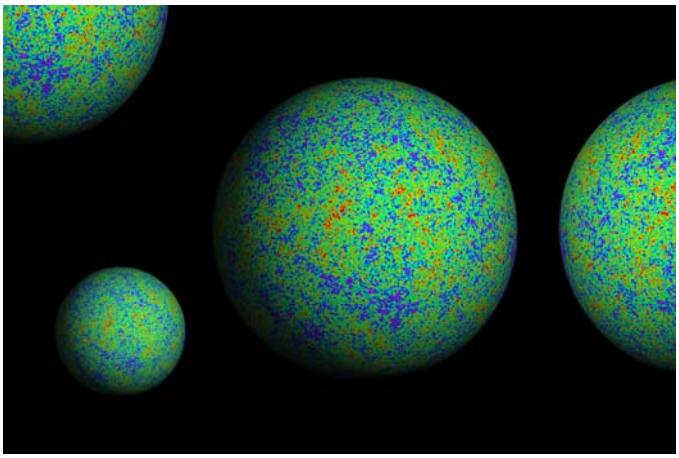
STAR FIELDS

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

Vol. 26, No. 2 February 2014

This Month's Meeting…

Thursday, February 13th, 2014 at 8:00 PM
Phillips Auditorium
Harvard-Smithsonian Center for Astrophysics
Parking at the CfA is allowed for the duration of the meeting



Maps of the Cosmic Microwave Background. ESA Planck satellite/Max Tegmark.

Our Mathematical Universe

Our speaker this month will be Professor Max Tegmark who teaches Physics at MIT and is a leading researcher in the area of Precision Cosmology. He has just finished writing a new book called ***"Our Mathematical Universe, My Quest for the Ultimate Nature of Reality"*** and will talk to us about the book and the theories he presents which encompass the areas of Physics, Cosmology, Philosophy, and the mathematical nature of our universe and the reality that we perceive.

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…

For many months now I have been watching Jupiter rising out across the fields I overlook to the east and arching up overhead as the night progresses. No telescope. No binoculars. Just me and my imagination. What has been fun to watch is the progression of time, for when I first started really noticing Jupiter was rising around midnight or so and I was seeing it as I stepped out for my last look up before retiring to bed. If I happened to get up in the middle of the night and happened to go out for a quick look there was Jupiter staring, no - glaring down at me, from high above – a most beautiful sight when the air was clear and crisp. Over the months I have watched that timing progress earlier and earlier, night by night until now I step out just after sunset and there in the approaching darkness is a dim Jupiter peering through the dusk, soon to be the brightest object in the sky – shining like a diamond. Jupiter is at or near opposition now and therefore it is a great time to get out and view it telescopically as well as visually. Being that it is so big it is certainly one of the more entertaining of the planets since you get to see a good deal of detail and it is ever changing.

Some of the other planets can be equally entertaining though. Venus just put on a spectacular show, first shining brightly in the western sky and also putting on a great show of daily motion as it slid down from its greatest eastern elongation with ever increasing speed and culminating with the show of a tiny thin crescent as it approached the Sun. I got to see it when it was a thin crescent but I wasn't adventurous enough to get out there when it was a really, really thin crescent. I just enjoyed the pictures taken by others - those brave enough to point their telescopes just a few degrees from the Sun.

By the time you read this Venus will be a morning object, it will have gone through a similar phasing but in the opposite direction and will now start climbing up into the eastern sky. It will be joining the other two planets of note, Mars and Saturn, which by now are prominently placed in the southern skies in the early morning. You'll have to be an early bird to see these but like Jupiter rising in the east for me, the nightly progression will bring these into view earlier and earlier making for interesting summer objects.

Planets are fun to watch with or without optics. So if you want to observe, but don't want the bother of dragging out equipment, just focus in on planets, their motions, and ever changing positions in the nighttime sky.

~ Mike Hill – President ~

Planetary Images by Chuck Evans

January Meeting Minutes . . .

Professor Karin Oberg.*

Minutes of ATMoB meeting held on January 9, 2014.

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

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

- Sidney Johnston gave the Secretary's Report of the December 12, 2013 meeting.

