



# Astronomy Club of Tulsa

## Observer

### March 2014

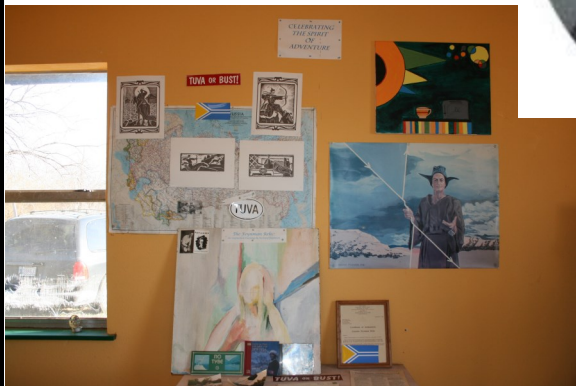
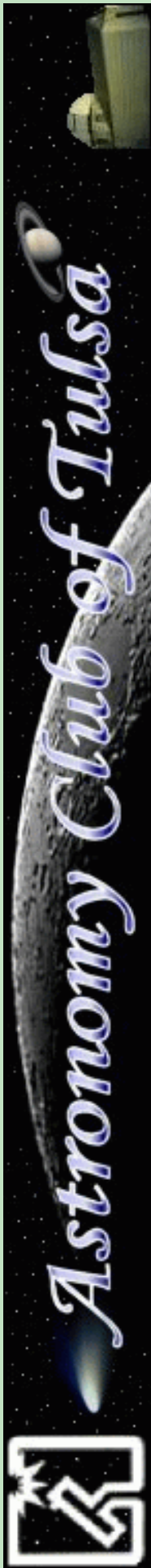


Photo: Some pictures honoring our Messier Marathons of the past, photos by Tamara Green, *except the picture of Charles Messier, which is an image that was found using Google Image Search.*

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## MARCH 2014

## APRIL 2014

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

### UPCOMING EVENTS:

#### DAYLIGHT SAVING TIME BEGINS: SUN, MAR 9.

General Meeting	Fri, Mar 14	TCC NE Campus	7:00 PM
Club Work Day	Sat, Mar 15	ACT Observatory	TBA
Sidewalk Astronomy	Sat, Mar 15	Bass Pro	6:00 PM
VERNAL EQUINOX	Thu, Mar 20		11:57 AM CDT
Public Star Party	Fri, Mar 21	ACT Observatory	7:00 PM
Back-Up Night	Sat, Mar 22	ACT Observatory	7:00 PM
Members' Night	Fri, Mar 28	ACT Observatory	7:15 PM
Messier Marathon	Sat, Mar 29	TUVA	TBA

*(Please note: This event is for Astronomy Club of Tulsa and TUVA members only.)*

General Meeting	Fri, Apr 11	TCC NE Campus	7:00 PM
Sidewalk Astronomy	Sat, Apr 12	Bass Pro	7:30 PM
Good Friday	Fri, Apr 18		
Public Star Party	Fri, Apr 18	ACT Observatory	7:30 PM
Back-Up Night	Sat, Apr 19	ACT Observatory	7:30 PM
Easter	Sun, Apr 20		
Members' Night	Fri, Apr 25	ACT Observatory	7:30 PM
Club Work Day	Sat, Apr 26	ACT Observatory	TBA
Back-Up Night	Sat, Apr 26	ACT Observatory	7:30 PM

*(Note: This is also an alternate back-up night for the Messier Marathon.)*

The Astronomy Club of Tulsa Invites All Members to Join the Fun of our Annual



## Messier Marathon

Saturday, March 29

TUVA

Each year in the late Winter or Early Spring, Club members get together at TUVA (the home of our wonderful hosts Ron and Maura, located near Muskogee, OK) for a pot-luck dinner and Messier Marathon! There will be a caravan to TUVA, led by Tamara, which will meet in the parking lot of Burger King, 1600 N. Elm Pl., Broken Arrow, OK (West side of Elm Pl., just South of the Broken Arrow Expressway. It is across the street from the Ferguson car dealerships.) The caravan will leave at 3:15 PM sharp. Contact Tamara via E-mail at [astronomer.misstamara@yahoo.com](mailto:astronomer.misstamara@yahoo.com) if interested in joining the caravan.

There are 110 objects in Messier's famous catalog. The object of the game is to see how many of them you can find in one night. How many can YOU find? Will it be YOU who wins the Big Toe (TUVA Observer Extraordinaire) Award this year?



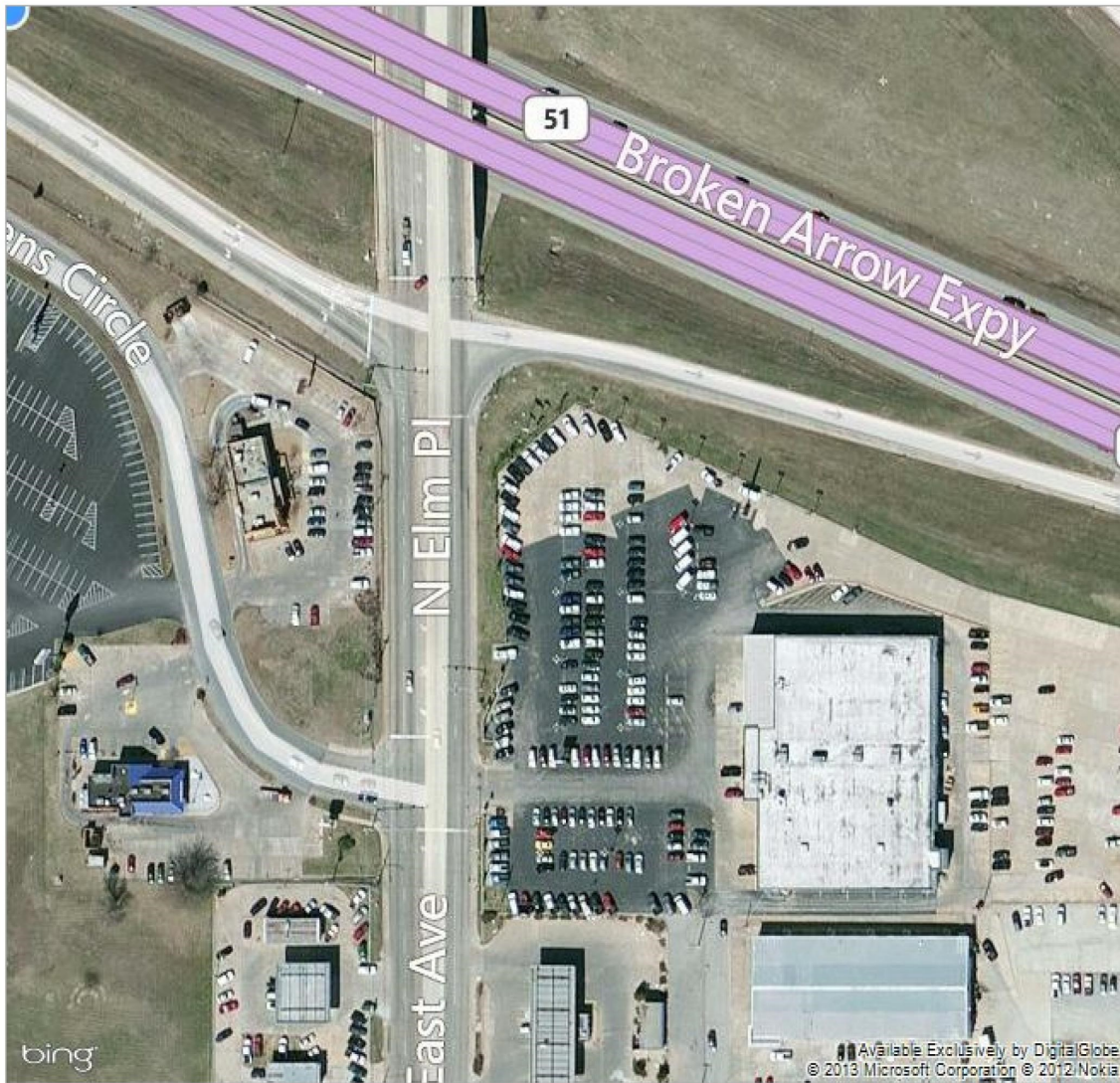
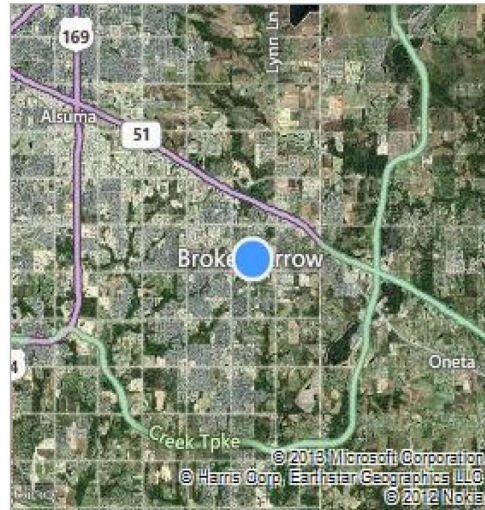


