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President's Message



Hi all,

Well, what a winter we have had so far! Name your favorite kind of weather and I'm sure you've had more than your fill of it. We've had wind, snow, ice, more snow and freezing rain, and of course clouds,

clouds, clouds. Still, there have been a few dry, cold nights with good transparency.

There are some great shots of M81 and M82 coming into the forums, as well as excellent images of Jupiter, which is still well placed for observing and imaging even though it is just past its opposition (as of January 5th).

As **David Dickinson** recently pointed out in his blog entry on [UniverseToday](#), the term "opposition" means that an outer planet is rising "opposite" the setting sun, as Earth catches up and passes it on its inside-track orbit. Since we have just passed the winter solstice, Jupiter is now occupying the position in the sky where the Sun will be during next June's solstice. Doesn't the idea of June sunshine make you feel warm all over? No? I understand. Frozen toes and fingers make it hard to think summer, but keep the faith. The days *are* getting longer.

Our Spring Messier Marathon is scheduled for Friday, March 28th, with a backup date of Saturday, March 29th, at the home of **Larry** and **Linda Lopez**. Although we use the term "Marathon" to describe this event (as most astronomy clubs do), I assure you it does not need to be a test of endurance! This event is a great place to spend a relaxing evening or night observing with the rest of the club, walking around and looking through other people's scopes, chatting about the best way to find your various objects, learning your constellations, enjoying the wonderful food everyone brings, and of course the great

hospitality of the Lopezes. Even if this is your first club event, you will have a great time. In addition, our own **Ed Ting** will be giving a talk at the March business meeting on his version of a mini-Marathon that is an excellent way for beginners to get started on observing the easier-to-locate Messier objects.

Saturday, March 8th is the seventh annual [International Sidewalk Astronomy Night \(ISAN\)](#), and it happens to fall on the night of our own Sidewalk Astronomy activities in Portsmouth. This year **ISAN** is dedicated to the memory of **John Dobson**, who started it in the late 1950's. All are welcome, of course.

A dual shadow transit will occur on Jupiter on March 16th, from about 6:30 to 8:30pm EDT. During this transit, the shadow of Io will catch up to and gallop past the shadow of Ganymede in spite of the latter's 30-minute head-start on its trip across Jupiter's disk. What a clear demonstration of celestial mechanics right in the Solar System! Let us hope for clear skies.

Another event that has been on my mind lately is the occultation of Regulus on March 20th. It is the best and brightest occultation ever predicted to occur over a populated area. I'll be somewhere in New York State, looking for a hole in the clouds along the path which runs from Long Island up through Oswego. I got my degree in Computer Science there back in 1974 – I think computers were powered by steam in those days, but my memory is fuzzy.

April and May will bring a flurry of school skywatch activity as the weather warms but sunset is still early enough for kids on a school night. With or without a scope, I encourage everyone to come to a few of these events and see the excitement on the faces of the children as they see these objects for the first time with their own eyes.

Clear skies,

Ted Blank
NHAS President

First Friday at MSDC, Concord NH

We had visitors come to *First Friday* at MSDC on February 7th for club-oriented reasons. One was a man named Mike (from Concord) who had had the Concord Library's (Orion *StarBrite* LTP) scope checked out for several weeks and wanted to see some bigger gear, like **John Rose's** 6" XT dob and the refractors and SCTs belonging to other club members. He will be coming to the next business meeting on Feb. 21st.

Then there was the father and daughter pair who drove up from south of Boston (!) with their Celestron *Astromaster* 114mm, the one with 1000mm focal length and built-in Barlow in the focuser. Well, nobody, including **Mike Townsend**, **Gardner Gerry** and **John Rose**, could get it to give a focused image – just a blob of light. All the NHAS members who were there worked on it for a long time. In the end I suggested to the dad that he return it, figuring that if this team could not get it working, then no beginner stood a chance. But he and his daughter then looked through a bunch of telescopes (that worked) when holes in the clouds came by; they saw Jupiter and its moons, as well as Luna, and one hopes they'll stick with it.

A big "Thank You" to all the other members who came (**Scott McCartney** and his son **Liam**, **Dan Smith**, and **John Bishop**) and brought equipment under less-than-ideal weather conditions, worked so hard for members of the public, and again made the club look good.

- **Ted Blank**

[Both *Coffee House Night* at YFOS on February 1st and the *Portsmouth Sidewalk Astronomy* event on February 8th were cancelled due to heavy overcast. –Ed.]



Mike Townsend helps out with a scope. (Photo: Ted Blank)

“Bring Your Child To The Library” Day at Portsmouth Library, Portsmouth NH

Saturday February 1st was "Bring Your Child To The Library" day at the Portsmouth Library. Representing NHAS, **David Speltz**, **Tom Cocchiaro** and **Ted Blank** spent the better part of the day (10am-4pm) showing patrons how to check-out and use a Library Telescope.



The Three Amigos

(Photo: Nike Speltz)



Light Bucket in a light bucket (Photo: T. Cocchiaro)

Several dozen kids and families stopped by to sample the telescope on nearby library objects and many put their names on the waiting list. The library has 2 scopes and a happy family checked one out that day.

- **Tom Cocchiaro**

***His Mansion Ministries, Deering NH,
February 22***

A very enthusiastic group of about 50 or so young people were treated to our standard "what's up in tonight's sky" presentation, followed by a skywatch. The skies were very clear and transparent – a few stray clouds that came through didn't spoil the observing. **Herb Bubert** was there with his 11" reflector and I had brought my 4" refractor. We showed the Orion Nebula, Pleiades, Jupiter, M31, M82 with the supernova SN 2014J still evident, and Castor and Algieba. The organizers would like us to return and I hope we do, as they have a nice dark location with great skies.

- ***Gardner Gerry***

***Goffstown Public Library, Goffstown NH,
February 26***

It was a cold night! **Ted Blank, Herb Bubert, Elaine Gratham-Buckley** and **Chris Krstanovic** were also there with scopes. We showed about the dozen or so folks the typical winter objects such as M42, M45, M1, as well as Jupiter. Our audience didn't stick around long (most had small children with them), so everyone packed up and left by 8pm. Patti Penick would like us to come back when it's warmer and we can draw a larger crowd.

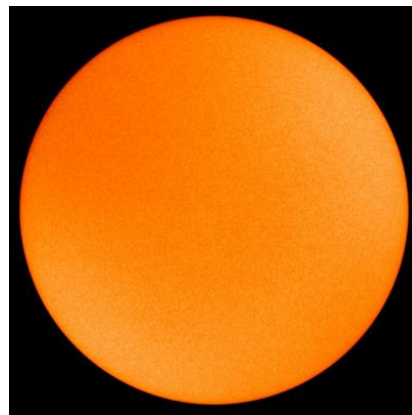
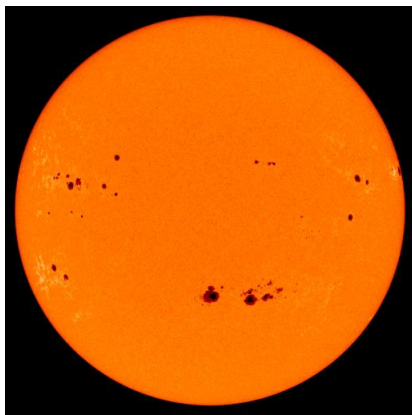
- ***Gardner Gerry***

[Sky watches at Parkside Middle School, Manchester NH and Hampton Academy Middle School, Hampton NH were cancelled due to weather conditions, and will be re-scheduled in the Spring. –Ed.]

Groundhog Day at the Sun

The year began with Solar Cycle 24 presenting one of the largest and most active of Active Regions on the Sun. What was dubbed AR1944 in January went all the way around in 25 or so days, and returned as AR1967 in early February. One more revolution and it is now back as AR1990 – slightly different with each incarnation, but throwing up X-flares (an X-4.9 on Feb. 25) and CMEs with abandon each time.

