

INSIDE THIS ISSUE:

CALENDAR & EVENTS	2
IMAGE OF M42, BY FRANK NEWBY	3
MESSIER MARATHON	
ANNOUNCEMENT	4
PRESIDENT'S MESSAGE	7
TREASURER/MEMBERSHIP REPORT	8
SECRETARY'S CORNER	9
SPECIAL GUEST ARTICLE:	
"THE MAJESTY OF YESTERYEAR'S	
PLANETARIUM", BY F. JACK EASTMAN	10
NITELOG	12
WHERE WE MEET	19
OFFICERS, BOARD & STAFF	21



ASTRONOMY CLUB OF TULSA

# OBSERVER

FEBRUARY 2015

PERMISSION TO REPRINT ANYTHING FROM THIS NEWSLETTER IS GRANTED, **PROVIDED THAT CREDIT IS GIVEN TO THE ORIGINAL AUTHOR AND THAT THE ASTRONOMY CLUB OF TULSA "OBSERVER" IS LISTED AS THE ORIGINAL SOURCE.** FOR ORIGINAL CONTENT CREDITED TO OTHERS AND SO NOTED IN THIS PUBLICATION, YOU SHOULD OBTAIN PERMISSION FROM THAT RESPECTIVE SOURCE PRIOR TO REPRINTING. THANK YOU VERY MUCH FOR YOUR COOPERATION. PLEASE ENJOY THIS EDITION OF THE OBSERVER.

THE ASTRONOMY CLUB TULSA  
IS A PROUD MEMBER OF



THE ASTRONOMICAL LEAGUE



PHOTO: Comet Lovejoy and the Pleiades, by Skip Whitehurst. Taken from the ACT Observatory on Fri, Jan 16 using a Canon 60Da, Canon 100 mm f/2.8 piggybacked on a AT6RC/CG -5GT. He took 16 frames, 25 seconds each, ISO 3200 f/3.5 stacked in DSS (20 frames total, 4 rejected.) Post-processing done in GIMP. Thank you Skip for this wonderful image!

# FEBRUARY 2015

MOON PHASES AND HOLIDAYS:

SUN	MO	TUE	WED	THU	FRI	SAT
1	2	3 	4	5	6	7
8	9	10	11 	12	13	14
15	16	17	18 	19	20	21
22	23	24	25 	26	27	28



FULL MOON (Snow Moon) TUE FEB 3  
 LAST QUARTER WED FEB 11  
 VALENTINE'S DAY SAT FEB 14  
 PRESIDENT'S DAY MON FEB 16  
 NEW MOON WED FEB 18  
 FIRST QUARTER WED FEB 25

UPCOMING EVENTS:

GENERAL MEETING	FRI FEB 6	7:00 PM	JENKS HS PLANETARIUM
SIDEWALK ASTRONOMY	SAT FEB 7	6:00 PM	BASS PRO
MEMBERS' NIGHT	FRI FEB 20	6:15 PM	ACT OBSERVATORY
MEMBERS' NIGHT BACKUP	SAT FEB 21	6:15 PM	ACT OBSERVATORY
PUBLIC STAR PARTY	SAT FEB 28	6:30 PM	ACT OBSERVATORY
GENERAL MEETING	FRI MAR 6	7:00 PM	JENKS HS PLANETARIUM
SIDEWALK ASTRONOMY	SAT MAR 7	6:30 PM	BASS PRO
CLUB WORK DAY	SAT MAR 14	TBA	ACT OBSERVATORY
MEMBERS' NIGHT	FRI MAR 20	7:30 PM	ACT OBSERVATORY
MESSIER MARATHON	SAT MAR 21	TBA	TUVA

# MARCH 2015

MOON PHASES & HOLIDAYS:

SUN	MON	TUE	WED	THU	FRI	SAT
1	2	3	4	5 	6	7
8	9	10	11	12	13 	14
15	16	17	18	19	20 	21
22	23	24	25	26	27 	28
29	30	31				



FULL MOON (Worm Moon) THU MAR 5  
 LAST QUARTER FRI MAR 13  
 ST PATRICK'S DAY TUE MAR 17  
 VERNAL EQUINOX FRI MAR 20  
 NEW MOON FRI MAR 20  
 FIRST QUARTER FRI MAR 27

DAYLIGHT SAVING TIME BEGINS SUN  
 MAR 8



## The Orion Nebula, M42



The Orion Nebula, M42, Image by Club Member Frank Newby. This image was taken in a neighborhood 5 miles SE of Broken Arrow, using an 8-inch Orion Astrograph telescope with a Paracor corrector at f/4/5. The camera used is a Canon T3I at prime focus. He took 10 images (ISO 800 at 30 seconds each) that he processed for noise using Digital Photo Professional then aligned, stacked and enhanced with Image Plus.

Thank you Frank for this really nice image!

The Astronomy Club of Tulsa and TUVA Astronomy Club Cordially Invite you to our Annual

## MESSIER MARATHON!

Saturday, March 21, 2015

TUVA Astronomy Club, Checotah, OK



Our Host, Ron Wood, will be giving a presentation on the Messier Marathon at our February General Meeting on Friday, February 6 at 7:00 PM.

In the event of adverse weather conditions, the back-up date is Saturday, April 18.

Each year, around late Winter/early Spring, observers can potentially find and log all 110 of the wonderful objects in Charles Messier's famous catalog IN ONE NIGHT! Many of our Club members enjoy going out to challenge each other to see who can find the most, or challenge themselves to see if they can beat their last year's score. The one who finds the most objects wins the coveted David Stine Award. Some come out to just have a good time with friends under the stars. Any way you slice it, the Messier Marathon is one of the highlights of our year!

A Caravan to the event will be led by our very own Vice President, Tamara! The Caravan will meet at the Burger King located at 1600 N. Elm Pl., Broken Arrow, OK (on the West side of Elm Pl. (161st E. Ave.), just South of Highway 51 (the BA Expwy.). **The Caravan will leave promptly at 3:00 PM.** Maps to appear on next page.

There will be a pot-luck dinner before the marathoning begins! So bring your favorite dish or dessert to share!

*Please note: This event is for Astronomy Club of Tulsa and TUVA members and their families only.\**

For more information, including information on how to get in on the Caravan to TUVA, contact Tamara Green at [astrotulsa.vp@gmail.com](mailto:astrotulsa.vp@gmail.com).



*\*As with any members-only event, any ACT member may invite up to, but not exceeding, two (2) individual non-family guests. TUVA may or may not have its own rule regarding same.*

