the Skyscraper
vol. 40 no. 10
October 2013

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

AstroAssembly 2013
October 4th & 5th

Friday Evening Informal Talks and Stargazing

At Seagrave Memorial Observatory

Pomfret's Olmsted Observatory: From Manual to Robotic in Five Years by Josh Lake

Imaging the ISS - It's easier than you think! by Bob Horton

Recent Upgrades at Margaret M. Jacoby Observatory by Brendan Britton

My Visit to Questar by Tony Costanzo

Saturday Program

All day at Seagrave Memorial Observatory: Swap Tables, Solar Viewing, Astrophotography Contest, Homemade Telescope Exhibit (bring your telescope) and the whimsical Astro Bakeoff Contest!

The Amateur Astronomer's Equipment of the 1960s by Ed Turco

Astrophotography on The Cheap by Scott MacNeill

MEarth Project: Super-Earths Transiting Nearby Low Mass Stars as Laboratories for Exoplanetary Science by Zachory Berta-Thompson

The Best of all Worlds: Creating Unique Astronomical Images from Professional and Amateur Data Sources (with emphasis on the Hubble Legacy Archive) by Robert Gendler

MicroObservatory: Approaching Two Decades of Observing with a Network of Online Robotic Telescopes for Education and Outreach by Frank Sienkiewicz

Saturday Evening Program

At North Scituate Community Center: Reception, Hors d'oeuvres served, Evening Banquet (pre-registration required), Words of Welcome, Awards, and Raffle Prizes, A Preview of Seagrave Observatory's Centennial, 1914 to 2014 & Honorary Awards

The Design, Construction and Use of a Large Private Research Observatory by Mario Motta

President's Message

Ed Haskell

Members may recall that I mentioned in a previous *President's Letter* the importance to Skyscrapers, Inc., of our outreach programs (aka star parties). These activities not only fulfill our statutory obligation as an educational corporation, but they are a major source of income to the Society. They are also a major drain on volunteer efforts.

Recently we suffered a very visible embarrassment at canceling a major star party for lack of available volunteers and telescopes. While this alone might stimulate this month's *Letter* it is just the most recent evidence of a growing problem that needs to be addressed.

The only thing we are all shorter of than money is time. For any of us to participate in a star party incurs one or both of these shortages. While we have been very fortunate in almost always finding a way to accommodate all requests from the public I have sensed that we are approaching the breaking point in our ability to continue as usual. Accordingly, the Board will take up the subject of how and when we provide access to the heavens to non-members. I put it that way because the subject is not limited to just star parties away from Seagrave but also Open Nights at the Observatory.

Let me raise some possible approaches to the solution of this problem and then I am going to ask for your help.

Bearing in mind that Members have finite resources to devote to this important activity perhaps we should do one or more of the following:

• Ration the number of public events we can "fund" and steer groups into combined star parties instead of private events.

• Set a lower limit on the size of attendance we will service.

• Insist that school districts combine requests to a single date involving multiple schools in one of their locations.

• Set a price on events rather than asking for a per capita donation.

• Formalize the process to include a set of guidelines which include timelines and expectations.

• Insist that smaller groups come to an Open Night at Seagrave rather than going to them.

• Devise ways to use technology to lower the "cost" (in time, effort, and number of Members) of putting on a Star Party.

I warned you that I was going to ask for your help. In the aggregate the Society must have several hundred years experience in interfacing with the public. Some of that experience certainly resides in the Board but surely more is in the readers of this *Letter*. Please take the time to write me with suggestions on how we can continue to meet all requests for outreach within the bounds of what we can manage to do. No idea is out of order. Even if what you suggest doesn't gain traction it might well stimulate another idea that would be a winner. My email address is haskell.ed@gmail.com. Please help.

Thanks for all you do for Skyscrapers.

Phases of the Moon

New Moon
October 5 0:35

First Quarter Moon
October 11 23:02

Full Hunter's Moon
October 18 23:38

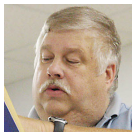
Last Quarter Moon
October 26 23:40

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 **October 16** to Jim Hendrickson, 1 Sunflower Circle, North Providence, RI 02911 or e-mail to 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. Note that you will no longer receive the newsletter by postal mail.



October Highlights:

Orionid Meteor Shower & Penumbral Lunar Eclipse

Dave Huestis

The Full Hunter's Moon occurs on October 18, but more importantly that evening we will be treated to a penumbral lunar eclipse. For a lunar eclipse to occur the Sun, Earth and Moon must be nearly in a straight line with the Earth in the middle of this alignment. The reason why lunar eclipses do not occur monthly is because the Moon usually passes north or south of the Earth's shadow in space.

Unfortunately we will not experience a partial or total lunar eclipse because the Moon will not move into the Earth's darker umbral shadow. Instead, the Moon will slide into a pale portion of the shadow called the penumbra. You will need to watch it closely and carefully. Many people will not notice anything different about the Moon unless they have followed the eclipse's progress throughout the evening.

Though the eclipse will begin at 5:50 p.m. (first contact), this event cannot be seen. The Moon is only then beginning to slip into the dim penumbral shadow. Besides, it will have just risen at 5:47 p.m. and will be close to the horizon. Only as the eclipse progresses will an observer see a slight darkening of the lunar surface as the Earth's penumbral shadow sweeps across it from south (bottom) to north (top). Mid-eclipse, or maximum, will occur at 7:50 p.m. when 76% of the lunar disk will be within the penumbral shadow. At that time an informed observer should notice the subtle shading of the southern portion of the moon. The northern 24% will remain unchanged.

