OBSERVER

January 2018

Bringing Stars to the eyes of Tulsa since 1937

Double Cluster in Perseus – Frank Newby – 8 inch Astrograph

In this Issue

Astronomy Club Events

Details at http://astrotulsa.com/Events.aspx

MEMBERS' NIGHT** FRI Jan 12 5:30 PM ACT OBSERVATORY
* This event dependent on plumbing repairs being completed.
ASTRO CLUB MEETING FRI Jan 26 7:00 PM JENKS High School Planetarium
"The Stars We Never See" Introduction to the Southern Hemisphere Skies.
SIDEWALK ASTRONOMY SAT Jan 27 4:45 PM BASS PRO
PUBLIC STAR PARTY SAT Feb 10 5:30 PM ACT OBSERVATORY
MEMBERS' NIGHT** FRI Feb 16 6:00 PM ACT OBSERVATORY
ASTRO CLUB MEETING FRI Feb 23 7:00 PM JENKS High School Planetarium
SIDEWALK ASTRONOMY SAT Feb 24 5:15 PM BASS PRO
**MEMBERS AND FAMILY ONLY PLEASE.

Planets in January

Mars and Jupiter were in conjunction Jan 6th and visible in the morning sky in the SE. On Jan 11 the moon joins the pair for a nice morning trio. Jupiter rises around 3 AM and dominates the morning sky. **Mercury** has a conjunction with **Saturn** on Jan 13 but the pair are only 7 degrees above the SE horizon in the morning twilight. Saturn will continue to climb higher each morning and put on a nice show later in the Spring. **Venus** is in superior conjunction behind the Sun Jan 9th and not visible.

Wanted Newsletter Articles

This is a club newsletter. We'd love to hear from YOU our Members. Had a great astronomy adventure. Want to share a memorable experience from the past. Got some new Astro Gizomos from Santa. Write up a one or two page article and send it in. Love to have Pictures too.

Contact John Land at Tulsaastrobiz@gmail.com

Total Lunar Eclipse before dawn Weds Jan 31st

Also be sure to read John Newton's Secretary Report on **page 5** to learn how the Blue Moon turns Red.
On Jan 31st Tulsans will have an opportunity to observe a Total Lunar Eclipse. You don't need any special filters to observe a lunar eclipse as you will be looking at the full moon. It can easily be seen with the unaided eye but binoculars or a small telescope will enhance the view. The moon will be low in the WNW as the eclipse begins so you'll need a good view toward the horizon. Start observing no later than 6:15 AM as the moon will be low and growing darker as the sky becomes brighter near sunrise.

Time table of events from Tulsa

Phase	Time	Lunar Altitude	Lunar Azimuth	(West is 270 deg)
Partial Eclipse begins	**5:58 AM**	**18**	**278**	
Total Eclipse begins	**6:52 AM**	**6**	**286**	
Sunrise in the SE	**7:25 AM**	**0**	**111**	
Moon Sets	**7:27 AM**	**0**	**291**	
Maximum Eclipse	**7:30 AM**	**Below Horizon.**		

During a lunar eclipse the moon passes through the Earth's shadow.
The PENUMBRA is the outer shadow of the Earth where only part of the Sun's light is blocked. This early phase is not obvious until it is near totality. You'll notice the left side of the full moon looks more gray or dusky than the right. The UMBRA is the inner shadow of the Earth where the Sun's light is completely blocked. As the moon enters the Umbra it will look like a bite has been taken out of the left side of the moon. Over the next hour more and more of the moon will be covered. As Totality darks near the color of the moon will appear brownish to a dull orange.
The color of the eclipse depends on how much dust is in earth's upper atmosphere to scatter the sunlight. This eclipse may be a challenge as totality begins during bright morning twilight.

