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. 22, No. 2 February 2010

This Month's Meeting…

Thursday, February 11th, 2010 at 8:00 PM
Phillips Auditorium
Harvard-Smithsonian Center for Astrophysics
Parking at CfA is allowed for duration of meeting

Member Show and Tell Night

The February meeting will be a "Member Show and Tell Night". Four members have stepped forward to talk on some of their telescope making and observing projects. Mike Hill will be giving a talk on the completion of his ten-inch reflecting telescope, Mario Motta will describe the mechanical modification to his 32-inch Milligan Relay telescope, Tom Calderwood has been volunteering his time at the Maria Mitchell Observatory and will be giving a short presentation on that subject and Paul Valleli has a ten minute presentation on his imaging of Mars with his fourteen-inch SC telescope.

Also, this is an opportunity to bring in any equipment you'd like sell to the membership.

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…

We're fast approaching the time of the year when club officers and Members-at Large are selected and we could use your help in this process. Help can come in three forms: running for one of the elected positions, being a member on the Nominating Committee or casting your vote at this June's annual meeting.

There are two ways a member can become a candidate for one of the elected positions. The first is to have you nominated for a position by the Nominating Committee at the May meeting, or be nominated from the floor at the annual meeting in June provided that a suitable written notice, containing the name or names of the person or persons to be nominated from the floor at the annual meeting, and the signatures of at least seven members, is filed with the Secretary not less than ten days prior to the date of the annual meeting.

The nominating committee is selected at the April meeting from a slate of six volunteer members presented by the president to the attending membership. A ballot is taken with the attending members and the top three vote getters are selected for the nominating committee and tasked with making election slate recommendations to the membership as described above.

If you're interested in participating as a club officer or volunteering as candidate for the nominating committee, please contact me via email (stevebeckwith@comcast.net) or via my home phone (978-779-5227).

Clear Skies
Steve Beckwith

~ Stephen Beckwith, President ~

January Meeting Minutes . . .

Ruben Kier and the Pacman Nebula

The January meeting of the Amateur Telescope Makers of Boston featured astro-imager Ruben Kier who has just published a new book on CCD imaging, *The 100 Best Astrophotography Targets: A Monthly Guide for CCD Imaging with Amateur Telescopes*. His personal goal has been to show how to produce images that can match those taken by much larger professional equipment. His talk explained how he selected his 100 best images, what he did to capture the images, how astrophotography can be used "to teach us about astronomy and to enrich the experience of the visual observer".

To help decide which objects to include in his book, Kier researched several lists of objects, including the Messier catalog, the Caldwell Objects, the Herschel 400 list and the O'Meara list. One of his criteria for selecting an object was to "make sure that every image is something that inspired the viewer". He also constrained his list to objects that can be imaged from mid-northern latitudes: from approximately minus 25-degree declination to the zenith. Finally, "it had to be bright

enough to be able to image with an amateur telescope, an average CCD camera and two hours of imaging." He settled on 48 Messier objects, 28 Caldwell objects 13 O'Meara objects, plus a bunch of Arp, Hickson, Sharpless and Barnard objects.

While good optics are important, Kier insisted that you do not need to spend a lot of money. For wide field work he uses 180mm and 300mm manual focus camera lenses that he bought used on eBay for $200 each. His telescopes include a Takahashi Sky90 APO refractor, a Tec 140 APO refractor and a 12" Meade modified Schmidt-Cassegrain. His CCD imaging cameras are a QSI-583, an SBIG ST10XME, and the SBIG ST2000XM anti-blooming version.

Kier first introduced the emission nebulous objects by explaining that ultraviolet emitting type O and B stars ionize hydrogen gas in their vicinity and that their recapture of the electron as it falls into a lower energy state produces the reddish glow. He showed us some wide field images of the North American nebula, the Heart and Soul nebula and the "Horse" or Wizard nebula. Kier normally uses a hydrogen-alpha filter plus an RGB (red-green-blue) filter set for CCD imaging of these nebulas.

As stars mature and die they shed their outer layers and produce interstellar dust. The Flaming Star, The Iris, Cocoon, the Pacman, Cave, Trifid and the Lagoon and the Orion nebulas are examples of reflection nebulas. These objects have a greater blue spectrum component due to nearby type O and B stars, and also because "dust preferentially reflects blue light better than it does red light".

Kier continued by explaining open and globular cluster star colors by referring to the Hertzsprung-Russell (H-R) diagram. He reminded us that many of the clusters are very old and that most of those stars are white and yellow while older ones are red and yellow in color. Photographically the few brighter blue type O, B and A stars dominate the image even though there are many more yellow and red stars that cannot be detected. Some examples of open clusters are the Double Cluster, M67, M44, M35 (plus NGC 2158), M37 and M45. Globular clusters are even older and primarily have white and red stars but rarely have any blue stars.

