

The ECLIPSE

The Newsletter of the Barnard-Seyfert Astronomical Society



August 2022



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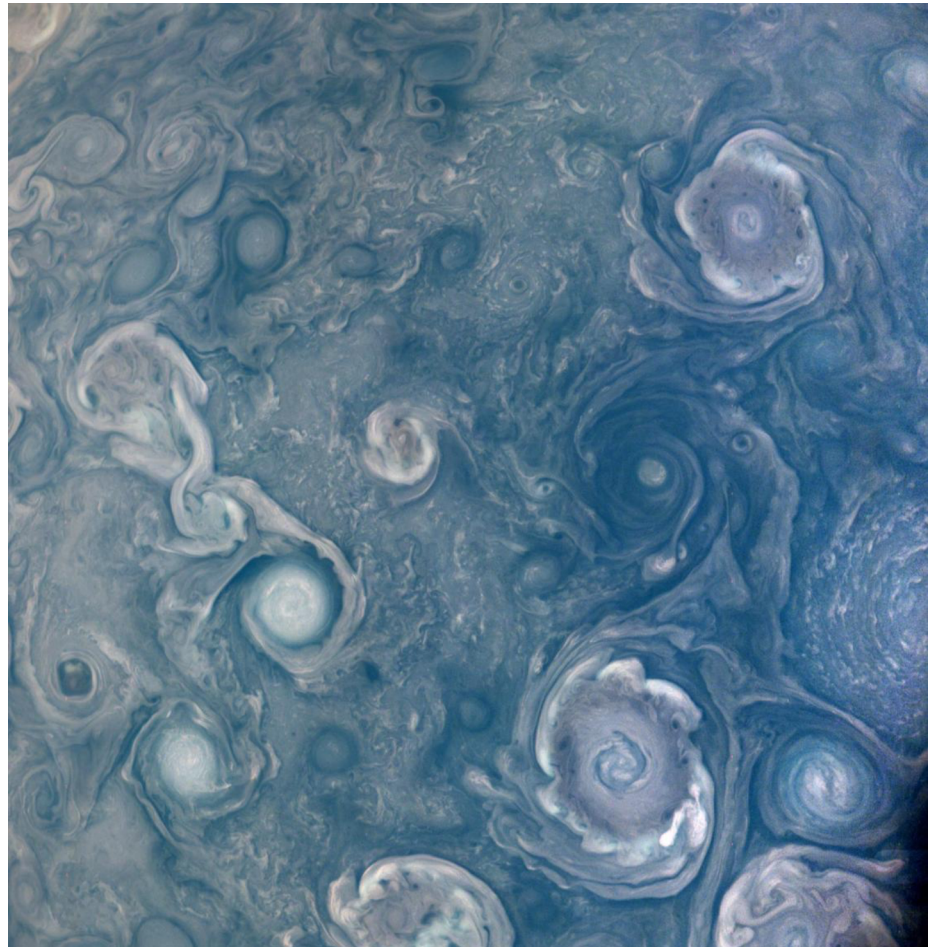
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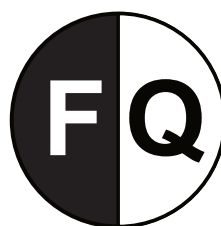
As NASA's Juno mission completed its 43rd close flyby of Jupiter on July 5, 2022, its JunoCam instrument captured this striking view of vortices – hurricane-like spiral wind patterns – near the planet's north pole.

A NASA citizen science project, Jovian Vortex Hunter, seeks help from volunteer members of the public to spot and help categorize vortices and other atmospheric phenomena visible in JunoCam photos of Jupiter. This process does not require specialized training or software, and can be done by anyone, anywhere, with a cellphone or laptop. As of July 2022, 2,404 volunteers had made 376,725 classifications using the Jovian Vortex Hunter project web site at www.zooniverse.org/projects/ramanakumars/jovian-vortex-hunter

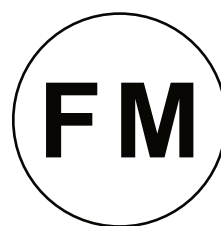
Credit: NASA/JPL-Caltech/SwRI/MSSS, Image processing by Brian Swift © CC BY



