

The ECLIPSE

December
2017

The Newsletter of the Barnard-Seyfert Astronomical Society

Next Membership Meeting:
December 20, 2017, 6:30 pm

Cumberland Valley
Girl Scout Council Building
4522 Granny White Pike

*Topic: Potluck Dinner and Silent
Auction / The Return of Mars*

Details on page 11

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From the President

Greetings,

December is here and with it comes colder nights but clearer skies. It is also the month for our special member meeting being held on Wednesday, December 20th. We will start at 6:30 PM, so please plan on arriving earlier than usual with doors opening around 5:30 pm. We will have our traditional pot luck dinner with BSAS providing the meat and beverages. Just plan on bringing a side dish or desert and enjoying a great meal and social time. BSAS member and NASA/JPL Solar System Ambassador, Lonnie Puterbaugh, will bring an exciting presentation on Mars and the red planet's close approach in 2018 as well as an update on NASA's Mars Insight Mission. We will also hold our annual silent auction to benefit the equipment fund. If you have items you can donate for the auction it would be much appreciated. Just about any type of astronomy or space related item will do. Bring some cash and hopefully you can take home a useful bargain or two.

BSAS is managed by an eleven-member board of directors. During our brief business meeting we will be voting on our BSAS board officers and members for 2018. Each year we typically need two new board members to serve three-year terms. Kathy Underwood and Rob Mahurin will be rotating off this year. Thank you, Kathy and Rob! Johanna Keohane and KC Katalbas have agreed to serve as board members beginning in 2018. So, our thanks go out to them as well as all of the returning members. The full slate of names being nominated was submitted at our member November meeting, but here they are again for those who were not present:



