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. 33, No. 3 March 2021

This Month's Meeting . . .

Thursday, March 11th, 2021 at 8:00 PM
Zoom On-line Meeting

All ATMoB meetings scheduled for the Harvard-Smithsonian Center for Astrophysics in Cambridge, MA have been **canceled indefinitely** due to concerns over the coronavirus outbreak.

We are holding virtual on-line meetings using the Zoom application. Please refer to the ATMoB website for future meetings. Members should check their email on the ATMOB-ANNOUNCE list for additional information. Please select this Zoom link to attend the 939th Meeting of the Amateur Telescope Makers of Boston.

A Man on the Moon

Buzz Aldrin on the Moon. Image Credit: NASA

I am pleased to announce that this month's speaker is space historian, Andrew Chaikin. Andrew summarizes his presentation as follows:

"Space historian Andrew Chaikin conducted extensive interviews with 23 of the 24 Apollo lunar astronauts while researching his 1994 book, *A Man on the Moon: The Voyages of the Apollo Astronauts*. He will share some of the stories he heard during those conversations, about what they saw, thought, and felt during their historic explorations-including the elation and awe of setting foot on an ancient, alien wilderness, the demands of being lunar field geologists under the merciless pressure of the timeline, and the beauty of the Moon itself and the distant Earth suspended in a sky of utter blackness. The book was the main basis for Tom Hanks' 12-part Emmy-winning miniseries for HBO, "From the Earth to the Moon." Chaikin will also explore some of the lessons of the first lunar landings for NASA's return-to-the-Moon program, Artemis."

A graduate in geology from Brown University, Andrew has brought his knowledge of planetary science to his writing and teaching. As a visiting instructor at NASA, he has taught the history of human and robotic space missions, as well as the human behavior aspects of success and failure in spaceflight projects. For more information, check out his website: www.andrewchaikin.com .

I think you'll enjoy Andrew's presentation and I hope you'll join us!

~ Rich Nugent – President ~

President's Message . . .

Where were you on January 27, 1967? December 24, 1968? How about July 20, 1969? April 13, 1970? If you were around back them, just like me, you were glued to your television screen watching some of the triumphs and tragedies of the Apollo program. Back in the sixties, despite receiving only three channels of mostly black and white TV, you could hardly miss the excitement of the "Space Race to the Moon". President Kennedy's speech in front of a joint session of Congress on May 25, 1961 must have sent the engineers reeling when he proclaimed, "I believe that this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the Moon and returning him safely to Earth."

The next year, at Rice University, President Kennedy acknowledged the challenge and inspired the country to go forward by saying, "We choose to go to the Moon in this decade, and do the other things, not because they are easy, but because they are hard…" Of course, we know the rest.

As a kid I eagerly followed the Mercury and Gemini missions. Living in New England, we were too far north to see any of the spacecraft crossing the skies, so I asked my parents if we could move the family to Florida so we could be near the action. I just got "the look" and had to rely on television coverage to follow the missions. I remember the shock and sadness I felt when I heard that the crew of Apollo 1 had been lost. Filled with pure oxygen, the capsule was engulfed in flames as a spark ignited the materials inside the capsule. The hatch couldn't be opened easily and with the pressure inside building up rapidly, there was no escape. I thought for sure this tragedy would end the program. But it did not. The capsule's life support system was redesigned, as was the hatch. Tests followed and then, just 21 months after the accident, Apollo 7 lofted humans into orbit. It was on Christmas Eve 1968, when the world celebrated as Apollo 8

slipped into lunar orbit. Astronauts Borman, Lovell, and Anders beamed live TV images of the Moon right into our living rooms! We had reached the Moon!

Just 7 months later, on July 20, 1969, Armstrong and Aldrin landed their lunar module Eagle onto the plains of the Sea of Tranquility. I was ecstatic! But the best was to come. Late that evening, we were witness to Neil's first steps on the Moon and watched as he and Buzz planted the flag, set up equipment, and explored that tiny piece of the lunar surface! They returned home three days later to a hero's welcome. Kennedy's dream had been fulfilled. Of course, there were other missions, largely forgotten by many.