bing Maps

**Broken Arrow, OK**

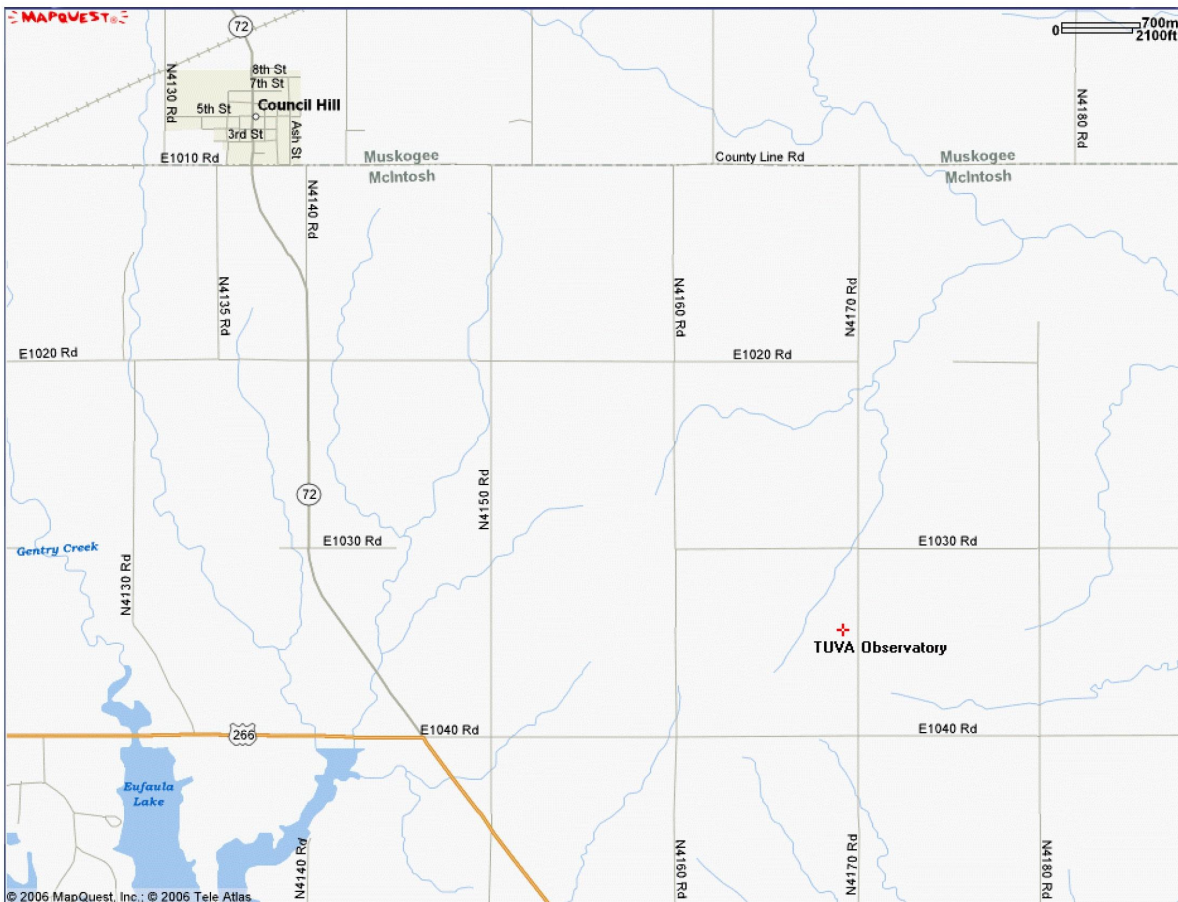
Burger King on N. Elm Pl., Broken Arrow. Building is on the Left side the map, blue roof.

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.





# HELP SAVE THE LICK OBSERVATORY!!!!!!

The following links and message were E-mailed on March 4, 2014 by John Land:



Here are some spectacular Images from Lick Observatory located on the Mt Hamilton just East of San Jose, CA at the southern end of the San Francisco Bay

<http://sploid.gizmodo.com/nature-is-so-incredibly-beautiful-isnt-it-1517481844#>

The 120 Inch Shane Telescope shown with its sodium laser adaptive optics is one of the leading instruments in the detection and follow up research on Extra Solar Planets

<http://www.ucolick.org/public/telescopes/shane.html#overview>

Lick Observatory Home Page

<http://www.ucolick.org/>

Sadly - This note is found at the end of the display

One more thing: A controversy is brewing within the University of California about [their potential closure of Lick Observatory](#). UC administrators recently voted to [gradually terminate funding for the Mt. Hamilton facility](#) over the next few years, to the considerable dismay of [the greater science community](#) which is protesting vigorously.

You can [support the Lick Observatory here](#).

From John Land Astronomy Club of Tulsa

A Word About Sky & Telescope

from John Land

SKY & TELESCOPE

**Table of Contents: 1941 – 2013**

by the Editors of Sky & Telescope

S & T is the longest running of the two major American Astronomy Periodicals. A couple of years ago they published a comprehensive DVD set of all their issues. Now they have put online a comprehensive Table of Contents to all those issues. A very valuable tool for subscribers who have collections of back issues or persons looking for a particular type or information or event.

The Table of contents is available in a searchable Excel format or Text Format

<http://www.skyandtelescope.com/community/skyblog/newsblog/iSTi-Table-of-Contents-1941---2013-242816951.html>



There is a **TOTAL LUNAR Eclipse** that starts at **12:58 AM CDT on April 15<sup>th</sup>**

by John Land - Tulsa Club

You don't need any special equipment to observe an eclipse of the moon. Just go outside locate the moon in the southern sky and enjoy. **You don't need dark skies and no special filters are needed.** Of course binoculars or a low power telescope will enhance the view but certainly are not required. However you do need to go out and locate the moon BEFORE it is totally eclipsed, as it will be harder to find during totality.



During a lunar Eclipse the Full Moon passes through the Earth's shadow. The outer region of the shadow is called the **Penumbra** – where the sun's light is partly eclipsed by the Earth shadow. An observer on the moon would see a solar eclipse as the Earth passed in front of the sun. Typically you won't notice much of the penumbra until the sun is about 90% or more eclipsed.

The Dark inner shadow of the moon is called the **UMBRA**. The Umbra will appear as small "bite" out of the left side of the moon and progress across to the right. Finally the Umbra will completely cover the moon during totality. However the Earth's atmosphere still bends some sunlight onto the moon. The moon takes on an eerie orange or reddish color. The color varies depending on how much dust is in the Earth's upper atmosphere. I have seen eclipses as bright as a new penny – a dark brick red – and even one that was almost an invisible gray due to a recent volcanic eruption in Mexico. In ancient times people described the moon as turning to blood evoking fear and panic.

The Umbral phase of the eclipse starts about **12:58 AM CDT on April 15<sup>th</sup>**

Look for a small "nibble" on the Left side of the moon at about the 9 o'clock position.

**Totality begins at 2:06 AM CDT** on the 15<sup>th</sup> and **Mid eclipse is 2:45 AM CDT**

**End of totality is 3:24 AM CDT** and the Umbra finally leaves the moon around 4:33 AM CDT

There is a great animation of this Eclipse at <http://shadowandsubstance.com/>

Lunar Eclipse view <http://apod.nasa.gov/apod/ap111215.html>

A great composite image of the Earth's Shadow <http://apod.nasa.gov/apod/ap130425.html>



# President's Message

## By Mandy Nothnagel

Hello All!

