



# the Skyscraper

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AMATEUR ASTRONOMICAL SOCIETY OF RHODE ISLAND \* 47 PEEPTOAD ROAD \* NORTH SCITUATE, RHODE ISLAND 02857 \* WWW.THESKYSCRAPERS.ORG

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**Skyscrapers  
Board Meetings**  
Third Monday of the Month  
All Members Welcome

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## Phases of the Moon

**First Quarter Moon**  
December 7 09:03

**Full Cold Moon**  
December 14 00:06

**Last Quarter Moon**  
December 21 01:56

**New Moon**  
December 29 06:53

## Saturday, December 10, 5:30pm at North Scituate Community Center

### 5:30 pm Pot Luck Dinner

Please bring an appetizer, main dish, salad or dessert. You are also invited to bring cold drinks, chips, dips, etc. Skyscrapers will provide: coffee, water, plates, cups and napkins Please let Kathy Siok know what you plan to bring (kathys5@cox.net).

### 7:00 pm "Building twin 3/4 scale reproductions (Castor and Pollux) of Skyscrapers' 8" Alvan Clark refractor"

Allen Hall and Dick Parker will talk about the building of their 3/4 scale replicas of the 1878 Alvan Clark telescope at the Seagrave Memorial Observatory, cared for by the Skyscrapers. The talk will include photos from the first light ceremony and Stellafane 2016.

Dick Parker has been involved with amateur telescope making since he built his first 8 inch Newtonian reflector in 1962. A time when that was a giant telescope. Dick has held telescope mirror making workshops in his home since 2000, has assisted with testing at the Delmarva Mirror making seminar for the past 8 years, and assisted some with testing at the Springfield Telescope Makers mirror class. Dick has shown to be proficient at making Newtonian reflectors, Cassegrain reflectors and 6 and 4.5 inch

refractors with both airspaced and oiled elements and won 1st place optical prizes at Stellafane in all three categories. Dick was on the team with the restoration of the Seagrave telescope in 2010.

Al Hall has been a member of Skyscrapers since 1971. He rebuild the flyball governor on the 8-inch Clark telescope from old photographs and memory, and spearheaded the restoration effort in 2010. He has won numerous awards at Stellafane.



Seagrave Memorial Observatory  
Open Nights

Saturdays at 7:00 pm  
weather permitting

# President's Message

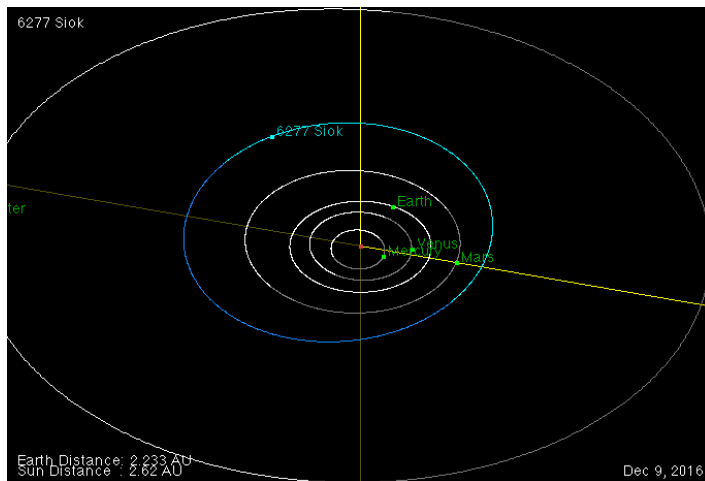
by Steve Siok

How many of you are aware that as a society, Skyscrapers has a history of fostering young people interested in pursuing careers in astronomy?

Just this week, I was contacted by a Portsmouth High School student, Joshua Corr, who is planning his senior project. His hope is to build a Dobsonian telescope. He has asked Skyscrapers to mentor him. Joshua has been an observer and is planning to study astronomy in college. This Saturday, he and his family visited the observatory and attended Jeff Padell's talk about telescopes. He was very excited to have made the connection with our group. If you have experience in telescope making and would like to help him, please contact him directly at [joshcorr4@gmail.com](mailto:joshcorr4@gmail.com).

Let me tell you a little about some of the people who have been influenced by our organization.

How many of you have seen the picture in the meeting hall of Woody Spring accomplishing an EVA from the Space Shuttle Atlantis? This was a gift from Woody when he visited Skyscrapers in the 90s. He is a Gloucester native and was inspired to go into the



Astronaut Corps because of his visits to Seagrave as a child and adolescent.

Todd Kosikowski was a member in the 1980s along with his dad, Stan. They lived in nearby Greenville. Todd was a frequent visitor to Seagrave and also a talented musician. He earned a PhD in Astronomy and did galactic research with the 200". He now runs several software companies and observes from his personal observatory in New Hampshire.

Jim Bell was a member around the same time as Todd. He became a Planetary Geologist and was operated the panoramic cameras on the Mars rovers, Spirit and Opportunity. Jim has written several books about astronomy and Mars, including the book, "Postcards from Mars", which he brought with him when he spoke at a monthly meeting. Jim teaches at Arizona State and is the president of The Planetary Society.

Most recently, Alex Bergemann, a junior member who aspires to become an astronaut and maybe travel to Mars, completed his Eagle Scout project by designing, obtaining funding and building the wonderful gazebo attached to our meeting hall. Alex's Eagle induction ceremony was held at Seagrave during which he spoke to Woody Spring via Skype. He and Woody have been emailing in contact with each other for several years,

Skyscrapers has really helped to make a difference and continues to have the opportunity to do so in the future. Our programs reach out to all those who are interested in what's happening in the skies. I encourage everyone of us to participate in the variety of activities Skyscraper offers. I hope that each of us will be inspired to help promising students like Joshua as he starts his own journey.

Keep looking up. -Steve



Steve Siok is president of Skyscrapers, Inc. See more at <http://www.theskyscrapers.org/steve-siok>



The Skyscraper is published monthly by Skyscrapers, Inc. Meetings are held monthly, usually on the first or second Friday or Saturday of the month. Seagrave Memorial Observatory is open every Saturday night, weather permitting.

## Directions

Directions to Seagrave Memorial Observatory are located on the back page of this newsletter.

## Submissions

Submissions to The Skyscraper are always welcome. Please submit items for the newsletter no later than **December 15** to Jim Hendrickson, 1 Sunflower Circle, North Providence, RI 02911 or e-mail to [jim@distantgalaxy.com](mailto:jim@distantgalaxy.com).

## E-mail subscriptions

To receive The Skyscraper by e-mail, send e-mail with your name and address to [jim@distantgalaxy.com](mailto:jim@distantgalaxy.com). Note that you will no longer receive the newsletter by postal mail.

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## Upcoming Meetings

**Saturday, January 7 at North Scituate Community Center**  
Conrad Cardano

**Saturday, March 4 at North Scituate Community Center**  
still open

**Saturday, December 10 at North Scituate Community Center**  
Holiday Meeting, Al Hall & Dick Parker

**Saturday, February 4 at North Scituate Community Center**  
Stephon Alexander

## Enjoy A Starry Tale at the University of Rhode Island Planetarium

University of Rhode Island Planetarium  
Kingston Campus  
Upper College Road

Friday, December 9th, 2016  
6:00 P.M.