On February 27, [northern Europe was treated to a fantastic aurora display](#). Unfortunately the storm did not last long enough to greet New Englanders after dusk, but do stay tuned – no one knows the agenda. But for sheer contrast in sunspot activity, recorded exactly 7 years apart, consider the following:

Images of the Month

On 21 September 2001 (left) and 21 September 2008 (right) (Images: SOHO/ESA/NASA)

M46 and NGC 2438 – Open Cluster and Planetary Nebula in Puppis

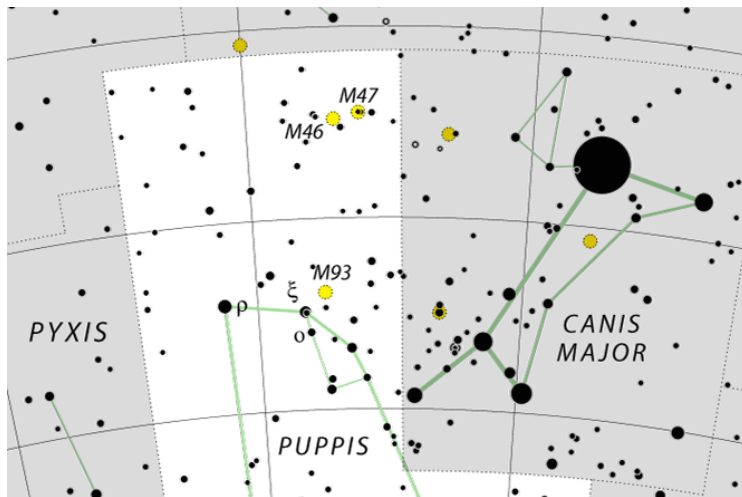
by Glenn Chaple

There's a saying that goes: "You can't see the forest for the trees." In the case of the planetary nebula NGC 2438, "you can't see the nebula for the stars." NGC 2438 lies within the northern portion of the open cluster Messier 46 and is often overshadowed by the surrounding stars.

M46 and NGC 2438 are located in a rather star-poor region in the northwest corner of Puppis. To find them, trace an imaginary line from beta (β) Canis Majoris through Sirius and extend it about 14 degrees eastward. Here, binoculars and finderscopes will reveal a pair of clusters just 1 ½ degrees apart. The brighter, splashier one is M47 (we'll look at that one another time). The fainter, more concentrated one to its east is M46.

M46 was discovered by Charles Messier in 1771. Shining at 6th magnitude, it spans an area about 20 arc-minutes across and contains some 180-plus stars brighter than 13th magnitude. My first encounter with M46 came in 1978 when I viewed it with a 3-inch reflector and magnifying power of 30X. My logbook entry reads, "much fainter than 38⁸ (note: my 1966 edition of *Norton's Star Atlas* plotted M47 using its Herschel designation of 38⁸); individual stars hinted at with averted vision." In 2010, I revisited M46, using a 4.5-inch reflector and the same 30X magnification. The cluster was more readily resolved, and I noted "numerous mag 10-11 members." On both occasions, NGC 2438 went unobserved. I had failed to see "the nebula for the stars."

That changed last winter when I made a purposeful search for NGC 2438. Using a 10-inch reflector and a magnification of 80X, I easily spotted the 11th magnitude "puff-ball," which is about an arc-minute across. Knowing where to look, I switched to the 4.5-inch reflector – this time with 75X. Sure enough, I could make out a faint, averted vision glow in the correct spot. By the way, Messier also failed to see "the nebula for the stars." NGC 2438 was discovered by William Herschel 15 years after Messier found M46.



(Chart courtesy: [Free Star Charts](#))



NGC 2438 and M46 stars (Image: Mario Motta)

The Galileo Museum, Florence, Italy

In October 2013, my wife and I spent 11 days enjoying the beauty of Italy. We spent two days in Florence, the place where the art world goes to see the best of the best at places like the Uffizi Gallery. My plan was slightly different, to visit the Museum of the History of Science, recently rebuilt and renamed the *Museo Galileo*, or the Galileo Museum.

My main goal was to see and photograph the original telescopes used by Galileo himself, which are on display. These beautiful wood and leather telescopes were hand-made by Galileo to hold the lenses that he himself ground and polished. His major early discoveries - Jupiter's moons, craters on the Moon, the phases of Venus - were made with these very instruments. I was, and remain, awe-struck that we can now visit these tools, that they have survived to this day. To think that the very first glimpses of Io, Europa, Ganymede and Callisto - entire worlds! - the first sights of these worlds by any of the billions of humans who have ever lived on our planet were first obtained through these very instruments. I was, and am, very grateful to have had the opportunity to see them in person.



*Museo Galileo, Firenze, Italia
(Tutte le foto di Ted e Tina Blank)*



Is this Heaven? It is certainly not Iowa.

Once I tore myself away from Galileo's telescopes, and passed by the case containing his finger (seriously), I went up to the second floor where early telescopes are displayed. Here I found myself among more recent friends, scopes with apertures that matched those of present-day telescopes. An astronomer named Giovanni Battista Amici created both refractors and reflectors, which he used to study double stars and search for comets. After his death, the instruments were used for hundreds of years at places like [Arcetri Observatory](#), which began operation in 1790 and continues to do astronomical and astrophysical research today. Several of these instruments are on display at the museum, along with more recent designs. The wood- and brass-work of these devices are of extraordinarily high quality, and it is clear that they were valued highly by their owners.

Not being an engineer, I am sure I cannot do justice to any design descriptions. However I want to point out a couple of items that caught my eye. One was a spiral pulley for raising and lowering the OTA of an alt-azimuth-mounted reflector telescope. This pulley was cleverly designed to require the same amount of manual turning force to raise the back of the scope regardless of whether the scope was pointing near vertical or almost straight horizontal. The other was the design of a sliding focuser on a Newtonian reflector which moved the entire secondary mirror assembly with eyepiece back and forth to focus the image, rather than moving just the eyepiece in and out and leaving the secondary mirror stationary.

The *Museo Galileo* also has a number of working models and video recreations of many physics demonstrations attributed to Galileo, like rolling balls down inclined planes and dropping objects of different masses but the same size. If you ever get to Florence, I hope you can make time to visit it.

- *Ted Blank*



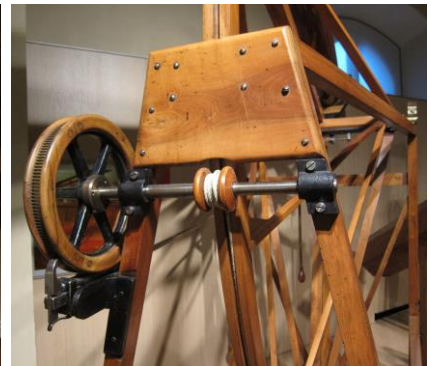
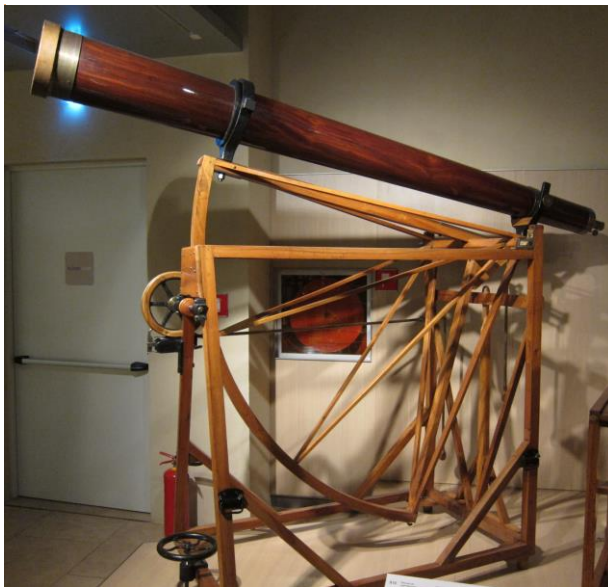
Above: The telescope used by Galileo to see the moons of Jupiter. The objective end held a plano-convex objective (now cracked), the convex side facing outward, 37mm diameter, 15mm aperture, 980mm focal length (f/65). Magnification 21X.
Right: Eyepiece holders (top & bottom).
Left: A 10' tall Armillary, representing Ptolemy's geocentric view of the heavens.