February was another great month for us! Aside from our always successful and "intriguing" events (and that is a quote from one of our BA High School guests!), we launched Square, a mobile credit card swiping system! This is huge for us because we have now entered the 21<sup>st</sup> century! We've missed a lot of opportunities for memberships and donations in the past because people rarely carry cash anymore. Credit cards will no longer hold us back! Credit cards will now be accepted for a small fee of only 2.75%, which is even less than PayPal!

March is packed with great events! Our Big Kahuna event, the Messier Marathon, will be March 29th (details later in this issue). I really encourage you to participate, I've always had a great time and it gives you the opportunity to learn from your peers and fine tune your observing skills. Plus, you get a certificate from Ron Wood (who leads the Astronomy club, TUVA, in Chouteau, where the Marathon takes place) and you can observe through BART, the amazing, 24 inch telescope (pictured here) Visit this link to view other photos from the event: <https://www.facebook.com/media/set/?set=a.611635978865185.1073741825.135286706500117&type=3>



Other March Astronomy events include:

**Thursday, March 6<sup>th</sup>** - 8:00 pm: Night Sky Network Telecon discussing the future of Mars Exploration (More details later in this issue. The Club has not created a special event for this but if you would like to get together, let me know!)

**Saturday, March 8<sup>th</sup>** - 6:00 pm: Group Night- The Science Enrichment Club of Verdigris High School (also International Sidewalk Astronomy Day)

**Friday, March 14<sup>th</sup>** - General Meeting followed by PIZZA!

**Saturday, March 15<sup>th</sup>** - 12:00 pm: Observatory Appreciation Day

7:30 pm: Sidewalk Astronomy

2:09am: Total Eclipse of the Moon (the Club has not arranged an event for this)

**Friday, March 21<sup>st</sup>** - 7:00 pm: Public Night

**Friday, March 28<sup>th</sup>** - 7:15 pm: Members' Night

**Saturday, March 29<sup>th</sup>** - 3:00 pm: MESSIER MARATHON!

If you are interested in helping with any of these events, please email me at [ACTGroupScheduling@gmail.com](mailto:ACTGroupScheduling@gmail.com). We would *greatly* appreciate your help!

Don't forget that we are on Facebook! It is the best place to get the most up-to-date club news and other updates about events. Visit [www.facebook.com/AstronomyClubofTulsa](http://www.facebook.com/AstronomyClubofTulsa) to be in with the cool crowd! J

Thank you and I look forward to seeing all of you soon!

Mandy Nothnagel

[ACT\\_Pres@astrotulsa.com](mailto:ACT_Pres@astrotulsa.com)

## President's Message, Ct'd.

### Save the Date: Mission: Mars Telecon with Dr. Pascal Lee coming in March



Save the date: **March 26th at 6:00 pm PT/9:00 pm ET** for our telecon with Dr. Pascal Lee of the Mars Institute and SETI on the future of Mars exploration with Mission: Mars! Subzero temperatures, killer rays, raging dust storms...Mars is a hostile planet. Could anything survive there? One job for Future Mars Explorers: ***Stay alive and help search for alien life.***

Dr. Pascal Lee is chairman of the Mars Institute and a planetary scientist at the SETI Institute. He is also director of the NASA Haughton-Mars Project at NASA Ames Research Center. The project helps plan future human missions to Mars.

-Courtesy of Night Sky Network



### Astronomy Club Yahoo Groups Page

The [AstroTulsa Yahoo Groups](#) page is an extremely useful tool for ALL of our astronomy club members! You should check it, our Facebook, and our website any time you are going out to any of our events (especially on members nights) because we post all updates and any time changes there! If you are not already a member of the Yahoo Groups group, go to our website, [www.astrotulsa.com](http://www.astrotulsa.com), and click on the purple **Y!** icon at the very top right corner of the page. That will take you to the Yahoo Groups. You can then check messages (conversations) or click "Join." Once your membership is verified, we will get you added so you can post and reply! Make sure you change your settings (the gear icon at the top right of the page) to receive updates when people post! This is a huge communication tool for us in the club! If you have questions about this, contact me!

([ACT\\_Pres@AstroTulsa.com](mailto:ACT_Pres@AstroTulsa.com)) President - Mandy Nothnagel



# Treasurer's and Membership Report

## By Tim Davis

**Astronomy Club of Tulsa: 126 members, including 16 new members in 2014.**

**Welcome to our new members this month:** Katie Teal Ellington, Rachel Scott, Alan Lane, Cory Suddarth and Celeste and Terry Tillery

**Club Accounts as of Feb 26, 2014:**

**Checking: \$ 5,766.39**

**Savings: \$ 769.09**

**Investment accounts: \$ 18,294.96** (*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.

**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 2014 are as follows:

**Adults: \$ 45 per year, includes Astronomical League Membership.**

**Sr. Adult: \$ 35 per year for those 65 or older, includes Astro League Membership.**

**Students: \$ 30 with League membership; Students: \$ 25 without League membership.**

**Additional Family membership: \$ 20 with voting rights and League membership, \$ 15 with voting rights but without League Membership.**

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

**Join Online – Add or renew magazine subscriptions.**

<http://www.astrotulsa.com/page.aspx?pageid=16>

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

**Astronomy is \$ 34 for 1 year, or \$ 60 for 2 years.** [www.astronomy.com](http://www.astronomy.com)

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

**Sky & Telescope** is \$ 33 per year [www.skyandtelescope.com](http://www.skyandtelescope.com)

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



## Treasurer's and Membership Report, Ct'd.

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.



The club now has an account with Square. Each club officer now has one of the Square readers which you connect to your smart phone or tablet and this allows us to read and accept credit cards for payments. So now we can accept donations, or take membership renewals, or anything else we may need as a monetary transaction via credit card. (As it is with PayPal, a small processing fee is added to these transactions).

Here is the final club financial report for 2013:

Astronomy Club of Tulsa		Expense Summary 2013		Treasurer - Tim Davis	
	<b>118 Members</b>				12/31/13
Closing 2013	74 Long term members - 44 New Members				
<b>Annual Report of Accounts</b>		Dec 31-2013			
Checking		\$	9,005.31		
Savings		\$	769.09		
PayPal		\$	177.43		
Total Liquid Assets		\$	9,951.83		
<b>Club Investment Accounts</b>		\$	18,048.40		
<b>Regular Club Income</b>					
Membership Dues		\$	4,065.09		
Bank Interest on Savings		\$	9.41		
Monetary Donation		\$	2,763.76		
Silent Auction		\$	198.23		
Observatory Donations		\$	848.95	<<<<<	
Net Events & Sales		\$	(351.47)		
<b>Total 2013 Income</b>			<b>\$ 7,533.97</b>		
<b>2013 Major Expenses</b>					
Club Operation Expenses		\$	7,686.25		
Observatory Operating Costs		\$	958.28		
			<b>Total 2013 Expenses</b>	\$	<b>8,644.53</b>
			<b>Club Income minus Expenses</b>	\$	<b>(1,110.56)</b>
<b>Expenses</b>				<b>Paid out</b>	
Philadelphia Insurance				\$	1,669.00
Astro League dues - 115 AL memberships				\$	585.00
Club Meeting costs - Guest speakers, etc.				\$	420.03
PO Box rent				\$	124.00
Club safety deposit box				\$	45.00
Investment account annual fee				\$	60.00
Newsletter printing & postage & pamphlets				\$	181.54
AstroTulsa website				\$	49.80
Observatory roof repair (\$4500 remainder paid in Jan 2014)				\$	4,551.88
<b>Club Operation Expenses</b>				<b>\$</b>	<b>7,686.25</b>

