



OBSERVER

Vol. 2015, No. 11

Newsletter of the New Hampshire Astronomical Society

November 2015

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Heart and Soul bared in H-alpha



*or Soul and Heart – IC 1848 (left) and IC 1805, imaged in H- α by **Herb Bubert** in December 2013 with a Canon 70-200mm f/2.8 lens at f/3.5 attached directly to his SBIG ST-8300M camera mounted on the G11 plus PHD guiding with a 50mm finderscope (see page 7).*



Looking Back at 2015

I have now been club President for almost a year. It's been a good year for NHAS, I think. In particular, we managed to do two things which we had wanted to do for years and never quite got around to before: a summer picnic and pre-Christmas telescope-buying talk for the general public.

The summer picnic went well and I hope we will have one again next year.

The pre-Christmas talk did not go so well. We wanted to educate the general public so that when they bought telescopes they would buy good telescopes. We had hoped for an audience of twenty to fifty. Instead there were only three non-club attendees. More publicity might help, but perhaps we should look for other ways to educate the public about telescopes.

I'm happy to have been the "Round Tuit" which let NHAS get 'around to it'. I am thankful that you have honored me with the office. But you members should also pat yourselves on your backs – without your contribution of time and effort, none of this year's successes would have happened. As I've said before, the club is the members – so I thank you all and you should thank yourselves!

John Bishop
NHAS President

Sky Watch Review

Epping Middle School, Epping NH, November 3

The event took place as scheduled under clear skies. Representing NHAS were **John Bishop, Gardner Gerry, Steve Rand** (who gave the indoor presentation) and **Paul Winalski**. A large crowd (more than the 70 expected) showed up, and the scopes were very busy. There were a few meteors, including a very bright fireball. In the 14" TScope I showed the Pleiades, the Perseus Double Cluster, 61 Cygni, NGC 457, M15, M57, M31/M32/M110 and T Lyrae.

- **Paul Winalski**

Bethlehem Public Library, Bethlehem NH, November 4

Marc Stowbridge and I gave the indoor talk, then we had the sky watch on the library patio, where we were joined by **Steve Forbes**.

The sky was exceptionally dark – M36 and M38 in Auriga were visible naked eye. Among other objects I showed: Albireo, 61 Cygni, the Pleiades, NGC 457, M13, M57, M32, M33, T Lyrae.

- **Paul Winalski**

GSAMA Aviation Day, Concord NH, November 7

The event took place as scheduled, with **Steve Forbes, Mike Townsend, Marc Stowbridge** and **Paul Winalski** representing NHAS. Steve, Marc, and Mike set up both H-alpha and white-light solar scopes. It was very cloudy for most of the day, but there were breaks in the clouds and the public did get to see the Sun through the scopes.

I spent most of my time manning our table indoors. We had a bunch of NASA give-away posters, brochures, and DVDs, as well as solar observing glasses. I had the newly-released 1/2 hour NASA "SDO highlight reel" HD

video playing continuously on my laptop computer. The booth was very popular and I had a lot of good discussions about the Sun, telescopes and our society with members of the public. I had to replenish the tray of brochures about NHAS a couple of times, so we might get new members from this event.

- **Paul Winalski**

Kimball Library, Atkinson NH, November 17

Steve Rand gave the presentation to about 40-45 folks and later joined **Gardner Gerry** at the observing field. Objected shown included a lovely crescent Moon, M31, M15, Alberio and NGC 457. It was very well received and we might have started a few on the path to an astronomy hobby.

- **Gardner Gerry**

Boy Scout Troop 11, Wilmot NH, November 21

It was organized for Troop 11 of Litchfield NH at their camp in Wilmot, and as the Saturday afternoon progressed so did the cloud cover. “Rags” was the DA and decided to go anyway, so I did the same. I figured at the very least we could talk about telescopes and focus on some nearby objects. After supping on a turkey dinner, complete with pumpkin pie, Rags set up his refractor and 13” dob while I went with my 10” dob. Some of the 100 or so scouts went off to games while many others stopped by our scopes. The skies did open up enough for the Moon, the Ring Nebula, Albireo and the Pleiades to be observed, along with M42 low above the horizon. The overcast aside, Camp Wilmot was a very good observing location.

- *Steve Rand*

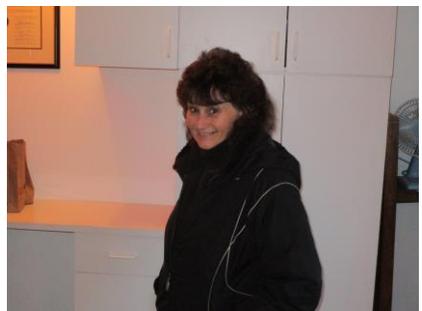
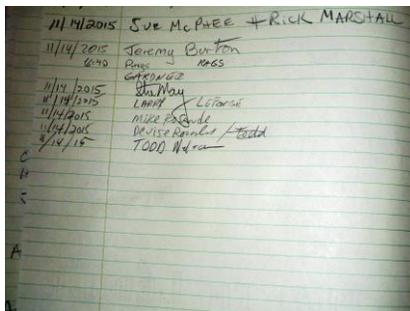
Society Activies

Coffee House Night at YFOS, November 14

At last month’s Coffee House Night we had a spectacular number of people show up, no doubt to listen to Gardner, and the mob, er, observers spontaneously decided that we should have a pot luck at the next event. I’m not sure if I had suggested this or if I had egged them on. My memory isn’t as good as I think.

On this Saturday I arrived early. It was a pot-luck after all. I was in a frizzle: this was the day after a Business meeting (on Friday night), an Officers’ meeting (on that Saturday), after I had picked up 50 pounds of rock salt so that certain unmentionables at YFOS wouldn’t freeze (aka the porta-potty), and after I had done a micro shop and picked up some chips and rolls for the pulled pork. I arrived home and packed up some utensils and things to bring.

