The ECLIPSE

August 2021

The Newsletter of the Barnard-Seyfert Astronomical Society

Next Membership Meeting:

August 18, 7:30 pm
Online meeting

Link will be posted on
bsasnashville.com

Details on page 5

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BSAS
Barnard-Seyfert Astronomical Society
BSASNashville.com

BSAS
Barnard-Seyfert Astronomical Society

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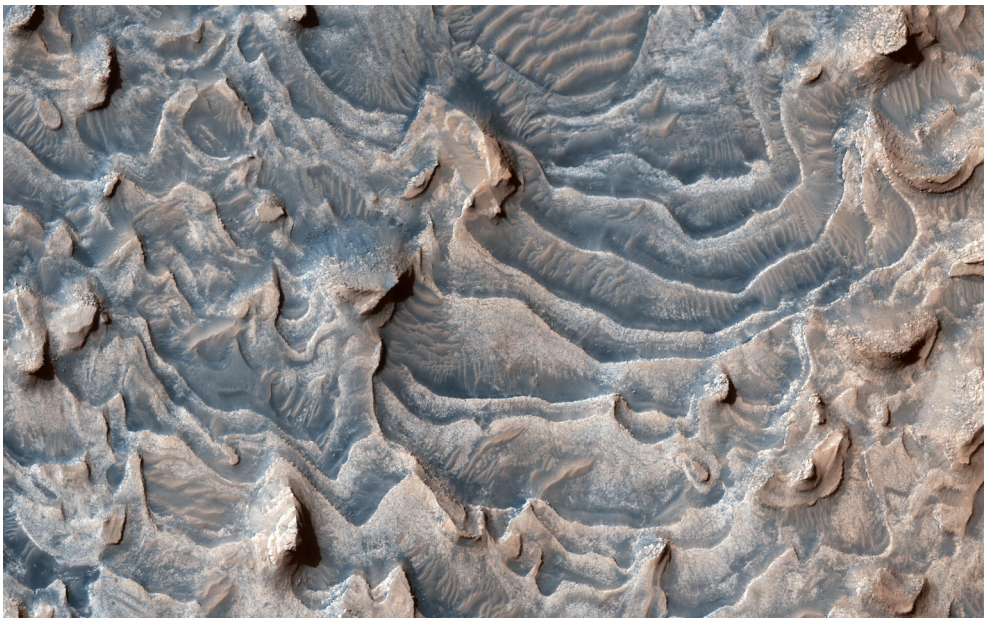
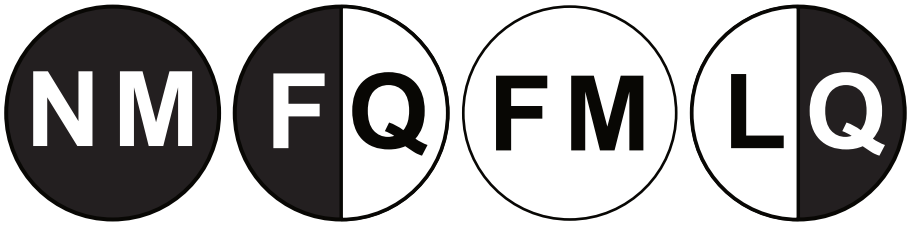


This image shows a layered rock formation within Jiji Crater that has eroded into buttes and stair-like layers. This formation extends west and east. Similar layered rocks are within several craters in Arabia Terra and Meridiani Planum, including Sera and Banes craters. The similarities suggest that the same process was forming deposits over a large geographic area long ago. Our image also indicates that much of the formation has eroded away relative to what has remained. Multiple HiRISE images within Jiji Crater allow scientists to evaluate how similar or different layers are over this area, which can help them understand geologic layers and their properties over greater distances.