## Treasurer's and Membership Report, Ct'd.

<b>Observatory Operation Costs</b>				
				Avg monthly cost
	Electricity	\$ 455.46	\$ 37.96	
	Water	\$ 191.02	\$ 15.92	
<b>Observatory Maintenance &amp; Repairs</b>		<b>\$ 311.80</b>	<b>\$ 25.98</b>	
	<b>Observatory Total cost</b>	<b>\$ 958.28</b>	<b>\$ 79.86</b>	
<b>Events &amp; Sales; Paid in advance by club members -</b>				
			Received	Paid out
	Astronomy Magazine Subscriptions		\$ 656.00	\$ 750.00
	Sky & Telescope Subscriptions		\$ 264.00	\$ 296.55
	2014 Astronomy Wall Calendars		\$ 390.00	\$ 323.75
	Annual Club Dinner		\$ 636.00	\$ 951.84
	Solar Filters		\$ 112.67	\$ 88.00
	<b>Net Received vs Paid Out</b>	<b>\$ (351.47)</b>	<b>\$ 2,058.67</b>	<b>\$ 2,410.14</b>
<b>Annual Report of Accounts</b>				
		Dec 31-2012	Dec 31-2012	Dec 30-2011
		Dec 31-2010		
Checking	at Bank	\$ 9,005.31	\$ 2,253.39	\$ 3,127.38
Savings	at Bank	\$ 769.09	\$ 7,009.68	\$ 5,996.49
PayPal		\$ 177.43	\$ 0.00	\$ 0.00
<b>Total Liquid Assets</b>		<b>\$ 9,951.83</b>	<b>\$ 9,263.07</b>	<b>\$ 9,123.87</b>
<b>Club Investment Accounts</b>				
Dow Jones close Dec 31, 2013 <b>\$16,576.66</b>				
		Dec 31-2013	Dec 30-2012	Dec 30-2011
		Dec 31-2010		
Cash Balance		\$ 8.28	\$ 874.16	\$ 934.04
		minus \$ 60 annual fee		\$ 933.88
Franklin Income Fund		\$10,785.45	\$10,526.34	\$9,317.51
		at \$ 2.45 / share		\$ 9,110.07
American Balanced Fund		\$3,631.37	\$2,983.11	\$2,612.33
		at \$ 24.42 / share		\$ 2,516.17
Washington Mutual Inv Fund		\$3,623.30	\$2,746.85	\$2,441.74
		at \$ 39.43 / share		\$ 2,280.98
<b>Total Club investments</b>		<b>\$ 18,048.40</b>	<b>\$17,130.46</b>	<b>\$15,305.62</b>
<b>Net Increase from 2012</b>		<b>\$ 917.94</b>	5.36%	increase
<b>2013 reported dividends</b>		<b>\$ 764.19</b>		
<b>Investments gain</b>				
Franklin Income fund (note 1)		\$259.11	2.46%	increase
American Balanced Fund		\$648.26	21.73%	increase
Washington Mutual Inv Fund		\$876.45	31.91%	increase
Note 1: Sold 494 shares of Franklin Fund on Dec 23 at \$2.42 /per = \$1194.00. Used \$808.00 of available cash for total of \$2000.00 which was transferred to bank account on Dec 30 to use toward roof repair. This was in accordance with club vote at Nov general meeting.				



# The Secretary's Stuff

By Tamara Green

## ASTRONOMY CLUB OF TULSA – MINUTES – GENERAL MEETING FEB 7, 2014

### **PRESENT:**

**Mandy Nothnagel, President**

**Richard Brady, VP**

**Tamara Green, Secretary**

**Tim Davis, Treasurer**

**Stan Davis, Board**

### **NOT PRESENT:**

**Lee Bickle, Board**

**Michael Blaylock, Board**

**John Land, Board**

**Christopher Proctor, Board**

**James Taggart, Board**

**Skip Whitehurst, Board**

The meeting was held at Tulsa Community College Northeast Campus and there were 22 attendees.

**WELCOME AND INTRODUCTION:** Mandy called the meeting to order at 7:15 PM and welcomed members and guests.

**PROGRAM:** Ron Wood on the Messier Marathon; Tamara Green on the NSN Kit "The Universe in a Different Light"; Mandy Nothnagel with Astronomy News.

### **OFFICERS'/STAFF REPORTS:**

**PRESIDENT** – Mandy talked about the problems with the dome, etc. on the last public night, but the supernova in M82 is still visible. Lee will get us a boom lift to install the new cable, next work day is Apr. 26, she listed off some of the things that we are going to try to get done. Gate at top of stairs is fixed but we will need to put a lock on it. Chris will give an orientation on the scope and dome soon.

**VICE PRESIDENT** – Richard gave a recap of the webinar "Globe at Night". Richard talked to John Land, and he spoke to Cory Suddarth who was present at our meeting tonight; the corrector plate is dirty and needs to be cleaned. Eyepieces may need to be cleaned too.

**SECRETARY** – Tamara announced that she is leading the caravan to TUVa, so if anyone is interested in joining in to call, email or text her, and if anyone wanted a copy of the minutes from the last general meeting to call or email her. She then announced that for those who have completed an observing program she will be happy to submit their logwork to the AL so they can get their certificate and pin. Then she announced a call for articles for the March newsletter, due to be out on or around February 28.

## *The Secretary's Stuff, Ct'd.*

**TREASURER** – Tim talked about the club accounts and then about Square.

**GROUPS** –The group scheduled for Feb 8 cancelled due to weather, will reschedule later.

**FACILITIES** – James not present, no report. Mandy had announced the work day for Apr 26, with a Noon start.

**PR/OUTREACH/SIDEWALK** – Owen announced the Sidwealk event, to take place on Sat, Feb 15 at 6:00 PM at Bass Pro.

**OBSERVING** – Tamara told attendees that if they have completed any AL observing program to submit their logwork to her or Richard and she will forward it to the appropriate observing club chair at the AL.

Being no other business, Mandy adjourned the meeting.

The following photograph was e-mailed to me by one of my co-workers recently. It shows the first photograph of Earth, taken by Curiosity from Mars!

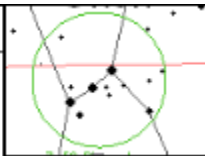




# Measuring your Eyepiece Field of View

by John Land

Before we had GoTo telescopes or even computers to aid in locating objects, astronomers relied on printed star charts to find their way around the sky. "Star Hopping" was the technique most of us used to find our way around the sky. It's still one of the most reliable methods to track down an illusive object. Knowing the field of view of your finder scope and each of your eyepieces is a valuable tool of any good observer.



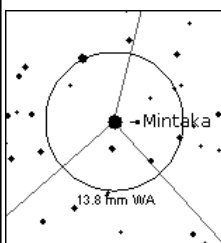
The Constellation of Orion is an excellent target to start your measurements. Orion is a little west of due south as it gets dark in mid-March. Orion is easily recognized by the 3 bright stars that make up his belt. These three stars span a distance of about 2.7 degrees from end to end. A typical 7 by 50 finder scope has a field of view of about 7

degrees. Earth's rotation carries stars on the celestial equator 1 degree to the west in 4 minutes of time. Put a different way the earth rotates 1 degree in 240 seconds. A degree is a fairly large area of sky. The moon only covers an angle of about 1/2 degree. Astronomers subdivide a degree into smaller segments. One degree measures 60' arc minutes across. Each arc minute is further divided into 60" arc seconds.

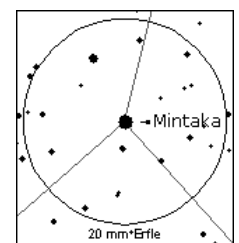
So one degree equals 60' or 3600" The full moon measures roughly 30' across while the disk of Jupiter is 44"

**Using the Drift Method** to measure eyepiece field of view ( FOV ) To do so you need to locate a star near the celestial equator. Orion's 3 belt stars also lay very near the celestial equator with the left most star, Mintaka, almost exactly on the equator. To measure your eyepiece field of view you'll need a stop watch or clock ( phone display ) that shows seconds. Start with a medium power eyepiece. Something around 15 mm. The focal length of an eyepiece is usually printed on it. The larger the focal length # the lower the eyepiece magnification. Position your telescope so that Mintaka is in the field of view of the eyepiece. **Turn Off any drive motors** and watch the direction that the stars are drifting across the field of view. The direction the stars are drifting is WEST in the sky. Next move the telescope until Mintaka is just out of view on the on the EAST ( opposite side ) Start timing when the star enters your field of view and stop in when leaves the field of view. The star should drift more or less along a center diameter of the eyepiece. If it cuts across at a shallow angle, just reposition it and start your timing over. I find that it is sometimes easier to measure with one of the dimmer stars near Mintaka.

