THE OBSERVER

The Astronomy Club of Tulsa's Newsletter Published Since 1937

RON WOOD ANN BRUUN JOHN LAND JERRY MULLENNIX

Manned Space Flight in America Comes To An End

www.astrotulsa.com

JUNE 2011

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THE COVER

As America prepares to part with manned space flight the future looks rather bleak. NASA has several great ideas but is running short on commitment from our government. My personal opinion is that support from the public could not be higher.

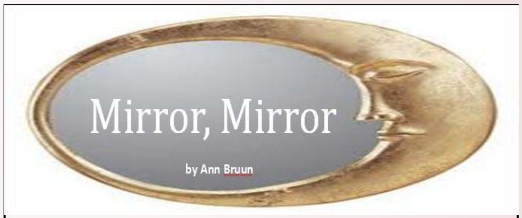
Hopefully, we are just experiencing a stumbling block and will come roaring back bigger and better than ever before. We are a long way from being counted out.

Jerry Mullennix

I would like to apologize as this edition is several days late. Unfortunately the real job has been very demanding this month with lots of vacation around here. I hope this meets with your expectations. Typically our summer letters are much smaller so I am very pleased with this offering and would like to give a special thank you to Ann Brunn and Ron Wood. Jerry Mullennix

THE OBSERVER IS EDITED & PUBLISHED BY: JERRY MULLENNIX

JUNE FEATURES



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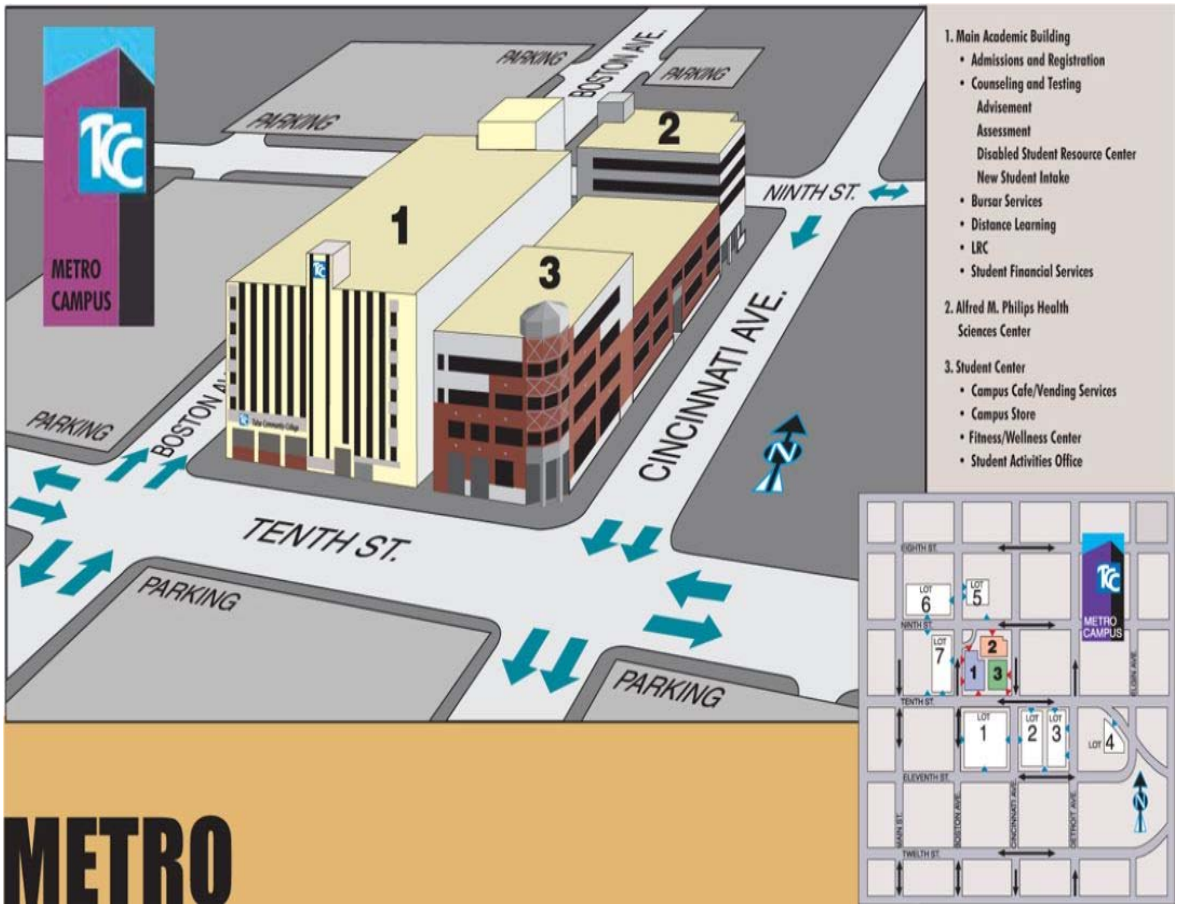
EVENTS

EVENT	PROGRAM	WHERE	DATE	TIME
June Star Party	Public Observing	ACT Observatory	6-24-2011	8:30 PM
July Star Party	Members Night	ACT Observatory	7-1-2011	8:30 PM
Sidewalk Astronomy	Public Observing	Riverwalk Crossing	7-16-2011	8:30 PM
July Star Party	Monthly Star Party	ACT Observatory	7-22-2011	8:30 PM

TCC Metro Campus - Philips Auditorium Located in Building 2 at the corner of 9th and Cincinnati. Park in Lot 5 to the north on Boston Ave.



Mirror, Mirror

by Ann Bruun

I knew the dreaded time had finally arrived. I took my scope out to a public star party and noticed three little white spots on my mirror. The thick layer of dust that had been building up over the five years I've owned the scope did not bother me but those spots did. Had someone come too close to the scope while munching potato chips? Had a bird let go with a lucky shot while I was setting up? All I knew was I wanted those white spots OFF. I would have to do it – I would have to ***clean my mirror***.

I dug out the instructions I had printed from the internet and read them carefully. You can find all sorts of instructions online. It is a good idea to read several and decide which one you think sounds best. Some of them are off the wall and give bad advice. You can also sometimes find descriptions specific to your telescope.

