Astronomy Club of Tulsa

Observer

September 2012

Photo: Sagittarius and the Milky Way over the west ridge of Camp Billy Joe, OTSP 2012, by Tamara Green.

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October 2012

Tulsa, Oklahoma

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1 Sunrise: 7:19am Sunset: 7:08pm Moonrise: 7:50pm Moonset: 8:46am	2 Sunrise: 7:20am Sunset: 7:07pm Moonrise: 8:26pm Moonset: 9:43am	3 Sunrise: 7:20am Sunset: 7:05pm Moonrise: 9:05pm Moonset: 10:38am	4 Sunrise: 7:21am Sunset: 7:04pm Moonrise: 9:48pm Moonset: 11:32am	5 **Public Star Party** Sunrise: 7:22am Sunset: 7:02pm Moonrise: 10:34pm Moonset: 12:23pm	6 Sunrise: 7:23am Sunset: 7:01pm Moonrise: 11:24pm Moonset: 1:11pm
7 Sunrise: 7:24am Sunset: 6:59pm Moonrise: none Moonset: 1:55pm	8 Sunrise: 7:25am Sunset: 6:58pm Moonrise: 12:18am Moonset: 2:36pm Last Qtr: 1:34am	9 Sunrise: 7:25am Sunset: 6:57pm Moonrise: 1:15am Moonset: 3:14pm	10 Sunrise: 7:26am Sunset: 6:55pm Moonrise: 2:14am Moonset: 3:50pm	11 Sunrise: 7:27am Sunset: 6:54pm Moonrise: 3:15am Moonset: 4:24pm	12 **M.O.O.N.** Sunrise: 7:28am Sunset: 6:52pm Moonrise: 4:18am Moonset: 4:58pm	13 Sunrise: 7:29am Sunset: 6:51pm Moonrise: 5:24am Moonset: 5:33pm
14 Sunrise: 7:30am Sunset: 6:50pm Moonrise: 6:31am Moonset: 6:10pm	15 Sunrise: 7:31am Sunset: 6:48pm Moonrise: 7:41am Moonset: 6:51pm New Moon: 6:04am	16 Sunrise: 7:31am Sunset: 6:47pm Moonrise: 8:53am Moonset: 7:36pm	17 Sunrise: 7:32am Sunset: 6:46pm Moonrise: 10:03am Moonset: 8:28pm	18 Sunrise: 7:33am Sunset: 6:44pm Moonrise: 11:11am Moonset: 9:25pm	19 Sunrise: 7:34am Sunset: 6:43pm Moonrise: 12:13pm Moonset: 10:28pm	20 Sunrise: 7:35am Sunset: 6:42pm Moonrise: 1:08pm Moonset: 11:33pm
21 Sunrise: 7:36am Sunset: 6:41pm Moonrise: 1:55pm Moonset: none First Qtr: 9:33pm	22 Sunrise: 7:37am Sunset: 6:39pm Moonrise: 2:36pm Moonset: 12:38am	23 Sunrise: 7:38am Sunset: 6:38pm Moonrise: 3:12pm Moonset: 1:43am	24 Sunrise: 7:39am Sunset: 6:37pm Moonrise: 3:45pm Moonset: 2:45am	25 Sunrise: 7:40am Sunset: 6:36pm Moonrise: 4:16pm Moonset: 3:45am	26 **A.C.T. Meeting** Sunrise: 7:41am Sunset: 6:35pm Moonrise: 4:47pm Moonset: 4:43am	27 **Sidewalk Astronomy** Sunrise: 7:42am Sunset: 6:34pm Moonrise: 5:18pm Moonset: 5:41am
28 Sunrise: 7:43am Sunset: 6:32pm Moonrise: 5:50pm Moonset: 6:38am	29 Sunrise: 7:44am Sunset: 6:31pm Moonrise: 6:25pm Moonset: 7:35am Full Moon: 1:51pm	30 Sunrise: 7:44am Sunset: 6:30pm Moonrise: 7:03pm Moonset: 8:31am	31 Sunrise: 7:45am Sunset: 6:29pm Moonrise: 7:44pm Moonset: 9:25am			

Daylight Saving/Summer Time is in effect for the entire month.

UPCOMING EVENTS:

Public Star Party	Fri, Oct 5	ACT Observatory	6:30 PM
Members' Night	Fri, Oct 12	ACT Observatory	6:30 PM
General Meeting and Elections	Fri, Oct 26	TCC NE Campus	7:00 PM
Sidewalk Astronomy	Sat, Oct 27	Bass Pro	6:30 PM

Friday Sept 28 at 7:00 PM at TCC NE campus

Our guest speaker will be Dr. Yun Wang Associate Professor of Cosmology at Oklahoma University. Dr. Wang's research focus is in the filed of cosmology probing the mysteries of the early universe. One of the most intriguing current aspects of cosmology is that *"Our Universe has been observed to be undergoing accelerated expansion today. The unknown reason for this cosmic acceleration is referred to as "dark energy". At present, we do not know whether it is a new energy component of the Universe with negative pressure, or a modification of Einstein's theory of gravity. Solving the mystery of the nature of dark energy is the most important problem in cosmology today."* Current research suggests that over 70% of the known universe may be composed of DARK ENERGY. Dr. Wang will be sharing with us what her research is revealing about this fascinating frontier of astronomy. Dr. Wang has been a guest of our club in the past and has a compelling way of presenting her research to our members.

