



# the Skyscraper

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2012

Amateur Astronomical Society of Rhode Island ★ 47 Peepoad Road ★ North Scituate, Rhode Island 02857 ★ www.theSkyscrapers.org

## May Meeting with Francine Jackson

Friday, May 4, 7:30pm

Seagrave Memorial Observatory

### A General History and Significance of the Transit of Venus

We hope you are all gearing up for the June 5th Transit of Venus, the last we'll be able to view in our lifetimes. Francine will speak on how they were first determined, their importance in giving us the size of our neighborhood, and remind us that there are three Rhode Island associations with respect to the worldwide expeditions to observe this exceedingly rare astronomical phenomenon.

Francine, a Skyscrapers member, is the Director of Frosty Drew Observatory. She also has been associated with Ladd Observatory for close to four decades. In addition, she performs planetarium shows at the University of Rhode Island facility, one of the smallest in the world, and teaches astronomy at Framingham State University.

She has studied transits of Venus for many years, and has written several articles on their historical significance.

By now, you should be aware that the last Transit of Venus for over a century will be taking place next month. If you were able to observe the one in June of 2004, you know that what you're waiting for is the planet Venus passing directly across the face of the Sun.

The main question is why doesn't this happen any time Venus passes between the Sun and us? This is the same as asking why don't we have solar eclipses every New Moon? The Sun as we see it is only 1/2 degree in angular size, and Venus is only a tiny little sphere, so lining them both up for our enjoyment is much harder than you

can imagine. In fact, their period is one of the stranger in all of science: Two within an eight-year period, 105½ years, two within an eight-year period, 121½ years, two within an eight-year period... And yes, Mercury also undergoes transits, but does so about 12 times every century. We'll be able to observe one, weather permitting, in 2016.

Venus transits were first written about by Johannes Kepler in 1627, who predicted that one would occur four years later; unfortunately, Kepler died in 1630, but all accounts say that he was very near-sighted, so he probably wouldn't have seen it, anyway. Actually, no one saw it, although Gasendi tried, but the sky was cloudy, and the Sun had set from his vantage point before the transit started, so he would have been denied the chance to see it, anyway.

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**Other notable events:** Jupiter is in conjunction with the sun on the 13th. Minor planet Juno is at opposition on the 20th. The Moon is 5° S of Venus on the 22nd. Mercury is at superior conjunction on the 27th. The Moon is 7° S of Mars on the 28th. The Moon is aligned below Saturn and Spica on the 31st. Venus continues to sink lower and lower in the western sky on its way to inferior conjunction and transit on June 5th.

Seagrave Memorial Observatory Open Nights  
Saturday 9:00-11:00 pm - weather permitting



# President's Message

Ed Haskell

Spring seems finally to have sprung, and just in time for Spring Cleaning! The area to the north and east of the observatory was cleared of many trees some months ago but there remained lots of small brush, presenting an area both cluttered and unsightly. Dave Huestis decided the clutter should recede into history, and enlisted the help of junior member Alex Bergemann's Boy Scout troop to clear the debris. More than a dozen scouts and assorted family members, as well as some Skyscrapers members, worked all morning Saturday the 14th and made the area much more presentable. It's amazing how much can be accomplished by a large group of volunteers.

Members who attended the Annual Meeting in April were treated to a fascinating survey of the state of the search for the Higgs boson, a subatomic particle thought to be responsible for generating all known particle masses and bestowing light with its fundamental properties. Professor Brandon Murakami proved once again that physicists can laugh at themselves and at nature in their quest for universal principles.

May's speaker will be Francine Jackson, Skyscrapers member and Director of Frosty Drew Observatory. Her topic will be the historical significance of the Transits of Venus.

I am sure Members share my appreciation of the dedication to the Society shown by outgoing elected officials and others. The organization cannot function without volunteers willing to devote their time and effort to making it work. A new team is forming to carry on the stewardship of the Society for the coming year. Please be mindful of the extra contribution of these members and help them to be successful however you can.

The long and tedious job of bringing our founding documents into the 21st Century was concluded at the April meeting with the approval of extensive revisions to the

Constitution and By-Laws. A large number of Members contributed their time at various points in this process to the betterment of the Society. While the magnitude of the changes in practice is not large it is useful for the documents to actually reflect how we have operated for several decades and to serve as guides for the future conduct of the Society. Thanks to all who helped.

The 2012-2013 Budget was approved, as was the recommended Dues increase. It should be noted that, even with the first dues increase in over a decade, the Budget is very tight and care will have to be exercised to live within our means this year.

With little help from Skyscrapers, Venus will transit the sun on June 5th, which celestial event will be visible from Rhode Island (see it now, even the hardest of us will not live long enough for the next time). However, help from Skyscrapers' members is needed for the public observing programs being organized by Bob Horton. Please contact Bob to see how you can help.

I am in the process of deciding committee assignments for the coming year. In addition to the regular efforts, we will be forming committees to, among other things, handle Membership (and its benefits), Activities (beyond what has been occurring), and Facilities Usage (ranging from toilets to remote access to the scopes). It is too early to predict what will result from these committees so watch this spot for announcements from time to time.

Thank you all for your support of the Observing Committee and the Public Outreach Program. Without all the volunteer time these committees could not continue to perform in the outstanding manner to which we have become accustomed.

On a closing note thank you for the trust you have placed in me and in the other new officers as we begin a new year.



