



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. 5 May 2014

This Month's Meeting...

Thursday, May 8th, 2014 at 8:00 PM

Phillips Auditorium

Harvard-Smithsonian Center for Astrophysics

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

Black Holes and the Beast in Our Galaxy



Artist Conception of a Black Hole. NASA / JPL / CalTech

This month's speaker will be Monica Young from *Sky and Telescope* who will be talking to us about Black Holes which are one of the inherent mysteries of the universe. But even though we can't ever travel to a black hole and poke around, we can learn an awful lot by studying them from a safe distance. Gorging supermassive black holes shine like beacons from the distant universe, millions of stellar mass black holes inhabit our galaxy and a dormant beast that slumbers in the center of our galaxy may soon wake up for a snack. In this talk you will get a broad overview of what is known about black holes today and hear a bit about their ultimate fate.

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...

On April 16th I heard the sad news that Ed Knight had passed away. He was 98 and had a very full life to be happy for. Part of that life was with the ATMoB family and he was in no uncertain terms a very prominent part of that family. Among other things, he designed the roll off roof mechanism for our largest observatory – EKO, and had an integral part in the design of the main structure of our latest observatory – ARIO. His legacy will live on quietly as we, without much purposeful thought, work with both as we study the heavens with which he has become a lasting memory.

Our club, now 80 years old, has a lot of old timers! Members of note that have seen us through many years, both good and sometimes unduly stressful. Members who were active when telescope making was an integral, perhaps mandatory part of the hobby. Members who we look up to for their deep experience in the science and art of the hobby we share intimately with them.

I hope we can find the time to talk with these members. Hear their stories and learn from them - the history of the club, the hobby, and the experience of their past. These stories are important to pass on. Ask any long time member about the club's past and I'm sure you will very much appreciate all that they have to tell. I have done this in a big way as part of the planning for our June meeting. I am planning on it being a celebration of our 80 years and to that end have included some of these old timers to tell us all a thing or two about the history of the club from their perspective.

The perspective of the past is always a pleasure to hear. I already feel we are missing a great deal with the passing of Ed Knight but I know that there are those among us that have spent a good deal of time with him in these later years. His stories have not been lost. The stories of our aging members should not be lost either. We should make sure that they are told and I look forward to hearing some of them in June.

~ Mike Hill – President ~



Ed Knight attending the Club's picnic. August 5, 2006.*

March Meeting Minutes . . .



Dr. Justin Kasper, Principal Investigator for the SWEAP mission.*

Minutes of ATMOB meeting held April 10, 2014.

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

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

President Mike Hill introduced Justin C. Kasper, PhD, as the invited speaker.

Dr. Justin Kasper is an Associate Professor in the Department of Atmospheric, Oceanic & Space Sciences at the College of Engineering at the University of Michigan. Dr. Kasper is also a faculty member of the Smithsonian Astrophysical Observatory in Cambridge, MA.

The Solar Wind Electrons Alphas and Protons (SWEAP) Investigation is led by Dr. Kasper. Institutions participating in SWEAP include the University of California, Berkeley Space Sciences Laboratory, the NASA Marshall Space Flight Center, the University of Alabama in Huntsville, NASA's Goddard Space Flight Center, Los Alamos National Laboratory, the University of New Hampshire, and the Massachusetts Institute of Technology.

The SWEAP Investigation is slated to enter the solar corona by spacecraft and measure particles comprising the solar wind.

Dr. Kasper designs sensors for spacecraft that explore extreme environments in space from the surface of the Sun to the outer edges of the solar system. He is interested in understanding the forces that lead to solar flares and the solar wind, a stream of particles heated to millions of degrees in the Sun's atmosphere, or corona. His major results concern heating, instabilities, and helium in the solar corona and solar wind, and the impact of space weather on society. In 2007, he used measurements by the Voyager spacecraft to detect the termination shock, a massive shockwave surrounding our solar system. He has served on advisory committees for NASA, the National Science Foundation, and the National Academy of Sciences. He currently leads the SWEAP Investigation, an international team of

scientists and engineers building sensors that will collect samples of the Sun for the NASA Solar Probe Plus spacecraft, a mission of exploration that will make history in 2018 as the first human-made object to plunge into the solar corona.

