

The ECLIPSE

May
2021

The Newsletter of the Barnard-Seyfert Astronomical Society

Next Membership Meeting:

May 19, 7:30 pm
Online meeting

Topic TBD

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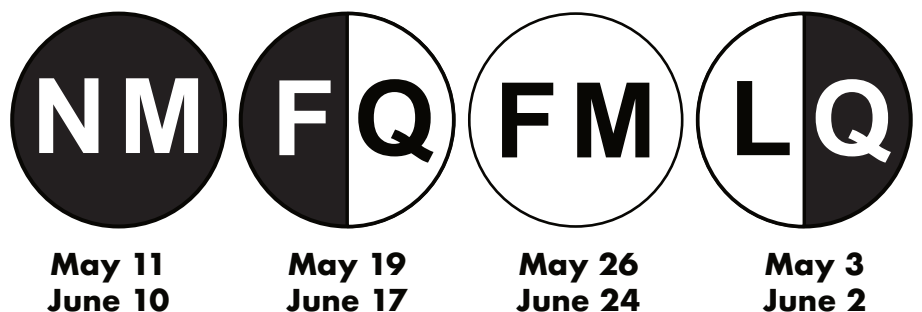


Four astronauts splashed down safely in the Gulf of Mexico Sunday, completing NASA's first commercial crew, long-duration mission aboard the International Space Station. The return comes nearly six months after the crew members arrived at the microgravity laboratory and also marks the longest-duration mission of a crewed American spacecraft to date.

SpaceX's Crew Dragon, carrying NASA astronauts Michael Hopkins, Victor Glover, and Shannon Walker, and Japan Aerospace Exploration Agency astronaut Soichi Noguchi, returned to Earth in a parachute-assisted splashdown at 2:56 a.m. EDT May 2, 2021, off the coast of Panama City, Florida. Crews aboard SpaceX recovery vessels successfully recovered the spacecraft and astronauts. After returning to shore, the astronauts will fly back to Houston.

NASA's SpaceX Crew-1 mission launched Nov. 15, 2020, on a Falcon 9 rocket from the agency's Kennedy Space Center in Florida. The astronauts named the spacecraft Resilience, in honor of their families, colleagues, and fellow citizens and highlighting the dedication displayed by the teams involved with the mission and demonstrating that there is no limit to what humans can achieve when they work together. Crew Dragon Resilience docked to the Harmony module's forward port of the space station Nov. 16, nearly 27 hours after liftoff.

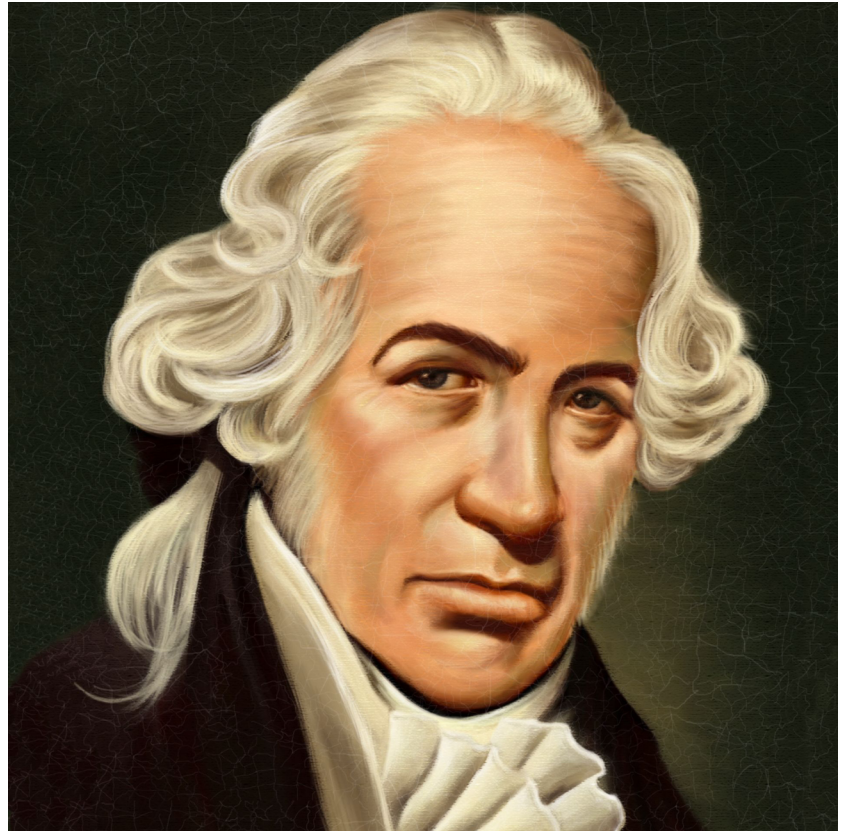
Credits: [NASA/Bill Ingalls](#)