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

## President

Ed Haskell [haskell.ed@gmail.com](mailto:haskell.ed@gmail.com)

## 1st Vice President

Bob Horton [Robert\\_Horton@brown.edu](mailto:Robert_Horton@brown.edu)

## 2nd Vice President

Kathy Siok [ksiok@cox.net](mailto:ksiok@cox.net)

## Secretary

Tom Thibault [DeepSpaceViewer@aol.com](mailto:DeepSpaceViewer@aol.com)

## Treasurer

Lloyd Merrill [lloydmerrill@gmail.com](mailto:lloydmerrill@gmail.com)

## Members at Large

Jim Hendrickson [jim@distantgalaxy.com](mailto:jim@distantgalaxy.com)

Bob Napier [bob\\_napier@hotmail.com](mailto:bob_napier@hotmail.com)

## Trustees

Pat Landers [pbl64@comcast.net](mailto:pbl64@comcast.net)

Steve Siok [ssiok@cox.net](mailto:ssiok@cox.net)

Conrad Cardano [cardanoc@verizon.net](mailto:cardanoc@verizon.net)

## Star Party Coordinators

Conrad Cardano [cardanoc@verizon.net](mailto:cardanoc@verizon.net)

Bob Forgiel [bforgiel@cox.net](mailto:bforgiel@cox.net)

## Librarian

Amber Lesperance [ambie630@yahoo.com](mailto:ambie630@yahoo.com)

## Historian

Dave Huestis [dhuestis@aol.com](mailto:dhuestis@aol.com)

## Editor

Jim Hendrickson [jim@distantgalaxy.com](mailto:jim@distantgalaxy.com)

## 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 **May 20** 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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Kepler missed a scheduled transit for 1639, but its occurrence was noted and observed by two people: Jeremiah Horrox, and his pen pal William Crabtree.

Edmund Halley, while still very young, observed a transit of Mercury, and realized the mathematical possibility of using transits to determine the distance between the Sun and the Earth, the astronomical unit. This standard candle was utilized to form a relationship with the Sun and all the (then) known planets - From Mercury to Saturn - but the actual length of this was unknown.

Halley noted that, although a transit of Mercury could be used for this, Mercury is very small and rather far away; Venus, on the other hand, is much larger and about twice as close to Earth, so its passage across the Sun would be much easier to observe. This resulted in a large number of expeditions to the most optimal sites for the transits of 1761 and 1769. However, despite the fact that scientists did watch this from many places, the actual distance was not very accurate.

Luckily, there was another set of Venus transits coming up in order to try again to

perfect the length of the astronomical unit, in 1874 and 1882. However, these also resulted in inaccurate observations, and the U.S. government didn't budget enough to allow the mathematics to be configured, but better, less rare planetary alignments had by then been developed, so we are pretty sure of the 92,900,000 figure that we use today.

Next month's transit of Venus will be nothing more than a curiosity, but one that, if you don't see it, you will have missed out on your last chance to view this very rare astronomical occurrence. Don't miss it!

# Transit of Venus: A Rare Astronomical Event

Dave Huestis

Eight years ago in 2004, astronomers and lay people around the globe were anxiously waiting for a very unique astronomical phenomenon to occur. In fact, this event was so rare that no one then alive had observed it before. The last time it had occurred was back in 1882. This rare and fascinating event was a transit of our planetary neighbor Venus across the face of the Sun.

Transits of Venus occur in pairs and can be seen over a large area of the Earth's surface. In 2004, residents in this area of the country were able to view the transit already in progress as the Sun rose. Despite some initial clouds, we finally did get some great views. See my observing report on the Skyscrapers' web site (<http://www.theskyscrapers.org>).

Well, the second Venus transit of this current pair happens on June 5-6. In this hemisphere it occurs on the 5th. To prepare everyone for this rare event I will first present a brief historical overview on Venus transits in general, and I will provide the local observing circumstances with some tips on safely viewing this phenomenon.

I think the astronomers of the first years of the twenty-first century, looking back over the long transitless period which will then have passed, will understand the anxiety of astronomers in our own time to utilise to the full whatever opportunities the coming transits may afford; and I venture to hope that should there be found, among the old volumes on their book-stalls, the essays and charts by which I have endeavoured to aid in securing that end (perhaps even this

little book in which I record the history of the matter), they will not be disposed to judge over-harshly what some in our own day may have regarded as an excess of zeal.

So wrote Richard Proctor (1837-1888), in the concluding paragraphs of his 1875 book, *Transits of Venus*. Proctor was a prominent astronomer and prolific writer on the subject of astronomy. For me, he apparently gazed not only into the heavens but also into the future as well. For when I began my research into the transit of Venus across the face of the Sun for June 8, 2004, I immediately scanned my bookshelves for works published in preparation for the then more recent transits of 1874 and 1882.

I knew I possessed Proctor's above mentioned work, for I had only recently acquired it from another amateur astronomer friend who knew I liked Proctor's writings. It's an increasingly difficult volume to locate at a reasonable price in good condition. My initial research into Venus transits came from reading this work. I also located another antiquarian book from the same time (1874) that was extremely technical, plus three more recent works that were entirely devoted to transits of Venus and Mercury.

Most books on astronomy have a small section on solar transits, but the works I referenced contained a wealth of information. They helped me to prepare the casual reader for the 2004 experience that no one living had ever witnessed.

## What is a Transit?

Let's first explore what a transit is. Simply stated, an astronomical transit occurs when one celestial object, such as a planet or a moon, passes in front of another celestial object. If you think about it, technically a solar eclipse is really a transit of the Moon across the face of the Sun! We just have another name for it!

But, let's extend that analogy a little further. The Moon passes between the Earth and Sun and occasionally we observe a solar eclipse. Sometimes it's a partial, sometimes it's a total, and most times it doesn't occur at all. It all depends upon the alignment of these three bodies! But why don't we get a solar eclipse every new Moon? We would if the Moon's orbit wasn't tilted or inclined at an angle to the Earth's orbit around the Sun. If all things were perfect, we would see a total solar eclipse and a total lunar eclipse every lunar month. It would become so routine that we probably wouldn't pay much attention to it.

Well, when it comes to transits of Venus and Mercury across the face of the Sun, a similar principle applies. Since both planets occupy orbits between the Earth and the Sun it stands to reason that they would more than likely be seen to pass in front of the solar disk from time to time. Again, though the planets in the solar system pretty much lie in the same flat plane, the orbits may be inclined either above or below the plane of the Earth's orbit.

