



## STAR FIELDS

Newsletter of the  
Amateur Telescope Makers of Boston  
Including the Bond Astronomical Club  
Established in 1934  
In the Interest of Telescope Making & Using

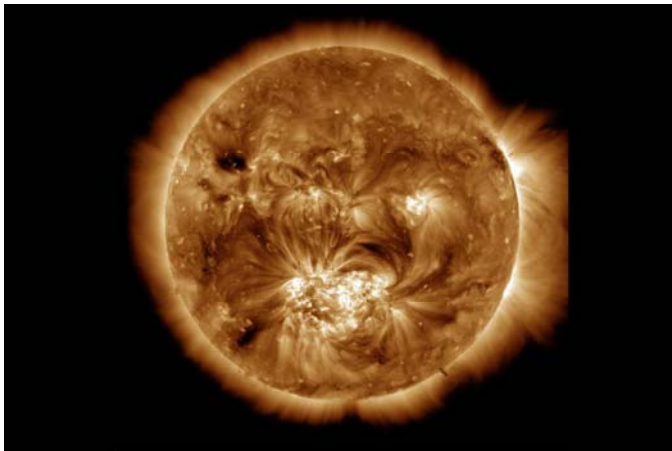
Vol. 25, No. 4 April 2013

### This Month's Meeting...

Thursday, April 11<sup>th</sup>, 2013 at 8:00 PM  
Phillips Auditorium

Harvard-Smithsonian Center for Astrophysics

Parking at the CfA is allowed for the duration of the meeting



Sun – Hi-C Image. Credit NASA

### A New View of the Solar Corona

This month's speaker will be Dr. Leon Golub, Senior Astrophysicist at the Harvard-Smithsonian Center for Astrophysics. The technique of using short-wavelength multilayer coatings to allow mirrors to reflect EUV wavelengths at normal incidence has led to significant improvements in spatial and spectral resolution of astronomical telescopes. Over the past three decades a continual improvement in performance of telescopes designed to image the solar atmosphere has now led to major breakthroughs in our understanding of coronal structure and dynamics. Dr Golub will discuss the methods used to construct these telescopes and the results being obtained from the most recent instruments, the Atmospheric Imaging Assembly (AIA) for the Solar Dynamics Observatory and the Hi-C (High Resolution Coronal Imager) sounding rocket.

Please join us for a pre-meeting dinner discussion at [Changsho, 1712 Mass Ave, Cambridge, MA](#) at 6:00pm before the meeting.

### President's Message...

Welcome to spring. After a cold and snowy winter this is always a favorite time of year for me. Although I don't do much observing with a telescope in the winter, I certainly do appreciate the majestic winter constellations such as Orion, Gemini, and of course Taurus and the Pleiades, gleaming up above (not that we saw that too often this winter). I really do feel good when I start to see the spring constellations like Cancer, Leo and Bootes making an appearance in the East. They are a sign of warmer times and a reminder of some of my early memories of spring-time observing.

One of those memories takes me back to the days when the ATMob held observing sessions at Drumlin Farm in Lincoln. We would meet at the top of a small hill that had an open field for setting up our telescopes. To the South the hill fell off down to a wooded wetland area, and in the springtime the air was filled with the wonderful sound of the spring peepers. In the early evening a cacophony of sound could be heard, trailing off as the evening wore on to the occasional peep, peep - wait for it - peep - at a tempo mirroring the cooling off of the nighttime air, the steadying of the seeing conditions and the observers settling down to the business of observing. For me observing isn't just about the stars. It's about the beauty of the nighttime experience. I love the sounds of the night - the peepers, an occasional chirp of a restless bird, crickets in the summer and early fall, or the hooting of an owl or the eerie howl of a coyote off in the distant woods. I love the quiet rustling of the trees as the daytime wind settles down to a gentle breeze and then nothing more than an occasional puff of air. I love the quiet of the night with the peacefulness and serenity that it brings.