I gathered my supplies and got started. The first step is to remove the mirror cell from the tube. The mirror cell is the piece that includes the clips that keep the mirror from falling forward, the flotation apparatus, which supports the mirror and the collimation adjustment screws.

In my case there were six screws holding the tube to the cell. Once I removed the screws the two pieces came apart. Next I expected to just remove the clips and lift the mirror out according to the instructions. In the case of a 12" Meade Lightbridge, however, the flotation pads on the back of the mirror have been adhered to the mirror. Fortunately I had read a discussion online about this so I was not completely surprised. My two options were to use a solvent around the pad to release the mirror or just leave the mirror in the cell and give the whole thing a bath. I like simple so I chose the second option – easy.

Once the mirror cell was separated from the tube the next step was to blow any loose dust off the mirror. Compressed air is dangerous because if you don't hold it in a vertical position it can spit out chemicals. I learned this the hard way several years ago while trying to blow dust off a mirror. This time I used my Shop-Vac with a micro attachment being careful to insure I was not going to sandblast the mirror with grit.

With all the loose dust removed it was time for a bath. I added a small amount of dish soap to the lukewarm water in my bathtub. I then submerged the mirror, cell and all, and let it soak for about five minutes. I ran water out of the faucet over the mirror to remove more of the stuck-on dust. Once I was satisfied no more dust was coming

off I put the mirror back down into the soapy water and got ready to go after the white spots. This is the tricky part, the point at which I could do harm if I didn't follow the correct procedure. In my online reading I accepted the idea that dragging any dust across the mirror will cause scratches. I liked the dabbing method best with no wiping and no rubbing. With my cotton I carefully dabbed the white spots changing cotton after each touch. Once all the spots had been lightly swabbed I drained the water and rinsed the mirror and cell under tap water for a couple of minutes to ensure no residue was left. Finally I rinsed the mirror repeatedly with distilled water and set it up on its side to drain and dry. I carefully touched any water droplets with the corner of a folded Kleenex to blot the drops away.

I was pleased with the results. There were no water spots and only a very thin layer of dust was left behind. The mirror looked almost new except that the white spots remained. Upon closer inspection I discovered they were the first indication that my coating is starting to deteriorate. I have heard that mirrors need to be recoated about every ten years or so. I guess I expected to wake up one day after ten years and my mirror would suddenly need to be recoated. I never thought about the gradual deterioration that occurs over the years that leads to that point. I am now forced to accept the fact that like me, my mirror is middle aged. Fortunately, for the mirror, in another five years it can just be recoated and truly be like new again. Human recoating is not nearly as effective.

I am glad I went through the cleaning process even if the white spots remained. It is something I've been dreading for a long time and it really wasn't bad. If your time is approaching just do some reading, gather your supplies and take your time. It is not as scary as you might think.

CLARIFYING NEBULOSITY

BY: RON WOOD

The beginning astronomer quickly learns that nebulas (or nebulae) are one of the most interesting types of objects commonly observed. She may also soon learn that the nomenclature associated with them can also be somewhat nebulous. There are bright, dark, emission, absorption, diffuse and planetary nebulae. And then there are H(II) regions and supernovae remnants which are nebulae and the Great Nebula in Andromeda which is not a nebula.

Let us attempt to clarify this nebulosity. A deeper understanding of the different types of nebulae begins with the interstellar medium (ISM) where they are found.

Composition of the interstellar medium

The ISM is just the stuff between the stars within a galaxy. Furthermore, this material is relatively simple, consisting of the hydrogen and helium produced in the big bang plus the small amount of heavier atoms, called "metals" by astronomers. These "metals" which include things like oxygen and nitrogen have been produced inside stars by nucleosynthesis and then returned to the ISM by stellar winds and supernovae explosions.

Depending on local conditions the atoms of the ISM may have lost some electrons to become electrically charged ions, or they may have combined with other atoms to form molecular compounds. Ionized hydrogen is designated H(II), neutral atomic hydrogen is H(I). About 25% of the hydrogen in the ISM consists of two atoms combined to form molecular hydrogen H (2). The He is found mostly in the electrically neutral atomic form, but like hydrogen and the metals it can be ionized in extreme conditions of temperature and radiation.

In addition to these two transparent gases which make up 99% of the ISM, there is dust in the form of very fine particles with a typical size of 500 nanometers which is comparable to the particle size in cigarette smoke and to the wavelength of blue light, a fact which is relevant to an understanding of reflection nebulae.

A typical grain is elongated and believed to be composed of carbon in a graphite-like crystal structure mixed with silicates like olivine (MgSi03). Nearly all of the elements like carbon and silicon in the ISM are tied up in dust. In molecular clouds the grains appear to be coated with a water-ice shell. These materials have been injected into the ISM by stellar winds and supernovae.

Architecture of the ISM

The interstellar medium is blasted by supersonic shock waves from supernovae explosions, swirled by magnetic fields and energized by cosmic rays and ultraviolet radiation resulting in structure at all scales. The neutral gas and dust is distributed in a clumpy fashion with cool, denser regions that astronomers call "clouds" but which are more like filaments which tend to lie along the galactic plane.

These clouds have typical temperatures of 100-300K and densities of 10-100 atoms per cc. Surrounding this filamentary network and somewhat thicker is a warmer (1000K) less dense (.1 atom per cc) medium. Scattered throughout this region are occasional large (150ly) dense (1000 atoms per cc) regions with temperatures as low as 10K called Giant Molecular clouds (GMCs).

The Realm of the Nebulae

So how does this composition and structure lead to the various nebulae that we observe? First and foremost remember that a nebula is just a cloud in the interstellar medium. Next, take note of the fact that all nebulae are either bright or dark. If they emit or reflect light they are bright nebulae, and if they are seen in silhouette against a brighter background they are dark nebulae.

Bright nebulae are either emission or reflection nebulae. If they are extended and have no well defined boundaries they are described as diffuse nebulae which differentiates them from planetary nebulae like the Ring or Helix or Dumbell.