My research has focused on extracting fundamental physics from cosmological data, in particular, probing dark energy and early universe physics using supernovae (SNe), cosmic microwave background anisotropy (CMB), and cosmic large scale structure data.

Our Universe has been observed to be undergoing accelerated expansion today. The unknown reason for this cosmic acceleration is referred to as "dark energy". At present, we do not know whether it is a new energy component of the Universe with negative pressure, or a modification of Einstein's theory of gravity (i.e., general relativity). Solving the mystery of the nature of dark energy is the most important problem in cosmology today. Dark energy can be probed using various techniques, most notably, using Type la supernovae (SNe la) as cosmological standard candles. I have done fundamental work in the use of supernovae to probe dark energy. My work has ranged from survey strategy, optimal data analysis, to the modeling of weak lensing effects. In the last several years, I have focused on using galaxy redshift surveys to probe dark energy and test gravity theories.

I am involved with observational projects to probe dark energy from both space and ground. I am a member of the Wide-Field Infrared Survey Telescope (WFIRST) Science Definition Team, and a member of the LSST Supernova Science Collaboration. I served as the U.S. Representative on the Science Advisory Team for Euclid-NIS, and am now a member of the Euclid Consortium.

2013 Astronomy Calendars and Observing Guides

Its time again to place your orders for the 2013 Astronomy Calendars

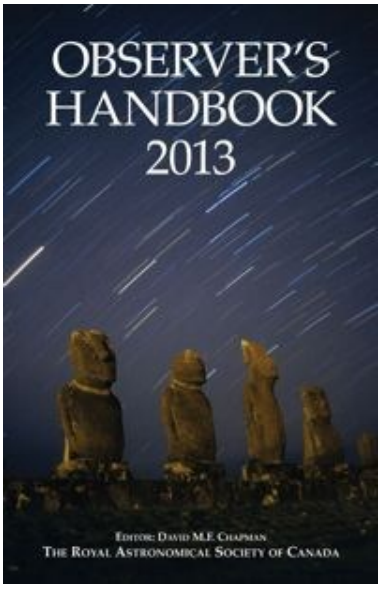
and Canadian Observers Handbook. Since we won't have a December meeting all orders need to be placed ASAP – on or before our Oct 26 club meeting. Delivery will be made at our annual club dinner on Nov 16th.

To order or questions Contact John Land astroclubbiz AT windstream.net

$ 10 each 2013 Astronomy Wall Calendar

Preorder or available at meetings –limited supply available.

The calendar is filled with stunning images of stars, planets, galaxies, and other deep space wonders. A highly informative essay accompanies each inspiring photograph. For each month, celestial viewing opportunities, historical events, and national holidays are listed. ***View a portion of this product!***



$ 27 each – Orders must be PREPAID ONLY –Include $ 3.50 Extra to have issue mailed to you.

The Observer's Handbook is a 352-page guide published annually since 1907 by The Royal Astronomical Society of Canada. Through its long tradition and the expertise of more than 50 contributors, the Observer's Handbook has come to be regarded as the standard North American reference for data on the sky. The material in the Handbook is of interest to professional and amateur astronomers, scientists, teachers at all levels, students, science writers, campers, Scout and Guide leaders, as well as interested general readers. The Observer's Handbook is an integral part of many astronomy courses at the secondary and university levels, and it should be on the reference shelf of every library. http://rasc.ca/handbook

This fall the **Great World Wide Star** count takes place during the dark of the moon **Oct 5 to Oct 19, 2012**. This is a citizen science co-operative effort to obtain thousands of observations all over the world and map out the effects of light pollution on a large scale. You don't have to be an expert on the sky. Just willing to take about 30 minutes of your time to contribute to this global effort. It's a great opportunity for students or adults to get involved in real science. Our club has observing nights scheduled on Oct 5th and 12th** but you can observe from anywhere. You might want to compare the sky near your home to the club's observatory site or your favorite countryside recreation spot.

Details can be found at **http://www.windows2universe.org/starcount/**

Star maps at **http://www.windows2universe.org/starcount/GWWSC2011_ActivityGuide.pdf**

Clicking on the individual star maps will give an enlarged view.

Finding your location: Since I don't have a GPS, I was able to ZOOM in on my house using their Geocode link.

I simply typed in my address and used the map and satellite views to zoom in on my driveway.

http://eo.ucar.edu/geocode/

***Editor's Note: The observing night scheduled on Oct 12 is for **club members and their families only.** The public viewing night is Oct. 5.*

President's Message

By Ann Bruun

Fall is here and that means the return of our monthly meetings. This months meeting, September 28th, will feature a talk by Professor Wang from the University of Oklahoma. When she spoke to the club several years ago we had a packed house and I am very excited we could get her again this year.