Sometimes the "observing" isn't always that good in our New England climate, and with light domes creeping ever closer to our favorite observing locales the stars do not always shine so brightly. Nevertheless just being out there is always a relaxing treat, be it at home, at the clubhouse, or occasionally at some remote location. Even though the stars may not always shine so brightly, the nature of observing is always comforting. I know we all often gripe about the brightening skies, but like any hobby our pursuit of astronomy is ultimately just a way to relax and unwind from our day to day lives and responsibilities. So regardless of the sky conditions, the natural environment in which we play is something we can all appreciate. It is part of the experience. So go out and enjoy the springtime skies, the peepers and of course the warming air. Welcome to spring!

~ Mike Hill - President ~

## March Meeting Minutes . . .



Dr. Taylor Perron. Image by Al Takeda

Minutes of ATMoB meeting held on March 14, 2013.

Meeting held in the Phillips Auditorium, Harvard-Smithsonian Center for Astrophysics.

Mike Hill, President: called the meeting to order at 8:00 PM.

- The Secretary's Report of the February 2013 meeting was given by Sidney Johnston.
- President Mike Hill gave the Treasurer's report which was prepared by Nanette Benoit.
- Glen Chaple gave the Observing Committee Report.
- Steve Clougherty gave the Clubhouse Report.
- Bruce Berger reported on the Atmob Research and Imaging Observatory (ARIO). Bruce thanked an anonymous ATMoB member for donating an SBIG 8300 C camera to ATMoB.
- Old Business: None.
- New Business: None.

President Mike Hill introduced Dr. Taylor Perron, Ph.D. as the invited speaker.

Dr. Taylor is the Cecil and Ida Green Assistant Professor of Geology in the Department of Earth, Atmospheric and Planetary Sciences at MIT. Dr. Taylor holds an AB in Earth and Planetary Sciences and Archaeology from Harvard University and a Ph.D. in Earth and Planetary Science from the University of California, Berkeley.

Dr. Taylor's talk was entitled "Rain, Rivers, and the Icy Landscape of Titan". The talk described the frozen methane landscape of Titan, Saturn's largest moon. The frozen landscape of Titan is studied by analysis of images from the Huygens

Descent Imager/Spectral Radiometer ESA/NASA/U. Arizona – Tomasko et al., [2005].

The Huygens Descent Imager is described at the website of APOD (Astronomy Picture of the Day) on January 21, 2013, at the link: [apod.nasa.gov/apod/ap130121.html](http://apod.nasa.gov/apod/ap130121.html).

The following quotation describes the Huygens descent imager: "The European Space Agency's Huygens probe set down on the Solar System's cloudiest moon in 2005, and a time-lapse video of its descent images was created. Huygens separated from the robotic Cassini spacecraft soon after it achieved orbit around Saturn in late 2004 and began approaching Titan. For two hours after arriving, Huygens plummeted toward Titan's surface, recording at first only the shrouded moon's opaque atmosphere. The computerized truck-tire sized probe soon deployed a parachute to slow its decent, pierced the thick clouds, and began transmitting images of a strange surface far below never before seen in visible light. Landing in a dried sea and surviving for 90 minutes, Huygens's return unique images of a strange plain of dark sandy soil strewn with smooth, bright, fist-sized rocks of ice."

The Cassini mission is further described at the link: [saturn.jpl.nasa.gov/mission/flybys/](http://saturn.jpl.nasa.gov/mission/flybys/). "Flybys are a major element in Cassini's orbital tour of the Saturn System. The spacecraft's looping, elliptical path around Saturn allows for these occasional visits to the Ringed Planet's many moons. All flybys provide an opportunity to learn more about Saturn's icy satellites, and some of the close encounters -- mostly with giant Titan -- are actually used to navigate the spacecraft, changing its orbit or setting up future flybys.

Many of the most exciting encounters are 'targeted' flybys, for which Cassini's flight path is steered so the spacecraft will pass by a specific moon at a predetermined distance, referred to as 'closest approach'. Cassini's targeted flybys have yielded incredible close-up views and many groundbreaking science results. Visits to Dione and Hyperion, for example, as well as the daring Oct. 2008 dives through the Enceladus plume, have provided some of the great highlights of the mission."