Emission nebulae are visible because they emit light. This is the case for H (II) regions, planetary nebulae and supernovae remnants. The light from

these nebulae is generated by the process called fluorescence which occurs when ionized or excited atoms emit photons at precise visible wavelengths as they recapture electrons and return to lower energy levels, producing bright line emission spectra in the process.

The Orion Nebula is a diffuse emission nebula known as an H(II) region. It is a bubble on the side of a much larger giant molecular cloud. The four newly formed very hot massive stars known as the trapezium emit intense ultraviolet light, exciting the surrounding hydrogen gas causing it to fluoresce. Fluorescence is also the underlying process in the case of planetary nebulae such as the Ring, Eskimo, Owl and the Helix. The Crab and Veil nebulae are supernova remnants and bright emission nebulae.

Reflection nebulae, like the one surrounding the Pleiades does not involve fluorescence. And though they are called reflection nebulae it might be more precise to call them "scattering" nebulae.

The stars within the gas and dust of the nebula are illuminating it but they are not energetic enough to cause ionization and fluorescence. When the illuminating photons encounter the grains of dust they are scattered by an amount inversely proportional to the fourth power of their wavelength, meaning that scattering is much greater for the short wavelength blue light than for the longer red wavelengths.

So the red component passes through and out of the nebula while the blue is repeatedly scattered, illuminating the cloud from the inside like a blue Chinese lantern. This process is called Rayleigh scattering and is also the explanation for the red sunsets and blue skies here on earth.

Dark nebulae, sometimes called absorption nebulae, are seen as empty patches in a field of stars or as dark clouds obscuring part of a bright nebula in the background, as in the case of the Horsehead Nebula. Some GMCs can be seen as dark nebulae and Hubble images of the Orion nebula reveal the small (2-3 ly) dark nebulous bodies called Bok globules, believed to be an early stage of star birth prior to the onset of fusion reactions.

Because of the difficulty of observing them optically, dark nebulae don't receive much attention from amateur astronomers, but they have a rather larger impact on the professional community because of the phenomena of extinction and interstellar reddening. Measurements of luminosity and spectra of distant objects must be corrected for the loss of light (extinction) and losses at blue wavelengths (interstellar reddening) during passage through intervening dark nebulae.

ASTRONOMY CLUB OF TULSA

OBSERVER

June 2001

http://AstroTulsa.com

ACT, Inc. has been meeting continuously since 1937 and was incorporated in 1986. It is a nonprofit; tax deductible organization dedicated to promoting, to the public, the art of viewing and the scientific aspect of astronomy.

What

The Astronomy Club of Tulsa Club Picnic and Star Party

When

June 22, 2001 at 6:00 P.M.

Where

Club Observatory near Mounds, OK.

Notes from the President

John Land

Club Picnic and Star Party - Friday June 22nd. If the weather is cloudy on the Friday then we will meet on Saturday. Future Events: July 20, Aug 10 - 11

During the warmer months many club members and their guests enjoy gathering at the club's observatory for an evening of observing and visiting with friends. For the new comers to astronomy this is a great chance to see different types of telescopes and enjoy a variety of celestial objects. Arrive early and bring materials for a picnic before sundown. We have plenty of tables and chairs and even an outdoor grill. All you need to bring is plenty of food and drinks and some snack food or dessert to share with others. Its summer time so remember to bring your insect repellent. If you stay late a light jacket or windbreaker may be useful depending on the weather conditions. The observatory does have a single access restroom.

We typically have 30 to 50 people for these events and 15 to 20 telescopes to look through. In addition our observatory features a 16-inch telescope and classroom area. We also have about 1.5 acres of open ground for setting up your own equipment. This is a great time to begin work on one of the observing certificate programs offered by the Astronomical League. Families are welcome but Children MUST be supervised. You can see more about the observatory at our website. The Observatory is open at club star parties and other scheduled events. If you plan to go at other times < *Gerry Andries e-mail* > or a club officer should be notified. Due to our remote location it is not advised for observers to go alone. See schedule of events below.