Officers

Gary Eaton
President
gceaton@comcast.net

Keith Rainey
Vice President
Keith.Rainey@gmail.com

Tom Guss
Treasurer
t_guss@bellsouth.net

Bud Hamblen
Secretary
wrhamblen@comcast.net

Theo Wellington
Ex-officio
tmwellington@comcast.net

Directors at Large

Mike Benson
ocentaurus@aol.com

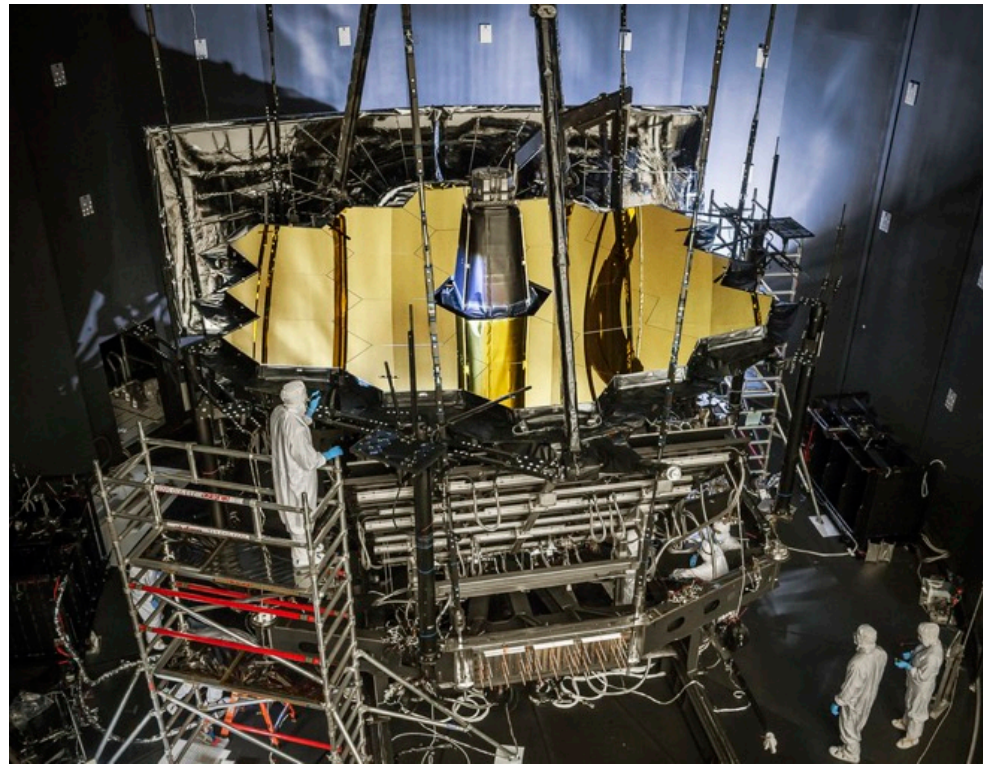
Spencer Buckner
BucknerS@apsu.edu

Drew Gilmore
eclipse@bsasnashville.com

Rob Mahurin
robert.s.mahurin@gmail.com

Todd Nannie
toddn_us@yahoo.com

Kathy Underwood
katy2222@comcast.net



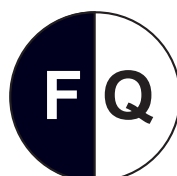
NASA's James Webb Space Telescope sits inside Chamber A at NASA's Johnson Space Center in Houston after having completed its cryogenic testing on Nov. 18, 2017. This marked the telescope's final cryogenic testing, and it ensured the observatory is ready for the frigid, airless environment of space. Credits: [NASA/Chris Gunn](#)

Upcoming Star Parties

Friday 12/8 6:30 pm to 8:30 pm	Public Star Party Bells Bend Outdoor Center
Saturday 12/16	Private Star Party Natchez Trace Parkway mile marker 412 (Water Valley Overlook)
Friday 1/19 6:30 pm to 8:30 pm	Public Star Party Bells Bend Outdoor Center
Saturday 2/24 6:30 pm to 8:30 pm	Public Star Party Edwin Warner Park



Dec 18
Jan 16



Dec 26
Jan 24



Dec 3
Jan 1, 31



Dec 10
Jan 8

Happy Birthday Annie Jump Cannon by Robin Byrne

This month we pay tribute to one of the founding women of astronomy. Annie Jump Cannon was born in Dover, Delaware on December 11, 1863. Her father, Wilson Cannon, was a prosperous shipbuilder and state senator. Her mother, Mary Jump, was the source of Annie's interest in astronomy. It was Mary who taught Annie the constellations. It was discovered, while she was young, that Annie was very hard of hearing, but that didn't keep her from leading a normal and very productive life.

Annie went to Wellesley College and majored in physics, but also studied a great deal of astronomy, too. It was here that she learned to make spectroscopic measurements. She graduated in 1884 and returned home to live with her parents.

Annie was an avid photographer. In 1892, she traveled through Europe, taking many pictures. When she returned to America, she created a small book of pictures and prose from her trip. It was published under the title "In the Footsteps of Columbus", and was sold as a souvenir at the Chicago World Fair in 1893.

In 1894, Annie's mother died. It was then that Annie returned to Wellesley as a postgraduate assistant and taught physics. She also became a "special student" of astronomy at Radcliffe.

In 1896, Annie began her work at Harvard College Observatory. She became a member of the group known as "Pickering's Women", who were women hired by the Observatory director, Edward Pickering, to reduce data and do calculations. Annie's job was to catalog variable stars and classify the spectra of stars in the southern hemisphere. Pickering had hired several women to do this sort of work, and they were paid 50 cents per hour for their labor. This program was funded by a grant set up by Anna Draper, the widow of Henry Draper.

Pickering's hope was to not only obtain spectra of as many stars as possible, but to



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Annie Jump Cannon, continued

classify the stars based upon their spectral characteristics. Developing a suitable classification scheme proved to be difficult. The first to begin this task was Nettie Farrar in 1886. After she left, Willamina Fleming picked up where she left off. Fleming divided the spectra into 22 classes. Next was Antonia Maury, who started her own system based on theoretical arguments, but it was very cumbersome. Next it was Annie's turn. She developed a third scheme, based on Fleming's and Maury's. It, too, was based on theoretical arguments, but was simpler than Maury's. Annie reorganized Fleming's classes, reduced their number, and was left with the now familiar "O B A F G K M" stellar classifications, which groups stars based upon their temperature from hottest to coolest. This system is still in use today.