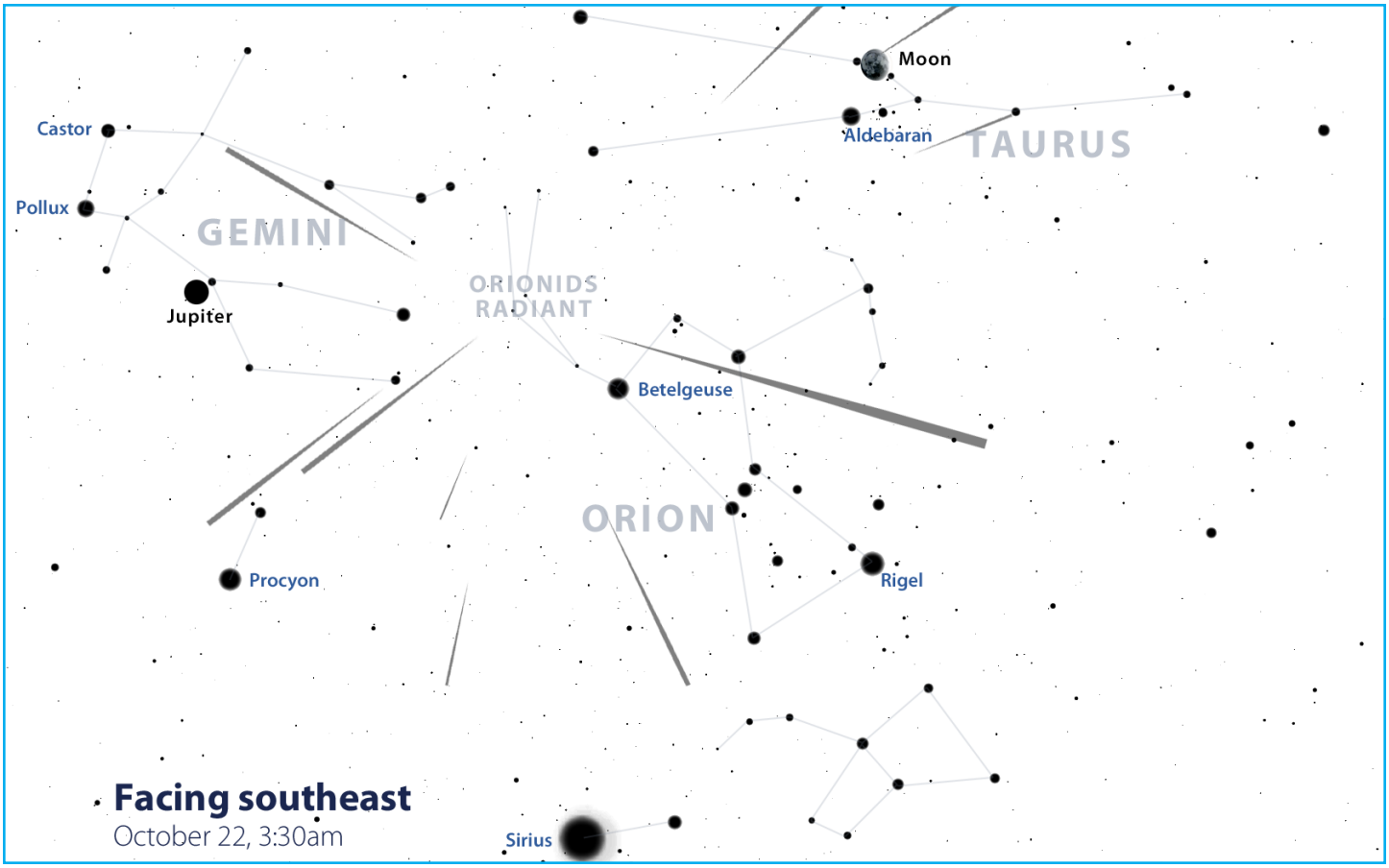
After mid-eclipse the Moon will begin to move out of the penumbral shadow and the lunar surface will brighten from north to south, returning the Moon to its normal brightness at 9:49 p.m. This event, like first contact, will be unobservable. (The next total lunar eclipse visible from southern New England will occur in 2014 on April 15.)

Three days later on the evening of October 21st to the early morning of the 22nd the annual Orionid meteor shower will grace our skies. Unfortunately the still bright waning gibbous Moon will interfere with observing the peak rate of 20 or so yellow and green meteors per hour. However, the Orionids are also noted for producing fireballs that create persistent dust trains high in the atmosphere, so it might still deserve a few hours of your time if clear skies prevail.

The meteors appear to radiate out of the sky just above Orion's head (hence the name of the shower) and not far from the bright red super giant star Betelgeuse, which marks his right shoulder. While Orion is an easy star pattern to identify, at 3:30 a.m. this giant constellation will be due south of your location and about halfway up above the horizon. That pesky Moon, nestled among the V-shaped Hyades cluster of stars in Taurus, will be very close to the shower's radiant point. Try to block the Moon from your vision to maximize your meteor count.

The best activity should occur between midnight and dawn. The particles we will see disintegrating in our atmosphere at around 41.6 miles per second are the remnants of Halley's Comet.

Wishing you clear skies for all your astronomical endeavors.



Fly me to the Moon

Mark Sweberg

On July 20, 1969, Neil Armstrong (1930-2012) and Edwin "Buzz" Aldrin (1930-) became the first men to land on the Moon. Earth's multitudes sighed a collective sigh of relief when the scratchy transmission, "Houston, Tranquility Base here. The Eagle has landed," echoed around the globe. A jubilant world came together as one, for those precious, glorious moments.

Below is the congratulatory telephone call, delivered the next morning, by then President Richard Nixon to our brave astronauts on behalf of a grateful nation and an admiring world:

Richard Nixon telephones Armstrong on the Moon http://youtu.be/Htx5oT-s2wA

The following speech was the other one. The one that was not delivered. The one that was to be used in the unthinkable event of a disaster that would maroon the astronauts on the Moon for all eternity:

"Fate has ordained that the men who went to the Moon to explore in peace will stay on the Moon to rest in peace. These brave men, Neil Armstrong and Edwin Aldrin, know that there is no hope for their recovery. But they also know that there is hope for mankind in their sacrifice. These two men are laying down their lives in mankind's most noble goal: the search for truth and understanding. They will be mourned by their families and friends; they will be mourned by their nation; they will be mourned by the people of the world; they will be mourned by a Mother Earth that dared send two of her sons into the unknown. In their exploration, they stirred the people of the world to feel as one; in their sacrifice, they bind more tightly the brotherhood of man. In ancient days, men looked at stars and saw their heroes in the constellations. In modern times, we do much the same, but our heroes are epic men of flesh and blood. Others will follow, and surely find their way home. Man's search will not be denied. But these men were the first, and they will remain the foremost in our hearts. For every human being who looks up at the Moon in the nights to come will know that there is some corner of another world that is forever mankind."

History was on our side that night, thankfully. Tragically, I almost missed it all.

With family gathered around the living room television that July evening, I watched with anticipation and hope as the LEM prepared to undock from the command module and start its descent to the lunar surface. My adolescent imagination, fueled and soaring ever higher with each successive Mercury, Gemini, and Apollo mission, was uncontainable that night. Mankind was preparing to realize its nature; the need to explore, go further, to gain the next hill. I was taking it all in.

And, that's when the family dog heard HIS call of nature.

Abhorred, and with a lump of distress in my chest, I dutifully rose to walk my best friend; no one else was going to, and it was my responsibility to boot. As my unhurried, unfazed buddy rustled in the leaves, I looked toward the Moon, mindful of the momentous drama unfurling 240,000 miles away, anxious that I was missing it. Rocky was good to me, however. He uncharacteristically dispatched with his business promptly, and I gleefully made a beeline back to the television, and a front row seat to history. Ah, but for fortune.