**To calculate your field of view divide the number of seconds on the clock by 240** – this will give you the angle in degrees. Then multiple that number by 60 to find the angle in arc minutes. Or you can simply divide the timing by 4 to get the arc minutes directly. If you have more than one telescope you'll need to do the timings for each telescope / eyepiece combination. Write them down in your observing notes for future reference.



**The Magnification of a telescope** is found by dividing the focal length of the telescope in mm - millimeters by the focal length of each eyepiece in mm. My 10 inch f 5 Dobsonian telescope has a focal length of 1270 mm. Using my 13.8 mm eyepiece that gives  $1270 / 13.8 = 92 \times$  Using the **Drift Method** I timed **163 seconds** for stars to drift across its field of view. Calculating its field of view yields  $163 / 240 = 0.68$  **degrees** or  $163 / 4$  gives about **41'** arc minutes. My 20 mm Erfle eyepiece on the same scope gives 63 X magnification and 241 seconds of drift time yielding a full



degree field of view. Knowing the field of view of each eyepiece is a great asset in finding your way around the sky.

Some software programs like Sky Tools 3 allow you to use this information to customize the data for each telescope – eyepiece combination.

# Towards an AL Program Handbook

by Brad Young

I've been kicking around the idea of writing some short articles on the Astronomical League's Observing Programs for a while now, and after hearing that there was a great discussion at the last General Meeting on this subject, I'm going to try to start that project up.

Planning, observing, and completing an Observing Program is a great way to improve your enjoyment and skill level at our hobby, and provides a sense of accomplishment that casual observing may not give you. Several members of the Astronomy Club of Tulsa have completed several of these programs, and they can also share their experiences with you at the next club get together or observing night. For some background on why doing the programs may help, see "What Am I Going to Observe Tonight?"

[http://www.astrotulsa.com/cms\\_files/201107.pdf](http://www.astrotulsa.com/cms_files/201107.pdf)

If you are interested, check out the AL website list of clubs available at:

<http://www.astroleague.org/al/obsclubs/AlphabeticObservingClubs.html>

You can also view the list by experience level, equipment needed, etc. Stephen James O'Meara has also written guides for several of the major clubs, with sketches, photos, etc. These are invaluable as a reference guide, but also 400 pages long and may deter an observer who is looking for just a quick synopsis to see if they are interested.

I've written a few articles before in our newsletter, and other club members have covered a few of the clubs too. John Land wrote a great article about the Galileo Club:

[http://www.astrotulsa.com/cms\\_files/201002.pdf](http://www.astrotulsa.com/cms_files/201002.pdf)

Steve Chapman actually built or modified a scope if I remember correctly that mimicked Galileo's and did the program using it. And I mentioned one club in an article I did about observing after a surgery:

[http://www.astrotulsa.com/cms\\_files/201203.pdf](http://www.astrotulsa.com/cms_files/201203.pdf)

This was the Analemma Program, which involves plotting the course of the sun over a year and deriving parameters of the Earth's orbit. **Full disclosure:** I am currently protesting the administration of this club; the expectations of the program are not clearly defined and are beyond what one would expect from a beginner level program, in my opinion. I have asked Carroll Iorg, the AL President, to arbitrate my application, which has been turned down six times. I'll bet no one who knows me could have seen that coming..

I will probably not publish articles on the southern programs here, but they are just as fun to do if you get the chance. I certainly recommend going to the southern hemisphere at least once in your lifetime; see my over-the-top gush flood article here:

[http://www.astrotulsa.com/cms\\_files/201105.pdf](http://www.astrotulsa.com/cms_files/201105.pdf)

*Towards an AL Program Handbook, by Brad Young, Ct;d.*

If not Oz, a trip to the Florida Keys, e.g. the Winter Star Party will show you a bunch of the gems of the southern sky, also. When I reviewed the submittals for the Southern Binocular Club, several people finished the program from Hawaii, Florida, El Salvador, etc.

Most of all, if anyone has a particular program they want to learn more about, or are currently working, please let me know, and I'll try to write up those first. Otherwise, I'll probably attack them in the order I did them, starting with the Double Star Program. Following that, I will cover the other 4 "core" programs that, coupled with 5 "electives" will lead to certification as a Master Observer. Further details at:

<http://www.astroleague.org/al/obsclubs/master/master.html>

My plan is to use the following as an outline, so if you see any other information you'd like to see, let me know:

1. Why do this Program?
2. Experience Level and Skills Required
3. Darkness of site/Sky Conditions Required
4. Time
  - a. Investment
  - b. Seasons or preferred dates
5. Equipment Recommendations
6. Recording Observations
  - a. Forms and Info Required
  - b. Sketches/Imaging/Other Data
7. What to Watch Out For
8. Submittal Process and Feedback from Coordinators

I hope to start soon, so please send me an email directly or post to the Yahoo board if you have any ideas or feedback. The fine print: All article content will be copyrighted by Brad Young, and any impact on the articles prompted by your input will be considered part of that copyright.

## NITELOG - Norway InTErurban Local Observing Group

by Tom Hoffelder

Making Maple, March Madness, Messier Marathon! This is a busy month!!! But only the last one applies to most of you reading this, so I'll limit the comments here to that endeavor. As most (maybe all) of you know, there are a total of 110 Messier Objects and, thanks to a small gap in the heavens where there are none and where the sun resides around the first day of the March equinox, it is possible to see all of the objects in one night, all night. Some of us are crazy enough to actually do this, in fact, I know someone crazy enough to have done 20 marathons! (We don't mention names here.) Not everyone will enjoy participating in the event, but many do find it a fun challenge. The prime marathon night (the Saturday nearest a new moon and the equinox) this year is March 29/30; I will be attempting one near that date at Twitchell if there is a clear night. If you would like to be involved, at any level, please let me know and I will keep you updated. Also please let me know if you are not in Maine but would like to try a marathon and need detailed information (search order, etc).

**OBSERVING:** March open house at the Twitchell Observatory is scheduled for Monday the 3rd at 7:30. If it is clear I plan to have the C14 set up about an hour before, in case anyone wants to start earlier.

**MOON:** Two new moons again this month, 1st and 30th! There is a Lunar X event on the 8th; it occurs before sunset, 3:19 PM EST, which is not a problem as the feature is easily seen in a scope during daylight. In Maine the moon will be approximately 50 deg. high then and climbing for the next couple hours while the X will remain visible. If you need to see a photo, check last year's Dec. NITELOG.

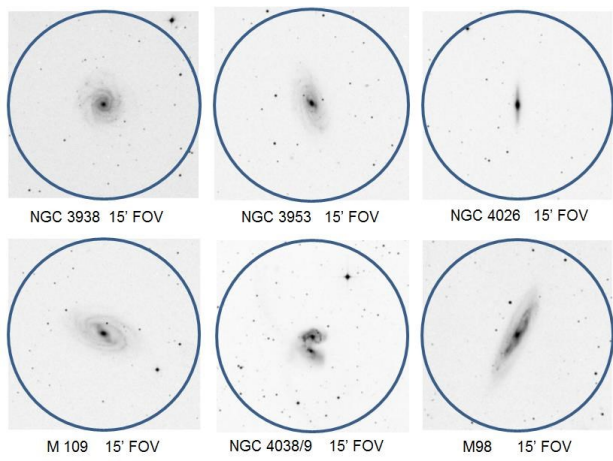
**COMETS:** It WAS most unusual and the view is somewhere at the top of my list of favorite things seen in a scope! Of course referring to Lovejoy and that LINEAR in the same field of view. This month I'm ignoring comets, since if you haven't seen those two, why bother now? There is a PanSTARRS predicted to be 10th mag, but it is also predicted to be 8th mag, and maybe even 6th later in the year, so I'm skipping it for now and expecting it to get that bright since there has been no hype. And actually if it does get to 6th mag in Sept., there is another comet forecast then to be the same mag and within a few degrees. That's all I'm saying for now, as anything else could be perceived as hype!