As a Type O super-giant star ages, it changes into a red super-giant. When it exhausts its hydrogen, it "burps" its outer layer and a strong stellar wind develops with the layer interacting with the star creating a Wolf-Rayet star. Kier showed the Crescent Nebula in Cygnus.

As opposed to Wolf-Rayet stars, planetary nebulas start out as stars similar in mass to our Sun. When these stars age to the red giant stage, they shed their outer shells and "blossom in a brilliant splash of color". Many planetary nebulas also have outer halos. Kier uses a technique of binning the luminance filter (2x2 or 3x3) and un-binning (1x1) the RGB channels to capture the dim outer regions. He then combines those images with other exposures that properly expose the core.

It was a learning experience for Kier when he realized that the expanding shell of interstellar material in a supernova shockwave was not the exploding star. The shockwave interacts with hydrogen and oxygen causing them to glow in objects like the Witches Broom portion of the Veil Nebula or the Jellyfish Nebula in the constellation of Gemini.

Galaxies have been found to be unique due to their different sizes, shapes and compositions, as well as their internal and external activities. Many of the same objects that we can see in our own galaxy, such as hydrogen alpha emission nebulas, active star forming regions, and supernovas, can be seen in other galaxies as well. Kier showed the galaxy M33, which has a hydrogen alpha region that is 50 times the size of the Orion Nebula and has its own NGC designation. He also presented the face on spiral NGC 6946 in which you can see many active star forming regions.

In closing, Kier talked about interacting galaxies. He showed various images, such as the Whale and Hockey Stick galaxies that have twisted and distorted arms. Kier also mentioned that he has borrowed a technique used by R. Jay GaBany to create a reverse luminance which produces an inverse image that allows us to see a stream of stars being pulled over from the interacting galaxies NGC 3729 and NGC 3718.

Sky and Telescope editor Bob Naeye informed the club that the March edition of the magazine featured an article talking about the effort to digitize the glass plates at Harvard University. The club and several of our members are mentioned in the article.

Bob showed some images from his 2003 trip to the European Southern Observatory in Cerro Paranal and the Cerro Tololo Inter-American Observatory in Chile. In 2009 Bob returned to Chile and visited the 8.1-meter Gemini telescope and the 4.1-meter SOAR Telescope. He showcased two nearby amateur telescope facilities near the city of Vicuna and the Observatorio de la Cruz del Sur (Observatory of the Southern Cross) which is another amateur facility near the city of Combarbala.

The Secretary's report was given by Al Takeda.

The Membership report was not given.

President Steve Beckwith gave the Treasurer's report.

Steve Beckwith gave the Observing report. The C-14/ Paramount mount in the Ed Knight Observatory is now operational.

The Clubhouse report was given by Steve Clougherty. He reported that the 17-inch and 20-inch Dobsonians are available although it is recommended that a Clubhouse Committee person should be assisting you with the 20-inch. The outside staircase is in place for the clamshell but some electrical work still needs to be done. Work was done to comply with an inspection report by MIT.

New Event Announcements:

- Quantum Mechanics Course – Fridays from Jan 29-Mar19
- New Member Night – Sat., Feb 20 at 7:00 pm
- Clubhouse Work Party – Sat., Feb 27

New Star Parties:

- Butler Middle School Star Party - Tuesday, Feb 23
- Annual 4th Grade Acton Star Party - Mon., Mar 1

Mario Motta announced that he has been appointed to the board of the IDA (International Dark Sky Association)

President Steve Beckwith reminded the group that elections for club officers will be held in June. If anyone is interested in participating in the nominating process please contact President Steve Beckwith.

Peter Bealo auctioned off some astronomy equipment on the back table. The proceeds of the auction were donated to the club.

~ Al Takeda, Secretary ~

Clubhouse Report . . .

January 2010

Thursday night mirror grinding, Friday night Astronomy lectures, and Saturday night observing sessions continue limited only by weather conditions. Having welcomed in the New Year under cloudy, snowy skies, the first work session of 2010 took place on January 2nd under continuing snow and 26 degree temperatures. This effort was made possible by 17 members: Sai Vallabha, Al Takeda, Art Swedlow, John Small & son, Sergio Simonivic, John Reed, Dave Prowten, Eileen Myers, Brian Maerz, Dick Koolish, Sydney Johnston, Mike Hill, Steve Clougherty, Paul Cicchetti, John Blomquist, and Bruce Berger.