Aug 27
Sep 25



Aug 5
Sep 3



Aug 11
Sep 10



Aug 18
Sep 17

Happy Birthday Otto Struve by Robin Byrne

This month we celebrate the life of a man who came from a long line of astronomers, and still managed to make his own important contributions to the field. Otto Struve was born August 12, 1897 in Kharkiv, Ukraine (which was part of Russia at the time). Among the astronomers in his family were: his father Ludwig, grandfather Otto Willhelm, great-grandfather Friedrich Georg, and uncle Karl Hermann. With such a legacy, it's not surprising that Otto began his astronomical career at an early age. As young as eight years old, Otto would go to the Kharkov University Observatory to make observations with his father, who was the director of the observatory. By the age of ten, he was trusted to make his own observations.



Otto was home-schooled up to the age of twelve, when he began attending a public school, where his mathematical talents stood out. Otto graduated in 1914, at the age of 17. For the next year, he pursued his own astronomical observations, including an observation of a total solar eclipse on August 21st of that year, which would be the basis of his Masters thesis five years later. In 1915, Otto began his college career at Kharkov University, majoring in mathematics and astronomy.

With World War I raging through Europe, Otto decided, after one semester of college, to join the war effort. He went to St. Petersburg to attend artillery school. After a year of training, he was sent to the Turkish front. A year later, the war was drawing to a close, and Otto returned home.

Struve completed the remainder of his college course work in only one year, and pledged to remain at the university to continue his astronomical studies.

However, in 1919, with the Russian Revolution in full swing, Struve once again felt the call to serve. His family supported the Tsar, so Struve fought against the Bolsheviks. During his time in the army, Struve caught diphtheria, scarlet fever, typhoid fever, rheumatic fever, and was wounded in action. As it became obvious that the Bolsheviks would win, Struve joined thousands of others who fled the country to safety. His family remained in Russia, though through various tragedies, only his mother and one of his sisters survived. Struve eventually made his way to Turkey, where he began looking for work.

Struve's life in Turkey was very difficult. He took whatever jobs were available, including working as a lumberjack, living in a tent with five other men, and eating at soup kitchens. Struve wrote to his uncle for help, not knowing his uncle had died. But his aunt contacted some of her late husband's colleagues to try to help Otto find work as an astronomer. Ultimately, Edwin B. Frost, the director of Yerkes Observatory, was contacted with a request for help. Without knowing much about Otto at all, but being well aware of the Struve family's reputation, Frost hired Otto sight unseen. After many months of red tape, a long voyage at

sea, and a number of days on a train, Otto Struve arrived for his new job in Chicago on October 10, 1921. Not wanting to arrive in his old Russian uniform (the only clothes he had), Struve stopped at a flea market in New York to get something to wear. He made his first appearance at Yerkes wearing a green jacket, purple pants, and orange shoes.

By the end of the year, Struve was officially working as a stellar spectroscopy assistant at Yerkes, while also taking classes at the University of Chicago. The observatory was in a slump, and Struve was the only regular student, so his “class work” involved doing readings on his own, getting practice with the equipment, and informal discussions with the professors. Five months later, Struve made his first astronomical discovery: he found that Gamma Ursa Majoris was a variable star with a regular pulsation rate. Within the year, he had also discovered two asteroids.

In December 1923, Struve defended his doctoral thesis, which was on short period binary stars. Struve immediately was hired by the University of Chicago as an instructor beginning the following month, eventually rising through the ranks as assistant professor, and ultimately becoming full professor in 1932.

In 1924, Struve’s sister died, leaving his mother alone in Russia. With his help, Struve’s mother immigrated to America in 1925. She moved in with Otto, even helping him with reducing the data from his observations. That same year, Otto married Mary Martha Lanning, who was a secretary at Yerkes. All three lived together up until Otto’s death, while Otto and Mary never had any children. Two years later, Otto Struve officially became an American citizen.

Struve continued relentlessly pursuing his astronomical work. In 1925, he observed the spectra of a variety of stars, noticing an absorption line due to calcium. The stars were too hot to have calcium, which led Struve to propose the calcium was in material between the stars. This was the first observational evidence for the interstellar medium. Meanwhile, Struve spent much of his time studying binary star systems, especially ones that had unusual qualities, such as evidence for mass transfer or strange eclipse patterns.

