! If you are interested in joining in on the caravan, please email Tamara Green at [astrotulsa.vp@gmail.com](mailto:astrotulsa.vp@gmail.com) and let her know what the make, model and color of your car is so that she will know who belongs in her caravan (and who doesn't!). Hope to see you there!

PLEASE NOTE: The caravan only goes TO the marathon on Saturday afternoon. Sunday morning, you are on your own getting back to town. This is because not everyone leaves TUVA at the same time, or even stays all night. A map to the caravan meeting place is below.

Print - Maps

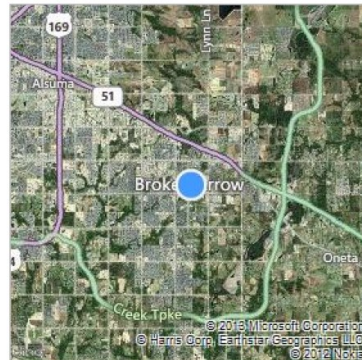
Page 1 of 1

bing Maps

### Broken Arrow, OK

Burger King on N. Elm Pl., Broken Arrow. Building is on the Left side the map, blue roof.

On the go? Use [m.bing.com](http://m.bing.com) to find maps, directions, businesses, and more



# PRESIDENT'S MESSAGE

BY RICHARD BRADY



Hi everyone. We don't have all the planetary happenings we did last month. Instead there are a couple of local things going on this month you need to know about, along with possibly something big coming next year.

This month, we are moving the General Meeting at the Jenks Planetarium to the second Friday this month, April 14, instead of the first Friday. This is due to a special group event on April 7. Then the following evening, Saturday, April 15, is our monthly Public Night. We are expecting a large group from Beggs Public Schools there, besides the normal number of people from the general public, so we really need to have a lot of volunteers there that evening to help out.

Early in March I got an email from Carroll Iorg, the convention coordinator for the Astronomical League. He was wondering if we would like to host a future convention for MSRAL, the Mid-States Region of the Astronomical League, of which we are a member. Although he didn't state specifically, I assume it is for 2018 (or beyond). Our club hosted it in 2003 and a couple of times last millennium. John Land was the driving force for us in 2003. I will ask if he would speak to us about it at the General Meeting on April 14.

This year the convention is hosted by the Springfield Astronomical Society and the Ozarks Amateur Astronomy Club. Info on this year's event can be found at [springfieldastronomy.org/index.asp?Q=MSRAL](http://springfieldastronomy.org/index.asp?Q=MSRAL). Also John has an article about MSRAL 2017 elsewhere in this newsletter. In 2016 the MSRAL convention was hosted by the St. Louis Astronomical Society and the Astronomical Society of Kansas City. You can read about the 2016 convention at [msral.org](http://msral.org) and [slasonline.org/msral2016.html](http://slasonline.org/msral2016.html).

We have not one but two a fairly bright comets in our northern skies now.

The first is Comet 41P/Tuttle-Giacobini-Kresak in Draco between the Little and Big Dippers. It was near M97 and M108 back on March 21. There is a nice image of the three on APOD for March 24. Charts can be found on the Sky & Telescope News page "Comet 41P/T-G-K Greens Up For St. Paddy's Day". The link is [www.skyandtelescope.com/observing/comet-41pt-g-k-glows-green-for-st-paddys-day/](http://www.skyandtelescope.com/observing/comet-41pt-g-k-glows-green-for-st-paddys-day/).

The second is C/2017 E4 (Lovejoy). It has been getting brighter in the past few days (as I'm writing this). It is in the morning skies in Pegasus near Enif (Epsilon Pegasi). It will be at perihelion on April 23, if it doesn't disintegrate before then. Charts can be found also on S&T's News page "Comet Lovejoy Brightens Quickly, Heads North". The link is [www.skyandtelescope.com/observing/comet-lovejoy-brightens-quickly-heads-north/](http://www.skyandtelescope.com/observing/comet-lovejoy-brightens-quickly-heads-north/).

Mercury remains in the evening sky for the first part of April. On April 1 it is at magnitude -0.2 and sets about 1 1/2 hours after sunset, but catch it early, as it will get harder to see each evening, heading for inferior conjunction (when Mercury is between the Sun and the Earth) on April 20. It will appear as a thin crescent in binoculars or a telescope leading up to then, getting thinner every day.

