

The ECLIPSE

November
2020

The Newsletter of the Barnard-Seyfert Astronomical Society

Next Membership Meeting:

November 18, 7:30 pm
Online meeting:

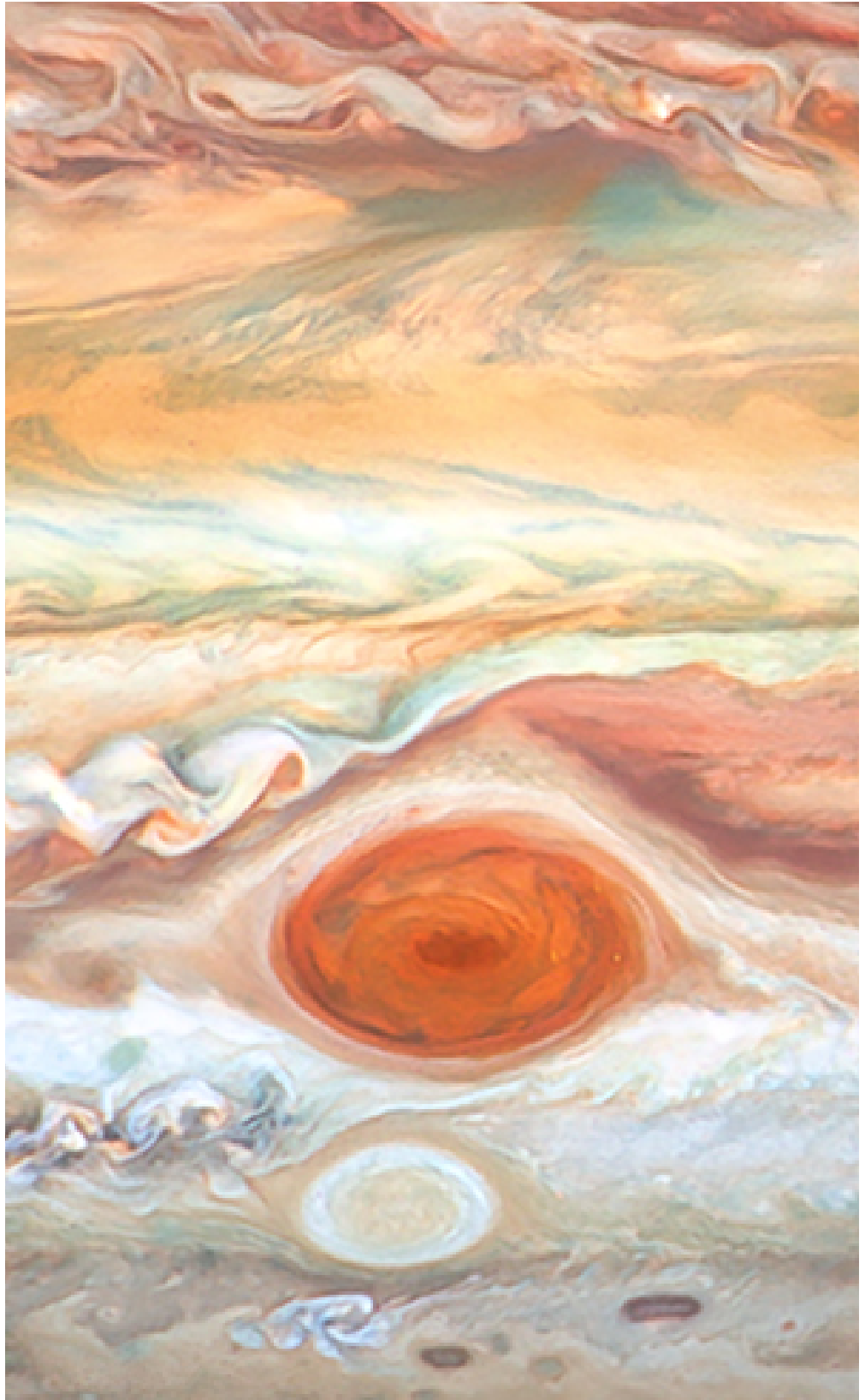
Topic: "All I Want for Christmas..."