Just a reminder, our October meeting is our club election meeting. If you have been a member of the club for at least a year and you have not served on the board before I encourage you to consider a position. We need leaders willing to step forward and represent the club. If you have any questions ask one of the current board members or officers. Anyone who wants to run for an office, including president, please let Tamara Green, our secretary, or me know so we can put you on the ballot. I will not be running for president this year because of work commitments.

We are also planning the November dinner meeting. It will be held at TASM again this year. Everyone enjoyed the atmosphere last year and the free planetarium presentation made it even better.

We have a lot to look forward to and the shorter days mean longer nights for us to enjoy the stars!

Ann Bruun

Astronomy Club of Tulsa

President

Land's Tidbits

By John Land

Heart of America Star party near Butler, MO
Oct 10 to Oct 14 **http://www.hoasp.org/**

Notice – Be sure your membership is current in order to vote at the club's annual elections at our October meeting.

Astronomy Club of Tulsa - Treasurer Report by **John Land**

The club has **109 members** including **24 new memberships** this year

In 2012 - **151** people requested information on the website version section

Newest Members - Steve Perkins, Melissa Cunningham, Paul DeMuro

Expenses	Deposits	Balance	Checking Account
		$ 1,224.32	Aug 14 Balance
	$ 393.00	$ 1,620.32	Deposits
$ 89.35		$ 1,530.97	Routine Expenses
$ 134.95		$ 1,396.02	Member Mag Subscriptions
		$ 1,396.02	Aug 14 Balance
		$ 7,004.37	Aug 14 Savings
		$ 7,004.37	Sept 18 Saving

Investment Account - End of month		Account Value varies with Market	
$ 15,305.62	Dec-11	May	$ 15,611.46
$ 15,682.28	Jan-12	June	$ 16,231.22
$ 16,067.58	Feb	July	$ 16,506.73
$ 16,217.08	Mar	August	$ 16,663.61
$ 16,240.96	Apr	Sept	

The Secretary's Stuff

By Tamara Green

Hello All!

Our next meeting at TCC will be on Friday, Sep 28 at 7:00 PM.

We are going to have a really great guest speaker, Dr. Yun Wang, Associate Professor of Cosmology at the University of Oklahoma!

Also, next month is our annual election of Officers and Board members-at-large. If you know of someone whom you would like to nominate for an office or board position, or if you are interested in such a position yourself, drop me a line at astronomer.misstamara@yahoo.com and I will get your name or your nominee's name on the ballot.

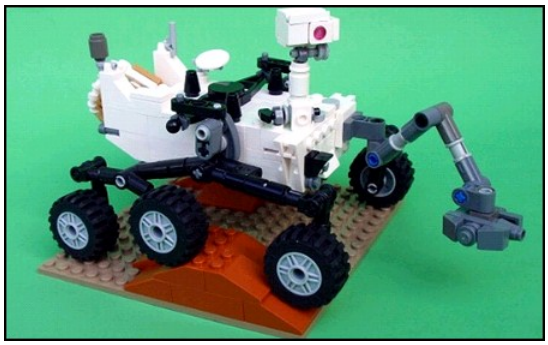
That is all I have for now, other than to tell you what a great time Owen and I had at Okie-Tex!

For those of you who have never been, you really should experience it at least once. I have included some pictures I took there and some pictures from Lee Bickle of the event to give you an idea of how rich of an experience it really is!

Hope to see you all on the 28th and Clear Skies to you!

Tamara

P.S., something John sent me that looks like a fun idea for kids of all ages, including us!



Build your Own Mars Rover from Lego's
Complete parts and diagrams at
http://lego.cuusoo.com/ideas/view/3431#

There is a nice article at the first telling about Curiosity. Followed by a step by step pictorial PDF for construction. At the end is a full visual listing of all the parts need and sources for buying if you don't have them all.

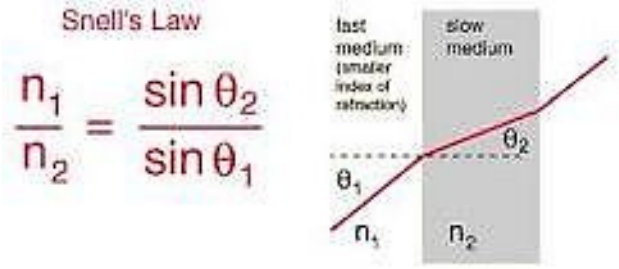
There's Physics in your Telescope
by Ron Wood

If your telescope is a reflector, the basic law of physics involved is the law of reflection.