In 1907, Annie received an M.A. from Wellesley College. In 1911, she was appointed curator of observational photographs at the Harvard Observatory. She immediately began classifying all the stars down to 9th magnitude. From 1911 to 1915, Annie averaged 5000 stars per month. By 1915, she had classified 225,300 stellar spectra. Before this could be published, each star had to be identified, and the position and magnitude had to be verified. This was completed in 1918, and the first volume of The Henry Draper Catalog was published. The 9th, and final, volume was completed in 1924. In addition to this tremendous project, Annie also published a catalog of variable stars that included 300 she had discovered herself.

Annie Cannon's career spanned 40 years and included many honors and firsts: first honorary doctorate from Oxford, first woman elected an officer of the American Astronomical Society, voted one of the 12 greatest living women in America in 1923, and was presented the Draper Award by the National Academy of Sciences.

Annie Jump Cannon led an extraordinary life. She traveled extensively and loved to entertain friends. She was an advocate of women's suffrage and a member of the National Women's Party. Annie was devoted to education and sharing her discoveries with others. But it was always astronomy that gave her the most fulfillment. Near the end of her life, Annie said, "In our troubled days it is good to have something outside our planet, something fine and distant for comfort." Annie Jump Cannon died in Cambridge, Massachusetts on April 13, 1941, but her legacy continues to live on.

References:

[Annie Jump Cannon: Theorist of Star Spectra Web Page](#)

[Annie Jump Cannon Homepage](#)

DEEP SKY DAZE by Mike Benson

December's skies are frequently like the little girl with the curl in the middle of her forehead. When they're good, they're very, very good; but when they're bad, they're horrid. So when they're good, get out there and take advantage of them. Chances are, the next night you'll wish you had after the "horrid" sets in. The Milky Way stretches SSE to NNW with the nose of Cygnus (or the foot of the Northern Cross, if you prefer) on the horizon, around mid-evening. The southern sky is dominated by the rather quiet constellations of Cetus and Eridanus, with Fornax wedged into one of the bends of the celestial river. Overhead are Perseus, Auriga and Andromeda.

* * *

For deep sky observers, there's a bushel basket of Herschel galaxies to the south and a flock of open clusters to the north. One object that has eluded me so far is **NGC 55**. This will be an early December object in the constellation Sculptor. It's said to be big and bright and asymmetrical. This constellation will already be dropping to the SW as twilight ends, and since it's far to the south, pick a night with little haze on the horizon and a site that's open to the south. You should probably make this your first find of the evening.

My November article ended in Cassiopeia, at M-103, and the observation that there were several other open clusters nearby--all on the Herschel 400 list. On early January evenings this constellation still hangs high in the north, so let's take a look at these objects.

We'll begin with one that may be my favorite galactic cluster (This depends in part on when you ask me and what else I have been observing recently.). It's not as big or bright as Praesepe or the Pleiades, but it is still a showpiece, in part because there are two bright stars on the edge of the cluster as we see it, neither of which is actually a member of this rather young group. These two stars constitute the "eyes" of the asterism. They are also helpful in finding the cluster. That's right! It's **NGC 457**, otherwise known as the "Owl" or the "E.T." cluster.



NGC 457 [credit](#)

The central star in the "W" asterism of Cassiopeia is γ and the eastern base is δ . NGC 457

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DEEP SKY DAZE, continued

is located two degrees SSW of δ and four degrees SE of γ . In a finder or a pair of binoculars at that position you will see a yellow-white star at 4.8 magnitude. On a good night, sharp eyes might find it without optical aid. Just to the SW is a fainter, white star at about 7.0 magnitude.