So, as is the case with Mercury and Venus, when they pass inferior conjunction

(between us and the Sun), sometimes they pass above or below the solar disk as seen from the Earth. (This concept is simply stated here, but it took the greatest astronomical minds of the past to figure it all out. It was a great mystery to be solved, and it took much observation, dedication and deduction to pull it all together into the solar system layout we have all come to know.) Like the Moon, the orbits of Mercury and Venus are also inclined slightly in relationship to Earth's orbit. While Venus' orbit is more circular, Mercury's is more eccentric and inclined at an angle almost double that of Venus. With Mercury also closer to the Sun than Venus, its passages across the solar disk are therefore more likely to occur!

What effect do these orbital variations have on the frequency of transits for both of these planets? Well, for Mercury between 1907 and our current day there have been 16 transits. Not very rare. In fact, on May 7, 2003, we were well positioned here in New England to watch a portion of a Mercury transit. Unfortunately we were clouded out. Though a first-hand look is much better than watching an event on a television or computer screen, I did watch the event on the Web from several locations, including the Canary Islands, South Africa, Hong Kong and Australia. Another Mercury transit was similarly clouded out locally on November 8, 2006.

When we talk about a transit of Venus, we are talking about a very rare astronomical event indeed (only 81 will occur between 2000 B.C. and 4000 A.D.). This rarity is due to Venus' nearly circular orbit and its inclination. When the calculations are performed, Venus transits usually come in pairs (like Mercury), but the interval between the second one of the pair and the next one is generally 122 years.

On June 8, 2004, Venus transited the Sun for the first time since 1882. No one alive had ever witnessed this event. Though I believe there is no new knowledge we can obtain from such an event these days, professional and amateur astronomers alike had been anxiously awaiting this rare occurrence. Like the old days when scientific expeditions were sent worldwide to observe these transits, some folks will still travel to far away lands to be ideally situated to watch the event in its entirety.

Like the 2004 Venus transit, I and many fellow Skyscrapers members will be content to observe the second of this pair of transits on June 5 from right here in Rhode Island. (A quick note: Seagrave Observatory will

not be open to the public for this year's transit. Since the transit occurs with the Sun very low in the western sky, our tree-studded horizon will prevent any observations from Seagrave.) At the time of this writing the other local observatories had not yet finalized any observing plans.

### Historical Transits

Before we get to the local circumstances for this transit and how to safely observe it, we first should examine why transits of Mercury and Venus were thought to be so important. Astronomers were trying to determine the mean distance from the Earth to the Sun, known as the astronomical unit (AU).

#### 1621 & 1629

It all began with the recording of planetary observations by German astronomer Johannes Kepler. Though his tables predicted the Venus transit of 1631, we have no record of any observations of that event. You will recall that the transits usually occur in pairs, but Kepler's tables did not predict one for 1639. Along came English astronomer Jeremiah Horrocks who noted some errors in Kepler's tables. When he corrected them he determined a transit of Venus would happen on December 4, 1639. He notified a friend, William Crabtree, from a nearby village, and it seems they are the only known individuals to have witnessed the transit that year. Some poor planning and bad weather prevented them from viewing the entire event. Some observations were noted, but very little scientific information was forthcoming.

#### 1761 & 1769

Once the Sun was accepted as the center of the solar system with the planets revolving around it, astronomers knew the order of the solar system but they did not know the scale. Some estimates had been made, but they were not very accurate.

Edmund Halley, in 1716, devised a method of timing a transit, noting the exact time the planet entered the solar disk, and the time it exited the solar disk. By positioning observers around the world to make precise measurements and timings, one could calculate the solar parallax. This measurement is an apparent shift in the position of Venus' transit across the disk of the Sun due to its being observed from different locations on the Earth's surface. It had been determined that Mercury's transits, though more frequent, could not be used

because the planet's shift in position from one location to another was too small for accurate measurements.

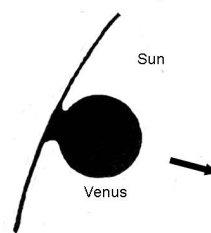
Halley knew he would be dead before the next transit occurred, so he sent his proposal to others who would hopefully execute the experiment in 1761. For the transit of June 6, 1761, Halley's method was chosen to obtain hopefully accurate data to define the scale of the solar system.

As luck would have it, many of the observations were foiled by bad weather in 1761 and also again in 1769 (some things never change). Also, a phenomenon called the "black drop" effect made getting precise timings nearly impossible.

The black drop effect is something I was anxious to observe for the first time back on June 8, 2004. As the black disk of Venus begins to cross the limb or edge of the Sun, it is a perfectly round dark spot — blacker and more round than any sunspot. Just as Venus is about to fully enter (2nd contact) or begins to exit (3rd contact) the solar disk, a portion of the planet seems to elongate outward toward the blackness of space along the Sun's limb (see accompanying graphic detail). It looks like a drip about to detach itself from a faucet, or like the shape of a teardrop.

The effect can last for several seconds, de-

Transit of Venus Black Drop Effect



This is the appearance of the black drop effect just after 2<sup>nd</sup> contact when Venus completely enters the solar disk. Arrow shows direction of Venus' motion.

pending upon atmospheric conditions, preventing astronomers from obtaining precise timings of the beginning (ingress) and ending (egress) of the transit. Observations differed greatly, thereby throwing the calculations off by millions of miles.

