



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

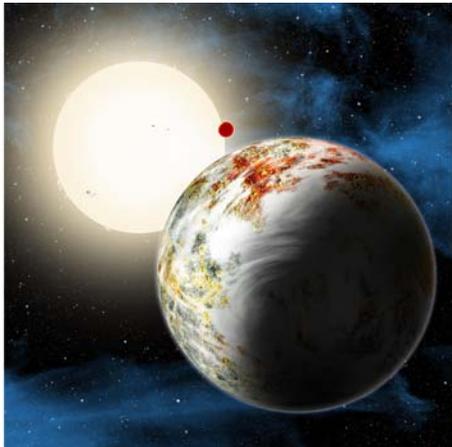
Vol. 27, No. 4 April 2015

This Month's Meeting . . .

Thursday, April 9th, 2015 at 8:00 PM
Phillips Auditorium

Harvard-Smithsonian Center for Astrophysics

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



Harvard-Smithsonian Center for Astrophysics, David A. Aguilar

Uncovering the Chemistry of Earth-Like Planets

This month's speaker is Li Zeng, a 6th-year graduate student in the Astronomy department at Harvard University. His research group proposes using evidence from our solar system to understand exoplanets, and in particular, to predict their surface chemistry and thereby the possibility of life. An Earth-like planet, born from the same nebula as its host star, is composed primarily of silicate rocks and an iron-nickel metal core, and depleted in volatile content in a systematic manner. The more volatile (easier to vaporize or dissociate into gas form) an element is in an Earth-like planet, the more depleted the element is compared to its host star. After depletion, an Earth-like planet would go through the process of core formation due to heat from radioactive decay and collisions. Core formation depletes a planet's rocky mantle of

siderophile (iron-loving) elements, in addition to the volatile depletion. After that, Earth-like planets likely accrete some volatile-rich materials, called "late veneer". The late veneer could be essential to the origins of life on Earth and Earth-like planets, as it also delivers the volatiles such as nitrogen, sulfur, carbon and water to the planet's surface, which are crucial for life to occur. Plans are to build an integrative model of Earth-like planets from the bottom up, and to infer their chemical compositions from their mass-radius relations and their host stars' elemental abundances, and understand the origins of volatile contents (especially water) on their surfaces, and thereby shed light on the origins of life on them.

Li Zeng is originally from Chongqing, China. He received a Bachelor of Science Degree in Physics from MIT.

As a 6th-year PhD graduate student, now in the Department of Astronomy at Harvard University, Zeng has been working with research advisor Professor Dimitar Sasselov on interior structure modeling of exoplanets. Recently, he has been collaborating with Professor Stein Jacobsen and Dr. Michail Petaev in the Department of Earth & Planetary Sciences on implementing elemental abundance calculation and mixing calculation to model the chemistry of Earth-like planets.

Zeng is also interested in Traditional Chinese Martial Arts, Medicine, and Healing. He is currently serving as the President of Harvard GSAS Anlin Taichi Wudao Association (Oriental Traditional Culture, Science, and Research Association). Li is also a new member of ATMoB.

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 . . .

I'd like to announce the second session of our ongoing "CCD Image Processing" classes! It's scheduled for Monday, April 20th, 2015 – at the Clubhouse. (If someone can suggest a larger facility, we could move the location...)

Last time, we covered an introduction to CCDStack – my image processing program of choice. We used some of the "luminance" data that I had on hand of M63.

This next session, I'll do a quick recap of what we covered in the first session, then we'll start on the color channel processing. We'll move on to optimization routines in CCDStack, color calibration, and then the preparation for the transfer into Photoshop. We will also cover at least a portion of items we could be doing in Photoshop to finalize our image.

Sign-up for this session will be through our web site event facilities. Hope to see you there!

Cheers...

~ Neil Fleming – President ~

March Meeting Minutes . . .



Dr. Daniel Eisenstein *

Minutes of ATMoB meeting held on March 12, 2015 in the Phillips Auditorium of the Harvard-Smithsonian Center for Astrophysics.