Exhausted, I arrived (before sunset) and found that Sue McPhee and Rick Marshall had arrived even earlier and were cleaning things up in the warming room. I snuck out and got rid of the 50 pounds of rock salt surreptitiously.



Rick Marshall (left) and Sue McPhee (right) were the first to log in and set about cleaning the hut. (All Photos: Larry Lopez)

To summarize the party:

Rick Marshall and Sue McPhee - general clean up and pastry, **Larry Lopez, Jeremy Burton, Stu May, Larry LaForge, “Rags” Gilmore** - Nori Treats, **Mike and Denise Rosander** - excellent Pulled Pork (Linda says so) and Skillet Apple Cake, **Todd Nelson** – Drop-dead Chocolate Cookies (also Linda approved), **Bob Keenan, Steve and Quinton Forbes** - really good meat loaf and **Herb Bubert** in an exciting change - no shrimp were brought.

Bear in mind that if everyone brought enough for everyone we would have had to have gotten rid of a few people to have little enough to eat to be able to actually eventually leave. (I’m sure this is a result of 4 years of Latin).

Gardner Gerry reran the Atlas Mount instructions and this was much appreciated.



Nori Treats (left), skillet Apple Cake and drop-dead Chocolate Cookies. Just Deserts for all.

(All Photos: Larry Lopez)



Hard to believe that the Nori Treats did not spell automatic entry – “Rags” had to claw his way in.



Photographing Astro-photographers is no easy task, though obviously Gardner and Herb were at home in red.

We all left a bit early, something like 9:30 or so. I checked all the doors and the things and the orientation lessons of the previous month seem to have worked perfectly.

I think I have missed a few things, sorry!!! We all had a great time. I know I did.

- *Larry Lopez*



Denise and Mike Rosander (left) and Todd Nelson (right) bookend a shot of what Larry termed “Intrepid Astronomers.”

[Larry’s long weekend did not end with the above narrative. He was part of The Gang of Four that descended on the YFOS facility the very next morning (Sunday, 11am) for tree removal and clearing chores. The co-conspirators were Rags, Todd Nelson and Dr. Jim Young. Larry continues his (short) story overleaf. –Ed.]

Well, we cut stuff, loaded it on my 93 pickup (formerly Jim's pickup) and moved the stuff to the end of the field. Quite unexpectedly I did not need treatment for poison ivy.

My Deerfield Fair saw (bought from a Stihl dealer as the Fair was closing down, a \$179.99 one that's been seen on TV) came into its own this day. Jim's big saw had jammed.

Fun was had by all and no tools were permanently injured in this reenactment.

- *Larry Lopez*



An exhausting end to an exhausting weekend – Larry at rest.

Nashua Winter Stroll, Nashua NH, November 28

For the seventh year running, NHAS participated in the Nashua Winter Holiday Stroll, the kick-off event of the holiday season in Nashua. We set up in Bicentennial Park, next to the river near 66 Main Street (Darrell's Music Building).

Mike Townsend and I represented NHAS. Also present for most of the evening was **Larry LaForge**, who helped spell us on the scopes – we used two of Mike's scopes. **Joe Dechene**, **Ed Los** and **Matt Marulla** stopped by, as well as **Susan Schueller** very early on. As for the actual skywatch, we were mostly showing the Wreath Nebula and Clock Nebula (the X-Mas wreath on the church and the clock on the Hunt building at the end of the street) since clouds covered the whole sky until almost 9:00pm. The Moon started showing through by then and it cleared up for the last half hour or so when there were great views of the Moon. Mike and I were on our way home by 10:45pm.

- *Ken Charles*



Mike Townsend and Ken Charles showed nearby Nebulae to Winter Strollers on an overcast evening. (Photos: Joe Dechene)

Our usual spot had been handed over to a Band by the new organization committee, but Ken managed to negotiate our way back in, with the Band moving across the street. One of the organizers stopped by later in the evening and had a look through the scopes – the spot should be safely ours next year as well. The skies were completely overcast for most of the evening, long after the rain and drizzle had ceased by about 4:30pm. The Moon broke through at about 8:25pm and we managed some great views in the 80mm and 5" refractors until almost 10:30pm. The event was a lot less crowded this year because of the weather, but a good time was had by those that showed up.

- *Mike Townsend*

Messier 52 – Open Cluster in Cassiopeia

by Glenn Chaple

If you're a fancier of open star clusters, Cassiopeia is the place to be. Among the best of the Queen's numerous open cluster offerings of is Messier 52.

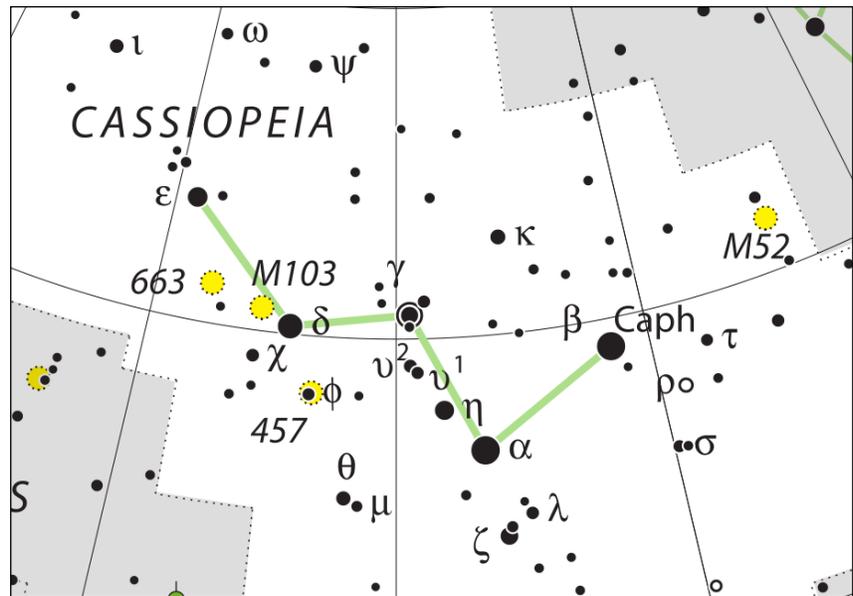
In binoculars and finderscopes, M52 appears as a fuzzy patch and remains mostly nebulous when viewed with small-aperture telescopes. My 3-inch f/10 reflector at 30X shows a triangular haze about 10 arc-minutes across and interspersed with a handful of tiny stellar specks. An 8th magnitude star located at the westernmost apex of the triangle gives M52 an appearance not unlike that of the "Wild Duck" Cluster, M11.