- Mike Hill gave the Treasurer's report prepared by Treasurer Nanette Benoit.

- Tom McDonagh gave the Membership Secretary's report. Tom mentioned that there are now 274 members, as some were dropped for not paying dues.

- Glenn Chaple gave the Observing Committee Report: A double star party is scheduled for Jan. 23 with a rain date of Jan 25th. Also, on the 25 of Jan there will be an eclipse of the star Algol. Eclipse viewing will start at 6:00 PM and Algol will be at its maximum at about 8:30 - 8:50 PM.

  Mercury is near its greatest eastern elongation, and will be near the crest of the Moon. On the 20th of March there should be an occultation of Regulus by an asteroid.

  Globe at Night is expanding their light pollution survey program to be monthly. Check the www.globeatnight.org web page for more information on participating.

- Steve Clougherty gave the Clubhouse Report. Steve thanked several members for their work on the evaporator room. The 20-inch Dobsonian is in the Clubhouse. The 25-inch Dobsonian mirror is being re-silvered privately and is going in the rolloff roof observatory. There is hope that it will be up and running in March.

- Mike Hill announced that the DVD lecture series "Impossible: Physics beyond the Edge" will be shown at the Clubhouse on Friday evenings.

- The April issue of Sky and Telescope has an article on a 70-inch amateur telescope.

- Old Business: None

- New Business: None

President Mike Hill introduced Professor Karin Öberg, Ph.D. as the invited speaker. Dr. Öberg earned a B.Sc. in chemistry at California Institute of Technology and a Ph.D. in astronomy from Leiden University, the oldest university in the Netherlands. She has served as an Assistant Professor of Astronomy at Harvard, an Assistant Professor of Chemistry and Astronomy at the University of Virginia, and a Hubble Postdoctoral Fellow at the Harvard CfA.

Professor Karin Öberg's talk was titled "Icy Origins: Snowlines During Star and Planet Formation". In the talk she described millimeter wave spectroscopy of molecular gas clouds found around stars, which are protoplanetary disks of gas and dust. The transitions between molecular energy states which she observed have photon energies in the 200 – 400 gigahertz frequency range, which is in the millimeter and sub millimeter wavelength range. The Atacama Large Millimeter Array (ALMA) and Submillimeter Array (SMA) were used for the observations.

The Atacama Large Millimeter Array (ALMA) and Submillimeter Array (SMA) is an array of parabolic reflector radio telescopes which will total 66 antennas when completed. They are located in the Atacama Desert of Chile at an elevation of approximately 5,000 meters (about 16,000 feet or 3.1 miles) above sea level. The array will have a baseline measured in kilometers. This array of antennas is powerful enough to study molecular disks surrounding stars. The reflectors must be accurate parabolas to sub-millimeter dimensions. Angular resolutions in the sub arc seconds can be achieved with sufficient sensitivity and low noise to study the jansky level microwave signals reaching Earth from these molecular clouds. A one jansky signal is 10^{-26} watts per square meter, which is about 10^{-16} times smaller than an ordinary radio communications signal in intensity, and so requires very sensitive equipment for detection.

Laboratory experiments aimed at simulating the chemistry and physics of interstellar molecules and dust coatings are conducted in order to identify photon energies likely emitted by molecules believed to be in protoplanetary disks. Searches using the proper telescopes are then conducted in order to detect the expected molecules.

Molecules of interest include carbon monoxide (CO), formaldehyde (H2CO), nitrogen ions HN2+, and many other small organic molecules. A search is underway to look for emissions of amino acids, which to date have not been found.

The small molecules accumulate on dust grains where they undergo further chemical reactions to form more complicated

molecules. Dust often refers to small inorganic particles which range in size from a few molecules to 0.1 microns in size. The Atacama AMA/SMA antennas are helping to open up this phase of cosmic chemistry.

Near a star, surrounded by dust and gas, the temperature of the dust and molecules is high and the molecules are in a gas phase. Farther distant from the star the temperature drops and a snow line forms for the molecules, beyond which distance the molecules are in a solid phase. The location of the snow line is important in this cosmic chemistry, and the snow line can be detected by the radio photon emissions of the gaseous phase molecules. Different molecules have their own freezing temperature and so snow lines for different molecules form at different radii from the star. Images of the radio photon emissions, with sufficient angular resolution, can locate these snowlines.