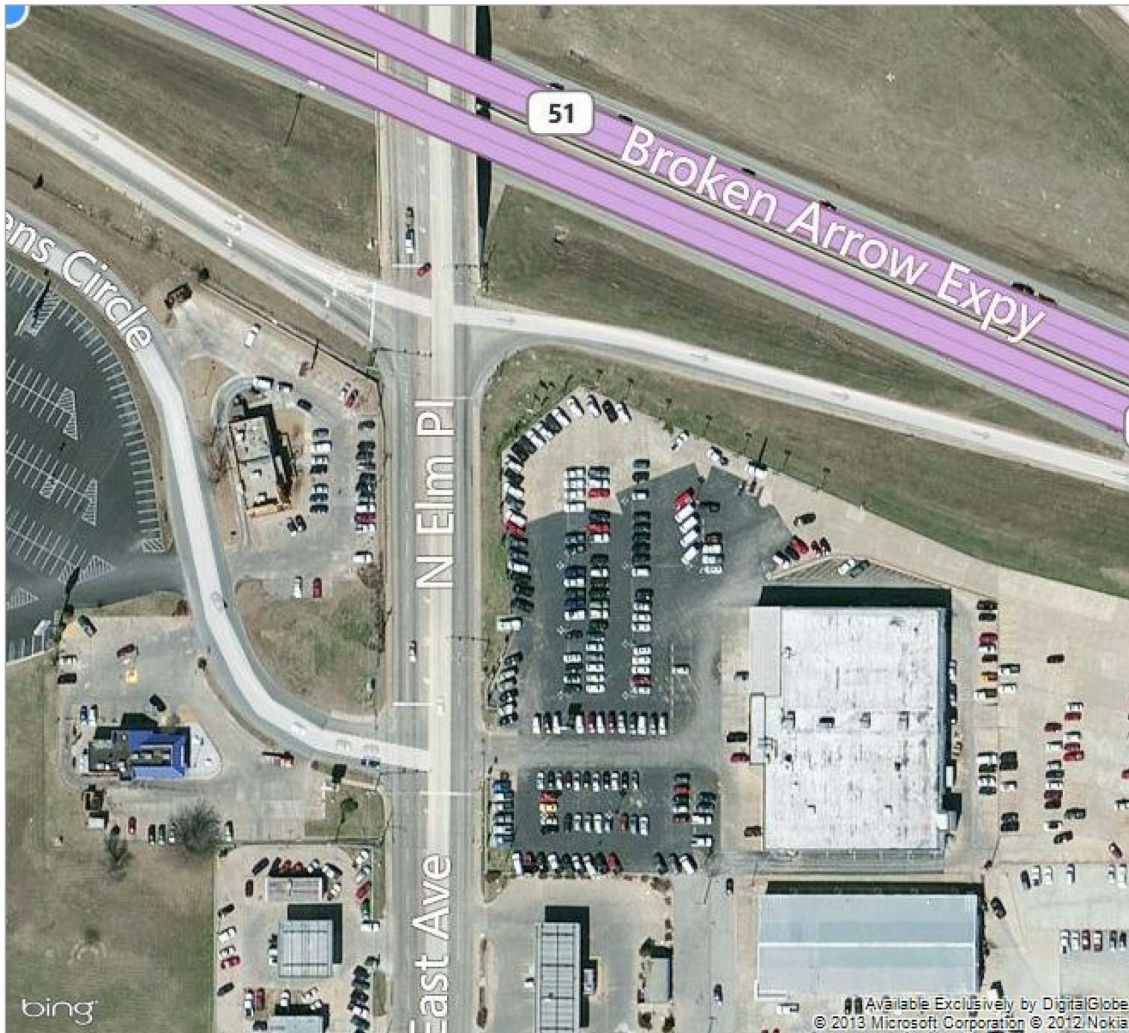
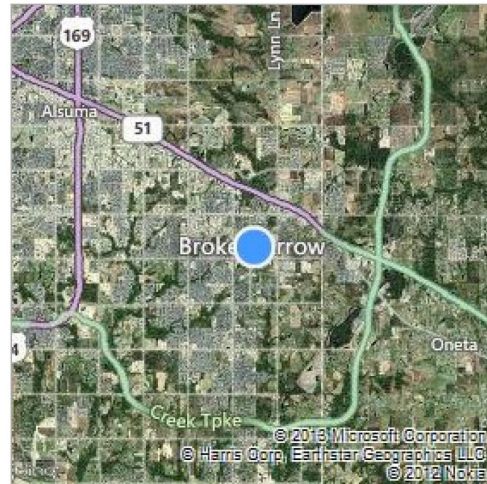
# Map to the Burger King on Elm Place:

bing Maps

## Broken Arrow, OK

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

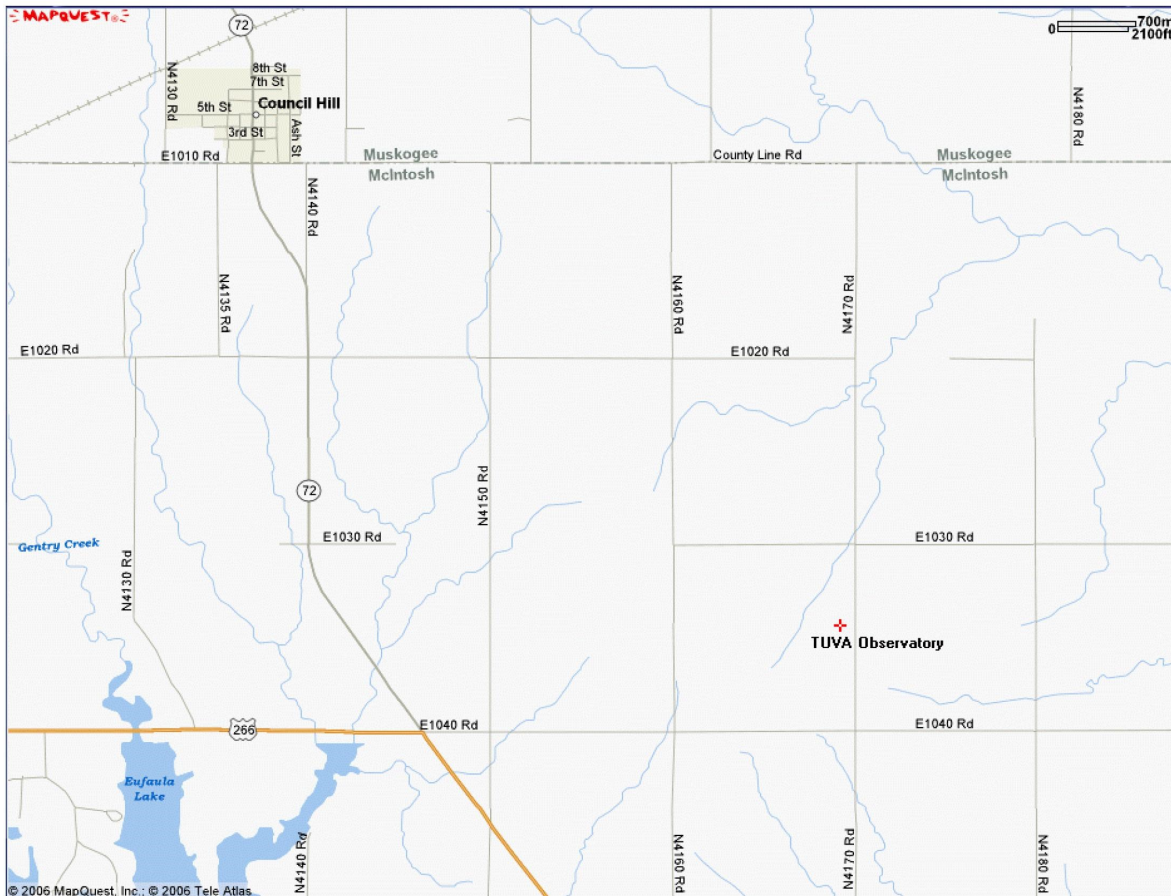
On the go? Use [m.bing.com](http://m.bing.com) to find maps, directions, businesses, and more





1. From the Broken Arrow Expressway going east, exit at 81st St. which is also Highway 51 (last exit before the Muskogee Turnpike).
2. Go about nine miles to Coweta. Watch for Wal-Mart on the left, go under the railroad bridge and through downtown Coweta on Highway 72.
3. Continue on Hwy 72 through Haskell, Boynton, and Council Hill. (Watch speed traps through these little towns).
4. About 3½ miles after you go through Council Hill, Hwy 72 ends. Watch for signs that say this and "Junction 266". To the right is 266 west to Henryetta and straight ahead is 266 to Checotah.
5. At this junction turn left (east) onto a county road.
6. Go ¼ mile to a stop sign, past a white church. Continue two miles east to another stop sign and a white two-story house on your left.
7. Turn left (north) and go ½ mile to a silver and red gate on your left (west).
8. There is a black mailbox and white Muskogee Phoenix box at the entrance of the site. Turn in and you are at TUVA.