The similarity isn't entirely coincidental. Like M11, M52 is extremely rich and densely packed. Many dozens of stars, from magnitudes 9 to 13, greet the eye of anyone viewing M52 with a large scope and moderately high magnification. In all, the cluster contains about 200 stars.

You can find M52 by tracing an imaginary line from Shedir (alpha [α] Cassiopeiae) to Caph (beta [β] Cassiopeia) and extending it about 6 degrees beyond. M52 lies less than a degree south of the 5th magnitude star 4 Cassiopeiae and appears in the same low-power field.

M52 was discovered by Charles Messier on September 7, 1774. Its exact distance is uncertain, but a commonly-stated value of 5000 light years yields a true diameter of about 19 light years.

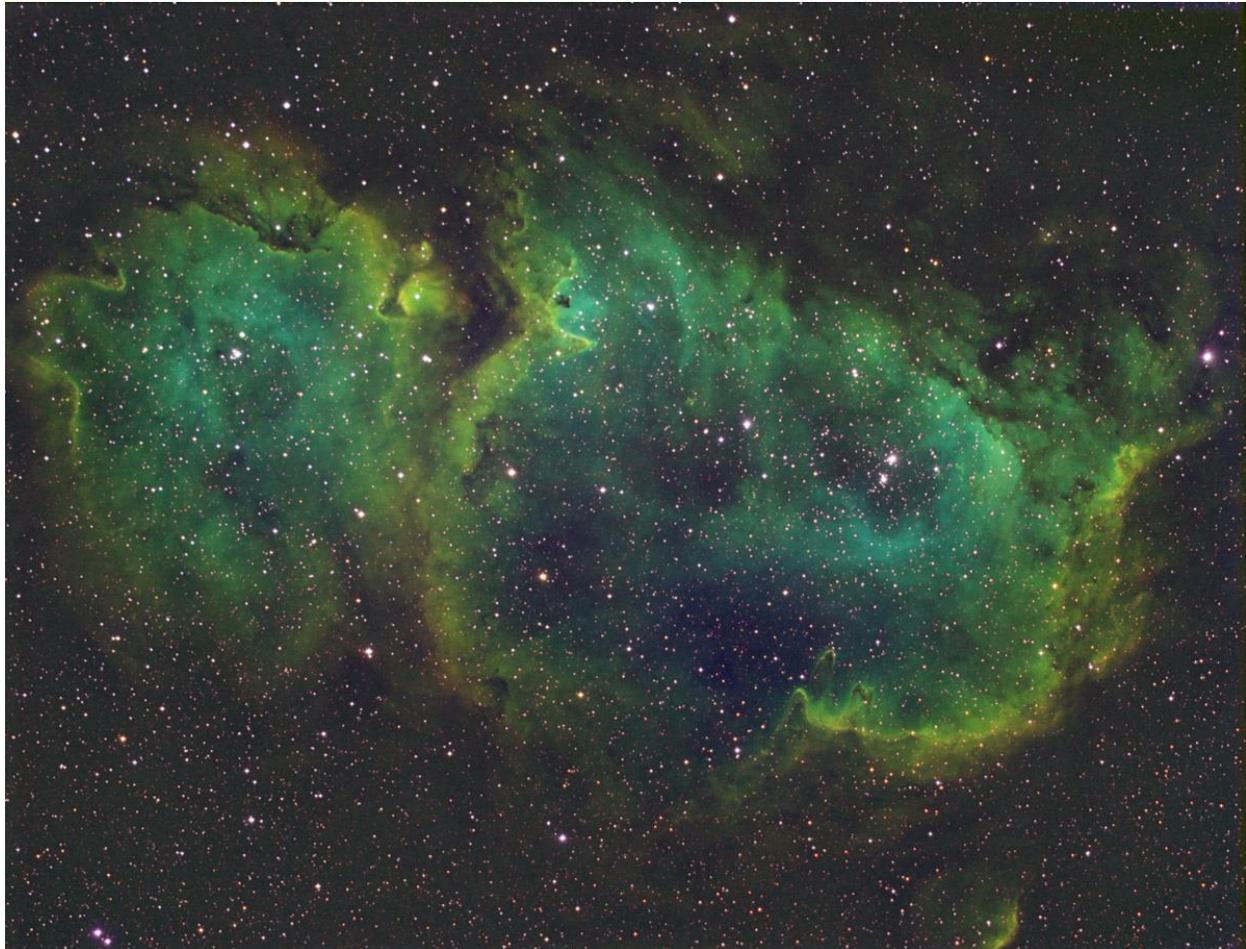
[For the time being, this article represents the last of this series of monthly musings by Glenn Chaple, who has recently assumed the position of Acting President of the Amateur Telescope Makers of Boston (ATMoB). We thank him for his contributions over the past 2 years to the NHAS Observer. –Ed.]