Dr. Kasper's research include: Principal Investigator, SWEAP Investigation, Solar Probe Plus; Instrument Lead, Faraday Cup, Deep Space Climate Observatory; Co-Investigator, FIELDS, Solar Probe Plus; Instrument Lead, Solar Wind Experiment Faraday Cup, Wind spacecraft; Project Scientist and Co-Investigator, Cosmic Ray Telescope for the Effects of Radiation, LRO; PI of NASA and NSF grants to conduct investigations into the fundamental physics of solar corona and solar wind including heating, instabilities, composition, shocks, magnetic reconnection, and radio emission.

Two puzzles about the Sun continue to defy explanation more than half a century after their discovery. Why is the atmosphere of the Sun, or corona, thousands of times hotter than the surface of the Sun beneath it, and how is a fraction of the Sun's atmosphere accelerated to escape as the solar wind? The best way to understand what causes the observed heating and acceleration is to send a probe directly into the solar corona, and advances in technology and mission design have finally made this possible.

Solar Probe Plus, the Solar Wind Electrons Alphas and Protons (SWEAP) Investigation is a NASA mission designed to plunge directly into the atmosphere of the Sun for the first time in history. Reaching 4 million miles from the surface of the Sun, the spacecraft will enter a completely unexplored region of space. At these distances the Sun will be over 500 times brighter than it appears at Earth, and particle radiation from solar activity will be harsh. In order to survive, the spacecraft folds its solar panels into the shadows of its protective solar shade, leaving just enough of the specially angled panels in sunlight to provide power closer to the Sun.

Isothermal hydrostatic equilibrium applied to the solar corona indicates that if it has a temperature of 5,700 Kelvin, then it has a scale factor of only 175 kilometers, where measurements show it to be closer to 700,000 kilometers.

So the conclusion in the 1930s was that the solar atmosphere is either made of a new form of matter 1,000 times lighter than hydrogen (called "Coronium" in 1905), or 1,000x hotter than the surface. The higher temperature theory was rejected until unusual emission linked to million degrees plasma was detected in the 1930s. A corona this hot is unstable.

Slides showing the solar corona streaming out from the Sun during a solar eclipse, as well as a close up view of the Sun, both show an active and unstable solar surface. Particles and light ejected from the Sun make up an ever-changing solar wind, as would be expected from an unstable solar atmosphere.

There are two fundamental questions that remain unsolved. First, what gives the solar corona and wind their structure? Second, what heats and accelerates the solar corona and wind? To answer these questions it was proposed that spacecraft should

be sent into the corona to make direct measurements of the solar atmosphere.

The goal of the spacecraft project is divided into three objectives:

1. Trace the flow of energy that heats and accelerates the solar corona and solar wind.
2. Determine the structure and dynamics of the plasma and magnetic fields at the sources of the solar wind.
3. Explore mechanisms that accelerate and transport energetic particles.

Fifty years into the space age, the physics responsible for coronal heating is still one of the most pressing questions in heliophysics, with implications far beyond the field. Solar Probe Plus will transform our understanding of the solar corona, solar wind, and energetic plasmas in general by collecting the first direct samples in the solar atmosphere.

The mission launch is scheduled for July 2018.

The spacecraft orbit is planned to be an elongated ellipse with the first perihelion at 34 Rs (Rs is solar radii). Aphelion remains near the orbit of the Earth. Close passages by Venus will shift the orbit so that the perihelion distance will become less as subsequent passes reduce the perihelion distance. It requires more launch energy than is available to bring a spacecraft into an orbit that intersects the Sun because of orbital energy and angular momentum considerations. The sequence of orbits influenced by close passes by Venus makes it possible to bring the perihelion closer to the Sun surface as time unfolds. The spacecraft will finally pass perihelion at approximately 9.5 solar radii.

