

The ECLIPSE

January
2016

The Newsletter of the Barnard-Seyfert Astronomical Society

Next Membership Meeting:
January 20, 2016, 7:30 pm
Cumberland Valley
Girl Scout Council Building
4522 Granny White Pike

Topic: How to Use a Telescope

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From the President:

Happy New Year!

It is (still) cloudy as I write this, but a new year brings new hope that we will have better weather.

What do we have to look forward to? The Moon occults Aldebaran on January 19. Double shadow transits on Jupiter in February and March. An astronomy weekend in April, a lovely grouping of the Moon, Saturn, Mars and Antares also in April, a May 9 Transit of Mercury, the planets - all of them - in the sky together come August. The close (0.06 degree) conjunction of Jupiter and Venus on August 27. Spacecraft Juno gets to Jupiter in July. The one-year-to-go start to the countdown to the 2017 Total Solar Eclipse. Good fun! Not to mention the unexpected comets and/or asteroids, supernovae, and other astronomical sights.

As we make our resolutions for the New Year, what astronomical goals would you like to set? How can BSAS help you to meet your goals? One of the wonderful things about astronomy as a hobby is that you can walk outside on any clear night and enjoy the night sky, without even getting out a telescope. But you *can* also pull out the telescope, get out binoculars, put the camera on a tripod... there are many ways to enjoy the view. My wish for the next year is to provide programs and information to all members to further your enjoyment of everything astronomical. So let us know what you would like the club to do for you in 2016!

If you have a telescope in the closet, let's get it back out under the stars! Our January meeting is all about answering questions about telescope (and other astronomical gear) setup and operation. We have many different telescopes owned by club members, so there is help for whatever questions you might have. Hopefully we'll have some guests as well, folks who got telescopes for Christmas perhaps. I get many inquiries all year long from folks trying to



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Observing Highlights January and February

Open Clusters

M52, NGC457 (*ET*),
M103, NGC654, NGC663,
NGC884/869 (*Double Cluster*),
M34, M45, M36,
M37, M38, M35,
M41, M50, M47,
M46, M93

Variable Stars

Beta Persei (*Algol*),
Omicron Ceti (*Mira*),
R Leporis (*Hind's Crimson Star*)

Galaxies

M31 (*Andromeda*),
M32, M110,
M33 (*Triangulum*),
M74, M77

Globular Clusters

M79 Nebulae
NGC7293 (*Helix*),
M76 (*Little Dumbell*),
NGC1499 (*California*),
M1, M42 (*Orion*),
M43, M78

Multiple Star Systems

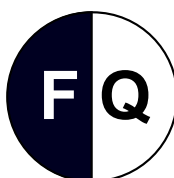
Eta Cassiopeiae,
Gamma Arietis,
Gamma Andromedae,
Beta Orionis (*Rigel*),
Alpha Geminorum (*Castor*)

Upcoming Star Parties

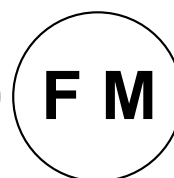
Saturday 1/9	Private Star Party Natchez Trace Parkway mile marker 412 (Water Valley Overlook)
Friday 1/15 6:30 - 8:30 pm	Public Star Party Bells Bend Outdoor Center
Saturday 2/6	Private Star Party Natchez Trace Parkway mile marker 433.5
Saturday 2/13 6:30 - 8:30 pm	Public Star Party Shelby Bottoms Nature Center



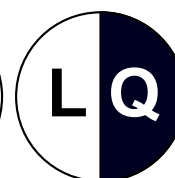
Jan 9
Feb 8



Jan 16
Feb 15



Jan 23
Feb 22



Jan 1
Mar 1

Happy Birthday Jacobus Kapteyn by Robin Byrne

This month we celebrate the life of a man who revolutionized our understanding of the Milky Way and so much more. Jacobus Cornelius Kapteyn was born to Gerrit and Elisabeth Kapteyn January 19, 1851 in Barneveld, Netherlands. At the age of 17, he entered the State University of Utrecht, majoring in mathematics and physics. Ultimately, Kapteyn received his doctorate in physics, but the field of astronomy was his destiny.