(Chart courtesy: IAU/Sky and Telescope)



(Courtesy: www.freestarcharts.com)

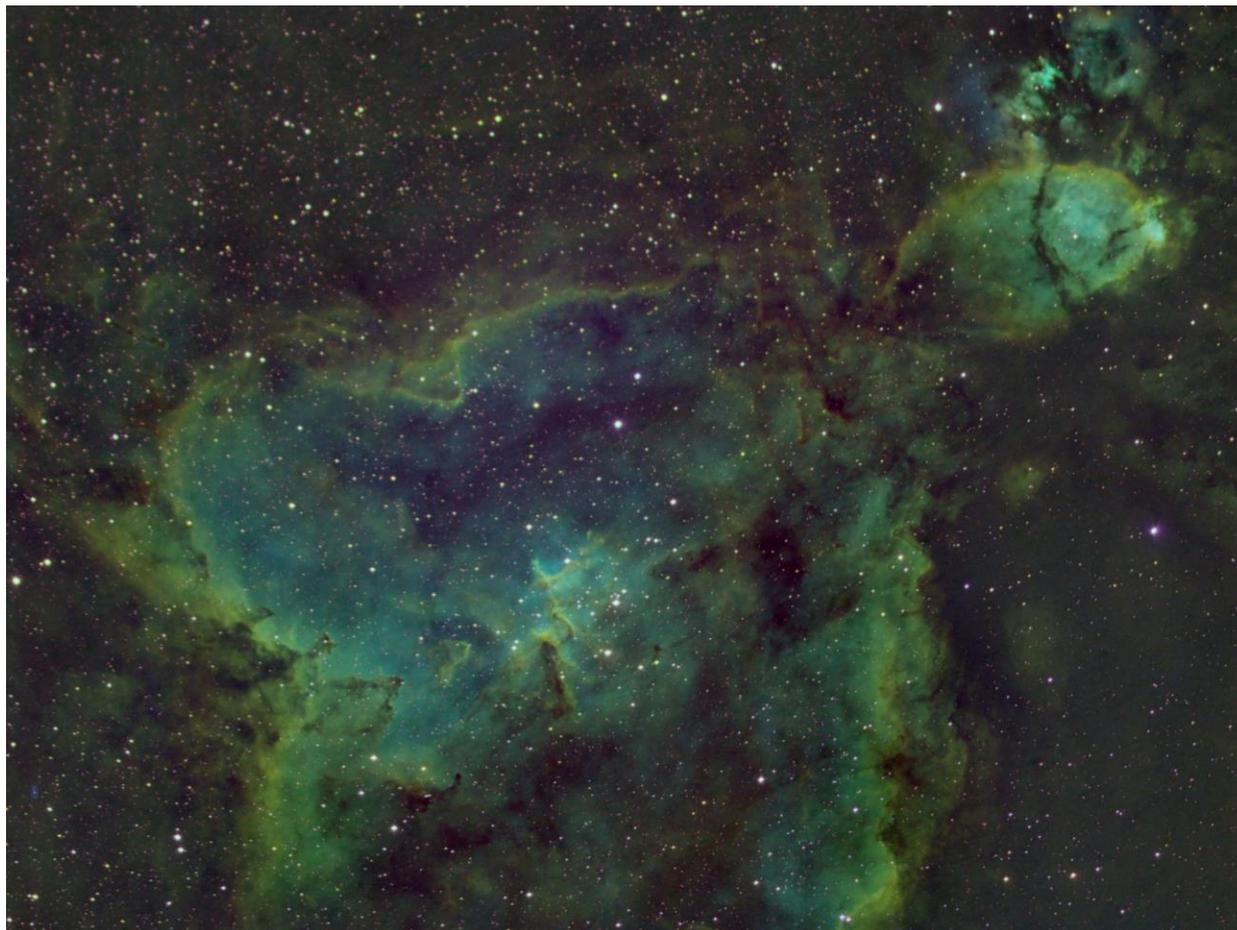
Sh2-190 and Sh2-199 in the Hubble Palette

*Sh2-190, with cluster designation of IC 1848, better known as the **Soul Nebula** in Cassiopeia. (Credit: Herb Bubert)
Imaged by Tele Vue NP127 with 0.8x reducer and STF-8300m. 10 minute subs - 3 hours H α , 4 hours OIII and 3 hours SII.*

The *Heart Nebula* (Sh2-199) and the *Soul Nebula* (Sh2-190) are emission nebulae located about 2.5° apart in the constellation of Cassiopeia near the Perseus boundary. These huge molecular clouds are located in the Perseus Arm of the Milky Way Galaxy that glow in the light of ionized Hydrogen (H II) from newly formed hot stars within them. Many of these O-class stars are part of open star clusters whose catalog designations also serve to identify the nebulae themselves. Thus an open cluster known in the Index Catalog as IC 1848 also identifies the Soul Nebula, and likewise with the cluster IC1805 for the Heart nebula. There are multiple open clusters within each nebula.

The Sharpless Catalog designation is independent of such considerations. **Stewart Sharpless** compiled a list of 312 objects north of -27° declination that he considered to be emission nebulae (H II regions). There were a few errors along the way – objects Sh2-191 and Sh2-197 lie just south of and between our pair, but they turned out to be galaxies some 15 million light years further away; they are now better known as Maffei I and Maffei II.

The embedded open clusters also help determine the distance to these nebulae. Radio sources are another aid, with sources known as W3 and W4 in the Heart nebula and the powerful W5 in the Soul nebula in play. Radio parallax measurements of W3 place the Heart nebula about 6750 light years away, yet other sources specify 7500!



*Sh2-199, or IC 1805, better known as the **Heart Nebula** in Cassiopeia. (Credit: Herb Bubert)
Imaged by Tele Vue NP127 with 0.8x reducer and STF-8300m. 10 minute subs - 3 hours each H α , OIII and SII.*

The Hubble Palette

The color of light from an astronomical object conveys a lot of important information about its composition. While there is an aesthetic sense to want true color in images, use of false color can take advantage of the brain's ability to discern color differences and so convey information on the relative distribution of the components of nebulae. False color images are the product of integrating exposures taken with specific narrowband filters, with each image showing the distribution of electromagnetic radiation of a particular narrow band of wavelength.

A false color image is constructed by taking 3 grayscale (i.e. black and white) images using specific narrowband filters (Page 1 has an H- α example) and assigning each to a color channel (RGB, i.e. Red, Green and Blue). Any such scheme is termed a Palette. 2 palettes are commonly used in astronomy; CFHT is the Canada-France-Hawaii Telescope Palette, known as HON for obvious reasons, whereas the other is used by our favorite Space Telescope.