When in contact with each other on a dust grain the simple molecules can interact chemically with each other and form more complex molecules. The more complex molecules may be seeds which lead to the formation of life.

Water ice and methane (CH4) ice spectral lines in the 3 micron range of infrared spectroscopy were detected in protoplanetary disks using the Keck telescope. (Boogert, Blake, and Öberg, "Methane Abundance Variations Toward the Massive Protostar NGC 7538 IRS 9", The Astrophysical Journal, 615:344–353, 2004, (www.arxiv.org/pdf/astro-ph/0407270.pdf)

The detection of these infrared emission lines shows that small molecules, especially methane, are in protoplanetary disks. It then is reasonable to look for more molecular signatures at frequencies of molecular transitions, especially at microwave millimeter wavelengths.

As an example, hydrogen has quantum energy levels where transitions produce the visible hydrogen alpha (red), hydrogen beta (blue green), and hydrogen gamma (blue) photons when excited. Also, hydrogen produces a 21-centimeter wavelength photon which radio astronomers use to map hydrogen in the Milky Way galaxy, and other galaxies. As a further example, molecules have rotational and vibrational quantum levels between which transitions produce photons in the millimeter and sub millimeter wavelength range, including those from about 200 to 400 gigahertz.

Millimeter range observations were discussed by Professor Öberg. These observations are designed to detect specific photon energies emitted by molecules believed to be in protoplanetary disks. The millimeter range observations looked at photon frequencies for formaldehyde (H2CO) at 225.69778 gigahertz and 281.52693 gigahertz, and for the molecule HN2+ at 279.51170 gigahertz. (www.arxiv.org/pdf/1301.2465v1.pdf)

These frequencies are slightly over 1 millimeter wavelength, requiring considerable accuracy in the construction of the parabola of the antennas.

Snow lines for these molecules were obtained as contours with sub arc second space resolution.

Emission from millimeter wavelength H2CO and HN2+ lines has been detected in a number of protoplanetary disks. Most detections are toward T Tauri stars with massive disks.

Research is continuing in a search for chemical reactions in protoplanetary disks which could indicate an origin of complex molecules leading to establishment of life on dust grains in the disks.

The meeting was adjourned at 9:30 PM

~ Sidney Johnston, Secretary ~

Clubhouse Report . . .

January 2014

John Blomquist milling down the teflon block for the 25-inch base.*

Weekly Saturday night observing, preceded by the Friday night astro class and DVD Lectures, and Thursday mirror grinding (except for the 2nd Thursday of the month meeting at Harvard) continued during this month.

The full moon Saturday work party took place on January 18th. The club thanks these 19 members and friends for donating their day to this effort: Joshua Ashenberg, John Blomquist, Paul Cicchetti, Steve Clougherty, Mike Hill, Eric Johansson, Dick Koolish, Tom Lumenello, Mike Mattei, Eileen Myers, Dave Prowten, Cheryl Rayner, John Reed, Art Swedlow, Al Takeda, Sai Vallabha and Bill Toomey with student & parent Leanne & John MacDonald.

With the morning temperature at 28 F, both in and outdoor activities proceeded as follows:

- Steve C, Sai V, Dave P and Cheryl R removed the "ground board" from the large Dob housed in the Ed Knight roll off observatory. The ground board was carried into the machine shop and the worn teflon pads were removed. Two new roller

bearings, fabricated by Dave P earlier in the week, were successfully installed in their new brass housings and replaced two of the teflon pads. John B meanwhile milled a 3" by 3" block of Teflon which Dave then installed to complete the new 3 point azimuth bearing. The bearings were leveled and the altitude teflon bearings were tightened down. The ground board was scrubbed clean by Cheryl and Steve. Many others assisted in this effort.

- The secondary was removed and brought home by Steve C. We are investigating the possibility of an aluminum re-coat. (*Editor: The secondary has been re-aluminized)*

- While the weather held, Joshua A (as he did last month), with Bill T and his student Leanne M worked to clear more brush away from near the rear of the far barn.