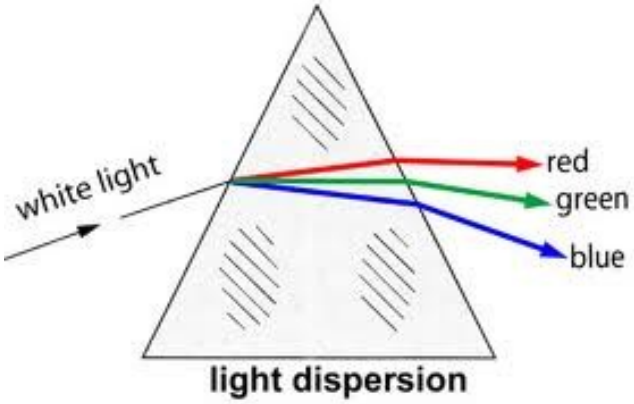
It is so simple and intuitive that it hardly seems worthy to be called a law. It just says that when a ray of light strikes a mirror, the angle of reflection is equal to the angle of incidence, both angles measured from the "normal," which is perpendicular to the surface.

If you want a mirror that will form a point image of a star, this law is all you need to determine the mirror's shape which, of course, is a paraboloid. Only with the parabolic shape will rays traveling parallel to the optical axis form an image at the focal point, while satisfying the law of reflection.

If your telescope is a refractor, the basic law of physics involved is Snell's law of refraction. Light rays coming from a distant star travel parallel to the optical axis, strike the objective lens and are bent (refracted) inward toward the normal to the lens' surface and toward the optical axis by an amount given by Snell's law. The rays travel through the lens at a reduced speed given by c/n-- where "c" is the speed of light in a vacuum and "n" is the index of refraction, defined as the ratio of the speed of light in a vacuum, to its speed in the lens. Crown glass, a common type in refractors, has a refractive index of 1.33.

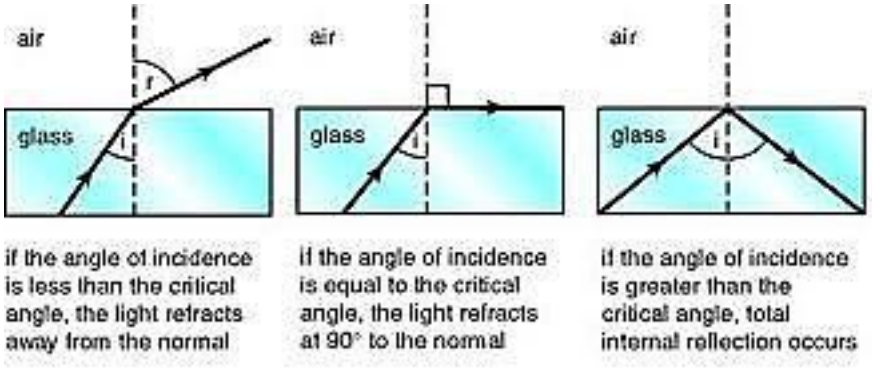


In addition to refraction there is a second phenomenon which takes place inside the lens. White light is a mixture of wavelengths and the amount of refraction is greater for the shorter blue wavelengths and less for the longer red wavelengths. This dependency of refraction on wavelength and the resulting separation of colors is the phenomenon called dispersion. The more strongly refracted blue waves are focused nearer the lens than the red wavelengths. This failure to focus all wavelengths at a single point is called chromatic aberration.



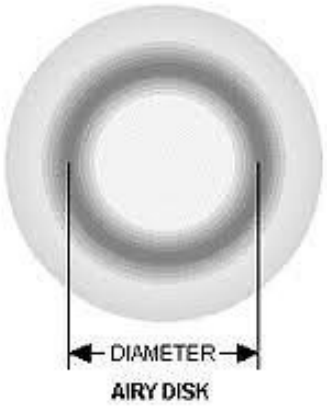
Chromatic aberration is greatly reduced by using an objective lens called a doublet-- consisting of two elements with different shapes and different indices of refraction. A doublet will bring the red and blue components to a common focal point. A refractor using a doublet objective is called an achromat. If a third element is introduced the intermediate wavelengths of green light can also be brought to the common focus. Such a refractor is called an apochromat.

Total internal reflection is another phenomenon related to refraction. A light ray passing from an optically slow medium, such as glass, into one where its speed is greater, such as air, is refracted away from the normal. As the angle of incidence is increased the angle of refraction will eventually reach ninety degrees. The angle of incidence which produces a 90 degree angle of refraction is called the critical angle and for all angles of incidence greater than the critical angle the ray will not pass into the faster medium but will instead be totally internally reflected just as if it had struck a mirror.



For an air/water boundary the critical angle is 49 degrees; for an air/crown-glass interface it is 41degrees, and for air/diamond it is 24 degrees. Diamonds are cut so as to produce total internal reflection. The folded light path in binoculars is achieved by total internal reflection within its prisms. Transmission of light through optical fibers is a result of total internal reflection.

Another phenomenon at work in your telescope is diffraction. Diffraction refers to the slight bending of a wave as it passes the edge of an obstacle such as the edge of your telescope's aperture or the support vanes of your secondary mirror. A result of diffraction is that instead of seeing a point image of a distant star in your telescope you see, instead, a tiny bright spot known as the "Airy" disk, which, together with a series of concentric bright rings around it, is called the "Airy" pattern. Images made with reflectors may show long diffraction spikes radiating from the bright stars.