In 1932, Struve became director of the Yerkes Observatory. At the same time, the University of Texas had received an endowment to build an observatory, but didn’t have any astronomers on staff. A partnership was established with Yerkes, leading to Struve overseeing the construction of the McDonald Observatory. Even before the observatory was completed, Yerkes astronomers were using the location to do observations with their own equipment, which led to discovering more characteristics of the interstellar medium.

Struve proved himself to be a very accomplished, though demanding administrator. As director of Yerkes, he was also in charge of the Astronomy Department at the University of Chicago. What had been a program in decline quickly began to grow under Struve’s leadership. He closely observed his staff to document who was making a contribution to the department and who was dead weight. Almost ruthlessly, Struve got rid of people, and replaced them with some of the brightest minds of the era, including: Subrahmanyan Chandrasekhar, Gerard Kuiper, Jan Oort, and Bengt Strömgren. Struve’s recruiting methods met with some resistance, since most of the people he hired were not American citizens. This especially rankled during the Depression, with cries of foreigners taking jobs from Americans.

Struve fought for and justified the hiring of each of these individuals.

In the 1930's Struve's research focused on how various characteristics of stars affect the spectral lines that are observed. He studied the relationship between a star's rotation rate, the star's temperature, the relative abundance of elements in a star, the electric fields generated by a star, and turbulence in the star's atmosphere, with how they all can cause spectral lines to get wider. At the same time, he continued to study the evidence for the interstellar medium (ISM). In 1938, Struve detected the signature for hydrogen in the ISM. This major discovery would tie in with his later work in radio astronomy.

The assembly of such a strong group of astronomers on the faculty at the University of Chicago had some repercussions. As their reputations grew, the astronomers were less likely to follow all of the directives given by Struve. Becoming more and more dissatisfied, in 1947 Struve resigned from Yerkes and moved to California to become director of the Leuschner Observatory and chairman of the astronomy department at Berkeley.

During the 1950's, Struve devoted his observations to a special class of stars in the Beta Canis Majoris class. These are stars with a spectral type in the range of B0 to B3 that are giants, sub giants, or bright giants. Because these stages are so short-lived, there are only a few dozen such stars known. Struve was particularly interested in observing how their brightness and spectrum change in a very short amount of time (within hours) and their very complicated light curves. It is thought that these stars go through a variety of pulsations which depend on a combination of their mass and rotation rate.

Also during the 1950's, Struve became a strong advocate for radio astronomy. In 1952, he became the first director of the National Radio Astronomy Observatory (NRAO) at the University of Virginia. He held this position for the next ten years. In 1959, he also took the role of first director for the NRAO in Green Bank, West Virginia. In this position, Struve had an opportunity to pursue one of his more controversial interests - the search for intelligent life in the universe. He used his position to support Frank Drake's use of NRAO telescopes as part of Drake's Project Ozma program to look for radio signals from intelligent civilizations. Struve's reasoning for believing in life elsewhere stemmed from his study of the rotation rate of stars. Many stars, including our Sun, rotate slower than expected from the physics of how stars form. It is thought that the reason has to do with having a planetary system, which effectively causes a drag that slows the star's rotation rate. Struve found many slow-rotating stars, which led to his belief that there were planetary systems around most stars, so why not intelligent life, too? While we still don't have any proof of life elsewhere, his conclusion that most stars have planets has definitely seen more and more confirmation over the years.

Throughout his career, Struve was a prolific publisher of articles, both in professional journals and in popular magazines, such as Sky and Telescope, for which he wrote over 150 articles alone. He felt it was important to share the discoveries made in the astronomical community with the public.

Starting in 1958, Struve's health began to decline. It began with a bad fall, which had resulted in several broken bones and the need for a body cast. A recurrence of hepatitis (which he had suffered from back in Russia and Turkey), led to cirrhosis of the liver. The damage to his liver ultimately resulted in Struve being hospitalized in 1963, where he died on April 6th of that

year. Although he is gone, Struve's name lives on in the form of asteroids named in his and his family's honor, a crater on the Moon, and the 82-inch telescope at McDonald Observatory.

Otto Struve truly lived up to the reputation passed down from his family. His contributions to astronomy are widespread and significant. It also feels appropriate to honor this native of Ukraine at a time when his birthplace is experiencing so much devastation. Whether you're observing some binary stars, admiring gas clouds in the interstellar medium, or even performing some radio astronomy observations, take a moment to thank this month's honoree - Otto Struve.