Credit: NASA/JPL-Caltech/University of Arizona



Aug 8
Sep 7

Aug 15
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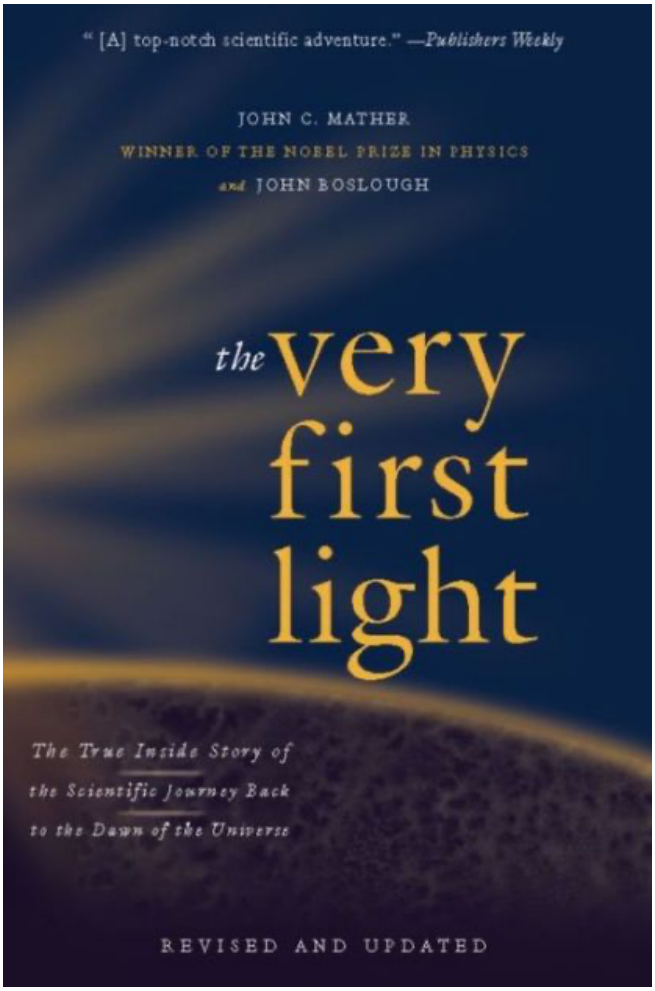
Book Review: The Very First Light
Reviewed By Robin Byrne



Summer is my chance to read more books, so this month I have another book review for you. The Very First Light: The True Inside Story of the Scientific Journey Back to the Dawn of the Universe by John C. Mather and John Boslough is a fascinating account of the various observations of the Cosmic Background Radiation (CBR), culminating with the Cosmic Background Explorer (COBE) telescope.

The book follows a fairly chronological accounting of the scientific investigations relating to the CBR. For me, I already knew a good portion of this material, but it was still enjoyable to revisit. Some of the stories about the individuals involved were new to me, and I was a little surprised by the number of times people's work was overlooked, often for petty reasons. The authors make an attempt to rectify this by giving credit to the unsung heroes in the scientific community.

The portion of the book that I found most riveting, though, was when the idea of placing a telescope in orbit to observe the CBR started to take shape. It began in the early-1970's with a proposal to include microwave detectors on the Infrared Astronomical Satellite (IRAS). That proposal eventually was cut from the IRAS mission, but enough people were interested in pursuing the idea of placing CBR detectors in orbit that a group was established to develop a stand-alone mission. I probably shouldn't have been, but was amazed by the amount of bureaucracy involved in proposing such a mission to NASA. It is an incredible team effort, that involves bringing together scientists, engineers, and NASA insiders to develop not only a workable design, but also present it in a way that will garner support from the committee charged with evaluating proposals, while keeping everything within a budget.

Once a mission gets preliminary approval, then the process becomes even more involved. In the case of COBE, there were three different detectors on board, each designed to study a unique aspect of the CBR. For each detector there was a lead scientist, instrument designer, a team of instrument engineers, and a team of software engineers. Many of the parts that would be used had to be specially built, so manufacturers needed to be contracted to meet the design specifications. In the

Continued on next page

The Very First Light, continued

book's appendix, it lists all of the people involved with COBE, which includes: 20 on the science team, 25 on the Engineering and Managing team, and almost another 1200 people listed as Contributors to COBE. It's easy to see how the budgets for orbiting observatories become so large just from salaries alone!