Further images of Titan are taken during these flybys and help to give an understanding of the surface of Titan. Also, RADAR images of Titan taken by the Cassini spacecraft contribute to the analysis of landforms observed on the surface of Titan.

Dr. Taylor began his talk by describing landforms generated by rain on Earth. An image of the Allegheny Plateau demonstrated two rivers which drained the Allegheny Plateau in Pennsylvania and West Virginia. Tributary streams fed the rivers, each of which carved out valleys. The tributary streams were fed by upper tributaries which had similarly carved out valleys with hills in between, to form a rolling landscape with drainage to the river.

An analysis, using computer models, reproduce this landform type of formation. Factors such as the density of materials, flow rate of the liquid, and size of particles of the material all contribute to the shapes of the landforms.

Computer analysis of the surface of Titan emulated liquid methane rain falling on a frozen methane solid surface.

The images, both optical and RADAR of the Titan surface, indicates that methane rainfall carved out drainage features of the frozen methane landscape of Titan. The computer models substantially reproduce the observed landform, or rather methane iceforms, observed on Titan.

The analysis of the Titan's images allowed Dr. Taylor to conclude that the surface is formed by methane ice, there is methane rain from the clouds of Titan, and the methane rain carves out a drainage landform.

The meeting was adjourned at 9:00 PM.

~ *Sidney Johnston, Secretary* ~

## Clubhouse Report . . .

APRIL 2013



Dave Prowten fixing the barn sill. Image by Al T.

We held an impromptu work party at the ATMob Clubhouse on Saturday, March 9th following the snow storm which dumped upwards of 18" of snow the day before. By early afternoon the driveway, parking area and observing field were cleared. The Messier Marathon went on as scheduled that evening, and it was a big success! Thanks to our volunteers who made this possible.

The March work party was held on Saturday, March 30th and a total of 20 members and friends volunteered for several projects. The telescope inventory project was completed by Al Takeda, John Maher, and Marion Hochuli. Optical and mechanical testing of those telescopes is underway. Dave Prowten built and installed a new shelf in the clamshell observatory. Much of the day was spent grading and leveling the observing field, which had taken quite a beating following two large snow storms this season. One cement pad was lifted after plowing earlier this month, and volunteers led by John Blomquist managed to move it back into position. The field was raked and grass seed was spread. In the near term, loam will be trucked in and we will continue our efforts in leveling the field.

Thanks to the lunchtime crew for all of their work in putting together a wonderful meal. Special thanks to new member Cheryl Rayner for cleaning the pans and dishes during the work party.

Dick Koolish has donated two shovels and a sledge hammer to the Clubhouse tool inventory.

Thanks to the following members and friends for helping out during the month of March:

Paul Cicchetti, John Blomquist, Joshua Ashenberg, Al Takeda, John Maher, Dick Koolish, Cheryl Rayner, JT Amirault and Katherine Amirault, Bill Toomey, Art Swedlow, Marion Hochuli, Eileen Myers, Steve Clougherty, Nina Craven, Bruce Berger, Neil Fleming, Phil Rounseville, Sai Vallabha, Eric Johansen and Cindy Gilbert.

~ *Clubhouse Committee Directors* ~

~ *John Reed, Steve Clougherty and Dave Prowten* ~

### Clubhouse Saturday Schedule

Apr 13	Al Takeda	Bill Toomey
Apr 20	<b>CLUBHOUSE CLOSED - NEAF</b>	
Apr 27	Dave Siegrist + Sonawane <b>WORKPARTY #4</b>	
May 4	Steve Clougherty	Neil Fleming
May 11	Nina Craven	Eric Johansson
May 18	<b>CLOSED - ASTRONOMY DAY</b>	
May 25	Paul Cicchetti+ John Reed <b>WORKPARTY #5</b>	
June 1	Tom McDonagh	Tom Wolf

## Membership Report . . .

Membership count as of 03/24/2013 is at 286 individuals  
Same time last year: 293

A number of members have experienced problems with Mailing List subscription. If you believe you have experience an issue with this function, please contact me via email at [tom\\_mcdonagh@yahoo.com](mailto:tom_mcdonagh@yahoo.com). Please don't forget to update your personal information such as email and mailing addresses. Send me a note or log into the ATMob website to edit your personal information today.