The size of the Airy disk is inversely proportional to the diameter of the aperture and directly proportional to the wavelength of the illuminating light. By examining this pattern at high magnification you can judge the quality of your optics, but, because of the very small size of the diffraction pattern, this is only possible under very steady atmospheric conditions. The size of this diffraction pattern determines the theoretical limit on the resolving power of your telescope. Two close stars are said
to be resolved when the center of the Airy disk of one falls on the first dark ring in the Airy pattern of the other. This is the Rayleigh criterion for resolution.

For a wavelength of 5500A, the 10 meter Keck telescope has a theoretical diffraction limit of 14 milli-arc seconds. You can compute the theoretical resolving power, (s), of your scope from the formula: $s = 2.76/D$, where D is the aperture in inches and (s) is given in arc seconds. This formula is for a wavelength of .000022 inches, the middle of the visible spectrum.

Unless your telescope is embarrassingly cheap, any lenses will be coated, and there is more physics here. Anti-reflection coatings were a German military secret until the early stages of World War II. The purpose of the coatings is to reduce reflection, producing brighter images with higher contrast. There are two common types of coatings, which work by different physical principles.

The simplest form of anti-reflective coating was discovered by Lord Rayleigh in 1886 and is known as "index matching." He discovered that some tarnished lenses actually transmitted more light that those newly made. Further experimentation revealed that by coating a lens with a film of material having an index of refraction midway between that of air and glass, reflection would be decreased and transmission increased. The index for air is essentially 1, and for crown glass it is 1.58, suggesting that the best coating should have an index of about 1.23.

One of the most common coatings in use today is magnesium fluoride with an index of 1.38 which is not optimal, but it is cheap and easy to apply. It reduces reflection from 4% for uncoated crown glass to about 2%. It should be stressed that this 2% reduction is added to the transmitted beam, not lost. It is possible to further reduce reflection by using multiple layers of other materials with incrementally increasing values of refractive index.

The second type of anti-reflection coating, sometimes called a "thin film coating," is based on the phenomenon of interference and consists of a single quarter-wave thick layer of transparent material whose refractive index is the square root of the substrate's refractive index. This, theoretically, gives zero reflectance at the central wavelength and decreased reflectance for wavelengths in a broad band around the center of the visible spectrum. The incident light reflects from the front and back surfaces of the thin film. These two reflected waves are then 1/2 wavelength out of phase so that they destructively interfere. Multiple thin layers can eliminate reflection across the entire visible spectrum.

There is a lot of physics in your telescope!

A fly-by for Neil By Ed Downs

(Observing the Apollo 11 Landing site and Tribute to Neil Armstrong)

(Ed is a member of our Astronomy club and also writes a monthly article for an Aviation magazine)

Regular readers of *In Flight USA* may have picked up on the fact that editorial opinions and the fun of connecting flying with space sciences come from the unsettled mind of a single person, this writer. It was planned to follow our standard two topic format in September. But history intervened to change those plans. A remarkable person, test pilot and astronaut passed away, and those who remember when this country was proud of its scientific accomplishments took a moment to reflect. Neil Armstrong is gone. The passing of this great American connects opinion, feelings, flying and science together in a way that warrants that only one story should be written this time. Please know that the Staff of *In Flight USA*, plus every aviator and astronomer I know extends their most hart felt sympathies and condolences to Neil's family and friends, for their loss is unspeakable. Indeed, God speed, Neil.

This writer was in his hotel room after a long day of teaching a Flight Instructor Refresher Clinic, tired and sore from standing for over 10 hours. But the evening was not over. Research was needed to confirm some facts and numbers before continuing with this month Skies to Stars column. With a cross country planned to the Moon, I was time to fire up the computer, unfurl a detailed Moon map, and consider how I would locate my destination, the Apollo 11 landing site. The quest for data clarification started with a search engine entry regarding Apollo 11 technical information, but I was stopped cold in my tracks. Almost every search link connected to some comment about the passing of Neil Armstrong, commander of Apollo 11 and the first man to set foot on the moon. This was the first I had heard of this news. I fired up the TV and confirmed that a person I had never met, but considered a friend and mentor, was gone. An era was at an end, like so many "eras" of scientific adventure and courage that have come to an end in recent times.

It was perhaps fitting that my sad discovery took place while planning a telescope adventure for the *Skies to Stars* column. But new meaning had now been assigned. The intent had been to discus our nearest celestial neighbor, the Moon, and then undertake a telescope adventure to visit this familiar sight. The planned "flight" would now be much more than a sight seeing trip, it would be a low fly-by over the Apollo 11 landing site, to acknowledge the achievements of Neil and the historic figures of Americans former moon program. Readers are invited to join in on this trip, to envision that you are seeing what is being described. Take moment to salute astronauts Neil Armstrong, Buzz Aldrin and Michael Collins with me as we make a low flyby of the Moon.