Contact: Francine Jackson 401-527-5558  
On Friday, December 9th, the University of Rhode Island Planetarium will present the program A Starry Tale. This planetarium program, a presentation of the Japanese optical company GOTO, is a beautiful introduction to sky mythology. Join us as we venture back in time to the gods and their interactions with the inhabitants of Earth, and their hope in our ability to live here in compassion and justice.

A Starry Tale, suitable for all ages, will

be offered at 6:00 P.M. Admission is only \$5.00, to benefit the University of Rhode Island Planetarium fund. The program will include a short presentation of Losing the Dark, why we all should do our best to keep the skies as dark as possible, then, after the main program, you will witness a live planetarium introduction to The Skies above the URI campus.

The University of Rhode Island Planetarium is located on the URI campus, on Upper College Road, across from the Art Center. It is available for school and other group presentations. For further information, please call Francine Jackson at 401-527-5558.



## 14" Meade LX200 F10 tube assembly for sale.

It works very nicely, has Bob's knobs on the secondary and comes with a Losmandy style dovetail on both the top and bottom. The top one works well with a guide scope. Corrector plate is a little dirty, but doesn't affect views. A few small screws that used to hold this to a fork mount are too long to fully set into the tube, but could be easily replaced. New, this set up would cost over \$5000. I am offering this to any interested Skyscraper members for \$2200.00. If interested, contact Steve Hubbard [cstahs@gmail.com](mailto:cstahs@gmail.com) for more details.

More photos here: <https://goo.gl/photos/TAY9VNQ6lhU7Su8z9>



## Celestron 8" SCT For Sale

My name is Mike Taraian. I'm offering this telescope that I purchased some time ago because I want to trade up to a set of Celestron SkyMaster Pro Binoculars or something that is more easily transportable. I believe it is a perfect telescope for another amateur astronomer to learn and enjoy. I am located just off I street over from the observatory and can bring it by if there is any interest. Please contact Mike Taraian for more information [mdtaraian@gmail.com](mailto:mdtaraian@gmail.com)

# Geminid Meteor Shower Mooned Out and Other Celestial Happenings

by Dave Huestis

I can't believe I'm writing about astronomical events for December already. Where did 2016 go? Time is flying by so fast that I often feel like I've gotten caught in the wake of someone's time machine, propelling me into the future. But more likely it is an inverse square function of age. Just substitute time for distance in the equation. The older one gets the faster time seems to pass. How many of you can relate to that declaration?

Usually my December column highlights the best meteor shower of the year — the Geminids. Unfortunately the peak of this shower on the night of December 13-14 coincides with the Full Moon this year. While the Geminids are fairly bright and also have a reputation for producing exploding meteors called fireballs, the region of the sky from where the meteors appear to radiate is near Gemini's brightest stars, Castor and Pollux. Regrettably the brilliant Moon will be in the neighboring constellation Taurus.

While you may still catch a glimpse of a couple of Geminids as they enter our atmosphere at 21.75 miles per second, we'll be lucky to see a handful of the normal 60+ meteors per hour. If the skies remain clear you could take a few minutes to see if any bright meteors overcome the Moon's brilliance. Otherwise you can wait until the Quadrantids on January 3-4.

On the evening of December 2 just after sunset take a look towards the western sky. A waxing crescent Moon will be just less than ten degrees to the right of brilliant Venus. On the following evening the Moon will be directly above Venus and separated by about six degrees. Send an image of this beautiful sky scene to me at [astronomygo-local@gmail.com](mailto:astronomygo-local@gmail.com).

Four days later an interesting occultation occurs. As the Moon slides eastward (12 degrees per day) across the sky, it often passes in front of bright stars and planets. During the late afternoon of the 6th our solar system's outer most distant planet Neptune will be occulted by the First Quarter Moon. A telescope is required to view this event. Unfortunately from here the disappearance of Neptune behind the Moon's dark limb/edge (left) at around 4:15 p.m. will not be seen as

the Sun will be setting at the same time. The sky will be too bright to discern Neptune. However, when Neptune reappears along the bright limb of the Moon at around 5:35 p.m. telescopic observers will be able watch its return. Neptune is faint and small, but you will be able to determine you've seen this distant world because of its blue-green hue. This occultation is well-placed in the sky with the event occurring about 40 degrees above the southern horizon.

Have you ever seen the planet Mercury? During the first three weeks of December you can find the solar system's inner most planet low in the western sky after sunset. At mid-month Mercury will be at its highest position above the horizon, just less than seven degrees. A fist held at arm's length covers ten degrees in the sky. So you'll require a decent treeless view towards the southwestern sky. After mid-month Mercury will quickly sink back towards the horizon and eventually disappear into a bright twilight sky. Its conjunction with the Sun is on the 28th.

The Moon has occulted Taurus the Bull's bright star Aldebaran several times this year. And we have another such event visible on the night of December 12, beginning just before midnight in southern New England. At approximately 11:17 p.m. the dark limb (left side) of a waxing gibbous Moon will occult (pass in front of) Aldebaran. For about one hour and fourteen minutes the star will remain hidden behind the Moon. At approximately 12:31 a.m. Aldebaran will emerge along the Moon's bright limb (right side). Occultations by the Moon are always fascinating to watch, as one can often see the occulted object blinking in and out from behind lunar mountains or crater rims.

Furthermore, don't forget that the Winter solstice begins at 5:44 a.m. on the 21st. Notice how low an arc the Sun travels across the sky. After this date and time the Sun's arc will rise higher and higher each day as it appears to travel northward in our sky, reaching the Vernal Equinox (Spring) on March 20, 2017. The apparent shift of the Sun's position in the sky is the result of the Earth's fixed axial tilt of 23.5 degrees as it revolves around the Sun. See my column

Reason for the Seasons (<http://www.theskyscrapers.org/reason-for-the-seasons>) to refresh your knowledge on this topic.

Also, as we approach the holiday season, many folks ask me about the mystery of the Christmas Star. An unabridged version of my latest treatise on this topic can be found on the Skyscrapers website <http://www.theskyscrapers.org/mystery-of-the-christmas-star> for your examination.

As I write this column early in November, once again we have had temperatures well above normal. However, winter will soon be upon us and colder weather patterns may blanket the area with snow. But as long as grounds at the local Rhode Island observatories are accessible, the telescopes will be available for you to explore "deep sky" objects within the brightest constellations of the night sky. Knowledgeable sky interpreters will be on hand to introduce you to a variety of celestial wonders. Be sure to visit each website prior to setting out for a field trip to these facilities, as wintry conditions can force unexpected closures.

Seagrave Memorial Observatory in North Scituate is open to the public every clear Saturday night. However, in December Seagrave will only be open on the 3rd and 17th. Ladd Observatory (<http://www.brown.edu/Departments/Physics/Ladd/>) in Providence is open every clear Tuesday night. The Margaret M. Jacoby Observatory at the CCRI Knight Campus in Warwick (<http://www.ccri.edu/physics/observatory.htm>) is open every clear Wednesday night. Frosty Drew Observatory (<http://www.frostydrew.org/>) in Charlestown is open every clear Friday night year-round.

Great American Total Solar Eclipse on August 21, 2017. Countdown: 262 days as of December 1, 2016.