Option: You can also bypass Coweta by going south on Memorial through Bixby, make the big curve to the east and go through Leonard to Haskell and follow the directions starting at step 3.



# PRESIDENT'S MESSAGE

BY RICHARD BRADY



Hi everyone!

Has everyone seen Comet Lovejoy? If not, time is running out. I have been able to see it with binoculars as it was moving through southern Taurus, west of the Hyades and south of the Pleiades. I think I saw it naked-eye just at the limits of my vision. Through binoculars it looked roughly the same brightness as the Orion Nebula. I was on the east side of Broken Arrow at the time. Several people also saw it at members night and public night in January.

March is Messier Marathon time. For those of you who don't know, a Messier Marathon is where committed amateurs stay up all night trying to see all 110 Messier objects in one night. March is the best time to try this right around new moon. Each year several members caravan down to TUVVA Observatory, a private observatory near Checotah, owned by one of our members, Ron Wood. This year the plan is to go down Saturday, March 21. Tamara Green has more information elsewhere in this newsletter.

Brad Young, James Taggart, and Michael Blaylock continue to work on the radio astronomy project. Brad got the software loaded into the old PC in the observatory. They hope to have "first light" soon.

The survey will be out soon. It will be online. An email will be sent out with a link as soon as it is ready.

I'm still looking for more people to come and present something at our club meetings. I have a couple of people who said they would have something for the next couple of meetings, but that leaves several later on in the year. Please let me know of anyone who might be interested. And if there is something you would like to see, let me know that too.

Clear Skies!  
Richard Brady

## TREASURER'S AND MEMBERSHIP REPORT

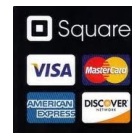
BY TIM DAVIS



**Astronomy Club of Tulsa: 136 members, including 4 new members in 2015.**

**Welcome to our new members this month:** Adam Ogle, Fred Bogan, Kirk Richardt and James Hardy

### Club Accounts as of Jan 28, 2015:



**Checking: \$ 4,456.73; Savings: \$ 3,773.33; Investment accounts: \$ 19,008.10 (Value Fluctuates with Market); PayPal: \$ 0.00**

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

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

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

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

### Membership rates for 2015 are as follows:

Adults: \$ 45.00 per year, includes Astronomical League Membership.

Sr. Adult: \$ 35.00 per year for those 65 or older, includes Astro League Membership.

Students: \$ 30.00 with League membership; Students: \$ 25.00 without League membership.

Additional Family membership: \$ 20.00 with voting rights and League membership; \$ 15.00 with voting rights but without League Membership.

The regular membership allows all members in the family to participate in club events, but only ONE Voting Membership and one Astronomical League membership.

**Join Online – Add or renew magazine subscriptions.** <http://www.astrotulsa.com/page.aspx?pageid=16>

**Magazine Subscriptions:** If your magazines are coming up for renewal, try to save the mailing label or renewal form you get in the mail. Forms are available on the club website.



**Astronomy** is \$ 34.00 for 1 year, or \$ 60.00 for 2 years. [www.astronomy.com](http://www.astronomy.com)

To get the club discount you must go through the club group rate.



**Sky & Telescope** is \$ 33.00 per year. [www.skyandtelescope.com](http://www.skyandtelescope.com)

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

Note: You may renew your Sky & Telescope subscription directly by calling the number on the renewal form, be sure to ask for the club rate.

NEW SUBSCRIPTIONS must still be sent to the club



# SECRETARY'S CORNER

BY TERESA DAVIS



This month in the “Secretary’s Corner” I want to thank the club for allowing me to serve as your secretary this year. Be sure to check this monthly article to learn about what has been going on in our latest public meetings as well as any and all board meetings. At the end of the article each month you will find a link to the official minutes of any meeting (s) since the last article.

Currently the board is exchanging email messages with discussion which started with a “professional driver” inquiring about setting up a map of the solar system on one of our highways. The driver has a high interest in astronomy and had seen this done before. John, skip, and Richard exchanged some ideas about where we might position the sun and then place the planets either on the way or coming back from OK city. The idea is to model the size and distance of objects in our solar system.

Just so you know: I plan to let you in on anything the board members are up to including items and ideas we consider through emails. Some of the greatest ideas come up while we are in simple discussion in a few emails. For instance, the March public meeting will be from our own Ed Downs and it sounds like this will be very interesting. Ed has interacted with NASA staff members recently while visiting the Johnson Space Center and involved with an engineering review of some spacecraft while there. I’m sure there will be an article in this issue of The Observer with the full scoop.

Did you know that the gate at the observatory has a new lock that requires a new key? We just replaced the old worn out lock and had keys ready for the current key holders at the last public Star Party. If you are one of the members with the responsibility of our opening and/or closing procedures and haven’t gotten your new key, send an email to Richard to find out how to get the new key.

Our last Public Star Party brought around one hundred new visitors. Thank you to all our club members that came out to help run the show. Chris Proctor ran 4 or 5 presentations in the dome with the telescope while Richard, Tim, and I kept groups entertained down stairs while they waited their turn. Several of our members set up telescopes to offer quality observing sessions all around. Some of the visitors came with their college instructor but most of them found our website once they realized the skies were clear and decided to join us.

Be on the lookout for an electronic survey that should be coming in an email. Your participation in the survey will give the board the opportunity to guide the club with the members input. Chris Proctor is putting this together with ideas given to him from the board.

That’s all I have this month. For a copy of our official minutes for the last public meeting dated January 9<sup>th</sup>, 2015, just go to this link for a google document:

<https://drive.google.com/file/d/0B0Buo9ksHSVrc1M5OTA5ZjJNb2M/view>

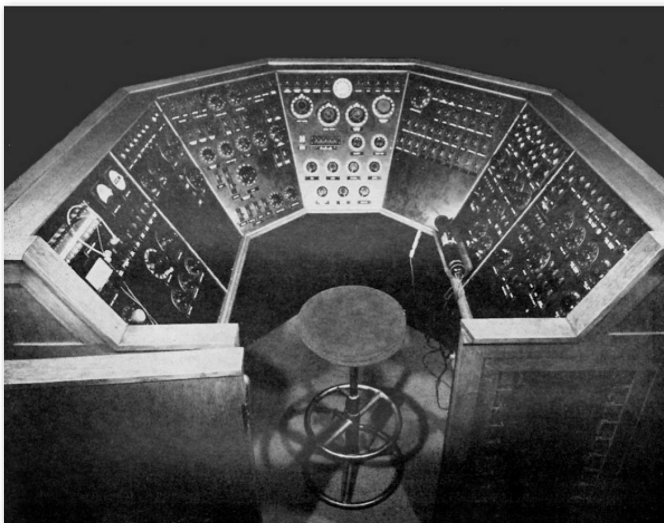
# THE MAJESTY OF YESTERYEAR'S PLANETARIUM

by F. Jack Eastman

First, I'd like to thank Anthony Cook, Griffith Observatory in Los Angeles, California, for his help acquiring the accompanying photographs; also Ron Oriti, my boss at Griffith back then, as well as Carla Johns and Arthur Johnson, colleagues at Griffith, for reviewing this article.