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20 Continuously Crewed Years of
Operation
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BSASNashville.com



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Next Membership Meeting:

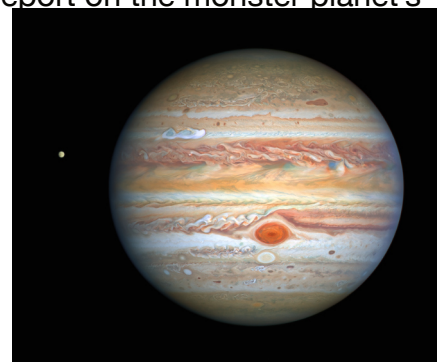
Wednesday, November 18, 7:30 pm Central
online on Zoom

Topic: "All I Want For Christmas..."

Zoom link will be posted to bsasnashville.com

On the Cover: This latest image of Jupiter, taken by the NASA/ESA Hubble Space Telescope on 25 August 2020, was captured when the planet was 653 million kilometres from Earth. Hubble's sharp view is giving researchers an updated weather report on the monster planet's turbulent atmosphere, including a remarkable new storm brewing, and a cousin of the Great Red Spot changing colour — again. The new image also features Jupiter's icy moon Europa.

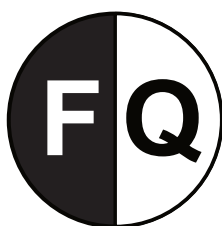
Credit: [NASA](#), [ESA](#), [A. Simon](#) (Goddard Space Flight Center), and [M. H. Wong](#) (University of California, Berkeley) and the OPAL team.



There were no BSAS meetings in October 2020.



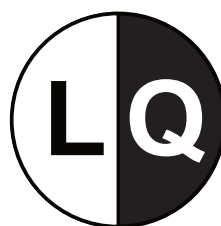
Nov 14
Dec 14



Nov 21
Dec 21



Nov 30
Dec 29



Nov 8
Dec 7

Happy Birthday, Harlow Shapley by Robin Byrne

This month marks the birthday of a man who helped us to find our place in the universe.

Harlow Shapley was born November 2, 1885 in Nashville, Missouri. He stayed in school up to the 5th grade, but had to leave to help out on his family's farm. As a teenager, Shapley got a job as a journalist in Chanute, Kansas. Shapley wanted to go to the University of Missouri to major in journalism, but the journalism school was a year away from opening. So Shapley looked in the school's catalog to find an alternative. Starting in the A's, he couldn't pronounce archaeology, so he went to the next choice and ended up majoring in astronomy.

Much of Shapley's work was concerned with properties of stars. In 1911, Shapley determined the size of stars by using the light curves of eclipsing binary stars. The technique he developed remained standard procedure for over 30 years. Shapley also used the light curves of Cepheid variable stars to prove that they were not eclipsing binaries. He then was the first to propose that they were instead pulsating stars. This led to the work done by Henrietta Leavitt.



In 1914, Shapley joined the staff at Mount Wilson Observatory in Pasadena, California. He used the 60" reflector to study the distribution of globular clusters in the Milky Way. He discovered that of the 100 known clusters, almost one third are found in the direction of Sagittarius. Within the clusters, Shapley could distinguish individual stars, including Cepheid variables. Shapley used Henrietta Leavitt's result that the period of variability of a Cepheid is related to its intrinsic brightness to determine the distance to each of the globular clusters. Plotting the positions of the globulars in 3-dimensions, Shapley discovered that they were arranged in a roughly spherical distribution. Shapley figured that the center of this spherical distribution should correspond to the center of the Milky Way. From this he calculated that the solar system was 50,000 lightyears from the center of the galaxy (this number was later revised to 26,000 lightyears). This was the first proof that the Sun was not at the center of the galaxy.

Having discovered the amazing size of our Milky Way, Shapley concluded that the

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Harlow Shapley, continued

Milky Way encompassed the entire universe. This led to a famous debate in 1920 between Shapley and Heber Curtis. Curtis believed that there were other galaxies beyond the Milky Way. It took Edwin Hubble to prove that Curtis was right.

In 1921, Shapley took over as the Director of the Harvard College Observatory after the death of Edward Pickering. Shapley continued Pickering's tradition of hiring women to serve as computers for the observatory, but also as research scientists. One of those women, Cecilia Payne-Gaposchkin, earned her doctorate in astronomy using the research she conducted while working at the observatory. Shapley would remain in the Director's position until 1952.