- The clean up and reorganization of the new telescope room was led by Mike H.

- Floor scraping of linoleum debris from the evaporator room floor continued by Paul C and John R. Electronic room organization was continued by Al T.

- Replacement water filters were purchased and delivered to the pump room for the periodic changing by the staff. We use a double system of 25 microns followed by a 5 micron filter to provide the polishing room with clean water. Night lights with clear red bulbs were also purchased and stored to provide for 'red light nights' in the future. With the new year, Congress has stopped the manufacture of incandescent bulbs; the replacement bulbs have proven to be temperature sensitive and LEDs are too bright for our use.

- Subsequently, Healy Oil called to remind us about filling the tank before we run out again. The tank is now full. This prompted us to remind all members to drain the water supply line before closing the Clubhouse during winter weather. Turn the supply valve CLOSED, and the drain valve OPEN. Ask an 'A' member to help you refresh your memory.

- Lunch was served by our intrepid crew by 2 pm, by which time the forecast snow had started. Prep was handled by Sai, Eileen, Cheryl, Leanne, Eric, John, Dick and others walking by (or munching donuts). Cleanup was handled by the hardy few.

As the snow began to build up, first outdoor activity stopped and then the indoor work. By 5 pm the snow removal required the closing of the Clubhouse and removal of cars. Work will resume at the next full moon session on February 15th. Please join us.

We are grateful to Tom Lumenello who drove to the Clubhouse to personally inform us of the passing of Chuck Evans.

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

Clubhouse Saturday Schedule

February 15	Brian Maerz and Glenn Meurer **WORK PARTY # 2**	
February 22	Eileen Myers	Rich Nugent
March 1	Steve Clougherty + Neil Fleming **Messier Marathon #1**	
March 8	Nina Craven	Rich Burrier
March 15	Art Swedlow and Sai Vallabha **WORK PARTY # 3**	
March 22	George Paquin	Tom Wolf
March 29	Henry Hopkinson and Dave Prowten **Messier Marathon #2**	
April 5	John Maher	Tom McDonagh

Sai Vallabha preparing lunch. *

Membership Report . . .

Membership count as of 01/27/2014 is at 284 individuals
Same time last year: 277

A number of members have experienced problems with the Mailing List subscription. If you believe you have experienced an issue with this function or with logging into the ATMoB website, please contact me via email at membership@atmob.org.

You can access your mailman user group subscriptions through our website. Simply log into the ATMoB.org website using your email address as your login ID. At the bottom of the home screen you will find a clickable link labeled Mailing Lists. From this page you can manage your ATMoB-Announce, Discuss and Newsletter subscriptions.

Please don't forget to update your personal information such as email and mailing addresses.

New and Returning members in March 2013:
Sivan Kartha
Maria Batista
Brian Rusch
Daniel Caunt

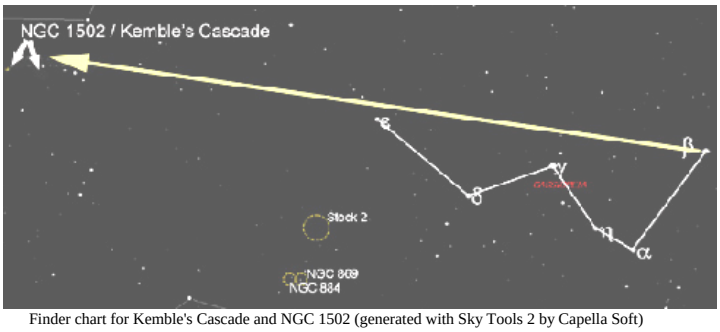
Welcome aboard!

~ Tom McDonagh – Membership Secretary ~

Sky Object of the Month . . .