Then there's the insanely slow process of actually getting it built, functional, and eventually launched. Much of the construction took place at Goddard Spaceflight Center by the staff engineers, but because they weren't specifically on the COBE team, the spacecraft wasn't always their top priority, leading to many delays. Once each part was built, it had to go through a myriad of tests. Typically, nothing works the first time, and that was true for every single part built for COBE. So, each part had to be re-evaluated to modify the design, get rebuilt, and tested once more. A very similar process took place on the software side of the project, and not just de-bugging computer code. Because each instrument had its own software team, they worked independently of one another, which led to issues when they got to the point of needing all the parts to be able to communicate to a centralized system that would send the data back to Earth.

Getting COBE into space met its own hurdles. From the beginning, the plan was to launch it from the Space Shuttle, but from a polar orbit. At the time COBE was first being designed, two launch facilities for the Shuttle were going to be built: the one in Florida, plus one in California designed for a polar path. Eventually, the decision was made to scrap the plans for a California launch site, so the first round of redesign for this portion of the mission began. The telescope would still be launched from the Shuttle, but would now be equipped with a way to maneuver into the necessary polar orbit. But, COBE was not fated for a Shuttle launch. The Challenger explosion during launch in 1986 put the Shuttle program on hold just when COBE was getting close to being ready for launch. After many alternate launch vehicles were explored, it came down to using a Delta rocket. Fortunately, very little of the spacecraft would need to be altered to fit inside the new launch vehicle, plus the Delta could be launched from California into a polar orbit. After 15 years of effort, COBE finally launched on November 18, 1989.

COBE's discoveries were ground-breaking, and the book details each of the significant findings made by the instruments on board. This is another section where, if you already know about the scientific findings, it will be familiar ground, but still fun to revisit the excitement when the discoveries were revealed. What many will not be aware of were the conflicts between members of the science team and the egos involved. Not everyone on the COBE team comes across in a good light.

The book ends with the awarding of the Nobel Prize in Physics to two members of the

Continued on next page

The Very First Light, continued

COBE team, one of whom was the book's co-author, John C. Mather. This part included a glimpse of what it's like to win a Nobel prize, from the notification of being an award recipient, to the press conferences, to all of the pomp and celebrations that occur surrounding the award ceremony. It is quite an event.

Originally written in 1996, and then revised and updated in 2008, The Very First Light is a comprehensive and fascinating retelling of all aspects of the COBE mission. I highly recommend this book to anyone interested not only in the cosmology of our universe's origin, but also interested in the astounding effort involved in creating and operating a space-based observatory. If you've ever asked, "Why is the James Webb Space Telescope taking so long to launch?" this book will help you to appreciate the long, complicated road to putting a ground-breaking telescope in space.

References:

The Very First Light: The True Inside Story of the Scientific Journey Back to the Dawn of the Universe by John C. Mather and John Boslough, 1996, 2008, Basic Books.

Next BSAS Membership Meeting:

Wednesday, August 18, 7:30 pm Central
online on Zoom

Beginning Astrophotography - Alex McConahay

Zoom link will be posted to bsasnashville.com

Corner the Great Square of Pegasus
By David Prosper

The Summer Triangle may be the most famous seasonal star pattern, but during early August evenings another geometrically-themed asterism rises: the Great Square of Pegasus. This asterism's name is a bit misleading: while three of its stars - Scheat, Markab, and Algenib - are indeed found in the constellation of the winged horse Pegasus, its fourth star, Alpheratz, is the brightest star in the constellation Andromeda!

Stephan's Quintet is one of the most famous deep-sky objects in Pegasus. First discovered in 1877, it contains the first galaxy group discovered (which includes 4 of the 5 galaxies making up the Quintet) – and has been studied extensively ever since. One day this group will merge into one supergalaxy! While famous, these galaxies are hard to spot in all but the largest backyard telescopes – but are a favorite target of astrophotographers. Take a virtual flyby of these galaxies with a tour created from Hubble data at: bit.ly/quintetflyby
Credit: NASA, ESA, and G. Bacon, J. DePasquale, F. Summers, and Z. Levay (STScI)

August evenings are an excellent time to look for the Great Square, as it will be rising in the east after sunset. If not obvious at first, wait for this star pattern to rise a bit above the murky air, and remember that depending on your point of view, it may appear more like a diamond than a square. Look for it below the Summer Triangle, or to the southeast of nearby Cassiopeia at this time. As the Great Square rises in prominence during autumn evenings, it becomes a handy guidepost to finding more constellations, including some of the dimmer members of the Zodiac: Aries, Pisces, Aquarius, and Capricornus. Like the Summer Triangle, the Great Square of Pegasus is also huge, but Pegasus itself is even larger; out of the 88 constellations, Pegasus is 7th in size, and feels larger as the stars in its neighboring constellations are much dimmer.