The Palette	Red channel	Green channel	Blue channel
CFHT (HON)	H- α	O III [5007 Å]	N II [6584 Å]
Hubble	S II [6732 Å]	H- α	O III [5007 Å]

Notes: H- α is equivalent to H II (singly ionized Hydrogen). The true color is obviously red (6563 Å) but its use for the Green channel is the reason why such images of emission nebulae appear so green! Imagers who do not have a Nitrogen filter will substitute Sulphur (S II) for Blue channel in CFHT.

Shooting with my New Canon

I have a confession to make: I am a fraud. I am unqualified to write about astrophotography. I dabble; I get a few results worth sharing. That's it. But every once in a while, someone sees one of my images and asks me for advice. In these cases, I can do no better than to quote fellow NHAS member and excellent photographer **Herb Bubert**, who, when asked for advice on astrophotography, usually responds: "Don't."

But here's a secret - the fact is that *no one* fully understands astrophotography. You could meet someone tomorrow who gets excellent results using a completely different process. It's part of what makes the endeavor a constant, ever-changing learning experience. I learned this (yet again) this Fall with the acquisition of an SBIG ST-i autoguider and a HuTech modified Canon EOS 5D Mark III, both items bought (used) from fellow club members.

The EOS 5D viewed to scale with a 60 mm Takahashi (below), and as part of my operational setup (right). (All Photos: Ed Ting)



If you know your cameras, you know that EOS 5Ds aren't exactly cheap. Not only that, as soon as we get them, we astrophotographers often send these cameras right back out to third-party outfits who rip out the IR filter, void the warranty and render the cameras useless for conventional photography – the IR filter in every camera blocks out the very part of the spectrum we astrophotographers want to capture.

The camera itself is huge. It's about 50% larger and heavier than Canon's entry level T3i or T5i series and you've got to be able to compensate for the weight on your mount. My imaging rig right now consists of the Takahashi FC-76, AVX mount and SBIG ST-i autoguider.

Once the modification is done to help with astrophotography, what about the "uselessness" of the EOS 5D for conventional photography? A normal scene looks very different once the IR filter has been taken out. Everything appears red (as illustrated overleaf). But as anyone will tell you, it is possible to reprogram the white balance settings on the EOS 5D so that the camera can be used conventionally, even though it takes time to switch modes. With the help of the camera's previous owner, I got it all sorted out.



Conventional photography with the modified camera (left) and the same view with custom white balance settings (right).

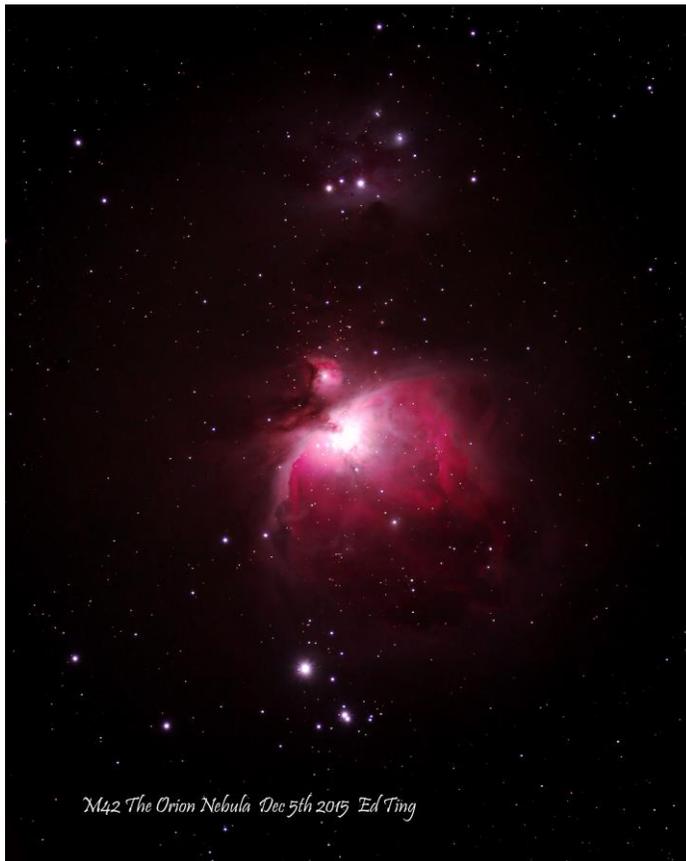
That's better, but there is also a problem with this. There's no such thing as a free lunch. The "normal" white balance settings must be dialed in under one of the custom settings, you also have to (for some reason that still eludes me) fix the ISO on the custom settings, and the "push here dummy" mode (sometimes known as the "green" mode) does not work anymore. So you are always in a compromised situation with conventional shooting. This is *not* the camera you want to grab when your kid is about to blow out the candles and you need to get the shot fast, right now.

For this reason, most people wind up just buying another camera body for normal photography. Not having another \$3000 in my back pocket for a second EOS 5D, I've elected to live with the custom white balance settings. At this point you may be asking, why go through all of this? Does the deletion of the IR filter really make so much of a difference? Why go through the hassle? I'll let you be the judge – until the Canon EOS 5D with the HuTech mod, my best images of M31 and M45 are shown below left.



My images from the Past and the Present: M31 (above) and the Pleiades (below).





M33 (below) imaged in late November, and M42 in early December, 2015.



I was asked to comment on CCD images taken by **Ed Ting** with a Takahashi FC-76 and a Canon EOS 5D as I thought the photos were very good. Most of my observing is spent on double stars, planets and the Moon. My deep sky observing is limited; my largest scope is a 10" reflector. These images through a 3" refractor show more detail than can usually be seen with an 8" to 12" reflector under very good conditions. The following is only my opinion:

M31: This image has a great amount of detail. You can see the two major dust lanes, as well as 2 small dust lanes of dark material to the left and right of the nucleus. Visible too is the large star forming region on the outer right hand spiral arm and minor dust lanes on the right hand spiral arms. Sharp-eyed observers might be able to see these details in a 12" to 16" telescope from a dark sky site.