**PLANETS:** Jupiter is way up there as soon as you can see it and remains observable until about 2 AM on the 1st and 1:00 at month's end, which would be midnight except for that goofy spring forward thing. Red spot and shadow transits attached, more of the former but fewer of the latter than normal. However, you will note on the 7th that Io's shadow and the GRS transit at about the same time, and on the 16th both Io's and Callisto's shadow will be on the planet as long as Io's is. Unfortunately it probably won't be dark enough to find Jupiter until the event is about half over, but that still gives about an hour to observe it. Mars (near Spica) rises high enough to observe by 11 PM early in the month and 10 at month's end, which of course depends on seeing conditions. Saturn in Virgo still follows Mars by a couple hours and with the rings tipped 22 degrees it is worth a look if you are out there. Mars transits (reaches highest point) around 2 AM the 1st of the month and Saturn about 4:30, when the latter doesn't quite make 30 degrees, up hee-yah in the North Woods. Venus is out there in the morning, and near a crescent moon on the 27th, but I won't be seeing it unless I happen to be finishing a marathon.

**STARS:** Three carbons with B-Vs of 3.2 to 4.1 and current magnitudes approx 6.5 to 8.5. Five doubles, one of which is a triple, but at 0.7" separation it is probably a double for most of us.

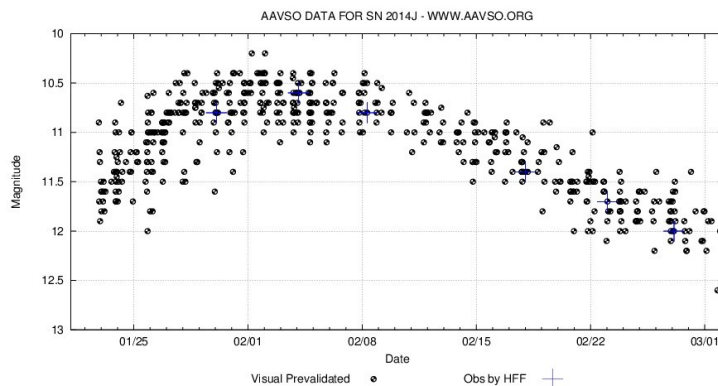


## NITELOG, Ct'd.



**THE GOOD STUFF:** It's all galaxies! And somewhat strangely, there are only two Messiers in the section of the sky that needs to be covered in order to make all the M's in one year and all the H400's in two. One of the M's is also an H400, making a total of 20 objects from that list. Since there was room, I added two additional Herschel galaxies (not in the 400) that are nice edge-ons and a little "earlier" in the sky. You might be thinking, OH NO, a bunch of dim Herschels this month. But based on surface brightness values, nearly all of them should be easier to see than the two Messier Objects.

**Supernova:** If you haven't seen SN 2014J in M82, you probably won't, since it is starting to slip below the surface brightness of the galaxy. Stand by for the next one to pop in an M galaxy! Or maybe the Milky Way? And I know you have all been waiting to see this, so I am attaching the AAVSO visual light curve that shows my six magnitude estimates.



**Astrophotography:** Usually I don't do any, but you can see the eyes quite well in the pic of The Owl. (For the rest of the story, see my Facebook Timeline photos of 2/23; a few of you have.)



**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.*

3/1		3/21			3/22			3/29		
SS	NTE	MS	SS	NTE	MR	SS	NTE	ATE	MS	
17:30	18:33	18:17	18:56	19:59	00:24	19:06	20:10	20:46	18:06	

Object (Type)	RA	Dec	Star	N/S	E/W	Mag*/(# of Stars)	Size (")/ Sep (")	Spect/ M# or H#	Dist (ly)	Urano Page	Comment, [B-V], {crnt mag} (opt x)
X Cnc	08 55.4	+17 14	δ Cnc	0.9 S	2.6 E	6.2-7.5		CII		142	[3.2] {6.6}
T Cnc	08 56.7	+19 51	δ Cnc	1.7 N	2.9 E	7.8-10.6		N		142	[4.1] {8.6}
Y Hya	09 51.1	-23 01	39 Hya	8.2 S	0.1 W	6.9-9...		C		323	[3.8] {7.7}
ζ Cnc	08 12.2	+17 39	-	-	-	5.6,5.9, 6	0.7,5.8	F8,G0,d G2	70	140	(650)/(80)
ι Cnc	08 46.7	+28 46	-	-	-	4.5, 6.5	30	G8, A3		102	(20)
57 Cnc	08 54.2	+30 35	PRV	1.8 N	1.8 E	6, 6.5	1.5			102	(320)
27b Hya	09 20.5	-09 33	α Hya	0.9 S	1.8 W	7, 9	9.6	F2, K2		278	(50)
Σ1340	09 22.7	+49 35	θ UMa	2.2 S	1.7 W	6.5, 8.5	6.2			44 (ni)	(80) 2854/6/7 0.5 SE
NGC 2820 (SBc/P)	09 21.8	+64 16	h UMa	1.3 N	1.0 W	[12.9]	4.1X0.4	H869-2	95M	23	GX 2814 is 0.1 W
NGC 3044 (SBc)	09 53.7	+01 35	α Sex	2.0 N	3.6 W	[12.9]	4.7X0.7	H254-3	70M	234	
NGC 3893 (SBc)	11 48.6	+48 43	χ UMa	0.9 N	0.4 E	[12.8]	4.5X2.8	*H738-2	60M	74	GX 3896 IS 0.1 SE
NGC 3898 (Sab)	11 49.3	+56 05	γ UMa	2.4 N	0.6 W	[13.3]	4.4X2.6	*H228-1	65M	47	GX 3888 is 0.3 SW
NGC 3900 (S0-a)	11 49.2	+27 01	93 Leo	6.8 N	0.3 E	[13.1]	3.2X1.7	*H82-1	95M	147	
NGC 3912 (SBb)	11 50.1	+26 29	PRV	0.6 S	0.2 E	[12.8]	1.5X0.9	*H342-2	80M	147	

*NGC 3938 (Sc)	11 52.8	+44 07	$\chi$ UMa	3.7 S	1.2 E	[13.5]	5.4X4.9	*H203.1	50M	74	
NGC 3941 (SB0)	11 52.9	+36 59	$\nu$ UMa	3.9 N	7.0 E	[12.5]	3.5X2.5	*H173-1	45M	107	
NGC 3945 (SB0)	11 53.2	+60 41	$\gamma$ UMa	7.0 N	0.1 W	[13.5]	5.2X3.5	*H251-1	70M	47	GX 3978 is 0.5 SE
NGC 3949 (Sbc)	11 53.7	+47 52	$\chi$ UMa	-	1.3 E	[12.2]	2.9X1.7	*H202-1	60M	74	
*NGC 3953 (SBbc)	11 53.8	+52 20	$\gamma$ UMa	1.4 S	-	[13.1]	6.9X3.6	*H45-5	60M	47	
*NGC 4026 (S0)	11 59.4	+50 58	PRV	1.4 S	0.9 E	[12.7]	5.2X1.3	*H223-1	50M	47	
NGC 3962 (E1)	11 54.7	-13 58	$\eta$ CrI	3.2 N	0.3 W	[12.7]	2.6X2.2	*H67-1	70M	282	
NGC 3982 (SBb)	11 56.5	+55 07	$\gamma$ UMa	1.4 N	0.4 E	[12.6]	2.3X2.0	*H62-4	70M	47	GX 3972 is 0.3 N
NGC 3998 (S0)	11 57.9	+55 27	PRV	0.3 N	0.2 E	[12.5]	2.7X2.3	*H229-1	60M	47	GX 3990 is 3'W
*NGC 3992 (SBbc)	11 57.6	+53 22	$\gamma$ UMa	0.3 S	0.6 E	[13.4]	7.5X4.4	M109	70M	47	Also *H61-4
NGC 4030 (Sbc)	12 00.4	-01 06	$\beta$ Vir	2.8 S	2.4 E	[13.3]	4.2X3.2	*H121-1	80M	237	
NGC 4036 (E-S0)	12 01.5	+61 54	$\delta$ UMa	4.9 N	1.7 W	[12.7]	4.3X1.7	*H253-1	70M	47	
*NGC 4038 (SBn)	12 01.9	-18 52	$\gamma$ CrV	1.3 S	3.3 W	[12.1]	3.4X1.7	*H28.1-4	65M	328	+4039 1'S=Antennae
NGC 4027 (SBd)	11 59.5	-19 16	PRV	0.4 S	0.5 W	[13.1]	3.3X2.4	*H296-2	75M	328	
NGC 4179 (S0)	12 12.9	+01 18	$\eta$ Vir	2.0 N	1.8 W	[12.6]	4.2X1.3	*H9-1	65M	238	
*NGC 4192 (SBb)	12 13.8	+14 54	$\beta$ Leo	0.3 N	6.0 E	[13.5]	9.8X2.8	M98	50M	193	
NGC 4203 (E/SB0)	12 15.1	+33 12	$\gamma$ Com	4.8 N	2.3 W	[13.4]	3.5X3.2	*H175-1	60M	107	