The one action that saved the day's program was the MIT plow making several passes around the driveway. This allowed plow/blower/shovel snow removal to be tackled by John B., Steve C., Eileen M., Sergio S., & Sai V.; earlier by Mike H. and Bruce B. Access paths, parking areas, and observing field were now accessible.

Since the house was still clean from the previous day's New Year's party, several projects were tackled. Brian M. took charge of removing paint from the pump room storage area; he then sorted and stored the water based paint in the heated bathroom. Bruce B. and Mike H. reconstructed the 4-holer floor off the barn machine shop. Paul C., Al T., and John R. completed the installation of the safety railing around the house attic stairwell hole. Dave P. reconstructed the failing window in the library.

Bruce B. donated a laptop computer to control the C-14 telescope; Eileen M. donated a new magazine rack for the meeting room. Art S., Sai V., and Eileen M. served a lunch at 2pm consisting of baked chicken, spaghetti with sauce and salad, deli tray sandwiches and hot garlic bread. As evening approached news reports of accidents north and south due to black ice on roadways prompted John Small and John Panaswich to close the clubhouse before members might leave their homes. A final pass by the MIT plow kept the driveway clear. Several volunteers stayed on continuing small projects, until the road conditions improved. The house was closed by 10pm.

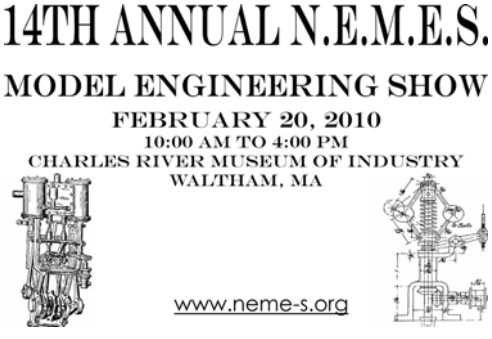
The next work sessions will be held January 30 and February 27, 2010 from 10am until the evening crew takes over. Repair of the bathroom walls and ceiling, damaged by the old leaking barn roof, and repair of the evaporator room floor, damaged by seeping water, will be started. Pump room wiring and machine shop construction will continue. Come on out. It will be good to see you at either or both sessions.

~ Clubhouse Committee Directors ~
~ John Reed, Steve Clougherty and Dave Prowten ~

(L-R) Paul Cicchettii and John Reed building safety railings. Image by Al T.

Clubhouse Saturday Schedule

Feb 6	Bruce Berger	Mike Hill
Feb 13	Clougherty,Mock-**Messier Marathon 1**	
Feb 20	Phil Rounseville	Brian Leacu
Feb 27	P. Cicchetti + J. Reed – **Work Party 3**	
Mar 6	Ed Budreau	Rich Burrier
Mar 13	Myers + Nugent - **Messier Marathon 2**	
Mar 20	Art Swedlow	Sai Vallabha
Mar 27	A.Takeda+B. Toomey– **Work Party 4**	



Membership Report . . .

Membership as of 01/29/2010 - 312 members.

Please contact the Membership Secretary if you have any problems logging into the ATMoB website or navigating through the renewal process, at Membership@ATMoB.org. Membership has its privileges. Consider making a New Year's resolution of attending a monthly meeting in Cambridge and a workshop/observing session at the clubhouse in 2010. There is always something new and exciting going on!

The Amateur Telescope Makers of Boston, Inc. is a 501(c)3 organization. Donations are gladly accepted and are tax deductible to the extent allowed by law. While the deadline for 2009 charitable donations has passed, please consider making a tax-deductible contribution to the club when planning for 2010 and beyond.

All members are encouraged to seek out and welcome our new members:

Jaques Pena **Patricia Udomprasert**
Samir Amin **William O'Neil**

membership@atmob.org

~ Tom McDonagh – Membership Secretary ~

Sky Object of the Month . . .
February 2010 - β Orionis (Rigel)

You won't need a finder chart to locate this month's featured sky object. It's the first magnitude star β Orionis, better known by its proper name Rigel. Seventh brightest star in the night sky, Rigel dazzles us with a diamond-white color; especially striking when compared with Orion's other first-magnitude star, the ruddy-hued Betelgeuse.

Many backyard astronomers are unaware that Rigel is a double star. Its companion (Rigel B) lies 9 arc-seconds away – a gap that should be easily breached by the smallest of telescopes. Unfortunately, it shines at magnitude 6.8, 400 times fainter than the primary. As a result, the little star often hides in the glare of its master.