THE OBSERVER JUNE 2001 10 YEARS AGO

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AS THE DOME TURNS

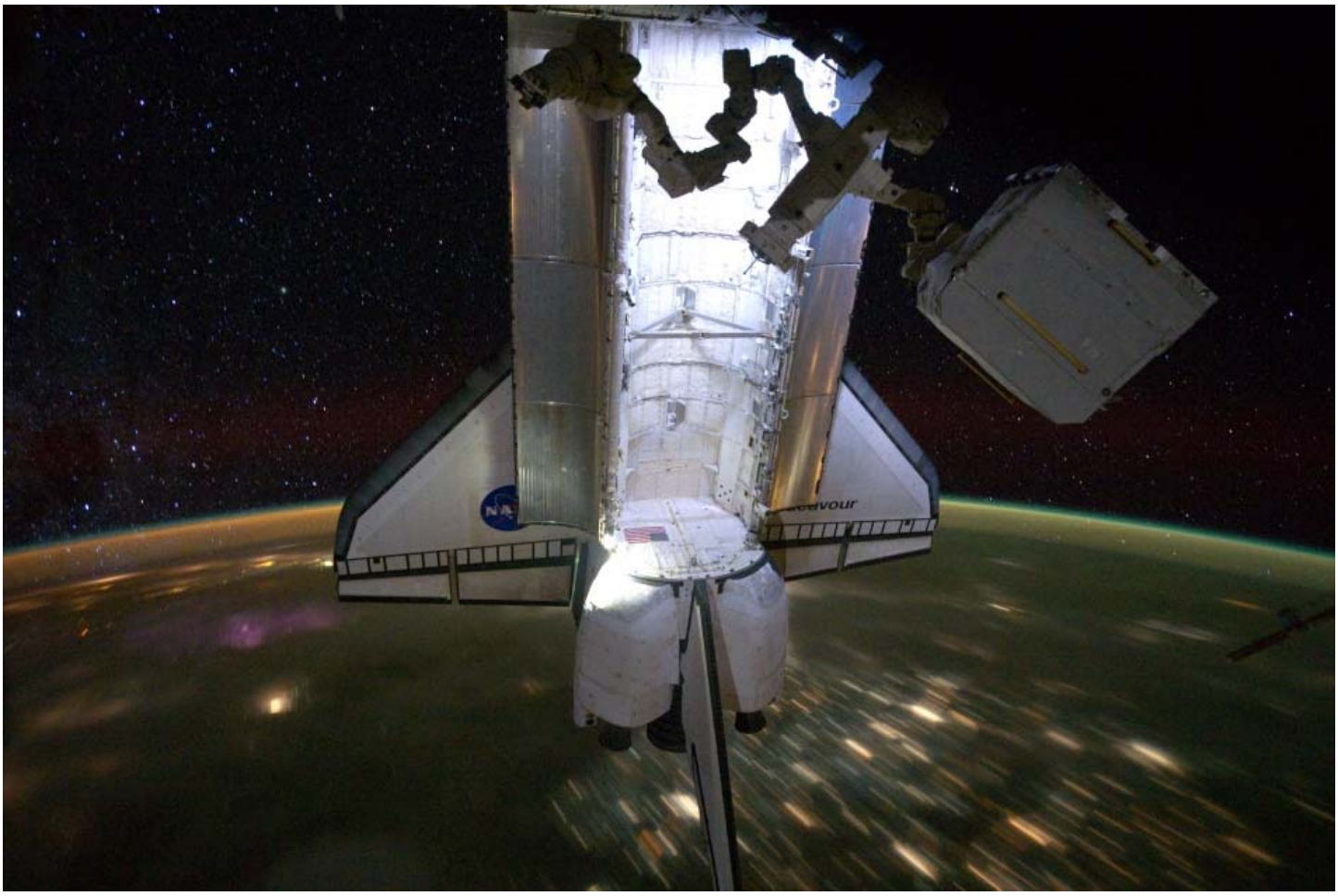
A Photo Essay By: Jerry Mullennix

As the Space Shuttle era comes to a close I wanted to post a few of my favorite pictures and a brief explanation of each. All of this came from Astronomy Picture of the Day.

Credit & Copyright: Ben Cooper (Launch Photography)

Explanation: In the final move of its kind, NASA's space shuttle Atlantis was photographed earlier this month slowly advancing toward Launch Pad 39A, where it is currently scheduled for a July launch to the International Space Station. The mission, designated STS-135, is the 135th and last mission for a NASA space shuttle. Atlantis and its four-person crew will be carrying, among other things, the Multi-Purpose Logistics Module Rafael to bring key components and supplies to the ISS. Pictured above, the large Shuttle Crawler Transporter rolls the powerful orbiter along the five-kilometer long road at less than two kilometers per hour. Over 15,000 spectators, some visible on the right, were on hand for the historic roll out.

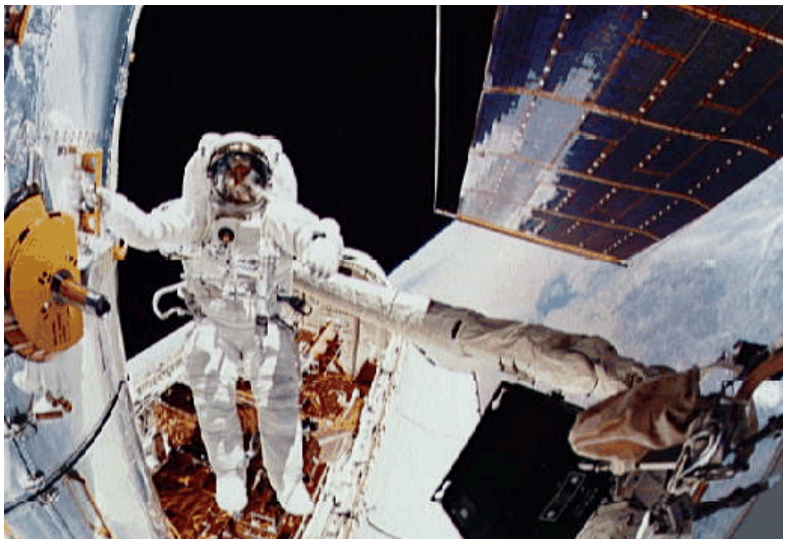
Explanation: They are some of the most complex machines ever built. From a standing start they can launch a school- bus sized object up so high and moving so fast that it won't fall back down. They have launched numerous revolutionary satellites that enable humans to communicate across the globe, to better understand Earth's atmosphere, and to peer into the distance universe. They are NASA's Space Shuttles, and NASA has recently released large digital posters to honor them. While the inaugural flight was in 1981, the shuttle fleet is aging and is now nearing retirement. Pictured above, the space shuttle Endeavour is shown rising to orbit, with patches for each of its missions shown in a spiral. Endeavour was named for the HMS Endeavour, a British research ship that explored the south Pacific Ocean in the 1700s, depicted on the lower right. On the upper left are panoramic windows delivered by Endeavour to the International Space Station earlier this year. In the background near the top is the NGC 602 nebula as imaged by the Hubble Space Telescope, which was serviced by Endeavour in 1993. Posters for all of the shuttles, including Atlantis, Challenger, Columbia, Discovery, Endeavour are available.



Explanation: This luminous night view of the space shuttle orbiter Endeavour, docked with the International Space Station for a final time, was captured on May 28. Orbiting 350 kilometers above planet Earth, Endeavour's payload bay is lit up as it hurtles through Earth's shadow at 17,000 miles per hour. At the top of the frame, the jointed appendages of the station's robotic manipulator arm Dexter appear in silhouette. Motion during the long exposure produced streaks in the starry background and the city lights on the darkened planet below. Completing a 16 day mission, Endeavour made a final landing at Kennedy Space Center in the dark, early morning hours of June 1.

WHO WAS FIRST? April 12, 1981 Columbia blasted into space. Her construction began in 1975 and before Her fiery re-entry over Texas on 2-1-2003 she deployed 8 Satellites, spent 300 days in space 4,808 orbits, travelled 125 million miles and completed 28 missions.