Published in the March 21st edition of the Acton Beacon was a [photo of Comet Pan-STARRS](#) taken by one of our newest members. Nice job Paul Benni! Check it out!

<http://www.wickedlocal.com/acton/features/x1037522528/Comet-seen-over-Acton?photo=0#axzz2PywILRhY>

New and Returning members in March 2013:

Scott Iverson  
Ryan Farber  
Richard Torti  
Cheryl Rayner  
Paul Benni  
Mike Mattinson



Please take the time to welcome our newest members.

~ Tom McDonagh – Membership Secretary ~

## Sky Object of the Month . . .

April 2013 - Messier 101 – Spiral Galaxy in Ursa Major

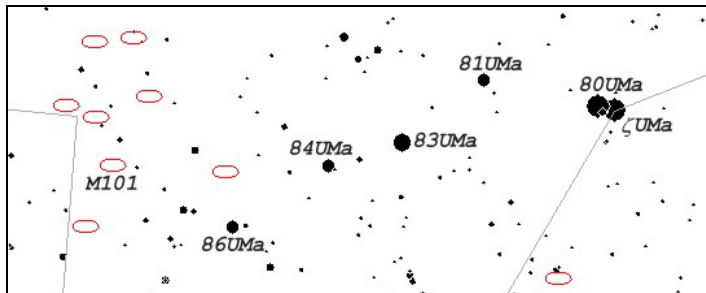


Chart from [www.astrosurf.com](http://www.astrosurf.com)

One of the best examples of a star-hop is the one that takes us from Mizar (the middle star in the Handle of the Big Dipper) to the face-on spiral galaxy M101. It's a fortuitous situation because, were it isolated, M101 might be one of the more difficult Messier objects to locate. M101 has a listed at magnitude of 7.9, but the light is spread over a roughly circular area just under one-half degree across. The situation mirrors that of M33, another elusive face-on spiral.

While there is no major star-hop path to M33, there is one to help us locate M101. Bridging the 5 degree gap between Mizar and M101 is a chain of stellar steppingstones made up of 81, 83, 84, and 86 Ursae Majoris. Mizar's naked eye partner Alcor (80 UMa) conveniently points the way from Mizar to 81 UMa, and from there you're on your way.



M101 photo by Mario Motta M.D.

Viewed with small-aperture scopes, M101 is a diffuse circular glow about ¼ degree across. An 8-inch scope will begin to reveal traces of the spiral arms, while a large Dob will capture knots within the arms – H II regions and stellar associations bright enough to have their own NGC designations.

Four supernovae have been observed in M101 since 1900. The most recent reached 10th magnitude in September 2011. This is indeed a galaxy worthy of our attention.

Your comments on this column are welcome. E-mail me at [gchaple@hotmail.com](mailto:gchaple@hotmail.com).

~ Glenn Chaple – Member at Large ~

## Tale of a Large Telescope Mirror . . .

I have always been interested in both building and using telescopes. The following is the life history of one of my mirrors. In the early 1980's I built a 16-inch telescope that I was quite happy with. By the late 80's however, after observing through some larger telescopes at a Stellafane Convention, I developed the urge, the aptly named "aperture fever", for a larger telescope. I was considering a 24-inch class mirror, and was searching for a suitable blank to grind and polish. Fortunately, Janet and Michael Mattei learned of my interest for a large mirror blank. You can imagine my complete surprise one evening when Michael Mattei, quite unannounced, showed up at my home and deposited a 32-inch Pyrex mirror blank. At the time Michael was very secretive, telling me I could not say where it came from, and to simply make a great telescope with it. It was only years later that he informed me that the secret of the mirror was now declassified and the tale could be told.