Accordingly, the scientific instruments must be able to withstand the high temperatures of the solar corona at close approaches to the surface of the Sun. Also, the spacecraft must be designed so as to not burn up on close approach, especially the CCD cameras and other electronics carried on board. Circulating water is used to cool critical parts, and the water system must be designed to also prevent the water from freezing when the spacecraft is far from the sun, such as when it is near the Earth's orbit.

It should be noted that the instruments for detecting particles of the solar wind are made from the highest melting temperature metals available from the periodic table.

A heat shield is interposed between the Sun and the rest of the spacecraft to protect against excess temperatures in the spacecraft. The pressure of light and particles from the Sun produce enough force on the spacecraft that torque from misalignment between the center of pressure and the center of mass must be carefully controlled, or the spacecraft will be spun around in its orientation and burned into a cinder.

The scientific instruments are being tested in the solar furnace in the Pyrenees Mountains at Font-Romeu-Odeillo-Via, on the French-Spanish border, and are also being tested by the use of

four IMAX movie projectors which deliver many Watts of light energy to the test objects.

Achieving the science goals of capturing and measuring the emissions of particles in the solar corona will be a difficult mission. However, success will shed light on fundamental questions about the composition of the solar corona, questions which have been pending for at least 50 years.

After the talk by Dr. Kasper the business meeting was held.

- President Mike Hill announced the formation of a nominating committee to select nominees for officer positions for the ATMob, with an election to be held during the June meeting.
- The Secretary's Report of the March 13, 2014 meeting was given by Sidney Johnston, Secretary.
- President Mike Hill gave the treasurers report prepared by Nanette Benoit, Treasurer.
- Tom McDonagh gave the Membership Committee Report.
- Glenn Chaple gave the Observing Committee Report.
- No Clubhouse Committee Report was given.
- Old Business: None
- New Business: None

The meeting was adjourned at 9:34 PM.

~ *Sidney Johnston, Secretary* ~

Membership Report . . .

Membership count as of April 21, 2014 is at 301 individuals.

Please welcome our newest and returning members: Kaixun Hua, Dave Stanley, Brian Andrew, Namesh Kotadia and Robert Toop.

The club's fiscal year begins June 1st. The membership renewal period begins at this time. Please mark your calendar and look out for renewal notices. New members are not required to renew at this time.

Our communication lifeline includes the ATMOb-Announce and ATMOb-Discuss mailing lists as well as our fantastic newsletter. Please refer to these tools for up to date information on club openings, events and interesting astronomy related discussions. Contact me with questions regarding accessing these options at: membership@atmob.org.

The Amateur Telescope Makers of Boston, Inc. is a 501(c)3 organization. Donations are gladly accepted and are tax deductible to the fullest extent allowed by law. Consider making a tax-deductible contribution to the club during your estate and tax planning this year. Many companies make matching contributions at an employee's request. This is a simple way to make your donation go twice as far.

~ *Tom McDonagh – Membership Secretary* ~

Executive Board Meeting . . .

There will be a board meeting on Monday, May 19th at the Clubhouse in Westford. This will be the annual budget meeting and will begin at 7:30 pm. Any member wishing to attend is welcome to do so.

Clubhouse Report . . .

April 2014



John Blomquist leveling packer material on the driveway. *

The Clubhouse committee held a very productive work session on Saturday, April 19 at the ATMoB clubhouse in Westford. A total of 14 members and friends volunteered their time. The weather was perfect! It was a sunny, mild and generally a nice day to work outdoors. A big thank you to Bill Toomey and his student volunteer, Leanne McDonald, for trimming the brush behind the Clubhouse barn. Several members took a turn at handling the wheelbarrow and hauling gravel/packer material to the potholes in our long driveway. A second team of volunteers raked and leveled the fill material. The driveway is in much better condition as a result of this effort on Saturday. The 17-inch Dob hutch was cleaned out and our birdhouses were also cleaned for our avian friends.

The Clubhouse Committee Directors approached the MIT contractor for an excavation project which will entail digging out a several inch layer of topsoil on our parking area, which is directly in front of the barn. Every year we have a significant mud problem, and soil removal with the addition of packer material would go a long way toward alleviating this issue. Volunteers staked out a perimeter in front of the barn and we expect to receive an estimate for this project within one week. Updates will be posted on the Announce list concerning parking restrictions when this project begins.