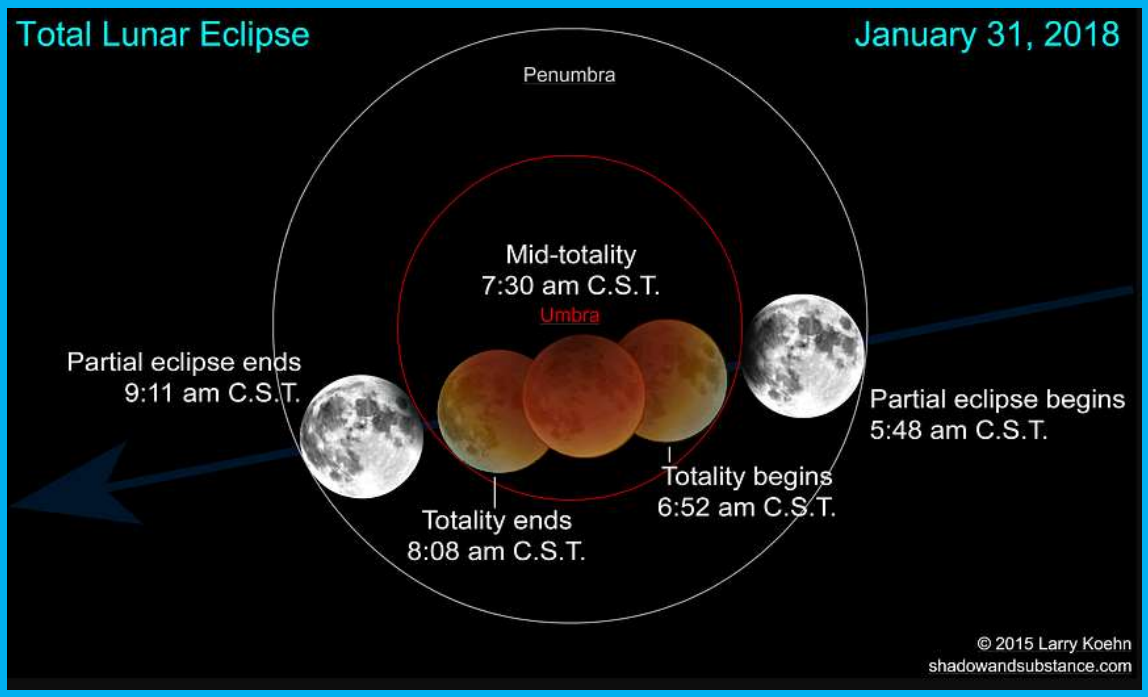


Image Credit: http://www.shadowandsubstance.com/20180131/EclipsetimesCST.png

For animations of this eclipse and other astronomical events go to:
http://www.shadowandsubstance.com/ Save it in your favorites for future events
Lunar Eclipse for Beginners
http://www.mreclipse.com/Special/LEprimer.html
Review all the times and details on the Jan 31, 2018 eclipse **Note: CST = UT – 6 hrs**
http://eclipsewise.com/lunar/LEprime/2001-2100/LE2018Jan31Tprime.html

Meteor Watch Report and Asteroid Tracking Video

On Weds night Dec 13 about 20 people gathered at the observatory to watch the 2017 Geminid Meteor Shower. The weather was great for December – mid 40's and calm. The sky was dark with no moon but transparency was somewhat diminished from effects of numerous grass fires in surrounding areas. During the early evening Gemini was low in the NE but began producing a few meteors. Near 10 PM the rate picked up with dozens of faint meteors and several bright meteors as well.
A couple of astronomers from Ames, Iowa had contacted the club about joining us for the meteor watch but decided to go further south to Hugo Lake State Park. They reported observed rates of 55 to 60 per hour from 10:30 PM to 3:30 AM Skies at our Tulsa site clouded up around midnight.

As reported in the December newsletter the source of the Geminid meteor shower is unique. Instead of comet their source is an asteroid named 3200 Phaethon (FAY-eh-thon). Turns out 3200 Phaethon orbits the sun every 524 days passing within 0.14 AU of the sun. This heats its surface to over 1200 F (lead melts at 800 F)

The asteroid 3200 Phaethon made a very close approach to the earth on Dec 16th passing within 6.4 million miles. The giant radio telescope at Arecibo Puerto Rico bounced radar off the asteroid which revealed it to be 6 Km wide - a bit larger than previous estimates.

Club Member John Moore set up a telescope to make a video of the asteroid flyby.
John sent this report. *"Here is the recording from my two nights at the ACT Observatory. I only captured one hour on the 13th (meteor shower) but I went back out there on Friday the 15th and got 3 more hours. Pretty basic video. I am impressed with how well my mount will track an asteroid"*

The images below are screen shots from the video he made on Dec. 13, 2017 showing the motion of the asteroid against the background of stars.

You can see the whole video at https://www.youtube.com/watch?v=G6ThwOoQ5UI

You can get the Scientific FACTS plus sky maps that may help you observe it at http://www.skyandtelescope.com/observing/3200-phaethon/

PRESIDENT'S MESSAGE

BY TAMARA GREEN

Hello Everyone!

I hope all of you all had a really wonderful Christmas and a Happy New Year!