Happy holidays and clear skies to all.



*Dave Huestis is Skyscrapers Historian and has been contributing monthly columns to local newspapers for nearly 40 years. See more at <http://theskyscrapers.org/dave-huestis>*

# The Sun, Moon & Planets in December

This table contains the ephemeris of the objects in the Solar System for each Saturday night in October. All times are in Eastern Standard (UTC -5) for Seagrave Observatory (41.845N, 71.590W).

Object	Date	RA	Dec	Const	Mag	Size	Elong	Phase(%)	Dist(S)	Dist(E)	Rise	Transit	Set
<b>Sun</b>	3	16 38.8	-22 07.4	Oph	-26.8	1946.9	-	-	-	0.99	06:56	11:36	16:16
	10	17 09.4	-22 55.6	Oph	-26.8	1948.9	-	-	-	0.98	07:03	11:39	16:15
	17	17 40.3	-23 21.5	Oph	-26.8	1950.4	-	-	-	0.98	07:08	11:42	16:17
	24	18 11.3	-23 24.6	Sgr	-26.8	1951.3	-	-	-	0.98	07:11	11:46	16:20
	31	18 42.4	-23 04.7	Sgr	-26.8	1951.7	-	-	-	0.98	07:13	11:49	16:25
<b>Moon</b>	3	19 20.9	-18 57.6	Sgr	-10.2	1803.2	39° E	11	-	-	09:56	15:00	20:07
	10	1 28.5	4 45.1	Psc	-12.5	1989.5	124° E	78	-	-	14:07	20:54	03:50
	17	8 35.0	15 33.2	Cnc	-12.6	1925.3	139° W	88	-	-	19:35	02:51	10:00
	24	14 14.9	-9 28.1	Vir	-11	1749.4	58° W	24	-	-	02:40	08:13	13:40
	31	20 00.0	-18 00.5	Sgr	-8.8	1814.1	20° E	3	-	-	08:38	13:47	19:00
<b>Mercury</b>	3	18 00.7	-25 50.2	Sgr	-0.4	5.7	19° E	81	0.41	1.18	08:38	12:59	17:20
	10	18 39.7	-25 13.5	Sgr	-0.3	6.5	21° E	66	0.37	1.04	08:45	13:10	17:34
	17	19 04.0	-23 39.9	Sgr	0.2	7.8	19° E	40	0.33	0.87	08:32	13:04	17:35
	24	18 56.8	-21 48.9	Sgr	2.9	9.4	11° E	10	0.31	0.72	07:47	12:25	17:04
	31	18 19.2	-20 27.8	Sgr	6.0	9.9	6° W	3	0.32	0.68	06:36	11:19	16:03
<b>Venus</b>	3	19 48.0	-23 34.4	Sgr	-4.0	17.3	43° E	68	0.73	0.98	10:13	14:46	19:18
	10	20 22.5	-21 49.4	Cap	-4.1	18.2	44° E	66	0.73	0.93	10:12	14:52	19:33
	17	20 55.5	-19 37.1	Cap	-4.1	19.3	45° E	63	0.72	0.88	10:08	14:58	19:48
	24	21 26.9	-17 01.8	Cap	-4.1	20.4	46° E	60	0.72	0.83	10:01	15:01	20:03
	31	21 56.7	-14 08.0	Cap	-4.2	21.8	47° E	57	0.72	0.78	09:51	15:03	20:16
<b>Mars</b>	3	21 22.1	-16 51.7	Cap	0.7	6.5	66° E	88	1.39	1.45	11:17	16:18	21:19
	10	21 42.7	-15 04.2	Cap	0.7	6.3	65° E	88	1.39	1.50	11:03	16:11	21:19
	17	22 03.1	-13 10.1	Aqr	0.8	6.1	63° E	89	1.40	1.54	10:49	16:04	21:19
	24	22 23.1	-11 10.6	Aqr	0.8	5.9	61° E	90	1.40	1.59	10:33	15:56	21:19
	31	22 42.9	-9 06.7	Aqr	0.9	5.7	59° E	90	1.41	1.63	10:18	15:48	21:19
<b>1 Ceres</b>	3	1 33.7	0 53.7	Cet	8.1	0.6	129° E	98	2.85	2.12	14:27	20:26	02:25
	10	1 32.2	0 23.9	Cet	8.2	0.6	122° E	98	2.84	2.19	13:56	19:57	01:58
	17	1 31.9	0 12.3	Cet	8.4	0.5	116° E	97	2.84	2.27	13:27	19:30	01:33
	24	1 32.7	0 54.3	Cet	8.5	0.5	109° E	97	2.83	2.36	12:57	19:03	01:09
	31	1 34.7	1 41.2	Cet	8.6	0.5	103° E	97	2.83	2.45	12:29	18:38	00:46
<b>Jupiter</b>	3	13 05.1	-5 38.3	Vir	-1.6	32.9	54° W	99	5.46	5.97	02:18	08:00	13:42
	10	13 09.3	-6 02.7	Vir	-1.7	33.5	60° W	99	5.46	5.88	01:56	07:37	13:17
	17	13 13.1	-6 24.8	Vir	-1.7	34.0	66° W	99	5.46	5.78	01:34	07:13	12:52
	24	13 16.6	-6 44.5	Vir	-1.8	34.7	72° W	99	5.46	5.67	01:11	06:49	12:27
	31	13 19.7	-7 01.4	Vir	-1.8	35.4	79° W	99	5.46	5.56	00:48	06:24	12:01
<b>Saturn</b>	3	17 08.2	-21 35.5	Oph	0.5	15.0	7° E	100	10.05	11.02	07:23	12:03	16:42
	10	17 11.8	-21 40.2	Oph	0.5	15.0	1° E	100	10.05	11.03	06:59	11:39	16:18
	17	17 15.3	-21 44.5	Oph	0.5	15.0	6° W	100	10.05	11.03	06:36	11:15	15:54
	24	17 18.8	-21 48.5	Oph	0.5	15.0	12° W	100	10.05	11.01	06:12	10:51	15:29
	31	17 22.3	-21 52.0	Oph	0.5	15.1	19° W	100	10.05	10.98	05:48	10:27	15:05
<b>Uranus</b>	3	1 18.0	7 33.7	Psc	5.7	3.7	130° E	100	19.94	19.30	13:41	20:11	02:40
	10	1 17.5	7 31.0	Psc	5.8	3.6	122° E	100	19.94	19.40	13:14	19:43	02:12
	17	1 17.1	7 29.1	Psc	5.8	3.6	115° E	100	19.94	19.50	12:46	19:15	01:44
	24	1 16.9	7 28.1	Psc	5.8	3.6	108° E	100	19.94	19.62	12:18	18:47	01:16
	31	1 16.9	7 28.1	Psc	5.8	3.6	101° E	100	19.94	19.73	11:51	18:20	00:48
<b>Neptune</b>	3	22 44.8	-8 53.1	Aqr	7.9	2.3	88° E	100	29.95	29.97	12:08	17:38	23:08
	10	22 45.0	-8 51.5	Aqr	7.9	2.3	81° E	100	29.95	30.09	11:41	17:11	22:41
	17	22 45.4	-8 49.3	Aqr	7.9	2.3	74° E	100	29.95	30.21	11:13	16:44	22:14
	24	22 45.8	-8 46.4	Aqr	7.9	2.3	67° E	100	29.95	30.32	10:46	16:16	21:47
	31	22 46.4	-8 43.0	Aqr	7.9	2.2	60° E	100	29.95	30.43	10:19	15:49	21:20
<b>Pluto</b>	3	19 08.9	-21 25.0	Sgr	14.3	0.2	35° E	100	33.23	34.03	09:22	14:03	18:43
	10	19 09.8	-21 24.3	Sgr	14.3	0.2	28° E	100	33.23	34.10	08:56	13:36	18:17
	17	19 10.8	-21 23.4	Sgr	14.3	0.2	21° E	100	33.23	34.15	08:29	13:10	17:50
	24	19 11.7	-21 22.4	Sgr	14.3	0.2	14° E	100	33.24	34.19	08:02	12:43	17:24
	31	19 12.8	-21 21.3	Sgr	14.3	0.2	7° E	100	33.24	34.22	07:36	12:16	16:57