M42: The amount of nebulosity seen in M42 rivals what can be seen in an 8" telescope on a good night, though the image does have more color saturation. Visually through an 8" telescope, more structure of the central nebula can be seen. That part of the nebula is over-exposed in this image. The sky background is nice and black with sharp stars. Well above M42 (NGC 1976), you can easily see the nebulosity around NGC 1977. I have yet to see this nebulosity visually with my 10" reflector.

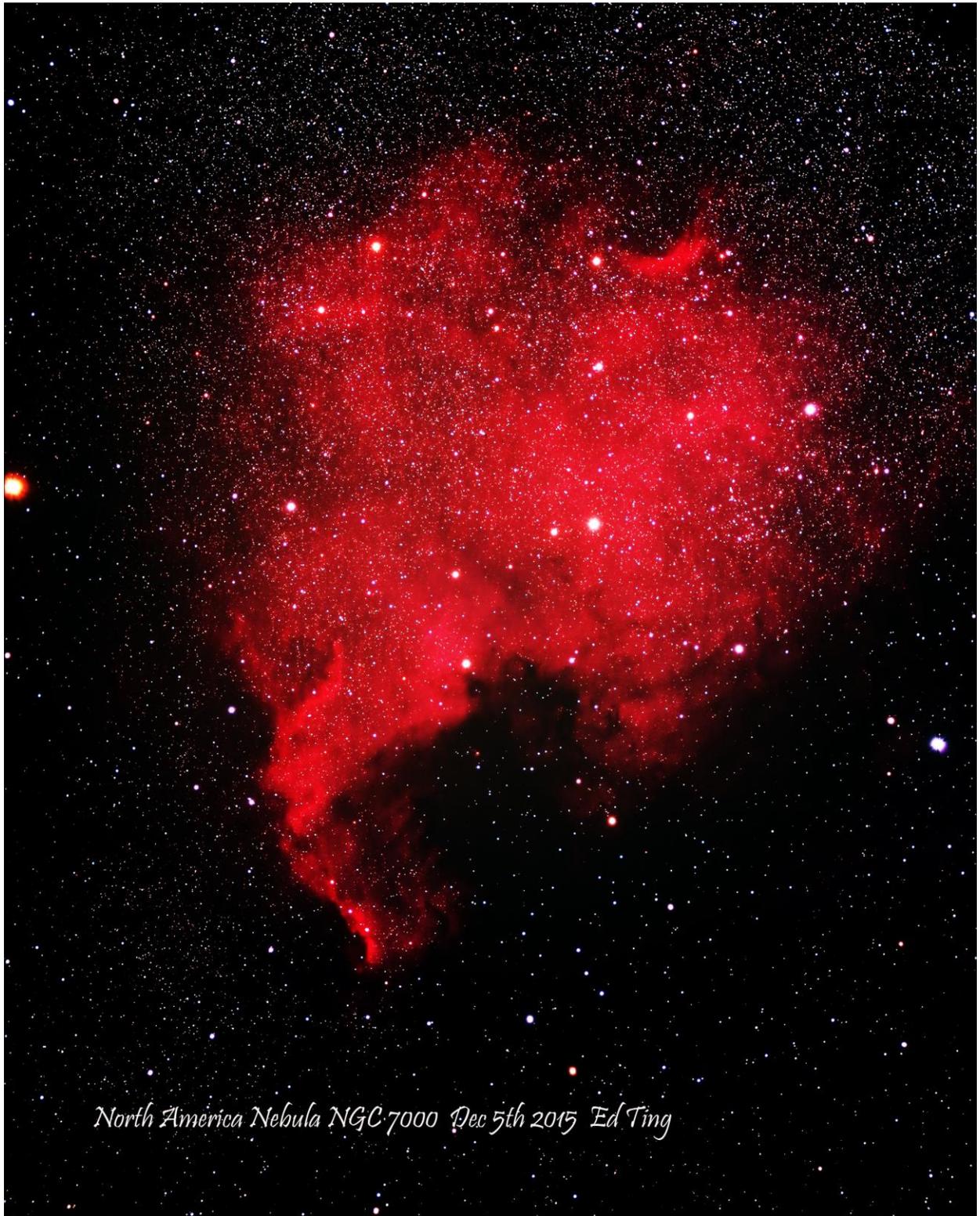
M33: This image impressed me the most. One of the best views on M33 I have had was with a 12" reflector at YFOS on a dark night, showing the two major spiral arms and the star forming region NGC 604. Here you can see the two major spiral arms that I saw visually plus two more; NGC 604 is also visible. Other star forming regions are visible as well, as clumps in the outer arms of this galaxy. The inner nucleus also shows hints of detail.

- **Mike Townsend**

The 'test' shot of M31 (on the previous page) was the product of 30 1-minute light subs plus 20 1-minute darks. M33 to the left was the result of 10 1-minute lights and 10 darks. The M42 image above and the North America nebula were similarly done.

As you can see, my adventure is just beginning. I've been able to get these results within the first month of acquiring the camera, and I still have much to learn.

- **Ed Ting**



North America Nebula NGC 7000 Dec 5th 2015 Ed Ting

From the isthmus of Panama to the vast expanses of the Canadian arctic – just don't call it the North American Nebula!

NHAS November 2015 Business Meeting Report

The monthly business meeting was held at St. Anselm College, Manchester NH on November 13th, with our President **John Bishop** presiding. The Treasurer’s report by “Rags” follows on the next page.

President’s Report

Election nominations are being accepted now, continuing on to the December meeting. We still need a coordinator for the year-end pot-luck as well as a new editor for the club newsletter beginning January 2016. The public observing event held for GSAMA on November 7 at the Concord airport was a great success.