My personal favorite memory of the program happened on April 11, 1970. Earlier that day, I watched as Apollo 13 reached low Earth orbit. Each mission parked there to check out the spacecraft before heading to the Moon. As darkness fell, here on the east coast, I rolled my newly acquired, 8-inch reflector out of the garage to do some observing. I happened to notice a star that didn't belong, and, even more unusual, it looked fuzzy! Turning the telescope onto it I knew immediately what I was seeing. It was the Apollo 13 spacecraft headed to the Moon! The astronauts were conducting the maneuver to extricate the Lunar Module from the Saturn rocket's third stage. I knew because I could see one of the S-IVB panels tumbling and flashing "brilliantly!" I suspect the fuzziness was liquid oxygen being dumped into space. I treated the family and some of my neighborhood friends to the view. They may not remember that night, but I'll bet they remembered when two days later, the entire world followed the now infamous mission as the crew battled to survive the catastrophic failure of one of the spacecraft's oxygen tanks. How relieved were you to see them splashdown in the Pacific Ocean? It raises goose bumps on me, to this day!

After Apollo 13, four more missions brought humans to the Moon. On December 13, 1972, Apollo 17's Gene Cernan took man's last steps on the Moon. He expressed hope that we would return to the Moon "not too long in the future…" Our manned space program continued with Skylab, the Space Shuttle flights to Mir, and today, our ongoing presence on the International Space Station continues to inspire new generations. Our spacecraft have visited all of the planets of the solar system, even Pluto, and most recently, we have celebrated the landing of the Mars Rover, 2020 Perseverance. It's been nearly 50 years since those last steps, and we are about to exit the Silver Anniversary era of the Apollo program, but there is hope. NASA plans to return humans to the Moon in just a few years using state of the art systems inside a spacecraft that bear an uncanny resemblance to the Apollo spacecraft of our youth. The Artemis program is expected to deliver humans to the Moon by 2024 and then on to Mars. I hope my grandchildren will tell their grandchildren about the excitement of their youth, remembering how they watched and maybe participated in our ongoing exploration of new worlds!

I can't begin to tell you how excited I am that Andrew Chaikin is our speaker this month! I am bursting with questions and I hope you are, too! I hope my monthly message has conjured up your own memories of the Apollo program. Perhaps you'll be willing to share them at the meeting. Join us on March 11th for a wonderfully nostalgic trip down memory lane. See you there! In the meantime, stay safe and be well, my friends!

~ Rich Nugent – President ~

February Meeting Minutes . . .

Tom Calderwoood on Zoom *

ATMoB 938th Meeting Minutes
February 11, 2021

Rich Nugent presented the President's report. The Harvard Center for Astrophysics remains closed. The Clubhouse also remains closed. At this point, we do not expect a reopening of either soon.

- Alva Couch presented the Secretary's report, including the events of the 937th meeting of ATMoB and a summary of the excellent talk by David Eicher.

- Eileen Myers presented the Treasurer's report. There is a small net inflow due to new memberships. "Thank you" letters of acknowledgement for 2020 donations have been mailed to donors; many thanks for your donations to ATMoB!

- Chris Elledge presented the Membership report, and welcomed new members Susan Edwards, James Goudreault, and Paul Hsi. Please see his complete membership report elsewhere in this newsletter. A hearty welcome to all new members!

- Glenn Chaple presented the Observer's Report, including the February Observer's Challenge of NGC 1893 and IC 410. Mercury will be of interest this month, being at greatest elongation on Saturday, March 6. On Wednesday, March 10, a thin waning crescent Moon appears with Saturn, Jupiter, and Mercury before sunrise. Rich Nugent suggested that lunar observers look at the spider-like Lamont crater to the east of the Arago crater, and volcanic domes to the west of Arago in the Sea of Tranquility. These are best observed on the 5-day-old moon on Feb 15-16, 2021.

- Steve Clougherty presented the Clubhouse report. The Clubhouse driveway has been plowed. Steve went to the Clubhouse on February 10 and was able to access the Ed

Knight roll-off and Toomey observatories. The heating elements were functional due to being rerouted to a different circuit than during the previous visit, when the breaker blew and left the dew heaters inoperative. The Clubhouse is weather-tight, we have a full tank of oil, and the basement is sound. Hopefully people who have been vaccinated can put together a work party and do some cleaning in the coming months.

- Bruce Berger presented the Mittelman-ATMoB Observatory report. This month was spent finding bugs in software, including the lack of an automatic meridian flip during tracking. Al Takeda is beginning the integration of pictures of IC 443. Gary Walker gave a talk during the Jan 26, 2021 Mittelman ATMoB Observatory working group meeting about the advantages and disadvantages of CMOS cameras. The Hydrogen-alpha, SII, and OIII filters are in hand, but the Johnson-Cousins photometric filters are backordered.