It looks like there is significant progress being made on repairing the water leak at the observatory. Thank you all very much for voting to approve the work being done! And a BIG thank you to James Taggart and John Newton who helped him with preparing the building for the plumbers, so they would not have to do it and it ending up costing us even more money!

We are teaming up with Tulsa Air & Space Museum for Telescopes 101 at TASM, to be held on Saturday, January 6, 2018 from 11:00 AM to 1:00 PM. Twelve of our members have volunteered to help out. TASM reports over 40 registrations for the workshop.

It is my hope that 2018 will be a good year for all of us! I hope that we can get a lot of stuff done, and we have some really good events. I look forward to it, and appreciate all of y'all's support!

Clear Skies!
Tamara

SECRETARY'S MESSAGE

BY JOHN NEWTON

The newly elected officers and directors of the Astronomy Club of Tulsa (ACT) held its first regularly scheduled Board Meeting on Saturday, December 2nd, 2017 with nearly all officers and board members in attendance.
The framework for this meeting included discussions surrounding near-term upcoming events, formation of new committees which are open to club member participation, and topics on ACT business-at-hand. These general topics are summarized below.

NOTE: Since the board meeting was in December some Events mention have already taken place.
Upcoming Events and Awareness:
Did you miss the Super Moon on December 3rd? No worries, there are two more coming in the month of January – Jan. 1st and Jan 31st. That's right, two full moons in January! A second full moon in the same month is better known as a Blue Moon. To top things off, the late January Super Moon will take place during a total lunar eclipse visible from western North America, the Pacific and Eastern Asia. A lunar eclipse is when the moon appears reddish or copper colored as the Earth transits between the moon and the sun casting its shadow on the moon's surface. This is sometimes called a Blood Moon. So, if you're lucky enough to be in the right place, you might get to see a Blue-Blood Moon on January 31st.

A Super Moon occurs when the full moon is at the closest point of its orbit to the Earth, which is also called the perigee. That makes the moon look extra-close and extra bright — up to 14 percent bigger and 30 percent brighter than a full moon at its furthest point from Earth, called the apogee.

Tamara Green has just finished working on the Calendar of Events for 2018. These include celestial events, meetings, scheduled members and public nights, sidewalk astronomy and other interesting stuff. You can find listing reminders and information on these events in the coming months on the website and in our ACT Newsletters.

ACT Business-at-Hand:
Owen Green will resume his functions as ACT Outreach, Public Relations, Sidewalk Astronomy leader, and Group Director again starting in January 1, 2018. Owen had to step away for a brief period to care for a family member in need. Happy to have you back, Owen!

A dark sky site is badly needed. As our fair city grows, so does the night sky glow. Both commercial development and home building construction seems to be moving closer to the ACT observatory where light pollution impedes on the quality of our night skies. Recognizing this as a growing and unavoidable problem, the board of directors has initiated a committee to investigate a secondary site to be used for dark night sky observing. The ideal location would be where land is available for our use and most importantly, the quality of its skies are dark and unobstructed by big city lights.
Pawhuska seems to be our first targeted location to consider. Pawhuska is roughly an hour and 20 minutes north/north west of Tulsa. For many of us, this would be about another 20 to 40-minute drive further than that to our observatory now. Jacob Shepherd will lead this committee, with Sheldon Padawer assisting. If you are interested and want to volunteer for this committee, please contact Jacob.

This year marked the 80th anniversary of this wonderful club, and as such we should take time to reflect and recognize the many individuals who have dedicated their time to improve, or donated their money towards making this club what it is today.

Therefore, the board of directors has established a committee to define guidelines for recognizing Lifetime and Honorary members for their vital and selfless contributions. The committee formed include James Taggart as chairman, with help from Teresa Davis and Jacob Shepherd.

As this club continues to break through new milestones, the same committee will consider creating a wall of honor for the names of those Lifetime and Honorary Members and history about their contributions. Additional insight from this committee will be forthcoming.

James Taggart, club facility manager, reported on his progress regarding ongoing projects and work going on at the observatory.

1. James indicated that he has nearly completed in a major undertaking of replacing heavy weather stripping that surrounded the bottom of the dome. He has had help by several others in this effort, namely Skip Whitehurst, Jerry Cassity, and Sheldon Padawer to mention a few. Thank you, James and all others, for doing an outstanding job.
2. James has been working on Observatory Security –
    a. Two video cameras have been installed at the observatory and two still need to be installed. This will make a total of 4 video cameras on premise to provide constant video surveillance.
    b. A new security door lock with a keypad will be installed as soon it arrives. The order for this door lock has been backlogged with the vendor.