Vice President Glenn Chapple called the meeting to order at 8:00 PM.

- The Secretary's Report of the February 2015 meeting was given by Secretary Sidney Johnston.
- Eileen Myers gave the Treasurer's Report.
- Tom McDonagh gave the Membership Secretary's Report.
- Glenn Chapple gave the Observing Committee Report. Glenn mentioned the Messier Marathon scheduled for March 20-21, and several observing projects, including:

Carbon Stars, along with a guidebook "A Guide to the Carbon Stars" and other information located at:

<https://www.astroleague.org/content/carbon-star-observing-club>

The "Sue French Fan Club": Observing the objects she writes about in *Sky and Telescope*

The Las Vegas Astronomical Society Object of the Month, at <http://www.lvastronomy.com/observing-challenge>

- Steve Clougherty gave the Clubhouse Report.
- Announcements:
- The new AAVSO director, Dr. Stella Kafka, was introduced to the membership.
- Old Business: Bruce Tinkler thanked the members for attending the Acton Star Party.
- Ken Launie announced that the Houghton Library at Harvard University is having an exhibition, using books and manuscripts, about the physical universe of the 1600's. "[Starry Messengers: Signs and Science from the Skies](#)". It is open to the public until May 2nd and admission is free.

- Lauren Westley, an artist/photographer who is working on her Masters degree at the Museum of Fine Arts in Boston, is asking for volunteers to have portraits taken with their telescope.
- Mario Motta mentioned that the state of New York has just enacted a light pollution law.
- New Business: None

Vice President Glenn Chapple introduced Dr. Daniel Eisenstein of Harvard University as the invited speaker. Dr. Eisenstein is a Professor of Astronomy at Harvard University and is the Director of the Sloan Digital Sky Survey III and the co-Spokesperson of the Dark Energy Spectroscopic Instrument collaboration. He works primarily in the subject of cosmology, using the large-scale structure of the universe to study the composition and expansion history of the universe.

Dr. Eisenstein spoke about how sound waves propagating through the plasma of the early universe, only 400,000 years after the Big Bang, now offer some of our most precise measures of the composition and history of the universe. The sound waves were compressional waves in the plasma "gas" of the early universe. The compressed areas of the sound waves left an imprint in the plasma as it recombined to form neutral atoms, and these regions are believed to seed the formation of galaxies.

Eisenstein gave an overview of the cosmological role of the sound waves and the observational program designed to detect any ordering of the galaxies in space caused by these compressed regions of the original plasma gas. He then described the observational program and explained to us what the results tell us about the shape of the universe and distribution of galaxies. In the last decade, scientists have been able to detect the fossil imprint of these sound waves using maps of the distribution of galaxies from the [Sloan Digital Sky Survey \(SDSS\)](#).

The SDSS uses a dedicated 2.5-meter, f/5, modified Ritchey-Chretien, altitude-azimuth telescope located at Apache Point Observatory, near Cloudcroft, New Mexico (Latitude 32° 46' 49.30" N, Longitude 105° 49' 13.50" W, Elevation 2788m). A 1.08-meter secondary mirror and two corrector lenses result in a 3° distortion-free field of view. Further information about the telescope used in this survey is described at <http://arxiv.org/pdf/astro-ph/0602326v1.pdf>.

The telescope uses a spectrograph capable of simultaneously recording the spectrum of 1,000 galaxies. Light from each galaxy is picked up by an optical fiber held in place by an aluminum plate with holes drilled to accept the light pickup end of the optical fibers. The optical fibers are led to the spectrograph which has two cameras, one for red and the other for blue. Each camera spreads the light from each optical fiber into a spectrum. Accordingly, during one observing session of about one hour, 1,000 spectra are recorded by the cameras. The spectrometer is further described at:

https://www.sdss3.org/instruments/boss_spectrograph.php.