Here in the colonies during 1769, some of the first notable astronomical observations were made during the transit of Venus. Joseph Brown, a prominent citizen in the Providence community, learned of the upcoming event and sent for a telescope and other equipment from England. It arrived about one month before the transit. (This same instrument can be seen today in the John Hay Library at Brown University.) Much preparation ensued to determine accurately the precise latitude and longitude

of the site from which they would observe the transit. This fact was critical if the solar parallax was to be determined and hence the calculation of the astronomical unit. As reported in Florence Parker Simister's book, *Streets of the City: An Anecdotal History of Providence*, Brown set up a temporary observatory "on the crest of a hill one hundred feet to the east of Benefit Street between what is now Governor and South Water Streets, at the southern end of Thayer."

Cloudless skies prevailed that June 3, 1769. Simister writes, "Crowds of curious spectators, and those interested in scientific matters, gathered at the observatory while Governor Stephen Hopkins, Dr. Benjamin West and Joseph Brown looked through their instruments and made their calculations."

Though the observations from Providence fell in line with observations made elsewhere, the scatter due to the black drop effect still produced an unacceptable error. Regardless, the Providence scientists did produce valuable results which not only were published "in the *Transactions of the American Philosophical Society*", [as noted by Steven F. Crump, Jr. in a *Rhode Island History* journal (Volume 27, January 1968) article titled, *Joseph Brown, Astronomer*] but also were well received by the Astronomer Royal of Greenwich, England.

Unfortunately Halley's method never proved successful. Other methods eventually provided the correct answer. Even during 1761/1769, when Halley's method was preferred, a French astronomer named Delisle proposed a simpler method. One only had to time either the ingress or egress of the transit, not track the time of the entire event. Unfortunately one had to know the precise location of the observer on the surface of the Earth for Delisle's method to work.

Latitude was easy to determine, but longitude at sea in those days was not. If you read the book *Longitude* by Dava Sobel, or watched the A&E television production, you know that only with precision-regulated clocks could one accurately determine longitude. John Harrison's precision pocket watch was successfully tested in 1764, and only in 1772 did he win a coveted prize of 20,000 pounds and recognition for his handiwork.

For all intents and purposes, the use of transits to determine the scale of the solar system proved fruitless. The expeditions to far away lands did provide valuable scientific discoveries in other disciplines, not to mention the exploration of our world. For example, if you want to follow-up on just

one of these expeditions, read about Captain Cook's voyage and his involvement with the transit of 1769. A quick hint: he may have thrown some gruel on the barbie!

### 1874 & 1882

During the transits of 1874 and 1882, photography was the new method of acquiring data to determine the solar parallax and to make other discoveries. However, simpler methods had already revised the AU to unparalleled accuracy, and although scientific expeditions were still funded for the purpose of research, very little new information was forthcoming. The one thing that did arise from the 1882 event was an increased interest and excitement of the event by the general populace.

In fact, Skyscrapers' own Frank E. Seagrave (whose 8-inch Clark refractor telescope we own and for whom our observatory in North Scituate, Rhode Island, is named) observed and photographed the 1882 transit from his original observatory in Providence. Visit the Skyscrapers website to see a letter Seagrave sent to Professor Asaph Hall of the US Naval Observatory in Washington, D.C. You also can read a more detailed account of the transit that appeared in the December 16, 1882, issue of *Scientific American* that was most likely compiled from Seagrave's submitted report.

### 2004

The 2004 transit did pique some interest by the public, but the early hour of the event on a weekday more than likely kept obser-

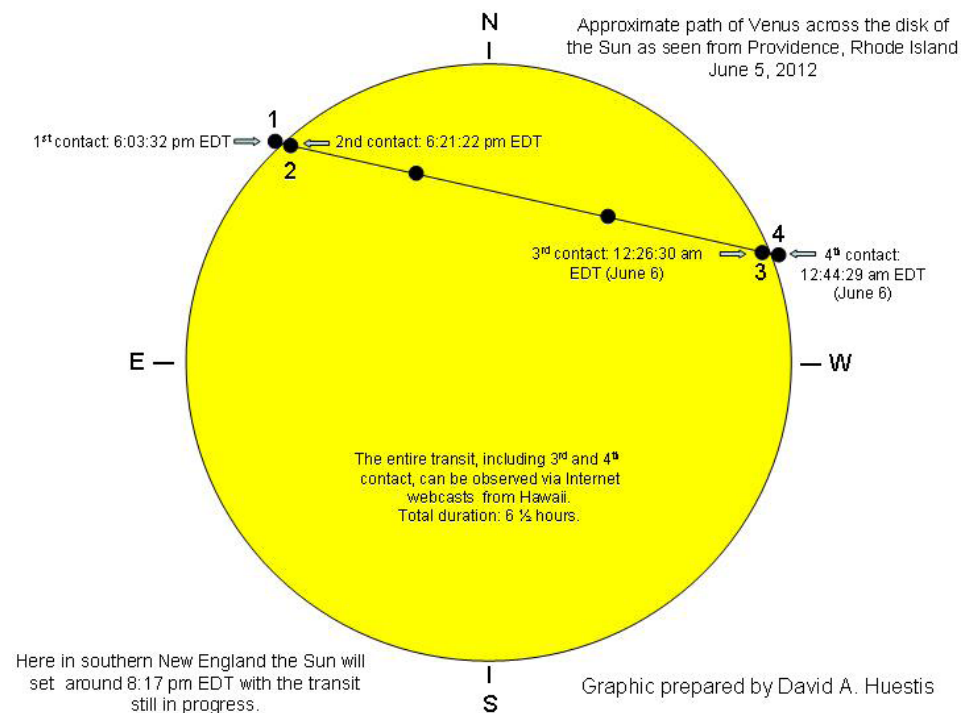
vations at a minimum. Besides, without properly filtered telescopes or cameras, observing the transit can pose damage to one's eyesight. (More about observing tips later.) June's transit may pose similar challenges.

### 2012

Let's now look at the circumstances for 2012's upcoming transit of Venus on June 5 (see accompanying graphic of the path of Venus across the face of the Sun). Unfortunately we will not be able to view the entire event from here in southern New England. Folks in Hawaii have the best seats in the house. I understand a few spacecraft will be observing the transit as well. Halley would be envious!!