Shapley was inclined towards activism, both to promote science, but also social issues. During the rise of Naziism, Shapley did what he could to assist fellow scientists to flee Europe and come to the United States. In the 1940's he worked alongside other scientists to help establish the National Science Foundation. He lobbied for science to be included in a new organization being developed at the United Nations, which ultimately became known as UNESCO (United Nations Educational, Scientific, and Cultural Organization). Because of his membership in the Independent Citizens Committee of the Arts, Sciences and Professions (ICCASP), which supported a variety of New Deal initiatives, as well as world peace, Shapley was brought before the House Un-American Activities Committee (HUAC) in 1946. Shapley, disgusted by the entire process, treated the committee with so much disrespect that he was almost charged with contempt of Congress. He accused the committee of using "Gestapo methods" that made "civic cowards of many citizens." In a clear rebuke toward the HUAC, a few weeks after his testimony, the American Association for the Advancement of Sciences named Shapley its new President.

Harlow Shapley died October 20, 1972 just prior to his 87th birthday. He was survived by his wife, Martha, one daughter and four sons.

Harlow Shapley may not be one of the more famous names among astronomers, but his work on the structure of the Milky Way was a major turning point in our understanding of where we reside in the universe. So as we look at the globular clusters in the direction of Sagittarius, we can thank Harlow Shapley for the fact that we know we are looking towards the center of our galaxy.

References:

The New Encyclopaedia Britannica, 1995

Astronomy & Space, From the Big Bang to the Big Crunch by Phillis Engelbert, 1997

[Wikipedia - Harlow Shapley](#)

The International Space Station: 20 Continuously Crewed Years of Operation by David Prosper

Did you know that humans have been living in the International Space Station, uninterrupted, for twenty years? Ever since the first crew members docked with the International Space Station (ISS) in November 2000, more than 240 people have visited this outpost, representing 19 countries working together. They have been busy building, upgrading, and maintaining the space station - while simultaneously engaging in cutting-edge scientific research.

The first modules that would later make up the ISS were launched into orbit in 1998: the Russian Zarya launched via a Proton-K rocket, and the US-built Unity module launched about a week and a half later by the Space Shuttle Endeavour.

Subsequent missions added vital elements and modules to the Space Station before it was ready to be inhabited. And at last, on November

2, 2000, Expedition-1 brought the first three permanent crew members to the station in a Russian Soyuz capsule: NASA astronaut William M. Shepherd and Russian cosmonauts Sergei Krikalev and Yuri Gidzenk. Since then, an entire generation has been born into a world where humans continually live and work in space! The pressurized space inside this modern engineering marvel is roughly equal to the volume of a Boeing 747, and is sometimes briefly shared by up to 13 individuals, though the average number of crew members is 6. The unique microgravity environment of the ISS means that long-term studies can be performed on the space station that can't be performed anywhere on Earth in many fields including space medicine, fluid dynamics, biology, meteorology and environmental monitoring, particle physics, and astrophysics. Of course, one of the biggest and longest experiments on board is research into the effects of microgravity on the human body itself, absolutely vital knowledge for future crewed exploration into deep space.



The ISS photobombs the Sun in this amazing image taken during the eclipse of August 21, 2017 from Banner, Wyoming. Photo credit: NASA/Joel Kowsky

More info: bit.ly/eclipseiss

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ISS, continued

Stargazers have also enjoyed the presence of the ISS as it graces our skies with bright passes overhead. This space station is the largest object humans have yet put into orbit at 357 feet long, almost the length of an American football field (if end zones are included). The large solar arrays – 240 feet wide - reflect quite a bit of sunlight, at times making the ISS brighter than Venus to observers on the ground! Its morning and evening passes can be a treat for stargazers and can even be observed from brightly-lit cities. People all over the world can spot the ISS, and with an orbit only 90 minutes long, sometimes you can spot the station multiple times a night. You can find the next ISS pass near you and receive alerts at sites like NASA's Spot the Station website (spotthestation.nasa.gov) and stargazing and satellite tracking apps.