Since the primary mirror of the telescope is curved, the aluminum plate, with 1,000 holes, is tensioned to about 1

millimeter of curvature, so that the light passes straight and uniformly into each optical fiber. Several observing sessions are performed each night for different target areas of the sky. Each observed area of the sky has its unique aluminum plate with precision holes drilled to record the spectrum of the galaxies in the target area of sky. Dr. Eisenstein brought with him to the meeting an actual large aluminum plate, which was passed around the audience for all to hold and inspect. More information about this plate can be found at

<http://blog.galaxyzoo.org/2009/04/01/a-visit-to-apache-point/>



The spectra have about 3 Angstrom resolution in order to give good observations of the spectral red shift. Two spectrometer cameras observe the spectra, and each image has 500 streaks from each observation. This gives 1,000 spectra for each observation period.

Results of the observations include a three dimensional map of the location of all galaxies in the region of sky observed from the Apache Point Observatory. The third dimension is obtained from the observed red shift of the spectrum and the Hubble constant relating distance to velocity.

The SDSS results give us precision cosmological observations. The distances to galaxies are measured to about 3%. A plot of the number of galaxies versus distance gives a peak at about the distance expected from the theory of sound waves in the primordial plasma from the Big Bang.

The results also show that the universe is substantially flat, in a General Relativity sense. In General Relativity, the geometry of the universe can be flat, curved as a sphere, or curved as a saddle. The result of the SDSS observations is that the universe is flat. The clustering of galaxies, measured by the SDSS, is a clear signal that the universe geometry is flat to about 1%.

Several other observing programs are carried out at The Apache Point Observatory, and are described at the URLs given above.

The meeting was adjourned at 9:45 PM

~ *Sidney Johnston, Secretary* ~

Clubhouse Report . . .



Dave Prowten painting the stairway wall*

March 2015 Clubhouse Report

For those reading this report in the ATMoB archives, the snow didn't know when to quit.

Yes we have a new snowfall record under our feet. We thought that Buffalo's record 7ft snowstorm was bad; and while that record stands, we are expecting more snow at the Clubhouse. So when will it stop? Today we have a 9ft total in Boston. We can now report on one actual clear and sunny work party day, held on March 7th with a 34 degree, 10 am temperature.

Fifteen members signed the log book and donated their Saturday: Sai Vallabha, Al Takeda, Art Swedlow, John Reed, Dave Prowten, Eileen Myers, John Maher, Dick Koolish, Eric Johansson, Nina Craven, Paul Courtemanche, Steve Clougherty, Paul Cichetti, Dan Christian, and Bruce Berger. Thank you.

Paul C. set up his solar scope and we all were able to view the dark surface filaments and a few bright prominences with his H-alpha filter before the clouds thickened.

John M. spent the day removing ice/snow from the clamshell and checking on the telescope systems. Bruce B. checked the ATMoB Research and Imaging Observatory (ARIO), and he also loaned the club a Canon XSi camera system for authorized members to use.

Dave P. led a team of 7 to prepare the first floor side stair walls and ceiling, and to coat the same with two layers of paint. They then prepared the second floor walls and applied a first coat of paint. The remaining time was spent cleaning up all floors and storing the supplies.

Thanks to Dave P., Dan C., Paul Cichetti, Steve C., Paul Courtemanche, Nina C., and Al T. for their hard work.

Steve C. spent a lot of effort organizing this project and purchasing supplies. Repair of the second floor ceiling will be tackled at the next work session and we hope to complete as much painting as possible.

A lunch of baked chicken, "Bailey Hill" spaghetti, salad, garlic bread, with fruits and cookies was prepared by Eileen M., Sai V., Art S., Eric J., Dick K., & John R. Clean up followed and care was taken to not slow down the painting crew. After dark, clouds

precluded observing; so an evening showing of space and astronomy DVD's followed.

The next work party is scheduled on Saturday April 4th, with the painting project continuing. If the ground is firm under foot, tree limb trimming will continue from where we finished last fall.

Before coffee goes the way of VHS tapes, come on up to the Clubhouse on April 4th and start your day with a cup of Clubhouse coffee shortly after 10 am.

Clear skies to all.