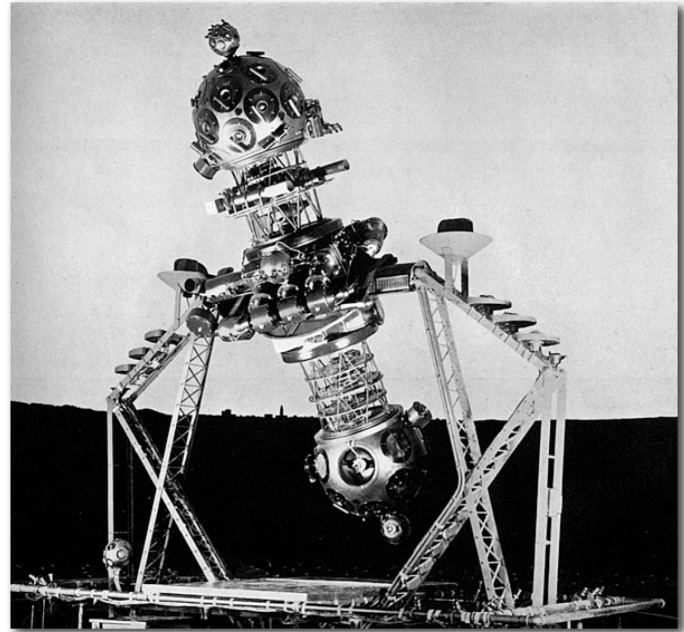
I have spoken before of the things that got me hooked on astronomy, my view of the moon with Dad's 8 × 30 binoculars when I was a second grader, our subsequent move to Southern California and the encounter with Knott's Berry Farm's 9-inch reflector that gave a truly captivating view of Jupiter and its moons. We soon discovered the Griffith Observatory not long after and began making regular trips, in particular, for the monthly shows in their planetarium. These were truly inspiring events, and this article is an attempt to relay some of my impressions and recollections of those early planetarium experiences. My tenure there was from September 1959 to September 1969. I had to give it up due to the move here, to Colorado.

The Griffith Observatory (see the *Denver Observer*, October 2010, page 10) was finished in 1935, and was a small part of a gift from Colonel Griffith J. Griffith who wanted to have an observatory and planetarium for the purpose of public education. The celebrated firm of Carl Zeiss of Jena, Germany, supplied the 12-inch refracting telescope (see the *Denver Observer*, January 2012, page 4) and the Mark II planetarium projector (Figure 1). This projector was truly a state of the art machine for its time. The 29-inch diameter balls at either end of the 12-foot long structure contain 1,000 watt lamps and 32 separate projectors that fill the planetarium sky with more than 9,000 stars, all accurately placed on the sky and of the proper brightness. The Milky Way is also realistically reproduced, and the sun, moon and naked-eye planets are all in their proper locations in the sky. It's a truly striking and beautiful night sky—an experience not soon forgotten! The stars are made from tiny holes, 0.023 mm–0.452 mm in diameter, in 64 different sizes, carefully punched into copper foil that is 0.0152 mm thick. These are projected on the dome from the 32 star projectors on the spherical ends of the instrument. In the cages supporting these "star balls" are the projectors for the sun, moon and naked-eye planets. These projectors are all geared so that they may be run forward and backward in time, and manage to keep the sun, moon and naked-eye planets in the right places amongst the



**Figure 2.** The Control Console of the Zeiss projector. This controlled the projector as well as the dozens of special effects projectors and sound system.

*Courtesy, Griffith Observatory*



**Figure 1.** The Zeiss Mark II planetarium projector. Note the Los Angeles skyline in the background.

*Courtesy, Griffith Observatory*

stars. The instrument, 2,000 pounds of moving parts (6,000 pounds overall), will also reproduce the effect of the precession of the equinoxes accurately over thousands of years in the past and future. It's truly a monumental example of the machinist's art—purely mechanical via complex gear trains. No software involved! The "sky" is a dome 75 feet in diameter onto which the stars and all are projected. At the base of the dome is the horizon, cut out of thin metal accurately showing the Los Angeles skyline as seen from the observatory. Even a truly flat black paint would still show brighter objects setting below the horizon before the shutters on the projector cut them off. At Griffith, a short distance behind the thin cutout are glossy black slats, inclined at 45-degrees which reflect any stray stars down behind the wall—it's a very effective light trap.

In addition to the Zeiss, there are many dozens of special projectors—sunset and sunrise, coordinates on the sky, constellation outlines, very realistic meteors, aurorae (my favorite), a five-stage zoom system for travel to the moon, planets and much more. Most of these special instruments were built in the observatory's own shops. The lecturer, in addition to keeping the talk going, might be operating almost all of these instruments—and in the dark to boot! There is no automatic control!

All of this is controlled from the lecturer's console, which resembles the flight deck of an advanced spacecraft (Figure 2). This is how it was done before the now ubiquitous computer.

Now, let's take in a show or two.

### ONE ENTERS THE "STAR THEATER"

The visitor first sees 650 or so seats arranged in circular rows centered around the "monster"—the Zeiss projector (Figure 1). In the background, classical music—Holst, Mozart or maybe Gilbert and Sullivan—is playing. With the bluish dome overhead and the L.A. skyline around the horizon, one could imagine being outside on a nice clear day.



# THE MAJESTY OF YESTER YEAR'S PLANETARIUM

BY F. JACK EASTMAN, AUGUST 2013, CT'D.

AUGUST 2013



**Figure 3.** At the Planetarium Console. Dr. Dinsmore Alter (Left) was the Director and Clarence H. Cleminshaw, Associate Director. The "flashlight" is the "Green Arrow" pointer, long before the days of the laser pointer.

*Courtesy, Griffith Observatory*

The lecturer arrives and climbs into the console (Figure 2). "Welcome to the Griffith Observatory and Planetarium," he says, and announces the subject of the program—"The seasons and how they work," "The constellations of Spring," or maybe a "Trip to Jupiter and Saturn." The lights are lowered and a number of slides, diagrams and such are shown to introduce the subject at hand, as everyone's eyes become adjusted to the dark.

### LET'S STEP OUTSIDE

A brilliant and glorious sunset graces the Western sky. "What a nice sunset," the lecturer says, "I'm told those clouds will be gone as darkness falls." Softly, the music begins: Claude Debussy's "Claire de Lune," or "Prelude to the Afternoon of a Faun," or maybe Igor Stravinsky's, "The Round of the Princesses" from the *Firebird Suite*. Stars begin to appear, perhaps preceded by a bright planet or two as the sunset colors fade into the night, and finally the sky fills with stars, the Milky Way and even a few naked eye nebulae. "Shooting stars" are seen streaking across the sky. One had to be careful not to program too soothing a selection of music, lest some of the audience start to snore!

The show proceeds with this evening's subject—perhaps the Solar System, how the planets move in the sky, the reason for the seasons, or perhaps the constellations of the season. Maybe we'll hear the story of King Cephus, Queen Cassiopeia, and their daughter Andromeda with her hero Perseus on his winged horse, Pegasus. The Zeiss projector, which faithfully reproduces the motions and positions of the planets over a simulated year or two is stationary while the outlines of the constellations are added to the sky. Perhaps

tonight's presentation is all about sky colors—rainbows, various weather effects, sunsets, sunrises, why the sky is blue, etc. We had a great demonstration regarding the blue of the sky and why sunsets are red. A roughly 5-inch diameter clear plastic tube, six feet long was aimed straight up and filled with Sodium Thiosulfate (photographer's "hypo" or "fix"). A bright light shone through this, putting a bright, white spot on the dome overhead. At the appointed moment we'd dump in a few ounces of sulphuric acid. Tiny particles of sulphur would begin to precipitate out, the tube would begin to glow blue (the blue of the sky) and the light overhead would

turn red as the shorter wavelengths were scattered out (red of the sunset/sunrise). However, the real highlight of this show was the aurorae.