February 2014

Kemble's Cascade/NGC 1502 – Asterism and Open Cluster in Camelopardis

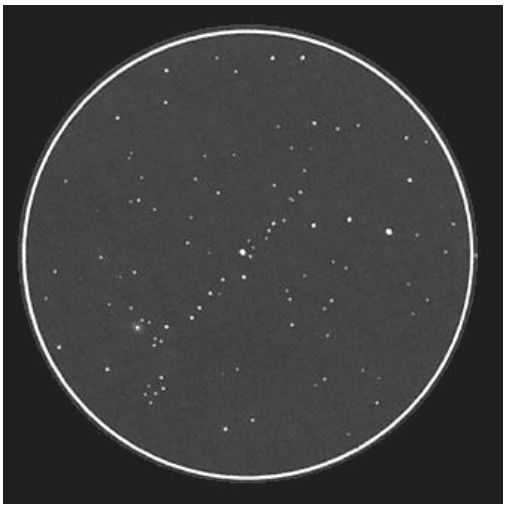


Finder chart for Kemble's Cascade and NGC 1502 (generated with Sky Tools 2 by Capella Soft)

Canadian amateur astronomer Fr. Lucian J. Kemble came across "a beautiful cascade of faint stars tumbling from the northwest down to the open cluster NGC 1502." He reported his finding to Sky and Telescope "Deep Sky Wonders" columnist Walter Scott Houston, who featured the remarkable asterism in the December, 1980, issue. Houston appropriately christened it "Kemble's Cascade."

This 2½ degree-long chain is comprised of some two dozen magnitude 7 to 9 stars with a 5th magnitude star at its midpoint. NGC 1502 is visible as a fuzzy patch of light at the southeastern end of the Cascade. This dazzling 8 arcminute-wide open star cluster is comprised of several dozen stars, magnitudes 10 to 11. At its center is the pretty double star Struve 485 (Σ485), a pair of 7th magnitude stars separated by 18 arcseconds.

Kemble's Cascade can be found by sweeping your binoculars from beta (β) through epsilon (ε) Cassiopeiae and continuing in a straight line an equal distance beyond. A dark-sky location on a moonless night will help you pick up the fainter Cascade members. Should you decide to view Kemble's Cascade via telescope, work with a rich-field instrument and an eyepiece that magnifies 15 – 20 times and captures a 3 degree field. NGC 1502 and its embedded double star are best viewed with a boost to 30X or more.



Sketch by Kiminori Ikebe (www.asod.info/?p=1272)

~ Glenn Chaple – Member at Large ~

Chuck Evans – In Memoriam. . .

Chuck Evans welcoming 2007 at the Clubhouse New Year's Eve party. *

From John Reed, Clubhouse Director

During the Clubhouse work party in January, Tom Lumenello arrived with the sad news of Chuck Evans' passing the day before.

Tom and Chuck pulled duty together for many Saturday nights over the years. We have enjoyed Tom's telescope projects and Chuck's observatory quest. We also followed the news of our members working with Chuck to build his observatory and get his telescope operational.

Our hobby builds true friendships. Memories of Chuck's accomplishments, through his great effort, helping with the Clubhouse, attending summer picnics and New Year's parties, and participating in club leadership roles will help us with Chuck's loss. Our sincere condolences go out to his family.

Editor: The obituary below was copied from the Littleton Independent *website.*

Charles Clark Cannelin Evans, 76, of Tyngsboro MA, formerly of Westford, died peacefully in his home surrounded by family on Friday, January 17. He was the husband of June (Brunkow) Evans with whom he shared 54 years of marriage. Born in Milwaukee, WI on November 24, 1937, he was the son of the late Dorothy and William Evans.

Chuck grew up in Park Ridge, IL and received his B.S and M.S. degrees in Electrical Engineering from the University of Illinois where he was a member of Delta Phi Fraternity.

Chuck began his career in 1961 at General Radio Company in Concord, MA as a Development Engineer and later Engineering Manager. In 1978, he joined Teradyne Inc. as Group Engineering Manager. In 1988 he returned to GenRad as Program Director. He finished his career as a self-employed consultant, providing technical and managerial services for new product development.

Among his professional activities, he was a Senior Member of the Institute of Electrical and Electronic Engineers (IEEE) and served on the Univ. of Illinois Electrical Engineering/Computer Science Alumni Board.