3. Now that construction on Alt. Highway 75 has completed, James will resume plans on having road signs made and installed for directing traffic to the ACT observatory. The ideal installation sites would be at Alt. Highway 75 and Fergusson Road, and at Highway 75.

Additional observatory related items:

1. A handicap access rail needs to be installed in the bathroom. James Taggart found a pivoting handrail that he can install in the bathroom.
2. Plans are to strip and repaint the stairwell and the Observatory upper deck in the spring. This includes installing new friction strips on the stairs after painting.
3. Improve lighting in the stairwell. This is under consideration on how to improve lighting.
4. Install a 90° angled view finder on the main observatory telescope. Skip Whitehurst to take the lead in finding a commercially available item.
5. William Optics Focuser – Sheldon Padawer has offered to install a supplemental piece of 5 mil Teflon tape atop the "V" adjustable pressure pad to ease the adjustment.
6. Determine the best way to control humidity that could result in dew formation on lenses and in telescope equipment. Humidity issues will be handled in a two-phased approach:
    a. Phase 1 - The observatory in general has a few water leaks resulting in moisture issues. This seems to be due to rain penetrating the roof or doom into the building. James Taggart and Skip Whitehurst have volunteered to camp out at the observatory during a rainy day to locate and mark any points where leaks exist.
    b. Phase 2 - Make recommendation on how to fix the leaks permanently.
    c. If after this work should the humidity continue to be problematic, the board will consider other steps to help protect club assets.

As the many listed committees undergo their assigned research, the board will post their findings in future newsletters.

Finally, updates to the website are being made to include the newly elected officials to the contacts sheet.

Please feel free to contact me with any questions or comments pertaining to the items listed above, email me at astrotulsa.secy@gmail.com.
John Newton – ACT Secretary

Enjoy a Planetarium Show
Shows each Tuesday evening
Jenks High School Campus
205 East B Street, Jenks

TICKETS
$5 online or $7 at the door
Purchase online at jenkscommunityed.com
or call 918-298-0340

For Show Titles and times
https://www.jenkscommunityed.com/search-for-a-class&cat=19
To Sort Click Date or Title Column

Plumbing Repairs at the Observatory.

In early December club treasurer, Tim Davis, reported that the observatory water usage had taken a sharp increase by several thousand gallons a month. No obvious leak was apparent so we contacted the water company which discovered the shut off valve at the meter had failed revealing a leak on our side of the meter.

Our observatory manager, James Taggart, contacted a leak detection company who identified the source was underneath the slab near the exterior wall of the restroom. After contacting a local plumbing company it appeared that the repair cost would be in excess of $1000.

Our Club By-Laws require that expenditures in excess of $1000 require a vote of the membership. After several emails with the board and discussion with some members present at the Dec 13th meteor watch it was decided to notify the membership of the situation and give them an opportunity to vote either at the Friday Dec 15th Member's Observing night or by email. Club Secretary, John Newton, sent out an email to membership on Dec 14th. The vote was 72 in favor and 1 against. Thank you members for being supportive of this club project.

James Taggart and John Newton started work on Saturday Dec. 16th. Equipment was rented to cut through the slab and break up the concrete and begin excavation. They first dug down on the outside where the water line comes in then began work on the inside. A BIG THANK YOU to JAMES and JOHN who put in several days' hard work to cut through reinforced concrete, dig down nearly six feet and remove all the dirt.

Once the excavation was complete the plumbers came to determine the best plan for repairs. It was discovered that the leak was caused by a hole worn in a copper pipe where it came went through the footing. It was decided that the best course of action was to install an entirely new line from the hose valve on the outside adjacent to the building into the bathroom underground. It will penetrate the cinder block foundation and run a new line through a sleeve. The new line will come up through the hole in the bathroom floor where he will secure it to the wall near the toilet inlet. The first portion of the plumbing project was completed Dec 30th.

The next phase of the project is to refill the holes and pour new concrete to repair the restroom floor. Due to the extreme cold the first week of January concrete work will have to be postponed until warmer temperatures so the concrete can cure properly. Once the concrete work is completed, the plumber will install a "T" to continue running the line for the sink along the curved back wall above the concrete floor. He will cover the new pipe using commercial grade insulation. The new line will be the modern freeze resistant material called PEX. PEX pipe is a non-corrosive, cross-linked polyethylene tubing capable of expansion under the damaging pressure caused by ice formation. An additional shut off valve will also be added in the restroom area.