Several volunteers led by Dave Prowten assisted a member with the building of a 12-inch Dob on Saturday. I am happy to report that the telescope saw first light that very night and the images were excellent! Eric Johannsen took care of electrical cable rerouting on the club's Schuppman telescope. Thanks to

Paul Cicchetti for setting up his refractor with the H-alpha filter for views of solar prominences.

Thanks to the following members and friends who helped out this month at the Clubhouse: John McDonald, Leanne McDonald, Bill Toomey, Paul Cicchetti, John Blomquist, Sai Vallabha, Al Takeda, Cheryl Rayner, John Maher, Eileen Myers, Dick Koolish, Art Swedlow, Eric Johannsen, Steve Clougherty, Phil Rounsville and Karl Dean.

~ Clubhouse Committee Directors ~

~ John Reed, Steve Clougherty and Dave Prowten ~

Clubhouse Saturday Schedule

May 10	CLOSED – Astronomy Day	
May 17	Eric Johannsen and Tom Wolf WORK PARTY # 5	
May 24	Paul Cicchetti and John Reed Meteor Shower	
May 31	Nina Craven	Tom McDonagh
June 7	Art Swedlow	Sai Vallabha
June 14	Dave Prowten and Al Takeda WORK PARTY # 6	
June 21	Brian Leacu	Phil Rounsville

Astronomy Day 2014 – Save the Date Saturday, May 10 . . .

Clay Center Astronomy Day 2014

Dexter Southfield School, Clay Center Observatory

20 Newton St., Brookline, MA

Saturday, May 10, 2014 at 4:30 PM

Join us at the Clay Center Observatory, located in Brookline, with a telescope outside, or a science exhibit inside.

ATM's who plan to attend, PLEASE PRE-REGISTER AT www.claycenter.org/astro and click on Astronomy Day 2014. Go to the **Exhibitors** sidebar on the right of the webpage and click on the **information form** link at the end of that sidebar. Pre-registering will allow the event organizers to prepare an ID with your name on it and a food ticket. These will be available for pickup in the Main Lobby on the day of the event.

Outdoor events 4:00 pm - 10:00 pm. Indoor exhibits 5:00 pm - 8:30 pm.

This public event drew over 2500 visitors last year and we need your help to provide telescopes for solar and night viewing, as well as indoor science exhibits. Set up any time.

For the general public: Many different types of telescopes will be set up for you to see and use. Safely view the sun in the daytime, and see the moon, planets, and stars in the evening, weather permitting. Demonstrations, lectures, planetarium shows, rocketry, kite flying, and more!

- Galileo himself will visit and present an entertaining show about telescopes.
- NASA/JPL Ambassadors will provide demonstrations with hands-on activities.
- LASER Light Science Show by Prismatic Magic! Segway rides! R2D2 Robot!

Events run from 4:00 - 9:00 p.m. Free admission with the exception of planetarium and LASER shows. Register on-line to be in the door prize drawings – including a telescope!

For additional information go to:
www.claycenter.org.

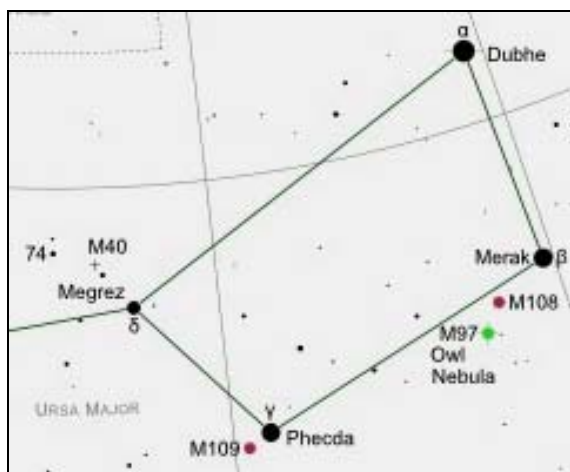
<http://www.dextersouthfield.org/Page/ABOUT/Clay-Center/Astronomy-Day-2014>

~ Submitted by Robert Phinney ~

Sky Object of the Month . . .