This October 12th marks the "International Observe the Moon Night", an annual event dedicated to encourage people to 'look up' and appreciate our nearest neighbor. Around the world, people will be looking at the Moon, using naked eyes or using the most sensitive telescope, and everything in between. It is a wonderful time to visit your local observatory and ponder the Moon, the Universe, and mankind's place in it. It is a wonderful time to honor those brave astronauts who paved the way for today's space exploration, and the myriad people from all walks of life that ordained this be done.

I will be doing this at the Frosty Drew Observatory in Charlestown on October 12th. I will be doing this, and more.

I will be remembering a man landing a spacecraft, with less computer power than a smart phone, on the lunar surface all those years ago.

I will remember, as well, a family dog named Rocky, a dear fur friend who smiled on me the night of July 20, 1969!

Harvest Moon by Bob Derouin

Spiral Galaxy in Cepheus

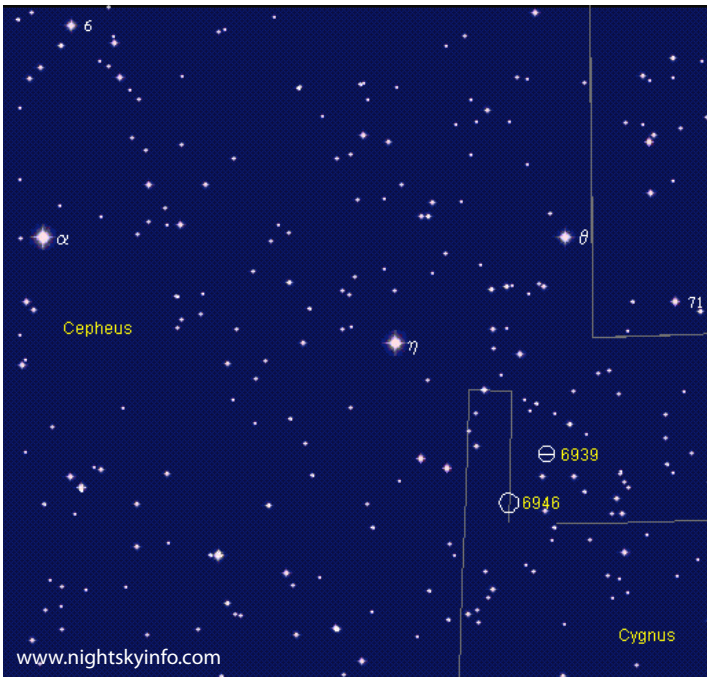
NGC 6946

Glenn Chaple

A mere 40 arcminute hop from last month's Sky Object (the open cluster NGC 6939) takes you 5000 times deeper into space to the face-on spiral galaxy NGC 6946. NGC 6946 was discovered by William Herschel on the same night – September 9, 1798 – that he notched NGC 6939.

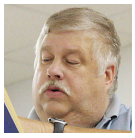
Most sources assign to NGC 6946 a visual magnitude of 8.9. Don't be misled by this seemingly "bright" figure. As is the case with similar face-on galaxies like M33 and M74, the light is spread across a wide area (in this instance, 11 by 10 arcminutes), resulting in a very low surface brightness. Working with a 10-inch reflector on a recent evening, I could barely glimpse NGC 6946 as "a large, circular glow (averted vision only)." The limiting magnitude that night was 5 – not exactly a pristine condition. If you want to spot NGC 6946 with a small-aperture scope or tease out any kind of structural detail with a big Dob, you'll want to work under clear, magnitude 6 or better skies.

NGC 6949 has been nicknamed, the "Fireworks Galaxy." The moniker is appropriate. Since 1917, nine of its stars have erupted as supernovae - the last in 2008. This is an amazing figure when you consider that NGC 6946 is about half the size of our Milky Way Galaxy.



Comet Hale Bopp was at maximum brightness in early 1997 near Cassiopeia in the northwestern Sky. Photo by Gerry Dyck using a Pentax K1000 and Kodachrome 100ASA film, 50mm fl, f/4, 10 seconds.

Preparing for Comet ISON: A Comet Primer for Casual Stargazers



Dave Huestis

In my January preview of astronomical highlights for 2013, I noted the predictions for a "Comet of the Century" to grace our skies in November and December. Descriptions like "as bright as a Full Moon" and "may possibly be seen even in broad daylight" were catch phrases bandied about the internet concerning Comet ISON. Well, as the comet approached, I followed the news updates on its progress. Soon there were news items saying something to the effect of "best comet in the last few decades." And a more recent analysis of the comet's changing expectations prompted a Skyscrapers member to comment "comet of the week!"

That's the way it is with comets. The only thing predictable about them is that they are unpredictable. A recent example was Comet PANSTARRS back in March. It was predicted to be brighter than it actually became. Up here in the northern hemisphere in the hazy and light-polluted skies of Southern New England PANSTARRS was just barely visible to the naked-eye.

At the end of May, while Comet ISON was still out beyond the orbit of Mars, it was lost to view because it was in the direction of the Sun. When the comet finally moved out of the solar glare and was imaged on August 12, it was still fainter than what was originally forecast. At the time some comet experts thought it was still too early to make a reliable call on what we could expect to see as ISON neared the Sun. Others simply didn't believe it would become visible to the naked-eye. And there are those experts who do not believe Comet ISON will survive its close passage to the Sun. Despite these disparate opinions, we may yet get a good look at this cosmic visitor to the inner solar system.

To prepare you for the potential Comet ISON experience (whatever that may be), today's column (Part I) is a primer that will provide some basic facts about comets in general. Part II will serve as an ISON observing guide, noting dates, times and where to look in the sky.

Let's hope Comet ISON doesn't become another Comet Kohoutek, which fizzled in 1973.

Part I: An Introduction to Comets

What's the first thing that comes into your mind when you read or hear the word comet? Most people will likely think of Halley's Comet, one of the more famous comets. (Edmund Halley was the first astronomer to predict the return of a comet in 1769, the one now named Halley in his honor. Unfortunately he died before it returned.) If one asks them to describe a comet they will tell of a star-like object with a long tail. That answer would actually be a good start. However, for many that would be the extent of their knowledge on these interplanetary visitors from the depths of our solar system.

The above description of a comet is fairly reminiscent of a centuries old depiction. Comet actually means "long-haired," and Greek philosopher and scientist Aristotle (384 BC – 322 BC) is the first known person to use it to describe these "hairy stars." Comets were very often considered bad omens, supposedly foretelling the death of royalty or the onset of some calamity. They seemed to appear out of nowhere, and then disappear just as quickly. Astrologers must have flourished when a comet appeared in the heavens.