### LET'S HEAD TO NORTHERN CANADA, AND IF WE'RE LUCKY, WE'LL SEE THE NORTHERN LIGHTS

We travel north by moving the latitude motion of the Zeiss until we are about 60° northern latitude. We demonstrate how the sky moves at different latitudes and explain the aurorae, solar activity and charged particles in the magnetosphere. But, 1,000 or so years ago, what did the Norse and Vikings make of these? We'll talk about the Valkyries, handmaidens of the god Oden (Wotan) riding their fiery steeds across the sky to collect the fallen warriors and carry them back to Valhalla. The lecturer says, "So as we look to the north, let's be very quiet and see if we can hear those Valkyries as they ride across the sky." The aurorae start to appear, and the Valkyries do, indeed, ride. We hear Richard Wagner's "Ride of the Valkyries" and "Magic Fire Music" from the final act of his opera, *Die Walküre*. This is the one that hooked me on classical music forever after. The aurorae projectors were incredibly simple. Hand-painted slides were projected through 38mm Erfle eyepieces—the spherical aberration added to the diffuse character of the images. Disks of plastic, 1/2-inch thick and slightly warped, were turned by motors just behind the lenses which created movement and shimmering effects. It was one of

the best effects in the planetarium! As the aurorae fades it's time to head back south.

### BLAST OFF

Before we are finished, let's look at another one of the shows—"A Trip to Jupiter and Saturn." This used the 5-stage zoom projector. We "travel" (latitude change, again) to an equatorial island for our launch. At this point the lecturer explains the fine points of space travel and shows why we will get a bit more of a boost if we leave from Earth's equator. We would also show some of the more prominent constellations visible in the Southern sky. We "step inside our spaceship" and then blast off with a roar, amidst flashing lights and all manner of what one would imagine blasting off would be like. A tiny Jupiter appears in the viewing screen and steadily grows in size, to the tune of, perhaps Debussy's *La Mer, 3rd movement*: "Dialogue of the Wind and the Waves." When we get close, we step outside and see a huge Jupiter, majestically rotating against the starry background. This is accomplished by a powerful opaque projector, with a ping-pong ball sized Jupiter (or Earth, Mars, etc. depending upon the subject of the particular show) projected on the dome. As the lecturer talks about Jupiter he's resetting the travel projectors, changing the image—he's hoping that all five of them change, if not he'll have to talk about space-time warps should things go awry—and then riding on the notes of Otterino Respighi's *Pines of Rome*: "Pines of the Appian Way," we're off to Saturn. This will involve a landing on Titan. Chesley Bonestell painted a great landscape for this, looking much like the Canyonlands in Utah—red rock formations coated with "snow," and a huge Saturn hanging in a dark blue sky (we knew Titan had an atmosphere, but being a "small" moon, we thought it couldn't be much. Did we ever get a lesson about that when Cassini's Huygens Probe landed on Titan in 2004). Upon our landing we listen to Vaughan Williams's *Sinfonia*

*Continued on Page 7*



**Photo right:** Later Griffith Director C. H. Cleminshaw (center) and planetarium lecturers Arthur Johnson (R) and F. Jack Eastman, from the 1960s.

*Courtesy, Arthur Johnson*



It's early to be talking galaxies, but that's where we are with the two year schedule of all the M's and H400's. All of the objects except two are in Leo and he is high enough for sweeping up objects by 9 PM at month's end. The stars listed are easily observed beginning at the end of twilight.

**COMETS:** If you've seen one fuzzball, you've seen them all, but Lovejoy is still pretty darn bright as far as comets go, so RA/Dec/Sweeps provided on the attached. Could be fun the 19th thru 21st, when within one degree of M76, and just before the moon ruins it for the rest of the month. Also listed Finlay on the spreadsheet, but who knows where that wacky thing will be magnitude wise. I did get to view it (#134) on 1/20 in the 8 inch, and it was surprisingly large and bright (relatively speaking of course).

**PLANETS:** Briefly Venus, it will be a pretty thing to see on the 20th, when near a two day old crescent moon. Also on that date, and the next three, Mars will be less than one degree away from Venus. Now Jupiter! I don't think I've ever been so excited about Jupiter in my 40 years of observing. Maybe the first few times I saw it in a scope? Anyway, I'm really psyched about these mutual events of the Galilean moons, something I'd never heard about until this round of them. I've only listed two so far, one eclipse and one occultation, the first for me being clouded out and the second "seeing'ed out." Whoever said planets don't twinkle never spent a wintah in Maine! So I still haven't seen a mutual event, but odds are good for correcting that in February. On the Jupiter spreadsheet you will see five each occultations and eclipses, all occurring close together and most at a convenient early evening hour.

**STARS:** Four carbons with B-Vs of 3.0 to 4.0. Three doubles and three triple comprise the multiple star section, with one of the triples again making it to the DSS photo sheet.

**THE GOOD STUFF:** Seven Messiers (6 GX's and 1 well known PN) and 16 Herschel 400 Objects (all GX's), two of which double as M's. Not that any of you use the RAS, but if you did, you'd see that "prev" shows up 10 times in the Sweep Star column. That means you only have to line up on a star 10 times to get to 21 objects. Even better, in this case sometimes you use the same star more than once, which means you only have to locate 7 stars. As far as the one planetary, it is M97, the Owl, located a little less than one degree from the galaxy M108. Since you are using your one degree true field eyepiece to sweep to the objects, you will be able to view both objects at the same time by placing each near opposite edges of the field. When you do that, realize (per the distance column) that photons streaming into your eye from the galaxy have traveled 20,000 times farther thru space, and obviously that same factor longer thru time, than those from the planetary. If that doesn't make you at least slightly dizzy, you aren't thinking about it hard enough.

**QUESTIONS:** As always, questions and comments are welcome!

tom hoffelder

[rocksnstars@gmail.com](mailto:rocksnstars@gmail.com)


*Come with me now, Pilgrim of the stars,*

*For our time is upon us and our eyes*

*Shall see the far country*

*And the shining cities of infinity ~ Robert Burnham, Jr.*

Jupiter




**Inverted view**

Please choose your view:  Direct view (Erect-image system)  Inverted view (Newtonian / Dobsonian)  Mirror reversed (SCT/Mak/refractor + diagonal)

Date: 02/15/2015 Time: 00:25 UT Time-zone offset from UT in hours (from your Web browser): -5

---

Jupiter




**Inverted view**

Please choose your view:  Direct view (Erect-image system)  Inverted view (Newtonian / Dobsonian)  Mirror reversed (SCT/Mak/refractor + diagonal)

Date: 02/20/2015 Time: 00:40 UT Time-zone offset from UT in hours (from your Web browser): -5

---

Jupiter




**Inverted view**

Please choose your view:  Direct view (Erect-image system)  Inverted view (Newtonian / Dobsonian)  Mirror reversed (SCT/Mak/refractor + diagonal)

Date: 02/22/2015 Time: 02:46 UT Time-zone offset from UT in hours (from your Web browser): -5

---

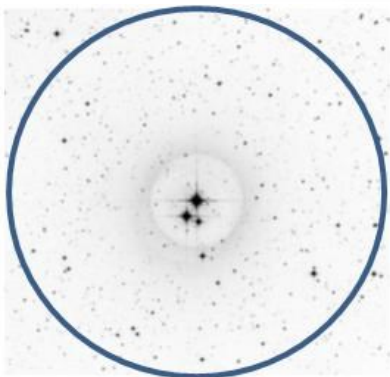
Jupiter



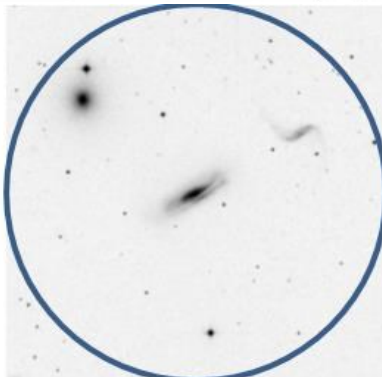
**Inverted view**

Please choose your view:  Direct view (Erect-image system)  Inverted view (Newtonian / Dobsonian)  Mirror reversed (SCT/Mak/refractor + diagonal)