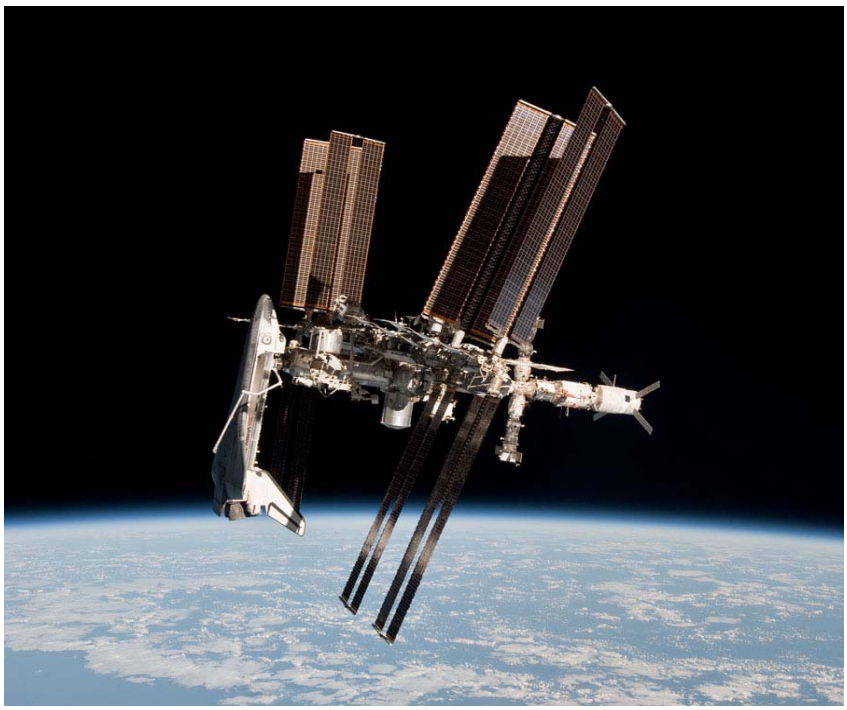
Explanation: What's that rising from the clouds? The space shuttle. If you looked out the window of an airplane at just the right place and time last week, you could have seen something very unusual -- the space shuttle Endeavour launching to orbit. Images of the rising shuttle and its plume became widely circulated over the web shortly after Endeavour's final launch. The above image was taken from a shuttle training aircraft and is not copyrighted. Taken well above the clouds, the image can be matched with similar images of the same shuttle plume taken below the clouds. Hot glowing gasses expelled by the engines are visible near the rising shuttle, as well as a long smoke plume. A shadow of the plume appears on the cloud deck, indicating the direction of the Sun. The shuttle .



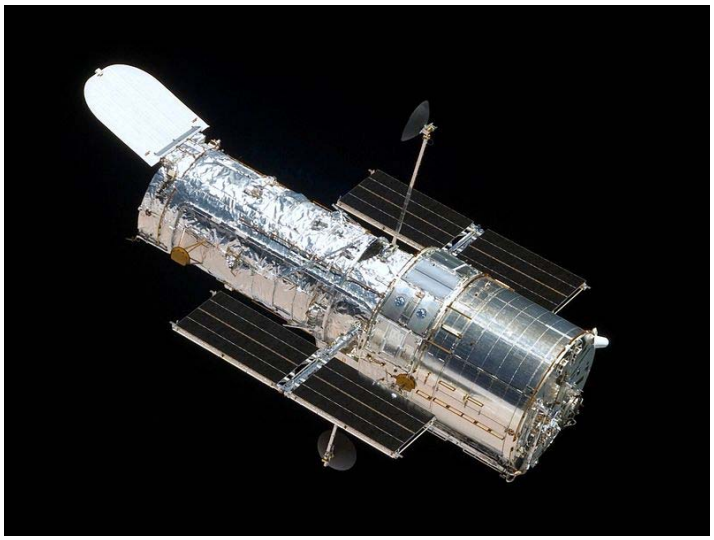
Explanation: The first Hubble Space Telescope (HST) servicing mission, STS-61, was one of the most complicated shuttle missions ever planned. Launched on December 2, 1993 in the Space Shuttle Endeavor, the astronauts were required to make 5 space walks to repair the HST. Astronaut F. Story Musgrave, holding one of the handrails on the HST, is seen here during what became the second longest space walk in NASA history at just under 8 hours. The highly successful mission demonstrated the ability of shuttle astronauts to repair satellites in orbit and allowed the HST to continue to explore the Universe.

Brand Spanking New Challenger's rollout from Orbiter Processing Facility (OPF) to the Vehicle Assembly Building (VAB) . 8-25-1983. I intentionally have left the images of Challenger and Columbia's disasters out of this photo essay. There are millions of them out there and we have seen them time and time again. If you are not familiar with Challengers final mission and NASA's attempt to send the first teacher into space I strongly recommend you read the story. Jerry

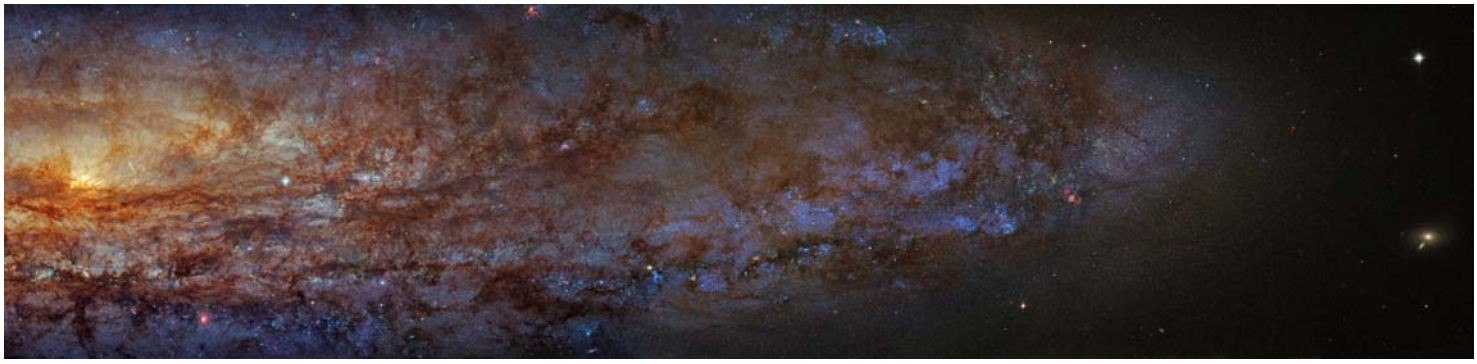
Explanation: Space shuttle Endeavour is home to stay. In a rare night landing last week, Endeavour glided onto a runway in Cape Canaveral, Florida, USA completing a 16-day mission that included a visit to the International Space Station (ISS). All told, space shuttle Endeavour flew 25 flights since being deployed by NASA in 1992, spending a total of 299 days in space. Endeavour's next mission will be a stationary one in the California Science Center. Even as Endeavour was landing, the space shuttle Atlantis was being rolled out in preparation for the last mission of any Space Shuttle, a mission currently scheduled to begin on July 8.