The Armillary sphere, from 1590, greets visitors upon entry. It is at least 10' tall, made of wood with gold leaf cover, and has the Earth at the center. This "universal machine" reflects the prevailing views in Galileo's times, based on Aristotle's concepts that were perfected by Ptolemy. Galileo's telescope (1609) is in a small case and quite easy to miss, as it is not sign-posted.

Three Telescopes in a Room

In fact there are a number of scopes in the second-floor room, but we will consider only three. First up is the **Amici II alt-az Refractor** made by Giovanni Battista Amici (1786-1863), with limited azimuthal capability. Altitude adjustment is via a rope wrapped around the quadrant-arc and wound on a pulley.



Clockwise from left: Amici II, Front view, Altitude adjustment mechanism, Rope on the arc & gear-wheel

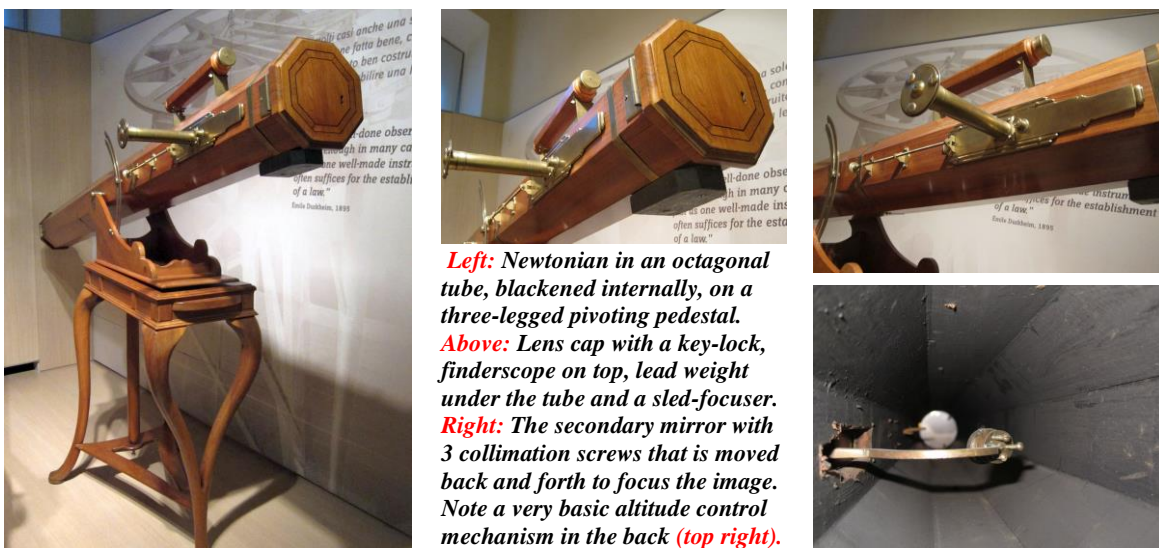
A person sitting at the back can turn a crank to work the worm screw, which will turn the gear/pulley to work the rope and raise or lower the front of the scope. No counter-weight is involved here.

The next unit is a **Newtonian Reflector** in a cylindrical internally-blackened tube, the “standard” 200mm f/8 model that is very common nowadays – in fact, the XT8 of its times (3 centuries ago). There is limited azimuthal control, and altitude is varied by use of rope on a conical pulley that manipulates the back-end of the telescope tube. The pulley’s design provides a constant amount of resistance while raising and lowering the tube. The primary mirror appears to be polished glass, rather than speculum metal (although it could have been replaced – the secondary mirror is now missing, but its bracket is still in place).



Left: Newtonian 200m Reflector, 1600m focal length f/8, tube on a pivot in front for altitude control.
Above: Conical pulley with rope to raise/lower tube at the back.
Right: Missing secondary mirror, brass focuser in side-bracket.

The last exhibit is the **Leto Guidi Octagonal Reflector**, with a 170mm primary mirror and 1960mm focal length (f/11.5) on a pivoting pedestal for azimuthal control and a brass-arc mechanism for altitude control. The finderscope has cross-hairs. Focus is achieved by sliding the brass plate (coupled to the secondary stock on one side and eyepiece holder on the other) back and forth along the side of the tube through a horizontal slot cut in the wood. This sled-focuser design is still seen from time-to-time at Stellafane [according to **Joel Harris**], and the secondary mirror intercepts more or less of the light cone as it moves in the tube. Evolution of the focuser design has now led to a fixed secondary and a movable eyepiece holder, first with a helical, and then a rack and pinion movement of the latter.



Left: Newtonian in an octagonal tube, blackened internally, on a three-legged pivoting pedestal.
Above: Lens cap with a key-lock, finderscope on top, lead weight under the tube and a sled-focuser.
Right: The secondary mirror with 3 collimation screws that is moved back and forth to focus the image. Note a very basic altitude control mechanism in the back (top right).



The telescope between the **Amici II Refractor** and the **f/8 Newtonian Reflector** has somewhat cumbersome controls. The mechanical altitude control requires the loosening and tightening of screws, while the threaded worm gear with a crank provides limited azimuthal movement. Small wonder that **John Dobson** got fed up and decided that something simpler was needed!

- **Ted Blank**

Did You Know That?

If you are headed abroad and likely to be in a spot with decent observing, [Stellarium](#) is a very good self-contained tool to figure out what's on offer up above, and when. All you have to know is the name of the nearest big city. You don't have to worry about the difference in time-zones – in fact it might be better to work relative to the new locality's sunsets and sunrises. Here are a few simple keys to open up the sky:

- Set the **Location** (F6) to your port of call, and advance the **Date/Time** (F5) to the date in question (or close enough to it). Stellarium will show you the local sky at the current time on your system. Ignore the initial display.
- Advance **Stellarium clock** in hours using (Ctrl Equal-sign) until you get to a sunset, and go beyond astronomical twilight. Advance to the twilight before the next sunrise to figure out the useful night. To go back an hour, use (Ctrl Minus-sign).
- Assuming you have the usual options selected to show names and stick-figures of the constellations, and the cardinal points, you can check out what is visible in which direction and at what altitude, much as you would back home.
- Then knock out the **Atmosphere** by pressing (A) and a lot more will be visible. Consider this an artificial aid to make unfamiliar objects pop out at you. You can always restore Atmosphere later by pressing (A) again.
- Finally, press the **Deep space objects** (D) or **Nebulae** (N) key – they are the same option; I prefer to use N. This will put out even more exotic objects on the screen. Zoom in and out and around at will.
- To set **grid-lines** on a sky map, press (Z) for Alt-Azimuth or (E) for Equatorial grid. Press same key to eliminate the grid-lines.
- Get a feel for the angle of the **Ecliptic** by pressing (comma). This can be useful in figuring out planetary motion in the local sky. *Sometimes the Ecliptic is vertical!*
- If you want to save a '**local sky chart**' of something you notice, press (Ctrl S) to capture the screen image. The screenshot file will be created in your Pictures directory (by default) as a PNG file type with a 3-digit suffix: (*stellarium-**nnn***). To save a screenshot in printer-friendly reversed mode (to save ink when printing), go to the Tools tab in **Configuration** (F2). Select the box for [**Invert Colors**], exit, and then save the screen image.