References:

[Otto Struve - Wikipedia](#)

"Otto Struve" by Kevin Krisciunas; National Academy of Sciences. 1992. Biographical Memoirs: Volume 61. Washington, DC: The National Academies Press. doi: 10.17226/2037.

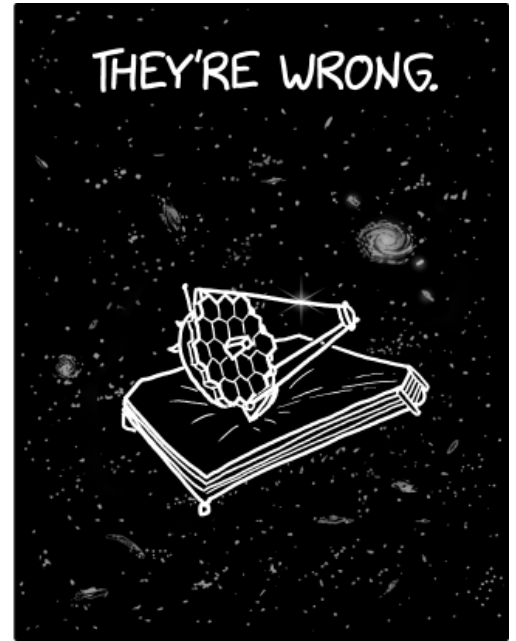
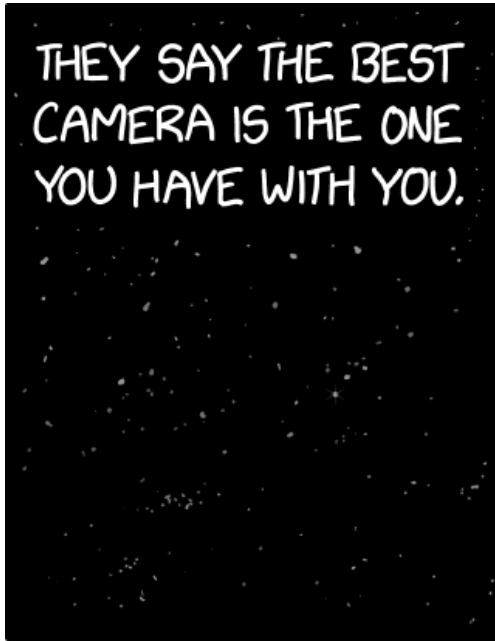
[Otto Struve American Astronomer - Encyclopedia Britannica](#)



On the Cover: An enormous mosaic of Stephan's Quintet is the largest image to date from NASA's James Webb Space Telescope, covering about one-fifth of the Moon's diameter. It contains over 150 million pixels and is constructed from almost 1,000 separate image files. The visual grouping of five galaxies was captured by Webb's Near-Infrared Camera (NIRCam) and Mid-Infrared Instrument (MIRI).

With its powerful, infrared vision and extremely high spatial resolution, Webb shows never-before-seen details in this galaxy group. Sparkling clusters of millions of young stars and starburst regions of fresh star birth grace the image. Sweeping tails of gas, dust and stars are being pulled from several of the galaxies due to gravitational interactions. Most dramatically, Webb's MIRI instrument captures huge shock waves as one of the galaxies, NGC 7318B, smashes through the cluster. These regions surrounding the central pair of galaxies are shown in the colors red and gold. Credits: [NASA](#), [ESA](#), [CSA](#), [STScI](#)

xkcd



Next Membership Meeting:

Wednesday August 17, 7:30 pm

Cumberland Valley
Girl Scout Council Building
4522 Granny White Pike

Artemis 1: A Trip Around the Moon – and Back! By David Prosper

We are returning to the Moon - and beyond! Later this summer, NASA's Artemis 1 mission will launch the first uncrewed flight test of both the Space Launch System (SLS) and Orion spacecraft on a multi-week mission. Orion will journey thousands of miles beyond the Moon, briefly entering a retrograde lunar orbit before heading back to a splashdown on Earth.