The following times have been specifically calculated for Providence. Though these times will vary by geographic location, the difference for locations throughout the New England region will only be a matter of seconds.

The transit of Venus begins at 22:03:32 UT (universal time; also known as Greenwich Mean Time). We are four hours behind UT in June, so at 18:03:32 or 6:03:32 pm EDT. (Please reference the accompanying graphic with detail insert once again.) At that time, called first contact, disk of Venus will begin to "notch" the Sun. This event will begin along the top left edge of the Sun. Just before Venus encroaches upon the solar disk, the "black drop" effect I mentioned in my 2004 report occurs. It will seem like a portion of Venus' dark disk is dripping towards the solar limb or edge like



a teardrop. It is an interesting phenomenon to observe. Within a few seconds the effect will vanish.

Venus will continue to progress across the disk. At 22:21:12 UTC (18:21:12 or 6:21:22 EDT), the entire disk of Venus will be in front of the solar disk. This event is called second contact. The transit's progress continues through sunset at around 8:17 pm EDT. Choose an appropriate viewing site with an unobstructed western view to maximize your observation of this rare astronomical event.

### How to View: Never Look at the Sun!

Now, several words of caution are necessary to state here. Do not stare or even attempt to take occasional glimpses at the Sun without protection! Just because the sunlight may be dimmed by the dense atmosphere when the Sun is low on the horizon, do not stare at it. Number 14 welders' glass is one safe method to use. DO NOT use exposed film of any kind. This method is not safe. In past columns on observing solar eclipses I have instructed folks on how to build a solar eclipse viewer using a shoe box. I'm not sure this observing method will work in this circumstance. The projected solar disk is so tiny that Venus' dark silhouette may hardly be noticeable. Also, with the Sun so low, the resulting image may not be bright enough to project a reasonable image.

Only if you are an experienced solar observer should you attempt to observe the

transit with a properly filtered telescope or use the solar projection method. If you have never observed the Sun before this event, don't start now! Don't risk your eyesight due to an oversight or an outright mistake. Even if you have one of those department store refractors that often come with small glass or plastic filters, do not be tempted to use them. They have been known to shatter when exposed to the Sun's concentrated image. If you use the Sun projection method (using a telescope to project the Sun's image on a white screen), remember to be very cautious if other folks, especially children are nearby. You don't want anyone accidentally stepping up to an unguarded eyepiece to take a look. And regarding eyepieces, do not use cemented eyepieces. Use air-spaced ones. Eyepieces have been ruined when the cement has melted due to the concentrated light collected by a telescope. Also, remember to block off your finder scope. I have seen observers singe their hair or clothes by failing to do so!!

Think about what a small magnifying glass can do, and then imagine the intensity and heat a larger telescope can focus. It's not worth it. Many years ago, when I first started out in astronomy, I had one of those glass/plastic filters shatter during a partial solar eclipse. Luckily I wasn't looking through the eyepiece at the time.

An inexpensive alternative is to purchase some solar eclipse glasses from a reputable vendor through the Internet. These glasses

will provide a safe view of the Sun, but be sure to place your order early, as the transit will be visible to millions of folks across the United States. Even when observing the Sun using these glasses, observe caution as well. Caution will be the keyword of the day. You will not wish to ruin your eyesight by looking at the event unfiltered, for there will be many more astronomical events for your eyes to experience and enjoy in the coming years.

In addition, I'm sure there will be some websites available from which you can safely watch the event. Surf the Web ahead of time to see what sites will be offering this great event. I agree that this method is not the same as experiencing it first-hand, but if you can't observe it safely, don't observe it at all. If all else fails, and I mean the weather, you may have no choice but to pull up a chair in front of your computer screen to watch the progress of the event. In fact, once the Sun sets for us here, I will continue to monitor the transit's progress on the Web from those locations further to the west. We can only hope we will have our opportunity to see the last Venus transit until the year 2117!

Good luck in whatever observing method you choose, and remember to keep your eyes safe.

And, just in case you're wondering what the current value of the astronomical unit (mean Earth-Sun distance) is, it's 92,955,807.3 miles, plus or minus about 10 feet!

Here's that photo of M51 finished up. It was a shot through the AT65-EDQ with a Meade DSI II, (90) 21.2 Sec exposures stacked and processed through PhotoShop. Photo by Tom Thibault.



Membership  
dues for 2012-13  
are now due

See page 11 for renewal form

# Shooting Stars of May

Dave Huestis

Well, the draught condition in southern New England was eased somewhat on the weekend of April 21-22. Two to three inches of precipitation helped to lessen the fire danger throughout the region. Unfortunately the rain coincided with the peak of the April Lyrid meteor shower! We just can't seem to catch a break.

Elsewhere, with clear skies and a New Moon, folks were treated to a fine display of the April Lyrids. There were even a few bright meteors called fireballs.

Two weeks later, on the night of May 5-6, another meteor shower will grace our skies—the Eta Aquarids. The particles we see hitting our upper atmosphere head-on at 41 miles per second were shed by Halley's Comet long ago and left to orbit about the Sun. Unfortunately this display is an old and declining one and is best seen from the southern hemisphere.

To make matters worse, this year the Full Moon is also on May 5 and will be in the sky all night. Most of the meteors will be blotted out by the bright moonlight. Besides, dawn arrives early in May, so you might catch a glimpse of a couple brighter members of this

display around 4:00 am.

Unfortunately you will not see anywhere near the peak rate of twenty swift and yellow Eta Aquarids per hour. Also, Aquarius, the constellation from where the meteors appear to emanate, is not very prominent and will be a little difficult to recognize with a bright sky to contend with. However, Aquarius will be about 12 degrees above the east-southeast horizon at the 4:00 am hour. With the Moon almost on the opposite side of the sky at that time, you might actually see the shower's radiant point in the Water Urn asterism (looks like a Y-shaped group of stars).