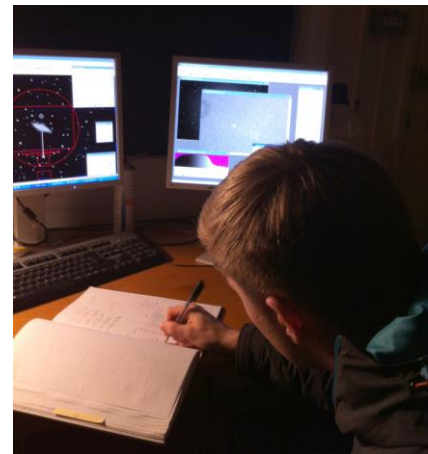
Of course there is nothing to be done about the local weather, so Good Luck!

Three Supernovae

He would have hated it to be called *Dobson’s Star*, or *Dobson’s Supernova*. Not that anyone tried to, but light from one of the best supernovae in recent times reached Earth on January 15, 2014, the day he died. But it was 6 more days before mankind became aware of a cataclysmic explosion some 12 million light years away, and 12 million years in the past. And yet, the manner of discovery of what is now known as SN 2014J would have delighted **John Dobson** – a ten-minute imaging workshop for a few undergraduate students that kicked off a global scramble for more images and spectral analysis of a new supernova.

Dr. Steve Fossey of University College London was about to start a class in practical astronomy at the University of London Observatory when weather started closing in. Quickly changing plans, he switched to a demonstration of the use of a CCD camera on one of the observatory’s automated 350mm telescopes, a Celestron C14. And thus it happened that at 19:20 GMT on January 21, a team of students – **Ben Cooke, Guy Pollack, Matthew Wilde** and **Tom Wright** – and their teacher spotted something new in M82.

The students had chosen the Cigar Galaxy as their target because it was in one of the shrinking patches of clear sky, and distinctive – M82 was in a sucker hole. While adjusting the telescope’s position, Dr. Fossey noticed a ‘star’ overlaid on the galaxy which he did not recognize from previous observations. Once it became apparent that they were dealing with a new star-like object, and with clouds closing in, they quickly took a series of 1- and 2-minute exposures through different filters to make sure the ‘object’ persisted, and to be able to measure its brightness and color. They eliminated the possibility of an equipment artifact by imaging M82 with a different telescope, just before cloud cover was complete by 19:40 GMT.

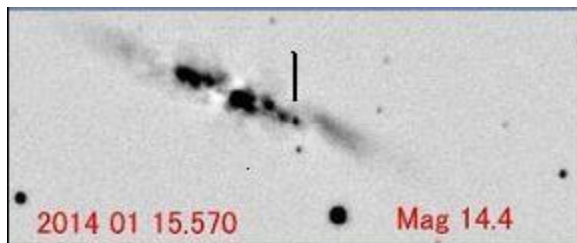


Matthew Wilde logging the observation. Note the image on the control monitor. (Photo: Guy Pollack, courtesy of UCL)

Finding no online reports of any prior discoveries of the object, Dr. Fossey prepared a report for the [Central Bureau for Astronomical Telegrams](#), and also alerted US-based supernova search teams with access to spectroscopic facilities (well ahead of nightfall in the US). CBAT announced their discovery to the world in the usual manner:

PSN J09554214+6940260 2014 01 21.81 * 09 55 42.14 +69 40 26.0 11.7 V 54W 21S M82 0 0

Across the world, Observatories and amateurs alike began tracking the supernova’s progress. M82 being a well-monitored galaxy, soon ‘pre-discovery’ images were available. One of these, from none other than

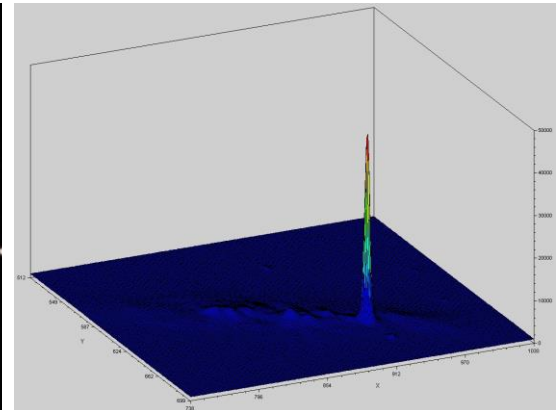
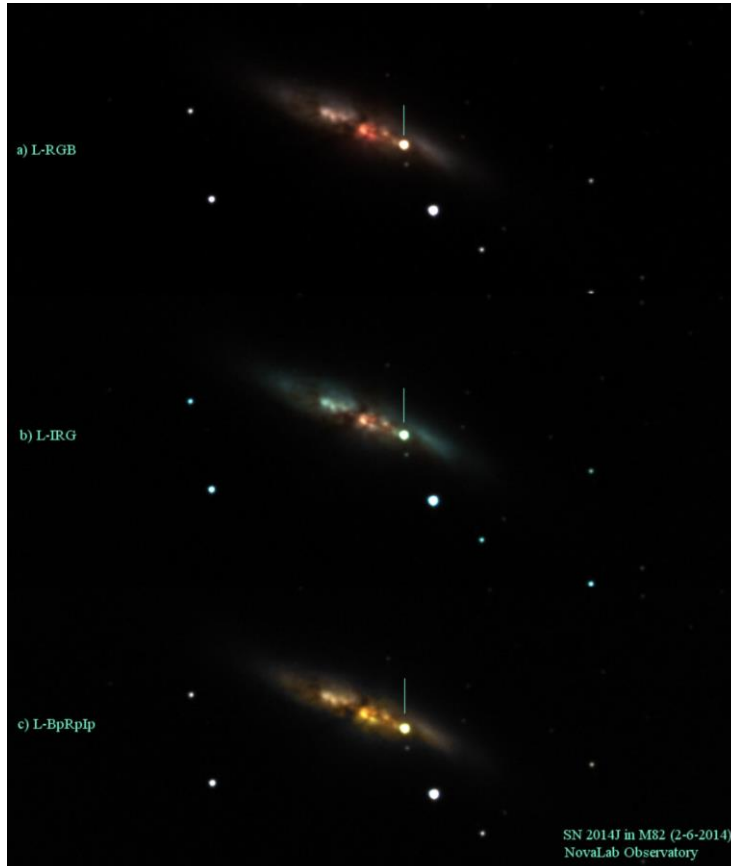


An early look at SN 2014J (Image: Koichi Itagaki)

Koichi Itagaki, established that first light from the supernova had reached Earth by January 15. Spectral analysis showed it to be of Type Ia-HV and AAVSO Light Curve indicated that the peak luminosity had been reached by February 2. Many NHAS members [imaged the newly named SN 2014J](#), and it was the star of a skywatch under the very dark skies of Bethlehem, NH on January 30, where even an 80mm FD refractor was able to show it shining at about 10.5 magnitude.

SN 2014J

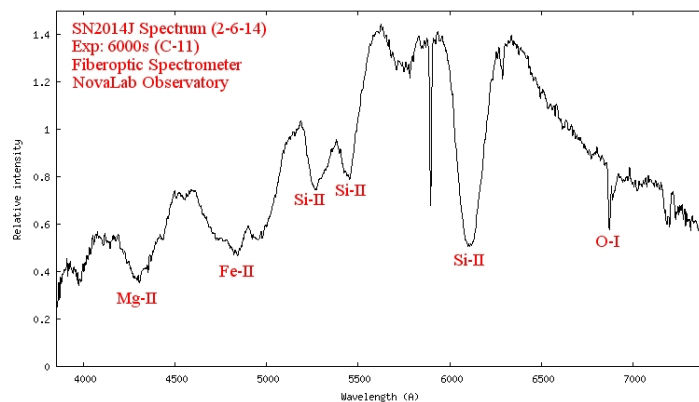
For the two weeks after discovery, weather conditions continued to be ‘sub-optimal’ at his observatory in Windham, NH, and it was February 6 before NHAS member **Chris Krstanovic** could properly image and analyze SN 2014J. The spike in the histogram below dramatically illustrates the degree to which this supernova outshone the rest of its host, the starburst Cigar Galaxy (NGC 3034), better known as M82.