The massive rocket will launch from Launch Complex 39B at the Kennedy Space Center in Florida. The location's technical capabilities, along with its storied history, mark it as a perfect spot to launch our return to the Moon. The complex's first mission was Apollo 10 in 1968, which appropriately also served as a test for a heavy-lift launch vehicle (the Saturn V rocket) and lunar spacecraft: the Apollo Command and Service Modules joined with the Lunar Module. The Apollo 10 mission profile included testing the Lunar Module while in orbit around the Moon before returning to the Earth. In its "Block-1" configuration, Artemis-1's SLS rocket will take off with 8.8 million pounds of maximum thrust, even greater than the 7.6 millions pounds of thrust generated by the legendary Saturn V, making it the most powerful rocket in the world!

Artemis-1 will serve not only as a test of the SLS and the Orion hardware, but also as a test of the integration of ground systems and support personnel that will ensure the success of this and future Artemis missions. While uncrewed, Artemis-1 will still have passengers of a sort: two human torso models designed to test radiation levels during the mission, and "Commander Moonikin Campos," a mannequin named by the public. The specialized mannequin will also monitor radiation levels, along with vibration and acceleration data from inside its mission uniform: the Orion Crew Survival Suit, the spacesuit that future Artemis astronauts will wear. The "Moonikin" is named after Arturo Campos, a NASA electrical engineer who played an essential role in bringing Apollo 13's crew back to Earth after a near-fatal disaster in space.

The mission also contains other valuable cargo for its journey around the Moon and back, including CubeSats, several space science badges from the Girl Scouts, and