\*DSS image

\*[Surf

Brtnss for  
GX's]

mag per  
square  
arcmin

\*H400

ni=shown,

not iden-  
tified

## JUPITER IN March 2014 (EST)

DATE	GRST*	I SHAD	E SHAD	G SHAD	C SHAD
1					
2	22:47				
3	18:39				
4					
5	00:26 & 20:18				
6					
7	02:05 & <b>21:56</b>	<b>20:57- 23:12</b>			
8	17:48				
9					
10	00:35 & 20:26				
11					17:11-21:03
12	02:14 & 22:05				
13			19:23-22:05		
14	23:44	23:52-			
15	19:35	02:08			



16		<b>18:21-20:37</b>		<b>18:08-21:24</b>	
17	01:23 & 21:14				
18					
19	22:53				
20	18:44		21:59-		
21			00:41		
22	00:32 & 20:23				
23		20:17-22:32		22:08-	
24	22:02			01:26	
25					
26	23:41				
27	19:32				
28			00:35-03:17		
29	01:20 & 21:11				
30		22:12-			
31	22:52	00:28			

\*Transit, visible +/- 50 min

## A Two-Toned Wonder from the Saturnian Outskirts

By Dr. Ethan Siegel

Although Saturn has been known as long as humans have been watching the night sky, it's only since the invention of the telescope that we've learned about the rings and moons of this giant, gaseous world. You might know that the largest of Saturn's moons is Titan, the second largest moon in the entire Solar System, discovered by Christiaan Huygens in 1655. It was just 16 years later, in 1671, that Giovanni Cassini (for whom the famed division in Saturn's rings—and the NASA mission now in orbit there—is named) discovered the second of Saturn's moons: Iapetus. Unlike Titan, Iapetus could only be seen when it was on the west side of Saturn, leading Cassini to correctly conclude that not only was Iapetus tidally locked to Saturn, but that its trailing hemisphere was intrinsically brighter than its darker, leading hemisphere. This has very much been confirmed in modern times!

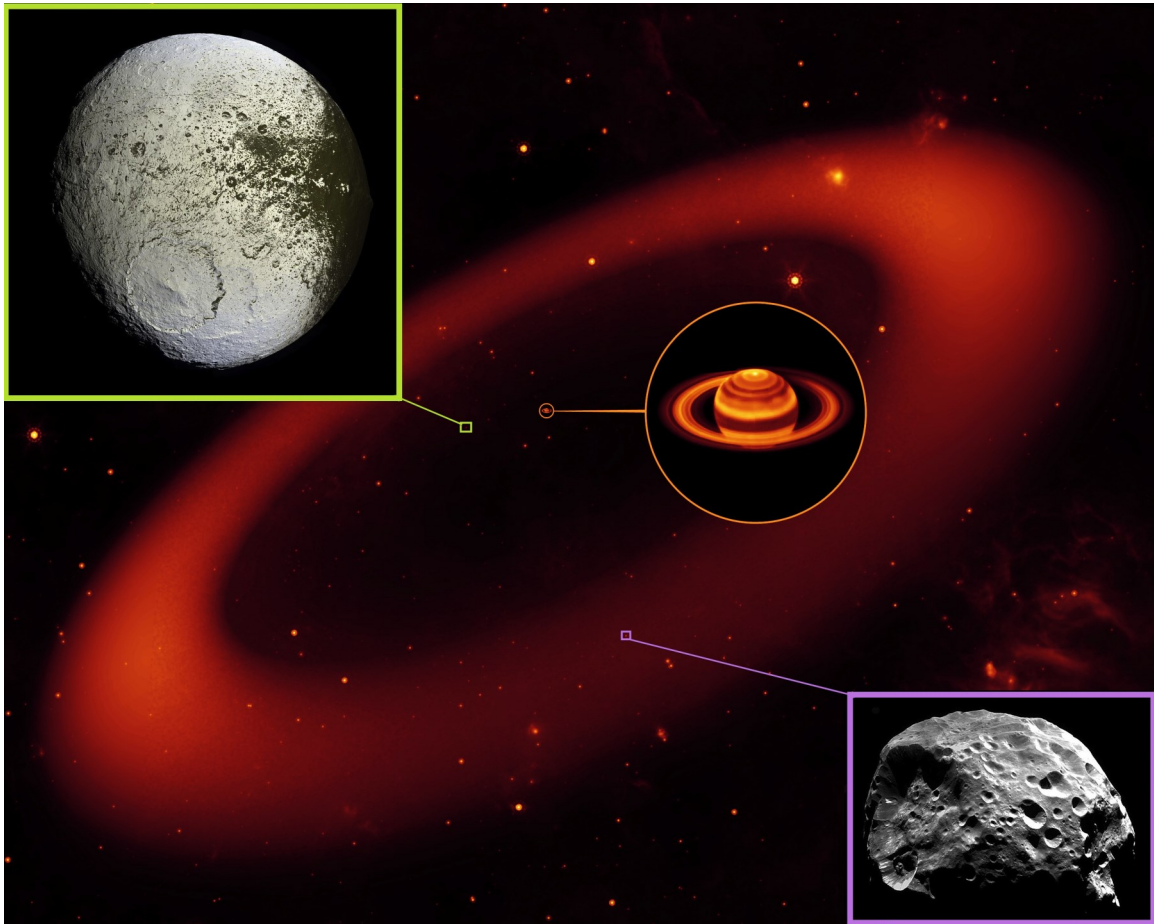
In fact, the darkness of the leading side is comparable to coal, while the rest of Iapetus is as white as thick sea ice. Iapetus is the most distant of all of Saturn's large moons, with an average orbital distance of 3.5 million km, but the culprit of the mysterious dark side is *four times* as distant: Saturn's remote, captured moon, the dark, heavily cratered Phoebe!

Orbiting Saturn in retrograde, or the opposite direction to Saturn's rotation and most of its other Moons, Phoebe most probably originated in the Kuiper Belt, migrating inwards and eventually succumbing to gravitational capture. Due to its orbit, Phoebe is constantly bombarded by micrometeoroid-sized (and larger) objects, responsible for not only its dented and cavity-riddled surface, but also for a huge, diffuse ring of dust grains spanning *quadrillions* of cubic kilometers! The presence of the "Phoebe Ring" was only discovered in 2009, by NASA's infrared-sensitive Spitzer Space Telescope. As the Phoebe Ring's dust grains absorb and re-emit solar radiation, they spiral inwards towards Saturn, where they smash into Iapetus— orbiting in the opposite direction—like bugs on a highway windshield. Was the dark, leading edge of Iapetus due to it being plastered with material from Phoebe? Did those impacts erode the bright surface layer away, revealing a darker substrate?

In reality, the dark particles picked up by Iapetus aren't enough to explain the incredible brightness differences alone, but they absorb and retain *just enough* extra heat from the Sun during Iapetus' day to sublimate the ice around it, which resolidifies preferentially on the trailing side, lightening it even further. So it's not just a thin, dark layer from an alien moon that turns Iapetus dark; it's the fact that surface ice sublimates and can no longer reform atop the leading side that darkens it so severely over time. And that story—only confirmed by observations in the last few years—is the reason for the one-of-a-kind appearance of Saturn's incredible two-toned moon, Iapetus!

Learn more about Iapetus here: <http://saturn.jpl.nasa.gov/science/moons/iapetus>.

Kids can learn more about Saturn's rings at NASA's Space Place: <http://spaceplace.nasa.gov/saturn-rings>.