This 32-inch mirror blank was apparently cast specifically for the US Air Force, to be used in a satellite surveillance program. The project eventually came to a close as the Air Force moved on to other surveillance methods of which I am not privy to, and this leftover blank was scheduled for destruction, so that the secret of the size of the optics used would not be revealed. All this is now declassified. Michael had saved this mirror from being broken into pieces and thrown into a landfill by gifting it to me. At the time the thought of grinding and successfully figuring a 32-inch mirror, I felt quite correctly, was a daunting task. Michael reassured me, and stated he would give me guidance and help to complete the project. Without his help and instruction, I am sure I would not have completed it properly.



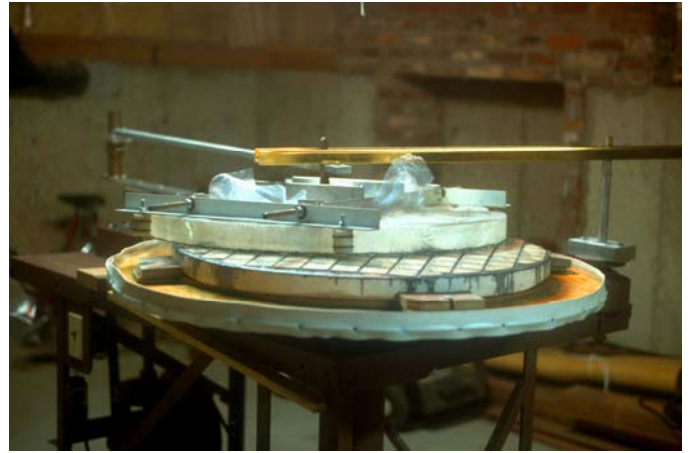
(L-R) Michael Mattei and Mario Motta working on the 32-inch mirror.

The first thing I decided to do was to lighten its weight, as I planned to grind this in my basement. I needed to be able to lift it and flip it with as little help as possible, given that it weighed 160 pounds. I devised a plan in which I brought the mirror blank to a gravestone company where they used sandblasting equipment to carve figures on head stones and monuments. It turns out they use carborundum 60 grit for these jobs, perfect for use on a Pyrex blank, as that is in fact the normal starting grit in grinding. After 4 hours of work and careful application, a very nicely etched pattern of ridges and lightweighted cavities emerged. The original 160 pound blank now weighed 80 pounds, and could be handled much more easily. Sandblasting however produces strain and micro cracks in glass, which would jeopardize the final mirror shape and potentially lead to the mirror cracks propagating as well. For that reason the next step was to bathe the entire glass in a warm solution of hydrofluoric acid. This etches the glass to relieve millions of tiny surface cracks the sandblasting produced. A very close friend and member of the [Amateur Telescope Makers of Boston \(ATMoB\)](#), Paul Valleli, was instrumental in obtaining this acid for me, as it is considered toxic and highly dangerous and generally not available. We built a plastic pool to submerge and bathe the mirror with the acid, which was heated to 50°C for 60 minutes. At the end of this time the glass was well etched, and now weighed 78 pounds.