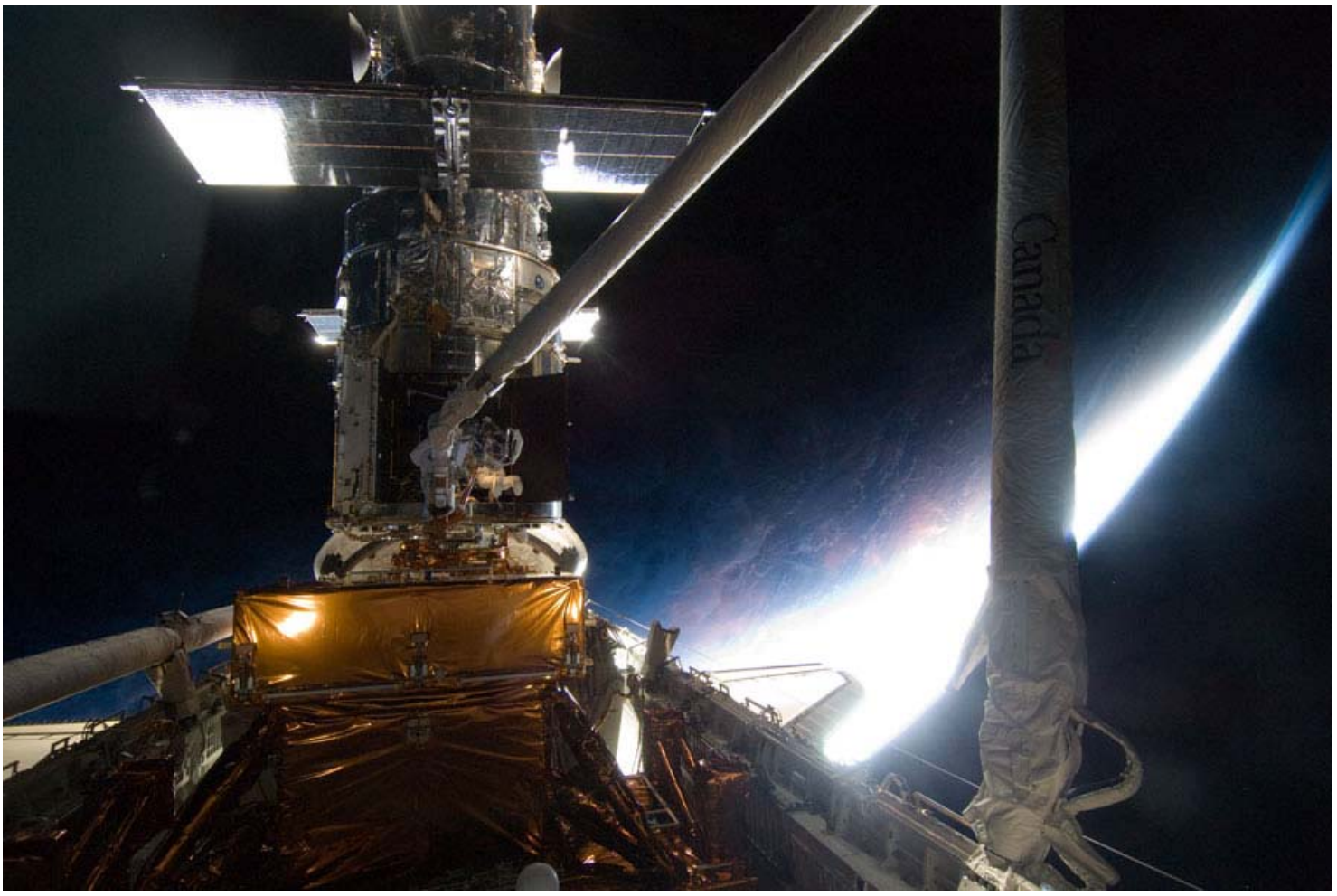


Explanation: How was this picture taken? Usually, pictures of the shuttle, taken from space, are snapped from the space station. Commonly, pictures of the space station are snapped from the shuttle. How, then, can there be a picture of both the shuttle and the station together, taken from space? The answer is that during the Space Shuttle Endeavour's last trip to the International Space Station two weeks ago, a supply ship departed the station with astronauts that captured a series of rare views. The supply ship was the Russian Soyuz TMA-20 which landed in Kazakhstan later that day. The above spectacular image well captures the relative sizes of the station and docked shuttle. Far below, clouds of Earth are seen above a blue sea. The next and last launch of a US space shuttle is scheduled for early July.

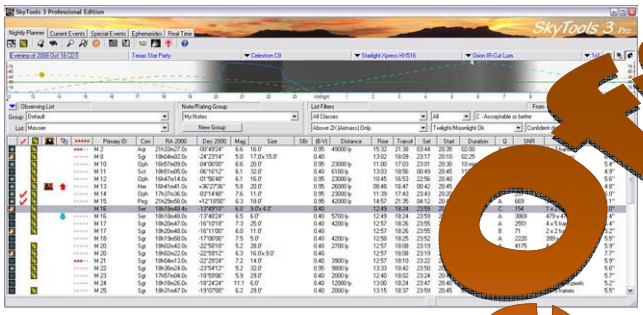


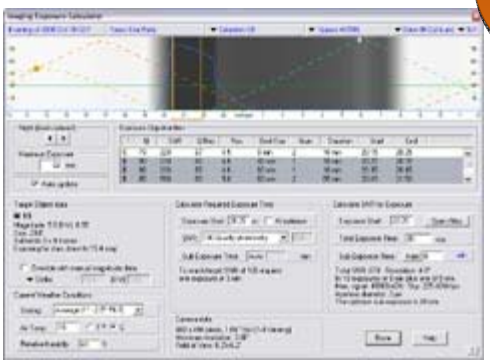
OK, I know this is not a shuttle, it is a picture of the Hubble Space Telescope and the history of this magnificent instrument would have been a very sad one without the numerous shuttle missions. Views like below of NGC 253 would have never happened as the Hubble left Earth with optics that were not perfect. NASA devised a plan to upgrade the software to compensate for the imperfections but it required someone go up and fix it. This great telescope is still sending daily pictures to us in majestic detail because of our great Shuttle Crews and the hours they spent keeping this scope alive. Bottom photo is Hubble linked to the shuttle on one of the repair missions.