By now you may be wondering what is meant by a "fly-by" of the Apollo 11 landing site? Certainly, this is not a "real" flight. But, in practical sense it is real, using a high quality astronomical telescope. The reflector telescope use for this flight does much more than simply "magnify" an object being viewed. Reflector technology was invented in 1668 by famed British scientist and physicist, Isaac Newton. Yes, this is the "apple on the head" gent of children's tails, who in real life co-invented calculus and many other mathematical principles that drove you crazy in high school. His telescope design consists of a finely polished mirror at the base of the telescope that collects and concentrates light, the secret of all celestial viewing. That concentrated light is then sent forward to the entry end of the telescope, where it encounters a secondary mirror that turns the light 90 degrees so that it is aimed at an eyepiece mounted to the exterior of the telescope. It is the eyepiece, which can be quickly changed from one magnifying power to another, that magnifies the highly concentrated light into a clear image that can be view directly, electronically sent to a computer, or into the lens of a camera. Referred to a "Newtonian" telescope, this basic technology has been used in virtually all telescopes that have made some of our greatest discoveries.

Let's get ready for the trip. This writer's Orion telescope has a 12-inch reflecting mirror, a good size for amateur viewing. Set up and "pre-flight is important. Our scope is carefully positioned away from bright lights and in an area free of major light pollution common in urban environments. A few simple adjustments, known as "culminating" precisely aligns the primary and secondary mirrors. For this trip, a 5-millimeter eyepiece will be used. A simple formula is applied that divides the length of the telescope (1500 millimeters) by the length of the eyepiece to determine the magnifying power that results, in this case, 300X. Let's put this in terms of a fly-by. The Moon does not "circle" the earth; it orbits in an elliptical pattern, with a perigee of 221,600 miles and an apogee of 252,500 miles. Have you ever looked up and thought, "Boy, the moon really looks big and bright tonight?" You were probably seeing the Moon at its closest, as the eye will pick up that 15,000 mile difference. If you average that difference out, and then divide it by the power of the telescope, you get a number close to 800. Our telescope will not just magnified the Moons image; it will moved our view to within 800 miles of the surface of the Moon. That will be our fly-by altitude on this trip.

Certainly too high to see the lander, but absolutely close enough to see the details of craters, volcanoes, mountains and flat lands that were seen by Neil and Buzz while on final approach. Topographical features use to identify the Apollo 11 landing sight will be clearly visible.

Next, our trip needs a high quality, high resolution Moon map that identifies the target. This writer chose one published by Sky and Telescope magazine, but there are others. Quality is important as our trip is pure pilotage, we will need to recognized geographic patterns and specific crater locations. Apollo 11's landing site was almost smack on the equator of the moon, in the western hemisphere. If just looking at the Moon, this would be on the right hand side. The landing was targeted for the southern region of the Mare Tranquillitatis (Sea of Tranquility), which lays on and slightly above the equator. Above Tranquility is Mare Serenitatis (Sea of Serenity) and below Tranquility is the much smaller Mare Nectaris (Sea of Nectar). Of course, these are not real seas, but massive areas that have been flooded by lava millions of years ago, causing the surface to "melt" into a relatively flat plain. Early observers interpreted these as being oceans. The three seas link together in a vertical pattern that makes them one of the first checkpoints we will look for. This is remarkably similar to identifying the multitude of dry lakes in the high deserts of our western U.S. Our magnification will start low to aid in finding large objects, like the seas, and then increased as we look for specific craters and mountainous outcroppings. A key checkpoint will be three craters, Theophilus, Cryillus and Catharina, which appear to be linked together, much like the top three rings of the Olympic Games logo. As we look closer, the landing sight is several hundred miles north of these craters where mountainous outcroppings join Tranquility and Nectar. Yes, there are plenty of checkpoints all of which were memorized by Neil and Buzz; to be called out over the radio as they approached their destination. Okay, our scope is set up and flight plan charted. Let's go.

Take off is planned so that the Moon is almost overhead. This means we are looking through the thinnest part of Earths atmosphere, about 20 miles of potential distortion. A low azimuth view could result in looking through a thousand mile of air. Our maximum magnification of 300 is at the edge of good viewing limits. More than that and all you see is atmospheric distortion. Next, we must make sure that a dimming filter is attached to the eye piece. Remember, the light is being concentrated and the Moon is highly reflective. If unfiltered, viewing can actually be painful, like staring into a bright light bulb. Our first eyepiece equates to a distance of about 7000 miles above the Moons surface and the entire Moon can be seen. One quickly notes that the image is upside down and left and right orientation can be confusing. One must spend time to become accustomed to this inverted viewing and learn to relate it to our Moon map. It does not take long to identify the three seas and we can move in for a closer look. Our next look is at an altitude of 1600 miles above the surface and the entire moon is no longer visible. We can now see the three checkpoint craters. Regrettably, the Moon is three quarters full during our trip, meaning it is extremely bight, a condition that blanks out some surface detail. Ideally, an object close to the terminator line (day/night) is much easier to see as deep shadows give everything a three dimensional look. It is now time to descend to our fly-by altitude of 800 miles, and sure enough, even with poor contrast, the mountains and outcroppings at the Apollo 11 landing sight are clearly visible. We are now, in real time and personally, seeing the place where the words "One small step for (a) man, one giant leap for mankind" where spoken. This writer paused, and wept, and prayed.