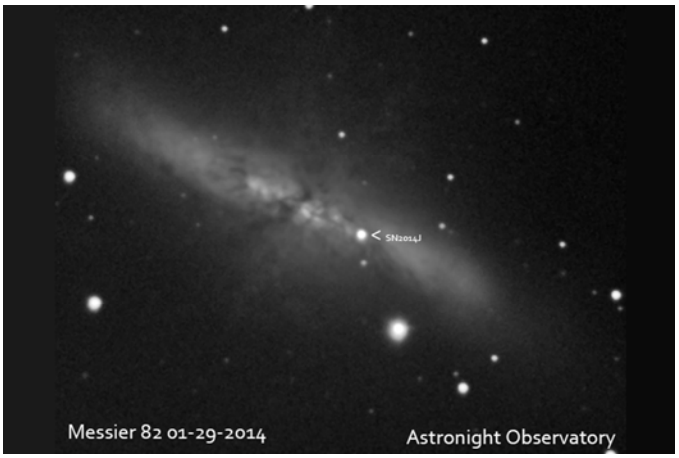
A 45-year resident of Westford MA, Chuck was a member of First Parish Church United, a former J.V. Fletcher Library Trustee, and a member of the Amateur Telescope Makers of Boston (ATMoB).

A consummate do-it-yourselfer, he was an accomplished astronomer, photographer, and builder of clocks and harpsichords. He greatly enjoyed classical music, travel, bicycling and was a former ski instructor at Nashoba Valley Ski Area. Chuck earned his private pilot certificate in 1954 and achieved instrument, multi-engine, commercial and glider ratings. After his retirement, he continued his passion for flying by serving as an Angel Flight pilot on 52 missions.

In addition to his loving wife June, Chuck is survived by three children: John Evans and wife Isabelle of Newton; Lisa Greene and husband Richard of Newton; and Sally Evans and husband Matthias of Natick, as well as six grandchildren, several nieces and nephews, and a brother, David A. Evans of Park Ridge, IL.

A memorial service followed by a reception will be held on Sunday, January 26th at 2 p.m. at First Parish Church United, 48 Main Street, Westford, MA 01886. In lieu of flowers, donations in Chucks memory may be made to VNA/Hospice of Middlesex East, 607 North Ave, Suite 17, Wakefield, MA 01880 (www.vnaofme.org) or The American Parkinsons Disease Association, 72 East Concord St. C3, Boston, MA 02118 (www.apdaparkinson.org/). Funeral arrangements have been entrusted to the care of BLAKE FUNERAL HOME, Chelmsford. For online condolences please visit www.blakefuneralhome.com.

M82 Supernova . . .



SN2014J Supernova in M82. Image by John Buonomo

Sometime around January 14-15 a supernova exploded in the irregular galaxy M82 in the constellation of Ursa Major (the Great Bear). Now dubbed SN2014J, this supernova peaked at a visual magnitude of 10.5 and was reported as having an orange tint due to its light being filtered by dust in the galaxy. It currently is bright enough to be seen in small amateur scopes.

Spectral analysis has confirmed that this is a Type Ia supernova caused by an exploding white dwarf star.

SN2014J was discovered by astronomy students and their teaching fellow at the University of London Observatory. Due to clouds obscuring most of the sky, the decision was made to change the program to an introductory lesson on CCD imaging. The students chose M82 as the target for the evening. While adjusting the telescope they noticed that there was a star overlaying the galaxy that was not seen on previous sessions. A check of archival photos confirmed that this was a "new" star.

ATMoB members have been visually observing this supernova at the Clubhouse whenever the sky is clear. A few members have been able to observe the exploding star with Steve Clougherty's 18-inch Dobsonian and Phil Roundsville's 10-inch Dobsonian.

John Buonomo, whose images are featured here, used an 8-inch Schmidt-Cassagrain telescope at f/10 and a Meade DSI pro II CCD camera.