The Supernova intensity is higher than the galaxy's, but in reality atmospheric blurring may have reduced the peak by a factor of 100X.

Left: Composite images, with L-RGB, L-IpRG and L-BpRpIp filters (Baader color, Astrodon Photometric) with no enhancements except to balance the colors for a G5 star. (All Images: Chris Krstanovic)

Chris imaged the M82 supernova with his Celestron C11 (CF) @ F7.2 on a CGE-PRO Mount, using an SBIG STF8300 CCD under a bright but clear sky (Moon 44%). Seeing estimate was 3.8arcsecs.



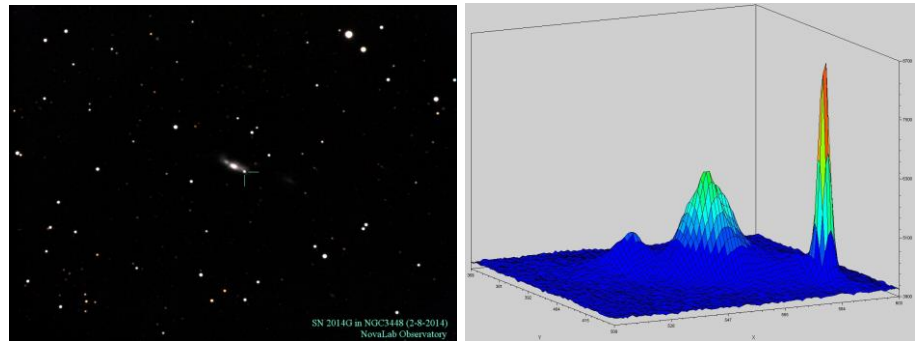
The tell-tale singly-ionized Silicon lines (Si-II) of a Type Ia event.

The spectrum (to the left) was generated by a high resolution Fiber Optic Spectrometer – the first time it recorded a stellar spectrum – taking a total of 10 x 600 second exposures that show the features very nicely, especially the Si-II absorption lines. To adapt it to the telescope, Chris machined a solid dummy 2” eyepiece out of Delrin, with a port to accept the fiber optic connector. The fiber went to the USB controlled spectrometer. It was hard to get the supernova on to the fiber, since the active area is only 50µm in diameter (and a better mousetrap is in the works!), but once properly set up, the mount tracking and the auto-guider kept it there for nearly 2 hours.

SN 2014G

The seventh supernova of the year 2014 was discovered a week before the tenth supernova (2014J), and it just happens to be in the same region of the sky, in the constellation of Ursa Major. Its host galaxy is NGC 3448, shining at visual magnitude of 11.7 and located about 68 million light years away.

Naturally it attracted the attention of our own Chris Krstanovic. From his Windham NH observatory he imaged NGC 3448 with a new ‘guest’ star (LRGB) under moonlit conditions. He will be revisiting the area soon to examine some distant and faint galaxies in this patch of the sky.



NGC 3448 with SN 2014G (marked) and Intensity histogram. (Images: Chris Krstanovic)

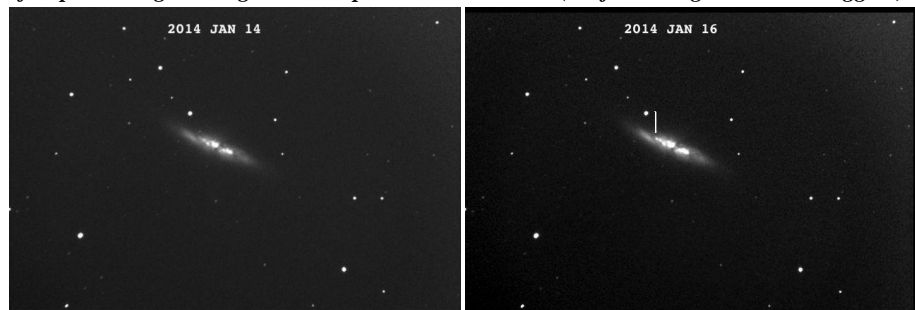
SN 2014G was also a matter of co-discovery: [Koichi Itagaki was involved](#), but Utah’s **Patrick Wiggins** had notified the [Minor Planet Mailing List](#) 5 hours earlier, and you’d be right in guessing it was his first Supernova! Dealing mostly with comets and asteroids, he was unfamiliar with CBAT reporting protocol. Russian colleagues on the MPML list reacted to the news and confirmed the SN sighting, even as folks on the Supernova Chat Group helped Patrick report it to CBAT. By then Itagaki’s report had been received. Spectral analysis soon classified this supernova as a Type II_n, but there is more to this story of the 3rd week of January, 2014.

On the night of discovery of SN 2014G, Patrick also imaged M82, as he does regularly. He imaged it on the next few days as well with his C-14 telescope operating at f/5.5 on a Paramount ME mount, using an ST-10XME camera. But the exposures were too long to really differentiate the emerging blip in the Cigar Galaxy. It would prove to be a case of the one that got away.



Above: NGC 3448 imaged on Jan 6 (left) and Jan 14 (right, with SN 2014G line-marked).

Below: M82 on Jan 14 (left) and on Jan 16 (right, with supernova SN 2014J line-marked) after processing to bring out the supernova. (All four Images: Patrick Wiggins)



You can see the animated GIF sequences of both [SN 2014G](#) and [SN2014J](#) (a sequence of 8 frames that continue the scan until January 22) at Patrick Wiggins’s web-site. Surprises are always around the corner in astronomy, and misses can be as instructive as hits.

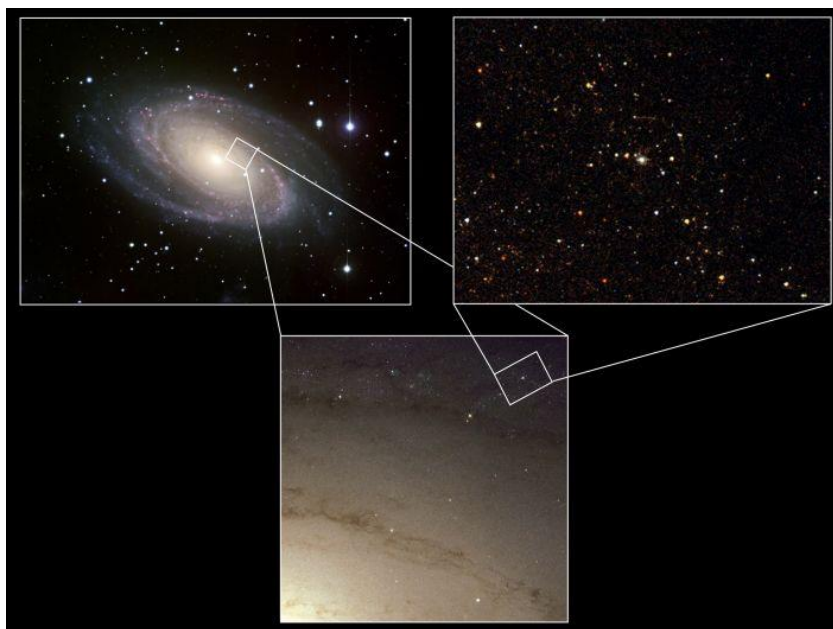
SN 1993J

Completing the trio for this article is the discovery 21 years ago of a supernova in M81, better known as Bode's Galaxy (NGC 3031), a companion to M82, the Cigar Galaxy.

It was originally considered to be a rare Type II-L category, 12 million light years away. That made it the second brightest Type II supernova of the century after SN 1987A. But over time, the strong Hydrogen (Balmer) emission lines disappeared from its spectrum and strong Helium lines appeared, making it look more like a Type Ib. Peculiarities in the shape of its Light Curve finally drove the classification to Type IIb, an intermediate between Types II and Ib. In other words, SN 1993J turned out to be a chameleon.