Other Reports

Speaker Search Committee: (Michelle Thomas)

Members’ choice of topic for the talk by **Dr. Nicole Gugliucci** in January is ALMA (the runner-up was Super-massive black holes. The February speaker will be new member Anton Ermakov of MIT.

Membership Committee: (Pat Adams)

The YFOS orientation conducted last month was very well attended. Astro 101/201 courses can use the conference room at St. Anselm in the coming year and if you are willing to present a course, please let Pat know.

YFOS: (Larry Lopez)

As stated above, the YFOS walk-through was a great success. This month’s edition (on November 14) is to be a Pot luck as well, with Gardner Gerry reprising his Titan mount talk. A Telrad and a Telrad glass plate are needed to complete pending repairs. Lastly, some tree trimming and clean-up is scheduled for the following day (Nov. 15).

Election nominations

No nomination was received for the post of Vice-president; incumbents were nominated for the other posts, along with a new Junior Director:
President: John Bishop
Secretary: Paul Winalski
Treasurer: David Gilmore
Director: Joel Harris

Book of the Month/ Scope of the Month

John Bishop presented the *Messier Planisphere*: a big planisphere with finder charts and the complete list of Messier objects.

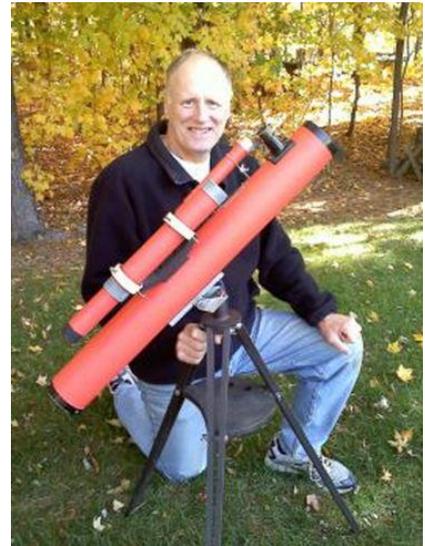
A Special Presentation

Before the break, **Megan Gialluca** presented her upcoming talk on “*Anti-Glitches in Magnetars.*” Megan is applying for the National Young Astronomer’s Award as a high school junior from the Hollis Brookline High School. Her talk at the school will be on December 1. Megan’s investigation is to come up with an explanation for the slow-down of magnetar rotation by anti-glitch events that could be resulting from different spin rates for the superfluid below the crust.



Megan stands proud. (Photo: S. Rand)

The Evening Presentation



Glenn Chaple, author and monthly contributor to both *Astronomy* magazine and this newsletter, talked about “*Double Stars for Backyard Astronomers*” – his motto being Double Stars are twice the fun! Benedetto Castelli’s discovery of Mizar as a double was a first for the telescope and Glenn talked about many of his favorites observed with his 3-inch f/10 Edmund Scientific reflector (shown above) and others, using gamma [γ] Virginis (Porrina) as an example to decode information on double star entries in catalogs. His observing tips included naked-eye and binocular viewing and also techniques employed when observing with CCD and video cameras. But for audience member **Steve Rand**, it was a case of a trip down memory lane when Glenn spoke of double star observations he’d made with the 6.5” Alvan Clark refractor at Oak Ridge Observatory (the George R. Agassiz Station) in Harvard MA – Steve had spent many hours there while an undergraduate intern at Boston’s Museum of Science.

NHAS Treasurer's Report (as of November 10, 2015)

Starting Checking Balance:	\$14,592.40	Membership:	76
Deposits:		Single + Family	
Membership	1,299.97	Cash Renewals:	18x30.00+2x10.00 560.00
Donations	220.00	Cash New Members	0x30.00+0x10.00 0.00
Interest	0.37	PayPal Renewals:	22x28.83+4x 9.61 672.70
Total:	\$1,520.34	PayPal New Members:	2x28.83+0x 1.61 67.27
		Total:	42 \$1,299.97
Expenses Paid:		Current Members:	118
Rackspace Cloud (Web site)	58.02	<i>[18 Family memberships; 73 members paid by PayPal]</i>	
United Site Service (porta-potty)	73.39	New Member:	
Kalmbach Publishing (magazines)	68.00	Randy Day	Hooksett NH
Sky Publishing (magazines)	32.95	Donations:	
Total:	\$232.36	North Hampton Public Library	GEN 50.00
Current Checking Balance:	\$15,880.38	Atco Inc., Newington NH	GEN 100.00
Petty Cash:	\$100.00	Eugene Solod, Wolfeboro, NH	EOC 70.00
Current Cash Balance:	\$15,980.38	Total:	\$220.00

Contact Information

How to join NHAS

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

Send Email to: info@nhaastro.com

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

NHAS Officers:

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

Board of Directors:

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

How to Borrow a Loaner Scope in 3 Simple Steps

- Contact the custodian of scope you're interested in
- Arrange to meet for the transfer (usually at a monthly Business Meeting)
- Sign the requisite papers and leave with the scope

It is a benefit of your membership in NHAS. The loan will be for 2 months; an extension might be granted if no one else is waiting for the unit. The objective is to help new members get to know what will suit them personally, to experiment with options and to understand **what will work** in the time available to them to pursue their new hobby, and equally, **what may not**. A suitable (beginner's) telescope is invariably one that is easy to transport to the observing site and easy to setup, and not necessarily the one with the most aperture or sophistication.



Orion Starblast 4.5 – LTP-style Telescope

Custodian: Pete Smith
Contact: psastro60@gmail.com

Equipped with:

Commercial red-dot finder with a special Joel Harris mount.

Celestron 8mm-24mm zoom EP, plus 17mm and 6mm EPs.
 A red/white Headlamp and a Lens Cleaning Pen in the pouch.
 A simple Collimation Cap to learn to collimate the old way.
 A Planisphere, a Moon Map and Richard Berry's "Discover the Stars" Instruction booklet and an Audubon constellations guide.