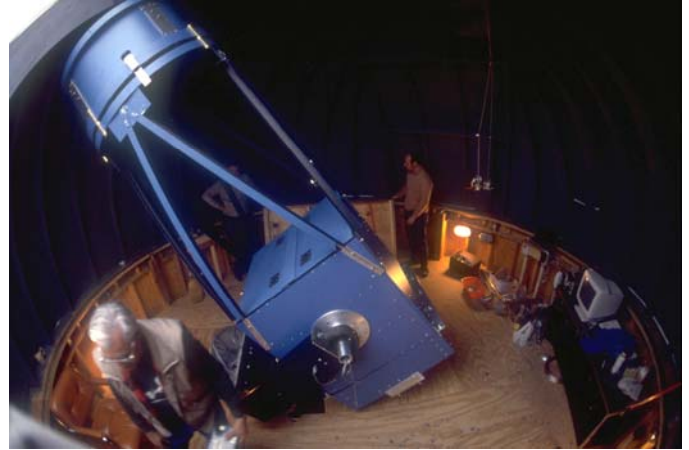
A lightweight 32-inch mirror blank

Next I built a homemade mirror grinder to handle this large size mirror. With a surface area of 800 square inches, the surface pressure of a 32-inch mirror can be more than human hands can push. Parts were obtained from mostly scrap and some parts from an old mirror grinder that the ATMoB was discarding. After 2-1/2 years of work, the blank was crafted into a quarter wave front, 32-inch, f/4 telescope mirror. This was accomplished with a lot of help from Michael Mattei, Paul Valleli, and other members of the ATMoB. Of course my wife was drafted to help lift, flip, and handle the mirror on a regular basis. My three children to this day have “fond” memories of trying to fall asleep to the sound of grinding glass and the machining of telescope parts in the basement.



Mario's homemade mirror grinder.

After completion, the mirror was installed in a homemade telescope and observatory that I built at a dark sky site in New Hampshire. I was thrilled with the views, and used it happily for a number of years. I was hoping for 1/8th wave or better, but could never achieve that due to the light weight nature of the mirror blank that I had created. Some years later I was able to obtain a second 32-inch mirror, of slightly better quality, and swapped the mirrors in the telescope. I learned from that experience that despite building an 18 point cell suspension, the real issue was lateral support. Once a sling was added for lateral support, the mirror actually performed much better. At that point however, the original mirror being discussed in this article was put aside for use later in life.



32-inch Newtonian in the New Hampshire observatory.

In 2004 I moved to Gloucester on the coast in Massachusetts. It was my original plan to possibly refigure this mirror for another Newtonian f/4 telescope. At about that time Scott Milligan convinced me instead to build a telescope of a radical and vastly improved design, a “relay telescope”. This telescope utilizes a spherical primary mirror using a Mangin secondary with multiple corrector lenses. This proved to be a stroke of genius, as this telescope now achieves a 1/12 wave front for very crisp beautiful views. The only problem was it required a completely different design for the primary mirror, a conical shaped cast mirror. I've never regretted that decision, but that left the original mirror unused. I contemplated various options, but with the other telescopes performing well I never got around to implementing

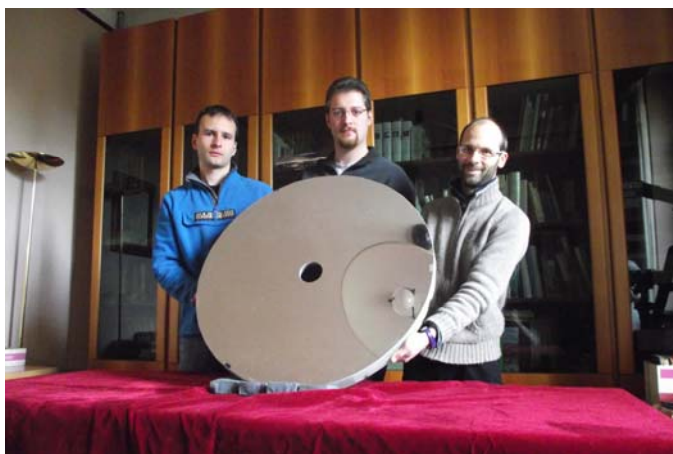


any action on these plans for it. Besides, how many 32-inch telescopes does one need?



Mario's 32-inch Relay Telescope in Gloucester, MA

Now fast forward to 2012, with a visit by Dr. Ulisse Munari, on sabbatical from the Padua University in Italy, to the [AAVSO \(American Association of Variable Star Observers\)](#) in Cambridge, Massachusetts. He described to the AAVSO Director, Dr. Arne Henden, how he has been advising and mentoring the Schiaparelli Observatory located above Lake Varese in Italy. This is a professional-amateur collaboration that has a nearly completed dedicated spectroscopy telescope. It has a finished observatory, complete with a telescope but missing one minor detail: the main mirror. He was developing plans to have a mirror commissioned to complete this project and make this observatory operational. Arne notified me that he was seeking a 32-inch f/4 mirror. Dr. Munari was very surprised when we informed him that I just happened to have one lying around unused. After showing him the mirror, after a dinner at my home, he exclaimed that this mirror would be perfect as a spectroscopy mirror for the observatory in Varese. Since it would be a dedicated spectroscopy telescope, a quarter wave front mirror was more than adequate.