Mars is still in the southwest sky this month, staying roughly 20 degrees up at sundown all month. It is between the Pleiades and the Hyades.

Jupiter is basically up all night all month. It goes through opposition on April 7. It is around magnitude -2.5 with an apparent diameter of 44". This is small for an opposition because Jupiter was the farthest from the Sun in its 12-year orbit a couple of months ago.

Saturn rises just after 1 AM at the first of the month and before midnight at the end. It stays around magnitude +0.3. Don't confuse it with Antares (magnitude +1.0) to its right.

Venus is now the morning star after passing through inferior conjunction last month. It comes up about an hour before sunrise at the beginning of the month and 1 3/4 hours by the end. It is still a very thin crescent, fattening up as the month goes by.

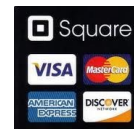
We were clouded out on March 25 when we planned to have our Messier Marathon at TUVVA. It is rescheduled for Saturday, April 22.

Clear skies!  
Richard Brady



# TREASURER'S AND MEMBERSHIP REPORT

BY TIM DAVIS



**Astronomy Club of Tulsa: 175 members, including 14 new members in 2017.**

Welcome to our new members this month: Larry Hagood, Chris Ford, Jeff Hintz, Christopher Call, Dragos Vesbianu, Larry White and Mickey Smith.

## Club Accounts as of March 31, 2017:

Checking: \$7,874.25; Savings: \$5,776.40; Investment accounts: \$21,231.13 (*Value Fluctuates with Market*)

The club now has PayPal available for you to start or renew memberships and subscriptions using your credit or debit cards. Fill out the registration form at <http://astrotulsa.com/page.aspx?pageid=16> Click **Submit** and you will be given the choice of either **mailing in your dues** with a check or **using PayPal** which accepts most major credit cards. A modest processing fee is added to PayPal transactions.

You may also renew your membership or join at one of our club events using your credit card by seeing one of our officers. We can take payments with the Square card reader. A small fee is also added on to these transactions.

**ALSO NOTE:** For our current members who are renewing their memberships, you can now go to a new link on the website to start your renewal process. On the home page, hover over the "Member" tab on the ribbon menu near the top of the page. Then select the "Membership Renewal" link and this will take to a page to fill out your information. Fill this out, submit it, then pay your dues by whatever method you choose.

**NEWS NOTE:** Both Sky & Telescope and Astronomy have free Digital subscriptions available with print subscriptions, or Digital subscriptions may be purchased separately. Contact their websites for details.

**Membership rates for 2017 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](http://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](http://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.



National Aeronautics and Space Administration



# NASA Space Place

Educator Newsletter

March-April 2017 / Vol. 10, Issue 2

## 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, Earth science, and technology.

Don't forget to subscribe to our monthly e-newsletter, the NASA Space Place Gazette!

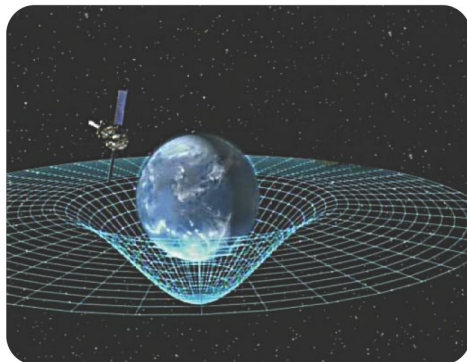
<http://spaceplace.nasa.gov/subscribe>

*New!*

### What are gravitational waves?

Gravitational waves are invisible (yet incredibly fast) ripples in space. Here's how we know they exist:

<http://spaceplace.nasa.gov/gravitational-waves>

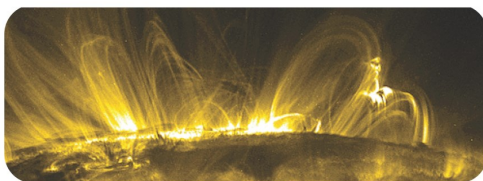


*New!*

### Sun's Corona

The corona is the outermost part of the sun's atmosphere. Its high temperatures are a bit of a mystery! Here's why:

<http://spaceplace.nasa.gov/sun-corona>

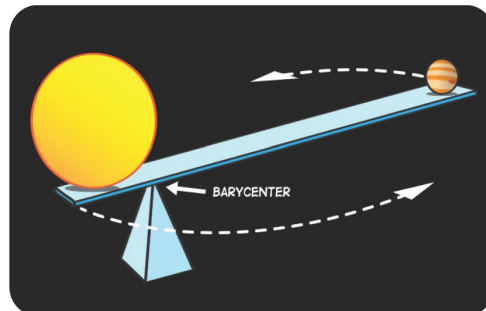


*New!*

### What's a barycenter?

We say that planets orbit stars, but that's not exactly the whole truth! Planets and stars actually orbit around their common center of mass—the barycenter. Learn more about barycenters and how they can help us find other planets outside our solar system:

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



### Why do we care about water on Mars?

Because on Earth, almost everywhere there is water, there is also life! If water once flowed on Mars, did life once thrive there too?

<http://spaceplace.nasa.gov/mars-adventure2>

Explore Earth and space at [spaceplace.nasa.gov](http://spaceplace.nasa.gov)

### What are satellite galaxies?

They are less massive galaxies that orbit a larger galaxy. Our Milky Way has a number of satellite galaxies, but the biggest one is called the Large Magellanic Cloud!

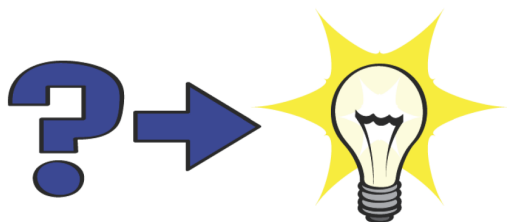
<http://spaceplace.nasa.gov/satellite-galaxies>



### Science Fair

Are your kids searching for some science fair project ideas? Look no further! Click to explore various topics:

<http://spaceplace.nasa.gov/science-fair>



### Space and Earth Glossary

What's the difference between an asteroid and a comet? Check out our glossary to find out and explore more space and Earth terms!

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

### Special Days

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

#### March 13 — Uranus was discovered on this day in 1781.

Learn all about this blue planet here:

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

#### March 14 — Albert Einstein was born on this day in 1879.

Learn about gravitational waves, which Einstein predicted over 100 years ago!

<http://spaceplace.nasa.gov/gravitational-waves>

#### March 20 — Today is the first day of spring in the Northern Hemisphere.

Why do we have seasons?

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

#### April 22 — Happy Earth Day!

Explore Earth's atmospheric layers:

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

#### April 28 — Astronomer Jan Oort was born on this day in 1900.

Learn all about the Oort Cloud that was named after him!

<http://spaceplace.nasa.gov/oort-cloud>

#### April 29 — Happy Astronomy Day!

Budding astronomers can learn more about our solar system here:

<http://spaceplace.nasa.gov/menu/solar-system>



**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](http://spaceplace.nasa.gov) to explore space and Earth science!



### **What It's Like on a TRAPPIST-1 Planet**

By Marcus Woo

With seven Earth-sized planets that could harbor liquid water on their rocky, solid surfaces, the TRAPPIST-1 planetary system might feel familiar. Yet the system, recently studied by NASA's Spitzer Space Telescope, is unmistakably alien: compact enough to fit inside Mercury's orbit, and surrounds an ultra-cool dwarf star—not much bigger than Jupiter and much cooler than the sun.

If you stood on one of these worlds, the sky overhead would look quite different from our own. Depending on which planet you're on, the star would appear several times bigger than the sun. You would feel its warmth, but because it shines stronger in the infrared, it would appear disproportionately dim.

"It would be a sort of an orangish-salmon color—basically close to the color of a low-wattage light bulb," says Robert Hurt, a visualization scientist for Caltech/IPAC, a NASA partner. Due to the lack of blue light from the star, the sky would be bathed in a pastel, orange hue.

But that's only if you're on the light side of the planet. Because the worlds are so close to their star, they're tidally locked so that the same side faces the star at all times, like how the Man on the Moon always watches Earth. If you're on the planet's dark side, you'd be enveloped in perpetual darkness—maybe a good thing if you're an avid stargazer.

If you're on some of the farther planets, though, the dark side might be too cold to survive. But on some of the inner planets, the dark side may be the only comfortable place, as the light side might be inhospitably hot.