You may even see a few bright "earthgrazers," which are shooting stars that blaze long and slow along the horizon. And because the Eta Aquarids are very fast meteors, forty percent of them leave long persisting dust trains when they disintegrate in the Earth's upper atmosphere.

Despite the interfering moonlight on the morning of May 6, consider scanning the eastern sky before dawn to catch a glimpse of a shooting star or two.

Keep your eyes to the skies.

# The Full Moon in May

Francine Jackson

If you happen to look outside right now, you might become aware very quickly why May gives us the Full Bloom Moon, or the Budding Moon, if our winter - unlike this year - has been very bad and our plants haven't been able to really dig themselves out of the ground. Also, this Moon is often referred to as the Milk, or the Corn Planting Moon, although smart farmers probably have their seeds in the ground already.

Also, with the beauty of the Earth, our thoughts can sometimes turn to celebrations, such as graduations and weddings. And, although we usually think of the normal wedding time as next month, we might just prepare for June by thinking of the Maasai

legend of the Sun and the Moon. They married, and traveled together for a long time; however, the Moon would become tired, and ask the Sun to carry her for three days of their journey. One day, the Sun, tired of this extra work, beat the Moon, scratching her face and pulling out one of her eyes; but, the Moon didn't take this lying down - she fought back, wounding the Sun in the forehead. When the Sun realized he had been wounded, he became embarrassed, and decided to shine so brightly that no one would be able to see his wounds. But, the Moon wasn't embarrassed by her looks, so she didn't add any brightness to her, and you can still see the wounds given to her by the Sun.

# Porrima: A Binary Star in Virgo

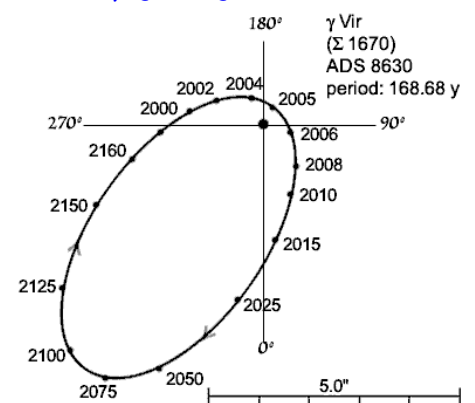
Glenn Chaple's Sky  
Object of the Month

Compiling a list of the finest double stars for backyard telescopes is always a work in progress. The list is forever in flux, because many showpiece double stars are binary systems that periodically close to the point where they can't be resolved by small-aperture telescopes.

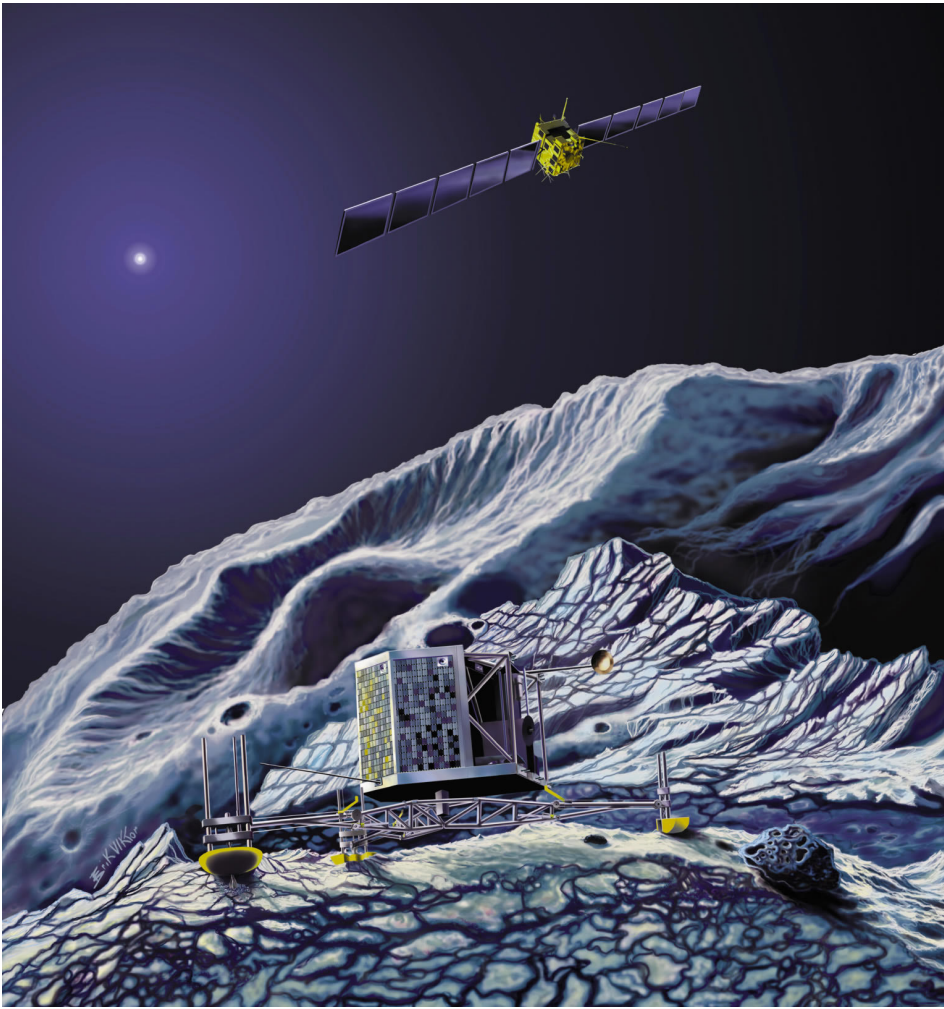
Such is the case with Porrima (gamma [γ] Virginis). In 1970, a compilation of the finest double stars would have included this striking pair of nearly identical magnitude 3.5 spectral class F0 stars. Back then, these stellar twins were separated by 4.6", an easy "kill" for the smallest of telescopes. The situation changed rapidly as the two stars began to close together. Between 2002 and 2007, they were within an arc-second of each other – all but impossible to resolve with anything but the largest telescopes. Porrima disappeared from the double star A-List.