The fly-by to honor Neil was complete. It was a surprisingly emotional trip, both sad and angry. Sad for the loss of a quite champion of the human spirit and exploration. Angry because of the contempt and disregard being shown towards scientific achievement by our supposed political leadership. Even with the stunning success of the Curiosity Mars landing, the media only ask question about justifying the cost and complaining about the money being tossed into space. No spacecraft of any type, certainly not Apollo 11, carried a suitcase filled with millions in cash, to be forever lost to the citizens of the U.S. The work of NASA is spread throughout the economy, to thousands of vendors, service providers, universities and tens of thousands of direct and indirect employees, **meaning more jobs to drive our economy!** It is not even possible to calculate the benefits of technological fallout, with the space program having been the parent of countless private businesses and technologies that we all use every day. This writer can think of no other government program that has so positively affected our economy and world leadership status in such a direct, measurable, fashion. Neil knew this, our astronaut corps knows this and the pros at NASA know this. Maybe it is time for "management" to talk to the "real workers" and get our country back on track

A LITTLE MINI-PICTORIAL FOR YOUR ENJOYMENT!

For those of you who have not been, a sampling of what this event has to offer.

For those of you who have, a little opportunity to relive the grand memories!

Pictures by Lee Bickle and Tamara Green.

Enjoy!

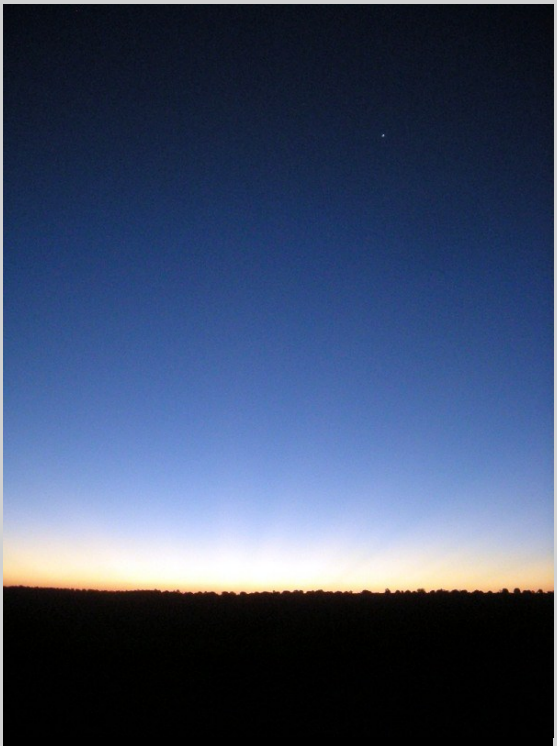
Camp and Kenton From Black Mesa Summit, by Lee Bickle. You can hike to the highest point in OK!

The annual Okie-Tex Star Party is about much more than just a week's worth of astronomy. It is also about discovery of the many natural wonders that Oklahoma, Colorado and New Mexico have to offer and the forging of new, lifelong friendships and memories. Once you go, you'll get it! You'll want to go back year after year!

Black Mesa from Capulin Volcano, by Lee Bickle. About 1.5 hrs away is this magnificent extinct volcano and its hiking trails!

Okie Tex 2012, by Lee Bickle. There is plenty of hiking and mesa climbing around camp too!

Friday Sunset, by Lee Bickle.



Saturday Sunrise, by Lee Bickle.

Whole Camp at Sunrise Saturday, by Lee Bickle.

Scenery, by Lee Bickle.

Tulsa Camp, by Lee Bickle.

Scenery 2, by Lee Bickle.

Michael and Steve w/scopes, by Tamara Green.

At camp, waiting for dark, by Tamara Green.

Bob and Gerald wait for dark, by Tamara Green.

There are always plenty of things to do at Okie-Tex while waiting for nightfall. Capulin Volcano, Dinosaur Tracks, lots of good food and fellowship!

Some of the guys at lunchtime, by Tamara Green. Nobody ever eats alone at Okie-Tex!!

Michael giving sage advice in the caldera of Capulin Volcano, by Tamara Green.

Capulin Volcano on a cloudy Wednesday afternoon, by Tamara Green. A really fun place to visit!

AND THERE'S SHOPPING!!!! Many vendors come out to Okie-Tex every year to offer for sale many different items for astronomers, from T-shirts to books to eyepieces! There is a quilt raffle and even a big drawing for some nice prizes!

Owen with Cathie from S&S Optika, by Tamara Green.

The astronomy-themed quilt that was raffled off for this year, PHOTO by Tamara Green.

The Vendors' Hall, by Tamara Green.

Sagittarius with the Milky Way, by Tamara Green. 1-min. exposure, 800 ISO, shot with a Canon Rebel XTi.