May 2014

M 108 –Barred Spiral Galaxy in Ursa Major



freestarcharts.com

Not far from the Big Dipper “bowl” star Merak (β Ursae Majoris) are two Messier objects - the edge-on spiral galaxy M108 and the planetary nebula M97. M108, discovered by Pierre Méchain in 1781, is nearer to Merak, lying just 1.5 degrees to its southeast.

A 10th magnitude object with 8 by 2 arcminute dimensions, M108 has a low surface brightness. Nevertheless, the small-scope owner can capture it, provided he or she sets up in a dark-sky location on a clear, moonless night. I once captured M108 from the camping area at Stellafane in Springfield, VT, using a 4-inch f/4 rich-field reflector and magnification of 74X. It stood out as a surprisingly easy elongated glow.

Things got interesting when I revisited M108 this past spring with a 10-inch f/5 reflecting telescope and magnifying power of 139X. The increase in telescope aperture and magnification brought out detail not seen with the RFT. M108 had a noticeably blotchy appearance – a ghostly version of M82. Near its center

was a 12th magnitude star - a foreground Milky Way star that could easily be mistaken for a supernova erupting inside M108.

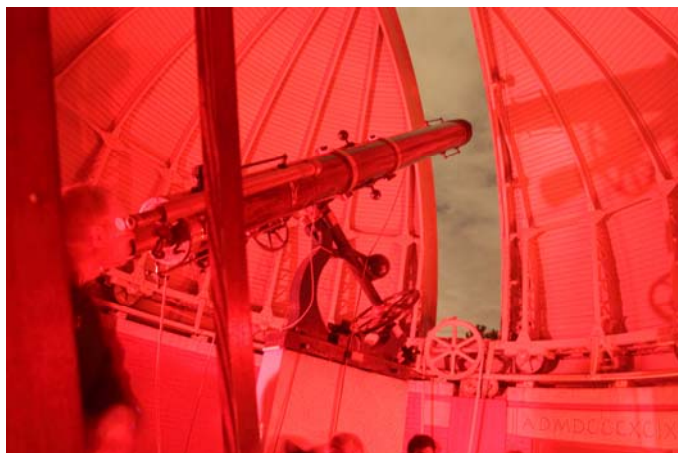
Just 48 arcminutes southeast of M108 is M97. We’ll pay a visit to this interesting planetary nebula next month.



M108 photo by Mario Motta, MD

~ Glenn Chaple – Member at Large ~

Tour of the Whitin Observatory . . .



Observing through the 12-inch Fitz/Clark Refractor.*

Very impressive. I felt like I was stepping back in time. That was the general feeling of the 40+ club members and their guests the evening of Saturday, April 26th after they toured the Whitin Observatory (pronounced white’ in) at Wellesley College, which has a long and prominent history in the field of Astronomy. Details about Astronomy at Wellesley College and the Whitin Observatory can be found at <http://www.wellesley.edu/astronomy>.

Dr. Wendy Bauer gave a wonderful talk about the history of the Observatory and those who were responsible for its development, the teaching, and the work done there. We learned that Annie Jump Cannon, whose cataloging work was instrumental in the development of stellar classification, and Pamela Anne Melroy, former NASA astronaut who piloted on Space Shuttle missions STS-92 and STS-112 and commanded mission STS-120, studied at Wellesley College. We learned about the restoration and expansion of the Observatory, and later saw the original white marble arched doorway entrance and marble walls, outside features now preserved and located inside the buildings. We learned about and later saw the two priceless stained glass panels, one of a crowd of people looking up at a comet in 1066

(Halley's Comet), the other of the Sun and its chromosphere and corona, along with the solar spectrum with Fraunhofer lines. <http://adsabs.harvard.edu/full/1914PA.....22..487W>.

Tour highlights:

The 24-inch Boller and Chivens f/13.5 Ritchey-Chrétien Cassegrain used with an additional focal length reduction lens yielding an effective focal ratio of f/9.6, currently used with an Apogee CCD camera, and retrofitted with a DFM control system. DFM Engineering, Inc. was founded in 1979 by Dr. Frank Melsheimer, an authority in telescope design and manufacturing. Currently used by students and faculty for studying asteroids, past projects include studies of binary and variable stars, supernova monitoring, and detecting extrasolar planets.

