

# The ECLIPSE

May  
2022

*The Newsletter of the Barnard-Seyfert Astronomical Society*

## Next Membership Meeting:

May 18, 7:30 pm  
Cumberland Valley  
Girl Scout Council Building  
4522 Granny White Pike

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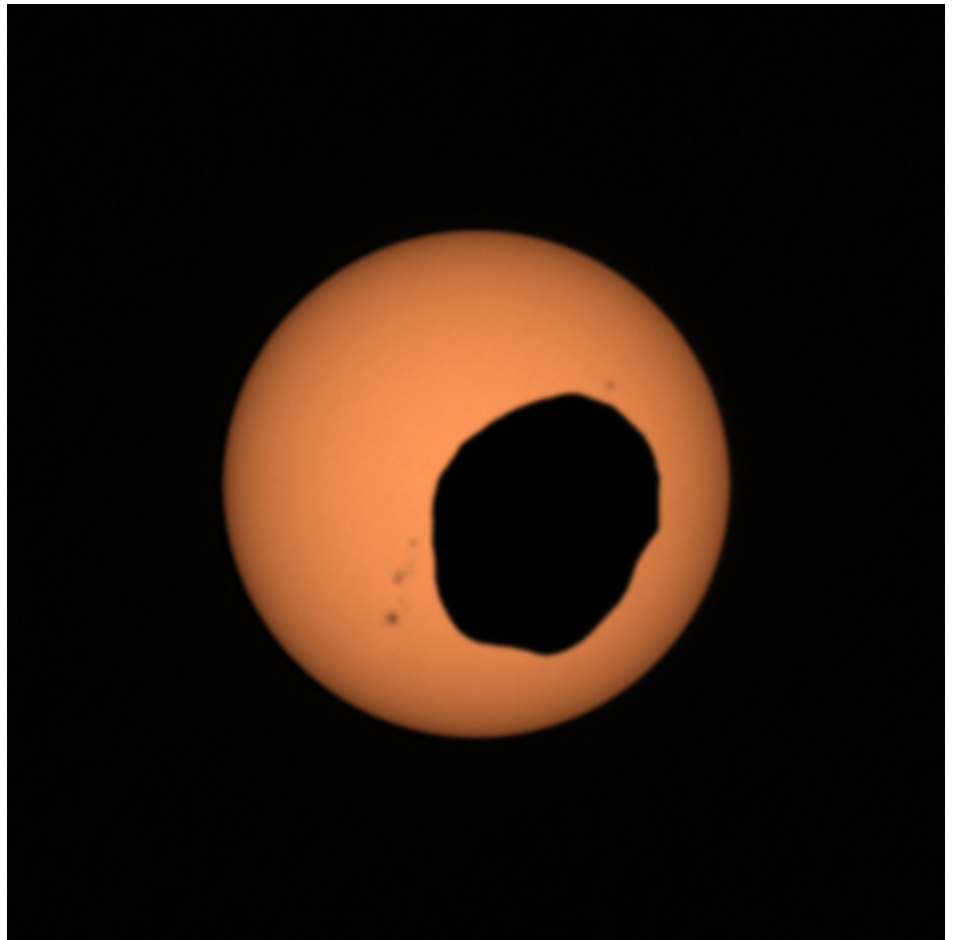
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Oswaldo Gonzalez

Andy Reeves

Kathy Underwood

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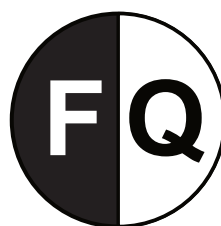


NASA's Perseverance Mars rover used its Mastcam-Z camera system to shoot video of Phobos, one of Mars' two moons, eclipsing the Sun. It's the most zoomed-in, highest-frame-rate observation of a Phobos solar eclipse ever taken from the Martian surface.

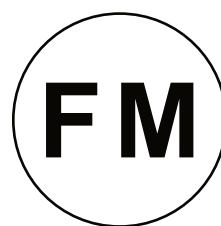
Credit: [NASA/JPL-Caltech/ASU/MSSS/SSI](#)



May 30  
Jun 28



May 8  
Jun 7



May 15  
Jun 14



May 22  
Jun 20

## Happy Birthday Williamina Fleming By Robin Byrne

This month we celebrate the life of one of the first of Pickering's Women. Williamina Fleming was born May 15, 1857 in Dundee, Scotland. She was one of nine children born to her father, Robert Stevens, a craftsman, and mother, Mary. When Williamina was 14, her father died. To help the family financially, she dropped out of school and started working as a student teacher. In 1877, at the age of 20, Williamina married James Fleming. Fleming was a widow, 16 years older than she, who worked as an accountant. A year later, in November of 1878, James and a pregnant Williamina sailed to a new life in Boston. Shortly after they settled in America, James abandoned Williamina and their unborn child.