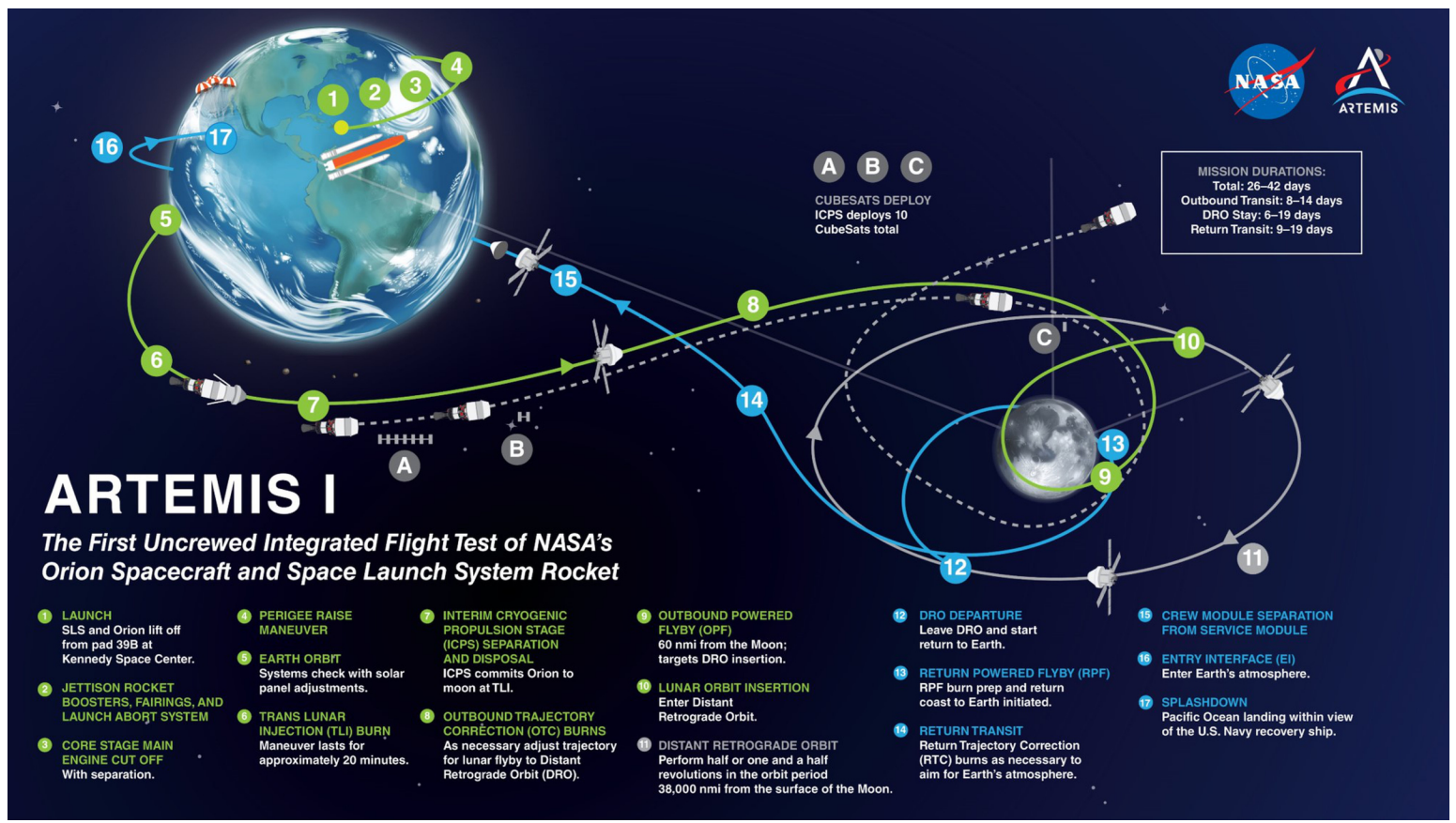


Full Moon over Artemis-1 on July 14, 2022, as the integrated Space Launch System and Orion spacecraft await testing.

Photo credit: [NASA/Cory Huston](#)

microchips etched with 30,000 names of workers who made the Artemis-1 mission possible. A total of 10 CubeSats will be deployed from the Orion Stage Adapter, the ring that connects the Orion spacecraft to the SLS, at several segments along the mission's path to the Moon. The power of SLS allows engineers to attach many secondary "ride-along" mission hardware like these CubeSats, whose various missions will study plasma propulsion, radiation effects on microorganisms, solar sails, Earth's radiation environment, space weather, and of course, missions to study the Moon and even the Orion spacecraft and its Interim Cryogenic Propulsion Stage (ICPS)!

If you want to explore more of the science and stories behind both our Moon and our history of lunar exploration, the Night Sky Network's Apollo 11 at 50 Toolkit covers a ton of regolith: bit.ly/nsmoon! NASA also works with people and organizations around the world coordinating International Observe the Moon Night, with 2022's edition scheduled for Saturday, October 1: moon.nasa.gov/observe. Of course, you can follow the latest news and updates on Artemis-1 and our return to the Moon at nasa.gov/artemis-1



Follow along as Artemis 1 journeys to the Moon and back! A larger version of this infographic is available from NASA at: nasa.gov/image-feature/artemis-i-map

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 6, 2022

The regular meeting of the Board of Directors of the Barnard-Seyfert Astronomical Society was held July 6, 2022, online, Dr. Tom Beckermann presiding. Logged in were Tom Beckermann, Cory Buckner, Chip Crossman, Osvaldo Gonzalez, Bud Hamblen and Theo Wellington. An on-line quorum being present, Tom called the meeting to order at 7:30 PM.

Tom asked for a motion to adopt the minutes of the board meeting on June 1, 2022, as printed in the July, 2022, edition of the Eclipse. The minutes were adopted unanimously.

Treasurer's Report: Theo reported the Truist bank balance is \$11,646.26 (\$4,578.07 equipment fund, \$7,280.19 general fund). The PayPal balance is \$156.31. An updated member list and a \$950 check for dues have been sent to the Astronomical League. The check has not yet cleared.

Membership report: 213 members.

Social media: Theo reported that Facebook page is liked by 2,041 and followed by 2,182. The Twitter (@bsasnashville) has 310 followers.

Star parties: Discovery Center in Murfreesboro would like to host a statewide star party in October. This would kick off their state wide STEAM festival (October 14-23). <https://www.tnsteam.org/host>

Pickett CCC Memorial State Park is planning a star party at the group camp site on September 24-25.

Public Star parties are scheduled for Bell Bend Outdoor Center July 9 and Edwin Warner Special Events Field August August 6.

Private star parties are scheduled at the Water Valley Overlook (Natchez Trace Parkway mile marker 412) on August and at the parking lot at mile marker 435.3 We want to use Google Groups to connect private star party participants because solo trips are not fun.

Meetings and programs: A program is planned for the Webb space telescope first light for the July 20 meeting. Keith can present "All I Want for Christmas" in November. The covered dish supper is in December.

Equipment: The Meade LX200 with a runaway declination motor is being troubleshooted. The Coronado solar telescope former held by Chuck Schlemm is available, and the 8" goto dob is available.

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

Respectfully submitted,

Bud Hamblen
Secretary



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.



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.