# The Mystery of the Christmas Star

by Dave Huestis

Perhaps the mystery of the Christmas Star will never be solved to everyone's satisfaction. As a young boy I was introduced to the biblical account of the event—"Behold there came wise men from the east to Jerusalem, saying, Where is he that is born King of the Jews? For we have seen his star in the east, and come to worship him..." Matthew 2:1-2.

Many folks "faith"-fully believe that divine intervention led the Magi to Jerusalem. But as my interest in astronomy grew, I began to wonder if the star was a real astronomical event. So began my detective work as an amateur astronomer to research what had already been written about the subject.

Through the course of my investigation I have come across some contradictions between the biblical and historical records. One must take into account the various methods in which people tracked time and compare them to find common historical references. Another important exercise is to translate the written word carefully from so many centuries ago.

For instance, it is said the Magi "followed" the star. How could that be? It depends upon its usage. I may follow a map, follow a movie or a conversation, or follow my conscious. None of those usages implies that I am literally traipsing after the above items. Regardless, I think it is scientifically prudent to recount some of the natural events proposed for the Christmas Star's origin.

First and foremost we have to understand the mindset of that time frame. Astrology ruled the land. Astrologers, and specifically the Magi who were most likely Persian or Babylonian priest astrologers, "followed" or charted the stars because they, as well as the populace, believed sky happenings had a direct effect upon humankind. These events, if read correctly, could inform them

of what was happening or what could happen. It was like a cosmic news bulletin, and the Magi were waiting for the big story to break!

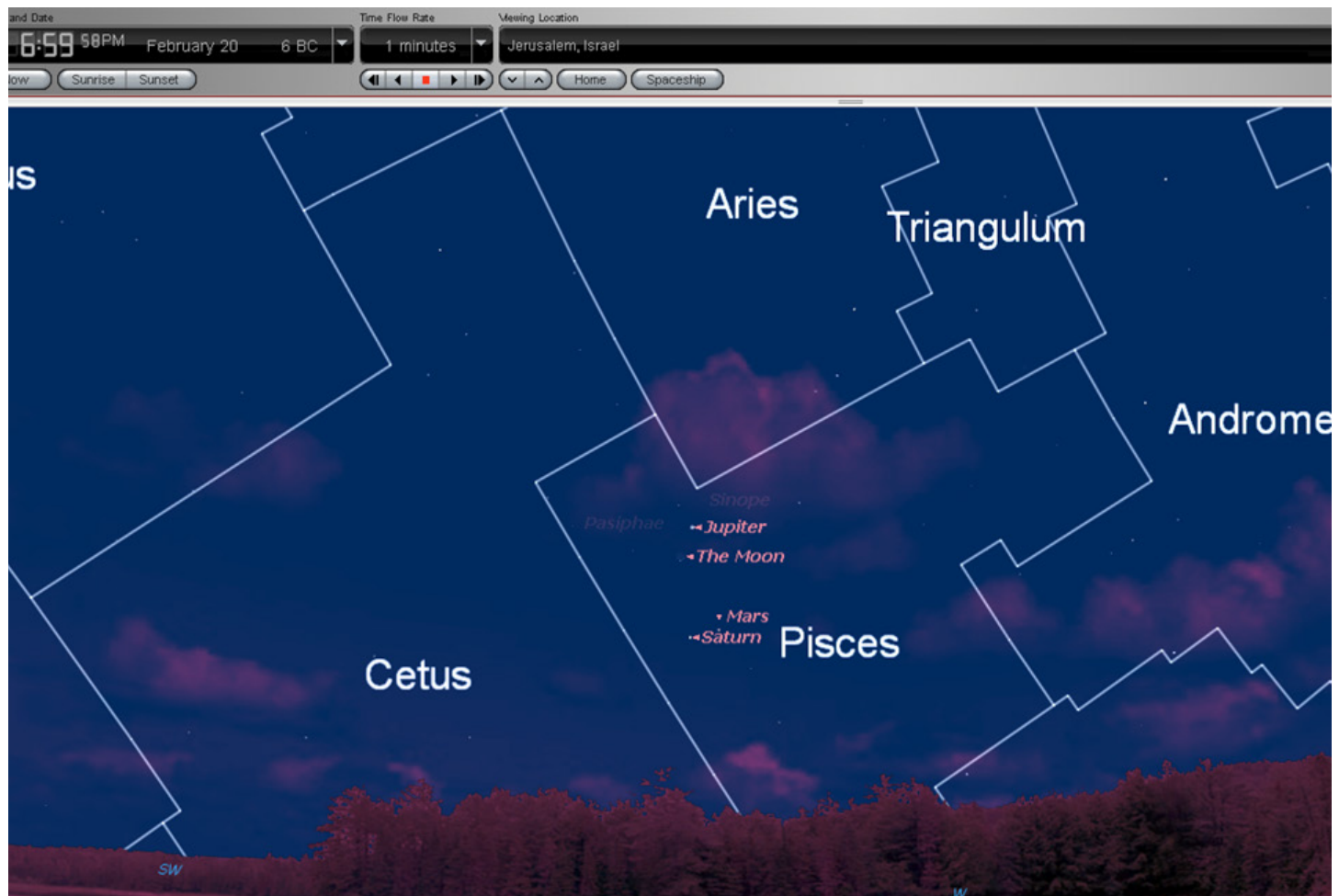
That big story was foretold in a prophe-

cy that the King of the Jews (the Promised One or Messiah) would be born in Bethlehem, and in Jewish tradition that a sign would appear two years before his birth.

While I do not personally believe in astrology, astronomers do owe a debt of gratitude to the early astrologer stargazers. Though they did not know the true layout of the solar system and our place in the universe, they were still very careful observers of sky events, since their knowledge and interpretation of those events had significant consequences for the people of the time.

Some scholars have recently wondered if an actual "visual" event occurred at all. Perhaps the Magi "saw his star in the east" in astrological charts only. The supporting evidence for this theory is that no other contemporary observers reported any unusually bright object in the heavens. This includes King Herod and the people of Judea, especially those residing in Jerusalem and Bethlehem.

However, it is this writer's belief that some astronomical event did occur in the



sky, and the Magi did interpret its astrological significance relative to prophecy.