*Images credit: Saturn & the Phoebe Ring (middle) - NASA / JPL-Caltech / Keck; Iapetus (top left) - NASA / JPL / Space Science Institute / Cassini Imaging Team; Phoebe (bottom right) - NASA / ESA / JPL / Space Science Institute / Cassini Imaging Team.*



# the Space Place

March – April 2014 / Vol. 7, Issue 2

## NEWS AND NOTES FOR FORMAL AND INFORMAL EDUCATORS

The Space Place is a NASA website for elementary school-aged kids, their teachers, and their parents.

It's colorful!  
It's dynamic!  
It's fun!

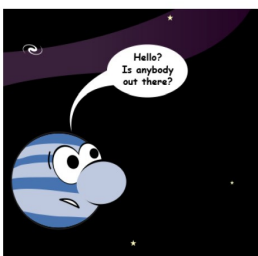
It's rich with science, technology, engineering, and math content!

It's informal.  
It's meaty.  
It's easy to read and understand.  
It's also in Spanish.  
And it's free!

It has over 150 separate modules for kids, including hands-on projects, interactive games, animated cartoons, and amazing facts about space and Earth science and technology.

*The Space Place prides itself on its ability to be useful to educators—informal and formal alike. In an effort to reach as wide an audience as possible, we have made our popular 'make-and-do' activities available in a print-ready, downloadable pdf format. This will allow educators with more students than computers to easily run these fun, educational activities without limitation. Check it out at <http://spaceplace.nasa.gov/make-do-pdf>.*

### What's New? The Lone Planet



What makes a planet a planet? In our own solar system we have a pretty clear definition—something that orbits our sun, and is large enough to have its gravity mold it into

a sphere and clear out any objects floating around nearby. But what about outside our solar system? A recent discovery of a lonely planet hovering around in space without a star to call its sun makes classifying planets a bit less straightforward. The Space Place tackles this new discovery and the debate about planethood with two new articles: <http://spaceplace.nasa.gov/lone-planet> and <http://spaceplace.nasa.gov/planet-what-is>.

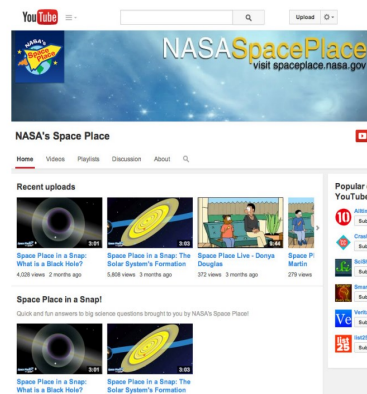
### Space Place en Español: Comet Quest

Not only is our popular game—'Comet Quest'—updated and better than ever. We also have a new Spanish version of the game on Space Place en Español. You get to land a rover on a comet and collect and



transmit as much data as possible as you command a comet orbiter faced with an increasing number of challenges. <http://spaceplace.nasa.gov/comet-quest/sp/>.

### Spotlight on YouTube



The Space Place now has its own YouTube channel! Be sure to check it for updates frequently. Not only will the channel be highlighting our popular 'Space Place in a Snap' videos, but we are also re-releasing our popular 'Space Place Live' animated series on YouTube in honor of the series' ten-year anniversary. <http://www.youtube.com/nasaspaceplace>.

Where kids and grown-ups have fun with space science and technology



## For the Classroom

We have created a new informational brochure that would be a great addition to any classroom. Interested in knowing a little bit more about the things in our solar system that are not our sun or the planets? Find out what these smaller bodies tell us about our cosmic neighborhood's formation. Check out and download 'Small Worlds, Big Discoveries' for your classroom today! <http://spaceplace.nasa.gov/posters/en/#small-bodies>.



## For Out-of-School Time

Snow day or heavy rain got you stuck inside? Why not give Space Place's latest 'make-and-do' activity a try. In this activity, you get to be the chief engineer for your own NASA mission. You will design a satellite—and all the choices are yours. We provide some suggestions in terms of materials (both edible and not edible), outline some of the basic requirements of a NASA satellite, and provide some examples of both real satellites and satellite models. <http://spaceplace.nasa.gov/build-a-spacecraft>.



## Special Days

### March 7 - Kepler mission launched in 2009.

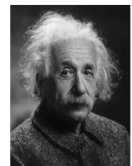
Kepler looks for habitable planets outside our solar system. It has found thousands of candidate planets! Make a model of your own Kepler spacecraft! <http://spaceplace.nasa.gov/build-a-spacecraft>.

### March 11: - International Ask a Question Day.

Visitors to Space Place partner museums have asked a lot of good questions, to which Dr. Marc has answers. <http://spaceplace.nasa.gov/menu/dr-marc/>.

### March 14: Albert Einstein's Birthday and Pi Day.

Not only was Einstein born on this day in 1875, but the day coincides with another very mathy holiday—Pi Day ( $\pi = 3.14 =$  March 14th)! Learn more about Einstein here: <http://spaceplace.nasa.gov/what-is-gravity>.



**April 1: April Fool's Day.** At least teach your nose not to be fooled! <http://spaceplace.nasa.gov/e-nose>.

**April 12: First Space Shuttle Launched in 1981.** See pictures of Space Shuttle launches and landings. <http://spaceplace.nasa.gov/gallery-technology/#rockets>.

**April 22: Earth Day.** Play "Missions to Planet Earth"—an online card game. <http://spaceplace.nasa.gov/earth-card-game/>.

**April 27: Tell A Story Day.** Read a couple of the storybooks on The Space Place, then make up your own story about space! <http://spaceplace.nasa.gov/menu/storybook>.

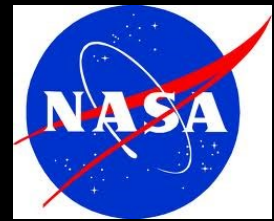
## Share

Want some help spreading the word about NASA's Space Place? Check out <http://spaceplace.nasa.gov/share>.

## Send Feedback

Please let us know your ideas about ways to use The Space Place in your teaching. Send to [info@spaceplace.nasa.gov](mailto:info@spaceplace.nasa.gov).





And For The Young Stargazers:  
Check out these fun websites from NASA!

<http://climate.nasa.gov/kids>

<http://scijinks.gov>

<http://spaceplace.nasa.gov>



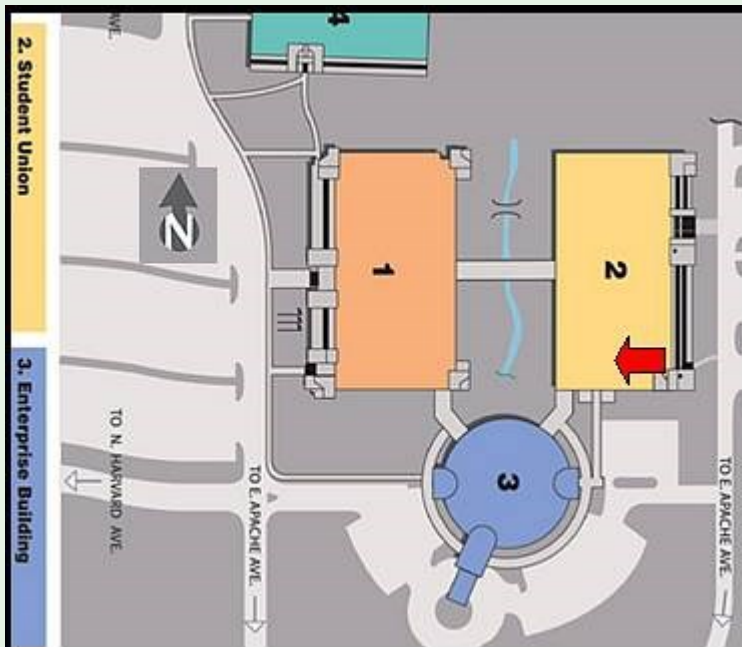
## Where We Meet:

**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/>**



**The General Meetings are free and open to the public.**

**We hope to see you there!**

## CLUB OFFICERS

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## MEMBERSHIP INFORMATION

### MEMBERSHIP RATES FOR 2014 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](http://www.astronomy.com)

Sky & Telescope is \$33 per year.

[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>



# Astronomy Club of Tulsa









Photo: Scorpius rising , ACT Observatory, Looking Southeast, May 2013, by Tamara Green.

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

OPEN TO THE PUBLIC

For more information please visit [www.astrotulsa.com](http://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](http://www.astrotulsa.com) where you will find all the information necessary to become a member.