The 32-inch mirror in Italy. Paolo Valesa is on the right.

So with everyone in agreement, I formally donated this mirror to the AAVSO this past year, which has now been permanently loaned by the AAVSO to the Schiaparelli Observatory. It arrived

there in December of 2012, where the observatory staff, led by Paolo Valesa, promptly began working on a large mirror cell to attach this to the existing built telescope. They are also working on a Cassegrain secondary. (Way back during the polishing phase, Mike Mattei and I cored out a central hole in case we ever wanted to turn this into a Cassegrainian telescope). Lead engineer, Paolo assures me that they should be operational by early summer. I look forward to visiting this summer and looking at this completed operational spectroscopy observatory.



Schiaparelli Observatory's spectroscopy telescope

The net result of this long tale of a telescope mirror's life history is that AAVSO members will be able to obtain a slice of time to use this fully robotic operational and dedicated spectroscopy telescope located in the foothills of the Alps in Italy, overlooking beautiful Lake Varese. I have the personal satisfaction knowing that a mirror I ground and polished will be going to very good use in research. I especially feel very good that Mike Mattei's original intent to save the needless destruction of a perfectly good mirror blank has been averted. This mirror has gone through several iterations since it was originally cast: from spy satellite, to amateur observatory use, to now professional research. I am pleased it will be actively used productively for many years to come. And finally, I have a great excuse to visit Varese, Italy.



Schiaparelli Observatory with the Alps in the background

*Editor: All images for this article are courtesy of Mario Motta.*

*~ Submitted by Mario Motta ~*

## 2013 Tenth Annual - NEAF Solar Star Party (NSSP) . . .

April 20-21. Sponsored by [The Rockland Astronomy Club](#)  
\*[Northeast Astronomy Forum \(NEAF\) & Telescope Show](#)  
Rockland Community College, Suffern, NY

NEAF attendees are invited to observe the Sun with attitude in different wavelengths, through a variety of solar filters and spectroscopes.

Join us, for two days of solar observing at NEAF 2013. No star party entrance fee, or registration required (NSSP only).

Bring a piece of clear sky to share with vendors and fellow photon-deprived amateur astronomers.

For further information, please visit our website:  
<http://www.neafsolar.com/>

*\*Editor: [The 2013 Northeast Astronomy Forum & Telescope Show \(NEAF\)](#) has more than 110 on-site equipment vendors & exhibitors, world-renowned speakers, daily solar observing, STARLAB planetarium shows, Getting Started Classes for beginners, space & astronomy events for kids, and great raffle prizes. April 20-21, Rockland Community College, Suffern, NY.*

~ Submitted by Barlow Bob ~

## Astronomy Day 2013 - May 18 . . .

Can you believe this will be the Clay Center Observatory's 10th year partnering with ATMoB to host the annual National Astronomy Day for the greater Boston public?

Over a thousand people attended in the past three years, and last year's total count exceeded 2,000. Astronomy Day 2013 is Saturday, May 18 this year, and with no conflict with NEAF, we hope you will join us. We need your help to provide outdoor telescopes, solar and night, as well as indoor science exhibits.

We open rain or shine, so please join us indoors even if the weather is not favorable. You can register your exhibit, telescope or other, on the website so we may plan for what you need – tables, electricity, food, etc.

Go to [www.claycenter.org](http://www.claycenter.org), Astronomy Day page, Exhibitor sign-in. Thank you for your participation!

2013 Astronomy Day Schedule

4:00 - Outdoor events begin with rockets, kites, solar telescopes

5:00 - Indoor events run from 5:00 pm to 8:30 pm – science exhibitors

7:00 - Indoor Kite Flying in the Hockey Rink 7-9 pm - kites that need no wind!