Several ideas have been proposed over the years to identify the source for the Star of Bethlehem's appearance. Due to historical references we can narrow our search to the years between 7 and 4 BCE. Some theories have consistently held up under careful scrutiny, while others have since been discarded.

For example, a very bright and exploding meteor, called a fireball, has been suggested. However, meteors, even exceedingly bright ones, are very short-lived. If an observer is not looking precisely at the moment of atmospheric entry it will be missed. Add in the fact that bright meteors are not a rare occurrence, and then mix in the probability for clouds, then attaching some great astrological significance to a meteor seems pointless.

In addition, a nova or supernova explosion of a star has also been proposed. It would be exceedingly bright, probably even visible during the daytime. Unfortunately for this theory, not even the astronomically observant Chinese recorded any such sky event during the years in question. The same applies to a variable star that periodically increases and decreases its brightness. These theories just don't meet all the criteria.

The one theory that had been tossed around for many years was the Halley's Comet/Christmas Star connection. The one insurmountable problem with this explanation is that Halley appeared during 11 BCE, somewhat too early to be considered. Until a few years ago there were no other accounts of any bright comets during the time with which we're concerned. However, ancient Chinese and Korean texts have recently revealed a bright comet in 5 BCE.

However, and most importantly, throughout history comets have always been seen as bad omens, not good ones. So I concur with other researchers that the comet connection should no longer be supported. But three other possible explanations tie things together much more nicely, especially when you consider the astrological influences of the time.

When I first started my research I would simply summarize what other astronomers had discovered. There were some great books and some not so great books. I have provided a brief bibliography (without prejudice) at the end of this column.

For several hundred years we have known the positions of stars and the orbits

of the planets to a great degree of accuracy. During modern times planetariums could be used to step back (or forward) in time to accurately present the sky as it truly looked many centuries ago or will look like many centuries hence.

Now, with sophisticated software and a home computer one can recreate the sky as it looked in the past from anywhere on the Earth's surface. This tool has been used by many researchers in the search for the Christmas Star.

My first attempt to recreate the skies at the time of Herod the Great was accomplished more than a decade ago using The Sky IV, and then later The Sky VI software, to verify various researcher's findings. More recently I used Starry Night Pro. My observations and conclusions follow.

While most portrayals of the birth of Jesus show a single star, we do not necessarily have to limit our investigation to that interpretation. Why? The word star during those days was used to describe a star, planet or any object in the sky. You'll see why word usage and interpretation is an important factor in trying to solve the Christmas Star mystery.

I started my inquiry by setting the sky clock in my software back to 7 BCE, as well as selecting a very specific location, Jerusalem. During that year, the planets Jupiter and Saturn had three close encounters, called conjunctions. The first occurred in March, 7 BCE, when there was a heliacal rising of Jupiter and Saturn, meaning they rose about the same time the sun did. Then the second conjunction occurred in September. The planets rose acronychal, that is, they rose in the east as the sun set in the west. Astrologically the heliacal rising was thought to signify birth, while the acronychal rising was one of five principal positions the early astrologers, especially the Babylonians, highly regarded.

The third and closest conjunction of Jupiter and Saturn occurred during December 7 BCE, when the planets were two full moon diameters apart from each other. Though they did not appear as one bright object, as many usually interpret the appearance of the Christmas Star, this trio of conjunctions had great astrological significance. And as I have already pointed out, the word star did not necessarily refer to one single object.

Also significant was that this triple conjunction occurred with two of the three close approaches occurring within the constellation of Pisces (the first one in March

occurred with Saturn just over the border into neighboring constellation Cetus), the sign of the Hebrews, and in the Jewish tradition the sign of Israel according to some references. Pisces, as well as Saturn, was the sign of the promised Messiah. Furthermore, the Jews considered Jupiter to be a royal symbol, and Saturn to be Israel's protector.

Could the above astronomical events have prompted the Magi to begin their trek? Perhaps, but according to one researcher, another more important astronomical/astrological event occurred on April 17, 6 BCE. There was a heliacal rising of Jupiter in the constellation of Aries at the same time Jupiter was occulted (eclipsed) by the Moon. That author believes that Aries, instead of Pisces, was the astrological sign of the Jews, and this occultation took place in that constellation. The astrological convergence pointed to the birth of the king of the Jews.

It's hard to know what to accept as astrological fact. One source encountered during my research stated that Pisces was the astrological sign of the Jews, while another stated that Aries was. I'm not a religious scholar, so I'm hoping a reader of this article will shed some light on this subject.

In addition, while my software does show an occultation of Jupiter by the Moon a couple of hours after sunrise on April 17, 6 BCE, it occurred fairly close to the Sun in daylight hours, but not in the skies above Jerusalem or Bethlehem. It did occur a couple hundred miles north. From those two towns even the extremely close conjunction of Jupiter and the Moon would not have been viewable. Still, perhaps the Magi "saw" this event in their charts and the astrological implications were compelling to the Magi for them to start their journey.

Later in February of 6 BCE, the planet Mars joined Jupiter and Saturn for a triple conjunction. Also significant was that this conjunction occurred in the constellation of Pisces, which would be astrologically significant only if Pisces was truly the sign of the Hebrews.

While planetary conjunctions occur frequently, the coincidences of all the circumstances are quite significant when you take into consideration the astrologer Magi were waiting for a specific sign whose interpretation would have announced the fulfillment of the prophecy ... the birth of the Jewish king. And since we know shepherds only tended to their flocks in night time during lambing in the spring, then despite Jupi-

ter and Saturn not appearing as one bright object, the astronomical events occurring during the years 7 or 6 BCE may account for the “appearance” of the Christmas Star.

Unless some new historical documents are uncovered, we may never know precisely what transpired in the Middle East more than two thousand years ago. In fact, while conducting further research to update this article with any new revelations, I noted that the New Revised Standard Version of the Bible, published in 1989, did provide a new translation for Matthew 2:1-2. In part it now reads, “For we have observed his star at its rising.” Now that’s what I’m talking about.

#### Brief Bibliography

- Boa, Ben & Proctor, William, *The Return of the Star of Bethlehem*, Zondervan Books, 1985  
Hughes, David, *The Star of Bethlehem: An Astronomer’s Confirmation*, Walker and Company, 1979  
McDonald, Donald, *Star of the Magi*, The Oregon Museum of Science and Industry, 1968  
Molnar, Michael R., *The Star of Bethlehem: The Legacy of the Magi*, Rutgers University Press, 1999

If a real astronomical event was observed in the sky in the distant past, I’m sure the dark skies of the day afforded both the Magi and the general populace a splendid view of the heavens. With the sophisticated software available today, you too can travel back in time to recreate the skies of history. At least the skies on my computer are always clear ones!

In conclusion, one may wonder why Christmas is celebrated on December 25th. When Julius Caesar developed his Julian calendar in 46 BCE, he established December 25 as the Winter Solstice. When the Christians were under the heel of the Roman Empire, their religion was declared

illegal. They had to worship in private. During this time though, the Romans celebrated the winter solstice with a week-long festival, Saturnalia (from the 17th through the 24th). Also, pagan Romans celebrated another holiday festival even more grand than Saturnalia on the 25th, and a secret cult also held another celebration. The Christians decided to hold their religious observance at the same time to escape persecution. The 25th of December was chosen, and in 313 CE when Emperor Constantine accepted Christianity for himself and his kingdom, he retained that date for the celebration of Christmas.