Happy Birthday Daniel Fahrenheit by Robin Byrne

This month we celebrate the life of a man who daily tells us, at least in the States, the temperature. Daniel Gabriel Fahrenheit was born on May 24, 1686 in, what is known today as, Gdansk, Poland, but was then Danzig in the Polish-Danish Commonwealth. His father, also named Daniel, was a successful merchant married to Concordia. They had five children, with Daniel Gabriel as the oldest, along with his one brother and three sisters.

On August 14, 1701, when Daniel was 15 years old, both his parents died, possibly due to eating poisonous mushrooms. Daniel's guardian sent him to live in Amsterdam, the Netherlands to work for a shopkeeper and train to be a merchant. Fahrenheit apprenticed with the shopkeeper for four years, but discovered he was more interested in scientific instrument-making.



Fahrenheit began traveling through Europe, visiting the best known instrument makers and scientists of the time, including Roemer and Leibniz. Almost a hundred years earlier, the first thermometer had been constructed, but no standard scale had been established. In 1701, Roemer had designed a thermometer based on a scale with boiling water set at 60° , melting ice at 7.5° (intentionally set at $1/8$ th the temperature of boiling water), and 0° the temperature of a water-ice-salt mixture. Fahrenheit had the opportunity to observe Roemer calibrate several of his thermometers while visiting with him. Fahrenheit described the process:

I found that he had stood several thermometers in water and ice, and later he dipped these in warm water, which was at blood-heat, and after he had marked these two limits on all the thermometers, half the distance between them was added below the point in the vessel with ice, and the whole distance divided into $22-1/2$ parts, beginning with 0 at the bottom then $7-1/2$ for the point in the vessel with ice and $22-1/2$ degrees for that at blood-heat.

In 1717, Fahrenheit returned to Amsterdam and began his career as a glass-blower and scientific instrument-maker. When Fahrenheit began making his own

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Daniel Fahrenheit, continued

thermometers, a misunderstanding of Roemer's "blood-heat" led to a different scale. Fahrenheit interpreted it as meaning body temperature, whereas Roemer likely meant lukewarm water. After trying various scales, Fahrenheit settled on 96° for body temperature and 32° for an ice-water mixture. Having a difference of 64° made calibration of the scale easier, since it can be successively divided by halves down to single degrees (64 to 32 to 16 to 8 to 4 to 2 to 1).

Fahrenheit's first thermometers were made with alcohol, but he later switched to using mercury. While experimenting with mercury and studying how it expands when heated, Fahrenheit discovered that the boiling point of water varies depending on the atmospheric pressure. In an article he wrote in 1724 for the Philosophical Transactions of the Royal Society, Fahrenheit stated that the boiling point of water at sea level was approximately 212°. This number was chosen because it is 180° above the water-ice freezing point, again making a convenient difference for calibrating the scale on a thermometer. However, because the boiling point of water ultimately became a more practical calibration point for constructing the thermometers, rather than body temperature, the normal temperature for a person was no longer 96°, but 98.6°.

Fahrenheit's thermometers became the first thermometers to have a standardized scale, allowing temperature measurements to have an understood physical meaning. His design included bulbs that were cylindrical, rather than spherical, and the mercury was cleaned using a method Fahrenheit developed himself. However, for 18 years, he was the only one who could make them, because he maintained that the design details were a "trade secret."

In addition to the thermometer, Fahrenheit also designed an instrument to measure the density of a liquid, called a constant weight hydrometer. It is basically a closed tube with weights at the bottom and air at the top. It is placed in the liquid, and how far it sinks gives an indication of the liquid's density, where the lower it sinks, the lower the density. Based on his discovery that water boils at different temperatures depending on the air pressure, Fahrenheit invented a hypsometric thermometer using the temperature when water boils to estimate the air pressure.