8:00 - Sunset, night telescopes set up

8:30 - Viewing of the first-quarter moon, Venus, Saturn, Jupiter, and Mercury

10:00 – Adjourn

~ Submitted by Robert Phinney ~

## Asteroid Near Miss . . .

On February 15, 2013, asteroid 2012 DA14 made the closest recorded pass to Earth of any object of this size. The 40-meter x 20-meter elongated object made its closest approach of less than 0.09 lunar distance or 17,200 miles above Indonesia. In order to take advantage of this educational opportunity, Michael Hecht, Assistant Director for Research Management at Haystack Observatory, invited MIT's Earth and Planetary Sciences graduate students and ATMoB members to the Haystack Observatory building. The attending group included three ATMoB members who participated in discussions about the science being done on 2012 DA14 and observed the asteroid on Haystack's radar screens. Later that evening, Tim Brothers at the Wallace Observatory also imaged the asteroid in visible light.

As 2012 DA14 passed over the ATMoB Clubhouse, Eileen Myers, John Maher and I configured the clamshell observatory's 10-inch Meade Schmidt-Cassegrain telescope for imaging. John set up the scope and gave me a short tutorial on its use. Eileen handled the astrometric positions and timing information for the asteroid.

I attached my SBIG ST-8300M Monochrome CCD camera along with a focal reducer to the scope and this setup gave us a 40-min. x 30-min. field of view. Using the JPL (Jet Propulsion Laboratory) ephemeris data, we slewed to the location where the asteroid would pass. I should note that I found the Minor Planet ephemeris data for The Sky off by many degrees. I confirmed this problem in a phone call to the Wallace Observatory team, which had just experienced the same issue. The camera was configured to take a series of 1-second images, binned at 3x3, which gave us noisy data but a faster download time to the computer. The timing and position information of the JPL data was spot on for the three sequences that we imaged that evening.

A [movie of asteroid 2012 DA14](#) is located in the gallery section of the ATMoB website.

~ Submitted by Al Takeda ~

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**April Star Fields DEADLINE**  
**Sunday, April 21<sup>st</sup>**

**Email articles to Al Takeda at**  
**[newsletter@atmob.org](mailto:newsletter@atmob.org)**

**Articles from members are always welcome.**

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**POSTMASTER NOTE:** First Class Postage Mailed Apr. 9, 2013

Amateur Telescope Makers of Boston, Inc.  
c/o Tom McDonagh, Membership Secretary  
48 Mohawk Drive  
Acton, MA 01720  
**FIRST CLASS**

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**PUBLIC OUTREACH**

STAR PARTY COORDINATOR:  
Virginia Renehan [starparty@atmob.org](mailto:starparty@atmob.org)

**How to Find Us...**

**Web Page [www.atmob.org](http://www.atmob.org)**

**MEETINGS:** Held the second Thursday of each month (September to July) at 8:00PM in the Phillips Auditorium, Harvard-Smithsonian Center for Astrophysics, 60 Garden St., Cambridge MA. For INCLEMENT WEATHER CANCELLATION listen to WBZ (1030 AM)

**CLUBHOUSE: Latitude 42° 36.5' N Longitude 71° 29.8' W**

The Tom Britton Clubhouse is open every Saturday from 7 p.m. to late evening. It is the white farmhouse on the grounds of MIT's Haystack Observatory in Westford, MA. Take Rt. 3 North from Rt. 128 or Rt. 495 to Exit 33 and proceed West on Rt. 40 for five miles. Turn right at the MIT Lincoln Lab, Haystack Observatory at the Groton town line. Proceed to the farmhouse on left side of the road. Clubhouse attendance varies with the weather. It is wise to call in advance: (978) 692-8708.

**Heads Up For The Month . . .**

**To calculate Daylight Saving Time (DST) from Universal Time (UT) subtract 4 hours from UT.**

- Apr Comet C/2011 L4 PanSTARRS – Sunset, NW Horizon
- Apr 10 New Moon
- Apr 18 First Quarter Moon (Moonset at midnight)
- Apr 22 Lyrid Meteors Peak
- Apr 20 Spica 0.004-deg S. of Moon
- Apr 25 Full Moon
- May 2 Last Quarter Moon (Moonrise at midnight)