Comets were initially thought to be manifestations of the atmosphere. But in 1577, Danish astronomer Tycho Brahe (1546-1601) and others took precise measurements of the motion of the Great Comet of 1577 from widely separated locations and determined that the comet did not show any parallax (difference in position as seen from multiple locations). These observations indicated that the comet was well outside of the Earth's atmosphere. But if these celestial objects were out roaming amongst the planets of our solar system, where did they come from?

Most all comets originate in the Oort Cloud, a theoretical spherical cloud or halo of perhaps several trillions of comets encompassing our solar system and extending up to 465 billion miles from the Sun. Comets are leftover material from the creation of the solar system 4.6 billion years ago. They are irregularly shaped objects, estimated to range in size from several hundred feet to 25 miles and over, composed of ice, small rocks, dust, various gases, and organic compounds.

In fact, during the 1910 apparition of Halley's Comet, astronomers spectroscopically discovered cyanogen gas in the comet's tail. With this news came reports

of what cyanogen gas was and what effects it could have on the human population. It became blown way out of proportion. The gas detected was so tenuous that Professor Mitchell of Columbia University stated, "I believe that if a cubic mile of the comet's tail could be gathered and put into a beaker, it would require the most minute chemical tests to detect anything more than a trace of the poisonous gas." But the damage had already been done. Some people were panicking.

Providence's resident astronomer **Frank E. Seagrave** had many queries on the comet's possible destruction of the Earth by collision. Things went from bad to worse when Mr. Seagrave announced that the Earth would pass through Halley's tail! That news really got everybody frightened. In fact, one prominent businessman from Providence refused an invitation to spend the night of May 18, when the comet's tail would sweep over the Earth, at Frank's observatory, insisting that the place for a conscientious man was at home with his family.

"Later in the evening throughout the city, people were outside waiting for something to happen at the appointed hour of the Earth's passage through Halley's tail. Providence at the time was wrapped in a hazy fog, again attributed to the comet by some, while others "in the vicinity of the Great Bridge, catching a whiff of the familiar Providence smell, were certain that they were able to trace the cyanogen gas of the comet's tail."

Well, nothing happened. No collision. No death by gas. Hopefully we are much more enlightened today, though all sorts of doomsday scenarios can be found on the internet each time a new comet is forecast to appear. The more things change, the more they stay the same.

In 1950, the late Dr. Fred Whipple (1906-2004) of Harvard College Observatory and an old friend of Skyscrapers, theorized that comets are like "dirty snowballs." Just how "dirty" are the surfaces of comets? They have the darkest surfaces of any object in the solar system. In fact, Comet Halley, being a very old comet, is so dark it reflects only about four percent of the light that bathes it. I can't stress enough how dark that is. A little quick research revealed that asphalt reflects seven percent of the light it receives! For those of you who live around New England, think about the snow on the side of the road in mid- to late-March. It's full of sand, dirt and small rocks. It's so dirty you almost want it to snow again just

Comet PANSTARRS moves towards the Andromeda Galaxy in March 2013. Photo by Jim Hendrickson.

Comet Hale Bopp in 1997. Photo by Gerry Dyck using a Pentax K1000 and Kodachrome 100ASA film, 135mm fl, f/4, 60 seconds.

to cover over the unsightly mess. Well, a comet's surface is many times more "dirty."

When comets are in their cold and cozy orbits within the Oort Cloud they are inactive. Occasionally one of them gets nudged by the gravity of a nearby star, sending the comet tumbling on its long journey towards our Sun. Initially it may take many hundreds of thousands of years for a comet to journey to our region of the solar system. The outer gas giant planets may alter the comet's path and drastically shorten its orbit, and the Sun will do likewise.

Comets with orbital periods of 200 years and greater are called long-period comets. Less than 200-year orbit comets are called short-period comets. Though short-eriod comets had their origins in the Oort Cloud, over time they have been "herded" by the Sun or the gas giants of the outer solar system into a region called the scattered disk, which lies from 5.1 billion to 9.3 billion miles or so from the Sun.

There are even comets like Encke, which orbits the Sun once every 3.3 years, since at aphelion (farthest from the Sun) it is just shy of Jupiter's orbit, and at perihelion (closest to the Sun) just comes inside of Mercury's orbit. It too started its existence long ago out in the Oort cloud, but successive travels through the inner solar system modified its orbit substantially.

In fact, in 1993 a comet was discovered in orbit around Jupiter. Comet Shoemaker-Levy 9 had made a close approach to Jupiter in 1992 and was captured by this giant world. Jupiter's gravity caused the comet to fragment into at least 21 pieces. But what was more significant was the fact the calculations showed that these fragments would crash into Jupiter's cloud tops. In July 1994, over a six-day period, the pieces plummeted into Jupiter's atmosphere. While we could not see the impacts happen because of our viewing angle, once the impact zones rotated into view even a small telescope revealed the huge impact scars. The impact zones were visible for several weeks. This incredible collision was the first time astronomers had ever witnessed such an event.

The Earth can also have a close encounter with a comet, though most don't come anywhere near our home world. I'm sure the Earth has had close encounters with comets throughout the four billion years our planet has been in existence, but most come no closer than several tens of millions of miles to us. However, in 1908, it is believed by some scientists that a fragment of Encke's Comet exploded high in the sky over the Tunguska region of Siberia. The resulting concussion wave leveled approximately 800 square miles of forest. Had it occurred over a more populated area the toll on life and property would have been devastating.

When a comet reaches the orbit of Jupiter (mean distance of approximately 483,500,000 miles), it starts to feel the influence of solar radiation. The comet reaches what is known as the H^2O turn on point. It begins to heat up. Subsurface ice melts and the pressure forces the material out through cracks or vents on the surface of the comet. Jets of this material spew out into space like geysers (remember the scene in the movie Armageddon?). This process is called outgassing. These jets can not only affect the rotation (tumbling) of the comet, but also they can affect the comet's orbital path through space.

All of this expelled material forms a cloud of nebulous material, called the coma, which envelopes the nucleus. Cometary comas can be many tens of thousands times the size of the nucleus. In fact, in late 2007, Comet Holmes developed the largest coma in recorded history. It set a record by becoming the largest object in the solar system – amazingly surpassing the diameter of the Sun.

The solar wind (a stream of particles radiating from the Sun) not only sandblasts loose material off the comet's surface, but also starts pushing dust, gasses and rocky material away from the comet, forming two tails. One is the curved dust tail, which is responsible for producing a trail of debris along the comet's orbital path. If the Earth happens to pass through this debris we experience a meteor shower. You probably know a few of the major ones by name, such as the Perseids and the Geminids. The second tail is the ion tail, comprising gases that always point directly away from the Sun. So unless you observe the comet over a period of time, you really can't tell if it's coming or going!