A comeback is in the works! Porrima A and B are separating and are nearly 2" apart – within the grasp of a good 3-inch scope under seeing conditions that permit a steady image at a magnification of 120X or more. Saturn is currently visiting Porrima's neighborhood. If the Ringed Planet is sporting an unusually crisp image, try your luck with Porrima.

I found an amazing Youtube clip of Porrima, taken by the North Carolina astroimager Michael C. Phillips through his 14-inch f/4.5 Newtonian reflector. Check it out at [www.youtube.com/watch?v=yQb5AdQoW38](http://www.youtube.com/watch?v=yQb5AdQoW38).



Orbit of gamma Virginis - Richard Dibon-Smith ([www.dibonsmith.com](http://www.dibonsmith.com))



NASA's Space Place

## NASA Helps Europe Study a Comet--Up Close and Personal

By Dr. Tony Phillips

Europe's Rosetta spacecraft is on its way to intercept comet 67P/Churyumov-Gerasimenko. Comets have been intercepted before, but this mission is different. Rosetta aims to make history by landing a probe on the comet's surface while the mother ship orbits overhead.

"Rosetta is the European equivalent of a NASA flagship mission," explains Claudia Alexander, project scientist for the U.S. Rosetta Project at NASA's Jet Propulsion Laboratory. "It will conduct the most comprehensive study of a comet ever performed."

Rosetta's payload contains 21 instruments (11 on the orbiter, 10 on the lander) designed to study almost every aspect of the comet's chemistry, structure, and dynamics. Three of the sensors were contributed by the U.S.:

Alice (an ultraviolet spectrometer), IES (an ion and electron sensor), and MIRO (a microwave sounder).

The main event of the mission will likely be the landing. The 100-kg lander, which looks a bit like a cross between NASA's old Viking Mars landers and a modern microsatellite, will spend two weeks fastened to the comet's icy surface. The European-built probe will collect samples for analysis by onboard microscopes and take stunning panoramic images from ground level.

"First the lander will study the surface from close range to establish a baseline before the comet becomes active," explains Alexander. "Then the orbiter will investigate the flow of gas and dust around the comet's active, venting nucleus."

Rosetta's sensors will perform the experi-

Rosetta's lander Philae will eject from the spacecraft, touch down on the comet's nucleus, and immediately fire a harpoon into the surface to anchor itself so it won't drift off in the weak gravity.

ments that reveal how the chemicals present interact with one another and with the solar wind. Alice and MIRO detect uncharged atoms and molecules, while IES detects the ions and electrons as the solar wind buffets the nucleus.

One problem that often vexes astronomers when they try to study comets is visibility. It's hard to see through the dusty veil of gas billowing away from the heated nucleus. The microwaves MIRO detects can penetrate the dust, so MIRO can see and measure its target molecules even when other instruments can't.

MIRO is one of several experiments focused on the comet's structural properties. It will determine the comet's dielectric constant, emissivity, and thermal conductivity to determine whether it is made of a powdery loose material, has a detectable layer of loose material, or is hard as rock.

"We want to find out whether comets have retained material from when the solar system formed," says Alexander. "If the ancient materials are still there, we can get an idea of what conditions were like at the dawn of the solar system."

Rosetta enters orbit in 2014. Stay tuned for updates!

Check out "Comet Quest," the new, free iPhone/iPad game that has you operating the Rosetta spacecraft yourself. Get the link at [spaceplace.nasa.gov/comet-quest](http://spaceplace.nasa.gov/comet-quest).

*This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.*



# April Reports

Ed Haskell, Secretary

Jim Crawford, Treasurer

## Meeting of April 13, 2012

The meeting was called to order by President Tom Thibault at 7:35 pm.

The evening's speaker was **Dr. Brandon Murakami** Assistant Professor of Physics at Rhode Island College who spoke on the fascinating world of particle physics and the search for the Higgs boson at the Large Hadron Collider and other research sites. The plethora of inhabitants of the sub atomic world, their interactions and life cycles, and the intertwined relationships of matter and energy cannot be comprehended in a single night's discussion. Nevertheless Professor Murakami managed an educational and entertaining presentation that left members with some appreciation of the state of research into matters of importance to the life of the universe and thus our own as well.

The Annual Meeting commenced after a break for refreshments.

There were no amendments to the **Secretary's Report** and the **Treasurer's Report** appears in the Skyscraper.

**The Trustees** reported the completion of the annual inventory of real and personal property of the Society and announced the establishment of a methodology for organizing and updating this information in the future. They also reminded members of the cleanup organized for the following day at the Observatory and said more help would be welcome.

**First VP Bob Horton** reviewed upcoming meeting speakers. May's speaker will be Francine Jackson on the history of the Transit of Venus which is particularly topical given the coming transit in June.

**Second VP Kathy Siok** reviewed arrangements for AstroAssembly and indicated this was now scheduled for the last weekend in September.

### Old Business

The pending matters of revisions to the Constitution and By-Laws, increasing dues, and the 2012-2013 Budget were all voted upon and passed unanimously.

Results of balloting in the annual election showed that the Nominating Committee slate was elected.



### New Business

First introduction of candidate for membership Casey Darconte.

### Good of the Order

Bob Horton announced upcoming activities and events involving Brown University and Skyscrapers to provide opportunities for the public to witness the transit of Venus in June. Volunteers will be needed to man scopes and answer questions.

### Presidential Announcements

President Tom Thibault thanked the meeting for the support he has received in his two terms as President. He offered best wishes to newly elected officers, and handed the gavel to the new President.