Upon completing his dissertation, Kapteyn went to work at the Leiden Observatory in 1875. Three years later, the State University of Groningen named him their first Professor of Astronomy and Theoretical Mechanics. He remained here until his retirement in 1921.

The University of Groningen did not have an observatory, so Kapteyn developed a laboratory to analyze photographic images taken at other observatories. Astronomical photography was still in its infancy, but Kapteyn was among the first to recognize its potential.

Beginning in 1896, Kapteyn collaborated with Sir David Gill, who had taken a series of photographic plates of the southern hemisphere sky at the Royal Observatory at the Cape of Good Hope. Four years later, their work was published in a catalog titled the Cape Photographic Durchmusterung. The catalog included positions and magnitudes of 454,875 southern hemisphere stars located between 18° S and the southern celestial pole.

While working on the catalog, Kapteyn was also using photographs to measure stellar parallax, the apparent shift of a star's position due to Earth's motion from one side of the Sun to the other. When Kapteyn began his career, only 34 stars had known parallax values. By the time he was done, over 10,000 stars had measured parallax angles.

While measuring parallaxes, Kapteyn discovered a star that now bears his name. In



Jacobus Kapteyn, continued

1897, he noticed a star observed in 1873, did not appear in more recent photographs. Robert T.A. Innes found a “new” star located roughly 15 arc seconds from where the “missing” star should have been. Now known as Kapteyn’s Star, it was the highest proper motion star known at the time. Barnard’s Star, discovered in 1916, is now the only known star with a faster proper motion. Kapteyn’s Star is only 12.76 lightyears away, though was as close as 7 lightyears away roughly 10,800 years ago. It is a 9th magnitude M1 star, so it is intrinsically very faint and cool, giving it a red color, and is found in the constellation Pictor. Based on its motion, it has been classified as being among a group of stars known as the Kapteyn Moving Group, which are likely stars that were once part of the Omega Centauri globular cluster. It is thought that the cluster was originally a dwarf galaxy that has been consumed by the Milky Way. Just a year ago, it was found to have two planets, one of which may be the oldest known habitable planet at an age of 11 billion years old.

The discovery of Kapteyn’s Star led to studying proper motions of other stars in the solar neighborhood. The expectation was that the stars would be moving in random directions. What Kapteyn discovered in 1904 was that there are two preferred directions of motions of stars in our galaxy. The two “streams” move almost in opposite direction, being 140° apart in direction. This was the first piece of evidence concerning how the Milky Way rotates.

Two years later, Kapteyn began a project in which he counted stars in images of selected areas to determine the structure of the Milky Way. He chose 206 regions to study, which became known as Kapteyn’s Selected Areas. Each region was roughly $1^\circ \times 1^\circ$ at 15° intervals across the sky. An additional 46 other regions were included for areas of special interest. Working with a group of more than 40 observatories, this was the first international collaboration in astronomical research. In each area, stars were measured to determine their apparent magnitude, proper motion, parallax, spectral classification, and radial velocity. The results were then analyzed statistically for patterns and trends. Working with Pieter van Rhijn, they published their interpretation of the structure of the Milky Way. Known as Kapteyn’s Universe, they pictured the Milky Way as being shaped like a lens, with a higher concentration of stars toward the center, becoming more sparse on the outer regions. Their estimate of the size was only 40,000 lightyears across (compared to the currently accepted size of 100,000 lightyears) with the Sun 2000 lightyears from the center (instead of 25,000 lightyears). The reason for their incorrect distance estimates is that they were unaware of the effects of the interstellar medium affecting stellar brightness and visibility. However, considering this

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Jacobus Kapteyn, continued

work occurred at a time when we didn't even know other galaxies existed, it was an impressive piece of work.

Kapteyn retired in 1921 at the age of 70, but did help with the upgrade of the Leiden Observatory at the request of a former student. The following year saw the publication of a book covering most of Kapteyn's lifetime of work, titled *First Attempt at a Theory of the Arrangement and Motion of the Sidereal System*.