- Old business: Rich Nugent reports that use of https://smile.amazon.com greatly benefits the club, and appreciates your use of the service to generate donations to ATMoB. Rich Nugent is still looking for Nominating Committee volunteers for the 2021 Board of Directors election.

- New Business: None.

Guest speaker and ATMoB member, Tom Calderwoood, spoke about the recent dimming of Betelgeuse that he wrote about in his article featured in the March 2021 edition of *Sky and Telescope*. Betelgeuse, a red supergiant in the constellation Orion, dimmed considerably and surprisingly in 2019-2020. Tom covered the possible theories for its dimming and the technologies applied to study this mystery. A “dust hypothesis” claims that there was an ejection of dust from Betelgeuse that caused part of the dimming, while a “cooling hypothesis” claims that the star cooled in temperature instead. Evidence for both hypotheses was collected via a variety of methods. New work on TiO (Titanium Oxide) spectra and radio imaging tend to support the cooling hypothesis, though this newer work occurred too recently to be referenced in the *Sky and Telescope* article.

Tom also described his own equipment for studying the brightness of Betelgeuse from his backyard, including a modified 9.25-inch Celestron Schmidt-Cassegrain with a single-pixel sensor specifically intended to measure brightness of bright stars like Betelgeuse.

Amateurs are invited to collect data on such mysteries and to become part of the American Association of Variable Star Observers (AAVSO). Many thanks to Tom for an inspiring presentation!

Our next Zoom meeting will be held on March 11, 2021 at 8 pm. The next meeting of the ATMoB Board will be held on Thursday, Mar 25, 2021.

~ Alva Couch - Secretary ~

Membership Report . . .

I am pleased to welcome our newest members: James Goudreault, Paul Hsi, Richard Kappler, David Rust, Giuseppe Santitto, and Larry St Clair.

As of March 1st, 2020 we have 330 memberships covering 421 members. This is broken down as follows:

- 136 Regular Members
- 132 Senior Members
- 4 Student Members
- 53 Family Memberships covering 144 Members
- 3 Guest Members
- 2 Honorary Members

You can check if you need to renew and start your renewal process on the website at https://www.atmob.org/renew.

You can also download the membership application from the website at https://www.atmob.org/signup by clicking on the "Download an application" link.

Please contact me if you need any help with renewing or logging into the website.

~ Chris Elledge – Membership Secretary ~

Meeting Recordings . . .

The recording of ATMoB meeting #938 is available on YouTube: https://youtu.be/OhiVKI08rA0

I would like to thank Tom Calderwood for giving his presentation and allowing us to record it.

This link is to the publicly available cut of the meeting recording. To view the original version of the meetings, please see the Announce Forum on the ATMoB Website https://www.atmob.org

~ Chris Elledge - Membership Secretary ~

Clubhouse Observing Suspension

Even though Massachusetts is starting to open up we will continue to suspend our observing sessions at the Clubhouse, for the time being.

Clubhouse Report . . .

Clubhouse Sunset. January 1, 2020 *

March 2021 Clubhouse Report

There is not much to report this month. I did an inspection of the Clubhouse last month and found the facility in very good condition. No leaks, the basement is dry and everything is in order.

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

Snowbound Observatories. February 7, 2015. *

Educational DVD Videos on Monday Evenings . . .

Member-at-Large Maria Batista is hosting Monday evening DVD lectures. These weekly Zoom meetings start at 7 PM. Members can sign up at www.atmob.org.

Observer's Challenge . . .

March, 2021

NGC 2685 - Lenticular Galaxy in Ursa Major
Mag: 11.3
Size: 4.6' X 2.5'

NGC 2685. 32-inch f/6.5 telescope, ZWO ASI6200 camera, 3 hours imaging, using LRGB filters, processed in Pixinsight. Image by Mario Motta

This month's Observer's Challenge, NGC 2685, is a lenticular galaxy with a twist. It has a ring of stars, gas, and dust that runs perpendicular to the plane of the main galactic disk. Such rarities are known as polar ring galaxies. These cosmic oddities are likely a result of a collision or gravitational interaction between two galaxies, one of which is lenticular. The appearance of the whorls surrounding NGC 2685 give it the nick-name the "Helix Galaxy".

NGC 2685, Canon 80D, 1200mm f/8.0 (150mm aperture) lens, ISO 800, 83 x 2 min (2.75 hours total, 2/3 scale, North up. Image by Doug Paul

Those with computer-controlled scopes will find NGC 2685 at coordinates RA 8h 55m 34.8s, Dec +58° 44' 03.9". If you locate deep sky objects via the star-hop method, begin your search at

the 3rd magnitude star Muscida (omicron [o] Ursae Majoris), shown in upper right of Chart A. Aim your telescope midway between Muscida and 5th magnitude 17 Ursae Majoris (Chart B), and you should come across a pair of stars of magnitude 6 and 7 that are about a degree apart. Chart C shows the location of NGC 2685 between these two stars.