Pregnant and alone, Williamina eventually found work as a maid for the director of the Harvard College Observatory, Edward C. Pickering. Pickering became Williamina's hero and savior, even naming her new son Edward Charles Pickering Fleming. Pickering's wife recognized that

Williamina was capable of more than housework and suggested that she could work for Pickering at the observatory. In 1879, Pickering hired Williamina to perform administrative work on a part-time basis. Two years later, she became a full-time employee, with the new duties of analyzing the spectra of stars. She was among the first of many female "computers" who would work at the observatory.

Seven years later, the defining work of the Harvard Computers began. The widow of Henry Draper, Mary Anna Draper, established a fund to support the creation of a catalog of stars classified by their spectra. This would become the Henry Draper Catalogue. Williamina was put in charge of the project. She had a reputation of being strict with the women who worked for her, but also very enthusiastic about the work they were doing.



The first step was to establish how best to classify the stars. Nettie Farrar had begun working on it, but left shortly after she began when she married. Antonia Maury developed a very complex system that was not popular with the rest of the team. Fleming wanted something much simpler. The system she created along with Pickering, known as the Pickering-Fleming classification system, looked at the strength of the spectral lines created by hydrogen. Stars with the strongest hydrogen lines were classified as A stars, second strongest were B stars, and so on through O stars. Annie Cannon would ultimately develop the Harvard system that became the standard adopted by all astronomers to this day, where the stars are classified by their temperatures, with the categories reduced and rearranged, in order from hottest to coolest stars, to OBAFGKM.

After four years of hard work, the first Henry Draper Catalogue was published in 1890. Over 10,000 stars were classified, and the majority of those were classified by Fleming. In the process of creating the catalogue, Fleming also created an organization system for all of the photographic plates used in the process. Her system made it possible for astronomers to search through earlier plates by including information about which telescope was used and other identifiers. Because of this work, in 1898 Fleming became the first woman to be named Curator of Astronomical Photographs at Harvard.

In addition to all of her work with the photographic plates and identifying spectra, Fleming was also in charge of producing most of the research papers coming out of the observatory for the astronomers working there, with duties that included writing, proofreading, and editing the papers, data tables, and publishing the annual reports. She once said, "If one could only go on and on with original work..., life would be a most beautiful dream; but you...use most of your available time preparing the work of others for publication." However, Williamina was one of the few women who did publish some of her own work and give presentations at astronomical conferences.

In the process of analyzing the photographic plates for the catalogue, Fleming made several discoveries, including identifying 59 gaseous nebulae, finding over 300 variable stars, and 10 novae. One of the best known objects that she discovered is the Horsehead Nebula, which she found on a photographic plate in 1888. However, it was over 20 years before she was given credit for the discovery. Williamina published her own catalogue of the variable stars that she had discovered. One of her last discoveries was the first identified white dwarf star, in 1910. Fleming's last publication was a catalogue of the spectra and magnitudes of thousands of stars, sorted into regions of the sky.

Despite believing that women had limitations, Williamina was a vocal crusader in favor of more women becoming astronomers. In 1893 she gave a speech at the World's Fair in Chicago, titled "A Field for Woman's Work in Astronomy," in which she wrote, "While we cannot maintain that in everything woman is man's equal, yet in many things her patience, perseverance, and method make her his superior." Williamina also was not afraid to complain about the salary discrepancy between male and female employees of the Harvard Observatory, once writing in her journal about arguing with Pickering on the subject, "I am immediately told that I receive an excellent salary as women's salaries stand....Does he ever think that I have a home to keep and a family to take care of as well as the men?...And this is considered an enlightened age!"

The work of Williamina Fleming and the other Harvard computers didn't end in the early twentieth century. In 2015, the curator of Harvard's Plate Stacks, Lindsay Smith Trull, discovered over 100 boxes filled with thousands of notebooks from the Harvard computers and astronomers. She began an effort to preserve and transcribe their work. Project PHaEDRA (Preserving Harvard's Early Data and Research in Astronomy) will allow researchers to not only access publications, but the original notes made by all of the women and men working at the observatory. So far, roughly a fourth of the over 2000 notebooks have been transcribed. Volunteers can help transcribe the notebooks through the Smithsonian Digital Volunteers Web site.