At the beginning of September in 1736, Fahrenheit became ill. By September 7th, he had deteriorated enough to have a will drawn up. On September 16th, 1736, at the age of 50, Daniel Fahrenheit passed away, having never married. Despite his accomplishments, he apparently died with very little money, receiving a "fourth-class funeral" for someone considered destitute. He was buried in The Hague, Netherlands.

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Daniel Fahrenheit, continued

Instrument-makers, like Fahrenheit, rarely had formal scientific training, but their trade involved many aspects of science. Fahrenheit had to be aware of many physical properties to construct his thermometers, including: the thermal expansion and contraction of various materials used in the instrument (such as glass, alcohol, and mercury), their behaviors at different atmospheric pressures, and the densities of the substances used.

Creating a device that had a standardized scale for measuring temperature allowed the scientific world to investigate thermal effects in scientific areas of study ranging from meteorology to chemistry to physics. While the United States is the only place in the world that still uses the Fahrenheit scale to measure temperature, everyone else now using Celsius, Fahrenheit's legacy is much more than just the temperature scale. His instruments helped advance the sciences into new realms. Whether you're looking at a weather forecast, checking to see if you have a fever, or popping something into the oven, the next time you see a temperature, give a nod of recognition to the man who made it all possible: Daniel Fahrenheit.

References:

[Daniel Gabriel Fahrenheit - Wikipedia](#)

[Gabriel Fahrenheit Biography - Encyclopedia of World Biography](#)

[Gabriel Daniel Fahrenheit - Your Dictionary](#)

[Fahrenheit, Daniel Gabriel - encyclopedia.com](#)

Next Membership Meeting:

Wednesday, May 19, 7:30 pm Central
online on Zoom

Topic TBD

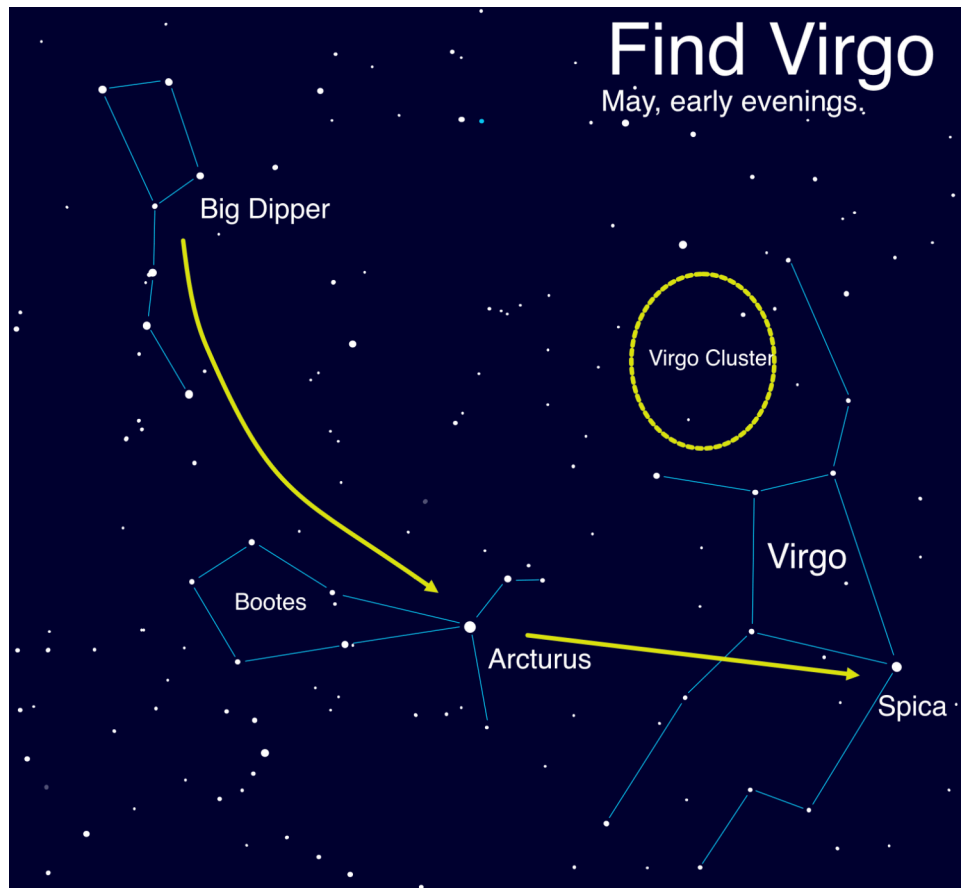
Zoom link will be posted to bsasnashville.com

Virgo's Galactic Harvest By David Prosper

May is a good month for fans of galaxies, since the constellation Virgo is up after sunset and for most of the night, following Leo across the night sky. Featured in some ancient societies as a goddess of agriculture and fertility, Virgo offers a bounty of galaxies as its celestial harvest for curious stargazers and professional astronomers alike.