Note that you're right in the middle of the winter Milky Way with a beautiful star field in all directions. Take time to enjoy the scene at low power (10X) before moving to 100X on your main telescope. That level ought to frame the cluster nicely since it's just a bit smaller than half the diameter of a full Moon. Note the two bright stars on the SE edge of the cluster. These are the "eyes"; the "feet" are a pair of 9th magnitude stars at the NW edge. The "wings" (or "arms", if you are thinking of E.T.) are curves of stars, spread wide to either side, while the central part of the cluster is the "body".

This cluster was first described by William Herschel and it is included in the Astronomical League's Herschel 400 list, shining with a total magnitude of 6.4. It is probably around 6000 light years distant, making it over 30 l.y. in diameter. There are 80-100 members of the cluster visible to the average amateur telescope. The brightest "eye", yellowish θ Cassiopeiae, is a red supergiant nearly 10,000 l.y. away and is one of the most luminous stars known, shining with the light of over a quarter million suns. The other "eye" is HD 7902. Its distance from Earth is still not well known, but it is probably another supergiant shining from some distance behind the cluster, itself.

Note the differences in star color in this group. It seems to me to be almost a northern version of the "Jewel Box" in the color variation, and how many double stars can you find?

While you're in the area follow a line from the "eyes", through the "feet", to **NGC 436**, a nice little cluster about 4' in diameter containing about 30 stars, the brightest of which is around 11th magnitude. It's a little over a half degree from the feet of the Owl to this cluster. To me it resembles a stick figure of a telescope on a tripod.

To get to our last three objects, we'll need to return to δ Cassiopeiae. About 2° ENE of Delta are a pair of stars, one about 6th magnitude and the other about 7th. They are both doubles, with faint partners. Less than 0.25° NE of the brightest of these stars is **NGC 659**. Its total magnitude is around 8. This cluster is marginally smaller than NGC 436, but it's a bit richer and quite a bit brighter.

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DEEP SKY DAZE, continued

Next skip NNE about a half degree to **NGC 663**. This cluster is about half the size of a full moon and shines at a combined magnitude of 7.1. Its brightest star is about 8.1 magnitude and there are a total of perhaps 80 stars to be seen in a moderate sized instrument. In other words, it's just a bit less impressive than NGC 457, but still a showpiece.

Our next object, **NGC 654**, is another half degree north and a bit west, at almost the same R.A. as NGC 659. It's small (about 5' in diameter), almost as bright as the Owl cluster, and contains about 60 stars.



NGC 663 [credit](#)

These five clusters make a fine grouping with a lot of variety, from dense to sparse, bright and faint stars, and color variation. And they are in the midst of the beautiful Milky Way. THIS is what deepsky observing is all about!

* * *

Next, let's move south. There are only two Messier objects to discuss this month, the first being a binocular object: **M-45**. Better known as the Pleiades, this beautiful open cluster is accompanied by some nebulosity, which carries its own **NGC** number--**1435**. As might be expected of an object 1.5° in diameter, this open cluster is relatively nearby. I have seen estimates from 260-410 light years. There are several multiple stars, and quite a bit of color variation is apparent among the 100 stars visible in a medium sized amateur instrument.

To find the second Messier object this month, we need to head south and east from the Pleiades to Cetus. Grab a star chart; find δ Ceti and you'll find **M-77** (NGC 1068) a degree southeast. This spiral galaxy is unusual in that it exhibits three spiral arms. You won't see much of that in the eyepiece, however. There is a very bright stellar core surrounded by faint, wispy nebulosity. Larger instruments will show this face-on galaxy to be about 6' x 7', but most of us will actually see something smaller. On any but the most transparent of nights, it may be difficult to see any of the disk at all.

While in the area, split the R.A. (Right Ascension) distance between M-77 and δ Ceti and move

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DEEP SKY DAZE, continued

just north of δ to a pair of stars at 7th and 8th magnitude. Just south of this pair is **NGC 1055**, a faint, edge-on spiral. At 12th magnitude, a 6" or larger scope should pick up this little slash. It is another of the objects of the Herschel 400 list.