Meeting adjourned at 9:55pm

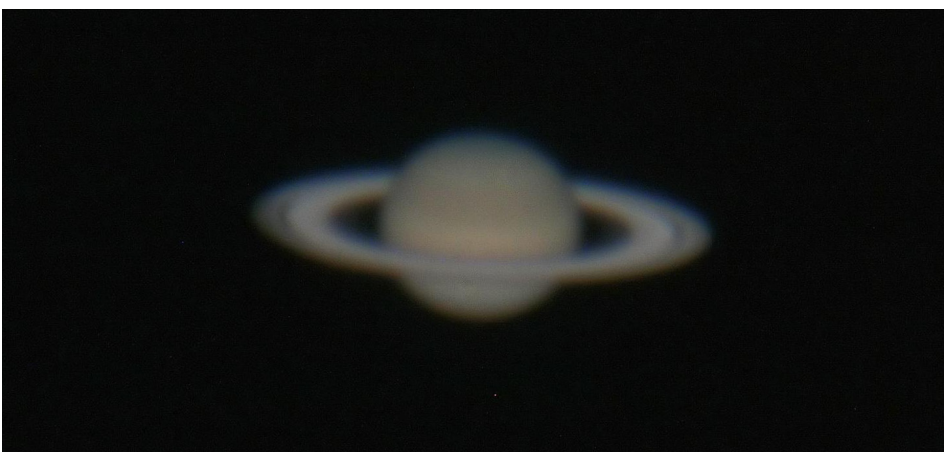
Respectfully submitted,  
Ed Haskell, Secretary

Budget as of 4/24/2012	2012-2013 Budget	Actual	Difference
<b>INCOME</b>			
Astroincome	\$3,500.00	\$0.00	-\$3,500.00
Cookoutinc	\$450.00	\$0.00	-\$450.00
Donation, Other	\$300.00	\$41.00	-\$259.00
Dues	\$3,310.00	\$1,025.00	-\$2,285.00
Interest Inc	\$60.00	\$3.91	-\$56.09
Starparty Donations	\$200.00	\$111.00	-\$89.00
<b>TOTAL INCOME</b>	<b>\$7,820.00</b>	<b>\$1,180.91</b>	<b>-\$6,639.09</b>
<b>EXPENSES</b>			
Astroexp	-\$2,750.00	\$0.00	-\$2,750.00
Cookoutexp	-\$400.00	\$0.00	-\$400.00
Corporation, State Fee	-\$22.00	\$0.00	-\$22.00
Domain Name	-\$15.00	\$15.00	\$0.00
Donations	-\$50.00	\$50.00	\$0.00
Electric	-\$175.00	\$13.15	-\$161.85
Other Insurance, Property	-\$2,600.00	\$0.00	-\$2,600.00
Postage and Delivery	-\$225.00	\$0.00	-\$225.00
Presidents Fund	-\$150.00	\$0.00	-\$150.00
Printing and Reproduction	-\$83.00	\$0.00	-\$83.00
Propane	-\$100.00	\$0.00	-\$100.00
Property Maint Fund	-\$200.00	\$0.00	-\$200.00
Refreshment Expense	-\$350.00	\$44.31	-\$305.69
Trustee Exp	-\$700.00	\$53.54	-\$646.46
<b>TOTAL EXPENSES</b>	<b>-\$7,820.00</b>	<b>\$176.00</b>	<b>-\$7,644.00</b>
<b>Cash Assets</b>			
Citizens	\$8,558.05		
Capital One	\$12,257.05		
<b>Total</b>	<b>\$20,815.10</b>		



The sun on April 20, 2012. Seeing conditions were much better today compared to yesterday. This image is sharper. Also note the position of the sunspots from one day to the next. Photo by Bob Horton.

Jim Hendrickson took this image of Venus near the Pleiades on April 2, 2012 during a company outing in Saxapahaw, NC. Jupiter is visible at the bottom right.



Back from the LA area. A visit to the 200" on Mount Palomar, Griffith Observatory, Labrea Tar Pits and Mount Wilson. 2 nights observing with the 60" on Mount Wilson, lots of pics to come plus some videos. Here's a sample. I just put my camera up to the eyepiece of the 60" and snapped this. Much more detailed thru the eyepiece. Photo by Steve Hubbard.

# Skyscrapers, Inc. Membership Renewal

NAME \_\_\_\_\_  
 ADDRESS \_\_\_\_\_  
 \_\_\_\_\_  
 CITY \_\_\_\_\_  
 STATE \_\_\_\_\_ ZIP \_\_\_\_\_  
 PHONE \_\_\_\_\_  
 EMAIL \_\_\_\_\_

## Membership Dues

	Annual Dues <i>(choose one category)</i>
JUNIOR (13-17) <input type="checkbox"/>	\$15
REGULAR <input type="checkbox"/>	\$50
FAMILY <input type="checkbox"/>	\$60
SENIOR (65+) <input type="checkbox"/>	\$25

CONTRIBUTING   
*(any amount in excess of annual dues is gratefully accepted as a donation)* \$ \_\_\_\_\_

## Magazine Subscriptions\*

Members may optionally subscribe to the following publications at a significant discount from their regular subscription rates.  
 \*Magazine subscription rates subject to change at any time.

ASTRONOMY  \$34.00\*  
 SKY & TELESCOPE  \$32.95\*  
 (\$10 savings)

TOTAL \$ \_\_\_\_\_  
 (Make check payable to Skyscrapers, Inc.)

Mail to:  
 Membership Secretary  
 Skyscrapers, Inc.  
 47 Peepload Road  
 North Scituate, RI 02857



This is a bright Iridium flare seen from my backyard tonight. It went from the left to the right and over the 20 seconds of this exposure started off dim, got very bright and then faded again as it moved across the background stars. Canon Rebel XS set at asa 400 on a tripod. Photo by Steve Hubbard.

# 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.
- 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