In 1822, the first reliable measure of the Rigel system indicated a separation of 8.9" and a position angle of 201°, the latter meaning that Rigel B lay south and slightly west of the main star. Not much has changed in nearly two centuries. In 2004, the separation and P.A. had increased slightly to 9.4" and 204°. Because Rigel A and B share a common proper motion, astronomers believe they form a physical binary separated by a whopping 2500 AU – a distance over 60 times greater than the gap separating Pluto from the sun. Their orbital period is thought to exceed 25,000 years. The last time Rigel B was in its current orbital position the Earth was in the grip of the Ice Age!

Because of the large disparity in brightness between its components, Rigel offers a similar challenge to the one presented by the notoriously difficult Sirius. While Sirius and its white dwarf companion the "Pup" require absolutely steady seeing conditions and an 8-inch or larger telescope, Rigel may be split with a 6-inch under normal sky conditions. Years ago, on an evening of unusually steady skies, I managed to glimpse Rigel B with a 3-inch f/10 Edmund reflector (the classic model sold back in the 50s and 60s) and a magnifying power of 120X. I cheated, first spotting the companion with a 6-inch reflector. Knowing where to look, I had no trouble capturing Rigel B with the 3-inch. It appeared as a tiny bluish speck just outside the brilliant sparkle of the main star.

Next time you turn your telescope skyward to admire the Orion Nebula, take a side trip to Rigel. Unlike the legions of backyard astronomers who have marveled at the great nebula, you'll be among a much smaller group of observers who have admired Orion's brightest binary star.

Your comments on this column are welcome. E-mail me at gchaple@hotmail.com.

~ Glenn Chaple ~

Thoreau on Astronomy . . .

The sun being low, I see as I skate, reflected from the surface of the ice, flakes of rainbow somewhat like cobwebs, where the great slopes of crystallization fall at the right angle, six inches or a foot across, but at so small an angle with the horizon that they had seemed absolutely flat and level before. Think of this kind of mosaic and tessellation for your floor! A floor made up of surfaces not absolutely level, though level to the touch of the feet and the noonday eye, composed of crystals variously set, but just enough inclined to reflect the colors of the rainbow when the sun gets low.

Journal, 12 February 1854

~ Submitted by Tom Calderwood ~

Preservation of Archival Materials . . .

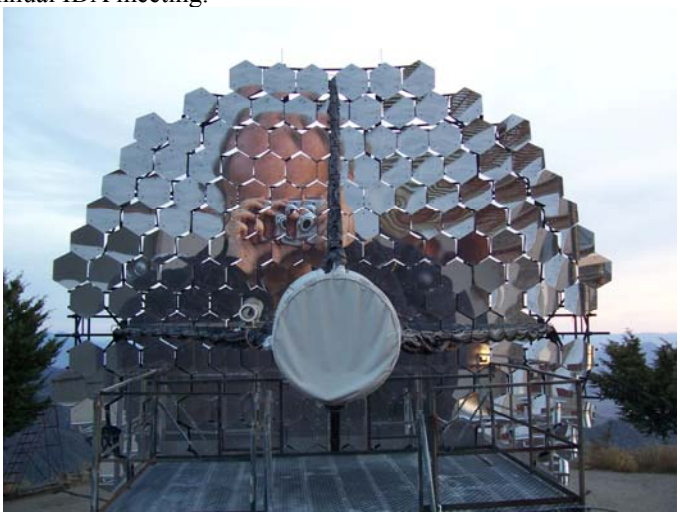
I have started organizing a group to work on the preservation of the club's archival material. The group will be under the auspices of the Clubhouse Committee. If you are interested and can attend work sessions once a month at the Tom Britton Clubhouse, e-mail me at anna.hillier@verizon.net during the month of February 2010. Monthly attendance at work sessions is not a requirement since we all have prior commitments, but with a large enough group, work will continue. Three other members in the group so far are Chase Green, Eileen Myers and Al Takeda. We shall start by discussing and sharing information on how to archive. I hope you will join us.

Best,

~ Anna Hillier~

Extrasolar Planets . . .