The Hale spectrohelioscope, installed in 1934. Sunlight, directed by a heliostat housed in a small aluminum dome on the roof, beams down through a vertical brass tube to the instrument in the basement. More than one person was overheard announcing appreciatively "This is going to be my next project."



Hale spectrohelioscope. *

The beautiful 12" f/16.5 Fitz/Clark refractor and its non-electrified heavy rope pulley system used to open the two sliding dome shutter doors. We were all able to stand on the observing stairs and look through this telescope, which was built in 1852 by Henry Fitz. Because of its poor image quality, the objective lens was refigured in 1867 by Alvan Clark & Sons. A few of us observed Jupiter. As our sucker hole closed in, one jokester in our group commented "The clouds look the same as in my scope."



Dr Wendy Bauer (Right) talking about the 12-inch Fitz/Clark refractor. *

There was much to see and learn and we thank Dr. Bauer for the wonderful experience. Many remained on campus long after the tour ended to discuss what they saw, and to enjoy the feeling of standing near the domes of the observatories. Plans were made to return during the Observatory's public viewing sessions.



Some ATMoB members posing in front of the 12-inch dome. *

~ Submitted by Eileen Myers ~

Ed Knight – In Memoriam . . .



Ed Knight at the Clubhouse. October 11, 2008. *

THOUGHTS ON OUR LOSS HAVING RECEIVED THE NEWS OF ED KNIGHT'S PASSING

Tuesday April 15th's phone call from Ed's son Bill told us the sad news. Ed had died in his sleep Sunday night. His loss of appetite and subsequent loss of mobility preceded that event. Ed had requested some ham, cheese and rye bread a few weeks earlier while he still enjoyed some pleasant memories. Over the years we would get a call from Ed requesting assistance for some repair work at the Clubhouse and inevitably the picnic basket would appear from the car trunk to be enjoyed by those participating. The furnace, some electrical problem, the outhouse, the sump pump or drain, the phone lines, you name it and Ed was there to help restore order for us. All three observatories we have constructed were started under his signature and stamp as a professional engineer for Massachusetts; in his unique case with no restrictions. His story of that acquisition over years of attending course after course of engineering disciplines under MIT professors' tutoring was amazing. All were a requirement to

learn the latest technology for the next power plant construction project in his professional life. His impact was world wide.

Then we learned of his membership in the Volunteer Yacht Club. He provided engineering counsel for the upkeep of their marina in Lynn. And during a major renovation we became recipients of several truckloads of salt seasoned oak pilings cut by ATMobers on site and delivered to our clubhouse. We were warmed many nights by his foresight. He enjoyed his days on the water and nights in harbor.

Ed was quite proud of his membership in our organization, as was listed in his obit in the *The Boston Globe*. He had constructed an original 8" Newtonian naugahyde covered optical tube, guided by the original Boston ATM cast bronze German Equatorial Mount on a wooden tripod. In the late 1990's he undertook construction of a miniature 6" richest field telescope (RFT) Newtonian which still allows school children to view the beauty of the Pleiades with room to spare. It too was constructed with cast parts as the original. His ability to return to first principles in every aspect of engineering for each project taught many of us life lessons. And Ed was a gentle man. Few knew that at the end of each day's work at the Clubhouse, as he was readying to leave, his last request was please call Anna and let her know "I'm on my way home."

You see, he had a daily 4:00 pm date with his lovely wife, Anna. And his wife supported his efforts to see Astronomy flourish, from the Sputnik era Moonwatch effort, to manning the gate at the Stellafane convention, to serving refreshments at monthly meetings at Harvard College. They were quite a team. He was a great mentor. Your friends salute you, and sincerely thank you, Ed. We remember. Thanks for the memories.

~ Submitted by John Reed ~

Ed Knight's long membership in our Club has served us very well. For twenty-five years, Ed and Anna provided us with refreshments including percolated hot coffee for our trip home from our monthly meetings.