Williamina Fleming was a tireless worker, up until her hospitalization for pneumonia in 1911. She succumbed to her illness May 21 of that year. Advice Williamina once gave provides an accurate description of her own life: "Labor honestly, conscientiously, and steadfastly, and recognition and success must crown your efforts in the end." The successes and recognition of Williamina Fleming continue to this very day.

## References:

[Williamina Fleming - Wikipedia](#)

[Williamina Fleming Brief life of a spectrographic pioneer: 1857 - 1911, Harvard Magazine, by Alan Hirshfeld](#)

[Williamina Fleming Astronomer, 1857 - 1911, National Library of Scotland](#)

## **Next Membership Meeting:**

Wednesday May 18, 7:30 pm

Cumberland Valley  
Girl Scout Council Building  
4522 Granny White Pike

## xkcd

BAD MAP PROJECTION #248:

## MADAGASCATOR

MERCATOR PROJECTION BUT WITH THE NORTH POLE IN THE INDIAN OCEAN  
SO IT EXAGGERATES THE SIZE OF MADAGASCAR INSTEAD OF GREENLAND



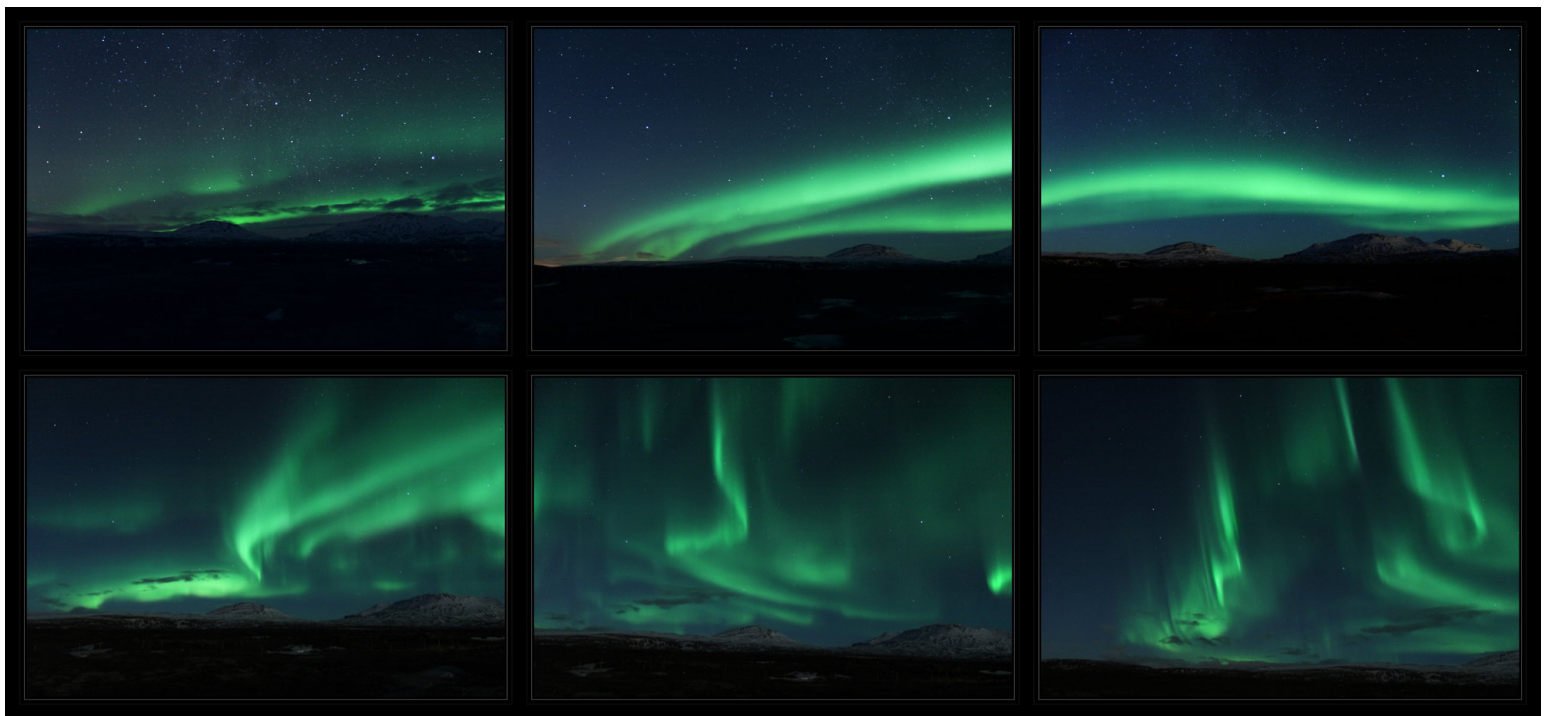
**On the Cover:** The magnificent spiral galaxy M99 fills the frame in this image from the NASA/ESA Hubble Space Telescope. M99 — which lies roughly 42 million light-years from Earth in the constellation Coma Berenices — is a “grand design” spiral galaxy, so-called because of the well-defined, prominent spiral arms visible in this image. M99 was captured by Hubble’s Wide Field Camera 3 on two separate occasions, helping astronomers study two entirely different astronomical phenomena.