NGC 2685 was discovered by the German astronomer Wilhelm Tempel on August 18, 1882. Studies indicate a distance of around 40 million light years and a visual diameter of some 50,000 light years - about half that of the Milky Way.

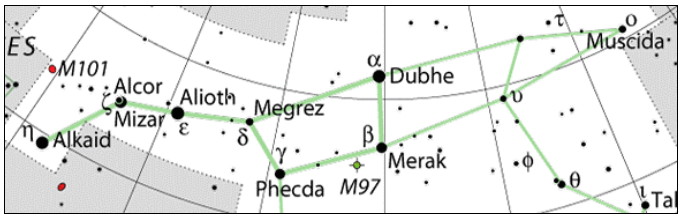

Chart A. www.constellation-guide.com (from IAU and *Sky & Telescope*)

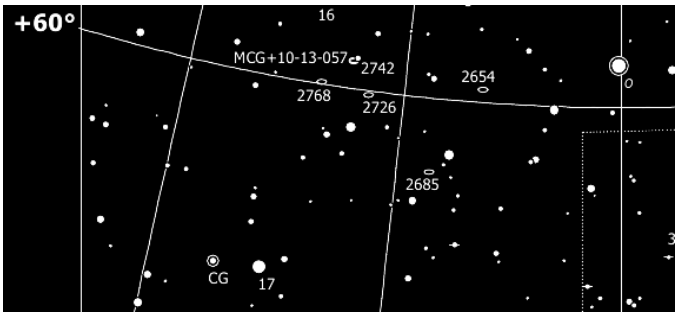

Chart B. Taki's magnitude 8.5 Star Atlas (takitoshimi.starfree.jp)

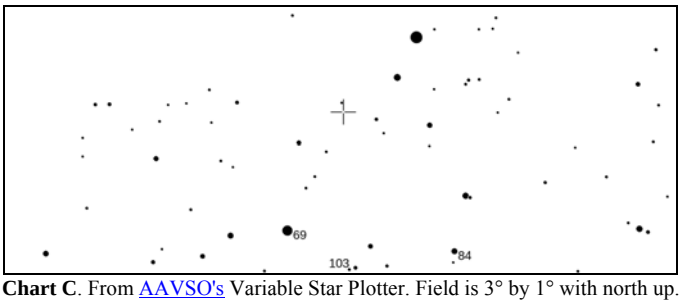

Chart C. From AAVSO's Variable Star Plotter. Field is 3° by 1° with north up. Stars shown to 11th magnitude. Glenn Chaple

The purpose of the Observer's Challenge is to encourage the pursuit of visual observing. It is open to everyone who is interested. If you'd like to contribute notes, drawings, or photographs, we'll be happy to include them in our monthly summary. Submit your observing notes, sketches, and/or images to Roger Ivester (rogerivester@me.com). To find out more about the Observer's Challenge or access past reports, log on to https://rogerivester.com/category/observers-challenge-reports-complete/ .

~ Submitted by Glenn Chaple ~

Skyward . . .

By David H. Levi
March 2021

Stars are people too

Orion and Dome. 5 images stacked. Image by David H. Levy, 2005

In last month's Skyward, I included that four-word phrase, but the first time I used it was actually in an article about the life of the star Betelgeuse, for *Astronomy* magazine. When I met Richard Berry, the editor at the time, he began by reciting those words: "Stars are people too." He added that he accepted the article for publication in his magazine after he read those words. (It turns out that wasn't my only unusual experience with that magazine. A few years later David Eicher, the current editor, and I witnessed a construction crew blowing up a freeway overpass near the magazine's headquarters in Milwaukee.)

As I explained last month, stars live out their lives much as we do. They are born in gaseous stellar nurseries, or diffuse nebulae. In our sky, two of the most famous nebulae appear; in summer, the Lagoon Nebula in Sagittarius, and in winter, the Orion Nebula. The little stars within the nebula vary in brightness, usually by a few tenths of a magnitude, but they can change quite quickly. There are a few others in the Hyades star cluster in Taurus, the Bull. I saw one star change rapidly over a period of a few minutes. These stars mimic the behavior and misbehavior of human youth.