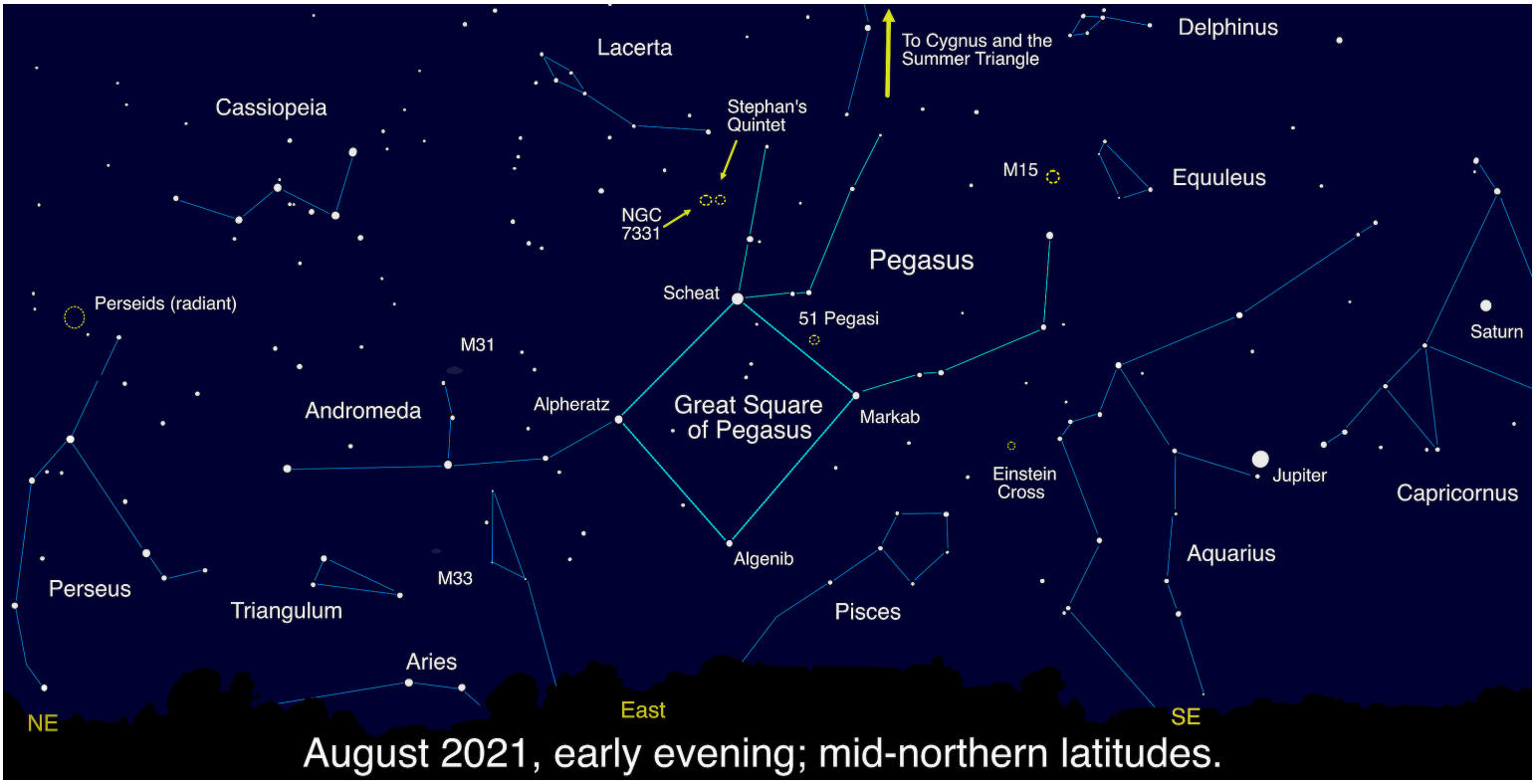
There are many notable deep-sky objects found within the stars of Pegasus - ranging from easily spotted to expert level targets - making it a great constellation to revisit as your observing skills improve. Notable objects include the densely-packed stars of globular cluster M15, a great first target. The potential "Milky Way look-alike" galaxy NGC 7331 is a fun target for more advanced observers, and expert observers can hop nearby to try to tease out the much dimmer interacting galaxies of Stephan's Quintet. A fascinating (but extremely difficult to observe) object is a gravitationally-lensed quasar famously known as the Einstein Cross. Pegasus has quite a storied history in the field of exoplanet research: 51 Pegasi was the first Sun-like star