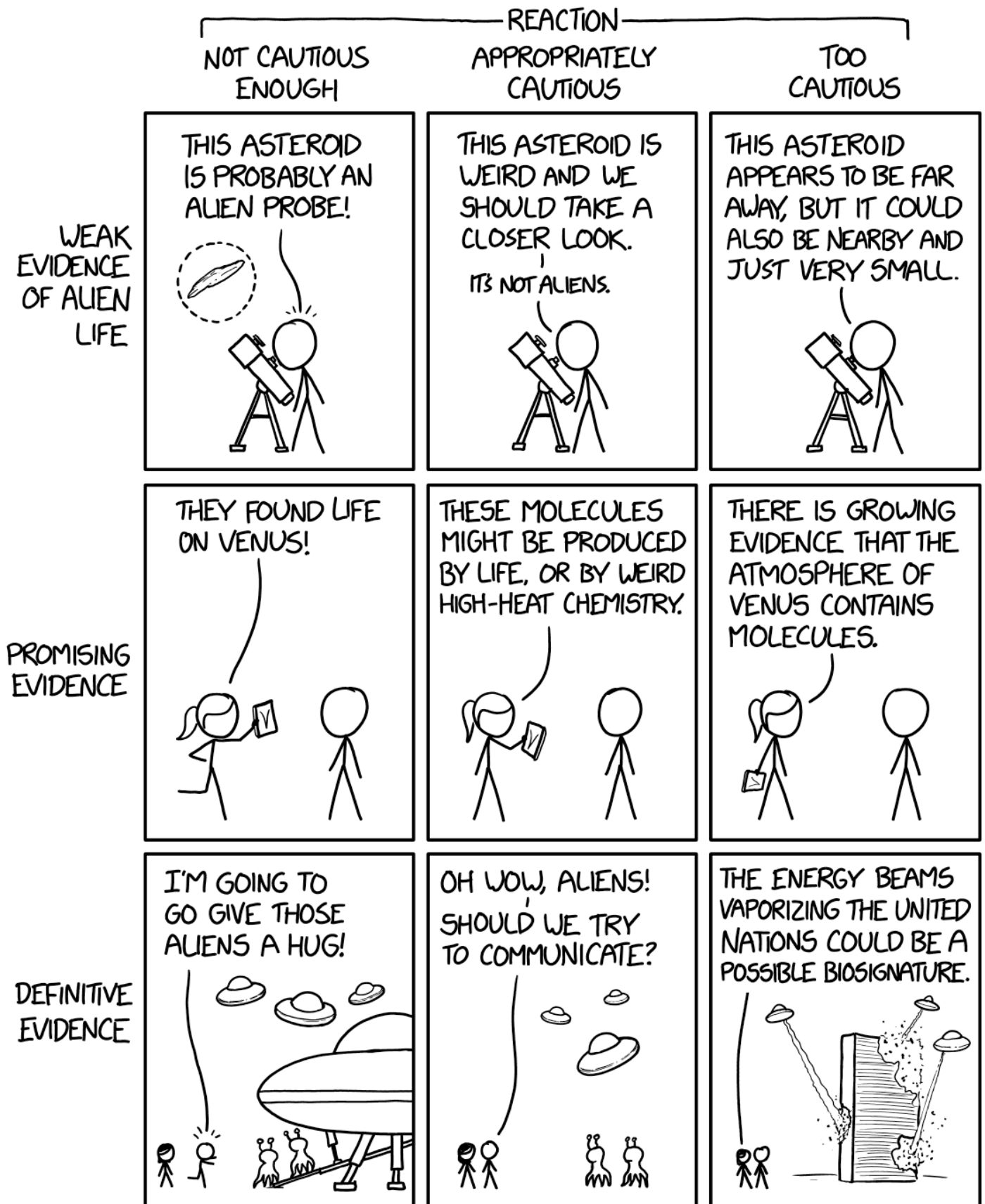
A complete view of the ISS as of October 4, 2018, taken from the Soyuz capsule of the departing crew of Expedition 56 from their Soyuz capsule. This structure was built by materials launched into orbit by 37 United States Space Shuttle missions and 5 Russian Proton and Soyuz rockets, and assembled and maintained by 230 spacewalks, with more to come! Credit: NASA/Roscosmos

More info: bit.ly/issbasics

Hundreds of astronauts from all over the world have crewed the International Space Station over the last two decades, and their work has inspired countless people to look up and ponder humanity's presence and future in space. You can find out more about the International Space Station and how living and working on board this amazing outpost has helped prepare us to return to the Moon - and beyond! - at 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 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!

xkcd





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.