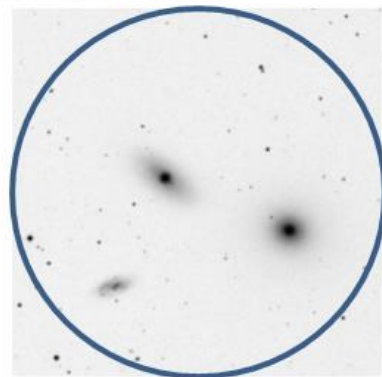
Date: 02/27/2015 Time: 03:36 UT Time-zone offset from UT in hours (from your Web browser): -5



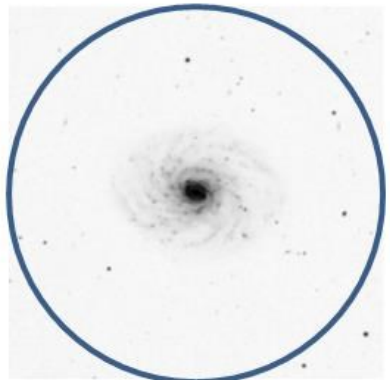
17 CMa 15' FOV



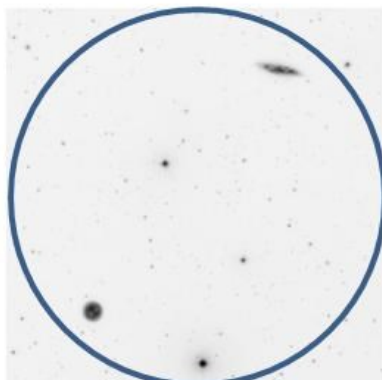
3193/90/87 15' FOV



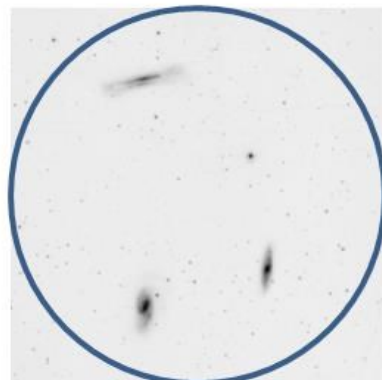
3389/84/M105 20' FOV



3486 15' FOV



M97/108 60' FOV



3628/M66/65 60' FOV

JUPITER IN FEB 2015 (EST)

DATE	GRST*	I SHAD	E SHAD	G SHAD	C SHAD	TIME	MUTUAL EVENT	MAG DROP
1	01:23 & 21:14	19:57-22:14						
2				04:11-07:50				
3	03:01 & 22:52		17:22-20:17					
4	18:43							
5	04:39							
6	00:30 & 20:21							
7		03:22-05:40						
8	02:08 & 21:59	21:51-						
9	17:50	00:08			16:11-21:00			
10	03:46 & 23:37		19:59-22:53					
11	19:28							
12	05:24							
13	01:15 & 21:06							
14						18:59-19:06	201	
14						19:20-19:27	2E1	0.8
15	02:53 & 22:44	23:45-						
16	18:36	02:02						



17		18:13-20:31	22:35-01:30					
18	00:22 & 20:14							
19					18:48-18:54	103		
19					19:35-19:43	1E3	0.8	
20	02:00 & 21:52							
21					21:04-21:11	2O1		
21	17:43				21:42-21:48	2E1	0.9	
22	03:38 & 23:30							
23	19:21	01:39-03:56		16:07-19:45				
24		20:07-22:25						
25	01:07 & 20:59		01:12-04:07					
26					21:16-21:24	1O3		
26					22:31-22:40	1E3	0.9	
27	02:46 & 22:37							
28	18:28				23:09-23:15	2O1		
29					00:01-00:08	2E1	0.9	
30								
31								

\*Transit, visible +/- 50 min



2/7		2/14				(2/15)		2/21	
SS	NTE	MR	SS	NTE	ATE	MR	SS	NTE	MS
17:00	18:05	20:51	17:10	18:14	18:47	03:43	17:19	18:23	21:00

Object (Type)	RA	Dec	Star	N/S	E/W	Mag*/(# of Stars)	Size (")/ Sep (")	Spect/ M# or H#	Dist (ly)	Urano I Page	Comment, [B-V], {cmt mag} (opt x)
TU Gem (CS)	06 10.9	+26 01	1 Gem	2.8 N	1.5 E	7.5-8.4		CII		137	[3.2] {8.0}
UU Aur (CS)	06 36.5	+38 27	θ Gem	4.6 N	3.2 W	5.1-7...		CII		99	[3.0] {6.0}
W Mon (CS)	06 52.4	-07 09	θ Cma	5.0 N	0.4 W	9.0-13...		Nvar		273	[3.3] OC 2302 0.1 NW
RY Mon (CS)	07 06.9	-07 33	θ Cma	4.5 N	3.2 E	7.7-9.2		Nvar		273	[4.0] {8.5}
β Mon (MS)	06 28.8	-07 02	-	-	-	4.6,5,5,3	6.9, 2.8	B3	700	272	(70/175)
12 Lyn	06 46.2	+59 27	δ Aur	5.1 N	6.0 E	5.4, 6, 7	1.9, 10	A3		42	(240/50)
δ Gem (MS)	07 20.1	+21 59	-	-	-	3.5, 8	5.6	A9, K3	60	139	(90)
α Gem (MS)	07 34.6	+31 53	-	-	-	1.9, 3.0	4.6	A1, A2	50	100	(110)
*17 CMa (MS)	06 55.0	-20 24	α CMa	3.7 S	2.4 E	6, 9, 9	44, 31	A2, K5	600	318	(15)
h3945 (MS)	07 16.6	-23 19	ο <sup>2</sup> CMa	0.5 N	3.2 E	5, 6	27	K3, F0		319 ni	(20)
*NGC 3190 (Sa)	10 18.1	+21 50	ζ Leo	1.5 S	0.3 E	[13.0]	4.4x1.5	*H44-2	65M	144	GX 3187 is 0.1 W
*NGC 3193 (E2)	10 18.4	+21 54	prev	0.1 N	0.1 E	[12.4]	2.0x2.0	*H45-2	65M	144	
NGC 3226 (E2)	10 23.4	+19 54	γ Leo	-	0.8 E	[13.3]	2.8x2.0	*H28-2	60M	144	
NGC 3227 (Sba)	10 23.5	+19 52	prev	2' S	2' E	[13.3]	4.1x3.9	*H29-2	60M	144	