Also like us, stars settle down as they grow older. Our Sun is an example of a star in middle age. It has shone steadily for almost five billion years and will continue this way for another several billion. Except for a cycle of eleven years during which the numbers of sunspots, which are storms on the face of the Sun, rise and fall, the Sun behaves constantly and predictably. There are vague hints of a 12,000-year cycle dating back to biblical times but I have not found any evidence for this.

As our Sun enters old age it will begin to act erratically again. Its hydrogen supply will be almost exhausted. It will begin to fuse its helium. At some point during its red giant phase, it will suffer a helium flash. This event might feature only a few minutes of strong helium fusion, but during which the Sun briefly will emit an enormous amount of energy equivalent to that of our whole galaxy. As it continues its red giant phase it might vary in brightness by several magnitudes over many months. Mira, a star in Cetus the Whale, is such a star. A Mira star's core begins to contract under the force of its own gravity and whatever hydrogen is left will ignite into a shell around the core. Mira, like other red giants, was once a Sun-like star that has used up its supply of hydrogen. Once the helium is exhausted, its core will be left with heavier elements like oxygen and carbon. The outer layers of these old stars will explode as novae every few hundreds or thousands of years. Eventually, with their outer layers gone, the core will become a white dwarf star.

If a star is much more massive than our Sun, it would end its life far more dramatically as a supernova. Such an event is really catastrophic. There are two kinds. In the first, the smaller member of a two-star system will keep on attracting material from its larger companion. But instead of repeated nova explosions, the small star will get more and more massive. When that star's core reaches a certain limit, in less than a second, the star finally will collapse on itself and will blow itself apart.

The other kind involves a very massive star; say three or four times the mass of the Sun. Just like in the smaller star, its supply of hydrogen will be gone. With little helium left the still contracting core is left with carbon and oxygen. When the core reaches a certain temperature, the remaining carbon will ignite all at once, tearing the star apart.

If the star is very massive, say nine or ten times the mass of the Sun, its very hot core allows the carbon to ignite and burn as before, but gradually, not all at once. Heavier elements like phosphorus and sulfur will be formed in shorter and shorter intervals, until silicon is generated. After just one day, the silicon will fuse into iron. Iron cannot fuse to anything heavier. Instead, in less than a second the core will crash in on itself. In the resulting explosion, the star's outer layers will be blown away. The brightness rise is so dramatic that the single supernova will outshine its entire galaxy. What is left is either a very dense neutron star, where a cubic inch of matter would weigh a ton or more here on Earth, or in the most massive stars, a black hole from which even light cannot escape.

Although stars do not have consciousness like we do, they lead extraordinary lives that are well worth our appreciation and study. Don't forget: Stars are people too.

~ Submitted by Mario Motta at the request of David Levy ~

Mittelman ATMoB Observatory Images . . .

Software configuration and debugging is continuing. In spite of manually controlling the image capture routines, we are able to acquire some images.

M42, Orion Nebula. 10 x H-a (12 sec. each), 10 x OIII (7 sec. each) and 10 x SII (30 sec. each) images mapped in the Hubble palette. January 18, 2021. Mittelman ATMoB Observatory. Processing by Al Takeda.

Barnard 33, Horsehead Nebula. 20 x Luminance (60 sec. each), 7 x H-a (120 sec. each) monochrome image. January 30, 2021. Mittelman ATMoB Observatory. Processing by Al Takeda.

~ Al Takeda - MAO Operations and Imaging ~

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

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April *Star Fields* DEADLINE
Sunday, March 21st

Email articles to Al Takeda at
newsletter@atmob.org

Articles from members are always welcome.
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POSTMASTER NOTE: Not mailed due to the coronavirus pandemic

Amateur Telescope Makers of Boston, Inc.
c/o Chris Elledge, Membership Secretary
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FIRST CLASS

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How to Find Us...
Web Page www.atmob.org

MEETINGS: Zoom On-Line Meetings until further notice. Meetings held the second Thursday of each month (September to July) at 8:00 PM. For meeting details go to 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 CLOSED. 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.

Mar 5 Last Quarter Moon (Moonrise at midnight)
Mar 6 Mercury at greatest western (morning) elongation (27 degrees)
Mar 13 New Moon
Mar 14 Daylight Saving Time begins
Mar 20 Vernal Equinox
Mar 20 Lunar X is visible, 20:00 - 21:00 EDT
Mar 21 First Quarter Moon (Moonset at midnight)
Mar 28 Full Moon
Apr 4 Last Quarter Moon (Moonrise at midnight)
Apr 12 New Moon