One final object in this area impressed itself on my attention for inclusion in this article. It's the remarkable triple star system, α^2 Eridani. It's one of the 50 stellar systems closest to ours, and it's the eighth closest of the naked eye stars. The primary (A) is a K type star about 0.75 solar mass and is, thus, an orange dwarf. Its apparent magnitude is about 4.5. Its companion (B) is, itself, a double--a surprising combination of a white dwarf and a red dwarf. The white dwarf is one of the few available to the small telescope. It was discovered by William Herschel in 1783 and is now known to have about .5 solar mass packed into a diameter about twice that of the Earth. This dense object is the remains of a star that has burned all its nuclear fuel and is simply radiating the residual heat. It will eventually become a cold, black cinder. Its apparent magnitude is 9.7 and its p.a. is 105, from the primary star--that's a little south of east--and they're widely spaced at 83".



M-77 and NGC 1055 [credit](#)

From the B star, its companion (C) is only about 9" distant in P.A. 340. It is a bit brighter than 11th magnitude and is very red. At .2 solar mass, it is one of the least massive of the stars visible in an average amateur telescope. The three make a fine sight with their varying brightness and colors. Even at 200X the distance between the A and B components will be less than a tenth of the eyepiece field. Incidentally, since these stars are only about 16 light years away, they exhibit considerable proper motion, heading approximately southwest at a bit over 4" annually. This is an object that can be drawn or photographed now, and again in a few years to document its movement against the background stars; and that's unusual! Keep your chin high and the eyes will follow to the heavens!

Have a very happy Holiday Season and may all your skies be starry!

Barnard-Seyfert Astronomical Society
Minutes of a Regular Meeting of the Board of Directors
Held On Wednesday, November 1, 2017.

The regular meeting of the Board of Directors of the Barnard-Seyfert Astronomical Society was held November 1, 2017, in the board room at the Girl Scouts office, 4522 Granny White Pike, Nashville, TN 37204. Present were Mike Benson, Spencer Buckner, Gary Eaton, Drew Gilmore, Tom Guss, Bud Hamblen, Todd Nannie, Keith Rainey, Kat Underwood and Theo Wellington. A quorum being present, the meeting was called to order at 7:30 PM. Gary asked for a motion to approve the minutes of the October 4, 2017, meeting. Spencer so moved, Todd seconded, and the minutes were approved without discussion, by an unanimous voice vote. Treasurer's report: \$6,615.26 in the checking account and \$4,156.51 in the savings account. Membership report: 146 members.

The board discussed the December general meeting. The club will be buying the entree. Theo said that she has the club's table cloths, plates, silverware, serving utensils and so-on. Gary said that he will be bringing the entree. Todd said that he will be bringing ice. The silent auction will be held at the December meeting. Gary said that he would mention the silent auction in the "President's Letter" column in the Eclipse. The room will be opened at 5:30 PM for set-up. The meeting will start at 6:30 PM.

The telescope how-to workshop is scheduled for the January, 2018, general meeting. A Messier Marathon-oriented "What's Up" is scheduled for the February, 2018, meeting. It may be possible to hold this meeting at the Sudekum Planetarium. The telescope maintenance presentation is scheduled for the March general meeting.

The meeting space in the Girl Scout office will be available in 2018 for board meetings on the first Wednesday and general meetings on the second Wednesday of the month. The board meeting for July is scheduled for July 11 because the first Wednesday in July 2018 is on the 4th.

Nominations for the board were discussed. The current officers (Gary Eaton, Keith Rainey, Tom Guss and Bud Hamblen) were asked to run for their respective offices for 2018. K. C. Katalbas and Johanna Koehane were asked to run as directors for 3 year terms. Kat Underwood and Rob Mahurin, whose terms are expiring, were commended for their service.

There being no further business, Gary asked for a motion to adjourn. Theo so moved, Keith seconded, and the meeting was adjourned at 8:55 PM.

Respectfully submitted,

Bud Hamblen
Secretary



Photo by Theo Wellington, outside of Tucumcari, NM

**Barnard-Seyfert Astronomical Society
Minutes of the Monthly Membership Meeting
Held On Wednesday, November 15, 2017.**

The Barnard-Seyfert Astronomical Society held its monthly meeting in the City Room at the Girl Scouts office, 4522 Granny White Pike, Nashville, Tennessee, on Wednesday, November 15, 2017. 34 members and guests signed in.