The supernova was discovered on March 28, 1993 by F. Garcia in Spain, and M81 being a well-studied object, pre-explosion images were examined carefully to identify the progenitor star, thought to be a non-variable red-supergiant that underwent core collapse.

Ten years later, Justyn Maund and his team came up with a binary model that tried to explain the spectral peculiarities of the SN 1993J explosion. At the position of the fading supernova, they detected the unambiguous signature of a massive star, the binary companion to the progenitor.



The survivor star (center, final image) of the SN 1993J explosion of its companion. (a sequence of Hubble Space Telescope images) (APOD Image courtesy: NASA)

This was evidence that Type IIb supernovae originated in interacting binary systems. Using imagery from Hubble Space Telescope and Gemini Telescope, they were able to identify the B-supergiant star that had survived the explosion of its K-supergiant companion.

Supernova Remnants

The most famous supernova remnant is the Crab Nebula, object number one in the Messier catalog. But we are not delving into *SN 1054* now; we are touching on the subject of the nebula and the Crab Pulsar only to talk a bit about the discovery of Pulsars (a contraction of Pulsating Stars).

The first pulsar was discovered on November 28, 1967 by **Susan Jocelyn Bell**, a graduate student working for Antony Hewish at the Mullard Radio Astronomy Observatory at the University of Cambridge. It was a matter of doggedly pursuing an explanation for what was termed “scruff” on a chart.



Jocelyn Bell at work in 1967

Fast forward to February 2014, and the Royal Society of Edinburgh announced the appointment of **Dame Jocelyn Bell Burnell** as its next President, assuming the office in October for a three-year term. Prior to this appointment she had served two years as the President of the Institute of Physics, until October 2010.

The BBC web-report of the news informed its readers that “the discovery of Pulsars won a Nobel Prize in 1974 - not for Dame Jocelyn, but for two male superiors.” And it may have cost another tempestuous man of science a Nobel.

More on the discovery of Pulsars later. *Stay tuned... tick.tick.tick.tick.*

Six weeks ago (as of this writing), a quartet of 19-20 year old undergraduates participated in the discovery of an exotic celestial happening, and now everyone else in their class is inspecting their own (other) galaxy images very carefully!



Dame Jocelyn Bell Burnell
(courtesy: Wikipedia)

“When we started looking and Steve began getting a bit more excited, none of us could really believe what was going on. I can't wait to get back on a telescope next week now,” said Matthew Wilde afterwards, but on that day he sat down to record the observation, following a tradition dating back to Babylonian times. His mate Tom Wright added: “One minute we’re eating pizza, then five minutes later we’ve helped to discover a supernova. I couldn’t believe it. It reminds me why I got interested in astronomy in the first place.” A very chuffed Guy Pollack remembered the time as: “It was a surreal and exciting experience taking images of the unidentified object as Steve ran around the observatory verifying the result.” But Ben Cooke had the last word: “My career plan had been to continue my studies in astrophysics. It's going to be hard to ever top this though!”

Let us all hope he is wrong.

- *Ramaswamy*

The Occultation of Regulus: a Preview

Shortly after 2am EDT on March 20, 2014, a chance alignment of orbits will cause a bright star to "disappear" from the sky. The asteroid **Erigone** is predicted to pass directly between Earth and the bright star **Regulus** (α Leonis), temporarily blotting the star out of the celestial sphere. No telescope will be needed to see this rare celestial event. Anyone with clear skies along a 50-mile-wide belt running diagonally across New York State into Canada may be able to see Regulus “wink out” for up to 14 seconds as the asteroid glides in front of it. The asteroid itself never comes anywhere near Earth.

What makes this event more notable is that the public will be able to assist in mapping the asteroid’s shape and size using just a stopwatch, a smart phone or a digital SLR camera with video capability. **Steve Preston**, President of the [International Occultation Timing Association \(IOTA\)](#) explains:

“In addition to the opportunity to share in a moment of celestial drama, we hope to enlist thousands of ‘citizen-scientists’ to time this event, allowing us to document it more thoroughly than any other asteroid occultation in history. The more observers scattered across the path of the shadow who time the disappearance and reappearance of the star, the more accurately we can measure the asteroid’s shape.”

The Media Contact person for this event is NHAS President, **Ted Blank**. It will be interesting to see if he too “winks out” from time to time in the days leading up to March 20! An account of his observations of an occultation of a star by the minor planet Ceres on October 25, 2013 was published in the [October 2013 issue of NHAS Observer](#) (page 11). Wearing his IOTA hat, Ted gave a talk on asteroid occultation (and the value of amateur contributions) at the 2013 Astronomical League Conference (ALCON) last summer.

IOTA has created a [FAQ page](#) at its web-site, supplying detailed information on recommended techniques (smartphone timing apps, digital SLRs, etc.) for the public to use to video-record and time the event, and most importantly, on how to submit their observations for analysis.

At the time of the occultation, **Regulus** will be about 40 degrees high in the southwest, or about half-way up from the horizon to a point straight overhead. An observing location can be selected any place between the outermost lines. Since the path the shadow will follow may change slightly, observers should check the [online zoomable map](#) on the day before the event for any last-minute adjustments to the path prediction.

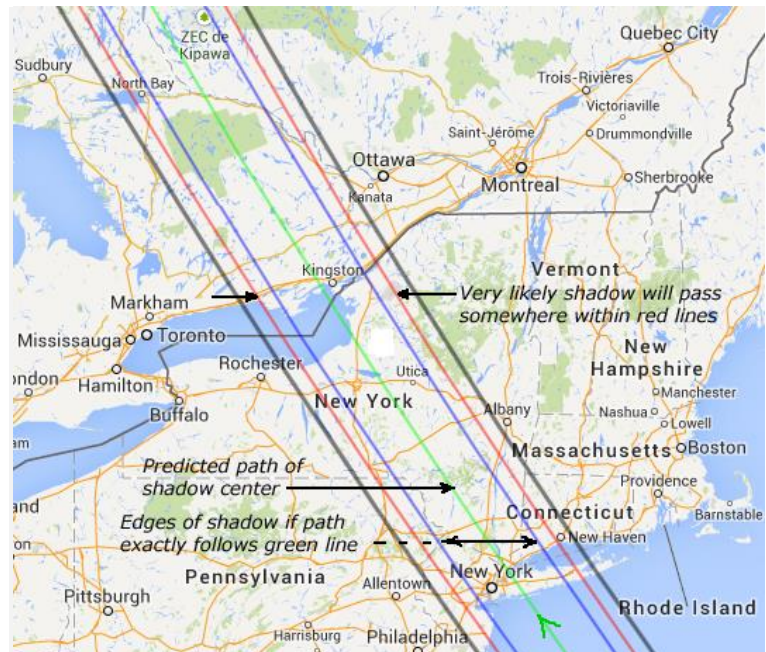
Typically only a few observers get to see any event, allowing the diameter of the asteroid to be measured at just a few places (called chords). However with a large number of observers, it will be possible to categorize the asteroid’s entire silhouette – IOTA is looking for volunteers to provide as any chords as possible to better ‘define’ **163 Erigone**.

After the event, observers may report their timing observations ([click here](#)), including reports of no occultation or a ‘miss’.

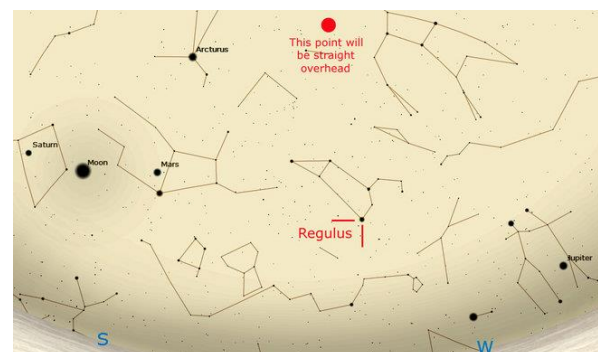
Steve Preston adds: "Both actual timings and 'miss' observations are extremely valuable. Timings of the disappearance measure the asteroid's diameter in the dimension along its orbital path, but the 'miss' observations improve our understanding of how wide it is across its path. Thus both types of observations improve our understanding of the asteroid's orbit."