Only a few weeks after his book was published, Kapteyn died on June 18, 1922 in Amsterdam. Kapteyn's legacy lives on in many places, including the Jacobus Kapteyn Telescope (JKT) located on La Palma in the Canary Islands as part of the Isaac Newton Group of Telescopes. We owe much of our understanding of our galaxy to Kapteyn. As you go out at night and enjoy your view of the winter Milky Way, pause and give thanks to Jacobus Kapteyn.

References:

[Jacobus Kapteyn - Wikipedia](#)

[Jacobus Cornelius Kapteyn | Dutch Astronomer | britannica.com](#)

[JKT - Jacobus Cornelius Kapteyn \(1851-1922\)](#)

[Kapteyn, Jacobus Cornelius \(1851-1922\)](#)

[Kapteyn's Star - Wikipedia](#)

From the President, continued

understand their gear, we've seen many at star parties this year.

Please also consider what you might like to do for the club. Everyone is invited to come to Board meetings, and we are still looking for someone who would like to serve as an at-large member. Bring suggestions! Maybe you have an interest you'd like to highlight by presenting a program. We would love to hear from you.

After all, even when it is clear and frosty, we're out looking up because we have fun enjoying the view!

Clear skies,

Theo Wellington



This enhanced color mosaic combines some of the sharpest views of Pluto that NASA's New Horizons spacecraft obtained during its July 14 flyby. The pictures are part of a sequence taken near New Horizons' closest approach to Pluto, with resolutions of about 250-280 feet (77-85 meters) per pixel - revealing features smaller than half a city block on Pluto's surface. Lower resolution color data (at about 2,066 feet, or 630 meters, per pixel) were added to create this new image. The images form a strip 50 miles (80 kilometers) wide, trending (top to bottom) from the edge of "badlands" northwest of the informally named Sputnik Planum, across the al-Idrisi mountains, onto the shoreline of Pluto's "heart" feature, and just into its icy plains. They combine pictures from the telescopic Long Range Reconnaissance Imager (LORRI) taken approximately 15 minutes before New Horizons' closest approach to Pluto, with - from a range of only 10,000 miles (17,000 kilometers) - with color data (in near-infrared, red and blue) gathered by the Ralph/Multispectral Visible Imaging Camera (MVIC) 25 minutes before the LORRI pictures. The wide variety of cratered, mountainous and glacial terrains seen here gives scientists and the public alike a breathtaking, super-high-resolution color window into Pluto's geology.

Credit: [NASA/Johns Hopkins University Applied Physics Laboratory/Southwest Research Institute](http://www.nasa.gov/jhuapl/southwest)

Next BSAS meeting
January 20, 2016, 7:30 pm
Cumberland Valley Girl Scout Council Building
4522 Granny White Pike

The January meeting of the Barnard-Seyfert Astronomical Society will focus on how to use a telescope and other astronomical gadgets. Whether you just received a telescope for Christmas or have one gathering dust in the closet, bring it to the meeting for some one on one instruction! Be sure to bring the manual and other parts that came with your telescope, if they're available. If you plan on bringing a telescope to the meeting, let us know beforehand by emailing your name along with the brand and model of the telescope to info@bsasnashville.com.

This way, we'll be prepared to assist you.

Mark your calendars!

The first Pickett-Pogue Dark Sky Park Astronomy Weekend April 1-3.

Bunkhouse and meals on Saturday, breakfast on Sunday for \$50.

Astronomy presentations and hiking and outdoor opportunities in this scenic park.

Barnard-Seyfert Astronomical Society
Minutes of a Regular Meeting of the Board of Directors
Held On Wednesday, December 2, 2015.

The regular meeting of the Board of Directors of the Barnard-Seyfert Astronomical Society was held December 2, 2015, at the Girl Scouts of Middle Tennessee, 4522 Granny White Pike, Nashville, TN 37204. Present were Gary Eaton, Bud Hamblen, Rob Mahurin, Kris McCall (by telephone), Poppy Simmons and Theo Wellington. A quorum being present, Theo Wellington called the meeting to order at 7:30 PM. Theo Wellington asked for a motion to approve the minutes of the October board meeting as printed in the November issue of the *Eclipse*. Rob Mahurin so moved, Poppy Simmons seconded, and the minutes were approved by a unanimous voice vote. Theo Wellington reported that Bob Norling said there was approximately \$1,700 in each account.