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

Clubhouse Saturday Schedule		
April 11	Al Takeda	Bill Toomey
April 18	NEAF & Messier Marathon #2 John Maher + Tom McDonagh	
April 25	Dave Prowten	Dave Siegrist
May 2	WORK PARTY # 6 Steve Clougherty + Neil Fleming	
May 9	Astronomy Day CLOSED	
May 16	Eric Johansson	Tom Wolf

Sky Object of the Month . . .

March 2015

NGC 3115 – Lenticular (SO) Galaxy in Sextans



www.eyes4skies.de

Some of the finest deep-sky objects are bypassed because they lie in star-poor regions of the sky. Such was the case with our February “Sky Object of the Month,” the planetary nebula NGC 1501 in Camelopardalis. It’s also the situation with NGC 3115 – a bright “shoulda-been-found-by-Messier” object in that eluded the French comet hunter’s eye and, therefore, his catalog. It was eventually discovered by William Herschel while surveying the obscure constellation Sextans in 1787.

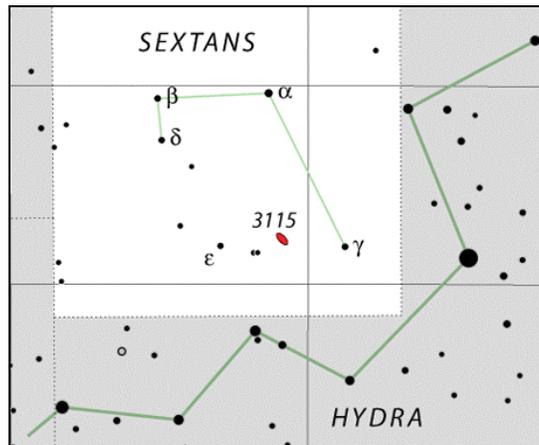
At 9th magnitude, NGC 3115 is the brightest example of an S0 galaxy, one that bridges the galactic gap between ellipticals and spirals. Its 8’ by 3’ dimensions (about half that, visually) have earned it the nickname “Spindle Galaxy” (a monicker it shares

with the galaxy NGC 5866). It is also entry number 53 in the late Sir Patrick Moore’s Caldwell Catalog.

NGC 3115 is found at coordinates 15^h 06.5^m (R.A.) and +55° 45.8’ Decl.). Star-hoppers need to begin outside Sextans with Alphard (alpha Hydrae). A line traced from this 2nd magnitude star through 5th magnitude gamma Sextantis and extended about 20 percent (3 degrees) further will bring you to the general vicinity of NGC 3115. A low power search should sweep it up.

From dark-sky sites, NGC 3115 can be glimpsed with binoculars. I had no trouble picking it up in a 3-inch reflector at 30X, noting that it appeared “as a very oval, compact nebulosity surrounded by fainter nebulosity.” Except for sharply pointed ends and a stellar nucleus, NGC 3115 remains relatively featureless when viewed with medium to large-aperture scopes.

A fuzzy, elongated blob isn’t exactly something you’d want to show visitors at a public star party. Don’t let this nondescript appearance fool you. In 1992, astronomers discovered a beast lurking at the core of NGC 3115 - a monstrous black hole with the mass of **2 billion** suns!



www.constellation-guide.com

~ *Glenn Chaple – Observing Committee and VP* ~

Membership Report . . .

Membership count as of 03/30/2015 is at 307 individuals.

A number of members have experienced problems with the Mailing List subscription. If you believe you have experience an issue with this function, please contact me via email at temcdonagh@gmail.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.

New and Returning members in March 2013: Ron Sampson, Vladislav Mlch, Thomas Harpin and Josh Nicolet. Please take the time to welcome our newest members.

~ *Tom McDonagh – Membership Secretary* ~

2017 Solar Eclipse Trip . . .



Eclipse map courtesy of Fred Espenak - NASA/Goddard Space Flight Center
<http://eclipse.gsfc.nasa.gov/eclipse.html>

An eclipse trip has once again been organized for the benefit of members of ATMoB, and friends (trip is open to the public). For more details, see <http://atmob.org/events/travel.php>

For more details and a registration form contact Mario Motta or Bernie Volz. We will be observing the eclipse from the central Missouri area.