Feel free to pitch in!

- **Ramaswamy** [adapted from IOTA Press Release]



Predicted path of the asteroid shadow (as of March 1). Shortly after 2:06 am EDT on March 20, 2014, observers between the red lines have the best chance of seeing the bright star Regulus temporarily disappear as asteroid (163) Erigone passes in front of it. (Courtesy: IOTA)



In addition to Arcturus, Spica, Procyon and the Gemini twins, Saturn, Mars and Jupiter will be prominent in the Southwestern skies. The Moon will at 87%, but waning! (Courtesy: IOTA)

NHAS February 2014 Business Meeting Report

The monthly business meeting was held at MSDC, Concord NH on February 21st, with 26 members in attendance and our Vice-President **Tom Cocchiaro** presiding. The Treasurer's report by "**Rags**" follows on the next page.

Vice-President's Report

The New Year kickoffs at *First Night* in Portsmouth and at MBC in Jaffrey were very successful.

The Top 3 News items of the past month, in reverse order:

- * Chang-e Rover was lost to cold on the Moon because the Solar panel designed to hold in heat from RTG during the 2-week lunar night failed to fold over the rover just before lunar sunset. The electronics failed to revive after lunar sunrise, so the rover has been declared lost.

- * Formerly, asteroids were thought to have been at the same distance from the Sun as when they were formed, but recent measurements indicate their positions are random. The best explanation is the giant planets Jupiter and Neptune have been shaking up the asteroid belt like a "snow globe" as the planets' orbits migrated closer and farther from the Sun over billions of years.

- * John Dobson – R.I.P. 1915-2014

Tom also reported on the "**Bring Your Child To The Library**" day at the Portsmouth Library and the **First Friday** Skywatch at MSDC (see page 2). He concluded with a slide show of the many images of the supernova SN 2014J taken by NHAS members (check them out in the [Pictures Forum](#)).

[Details regarding the **Astronomy Shorts** segment were unavailable. –Ed.]

Membership Committee



Rich DeMidio, the Membership Committee chair, reported on the progress made toward improving the NHAS membership experience.

Among the accomplishments in the past month:

- * Knowledge Base Rollout using Google Docs, for which no google account is required to view content. The links are in the forums.

- * New Member Welcome Brochure consisting of a one page summary (Front and Back) provided to new members in person at a meeting. It will also be available for download.

- * The Web and Audio Conferencing options have dried up; so we may have to go the paid route, which makes budget an issue. Please send in any suggestions.

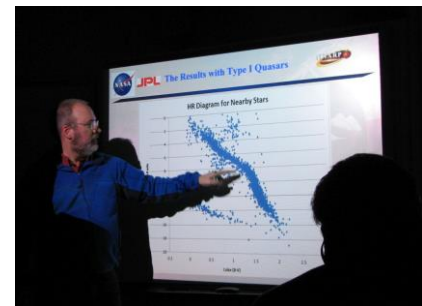
- * Membership Enrollment process is defining requirements for Web based capability. It's a collaborative effort between the Webmaster, the Treasurer, and the Membership Enrollment rep. (**Ken Charles**).

- * The Membership Handbook will be using the Welcome Brochure as a guide, with additional upload of enablement and other assets.

The Membership Committee is now looking at scheduling events in Q2.

The Evening Presentations

NHAS member **John Blackwell** gave a talk on his Quasars research; this was the concluding segment of a two part seminar, the first part having been delivered at the Business Meeting on November 15, 2013 [covered in the [November 2013 Observer](#), page 11]. He is the Director of the Granger Observatory at Phillips Exeter Academy and Chair of the school's science department.



John Blackwell's research in the past three years has been focused on Active Galactic Nuclei (AGN): Quasars and Seyfert galaxies. He still does a lot of variable star research, focusing on cataclysmic variables.

Quasi Stellar Radio Sources come in many types and are some of the most energetic phenomena in the universe. In this presentation, John discussed the results of his latest research involving Quasars' slightly fainter relatives: **Seyfert galaxies**.

The main result was that the data show Seyferts to have *very* similar luminosity trends, given their temperatures, much more so than had ever been thought previously. They were always believed to be fainter and redder, but this is not the case. Their data almost all fall exactly in the same space as type-1 Quasars.

NHAS Treasurer's Report*(as of February 19, 2014)*

Starting Balance:		\$13,660.75
Deposits:		
Membership	270.00	
Donations	1985.00	
Interest	0.56	
Total:		\$2,255.56
Expenses Paid:		
Cynric Company, LLC (Plowing Jan 26)	359.70	
Cynric Company, LLC (Plowing Feb 12)	468.60	
Liberty Mutual Insurance (was Peerless) (an increase from last year's \$1,546.00)	1,635.00	
U.S. Postal Service (PO Box 5823)	192.00	
Netrix, LLC (Prior unpaid LTP expense)	118.40	
Rackspace Cloud (Web site)	22.66	
Bolt Depot	32.53	
Barnes & Noble (Pocket Guides)	119.88	
Jameco (Battery boxes)	20.31	
Total:		\$2969.08
Current Checking Balance:		\$12,947.23
Petty Cash:		\$100.00
Current Cash Balance:		\$13,047.23
EOC Share:		\$9,229.52

Membership	121
Cash Renewals:	5x30.00 150.00
Cash New Members:	4x30.00 120.00
PayPal Renewals:	0x28.87 0.00
PayPal New Members:	0x28.87 0.00
Total:	9 \$270.00
Current Members:	130

New Members	
Anthony Costanzo	Plaistow, NH
Cameron Markovsky	Portsmouth, NH
Stephen Adams	Mont Vernon, NH
Alex Parker	Jaffrey, NH

Donations	
David Weaver (Dec. 20)	GEN 50.00
Ramaswamy	LTP 650.00
Elaine Grantham-Buckley	LTP 350.00
Portsmouth Sidewalk	GEN 145.00
Kilton Public Library (Lebanon)	LTP 325.00
Goffstown Public Library	LTP 140.00
MacKay Memorial Library (Chelmsford)	LTP 325.00
Total:	\$1985.00

Contact InformationHow to join NHAS

Write to us: **NHAS**
P. O. Box 5823
Manchester, NH 03108-5823

Send Email to: info@nhastro.com

Visit our web site: <http://www.nhastro.com>

How to contribute to the Observer

Email articles and snapshots to the Editor:

ramax.astro@yahoo.com

NHAS Officers:

President: [Ted Blank](#)
Vice-President: [Tom Cocchiaro](#)
Secretary: [Paul Winalski](#)
Treasurer: [David "Rags" Gilmore](#)

Board of Directors:

[Ken Charles](#)
[Pete Smith](#)
[Steve Rand](#)



Orion XT6 – 6” Newtonian on a Dobson mount
 (custodian: Ted Blank contact: tedblank@gmail.com)

Equipped with:

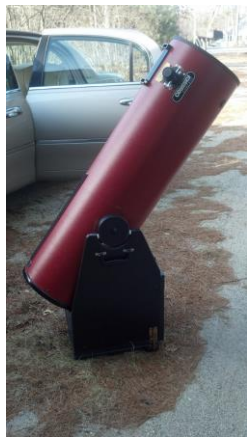
- Telrad finder with a dew shield
- 32mm, 25mm and 10mm Plössl EPs in a case
- A Planisphere, a Moon map, and a red light
- Richard Berry’s “Discover the Stars”
- Orion XT6 user manual