Virgo is the second-largest constellation and largest in the Zodiac, and easily spotted once you know how to spot Spica, its brightest star. How can you find it? Look to the North and start with the Big Dipper! Follow the general curve of the Dipper's handle away from its "ladle" and towards the bright orange-red star Arcturus, in Boötes – and from there continue straight until you meet the next bright star, Spica! This particular star-hopping trick is summed up by the famous phrase, "arc to Arcturus, and spike to Spica."

This large constellation is home to the Virgo Cluster, a massive group of galaxies. While the individual stars in Virgo are a part of our own galaxy, known as the Milky Way, the Virgo Cluster's members exist far beyond our own galaxy's borders. Teeming with around 2,000 known members, this massive group of galaxies are all gravitationally bound to each other, and are themselves members of the even larger Virgo Supercluster of galaxies, a sort of "super-group" made up of groups of galaxies. Our own Milky Way is a member of the "Local Group" of galaxies, which in turn is also a member of the Virgo Supercluster! In a sense, when we gaze upon the galaxies of the Virgo Cluster, we are looking at some of our most distant cosmic neighbors. At an average distance of over 65 million light years away, the light from these galaxies first started towards



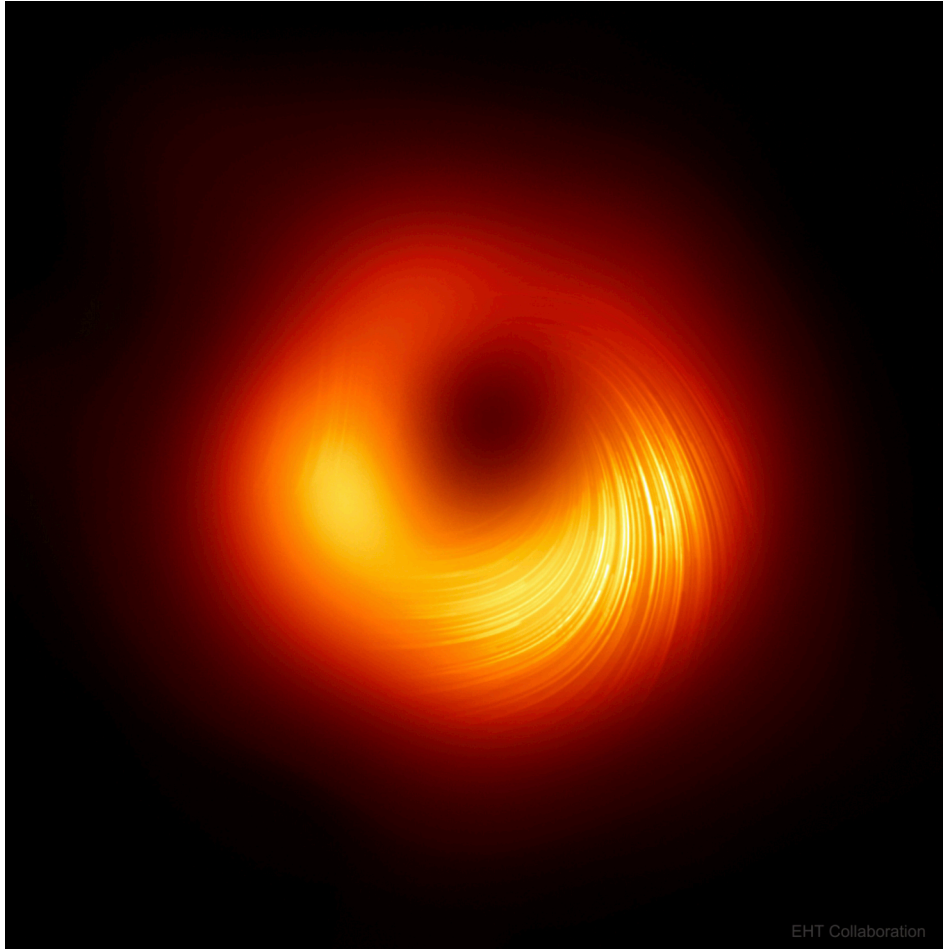
Find Virgo by "arc to Arcturus, then spiking on to Spica." Please note that in this illustration, the location of the Virgo Cluster is approximate - the borders are not exact.