SkyTools 3 Club Discount





Discount offer

SkyTools 3 is offering discounts to astronomy clubs that make group orders. SkyTools 3 is observing software that can be used for planning, creating charts [illegible] ing sessions. It is offered in a [illegible] Pro version. Here is the URL to their website:

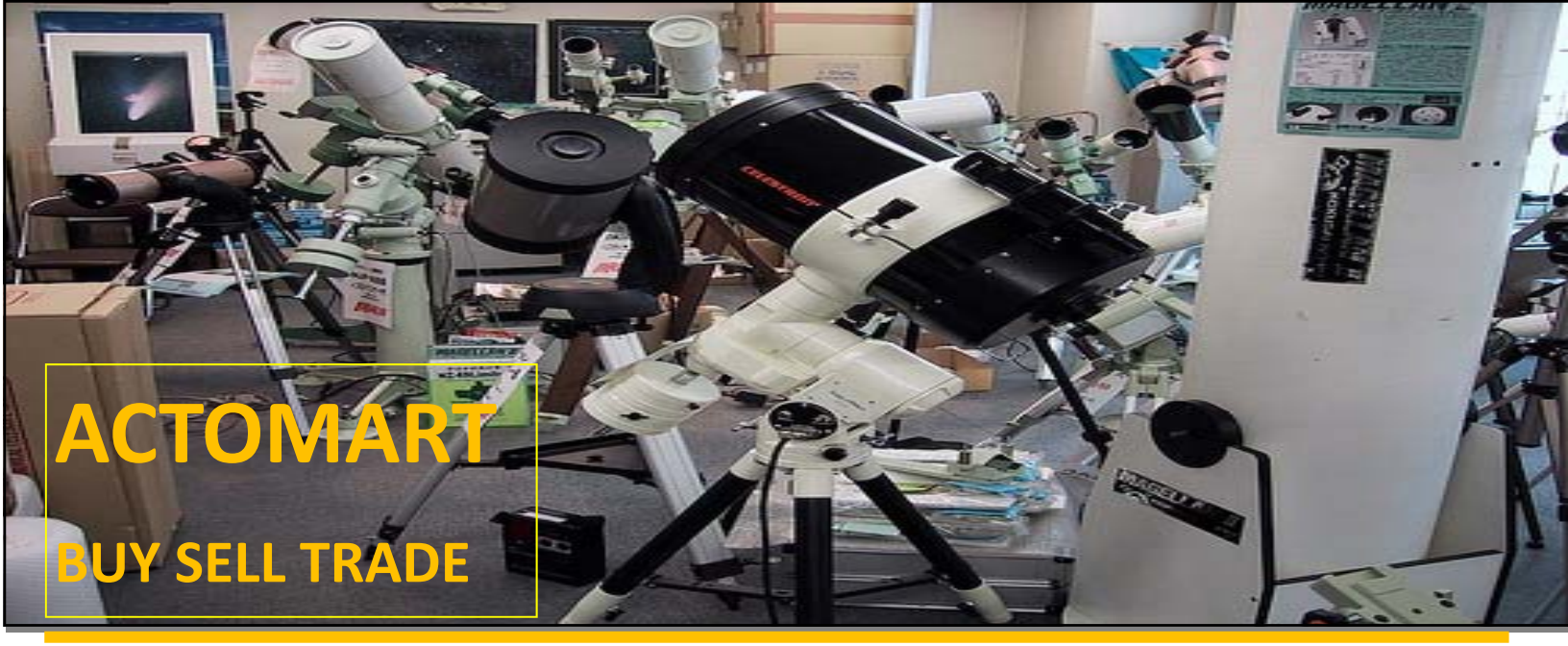
http://www.skyhound.com/[illegible]ols.html

The club discount applys [illegible] ers of 2 or more. A 25% discount is offered fo[illegible]irst 2 to 9 with higher discounts for 10-24 etc. [illegible] details at:

http://www.sky[illegible]und.com[illegible]discounts.html

A[illegible]Astronomy Club of Tulsa members that are interested in ordering a copy should let me know at act_obs@astrotulsa.com (that's act_obs) I plan to make the order around the end of May.

Ann Bruun



ACTOMART

BUY SELL TRADE

ACTOMART is a available to any member of the Astronomy Club of Tulsa free of charge. If you would like to sell your items on ACTOMART please contact John Land or Jerry Mullennix and we will be happy to post your products.

Hello! I attended one of your star nights at the observatory in the Fall and thought you all might be a good starting point. My husband and I have a Celestron NexStar 8 SE Telescope, along with many accessories and Eyepieces that we are wanting to sell. I just thought if anybody had any interest at all, it might be you all or your members. We have owned everything for about a year and we have used it about 3 times. Anyone can contact me if there is any interest. My contact information: Heather Thomas 918-269-6801 hdt12@mac.com Thank you, Heather Thomas

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STAR PARTIES WITH THE ASTRONOMY CLUB OF TULSA

SUMMER STAR PARTIES IN TULSA ARE ONE OF A KIND.

MAKE PLANS TO JOIN US THIS YEAR AND BRING THE WHOLE FAMILY.

THE TOY BOX

Here are a few new items that look very interesting. I have not spoken with anyone who has tried any of these but would welcome any review on new astronomy gear. This is not an endorsement of any of these items and the information provided is from the respective companies website.