The board reviewed upcoming dates for meetings and star parties. Kris McCall moved that they be adopted, Poppy Simmons seconded and the board approved the dates by unanimous voice vote.

First South Financial Credit Union, Memphis, Tennessee, has proposed to partner with the Barnard Seyfert Astronomical Society, where membership in the BSAS would qualify persons to join the credit union. First South Credit Union would donate \$500 to the BSAS and pay BSAS membership dues for credit union members. Background: unlike commercial bank depositors, credit union members need to be part of a group with some common relationship. Traditionally, credit union members were employed by the the same company or government agency, but they can have some other relationship in common. Rob Mahurin noted that a credit union in a former city of residence had a similar partnership with friends of libraries clubs in that city.

Resolution 2015-12-02. To accept the offer made by Mid South Financial Credit Union to partner with the Barnard Seyfert Astronomical Society. An email ballot was held December 3-4, 2015, with Gary Eaton, Poppy Simmons, Kris McCall, Rob Mahurin, Bud Hamblen and Theo Wellington voting affirmatively and carrying the motion.

There being no further business, the meeting was adjourned at 8:40 PM.

Respectfully submitted,

Bud Hamblen

Secretary

Send your cool astrophotos to
eclipse@bsasnashville.com!

Barnard-Seyfert Astronomical Society
Minutes of the Monthly Membership Meeting
Held On Wednesday, December 16, 2015.

The Barnard-Seyfert Astronomical Society held its annual potluck dinner at the Girl Scouts of Middle Tennessee, 4522 Granny White Pike, Nashville, Tennessee, on Wednesday, December 16, 2015, beginning at 6:30 PM. 29 members and guests signed in.

President Theo Wellington called the regular meeting to order at 7:30 PM. The following slate of nominees for officers and directors were presented:

Theo Wellington, President
Gary Eaton, Vice President
Tom Guss, Treasurer
Bud Hamblen, Secretary
Mike Benson, Director
Spencer Buckner, Director

Theo asked for a motion to elect the nominees en bloc. Terry Reeves so moved, Chuck Schlemm seconded, and the motion was adopted by a unanimous voice vote.

Retaining their seats on the board were:

Jeff Horne, Director
Rob Mahurin, Director
Kris McCall, Director
Kathy Underwood, Director

Theo then asked for a motion to adopt the minutes of the November meeting as printed in the Eclipse. Mike Benson so moved, Chuck Schlemm seconded, and the minutes were adopted by unanimous voice vote.

Theo announced upcoming star parties: 12/19 at Edwin Warner Park, 12/31 at Pickett State Park, 1/9 at Water Valley Overlook (private), 1/15 at Bells Bend Park. An astronomy weekend is scheduled for April 1-3 at Pickett State Park (IDA dark sky park), and the Nashville Outdoor Recreation Festival and Expo is scheduled for April 12 (solar observing).