NGC 3245 (S0)	10 27.3	+28 30	ζ Leo	5.1 N	2.5 E	[12.5]	3.2x1.8	*H86-1	68M	144	
NGC 3277 (Sab)	10 32.9	+28 31	prev	-	1.3 E	[13.0]	2.1x1.8	*H359-2	68M	145	
NGC 3351 (SBb)	10 44.0	+11 42	α Leo	0.2 S	8.7 E	[13.6]	7.4x5.0	M95	33M	190	
NGC 3368 (Sbab)	10 46.8	+11 49	prev	0.1 N	0.7 E	[13.2]	7.8x5.2	M96	35M	190	
*NGC 3379 (E1)	10 47.8	+12 35	prev	0.8 N	0.2 E	[13.1]	5.3x4.8	M105	36M	190	also *H17-1
*NGC 3384 (E/SB0)	10 48.3	+12 38	prev	-	0.1 E	[12.9]	5.4x2.7	*H18-1	30M	190	GX 3389 is 0.1 S
NGC 3377 (E5)	10 47.7	+13 59	prev	1.3 N	0.1 W	[13.2]	5.0x3.0	*H99-2	34M	190	GX 3367 is 0.3 SW
NGC 3504 (Sbab)	11 03.2	+27 58	54 Leo	3.3 N	1.7 E	[12.6]	2.7x2.1	*H88-1	62M	146	GX 3512 is 0.2 E
*NGC 3486 (SBc)	11 00.4	+28 59	prev	1.0 N	0.6 W	[14.1]	7.1x5.2	*H87-1	30M	146	
NGC 3489 (SB0-a)	11 00.3	+13 54	θ Leo	1.5 S	3.3 W	[12.3]	3.6x2.2	*H101-2	30M	191	
*NGC 3556 (Sc)	11 11.5	+55 40	β UMa	0.7 S	1.4 E	[13.0]	8.6x2.4	M108	42M	46	also *H46-5
*NGC 3587 (PN)	11 14.8	+55 01	prev	0.7 S	0.4 E	9.9	2.8	M97	2000	46	Owl Nebula
NGC 3593 (S0-a)	11 14.6	+12 49	θ Leo	2.6 S	0.1 E	[13.4]	5.2x1.9	*H29-1	26M	191	
*NGC 3623 (Sa)	11 18.9	+13 05	θ Leo	2.3 S	1.2 E	[12.7]	9.8x2.9	M65	35M	191	
*NGC 3627 (Sb)	11 20.3	+12 59	prev	0.1 S	0.3 E	[12.7]	9.1x4.1	M66	35M	191	
*NGC 3628 (Sb)	11 20.3	+13 35	prev	0.6 N	-	[13.5]	13x3.1	*H8-5	35M	191	
NGC 3626 (S0-a)	11 20.1	+18 21	δ Leo	2.2 S	1.5 E	[12.6]	2.7x1.9	*H52-2	80M	146	

\*[Surf

Brtns for

GX's] -

mag per

square

arcmin

\*DSS image

ni=shown,

\*H400

not iden-  
tified

## **WHERE WE MEET**

JENKS HIGH SCHOOL PLANETARIUM

105 E. B ST. JENKS, OK

### **DIRECTIONS TO THE JENKS HIGH SCHOOL CAMPUS:**

#### **FROM THE WEST: (MARKED IN RED ON MAPS)**

TAKE US 75 TO THE MAIN ST. - JENKS EXIT

FOLLOW MAIN ST. APPROXIMATELY 2 MILES AND CROSS THE RAILROAD TRACKS

TURN LEFT ON 1ST ST.

#### **FROM CENTRAL PART OF TULSA: (MARKED IN GREEN ON THE MAPS)**

TAKE RIVERSIDE DRIVE TO THE 96TH STREET BRIDGE

TURN RIGHT AND GO OVER THE RIVER

FOLLOW A ST. APPROXIMATELY 7 BLOCKS

TURN RIGHT ON 1ST ST.

#### **FROM THE EAST: (MARKED IN BLUE ON THE MAPS))**

TAKE THE CREEK TURNPIKE TO S. ELM ST. IN JENKS

FOLLOW ELM ST. NORTH TO MAIN ST.

TURN RIGHT ON MAIN ST. AND CROSS THE RAILROAD TRACKS

TURN LEFT ON 1ST ST.

#### **FOR EACH:**

PARK IN THE LOT AT THE END OF 1ST ST.