Continued on next page

discovered to be host to a planet outside our solar system, now officially named Dimidiam.

While observing Pegasus and its surroundings, keep your eyes relaxed and ready to catch some Perseids, too! August 2021 promises an excellent showing of this annual meteor shower. The crescent Moon sets early on the evening of the shower's peak on August 11-12, but you can spot stray Perseids most of the month. If you trace the path of these meteors, you'll find they originate from one point in Perseus - their radiant. Giant planets Jupiter and Saturn will be up all evening as well. Look south - they easily stand out as the brightest objects in the faint constellations Aquarius and Capricornus.

Pegasus truly holds some fantastic astronomical treasures! Continue your exploration of the stars of Pegasus and beyond with NASA at nasa.gov.



While the stars of the Great Square of Pegasus are not as bright as those of the Summer Triangle, they still stand out compared to their neighbors, and make a great foundation for exploring this area of the night sky. Note that the brightness of the stars near the horizon is exaggerated in this picture.

This article is distributed by NASA Night Sky Network. The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, and more! You can catch up on all of NASA's current and future missions at nasa.gov. With articles, activities and games NASA Space Place encourages everyone to get excited about science and technology. Visit spaceplace.nasa.gov to explore space and Earth science!

Barnard-Seyfert Astronomical Society
Minutes of a Regular Meeting of the Board of Directors
Held On Wednesday, July 7, 2021

The regular meeting of the Board of Directors of the Barnard-Seyfert Astronomical Society was held July 7, 2021, online. Logged in were Tom Beckermann, Tony Drinkwine, Bud Hamblen, Keith Rainey, Andy Reeves and Theo Wellington. Keith called the meeting to order at 7:30 PM. Keith asked for a vote to adopt the June, 2021, minutes as printed in the July, 2021, issue of the Eclipse. Andy made the motion, Keith seconded, and the minutes were adopted by voice vote. Theo reported the Suntrust balance to be $11,916.85 and the PayPal balance to be $273.39. Theo said another poster had been sold, but the buyer has not arranged for pick-up. Theo also reported that there were 1,944 likes and 2,075 followers on Facebook, and 274 followers on Twitter. Keith reported 195 members.

Meetings and outreach:

A request for a star party at a local school has been posted on Google Groups.

Meetings at the Adventure Science Center are currently up in the air, owing to turnover in personnel at the ASC. Possible alternative sites include Metro Parks Nature Centers.

The August Zoom meeting will be an introduction to astrophotography by Matt from The Astro Imaging Channel.

Theo noted that Heather from the Warner Nature Center said there will be Perseid meteor shower viewing at the nature center on August 12 from 8:30 to 10:30. Reservation are needed.

Tom said that private star parties on the Natchez Trace should follow COVID protocols. Take a copy of the permit with you if you go to the trace.

There being no further business, the meeting was adjourned at 8:00.

Respectfully submitted,

Bud Hamblen
Secretary

Barnard-Seyfert Astronomical Society
Minutes of the Monthly Membership Meeting
Held On Wednesday, July 21, 2021

Because monthly in-person meetings are suspended due to the COVID-19 epidemic, the Barnard-Seyfert Astronomical Society held an on-line meeting via Zoom on Wednesday, July 21, 2021.