**Credit:** [ESA/Hubble & NASA](#), [M. Kasliwal](#), [J. Lee](#) and the [PHANGS-HST Team](#)

## Night Lights: Aurora, Noctilucent Clouds, and the Zodiacal Light By David Prosper

Have you spotted any “night lights”? These phenomena brighten dark skies with celestial light ranging from mild to dazzling: the subtle light pyramid of the zodiacal light, the eerie twilight glow of noctilucent clouds, and most famous of all, the wildly unpredictable and mesmerizing aurora.

Aurora, often referred to as the northern lights (aurora borealis) or southern lights (aurora australis), can indeed be a wonderful sight, but the beautiful photos and videos shared online are often misleading. For most observers not near polar latitudes, auroral displays are relatively rare and faint, and without much structure, more gray than colorful, and show up much better in photos. However, geomagnetic storms can create auroras that dance and shift rapidly across the skies with several distinct colors and appear to observers much further away from the poles - on very rare occasions even down to the mid-latitudes of North America! Geomagnetic storms are caused when a magnetic storm on our Sun creates a massive explosion that flings a mass of particles away from its surface, known as a Coronal Mass Ejection (CME). If Earth is in the path of this CME, its particles interact with our planet’s magnetic field and result in auroral



A sampling of some of the various patterns created by aurora, as seen from Iceland in 2014. The top row photos were barely visible to the unaided eye and were exposed for 20-30 seconds; in contrast, the bottom row photos were exposed for just 4 seconds- and were clearly visible to the photographer, Wikimedia contributor [Shnuffel2022](#). License and source: CC BY-SA 4.0



Comet NEOWISE flies high above a batch of noctilucent clouds in this photo from Wikimedia contributor [Brwynog](#). License and source CC BY-SA 4.0

displays high up in our ionosphere. As we enter our Sun's active period of its 11-year solar cycle, CMEs become more common and increase the chance for dazzling displays! If you have seen any aurora, you can report your sighting to the Aurorasaurus citizen science program at [Aurorasaurus.org](https://Aurorasaurus.org)

Have you ever seen wispy clouds glowing an eclectic blue after sunset, possibly towards your west or northwest? That wasn't your imagination; those luminescent clouds are noctilucent clouds (also called Polar Mesospheric Clouds (PMC)). They are thought to form when water vapor condenses around 'seeds' of dust from vaporized meteorites - along with other sources that include rocket launches and volcanic eruptions - around 50 miles high in the mesosphere. Their glow is caused by the Sun, whose light still shines at that altitude after sunset from the perspective of ground-based observers. Noctilucent clouds are increasing both in frequency and in how far south they are observed, a development that may be related to climate change. Keeping in mind that observers closer in latitude to the poles have a better chance of spotting them, your best opportunity to spot noctilucent clouds occurs from about half an hour to two hours after sunset during the summer months. NASA's



AIM mission studies these clouds from its orbit high above the North Pole: [go.nasa.gov/3uV3Yj1](https://go.nasa.gov/3uV3Yj1)

You may have seen the zodiacal light without even realizing it; there is a reason it's nicknamed the "false dawn"! Viewers under dark skies have their best chance of spotting this pyramid of ghostly light a couple of hours after sunset around the spring equinox, or a couple of hours before dawn around the autumnal equinox. Unlike our previous two examples of night lights, observers closer to the equator are best positioned to view the zodiacal light! Long known to be composed of interplanetary dust orbiting in the plane of our solar system reflecting sunlight, these fine particles were thought to originate from comets and asteroids. However, scientists from NASA's Juno mission recently published a fascinating study indicating a possible alternative origin: dust from Mars! Learn more about their serendipitous discovery at: [go.nasa.gov/3Onf3kN](https://go.nasa.gov/3Onf3kN)

Curious about the latest research into these night lights? Find news of NASA's latest discoveries at [nasa.gov](https://nasa.gov).