USE THE DOORS AT THE NORTH SIDE OF THE BUILDING

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

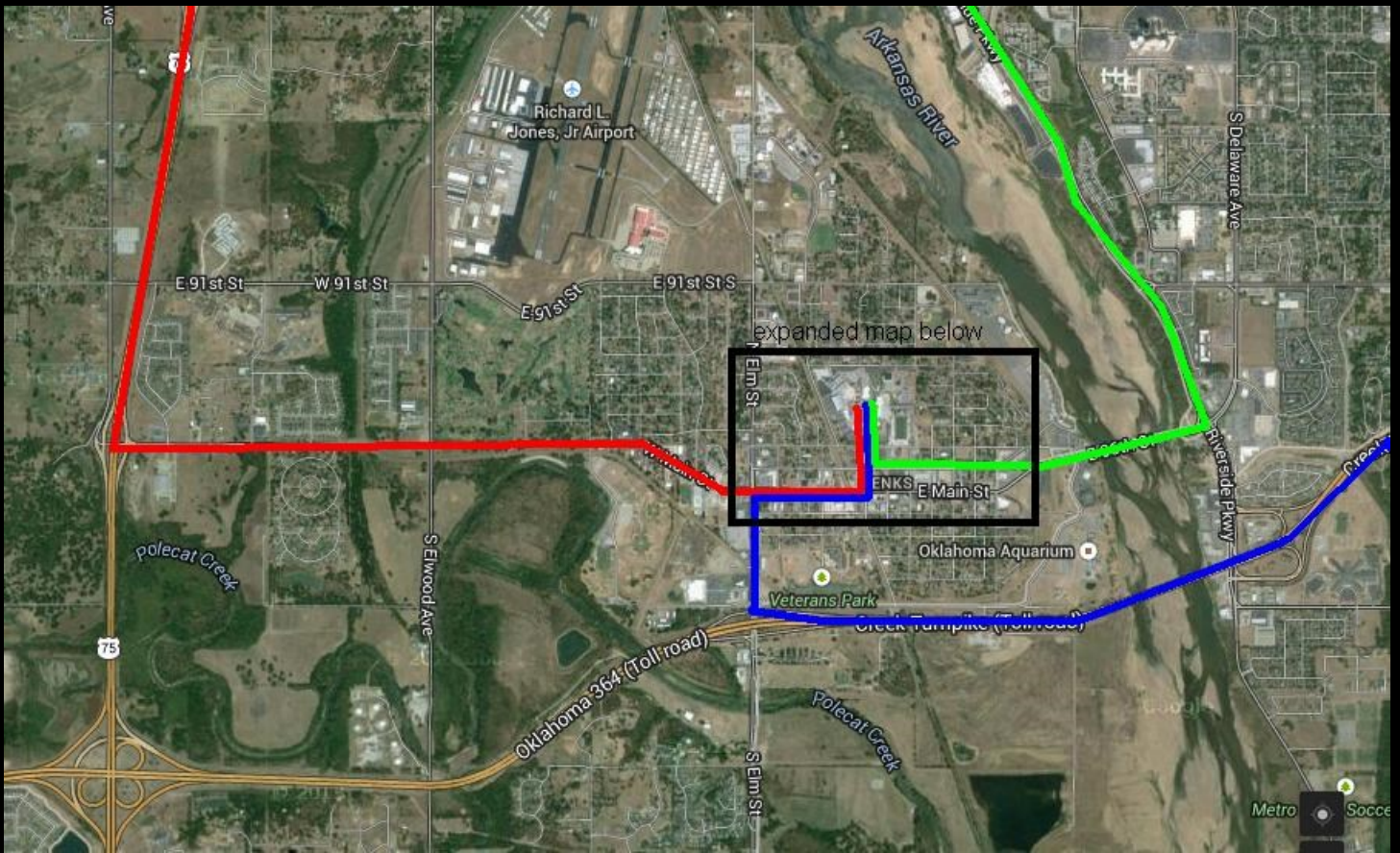
TURN RIGHT AND GO DOWN THE HALLWAY TO EITHER SIDE OF THE PLANETARIUM

### **MAPS ON NEXT PAGE**

**THE GENERAL MEETINGS ARE FREE AND OPEN TO THE PUBLIC.**

**WE HOPE TO SEE YOU THERE!**





**ABOVE:** DIRECTIONS TO JENKS HIGH SCHOOL FROM CENTRAL TULSA, WEST OF TULSA AND EAST OF TULSA

**BELOW:** MAP SHOWING ROUTE INTO PARKING LOT





## MEMBERSHIP INFORMATION

### ASTRONOMY CLUB OF TULSA OFFICERS:

**PRESIDENT** RICHARD BRADY  
astrotulsa.pres@gmail.com

**VICE PRESIDENT** TAMARA GREEN  
astrotulsa.vp@gmail.com

**SECRETARY** TERESA DAVIS  
astrotulsa.sec@gmail.com

**TREASURER** TIM DAVIS  
astrotulsa.tres@gmail.com

### BOARD MEMBERS-AT-LARGE:

JOHN LAND  
CHRISTOPHER PROCTOR  
JAMES TAGGART  
SKIP WHITEHURST  
ED UNDERHILL

### STAFF:

**NEWSLETTER EDITOR** TAMARA GREEN  
astrotulsa.vp@gmail.com

**WEBMASTER** JENNIFER JONES  
jjones@seedtechnologies.com

**MEMBERSHIP CHAIRMAN** JOHN LAND  
astroclubbiz@windstream.net

**OBSERVING CHAIRS** OWEN AND TAMARA GREEN  
darthnewo@yahoo.com, astrotulsa.vp@gmail.com

**SIDEWALK ASTRONOMY** OWEN GREEN  
darthnewo@yahoo.com

**PR AND OUTREACH** OWEN GREEN  
darthnewo@yahoo.com

**GROUP DIRECTOR** RICHARD BRADY  
actgroupscheduling@gmail.com, astrotulsa.pres@gmail.com

**NIGHT SKY NETWORK** RICHARD BRADY  
actgroupscheduling@gmail.com, astrotulsa.pres@gmail.com

**FACILITIES MANAGER** JAMES TAGGART  
astrotulsa.obs@gmail.com

### MEMBERSHIP RATES FOR 2015 WILL BE AS FOLLOWS:

ADULTS - \$45 PER YEAR. INCLUDES ASTRONOMICAL LEAGUE MEMBERSHIP.

SENIOR ADULTS - \$35 PER YEAR. **FOR THOSE AGED 65 AND OLDER.** INCLUDES ASTRONOMICAL LEAGUE MEMBERSHIP.

STUDENTS - \$30 PER YEAR. INCLUDES ASTRONOMICAL LEAGUE MEMBERSHIP.

STUDENTS - \$25 PER YEAR. **DOES NOT INCLUDE ASTRONOMICAL LEAGUE MEMBERSHIP.**

THE REGULAR MEMBERSHIP ALLOWS ALL MEMBERS OF THE FAMILY TO PARTICIPATE IN CLUB EVENTS, BUT ONLY ONE VOTING MEMBERSHIP AND ONE ASTRONOMICAL LEAGUE MEMBERSHIP PER FAMILY.

ADDITIONAL FAMILY MEMBERSHIP - \$15 WITH ASTRONOMY CLUB OF TULSA VOTING RIGHTS, \$20 WITH CLUB VOTING RIGHTS AND ASTRONOMICAL LEAGUE MEMBERSHIP.

*THOSE WISHING TO EARN ASTRONOMICAL LEAGUE OBSERVING CERTIFICATES NEED TO HAVE A LEAGUE MEMBERSHIP.*

### MAGAZINE SUBSCRIPTIONS:

ASTRONOMY IS \$34 FOR ONE YEAR OR \$60 FOR 2 YEARS.

WEBSITE: [www.astronomy.com](http://www.astronomy.com)

SKY & TELESCOPE IS \$33 PER YEAR.

WEBSITE: [www.skyandtelescope.com](http://www.skyandtelescope.com)

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

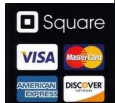
*IF YOU ARE AN EXISTING S&T SUBSCRIBER, YOU CAN RENEW DIRECTLY WITH S&T AT THE SAME CLUB RATE. BOTH S&T AND ASTRONOMY NOW HAVE DIGITAL ISSUES FOR COMPUTERS, IPADS AND SMART PHONES.*

### ONLINE REGISTRATION

WE NOW HAVE AN AUTOMATED ONLINE REGISTRATION FORM ON THE WEBSITE FOR NEW MEMBERSHIPS, MEMBERSHIP RENEWALS AND MAGAZINE SUBSCRIPTIONS. JUST SIMPLY TYPE IN YOUR INFORMATION AND HIT "SEND" TO SUBMIT THE INFORMATION. YOU CAN THEN PRINT A COPY OF THE FORM AND MAIL IT IN WITH YOUR CHECK, OR USE OUR CONVENIENT PAYPAL OPTION. .

LINK: <http://www.astrotulsa.com/Club/join.asp>

OR, IF AT A STAR PARTY OR MEETING, SIMPLY FIND A CLUB OFFICER TO ASK ABOUT JOINING OR RENEWING WITH YOUR DEBIT OR CREDIT CARD THROUGH OUR CONVENIENT SQUARE OPTION!





THE ASTRONOMY CLUB OF  
TULSA INVITES YOU TO MAKE  
PLANS THIS WINTER TO JOIN US  
AT A STAR PARTY!

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

THE OBSERVER IS A PUBLICATION BY  
THE ASTRONOMY CLUB OF TULSA. THE  
ASTRONOMY CLUB OF TULSA IS A 501C  
3 NON-PROFIT ORGANIZATION OPEN TO  
THE PUBLIC. THE CLUB STARTED IN  
1937 WITH THE SINGLE MISSION TO  
BRING THE JOY AND KNOWLEDGE OF  
ASTRONOMY TO THE COMMUNITY OF  
TULSA, OK AND THE SURROUNDING  
AREA. TODAY OUR MISSION REMAINS  
EXACTLY THE SAME. WE TRAVEL TO  
LOCAL SCHOOLS, CHURCHES AND  
MANY OTHER VENUES WITH SCOPES  
AND PEOPLE TO TEACH. OUR  
OBSERVATORY IS LOCATED IN MOUNDS  
AND MANY PUBLIC PROGRAMS ARE  
OFFERED THERE. TO JOIN THE  
ASTRONOMY CLUB OF TULSA, PLEASE  
VISIT WWW.ASTROTULSA.COM WHERE  
YOU WILL FIND ALL THE INFORMATION  
NECESSARY TO BECOME A MEMBER.

 Also find us on Facebook!

<https://www.facebook.com/AstronomyClubofTulsa>



WE ALSO ARE A PROUD PARTICIPANT IN  
NASA'S NIGHT SKY NETWORK.

THE EDITOR WISHES TO THANK THE FOLLOWING FOR  
THEIR CONTRIBUTIONS TO "THE OBSERVER" FOR  
THIS MONTH:

F. JACK EASTMAN, DENVER ASTRONOMICAL SOCIETY

TOM HOFFELDER

SKIP WHITEHURST

FRANK NEWBY

RICHARD BRADY

TIM DAVIS

TERESA DAVIS

TAMARA GREEN



PHOTO CREDIT: RICHARD BRADY. Taken with a Canon EOS Rebel  
T3i on Jan. 15 at 7:29 PM. This is a 0.6 second exposure at f/5.6, FL 232  
mm, ISO 800.



PHOTO CREDIT: RICHARD BRADY. Taken with same camera as used  
in the image above, on Jan. 16 at 7:12 PM. This is a 1/40 second  
exposure at f/4.0, FL 60 mm, ISO 3200.

**THANK YOU RICHARD FOR YOUR GREAT PHOTOS!!!**