When we acquired the Clubhouse under the stipulation that we fix the chimney so that it would no longer be a potential liability to MIT, Ed Knight's engineering skills accomplished this amazing feat. During this repair, four ropes held bricks suspended from the chimney with clear space below. This sight had to be seen in person to be believed. What followed was building up our new base brick by brick for a solid support. Upon completion we now had a place to grind mirrors and use the club's drill press and lathe to build our telescopes.

It was Ed Knight who helped us choose an appropriate and workable solution for the Clubhouse facility that would minimize additional plumbing. And when the existing Clubhouse furnace needed replacement, it was under Ed's able guidance that we selected and installed a new one properly.

When the foundation of the Clubhouse needed to be shored up, it was under Ed's leadership in having club members move boulders and put them in place.

It was Ed Knight who showed us how to put wiring into conduits so we could have electrical outlets in all the rooms when we first began using the Clubhouse.

When Owen Gingerich stopped in before one of our meetings to ask some of us to come up to the 15" on the roof to see if we could fix one of the supports for the stairs of the observing chair, it was one of the few meetings where Ed was absent. As VP, I called him a few days later to ask him to lead this endeavor as it was another Ed Knight project and he gladly led us for many Saturday mornings repairing, sanding, scraping and then painting until the stairs looked as good as new.

He was a generous person who gave his time selflessly and was a wonderful leader on all of the above projects and many more that the club needed. He will be very much missed.

~ Submitted by Marion Hochuli ~

Editor: The obituary below was copied from the Lehman Reen & McNamara Funeral Home web site.

William "Ed" Knight

Obituary

Born: Friday, October 29, 1915

Died: Monday, April 14, 2014

Of Newton April 14, 2014. Beloved husband of the late Anna (Walck) Knight. Devoted father of Judith Ann Coakley and her late husband Cornelius of Duxbury, William E and his wife Cynthia of Sharon, Anna Marie Longbottom and her husband Eric of Newmarket, NH, Christine E Dowd and her husband Philip of Greenland, NH, Margaret Knight and her husband George Moore of Groton. Brother of Margaret Crean of Salem and the late Eleanor Donahue, Dorothy Libadone, John and Arthur Knight. Also survived by 10 grandchildren, 10 great grandchildren and several nieces and nephews.

Funeral from the Lehman Reen & McNamara Funeral Home Tuesday April 22 at 9:30 am. Funeral Mass in Our Lady Help of Christians Church 573 Washington St. NEWTON at 10:30 am. Relatives and friends are kindly invited to attend. Visiting Hours Monday April 21st from 5-8 pm. Interment Newton Cemetery. Longtime employee of Stone Webster. Lifelong member of Amateur Telescope Makers of Boston for over 60 years, American Society Mechanical Engineer, National Association of Power Engineers, Volunteer Yacht Club of Lynn, Past President Dynamion Society, Registered Professional Engineer in MA and other states.

In lieu of flowers donations in memory of Ed may be made to Catholic Charities 51 Sleeper St. Boston, MA 02210 or the Special Olympics 512 Forest St. Marlborough, MA 01752

Editor: * Photos by Al Takeda unless otherwise noted.

**June Star Fields DEADLINE
Sunday, May 25th**

**Email articles to Al Takeda at
newsletter@atmob.org**

Articles from members are always welcome.

POSTMASTER NOTE: First Class Postage Mailed May 4, 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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NEWSLETTER Al Takeda newsletter@atmob.org

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 see www.atmob.org and check your email on the ANNOUNCE list.

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 Daylight Time (EDT) from Universal Time (UT) subtract 4 from UT.

- May 6 First Quarter Moon (Moonset at midnight) Eta Aquarids peak
- May 10 Saturn at Opposition
- May 14 Full Moon, Saturn 0.6° N. of Moon
- May 21 Last Quarter Moon (Moonrise at midnight),
- May 25 Mercury at greatest eastern elongation (evening)
- May 28 New Moon
- Jun 5 First Quarter Moon (Moonset at midnight)
- Jun 10 Saturn 0.6° N. of Moon