Before the supernova. 27 March 2011. Image by John Buonomo

After the supernova exploded. 23 Jan 2014. Image by John Buonomo

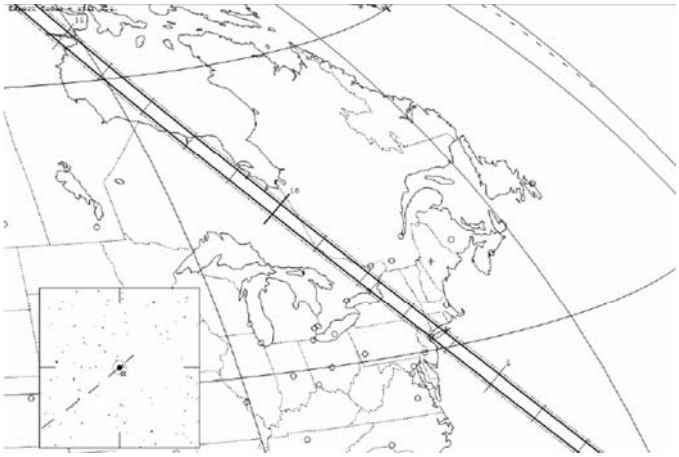
~ Submitted by Al Takeda ~

Asteroid Occultation of Regulus . . .

On March 20, 2014, the asteroid (163) Erigone will occult the star Regulus (Alpha Leonis) in the constellation of Leo at 06:10 UT (02:10 EST).

At that time, observers will be viewing Leo in the western sky at about 28 degrees in altitude.

The path of this occultation will be from Long Island to eastern Ontario (see map below).



Map from http://www.asteroidoccultation.com/observations/RegulusOcc/

In an occultation, a planetary body will drift in front of a star and occult its light. By accurately recording the time of the apparent change in brightness, the shape of an object can be determined.

A major effort to record this event is being made by the International Occultation Timing Association (IOTA).

Thanks to Dick Koolish and Glenn Chaple for alerting us to this upcoming event.

~ Submitted by Al Takeda ~

2014 Eleventh Annual - NEAF Solar Star Party (NSSP) . . .

EXPERIENCE THE GOLDEN AGE OF AMATEUR SOLAR ASTRONOMY

THE ROCKLAND ASTRONOMY CLUB
IS PROUD TO PRESENT THE 2014 ELEVENTH ANNUAL
NEAF SOLAR STAR PARTY

April 12 and 13, 2014
At the Rockland Community College
Suffern, New York

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 2014.
No star party entrance fee, or registration required.

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

For further information, please visit our websites:

www.rocklandastronomy.com

neafsolar.com

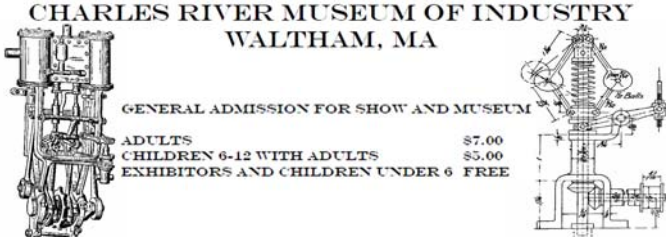
Editor: The 2014 Northeast Astronomy Forum & Telescope Show (NEAF) has more than 110 on-site equipment vendors & exhibitors, world-renowned speakers, daily solar observing, STARLAB planetarium shows, Getting Started Classes for beginners, space & astronomy events for kids, and great raffle prizes. April 12-13, Rockland Community College, Suffern, NY.

~ Submitted by Barlow Bob ~

18TH ANNUAL N.E.M.E.S.

MODEL ENGINEERING SHOW

FEBRUARY 15, 2014
10:00 AM TO 4:00 PM
CHARLES RIVER MUSEUM OF INDUSTRY
WALTHAM, MA



www.neme-s.org

*Editor: * Photos by Al Takeda unless otherwise noted.*

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March *Star Fields* DEADLINE
Sunday, Feb. 23rd

Email articles to Al Takeda at
newsletter@atmob.org

Articles from members are always welcome.
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POSTMASTER NOTE: First Class Postage Mailed February 5, 2014

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

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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 14 Full Moon
Feb 21 Saturn 0.3 deg. north of Moon
Feb 22 Last Quarter Moon (Moonrise at midnight)
Feb 25 Venus 0.4 deg. south of Moon
Mar 1 New Moon.
Mar 8 First Quarter Moon (Moonset at midnight)
Mar 9 Daylight Saving Time begins (subtract 4 from UT)
Mar 14 Mercury at greatest western elongation, 28 deg. (morning)
Mar 20 Vernal Equinox. Saturn 0.2° N. of Moon, Occultation of Regulus