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Virgo, continued

our planet when the dinosaurs were enjoying their last moments as Earth's dominant land animals! Dark clear skies and a telescope with a mirror of six inches or more will reveal many of the cluster's brightest and largest members, and it lends itself well to stunning astrophotos.

Virgo is naturally host to numerous studies of galaxies and cosmological research, which have revealed much about the structure of our universe and the evolution of stars and galaxies. The "Universe of Galaxies" activity can help you visualize the scale of the universe, starting with our home in the Milky Way Galaxy before heading out to the Local Group, Virgo Cluster and well beyond! You can find it at bit.ly/universeofgalaxies. You can further explore the science of galaxies across the Universe, along with the latest discoveries and mission news, at nasa.gov.



The first image of a black hole's event horizon was taken in the center of one of the most prominent galaxies in Virgo, M87! This follow up image, created by further study of the EHT data, reveals polarization in the radiation around the black hole. Mapping the polarization unveils new insights into how matter flows around and into the black hole - and even hints at how some matter escapes! More details: apod.nasa.gov/apod/ap210331.html

Credit: Event Horizon Telescope Collaboration

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, April 7, 2021

Zoom meeting with Keith Rainey, Theo Wellington, Kathy Underwood, Tom Beckerman, Tony Drinkwine

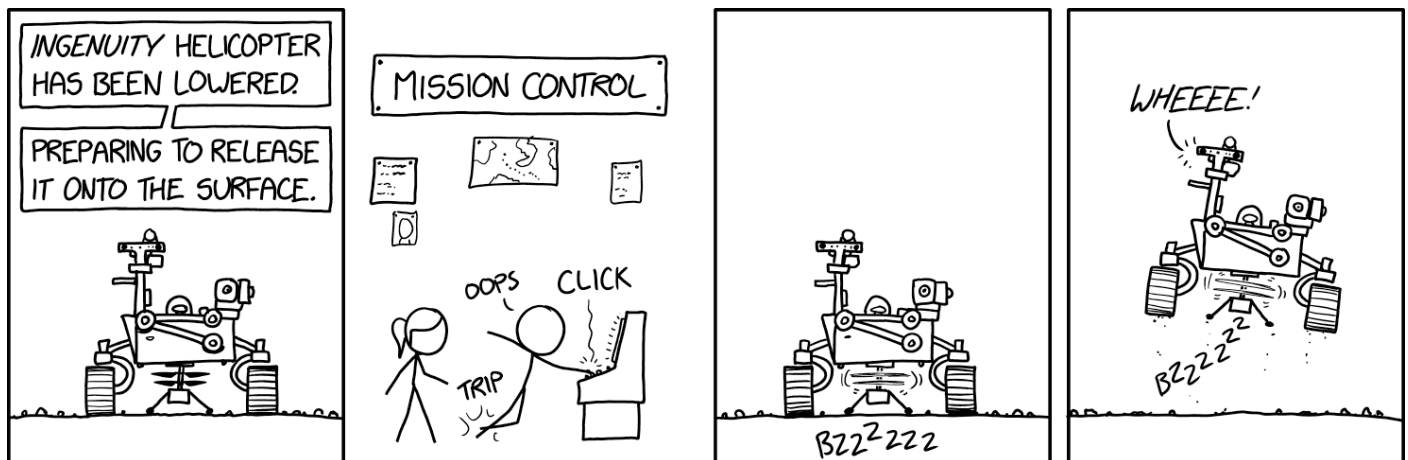
Need a meeting presentation this month, we had been thinking about a "What's Up." Suggestion to ask Dr. Terry Reeves, Theo will contact Tony got an email about the Leo Triplet, so an interesting item in the sky to find.

Minutes from last month...motion to approve by Kathy / second Keith, approved.
 Treasurer's report Bank balance of \$11,591.78, with \$388.39 in Paypal. The March 13 Virtual Star Party had 394 views to date, next is April 17.
 Membership, 188, pretty steady from last month.
 Mid TN science fair, no physics and astronomy projects. We'll check back next year!
 Star parties. Parks looking to open in the fall.