Some comets develop extensive tails, which can be many tens of millions of miles long. Also, as the comet gets closer to the Sun it will usually brighten very rapidly. If this is the comet's first encounter the Sun, it most likely has a lot of loose material on the surface and much fresher subsurface material that will react to the solar heat, which will be blown off by the solar wind creating a large and bright coma, as well as a lengthy tail. An old comet that has made many trips through the inner solar system may have exhausted a lot of this material and any activity may be minimal. This is especially true for short period comets. Eventually most of the volatile material contained in a comet nucleus evaporates away and the comet "dies out."

As a comet nears the Sun, one of several things can happen. A comet can fall into the Sun. The SOHO spacecraft has observed many suicidal comets. A comet, called a sungrazer, may pass so close to the Sun that the tidal forces will fragment the comet into several pieces. Or a comet may simply evaporate after a close encounter. Comets have also been known to be ejected from the solar system as they are slingshotted around the Sun.

Our view of a comet depends almost entirely upon our position in space in relationship to the position of the comet and the Sun. A comet may be better observed in the northern or southern hemisphere of the Earth. Also, depending upon the circumstances, one may be able to see a comet

in the morning sky before sunrise and in the evening sky after sunset for a period of time.

Once the comet travels around the Sun and begins the trek back towards the depths of the solar system, the tail is pushed out in "front" of the comet, since the solar wind blows the coma into a tail regardless of which direction the comet is moving. After a short time the comet becomes invisible to the naked eye, requiring binoculars to observe it. Soon binoculars will be useless and only telescopes will show the rapidly fading comet. Amateurs with large instruments will be able to watch the comet for quite some time, but for the casual observer the comet will be soon forgotten.

When a new comet is discovered astronomers do their best to predict how the comet will perform based on its orbital path and how bright it is at the distance it was discovered. Occasionally the predictions fall far short of the mark. Kohoutek in 1973 was one example. Even though the recent comet PANSTARRS back in March was better in the southern hemisphere as it approached perihelion (closest to the Sun), by the time it became visible to us here in southern New England it could barely be seen with the naked-eye. It was fainter by two full magnitudes (or 6.3 times fainter) than predicted.

David Levy, famed comet discoverer (of Comet Shoemaker-Levy fame), addressed the forecasting of comet behavior by saying, "Comets are like cats. They have tails, and they do precisely what they want." For instance, Comet Kohoutek in 1973 was predicted to be the comet of the century … and turned into the dud of the century. Then three years later in 1976 Comet West put in a pre-dawn appearance. It was a beautiful comet, easy to see with the naked-eye. However, despite efforts to publicize it in the local media, it received virtually no press. Why? News outlets felt they had been duped by the hype over Kohoutek, and they weren't going to be taken in again. The results: the general public missed a wonderful comet. Fortunately the spectacular appearances of Hyakutake (1996) and Hale-Bopp (1997) greatly helped the astronomical community fully recover from the Kohoutek curse.

Many historic comets have special names like The Great Comet of 1577 and The Great Comet of 1882. However, newly discovered comets now bear the name of their discoverer(s) – up to three names can be assigned. Plus, a comet is also assigned an astronomical designation, like C/2012 S1 for comet ISON.

While amateur astronomers have discovered many comets, today many are being discovered by automated search projects with and without space-based telescopes. They can be detected because they shine by reflected sunlight, just like all the planets and moons in our solar system.

On any clear night there are tens of comets visible to various sized telescopes. Once in a while a new comet will be discovered that shows potential for putting on a good show that anyone in a dark sky can observe and appreciate. However, naked-eye comets are fairly infrequent. Those that do not require a telescope to observe them are the best. Hyakutake (1996) and Hale-Bopp (1997) were prime examples. For the casual stargazer the best tools were the naked-eye and binoculars, for the tails of these visitors spanned a greater area of sky than a telescope could encompass.

With less spectacular comets binoculars will reveal a fuzzy patch of light with a small extension (the tail). It will resemble a small (very small) triangular wedge of pie in the sky. Once you find it in binoculars you can try your luck with a telescope if you've got one. The image will not be spectacular (we've all been spoiled by the likes of Hyakutake and Hale-Bopp), but the increased light gathering ability and magnification will certainly reveal more of the cloud-like fuzz-ball and its nebulous tail.

If the amount of material on the surface is limited, the comet will quickly brighten, and then diminish after the material has been depleted. If there is a more abundant frost layer, the comet will maintain its brightness. Also, if the material below the frost is loose, and not hard-packed, it too will contribute to the brightness of the comet. Increased activity adds more dust to the coma and the tail.

Will Comet ISON recover and put on a grand display? It is estimated to be only three miles or so across, albeit a very big "dirty snowball," but ISON will pass within 700,000 miles of the solar surface! I am not very optimistic about great naked-eye views at this point in time. Definitely do not expect anything like the spectacles of Hyakutake or Hale-Bopp. Despite the current prospects, I am hoping that ISON does not have a Kohoutek moment.

Next month in Part II, I will provide a Comet ISON viewer's guide, providing the details of when, where and how you may get a glimpse of the comet.

Keep your eyes to the skies!

Samhain

Francine Jackson

As we start our fall days by taking our sweaters out of hiding, and saving most Sundays for football, we know autumn began this year on Sunday, September 22nd, at 4:44 P.M., and will continue until Saturday, December 21st. But, this three-month time frame seemed very long to our predecessors, who depended so much on the weather for their livelihood. Between these two extreme seasons, there came a time of celebration, "Samhain," literally "summer's end," when it was known that there was very little chance for warm weather to still occur.

Because each season is a quarter of the year, the differing seasons often seemed not to obey the actual start-and-stop days. Some of this is the result of insolation, the fact that our atmosphere causes the seasonal temperatures to lag behind the calendar. This is kind of analogous to a pan on a stove not heating immediately when starting the burner. To our ancestors this coincided to the halfway point in a specific season. For fall, for example, there was still a chance that summer's warmth could still happen, but, at the end of this half seasonal time, it appeared all that was left was to wait to become colder with each passing day.

On this Samhain night, it was believed that the souls of the dead were invited to Earth, as the door to the Underworld would open. It also coincided with the Christian celebrations of All Saints and All Souls. To rid the neighborhood of as many of the evil spirits as possible, candy was offered as a bribe - just as it is today. Although we don't officially believe that the October cross quarter marks the beginning of evil, we should still open our homes to the local scary residents; it's always wise to be kind to them, just in case.

SEPTEMBER REPORTS

Secretary

Tom Thibault

Skyscrapers August Meeting Minutes – September 6, 2013

President Ed Haskell called the Skyscrapers May Members Meeting to Order at 7:30PM.

President, Ed Haskell: Ed opened the meeting and the floor for updates from the Trustees, B.O.D. and the membership.