Celestron
2835 Columbia St., Torrance, CA 90503
310-328-9560; celestron.com

Celestron unveiled its series of fully self-aligning telescopes at the Consumer Electronics Show last January. The SkyProdigy 130 ($799) features a 5.1-inch (130-mm) f/5 Newtonian Reflector coupled to the company's most technologically advanced Go To Altazimuth mount to date. Simply turn on the power, push a button, and the SkyProdigy aligns itself using a built-in digital camera and Celestronís StarSense technology. The entire process takes only about three minutes. The mount's internal database includes more than 4,000 celestial objects and there are customized sky tours for any time of the year. The SkyProdigy 130 includes a unit-power red-dot finder, 25- and 9-mm 1º-inch eyepieces, and a CD-ROM of The SkyX Light Edition. It is powered by eight D-cell batteries.

iOptron
6F Gill St., Woburn, MA 01801
781-569-0200; iOptron.com

Enjoy the Northern Hemisphere's night sky from your own home or classroom with iOptronís new LiveStar Mini Planetarium ($99). LiveStar accurately projects the brightest stars, constellation lines, and Milky Way onto your walls and ceiling. Align the unit's base to point south with the built-in compass, then set your latitude, time, and date, and you're ready to enjoy the Mini Planetariumís show. LiveStar is powered by an AC adapter, and includes a wireless remote control that allows you to brighten or dim the unit, speed up, reverse, or stop the globeís rotation.

Lunt Solar Systems
2520 N. Coyote Drive Suite 111 Tucson AZ 85745
520-344-7348 ; luntsolarsystems.com

Andy Lunt, son of the late David Lunt who founded Coronado Technology Group, is carrying on a family tradition with the launch of Lunt Solar Systems, a company dedicated to producing affordable solar telescopes and filters. The LS35THα ($499) is a hydrogen-alpha telescope that breaks new ground for a compact system that can show the Sun’s prominences and delicate surface detail. Featuring a full-aperture, 35-mm etalon, the system has a bandpass narrower than 0.75 angstrom, and it comes with a mounting bracket and diagonal — just add a tripod and eyepiece and you’re ready to enjoy our nearest star.

Barska's 80mm Triplet

$599

Barska
1721 Wright Ave., La Verne, CA 91750
909-445-8168; barska.com

Barska's new Magnus 80ED refractor ($599) offers color-free performance at an affordable price. The Magnus 80ED features an 80-mm f/7 air-spaced triplet objective with one element made of extra-low-dispersion glass that reduces color fringing to nearly imperceptible levels. Its dual-speed 2-inch Crayford-style focuser combined with an included 90∞ erect-image 2-inch diagonal makes the scope ideal for both astronomical and terrestrial viewing. Each scope comes complete with a tripod mounting bracket, a 1º-inch adapter, and an 8-to-24-mm 1º-inch Plˆssl zoom eyepiece, as well as a foam-lined hard carrying case.

Put the Solar System on your ceiling.

From: John Land

Wal-Mart is carrying night light that projects an image of the Solar system on your ceiling or wall. It also has a soft blue glowing orb to light up the floor. Depending on far it projects the image can be as much a feet or more across. So being a soft hearted Grandpa I just had to get some for my grandsons. They also come in Tropical Fish or Princess Castles. For $ 8 it's a fun way to bring the sky indoors. The product is licensed by a Jasco Products Company, LLC in Oklahoma City.

(PS I found them over in the section where they sell light bulbs and such)

OBSERVER

The Astronomy Club of Tulsa's Newsletter

Published Since 1937 **February 2011**

Lands Tidbits – by *John Land* for May 2011

Membership rates for 2011 will be as follows.

Adults - $ 45 per year includes Astronomical League Membership

Sr. Adult $ 35 per year for those 65 or older includes Astronomical League Membership

Students $ 30 with League membership Students $ 25 without League membership.

Additional Family membership $ 20 with voting rights and League membership. $ 15 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.

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 / yr** www.skyandtelescope.com

Sky and Telescope also offers a 10% discount on their products.

Note: **You may renew your Sky & Telescope subscription Directly Online** without having to mail in the subscriptions to the club. NEW SUBSCRIPTIONS must still be sent to the club treasurer.

We now have an automated on line registration form on the website for new AND renewal memberships plus magazine subscriptions. You simply type in your information and hit send to submit the information.

http://www.astrotulsa.com/Club/join.asp **To Join or Renew Memberships**

You can then print a copy of the form and mail in your check.

Astronomy Club of Tulsa - 25209 E 62nd St – Broken Arrow, OK 74014

Address Corrections- Email changes – Questions:

You may forward questions to the club by going to our club website and Fill out an online form or just click on John Land and send an email. Please leave a clear subject line and message with your name, phone number, your question – along with email

CLUB OFFICERS

President	Owen Green	918-851-8171
Vice-President	Teresa Davis	918-637-1477
Treasurer	John Land	918-357-1759
Secretary	Tamara Green	918-581-1213

BOARD MEMBERS AT LARGE

Bill Goswick	
Allen Martin	918-407-9706
Tim Davis	
Chris Proctor	918-810-6210

APPOINTED STAFF

Newsletter Editor	Jerry Mullennix	
Facility Manager	Chris Proctor	918-810-6210
Membership Chair	John Land	918-357-1759
Observing Chair	Ann Bruun	918-834-0757
New Members	Owen Green	918-851-8171
Group Director	Tamara Green	918-581-1213
Webmaster	Jennifer Jones	
Night Sky Network	Teresa Davis	918-637-1477

MEMBERSHIP INFO

Astronomy Club of Tulsa membership ($45/year) includes membership in the Astronomical League and subscription to ACT's "Observer" and AL's "Reflector". "Astronomy" ($34/year) and "Sky and Telescope" ($33/year) are also available through the club. For more information contact John Land at 918-357-1759. Permission is hereby granted to reprint from this publication provided credit is given to the original author and the Astronomy Club of Tulsa "Observer" is identified as the source.

Jim "O'Toole" Millers—Astro Words of Wisdom:

"For Gas Money Today I will gladly repay you Tuesday"

ACT welcomes your questions, suggestions, comments and submissions for publication. Please send all inquiries to jerrym@pantherenergy.us