Gary Eaton called the meeting to order at 7:30pm. Gary asked for a motion to approve the minutes of the October 18, 2017, meeting as printed in the November, 2017, issue of the Eclipse. Lonnie Puterbaugh so moved, Spencer Buckner seconded, and the minutes were adopted without discussion by a unanimous voice vote. There was \$6,615.26 in the regular account and \$4,156.51 in the equipment account as of November 1, 2017.

Gary recognized new members: Patrick King, Robert Towson, Janice Schuler and Ralph Chumbley. Keith Rainey reported that the club's Google group is up and running. E-mail Keith (click on his name on the BSAS web site) for an invitation to join the group. At the December meeting Lonnie Puterbaugh will present on the return of Mars in 2018. Expect something exciting.

Nominations for officers and directors included:

Gary Eaton, President

Keith Rainey, Vice-president

Tom Guss, Treasurer

Bud Hamblen, Secretary

K. C. Katalbas, Director

Johana Koehane, Director

No additional nominations were made from the floor, and the whole slate of candidates were elected unanimously by the members present at the meeting. Continuing to serve as directors are Mike Benson, Spencer Buckner, Drew Gilmore and Todd Nannie.

Orders and deposits for the RASC Handbook and the Deep Space Mysteries calendar were accepted. Delivery is expected by the December meeting.

Gary announced upcoming star parties: private star party on November 18 at Natchez Trace mile marker 435.3, public event on December 8 at Bells Bend Outdoor Center from 6:30-8:30 PM, and private star party December 16 at Natchez Trace mile marker 412 (Water Valley Overlook).

Monthly Membership Meeting, continued

Gary mentioned that anyone with interesting photos or other material for the Eclipse newsletter can send it to eclipse@bsasnashville.com.

Dr Spencer Buckner presented Astronomy Toys for Night and Day, describing useful and fun astronomy equipment in all price ranges. Suppliers mentioned were Orion Telescopes and Binoculars (www.telescopes.com), Oceanside Photo and Telescopes (www.optcorp.com), and Astronomics (www.astronomics.com). [Come to the January 2018 meeting for help with new astronomy equipment.] Gary mentioned that former BSAS member Dustin Gibson is the owner of OPT. Theo mentioned that the new Ioptron Sky Tracker is useful for wide field astrophotography with digital cameras.

There being no further business the meeting was adjourned at about 9:00 PM.

Respectfully submitted,

Bud Hamblen

Secretary

Next BSAS meeting
December 20, 2017, 6:30 pm

Cumberland Valley
Girl Scout Council Building
4522 Granny White Pike

Potluck Dinner and Silent Auction at 6:30! BSAS provides meat and drinks, bring a side dish/ dessert. Also consider bringing items for the silent auction table! Anything from books to gear to astronomically themed clothing items. Proceeds benefit our equipment account.

Speaker: Lonnie Puterbaugh - The Return of Mars

Contribute to *The Eclipse!*
eclipse@bsasnashville.com!

From the President, continued

Gary Eaton, President

Keith Rainey, Vice President

Tom Guss, Treasurer

Bud Hamblen, Secretary

Mike Benson, At Large Member

Todd Nannie, At Large Member

Spencer Buckner, At Large Member

Drew Gilmore, At Large Member

Johanna Keohane, At Large Member

KC Katalbas, At Large Member

Theo Wellington, Ex-Officio

If re-elected for 2018, I look forward to serving alongside these capable and dedicated individuals.

For those of you that ordered Astronomy Magazine's Deep Space Mysteries Calendar, 2018 or the RASC Observer's Handbook 2018, please plan on making your final payment and picking up your items at the meeting. We have already received the calendars and expect the handbooks any day now.

Thanks for being part of BSAS and we hope to see you all on the 20th.

Gary Eaton



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.