Trustee, Steve Siok and Jim Crawford: Jim informed the attendees of the launch of the unmanned LADEE Moon mission this evening at 11:27PM from Virginia that should be visible from the Northeast and New England.

Steve let the group know that a large group from the Greenville Library is expected to visit Seagrave Observatory this Saturday and noted member volunteers would be appreciated.

Historian, Dave Huestis: Dave indicated a Star Party is planned at the Cumberland Library on Thursday the 12th; those interested in assisting should contact him.

The Centennial Seagrave Observatory Calendar will be available during AstroAssembly. He also noted that commemorative postal caches are available for both the 2007 Skyscrapers Centennial and the 150th Birthday Celebration of Frank Seagrave.

Announced that New Members Guides are available for those newer members that may not have received a copy.

2nd Vice President: Bob Horton: Preparations for AstroAssembly are complete and volunteers are needed for various activities during the event, those interested in assisting should contact him or any of the Board of Directors.

All attending are welcomed to stay for viewing after this evenings meeting.

Treasurer, Linda Bergemann: Requested a vote for membership of Richard Savignano, which was approved by the membership, welcome aboard Richard.

Announced the following individuals are pending vote at our November Meeting: Robert Stahlbush, John Thompson, Pat McManus, Bernard Stack, Rienette Wasserman, Vin Pasquale, Nancy and Thomas Curry. Awaiting introduction is Mark Bruck.

President, Ed Haskell: Ed introduced our featured speaker, long time friend of Skyscrapers, Peter Schultz, who provided a fascinating presentation of the history of photography and its importance to planetary studies.

Meeting adjourned at 8:45PM

Peter Schultz

Treasurer

Linda Bergemann

Cash Flow YTD as of September 16, 2013
(4/1/13 through 9/16/13)

INFLOWS	
AstroAssembly	
Banquet	$640.00
Registration	$720.00
TOTAL AstroAssembly	**$1,360.00**
Donation	
Misc Donation	$152.00
Refreshment Donation	$138.20
TOTAL Donation	**$290.20**
Dues	
Contributing	$139.05
Family	$240.00
Junior	$0.00
Regular	$940.00
Senior	$475.00
TOTAL Dues	**$1,794.05**
Star Party Donations	$74.00
Subscription Income	
Astronomy	$324.00
Sky & Telescope	$197.70
TOTAL Subscription Income	**$521.70**
FROM Preservation Fund (See note below)	$96.30
TOTAL INFLOWS	**$4,136.25**
OUTFLOWS	
Astro Assem Exp	
Raffle	$5.00
TOTAL Astro Assem Exp	**$5.00**
Corporation, State Fee	$30.00
Postage and Delivery	$9.20
Refreshment Expense	$94.68
Subscription Payments	
Astronomy	$324.00
Sky & Telescope	$197.70
TOTAL Subscription Payments	$521.70
Trustee Expense	$388.65
Utilities	
Electric	$86.94
Porta-John	$495.00
Propane	$80.25
TOTAL Utilities	**$662.19**
TO Checking (See note below)	$96.30
TOTAL OUTFLOWS	**$1,807.72**
OVERALL TOTAL	**$2,328.53**

Note: Designated Preservation Fund monies used to digitize photos for archive.

Cash and Bank Accounts - As of 9/16/2013	
Capital One Bank	$12,313.85
Checking	$13,186.22
TOTAL Bank Accounts	**$25,500.07**

Board of Directors Meeting Minutes – September 16, 2013

Attendees: Ed Haskell, Kathy Siok, Bob Horton, Linda Bergemann, Tom Thibault, Steve Siok, Conrad Cardano, Jim Crawford, Dave Huestis and Jim Hendrickson

Ed Haskell, President: Meeting called to order at 7:15PM at Seagrave.

Kathy Siok, 1st Vice President: December's Members Meeting will be held on December 14th and feature Member Presentations. It was suggested that members be solicited to display their Astrophotography as was done last year and so well received.

Bob Horton, 2nd Vice President: Preparations are pretty much complete for Astro-Assembly, some final items to take care of, but overall things seem to be ready.

Linda Bergemann, Treasurer: Financials are in order.

Replacement unit for the digital projector has been purchased. Bob Horton brought the unit to the meeting and it was set-up and tested.

Trustees: Steve Siok and Conrad Cardano updated the group on the Automation Program. Communication has been completed as well as final adjustments to the motorized Roll-off Roof.

Steve Siok noted work sessions for ground preparation for AstroAssembly will be scheduled for September 28th.

Trustees will determine which surplus telescopes will be offered in the raffles at AstroAssembly.

Dave Huestis, Historian: Seagrave Observatory Centennial Calendars will be offered at a donation of $20.00.

Ed Haskell, President: Suggested discussions occur at upcoming meetings regarding the adoption of a Red Light Policy on the grounds of Seagrave.