Tom...meeting a gentleman to hand over a scope.
 Tom asked for form for folks to check out scope, Theo will send a copy. Also, we need to ask Johanna Keohane which telescopes she still has.
 Tom was asked to MC the member meeting as Keith will be out of town.
 There being no other business, the meeting was adjourned.

Respectfully submitted,
 Theo Wellington

xkcd



Barnard-Seyfert Astronomical Society Minutes of the Monthly Membership Meeting Held On Wednesday, April 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, April 21, 2021. 18 participants zoomed in.

Keith Rainey called the meeting to order at 7:35 PM and asked for a vote to adopt the minutes for the March 17, 2021, meeting. The minutes were adopted by voice vote. Theo Wellington reported that the SunTrust balance was \$12,104.85. 34 posters have been sold.

Theo reported on social media. The March 13 Virtual Star Party had over 400 views. The April 17 Virtual Star Party had 327 views. The club's Facebook page is liked by 1926 persons and is followed by 2064. The club's Twitter feed has 274 followers.

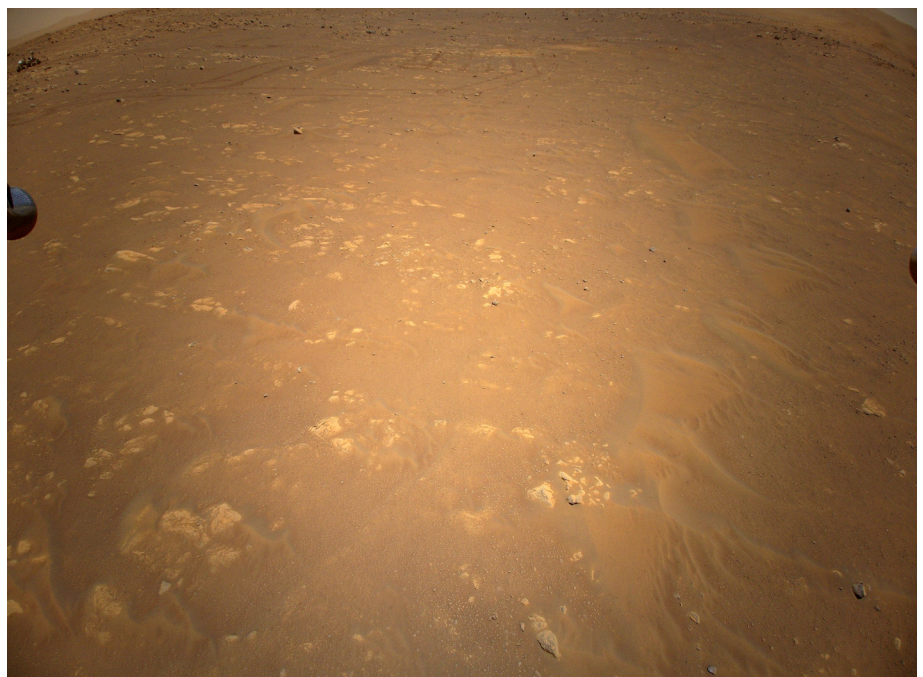
Keith reported about 130 members.