The zodiacal light as seen in the evening of March 1, 2021 above Skull Valley, Utah. The Pleiades star cluster (M45) is visible near the top.

Credit and source: [NASA/Bill Dunford](https://nasa.gov)

*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](https://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](https://nasa.gov). With articles, activities and games NASA Space Place encourages everyone to get excited about science and technology. Visit [spaceplace.nasa.gov](https://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 13, 2022**

The regular meeting of the Board of Directors of the Barnard-Seyfert Astronomical Society was held April 13, 2022, online, Dr. Tom Beckermann presiding. Logged in were Tom Beckermann, Chip Crossman, Osvaldo Gonzales, Bud Hamblen, Keith Rainey, Andy Reeves 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 March 2, 2022, as printed in the April, 2022, issue of the Eclipse. Andy made the motion, Theo seconded and the minutes were adopted unanimously.

Keith reported 216 members.

Theo reported \$11,234 in in Truist Bank account and \$600 in the PayPal account.

The Facebook page had 2,138 followers. The Twitter account had 298 followers.

The next general meeting will have John W. Briggs' presentation on E. E. Barnard and artifacts at the Lyceum in Magdalena, New Mexico.

There was discussion of a new PA system for use at meetings and star parties. We want a portable PA system with microphone, line-in, line-out, etc. to work with live streaming of meetings. Theo will circulate some possibilities. A suitable PA system runs around \$300-500.

The board adopted Resolution 2022-04-13 to authorize approximately \$500 to purchase a portable PA system.

Discussion of sky quality at Mill Ridge Park. There is plenty of stray light from business in Interchange City.

The MTSEF had no astronomy projects. No awards were made.

Oz said he currently has the credentials for the web site. He also reported that we are approved for James Webb first light announcement in July.

There being no further business, the meeting adjourned at 8:45 PM.

Respectfully submitted,

Bud Hamblen  
Secretary

## **Barnard-Seyfert Astronomical Society Minutes of the Monthly Membership Meeting Held On Wednesday, April 20, 2022**

Because monthly in-person meetings are suspended due to the COVID-19 epidemic, the Barnard-Seyfert Astronomical Society met at the Girl Scout Center on Wednesday, April 20, 2022, Tom Beckermann presiding. 13 participants were at the Girl Scout Center and 11 zoomed in.

Tom called the meeting to order at 7:30 PM and asked for a motion to adopt the minutes of the March 16, 2022, meeting as published in the April issue of the Eclipse. Theo Wellington so moved, Tony Drinkwater seconded, and the minutes were adopted unanimously.

Treasurer's report: Theo Wellington reported the Truist bank balance to be \$11,858.26 (\$4,578.07 in the equipment fund and \$7,280.19 in the general fund). The PayPal balance was \$ 23.64.

Membership report: Keith Rainey reported that there were approximately 216 members.

Social media report: Theo reported that the Facebook page was liked by 2,012 and followed by 2,148. Twitter had 299 followers.

Star parties: The Messier Marathon at Ron Ladd's property had a few members participate on a mainly clear night, April 1. The night sky on April 2 was partly cloudy. The public star party at the Shelby Bottoms Nature Center on April 9 had about 4 telescopes and a number of guests on what turned out to be a chilly night.

A private star party is scheduled for April 30 at the Water Valley Overlook, Natchez Trace Mile Marker 412. A public star party is scheduled for May 7 at Mill Ridge Park. Lunar eclipse viewing is scheduled for the Bells Bend Outdoor Center on May 15. A private star party is scheduled for May 28 at the parking area at Natchez Trace Mile Marker 435.2.

John W. Briggs, curator of the Astronomical Lyceum, Magdalena, New Mexico, made a presentation, "Edward E. Barnard -- A Heroic Figure in American Astronomy", on the life and work of E. E. Barnard, illustrated with artifacts in the collection of the Astronomical Lyceum. He also mentioned a biography of Barnard, *The Immortal Fire Within*, by William Sheehan.

There being no further business, the meeting was adjourned at about 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](https://bsasnashville.com). Frame not included.



Become a Member of BSAS!  
Visit [bsasnashville.com](http://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](http://bsasnashville.com). If you need more information, write to us at [info@bsasnashville.com](mailto: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](mailto:info@bsasnashville.com).