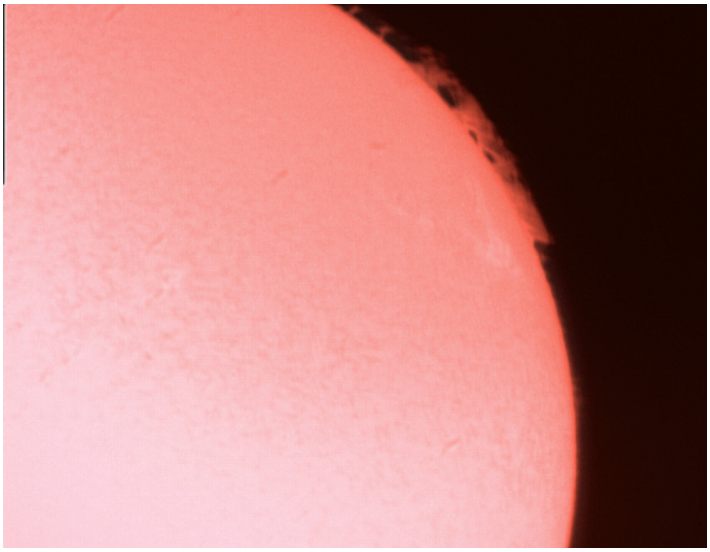
Meeting adjoined at 8:35PM

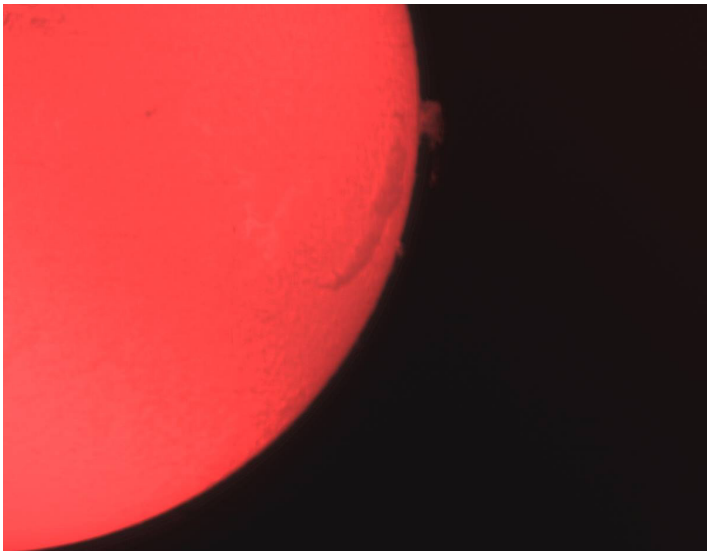
Submitted by Tom Thibault - Secretary

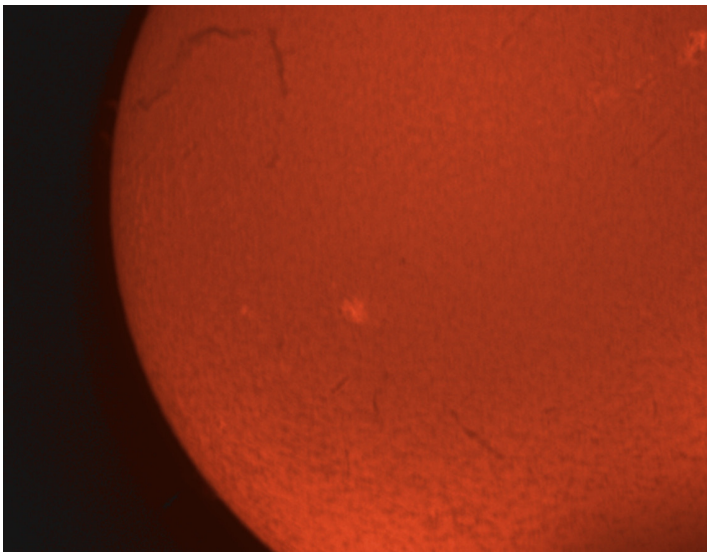
Following the meeting and observing, some members observed the launch of the Lunar Atmosphere and Dust Environment Explorer (LADEE) rocket launched from Wallops Launch Facility, Virginia. The rocket could easily be seen traveling from the southwest to south, shining brighter than magnitude 0. Bill Gucfa captured this image just after third stage ignition.

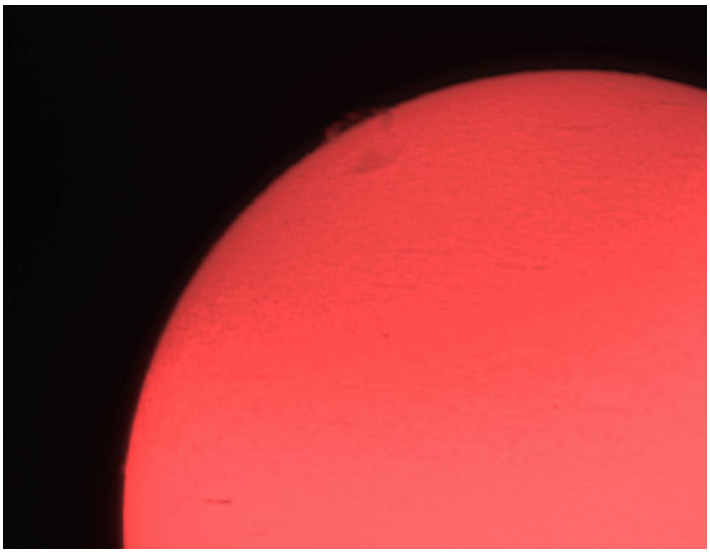
LADEE launch seen from Seagrave Observatory, September 6. Photo by Jim Hendrickson

Harvest Moon rising over Providence, September 19 by Jim Hendrickson.



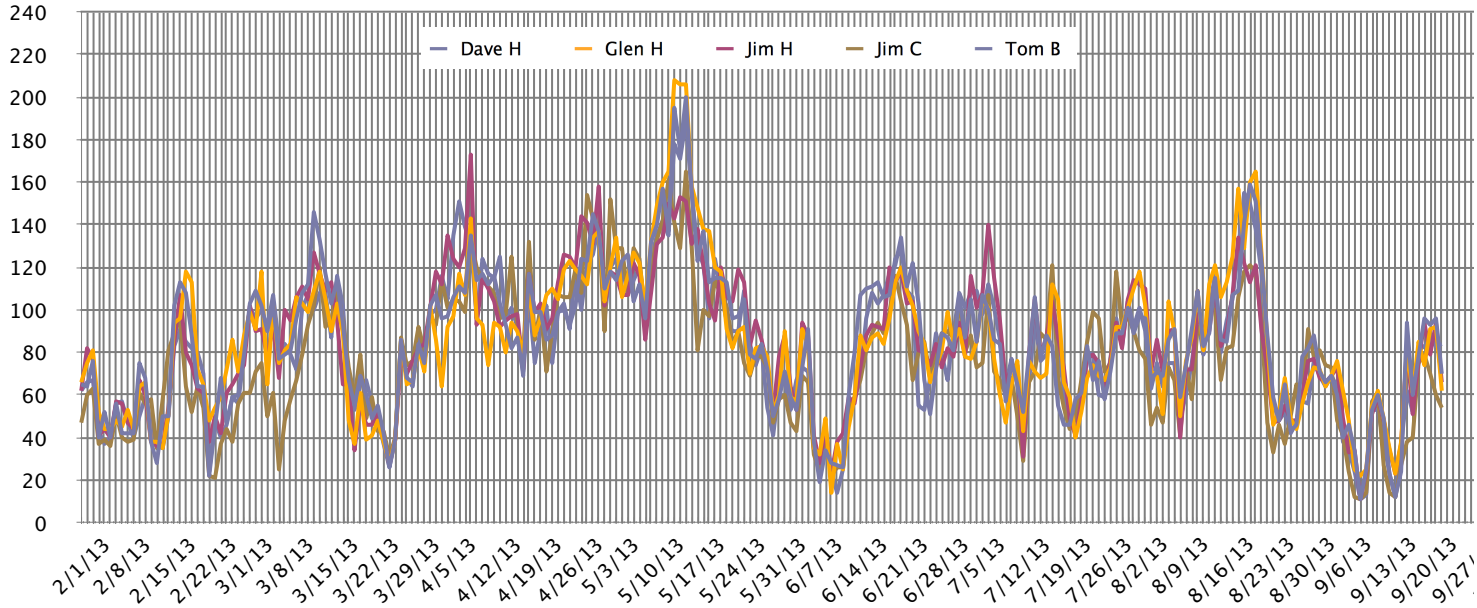






Solar images by Steve Hubbard; 60 mm h alpha scope, ZWO imager, 6 second avi run thru AS!2 on September 20 (left) & 22 (right).