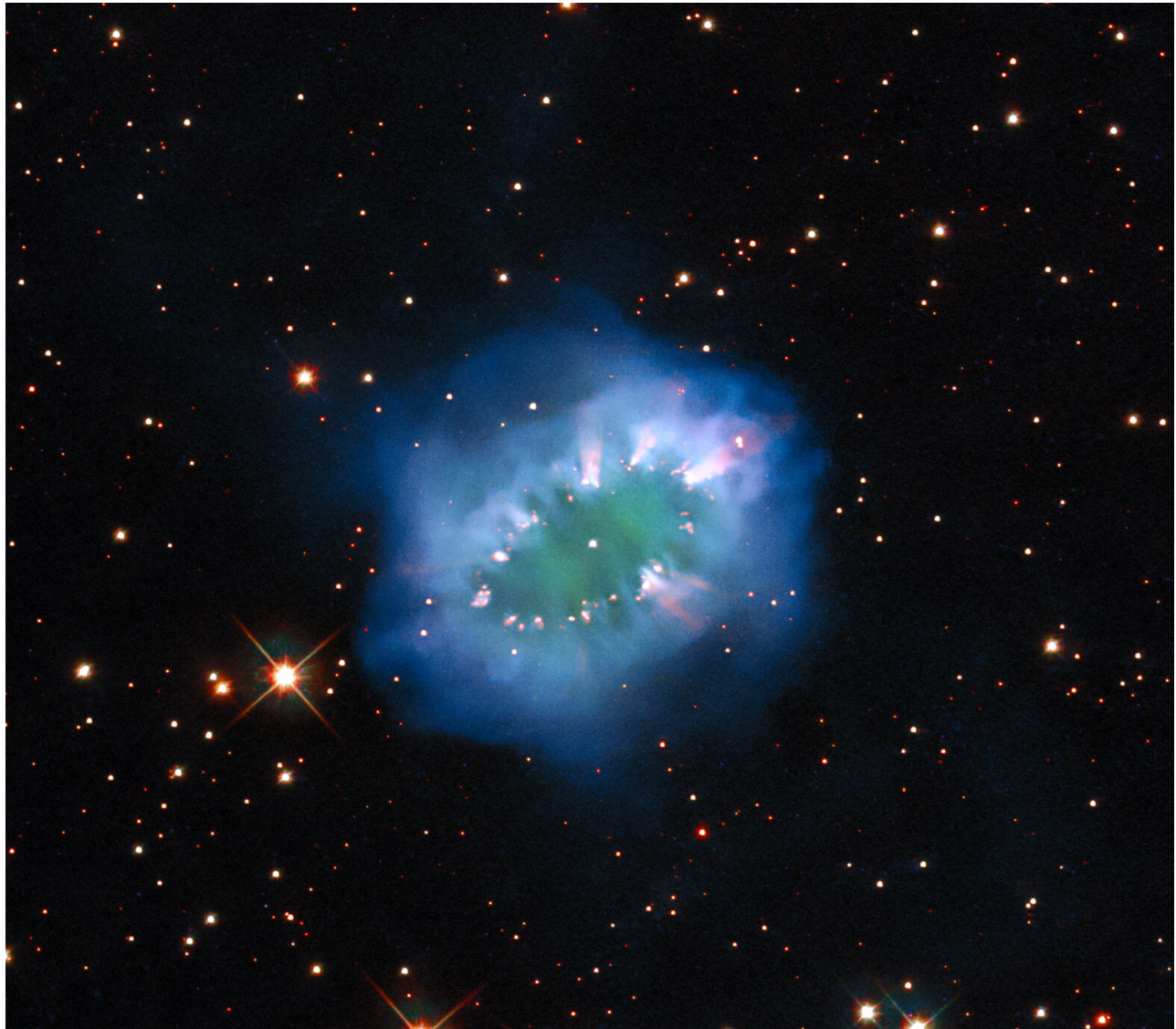
Dr. Terry Reeves presented "What's Up" in the sky this Spring.

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

Bud Hamblen
Secretary

On the Cover: NASA's Perseverance Mars rover is visible in the upper left corner of this image the agency's Ingenuity Mars Helicopter took during its third flight, on April 25, 2021. The helicopter was flying at an altitude of 16 feet (5 meters) and roughly 279 feet (85 meters) from the rover at the time. Credit: [NASA/JPL-Caltech](#)





The interaction of two doomed stars has created this spectacular ring adorned with bright clumps of gas — a diamond necklace of cosmic proportions. Fittingly known as the Necklace Nebula, this planetary nebula is located 15 000 light-years away from Earth in the small, dim constellation of Sagitta (The Arrow).

The Necklace Nebula — which also goes by the less glamorous name of PN G054.2-03.4 — was produced by a pair of tightly orbiting Sun-like stars. Roughly 10 000 years ago, one of the aging stars expanded and engulfed its smaller companion, creating something astronomers call a “common envelope”. The smaller star continued to orbit inside its larger companion, increasing the bloated giant’s rotation rate until large parts of it spun outwards into space. This escaping ring of debris formed the Necklace Nebula, with particularly dense clumps of gas forming the bright “diamonds” around the ring.

The pair of stars which created the Necklace Nebula remain so close together — separated by only a few million kilometres — that they appear as a single bright dot in the centre of this image. Despite their close encounter the stars are still furiously whirling around each other, completing an orbit in just over a day.

The Necklace Nebula was featured in a previously released Hubble image, but now this new image has been created by applying advanced processing techniques, making for a new and improved view of this intriguing object. The composite image includes several exposures from Hubble’s Wide Field Camera 3. Credit: [ESA/Hubble & NASA](#), K. Noll



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.