Hopefully the work can be completed by mid to late January. Membership will be notified once the observatory is Open for use again.

Once again a big thanks to James Taggart and John Newton for all their hard work and many hours of time devoted to the repairs.

East Wall Before cut

The Big Dig

New PEX plumbing

John Newton breaking up cement

Removing Dirt and Rock

" Sorry, Our Guys didn't strike Oil or Gold "

Plumbing Update Jan 7th

John Newton, John Moore and James Taggart resumed work on the observatory restroom on Sunday Jan 7th. They poured the concrete slab to restore the floor. James has contacted the plumber and he will be scheduling the remaining work later this week. Thanks to a gift of a pillar style sink from a mysterious “Elf”. So they were able to remove the old sink and the old cabinet which was in serious need of repair.

TREASURER'S AND MEMBERSHIP REPORT

BY TIM DAVIS

Astronomy Club of Tulsa: 169 members, including 61 new members in 2017.
Welcome to our new members this month:

Mohammed Zahid, Andrew Mitchell, Jonathan Garza, Cameron Matlock, Kevin Doll, William Ross, Matthew Llewellyn, Branson Evans, Gabriel Franklin, J. W. Hutchinson and Melissa Morrow

Club Accounts as of December 31, 2017:

Checking: $ 6,997.93
Savings: $ 6,778.01
Investment accounts: $ 22,786.42 *(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 per year, includes Astronomical League Membership.
Sr. Adult: $ 35 per year for those 65 or older, includes Astro League Membership.
Students: $ 30 with League membership; Students: $ 25 without League membership.
Additional Family membership: $ 20 with voting rights and League membership.
$ 15 with voting rights but without League Membership.
The regular membership allows all members in the family to participate in club events but only ONE Voting Membership and one Astronomical League membership.

Join Online – Add or renew magazine subscriptions.
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

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 https://spaceplace.nasa.gov/ to explore space and Earth science!

Snowy Worlds Beyond Earth

By Linda Hermans-Killiam

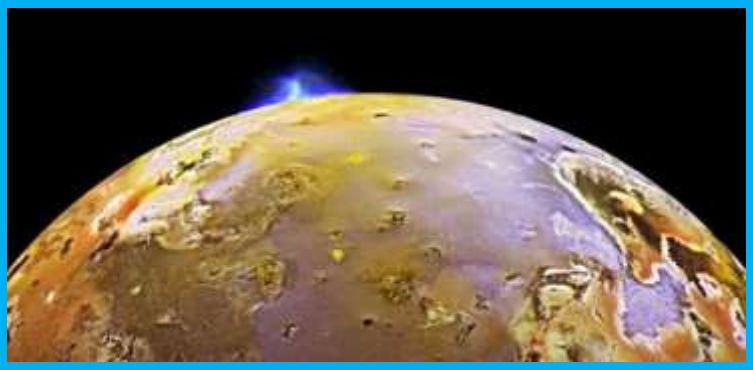
There are many places on Earth where it snows, but did you know it snows on other worlds, too? Here are just a few of the places where you might find snow beyond Earth:

Mars

The north pole and south pole of Mars have ice caps that grow and shrink with the seasons. These ice caps are made mainly of water ice—the same kind of ice you'd find on Earth. However, the snow that falls there is made of carbon dioxide—the same ingredient used to make dry ice here on Earth. Carbon dioxide is in the Martian atmosphere and it freezes and falls to the surface of the planet as snow. In 2017, NASA's Mars Reconnaissance Orbiter took photos of the sand dunes around Mars' north pole. The slopes of these dunes were covered with carbon dioxide snow and ice.

NASA's Mars Reconnaissance Orbiter captured this image of carbon dioxide snow covering dunes on Mars. Credit: NASA/JPL/University of Arizona

A Moon of Jupiter: Io



There are dozens of moons that orbit Jupiter and one of them, called Io, has snowflakes made out of sulfur. In 2001, NASA's Galileo spacecraft detected these sulfur snowflakes just above Io's south pole. The sulfur shoots into space from a volcano on Io's surface. In space, the sulfur quickly freezes to form snowflakes that fall back down to the surface.