Cassiopeia and Andromeda, by Tamara Green. 1-min exposure at 800 ISO, same camera.

The Big Dipper in Ursa Major, by Tamara Green. Same exposure and ISO, same camera.

Star Trails around Polaris, by Tamara Green. 1-hour exposure.

A better shot of Sagittarius and the Milky Way, by Tamara.

Another nice shot of the Dipper, by Tamara Green.

THE MAIN REASON WE COME EACH YEAR: HOW ABOUT THAT BEAUTIFUL DARK SKY?????????

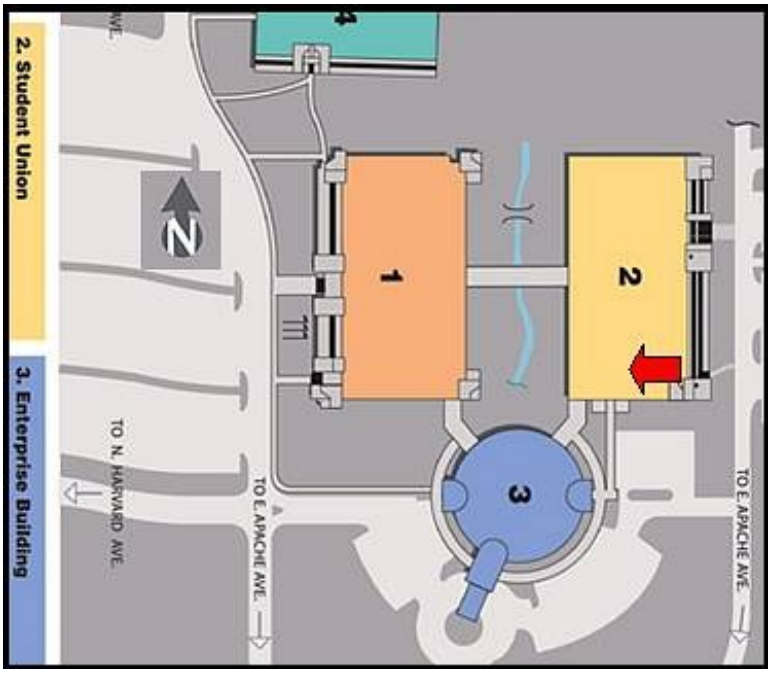
Where We Meet:

TCC Northeast Campus, 3727 E. Apache St., Student Union Bldg. 2, Room 1603

There is PLENTY of parking, lighting and security on this campus.

To get to TCC NE Campus, take the Harvard Exit off of Hwy. 11 (Gilcrease Expressway). Go south for about 1/2 mile to the campus located at the corner of N. Harvard and Apache. Turn east on Apache and take the entrance in front of Bldg. 3 (the large round building). Then turn right and park in front of Student Union Building #2. Room 1603 is just off of the lobby.

Google-type driving direction map at http://www.tulsacc.edu/13273/



We hope to see you there!

Friday, October 26, 7:00 PM.

Program: (TBA)

CLUB OFFICERS

PRESIDENT	ANN BRUUN	918-231-0301
VICE PRESIDENT	TONY WHITE	918-231-0900
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PR/OUTREACH/SIDEWALK ASTRONOMY	OWEN GREEN 918-851-8171
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FUNDRAISING CHAIR	CATHERINE KAHBI 918-230-8480

MEMBERSHIP INFORMATION

MEMBERSHIP RATES FOR 2012 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.

MAGAZINES:

Astronomy is $34 for one year or $60 for 2 years.

www.astronomy.com

Sky & Telescope is $33 per year.

www.skyandtelescope.com

Sky & Telescope offers a 10% discount on their products.

If you are an existing S&T subscriber, you can renew directly with S&T at the same Club rate. Both S&T and Astronomy now have digital issues for computers, iPads and smart phones.

ONLINE REGISTRATION

We now have an automated online registration form on the website for new memberships, membership renewals and magazine subscriptions. Just simply type in your information and hit “send” to submit the information. You can then print a copy of the form and mail it in with your check. At this time we do not have an option for credit card payment, but we may explore that at a later time.

Link: http://www.astrotulsa.com/Club/join.asp

THE ASTRONOMY CLUB OF TULSA INVITES YOU TO

MAKE PLANS THIS FALL TO JOIN US AT AN ASTRONOMY CLUB OF TULSA STAR PARTY!

OPEN TO THE PUBLIC

For more information please visit www.astrotulsa.com.

The Observer is a publication by the Astronomy Club of Tulsa. The Astronomy Club of Tulsa is a 501C 3 non-profit organization open to the public. The Club started in 1937 with the single mission to bring the joy and knowledge of astronomy to the community of Tulsa, OK and the surrounding area. Today our mission remains exactly the same. We travel to local schools, churches and many other venues with scopes and people to teach. Our observatory is located in Mounds and many public programs are offered there. To join the Astronomy Club of Tulsa please visit www.astrotulsa.com where you will find all the information necessary to become a member.