Happy Holidays to you all and keep your eyes to the skies!



Dave Huestis is *Skyscrapers* Historian and has been contributing monthly columns to local newspapers for nearly 40 years. See more at <http://theskyscrapers.org/dave-huestis>

## Spiral Galaxy in Pisces M74

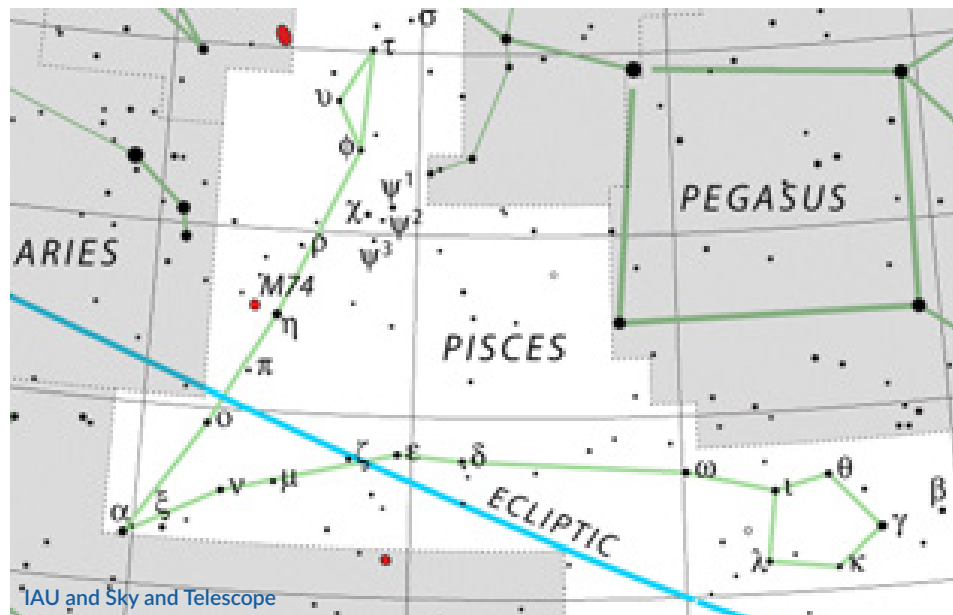
by Las Vegas Astronomical Society

For backyard astronomers who tackle the annual Messier Marathon, M74 is a serious stumbling block. Even in December, when Pisces rides high in the south when evening darkness has set in, this face-on spiral galaxy is difficult to view. During Messier Marathon time in mid to late March, M74 is all but lost as it sets in the glow of evening twilight.

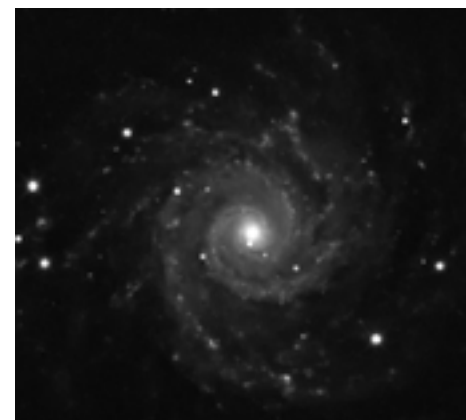
What makes M74 such a challenge is its low surface brightness. A 9th magnitude galaxy shouldn’t be difficult to observe, but when its light is spread over an area one-third the moon’s apparent diameter it becomes a phantom best saved for especially clear nights.

I’ve seen M74 in a 3-inch f/10 scope, but only with averted vision after knowing exactly where to look. A 3-inch f/6 rich-field scope captured both M74 and the 3.6 magnitude star eta ( $\eta$ ) Piscium 1½ degrees to its west-southwest. In both instances, I worked with a magnification under 40X. To me, M74 was large and roundish – a smaller version of M33 and M101. Even when viewed with my 13.1-inch f/4.5 reflector, M74 was a vague glow.

M74 was discovered by Pierre Méchain in the autumn of 1780. It lies an estimated 33 million light years from earth.



*The purpose of the LVAS Observer’s Challenge is to encourage the pursuit of visual observing. It is open to everyone that is interested, and if you are able to contribute notes, drawings, or photographs, the LVAS will be happy to include them in our monthly summary. If you would like to contribute material, submit your observing notes, sketches, and/or images to either Roger Ivester ([rogerivester@me.com](mailto:rogerivester@me.com)) or Fred Rayworth ([queex@embarqmail.com](mailto:queex@embarqmail.com)). To find out more about the LVAS Observer’s Challenge or access past reports, log on to [lvastronomy.com/observing-challenge](http://lvastronomy.com/observing-challenge).*



Mario Motta, MD





Super Moon rises over Providence from Neutaconkanut Hill on November 14. Photo by Jim Hendrickson.

## Reflections on November's Super Moon

by Francine Jackson

Neil Tyson had it correct. With everybody being so excited about the SUPER Moon, it's kind of forgotten that the Moon's closeness to the Earth, the perigee, is dependent on the Moon's place in its elliptical path around us.

To check the positions of the Full Moons in 2017, I printed out a copy of the perigee dates, to check this along with the phase of the Moon. January's closest point to us is two days after Full; February's is five days afterwards. Will anyone go for a super almost-3rd quarter? March is a slight problem, as there are two dates of perigee – the 3rd and the 30th – blue perigee, perhaps? The Moon is full on the 12th.

For April, May, June and July, we have to look toward apogee, the furthest point in the Moon's orbit. Those Full Moons are all within a couple days of being on the outer fringe of the path around the Earth. Will anyone push for a celebration of MINI Moons?

For most of the rest of the year, the Full Moon and perigee dates are still not really close enough for anyone to raise a glass to,

although we might want to wish a Happy Large 1st Quarter September 6th. And, yes, there is a Full Moon one day before perigee in December, if anyone is still considering the superness of the Moon a year from now.

In an interview, Neil Tyson was asked about the hoopla of celebrating the gigantic Moon, and he reminded his questioner that, even if the Moon were at its closest, the normal person is hard put to actually notice the difference in size from one night to another.

Granted, many of our astrophoto people did get beautiful and apparently “large” images of the Moon this past November 14th and 15th, the “closest Moon until 2034,” but they were taken alongside the eastern horizon, when the Moon was rising, and visible against objects of known size: trees, buildings, etc. It's a fact that our eyes see the Moon larger against the horizon, a phenomenon known as the Moon Illusion. But, how many noticed the Moon several hours later when it was high in our sky? It's surprising that not one person called the TV stations asking how the Moon had deflated,

although had they measured the Moon's diameter at the horizon, and then when it was in the southern sky, it would have been the same.

Yes, calling attention to the Moon low to the horizon when it is at perigee just possibly might have members of the public look up at the sky, and hopefully want to know more about what's up there – in addition to a slightly changing neighbor. If, in fact, that did happen, then maybe it was worth all the attention it got. Here's hoping the “super Moonness” did introduce someone new to the wonders of the universe, someone who will keep on looking up and enjoying it as much as we do.