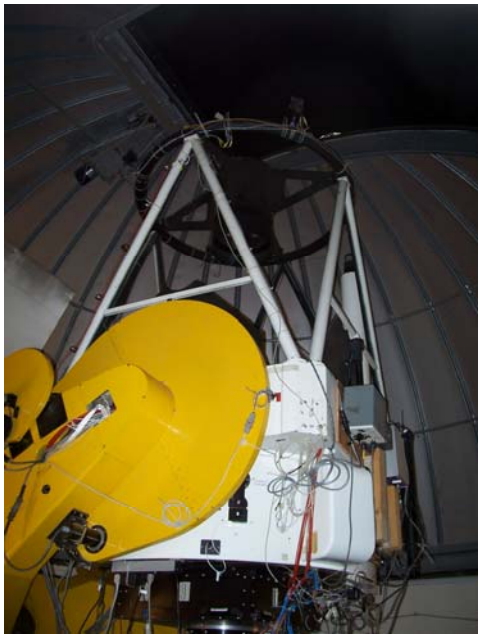
This past November I had the good fortune to take advantage of an invitation to spend time at the Fred Lawrence Whipple Observatory (FLWO) on Mount Hopkins in southern Arizona. I had been invited by 2 good friends, Dr. David Latham at Harvard CFA, and Dr. George Ricker of MIT to participate in an amateur professional collaboration on transits in the search for extra solar planets. I had a couple of days free between an AMA meeting in Houston, and a talk I was invited to do at the annual IDA meeting.



VERITAS Megalomania

Mt. Hopkins is best known for the MMT telescope, which at one point in fact had multiple mirrors, but now is a 6.5-meter giant telescope. I unfortunately was not given any observing time with that telescope, but did get a wonderful tour of it. The Observatory also boasts an array of gamma ray search telescopes. There is the VERITAS (Very Energetic Radiation Imaging Telescope Array System) with an array of four 12-meter segmented mirror telescopes. They do not detect any actual gamma rays; rather, they detect the photons emitted when gamma rays strike our upper atmosphere. If you stand at the focal point of one of these outdoor telescopes you can see an interesting image of yourself. I took an interesting image just inside the prime focus point of one of these detectors. There is the HAT (Hungarian-made Automated Telescope) array of small refractors that constantly scan the entire sky looking for any variable stars. Then there is the MEarth array of eight 16-inch Plane wave telescopes also scanning for any transits. I went to spend the night on the 48-inch scope dedicated to transit follow ups. (There is also a 60-inch scope dedicated to that purpose as well). You can see, Harvard is full swing into looking for extra solar planets!

I spent the first night at the home of Alan Delman (an expatriate long time ATMoB member), who lives at the foothills of the mountain. The next day we drove to the top of the mountain, where we were not only given a grand tour by Emilio Falco, but also shown our assigned sleeping quarters for visiting astronomers. Under Dr. Latham, the Observatory is now known as a planet hunting mecca. You need to bring your own food, but other than that, accommodations are quite comfortable.



My assignment was to spend the night on the 48-inch telescope with astronomer Gilbert Esquerdo, who graciously gave of his time. Admittedly, transit data collecting can be very tedious. Once the target is chosen, the software takes over and takes repeated images of a single star so that measurements could be taken off the light output. The goal is to see if the light output changes in any way from the comparison stars in the same field. Depending on the size of the planet, this can range from a "large" 1% drop, to as little as 100th of a percent. With much of this being fully automated, that allowed plenty of time for open discussion and training. I was fortunate to thereby have a one-on-one tutoring session on how to do transit studies, reduce the data, and graph appropriately. The experience was so exhilarating that I stayed up all night absorbing as much as I could from a very willing and patient teacher.

Worldwide over 400 planets have now been discovered, most via the Doppler method from spectroscopy, but about 80 from transits. What is most exciting is that transits are the best way to discover small planets such as the one we inhabit. The Harvard team is one of the world leaders in this field, second only to Dr. Marcy (Berkeley) in California. Dr. Rickers at MIT primarily does his research with satellites, and has many "possibles" that need follow-up. Both institutions welcome amateur professional collaboration, something the members of the ATMoB could get involved with if interested. For those who are at the stage where they may want to go beyond simple observing or imaging, this is a great field to get involved with, and one that would be appreciated by the professionals. I do in fact hope to discover a planet some day!

~ Mario Motta ~

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March *Star Fields* <u>DEADLINE</u>
Wednesday, February 24th

Email articles to Al Takeda at
secretary@atmob.org
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POSTMASTER NOTE: First Class Postage Mailed Feb 4th, 2010

Amateur Telescope Makers of Boston, Inc.
c/o Tom McDonagh, Membership Secretary
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FIRST CLASS

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OBSERVING AND PUBLIC OUTREACH
STAR PARTY COORDINATOR:
Virginia Renehan starparty@atmob.org

How to Find Us...
Web Page 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 Eastern Standard Time (EST) from Universal Time (UT) subtract 5 from UT.

Feb 5 Last Quarter Moon
Feb 12 Mercury is 2 degrees South of the Moon
Feb 13 New Moon
Feb 21 First Quarter Moon, Pleiades (M45) is 0.1 deg. S. of Moon
Feb 24 Moon is 0.7 deg. North of M35 Cluster
Feb 28 Full Moon
Mar 6 Last Quarter Moon