A volcano shooting molten sulfur out from the surface of Io. Credit: NASA/JPL-Caltech

A Moon of Saturn: Enceladus

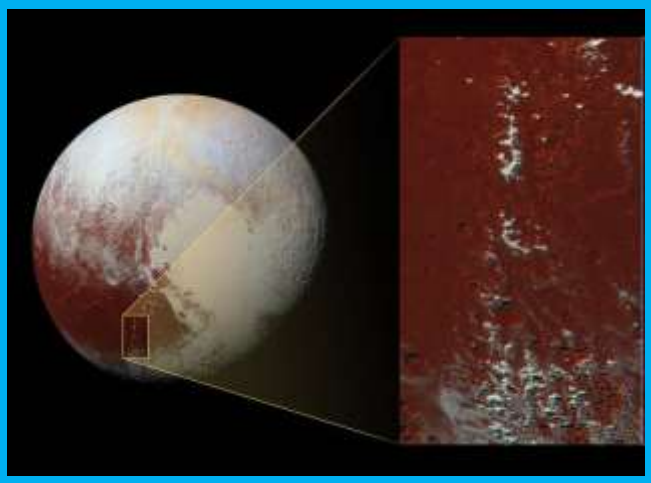
Saturn's moon, Enceladus, has geysers that shoot water vapor out into space. There it freezes and falls back to the surface as snow. Some of the ice also escapes Enceladus to become part of Saturn's rings. The water vapor comes from a heated ocean which lies beneath the moon's icy surface. (Jupiter's moon Europa is also an icy world with a liquid ocean below the frozen surface.) All of this ice and snow make Enceladus one of the brightest objects in our solar system.

Enceladus as viewed from NASA's Cassini spacecraft.

A Moon of Neptune: Triton

Neptune's largest moon is Triton. It has the coldest surface known in our solar system. Triton's atmosphere is made up mainly of nitrogen. This nitrogen freezes onto its surface covering Triton with ice made of frozen nitrogen. Triton also has geysers like Enceladus, though they are smaller and made of nitrogen rather than water.

The Voyager 2 mission captured this image of Triton. The black streaks are created by nitrogen geysers. Credit: NASA/JPL/USGS



Pluto

Farther out in our solar system lies the dwarf planet Pluto. In 2016, scientists on the New Horizons mission discovered a mountain chain on Pluto where the mountains were capped with methane snow and ice.

The snowy Cthulhu (pronounced kuh-THU-lu) mountain range on Pluto.
Credits: NASA/JHUAPL/SwRI

Beyond Our Solar System

There might even be snow far outside our solar system! Kepler-13Ab is a hot, giant planet 1,730 light years from Earth. It's nine times more massive than Jupiter and it orbits very close to its star. The Hubble Space Telescope detected evidence of titanium oxide—the mineral used in sunscreen—in this planet's upper atmosphere. On the cooler side of Kepler-13Ab that faces away from its host star, the planet's strong gravity might cause the titanium oxide to fall down as "snow."

This is an artist's illustration of what Kepler-13Ab might look like. Credit: NASA/ESA/G. Bacon (STScI)

Want to learn more about weather on other planets? Check out NASA Space Place: https://spaceplace.nasa.gov/planet-weather

Like us on Facebook

Follow us on Twitter

You are invited to come join us to learn more about
Astronomy and view the wonderful sights in the night sky.
Check our Events Page of Dates **Link to Events Page**

During the school year our club holds a
Monthly General Club meetings at
Jenks Public Schools Planetarium
105 East B St, Jenks, OK

Meetings begin at 7:00 PM

When you enter the building lobby,
take the elevator to the 3rd floor.
Click for Google Map Link

Sidewalk Astronomy Night

East side of Bass Pro in Broken Arrow near the lake.
101 Bass Pro Drive, Broken Arrow, OK
Click Map Link here

On a Saturday evening near the 1st Quarter moon Astronomy Club volunteers set up telescopes to share views of the moon, planets and other bright objects. It's a come and go event where shoppers and restaurant goers get a chance to experience glimpses of the universe with their own eyes.

ASTRONOMY CLUB OBSERVATORY
Located on a hilltop about 25 miles SW of Tulsa
Features: classroom, restroom, dome with 14 inch telescope and an acre to set up your telescopes.

Weather permitting we host two types of observing nights.

PUBLIC OBSERVING NIGHT on a Saturday
This event is open to individuals and families.
Club members set up telescope for public viewing.
***** Groups need to make separate arrangements.

MEMBERS OBSERVING NIGHT usually on a Friday near new moon
Reserved for club members and their families to allow them to pursue observing projects.

The Observatory is ONLY OPEN for SCHEDULED EVENTS. **Link to Events Page**
Click for Observatory Map
CAUTION: **DO NOT use GPS** it will likely send you on some nearly impassible back roads.

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