*Francine Jackson is Skyscrapers Public Relations Spokesperson, writes the weekly newsletter for Ladd Observatory and serves as planetarian at the University of Rhode Island. See more at <http://theskyscrapers.org/francine-jackson>*



# Dimming stars, erupting plasma, and beautiful nebulae

By Marcus Woo

Boasting intricate patterns and translucent colors, planetary nebulae are among the most beautiful sights in the universe. How they got their shapes is complicated, but astronomers think they've solved part of the mystery—with giant blobs of plasma shooting through space at half a million miles per hour.

Planetary nebulae are shells of gas and dust blown off from a dying, giant star. Most nebulae aren't spherical, but can have multiple lobes extending from opposite sides—possibly generated by powerful jets erupting from the star.

Using the Hubble Space Telescope, astronomers discovered blobs of plasma that could form some of these lobes. "We're quite excited about this," says Raghvendra Sahai, an astronomer at NASA's Jet Propulsion Laboratory. "Nobody has really been

able to come up with a good argument for why we have multipolar nebulae."

Sahai and his team discovered blobs launching from a red giant star 1,200 light years away, called V Hydrae. The plasma is 17,000 degrees Fahrenheit and spans 40 astronomical units—roughly the distance between the sun and Pluto. The blobs don't erupt continuously, but once every 8.5 years.

The launching pad of these blobs, the researchers propose, is a smaller, unseen star orbiting V Hydrae. The highly elliptical orbit brings the companion star through the outer layers of the red giant at closest approach. The companion's gravity pulls plasma from the red giant. The material settles into a disk as it spirals into the companion star, whose magnetic field channels the plasma out from its poles, hurling it into

space. This happens once per orbit—every 8.5 years—at closest approach.

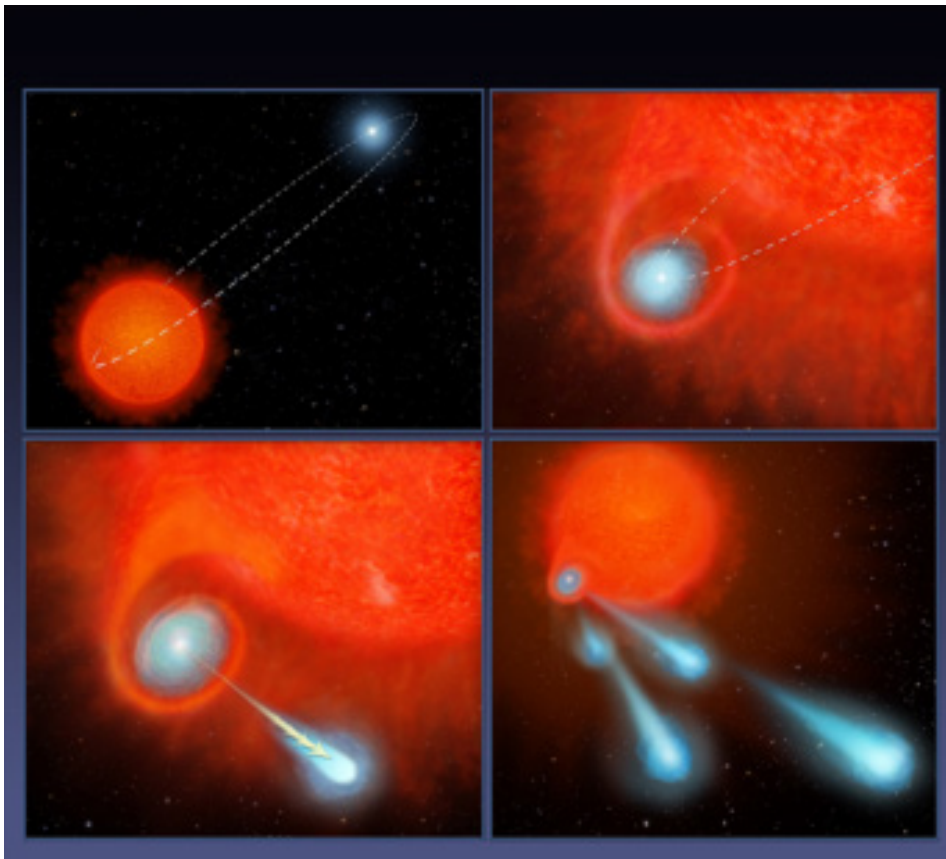
When the red giant exhausts its fuel, it will shrink and get very hot, producing ultraviolet radiation that will excite the shell of gas blown off from it in the past. This shell, with cavities carved in it by the cannon-balls that continue to be launched every 8.5 years, will thus become visible as a beautiful bipolar or multipolar planetary nebula.

The astronomers also discovered that the companion's disk appears to wobble, flinging the cannonballs in one direction during one orbit, and a slightly different one in the next. As a result, every other orbit, the flying blobs block starlight from the red giant, which explains why V Hydrae dims every 17 years. For decades, amateur astronomers have been monitoring this variability, making V Hydrae one of the most well-studied stars.

Because the star fires plasma in the same few directions repeatedly, the blobs would create multiple lobes in the nebula—and a pretty sight for future astronomers.

If you'd like to teach kids about how our sun compares to other stars, please visit the NASA Space Place: <http://spaceplace.nasa.gov/sun-compare/en/>

*This article is provided by NASA Space Place. With articles, activities, crafts, games, and lesson plans, NASA Space Place encourages everyone to get excited about science and technology. Visit [spaceplace.nasa.gov](http://spaceplace.nasa.gov) to explore space and Earth science!*



This four-panel graphic illustrates how the binary-star system V Hydrae is launching balls of plasma into space. Image credit: NASA/ESA/STScI

## Board of Directors meeting, November 21 2016, 7pm.

In attendance: Steve Hubbard, Steve and Kathy Siok, Jeff Padell, Tracy Prell, Kent Cameron, Jim Hendrickson, Francine Jackson, Bob Napier, Jim Crawford, Lloyd Merrill, Bob Horton, Ian Dell'Antonio, Matt Ouellette and Linda Bergemann.

**Treasurer's report:** Lloyd reported that we received a \$55 check from our bank, "transaction error." He has paid our 2016 to 2017 property insurance bill, approx.. \$2700. Per our bylaws, we are supposed to publish a financial statement every month. Due to concerns with involving on line fraud, it was decided to publish an abbreviated version each month that would not give anyone looking on line an idea of how much money we have.

**Future Meetings:** Ian reported that the next 4 will be at the Community center and due to speaker availability on Saturday nights. Our December meeting will be a member holiday potluck that will allow members to honor the deity and festival of their choice by bloating up on mass quantities of food. Al Hall and Dick Parker will be honored with a tribute for their recent completion of and awards for their twin ¾ scale reproduction telescopes. Both are exact reproductions of the society's Alvan Clark 8 inch refractor.

Member Conrad Cardano will be speaking at our meeting on January 7 about his home made observatory.

The meeting on February 4 will be "The Jazz of Physics."

**Secretary report:** There has been a recent issue with group emails sent to any members who use their cox cable accounts to have email address with a cox.net address. All of them started bouncing back. Tracy Prell volunteered to help me navigate the stupidity of cox cable and fix this.