Skyscrapers Daily Relative Sunspot Number Comparisons



How to hunt for your very own supernova!

By Dr. Ethan Siegel

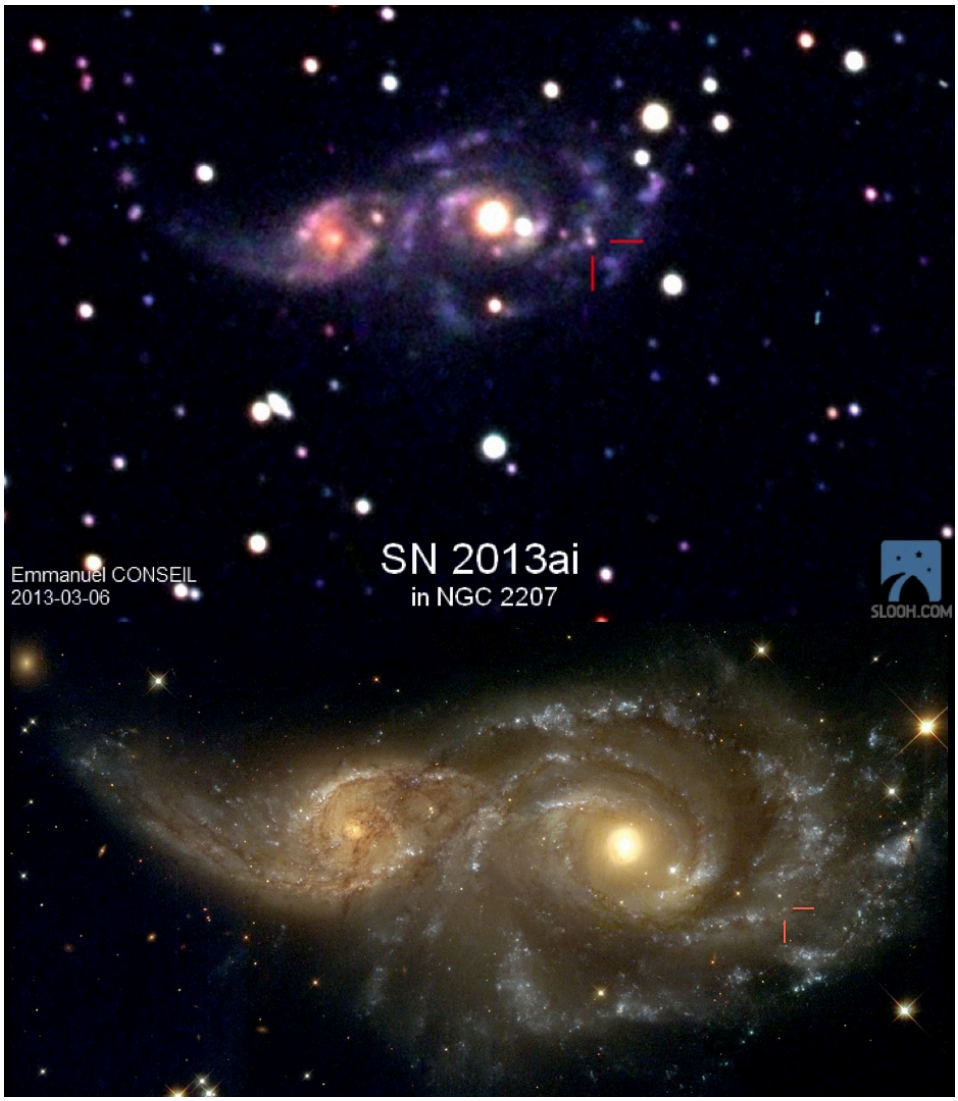
In our day-to-day lives, stars seem like the most fixed and unchanging of all the night sky objects. Shining relentlessly and constantly for billions of years, it's only the long-term motion of these individual nuclear furnaces and our own motion through the cosmos that results in the most minute, barely-perceptible changes.

Unless, that is, you're talking about a star reaching the end of its life. A star like our Sun will burn through all the hydrogen in its core after approximately 10 billion years, after which the core contracts and heats up, and the heavier element helium begins to fuse. About a quarter of all stars are massive enough that they'll reach this giant stage, but the most massive ones -- only about 0.1% of all stars -- will continue to fuse leaner elements past carbon, oxygen, neon, magnesium, silicon, sulphur and all the way up to iron, cobalt, and, nickel in their core. For the rare ultra-massive stars that make it this far, their cores become so massive that they're unstable against gravitational collapse. When they run out of fuel, the core implodes.

The inrushing matter approaches the center of the star, then rebounds and bounces outwards, creating a shockwave that eventually causes what we see as a core-collapse supernova, the most common type of supernova in the Universe! These occur only a few times a century in most galaxies, but because it's the most massive, hottest, shortest-lived stars that create these core-collapse supernovae, we can increase our odds of finding one by watching the most actively star-forming galaxies very closely. Want to maximize your chances of finding one for yourself? Here's how.

Pick a galaxy in the process of a major merger, and get to know it. Learn where the foreground stars are, where the apparent bright spots are, what its distinctive features are. If a supernova occurs, it will appear first as a barely perceptible bright spot that wasn't there before, and it will quickly brighten over a few nights. If you find what appears to be a "new star" in one of these galaxies and it checks out, report it immediately; you just might have discovered a new supernova!

This is one of the few cutting-edge astronomical discoveries well-suited to amateurs; Australian Robert Evans holds the all-time record with 42 (and counting) original supernova discoveries. If you ever find one for yourself, you'll have seen an exploding star whose light traveled millions of light-years across the Universe right to you, and you'll be the very first person who's ever seen it!



SN 2013ai, via its discoverer, Emmanuel Conseil, taken with the Slooh.com robotic telescope just a few days after its emergence in NGC 2207 (top); NASA, ESA and the Hubble Heritage Team (STScI) of the same interacting galaxies prior to the supernova (bottom).

Read more about the evolution and ultimate fate of the stars in our universe: http://science.nasa.gov/astrophysics/focus-areas/how-do-stars-form-and-evolve/.

While you are out looking for supernovas, kids can have a blast finding constellations using the Space Place star finder: http://spaceplace.nasa.gov/starfinder/.

4th Annual International Observe the Moon Night

Saturday, October 12, 7pm
at Seagrave Observatory
http://observethemoonnight.org/

Directions to Seagrave Memorial Observatory

www.theSkyscrapers.org

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.

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