On any of the middle planets, the light side would offer a dramatic view of the inner planets as crescents, appearing even bigger than the moon on closest approach. The planets only take a few days to orbit TRAPPIST-1, so from most planets, you can enjoy eclipses multiple times a week (they'd be more like transits, though, since they wouldn't cover the whole star).

Looking away from the star on the dark side, you would see the outer-most planets in their full illuminated glory. They would be so close—only a few times the Earth-moon distance—that you could see continents, clouds, and other surface features.



The constellations in the background would appear as if someone had bumped into them, jostling the stars—a perspective skewed by the 40-light-years between TRAPPIST-1 and Earth. Orion's belt is no longer aligned. One of his shoulders is lowered.

And, with the help of binoculars, you might even spot the sun as an inconspicuous yellow star: far, faint, but familiar.

Want to teach kids about exoplanets? Go to the NASA Space Place and see our video called, “Searching for other planets like ours”: <https://spaceplace.nasa.gov/exoplanet-snap/>



*This artist's concept allows us to imagine what it would be like to stand on the surface of the exoplanet TRAPPIST-1f, located in the TRAPPIST-1 system in the constellation Aquarius. Credit: NASA/JPL-Caltech/T. Pyle (IPAC)*

WHERE WE MEET

JENKS HS PLANETARIUM



**Our Club General meetings are held at the  
Jenks Public Schools Planetarium  
105 East B St, Jenks, OK**

**When you enter the building lobby, take the elevator to the 3<sup>rd</sup> floor.**

**Meetings begin at 7:00 PM**

**Printable Detailed map available at [http://astrotulsa.com/cms\\_files/  
Directions\\_JenksPlanetarium.pdf](http://astrotulsa.com/cms_files/Directions_JenksPlanetarium.pdf)**

**We hope to see you there!**

## MEMBERSHIP INFORMATION

### ASTRONOMY CLUB OF TULSA OFFICERS:

**PRESIDENT** RICHARD BRADY

astrotulsa.pres@gmail.com

**VICE PRESIDENT** TAMARA GREEN

astrotulsa.vp@gmail.com

**SECRETARY** JOHN NEWTON

astrotulsa.secy@gmail.com

**TREASURER** TIM DAVIS

astrotulsa.tres@gmail.com

### BOARD MEMBERS-AT-LARGE:

JOHN LAND

CHRISTOPHER PROCTOR

JAMES TAGGART

SKIP WHITEHURST

JAMES LILEY

TONY BLAKESLEY

JERRY CASSITY

TERESA DAVIS

### STAFF:

**NEWSLETTER EDITOR** TAMARA GREEN

astrotulsa.vp@gmail.com

**WEBMASTER** JENNIFER JONES

jjones@seedtechnologies.com

**MEMBERSHIP CHAIRMAN** JOHN LAND

astroclubbiz@windstream.net

**OBSERVING CHAIRS** OWEN AND TAMARA GREEN

darthnewo@yahoo.com, astrotulsa.vp@gmail.com

**SIDEWALK ASTRONOMY** OWEN GREEN

darthnewo@yahoo.com

**PR AND OUTREACH** OWEN GREEN

darthnewo@yahoo.com

**GROUP DIRECTOR** OWEN GREEN

darthnewo@yahoo.com

**NIGHT SKY NETWORK** RICHARD BRADY

astrotulsa.pres@gmail.com

**FACILITIES MANAGER** JAMES TAGGART

astrotulsa.obs@gmail.com

### MEMBERSHIP RATES FOR 2017 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](http://www.astronomy.com)

SKY & TELESCOPE IS \$33 PER YEAR.

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

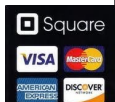
*IF YOU ARE AN EXISTING S&T SUBSCRIBER, YOU CAN RENEW DIRECTLY WITH S&T AT THE SAME CLUB RATE. BOTH S&T AND ASTRONOMY NOW HAVE DIGITAL ISSUES FOR COMPUTERS, IPADS AND SMART PHONES.*

### 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 SPRING TO JOIN US  
AT A STAR PARTY!

OPEN TO THE PUBLIC  
FOR MORE INFORMATION  
PLEASE VISIT  
WWW.ASTROTULSA.COM.

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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  
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 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:

MARCUS WOO

JOHN LAND

RICHARD BRADY

TIM DAVIS

TAMARA GREEN



**PHOTOS: More Spring and Summer starts, taken at the ACT  
Observatory, May 2016 by Tamara Green.**