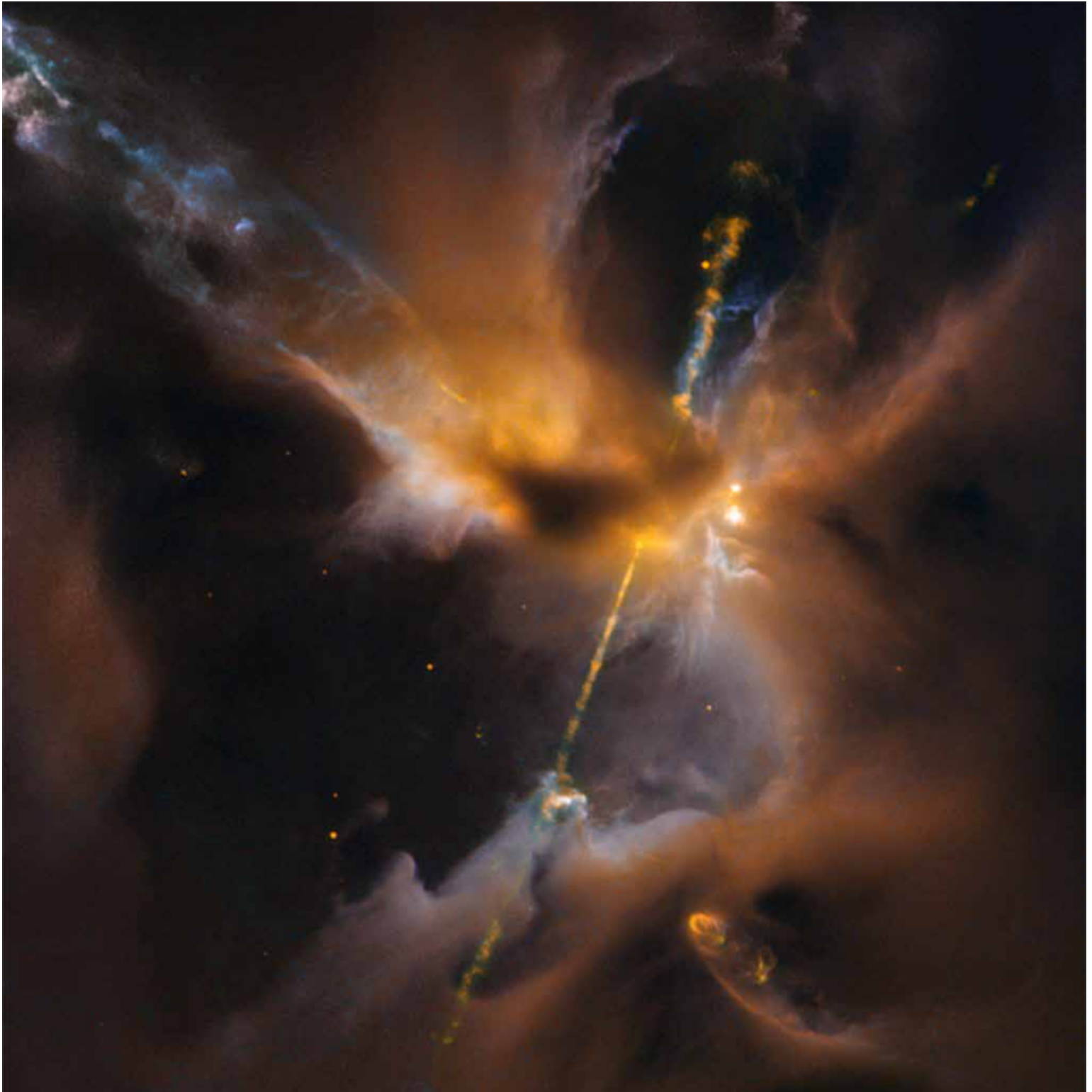
Dr David Weintraub, Vanderbilt University, presented a very interesting talk on Cepheid Variable Stars, E. E. Barnard, Edwin Hubble and the Age of the Universe.

The silent auction of donated items to benefit the club concluded the evening.

There being no more business, the meeting was adjourned at 9:00 PM.

Respectfully submitted,

Bud Hamblen



The two lightsabre-like streams crossing the image are jets of energised gas, ejected from the poles of a young star. If the jets collide with the surrounding gas and dust they can clear vast spaces, and create curved shock waves, seen as knotted clumps called Herbig-Haro objects.

Credit: [ESA/Hubble & NASA, D. Padgett \(GSFC\), T. Megeath \(University of Toledo\), and B. Reipurth \(University of Hawaii\)](#)



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Then fill it out and bring it to
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P.O. Box 150713
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Annual dues:

\$20 Individual
\$30 Family
\$15 Senior (+65)
\$25 Senior Family (+65)
\$12 Student*

* To qualify as a student, you
must be enrolled full time in
an accredited institution or
home schooled.

You can check the status
of your membership at
bsasnashville.com.

There will be a two month
grace period before any
member's name is removed
from the current distribution
list.

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 or call Theo Wellington at (615) 300-3044.

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.