Tom Beckermann called the meeting to order at about 7:30 PM. Theo Wellington reported that the SunTrust balance was $11,916.85. The PayPal balance was $273.36.

Vera Roberts, Warner Parks Nature Center, talked about what it takes to present a public star party at the park. Careful planning is needed. The history of star parties at the Special Events Field goes back to the apparition of Halley's Comet in 1985. The Nature Center will have a Perseid meteor shower viewing on August 12 from 8:30 to 10:30 PM. Reservations are needed. They can accommodate 50 people. It may be possible to have public star parties again beginning in November and large crowds are anticipated. Every member is urged to participate. Great expertise is not a requirement.

The being no further business, the meeting was adjourned at 8:30 PM.

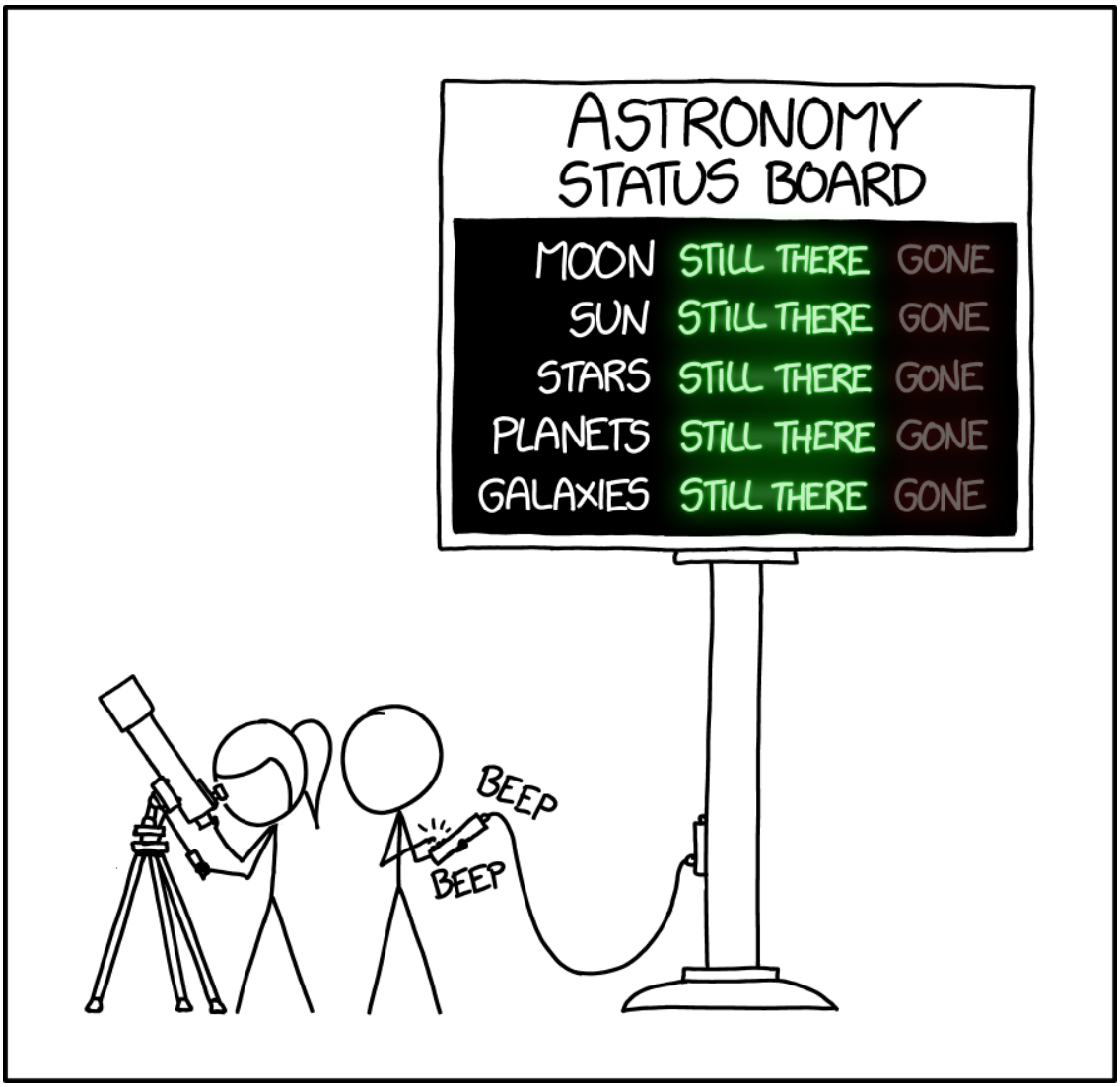
Respectfully submitted,

Bud Hamblen
Secretary

On the Cover: (July 29, 2021) – Russia's "Nauka" Multipurpose Laboratory Module is pictured shortly after docking to the Zvezda service module's Earth-facing port on the International Space Station with the Atlantic Ocean 262 miles below.

Credit: NASA JSC

xkcd


ASTRONOMY
STATUS BOARD
MOON STILL THERE GONE
SUN STILL THERE GONE
STARS STILL THERE GONE
PLANETS STILL THERE GONE
GALAXIES STILL THERE GONE
BEEP
BEEP

In honor of the club's 90th anniversary we partnered with Hatch Show Print to create a unique poster that would honor the achievement of the club. For those who don't know Hatch Show has been making posters for a variety of events and concerts for 140 years. In all that time we are their first astronomy club.

On the poster at the center is the moon. This was made from a wood grained stencil that the shop has used for over 50 years. To contrast that the telescope that the people are using is a brand new stencil made for our poster. The poster has three colors. First the pale yellow color of the moon was applied. Next the small stars, circles, and figures at the bottom were colored in metallic gold. The third color is a blue for the night sky. Where it overlaps with the metallic gold it creates a darker blue leaving the figures at the bottom looking like silhouettes. This was a one time printing so the 100 that we have are all that will be printed.

The prints are approximately 13 3/4” x 22 1/4” and are available for $20 at our membership meetings, or $25 with shipping by ordering through bsasnashville.com. Frame not included.

Barnard-Seyfert Astronomical Society

Become a Member of BSAS! Visit bsasnashville.com to join online.