As of March 2015, 94 people have signed up for the trip.

~ Submitted by Bernie Volz ~

2015 Astronomy Conventions . . .

Below is a list of the 2015 dates for “local” astronomy conventions attended by many ATMoB members:

Northeast Astronomy Forum (NEAF)

Presented by the Rockland Astronomy Club

Saturday, April 18, 2015 through Sunday, April 19, 2015

SUNY Rockland Community College

145 College Road

Suffern, New York 10901

Highlights: Vendors of telescopes and accessories from all over the world, exhibits, solar observing with all kinds of equipment, lectures, raffle prizes

Also **Northeast Astro-Imaging Conference**

Thursday, April 16 & Friday, April 17, 2015

<http://www.rocklandastronomy.com/neaf.html>

StarConn *****DATE CHANGE*****

Presented by the Astronomical Society of Greater Hartford with the kind and generous cooperation of the Astronomy Department of Wesleyan University

Department of Wesleyan University

Saturday, June 13, 2015

Wesleyan University in Middletown, Connecticut

Highlights: Lectures, swap tables, vendors, raffle prizes

<http://www.asgh.org/starconn/index.htm>

Connecticut River Valley Astronomers Conjunction

Friday, July 10, 2015 through Sunday, July 12, 2015

Some ATMoB members stay over Friday night to observe; some go only for the day on Saturday

Northfield Mountain Recreation and Environmental Center

99 Millers Falls Road (Route 63), Northfield, MA 01360

Highlights: Solar observing, dark sky observing, lectures, swap tables, raffle prizes

<http://www.philharrington.net/astroconjunction/>

Stellafane Convention

Presented by the Springfield Telescope Makers

Thursday, August 13, 2015 through Sunday, August 16, 2015

Springfield, Vermont

Highlights: Dark sky observing, solar observing, lectures, mirror grinding and telescope making demos, swap tables, raffle prizes

Workshop at the Hartness House to be announced

Thursday, August 13, 2015

Springfield, MA

www.stellafane.org

Arunah Hill Days

The Arunah Hill Natural Science Center

Cummington, MA

Family-oriented weekend of astronomy, star gazing, nature walks, and science education

Highlights: Camping in the dark skies of the Berkshire Hills of Western Massachusetts, rocket building and launching, dark sky observing, solar observing, key note speaker, sci-fi movies, raffle prizes

Arunah Hill Natural Science Center, Inc.

218 Trouble Street

Cummington, MA 01026

<http://www.arunah.org/events/ahd.htm>

2015 date not yet determined, but most likely the last weekend in August

AstroAssembly 2015

Presented by Skyscrapers, Inc. (Amateur Astronomical Society of Rhode Island)

Friday evening, October 2 and Saturday all day, October 3

Seagrave Memorial Observatory

47 Peeptoad Rd, off Rt. 166 North

North Scituate, Rhode Island 02857

Highlights: Lectures, vendors, swap tables, solar observing, raffle prizes

<http://www.theskyscrapers.org>

~ Eileen Myers – Treasurer ~

Editor: * Photos by Al Takeda unless otherwise noted.

May Star Fields DEADLINE

Sunday, April 26th

Email articles to Al Takeda at

newsletter@atmob.org

Articles from members are always welcome.

POSTMASTER NOTE: First Class Postage Mailed April 8, 2015

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

EXECUTIVE BOARD 2014-2015

PRESIDENT:	Neil Fleming	president@atmob.org
VICE PRES:	Glenn Chaple	(978) 597-8465
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	David Prowten	(978) 369-1596
OBSERVING:	Bruce Berger	(978) 387-4189
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 ATMOB-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.

Apr 11 Last Quarter Moon (Moonrise at midnight)
Apr 18 New Moon
Apr 22 Lyrid Meteor Shower
Apr 25 First Quarter Moon (Moonset at midnight)
May 3 Full Moon
May 6 Eta Aquarid Meteors
May 7 Mercury at greatest eastern elongation (evening)
May 11 Last Quarter Moon (Moonrise at midnight)