**Trustees Report:** Jim Crawford reported that he and Kent meandered aimlessly around the buildings and sealed up any openings to deny sweet little woodland creatures shelter during the long, cold winter months. They repaired a cinder block. Additional flashing was put up around the slit at the top of the dome where the Alvan Clark resides to fix a leak.

Jim Crawford volunteered to work on a better, more visible system for donation boxes around the grounds.

There will be a project to do some clean-

ing of the corrector plates on the 2 Meade Instruments in the spring.

It is expected that there will be work done to get remote imaging to the club house working in January of next year.

A new focuser for the 16 inch Meade has been received. Cost was \$710 and split between, Bob Napier, Tracy Prell and Jeff Padell.

**Special Announcement:** President Siok silenced the assembled worthies in the room with the stunning announcement that he had received a call from Mike Rudenko who works at the Minor Planet Center in Cambridge MA. Mike is a longtime friend of Skyscrapers and had presented a talk at AstroAssembly. Mike advised Steve that in honor of the many long years of service to amateur astronomy provided by Steve and Kathy that they would be naming an asteroid after them. Main belt asteroid 6277 is now 6277 Siok.

**Extended discussion concerning a policy for group visits at Seagrave:** There have been a number of questions raised concerning such things as: Do we allow group visits on Saturday nights? Who decides if a session is canceled? Who is the overall contact person? Expected Donation? Amount and when paid? How is this communicated to the group? After some spirited discussion, a few things were decided:

- We would not allow special group visits on Saturday nights
- Francine will be the point of contact

and will decide on whether an event goes forward due to weather.

- We need an outline of what a group needs to know about the grounds and what to expect before they commit and come. This will be rough drafted by the secretary for review at the next board meeting.

What suggested donations if any do we ask of groups:

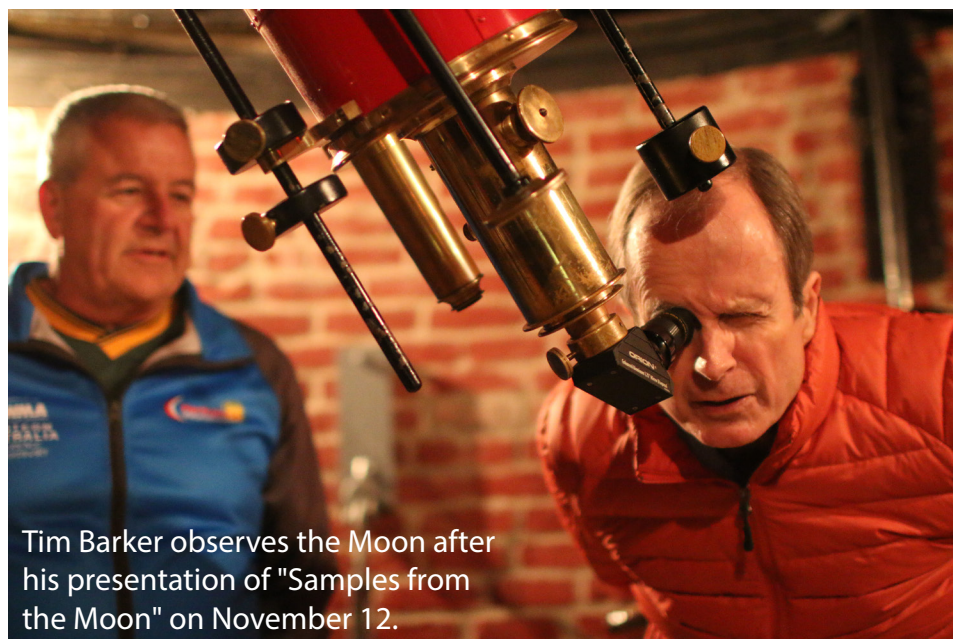
More spirited discussion with a consensus forming around a minimum of \$25. Further thought and discussion of the entire subject of suggested donations was tabled until the December board meeting.

**Remote Star Parties:** So we do them, when, how far will we travel? There was much discussion around this topic. No final consensus was reached and it was decided to table the discussion until the next board meeting.

**Library Telescopes:** There is a program wherein we can help get telescopes into local libraries in the area. These are Orion 4 inch "Star Blast" telescopes. Jeff Padell recently bought one to see what sort of views you can get with them. Steve Hubbard offered to get in touch with the contact person at the Aldrich Astronomy club in the Worcester Mass area that coordinates this program. Steve has done that and John Root from the Aldrich will be talking about this at our December board meeting.

Next Board meeting to be on Monday, December 19 at 7pm.

Respectfully submitted by your humble Society Secretary, Steve Hubbard.



Tim Barker observes the Moon after his presentation of "Samples from the Moon" on November 12.



Crator Plato and Mare Frigoris: Had some time before Dave's college class came to the observatory on November 8 on a field trip so I set up the Meade LX200 12" with my ZWO ASI174mm and took a series of avi's. Sky was clear but seeing was poor but did come and go. This is one of the better shots, 1936x1216, 4500 frames stacked 140 frames and ran through ASI2. Image by Jeff Padell.



Iridium flare: 11/8/2016, 5:39pm. From my backyard, Canon camera, 28mm lens, 30 sec exposure. Steve Hubbard.



Image of NGC891, the  
Outer Limits Galaxy.

Scope: C11 SCT  
Camera: Celestron Nightscape 8300C  
No guiding  
Exposure:  
· (60) 60 Second  
· (15) 90 Second  
· (10) 120 Second

Image by Tom Thibault.

Apennine Mountain range on the Moon, November 7 by Jeff Padell using 127mm Mak.



# Directions to Seagrave Memorial Observatory

## From the Providence area:

Take Rt. 6 West to Interstate 295 in Johnston and proceed west on Rt. 6 to Scituate. In Scituate bear right off Rt. 6 onto Rt. 101. Turn right onto Rt. 116 North. Peeptoad Road is the first left off Rt. 116.

## From Coventry/West Warwick area:

Take Rt. 116 North. Peeptoad Road is the first left after crossing Rt. 101.

## From Southern Rhode Island:

Take Interstate 95 North. Exit onto Interstate 295 North in Warwick (left exit.) Exit to Rt. 6 West in Johnston. Bear right off Rt. 6 onto Rt. 101. Turn right on Rt. 116. Peeptoad Road is the first left off Rt. 116.

## From Northern Rhode Island:

Take Rt. 116 South. Follow Rt. 116 thru Greenville. Turn left at Knight's Farm intersection (Rt. 116 turns left) and follow Rt. 116. Watch for Peeptoad Road on the right.

## From Connecticut:

- Take Rt. 44 East to Greenville and turn right on Rt. 116 South. Turn left at Knight's Farm intersection (Rt. 116 turn left) and follow Rt. 116. Watch for Peeptoad Road on the right.
- or • Take Rt. 6 East toward Rhode Island; bear left on Rt. 101 East and continue to intersection with Rt. 116. Turn left; Peeptoad Road is the first left off Rt. 116.

## From Massachusetts:

Take Interstate 295 South (off Interstate 95 in Attleboro). Exit onto Rt. 6 West in Johnston. Bear right off Rt. 6 onto Rt. 101. Turn right on Rt. 116. Peeptoad Road is the first left off Rt. 116.



47 Peeptoad Road  
North Scituate, Rhode Island 02857