All memberships have a vote in BSAS elections and other membership votes. Also included are subscriptions to the BSAS and Astronomical League newsletters.

Annual dues:

Regular: $25
Family: $35
Senior/Senior family: $20
Student*: $15

* To qualify as a student, you must be enrolled full time in an accredited institution or home schooled.

About BSAS

Organized in 1928, the Barnard-Seyfert Astronomical Society is an association of amateur and professional astronomers who have joined to share our knowledge and our love of the sky.

The BSAS meets on the third Wednesday of each month at the Cumberland Valley Girl Scout Building at the intersection of Granny White Pike and Harding Place in Nashville. Experienced members or guest speakers talk about some aspect of astronomy or observing. Subjects range from how the universe first formed to how to build your own telescope. The meetings are informal and time is allotted for fellowship. You do not have to be a member to attend the meetings.

Membership entitles you to subscriptions to Astronomy and Sky & Telescope at reduced rates; the club's newsletter, the *Eclipse*, is sent to members monthly. BSAS members also receive membership in the Astronomical League, receiving their quarterly newsletter, the Reflector, discounts on all astronomical books, and many other benefits.

In addition to the meetings, BSAS also sponsors many public events, such as star parties and Astronomy Day; we go into the schools on occasion to hold star parties for the children and their parents. Often the public star parties are centered on a special astronomical event, such as a lunar eclipse or a planetary opposition.

Most information about BSAS and our activities may be found at bsasnashville.com. If you need more information, write to us at info@bsasnashville.com.

Free Telescope Offer

Did someone say free telescope? Yes, you did read that correctly. The BSAS Equipment & Facilities Committee has free telescopes ranging in size from 2.6" to 8" that current members can actually have to use for up to 60 days at a time. We also have some other items in the loaner program such as a photometer, H-alpha solar telescope, educational CDs, tapes, DVDs, and books. Some restrictions apply. A waiting list is applicable in some cases. The BSAS Equipment Committee will not be held responsible for lost sleep or other problems arising from use of this excellent astronomy gear. For information on what equipment is currently available, contact info@bsasnashville.com.