Lunt LS60THα/B600PT H-alpha Solar Telescope

Custodian: Pete Smith
Contact: psastro60@gmail.com

Equipped with:

Tele Vue Sol Searcher
 Celestron 8mm-24mm Zoom EP

Feathertouch focuser for smooth and precise focusing.
 Celestron CG-4 EQ Mount with RA/Dec. motor drives and controller.
 Sun screen to shade the observer, a Marc Stowbridge special.
 Booklet with quick start instructions.
 Foam-lined custom hard case for the OTA.



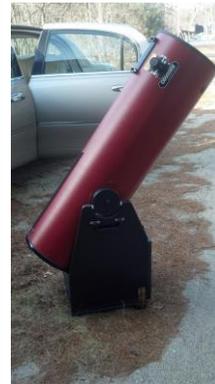
Orion XT6 – 6” Newtonian on a Dobsonian mount

Custodian: Tom Cocchiaro
Contact: tomcocchiaro@comcast.net

Equipped with:

Telrad finder with a dew shield
 32mm, 25mm and 10mm Plössl
 EPs in a case

A Planisphere, Moon map, red light
 Orion XT6 user manual
 Richard Berry's "Discover the Stars"



Coulter Odyssey 10” Newtonian on a Dobsonian mount

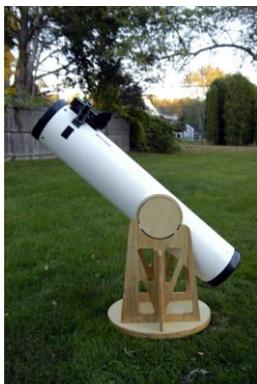
Custodian: “Rags” Gilmore
Contact: nhas@ragnorok.net

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 in a separate slip-case:
 Sky Atlas 2000.0 by Wil Tirion and Sinnott

Sky Atlas 2000.0 Companion by Robert Strong and Roger Sinnott



Meade 8” Newtonian on a Dobsonian mount

Custodian: Scott McCartney
Contact: Scott_McCartney@nhb.uscourts.gov

Equipped with:

Telrad finder with a dew shield
 25mm and 10mm EPs
 A custom-built base (made by
 Joe Derek and Chase McNiss)



Orion XT10 Newtonian on a Dobsonian mount

Custodian: Pete Smith
Contact: psastro60@gmail.com

Equipped with:

Telrad finder
 Assorted EPs: 35mm, 25mm
 wide-angle, 17mm and
 a mystery one (25mm?).

An EP case
 Richard Berry's
 "Discover the Stars"

Regional Astronomy Clubs

New Hampshire Astronomical Society
[NHAS] *Skywatches around the State*
Sidewalk Astronomy in Portsmouth
www.nhaastro.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.asne.org

Gloucester Area Astronomy Club
(Gloucester, Mass.)
www.gaac.us

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

Astronomy Gear

Adorama
www.adorama.com

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

Stellarvue
www.stellarvue.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)
www.stellarium.org

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

Event	Date	Time	Location
John Stark High School Skywatch	Thursday, December 3	7:00pm	618 N Stark Hwy, Weare, NH
First Friday Skywatch for MSDC	Friday, December 4	7:00pm	MSDC, Concord NH
Alton Central School Skywatch	Tuesday, December 8	6:30pm	41 School Street, Alton NH
Alton Central School Skywatch (backup date)	Wednesday, December 9	6:30pm	41 School Street, Alton NH
NHAS Business Meeting + Election	Friday, December 11	7:30pm	MSDC, Concord NH
Coffee House Night at YFOS	Saturday, December 12	5:00pm	YFOS
Rey Center Skywatch	Saturday, December 12	6:30pm	Waterville Valley NH
Goffstown High School Skywatch	Monday, December 14	6:00pm	27 Wallace Road, Goffstown NH
Goffstown High School Skywatch (backup date)	Tuesday, December 15	6:00pm	27 Wallace Road, Goffstown NH
Greenville Homeschool Skywatch	Wednesday, December 16	7:00pm	240 Adams Hill Road, Greenville NH
Henry Wilson Memorial School Solar Observing	Friday, December 18	9:00am	51 School Street, Farmington NH
Sidewalk Astronomy Skywatch	Saturday, December 19	6:00pm	Market Square, Portsmouth NH
Portsmouth First Night Skywatch	Thursday, December 31	6:00pm	Market Square, Portsmouth NH
Bedford High School Skywatch	Tuesday, January 5	6:30pm	Benedictine Park, Bedford NH
Bedford High School Skywatch (backup date)	Wednesday, January 6	6:30pm	Benedictine Park, Bedford NH
Hollis Elementary School Skywatch	Friday, January 8	7:00pm	12 Drury Lane, Hollis NH
Coffee House Night at YFOS	Saturday, January 9	5:00pm	YFOS
Rey Center Skywatch	Saturday, January 9	6:30pm	Waterville Valley NH
Hollis Elementary School Skywatch (backup date)	Monday, January 11	7:00pm	12 Drury Lane, Hollis NH
Sanborn Middle School Skywatch	Thursday, January 21	6:30pm	31 West Main Street, Newton NH
NHAS Business Meeting	Friday, January 22	7:30pm	St. Anselm College, Manchester NH
Sanborn Middle School Skywatch (backup date)	Thursday, January 28	6:30pm	31 West Main Street, Newton NH

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

Date	Time	Lunar Phase
Thursday, December 3	2:40am	 Last quarter
Friday, December 11	5:29am	 New moon
Friday, December 18	10:14am	 First quarter
Friday, December 25	6:11am	 Full moon
Saturday, January 2, 2016	12:30am	 Last quarter
Saturday, January 9	8:31pm	 New moon
Saturday, January 16	6:26pm	 First quarter
Saturday, January 23	8:46pm	 Full moon
Sunday, January 31	10:38pm	 Last quarter

Credits

Contributors to this month's **Observer:**

John Bishop, Herb Bubert, *Glenn Chaple*, Ken Charles, Gardner Gerry, "Rags" Gilmore, Larry Lopez, Steve Rand, Ed Ting, Mike Townsend and Paul Winalski.