Meade 8” Newtonian on a Dobson mount
 (custodian: Ken Charles contact: starnek2550@gmail.com)

Equipped with:

- Telrad finder with a dew shield
- 25mm and 10mm EPs
- Custom-built base (a Joe Derek/Chase McNiss original)



Coulter Odyssey 10” Newtonian on a Dobson mount
 (custodian: “Rags” Gilmore contact: nhas@ragnorok.net)

Equipped with:

- Telrad finder with a dew shield
- 26mm TeleVue Plössl and 15mm Celestron Plössl in a case
- A Planisphere and a Moon map
- Richard Berry’s “Discover the Stars”

Also available on loan, independent of the telescope, and in a separate slip-case:

- Sky Atlas 2000.0 by Wil Tirion and Roger Sinnott
- Sky Atlas 2000.0 Companion by Robert Strong and Roger Sinnott



Orion XT10 on a Dobson mount
 (custodian: Pete Smith contact: psastro60@gmail.com)

Equipped with:

- Telrad finder (replacing the original finderscope)
- Assorted EPs: 35mm, 25mm wide-angle, 17mm and 10mm.
- An EP case will be available in the near future.

Regional Astronomy Clubs

New Hampshire Astronomical Society
[NHAS] *Skywatches around the State*
Sidewalk Astronomy in Portsmouth
www.nhastro.com

Amateur Astronomical Society of Rhode Island (North Scituate, RI)
www.theskyscrapers.org

Amateur Telescope Makers of Boston
(Westford, Mass.)
www.atmob.org

Astronomy Society of Northern New England (Kennebunk, Maine)
www.asnne.org

McAuliffe-Shepard Discovery Center
[MSDC] (Concord, NH)
First Friday Observing Event
www.starhop.com

Northeast Kingdom Astronomy Foundation (Peacham, VT)
www.nkaf.org

North Shore Astronomy Club
(Groveland, Mass.)
www.nsaac.org

Penobscot Valley Star Gazers
(Bangor, Maine)
www.gazers.org

Online Live Observatories

Astronomy Live (broadcasts)
www.astronomylive.com

SLOOH (Tenerife, Canary Is.)
www.slooh.com/about.php

Worldwide Telescope
www.worldwidetelescope.org

Magazines

Astronomy
www.astronomy.com

Sky & Telescope
www.skyandtelescope.com

Sky at Night
www.skyatnightmagazine.com

Astronomy Gear

Agena AstroProducts
www.agenaaastro.com

Astromart
(Used equipment and advice)
www.astromart.com

Astronomy-Shoppe
(in Plaistow, NH 03865)
www.astronomy-shoppe.com

Celestron
www.celestron.com

Cloudynights
(Used equipment, Articles, Forums and Reviews)
www.cloudynights.com

Explore Scientific
www.explorescientific.com

High Point Scientific
www.highpointscientific.com

Kendrick Astro Instruments
www.kendrickastro.com

Lunt Solar Systems
www.luntsolarsystems.com

Meade Instruments
www.meade.com

Oceanside Photo & Telescope
www.optcorp.com

Orion Telescopes
www.telescope.com

ScopeStuff
www.scopestuff.com

TeleVue
www.televue.com

Vixen Optics
www.vixenoptics.com

William Optics
www.williamoptics.com

Astronomy Web Sites

CalSky
(Sky Calendar to plan Observing)
www.calsky.com

Free Star Charts
(Star Charts for MM, Planets etc.)
www.freestarcharts.com

Heavens Above
(on Satellites, Spacecraft, Planets)
www.heavens-above.com

NASA
www.nasa.gov

Dark skies Observing Sites
(Horizons and Clear Sky information)
www.observingsites.com

ScopeReviews
(Reviews by Ed Ting, NHAS)
www.scopereviews.com

Sloan Digital Sky Survey DR10
<http://skyserver.sdss3.org/>

SpaceWeather
(Solar activity, Asteroid passes)
www.spaceweather.com

Computer Software

Cartes du Ciel (*aka Skychart*) (Free)
www.ap-i.net/skychart/

Celestia
www.shatters.net/celestia

Computer Aided Astronomy (Free)
www.astrosurf.com/c2a/english/

Earth Sky Tonight
www.earthsky.org/tonight

SkyMap Online
www.skymaponline.net










Starry Night
(many versions, Novice to Expert)
www.starrynight.com

Stellarium (Free)
<http://www.stellarium.org>

WinStars (Free)
www.winstars.net/english/

Event	Date	Time	Location
Coffee House Night at YFOS	Saturday, March 1	5:00pm	YFOS
Rey Center Skywatch	Saturday, March 1	7:00pm	Waterville Valley NH
Goffstown High School Skywatch	Tuesday, March 4	7:00pm	Goffstown HS, Goffstown, NH
Salem High School Skywatch	Wednesday, March 5	7:00pm	Salem HS, Salem NH
First Friday Skywatch for MSDC	Friday, March 7	7:00pm	MSDC, Concord NH
Sidewalk Astronomy Skywatch [ISAN 7 in memory of John Dobson]	Saturday, March 8	6:00pm	Market Square, Portsmouth NH
Raymond Schools Science and Tech Night Skywatch	Thursday, March 13	6:00pm	Iber Holmes Gove MS, 1 Stephen Batchelder Pkwy, Raymond, NH
Rindge Recreation Department Skywatch	Friday, March 14	6:30pm	(42.7346121,-71.9859983), Rindge NH
NHAS Business Meeting	Friday, March 14	7:30pm	St. Anselm College, Manchester
Goffstown High School Skywatch	Monday, March 24	7:30pm	Goffstown HS, Goffstown, NH
The Beech Hill School Skywatch	Thursday, March 27	7:30pm	20 Beech Hill Rd, Hopkinton, NH
Spring Messier Marathon	Friday, March 28	3:00pm	[Members only]
Spring Messier Marathon (backup date)	Saturday, March 29	3:00pm	[Members only]
Daniel Webster College Skywatch	Monday, March 31	7:00pm	20 University Drive, Nashua NH
The Beech Hill School Skywatch (backup date)	Monday, March 31	7:30pm	20 Beech Hill Rd, Hopkinton, NH
First Friday Skywatch for MSDC	Friday, April 4	7:00pm	MSDC, Concord NH
Sidewalk Astronomy Skywatch	Saturday, April 5	6:00pm	Market Square, Portsmouth NH
Goffstown High School Skywatch	Tuesday, April 8	8:00pm	Goffstown HS, Goffstown, NH
Daniel Webster College Skywatch (backup date)	Thursday, April 10	7:30pm	20 University Drive, Nashua NH
NHAS Business Meeting	Friday, April 11	7:30pm	MSDC, Concord NH
Souhegan High School Astronomy Club Skywatch	Tuesday, April 15	9:00pm	Cemetery Hill, Amherst NH

Note: Please check [Calendar] at www.nhastro.com for up-to-date information on upcoming events.

Date	Lunar Phase
Saturday, March 1	 New moon 8:00am
Saturday, March 8	 First quarter 1:27pm
Sunday, March 16	 Full moon 5:09pm
Monday, March 24	 Last quarter 1:46am
Sunday, March 30	 New moon 6:45pm
Monday, April 7	 First quarter 8:31am
Tuesday, April 15	 Full moon 7:42am
Tuesday, April 22	 Last quarter 7:52am
Tuesday, April 29	 New moon 6:14am

Credits

Contributors to this month's **Observer:**
 John Blackwell, Ted and Tina Blank, Glenn Chaple, Tom Cocchiario, Joe Derek, Rich DeMidio, Steve Fossey, Gardner Gerry, "Rags" Gilmore, *IOTA*, Koichi Itagaki, Chris Krstanovic, *NASA*, Guy Pollack, Nike Speltz, *Wikipedia*, Patrick Wiggins and Paul Winalski.