

# The ECLIPSE

December  
2016

*The Newsletter of the Barnard-Seyfert Astronomical Society*

## Next Membership Meeting:

December 21, 2016, 6:30 pm  
Glendale United Methodist  
Church - Fellowship Hall  
900 Glendale Lane  
*Potluck Dinner and Silent Auction*

*Speaker: Dr. Jim Dickens*  
*"Citizen Cate Project"*  
*Details on page 10.*

## In this Issue:

Observing Highlights	2
Happy Walter Sydney Adams by Robin Byrne	3
Dimming stars, erupting plasma, and beautiful nebulae by Marcus Woo	7
Board Meeting Minutes November 2, 2016	11
Membership Meeting Minutes November 16, 2016	13
Membership Information	14

## From the President:

For the past four years it has been a wonderful privilege to serve as President of the Barnard-Seyfert Astronomical Society. This is a great group of people that share a common love and interest in astronomy, space, exploration and dark skies. We've grown a bit over the last few years, and I hope that this year's eclipse may bring us a few more members that will last beyond the biggest astronomical event in US history. Gary Eaton will step into the role of President, and he'll have a great time as well with all the support this group gives.

I will continue to be very active in the local community, especially this spring and summer doing what I call eclipse evangelism. There is a lot that really needs to happen to make the experience of watching a total solar eclipse a great one for residents and guests alike! If you belong to a group that would like a program on the eclipse, please let me know. I'm also doing eclipse outreach at Western Kentucky University... we are trying to make as big an impact on K-12 students as we can, inspiring the next generation in a way not normally possible! I've never seen a total eclipse, but listening to those who have - this is a must-see event. If you are outside the path, find a BSAS friend inside - no one we know should be left out! The club has bought a pile of solar glasses to distribute to members, we'll have some extras for sale as well.

I will also make a shameless pitch for my website dedicated to Tennessee specific eclipse information: [tn2017eclipse.info](http://tn2017eclipse.info). Feel free to make comments or ask for additions! Several other websites also have a page for Tennessee with maps and event information, thin as that is. Volunteer to help your local library or PTSA



## Officers

Theo Wellington  
President  
tmwellington@comcast.net

Gary Eaton  
Vice-President  
gceaton@comcast.net

Tom Guss  
Treasurer  
t\_guss@bellsouth.net

Bud Hamblen  
Secretary  
wrhamblen@comcast.net

(no one)  
Ex-officio

## Directors at Large

Mike Benson  
ocentaurus@aol.com

Spencer Buckner  
BucknerS@apsu.edu

Jeffrey Horne  
Jeffrey.Horne@gmail.com

Rob Mahurin  
robert.s.mahurin@gmail.com

Kris McCall  
planetmccall@gmail.com

Kathy Underwood  
katy2222@comcast.net

Drew Gilmore  
Newsletter Editor  
eclipse@bsasnashville.com

## Observing Highlights December and January

### Multiple Star Systems

Gamma Delphini  
Polaris

### Globular Clusters

M15, M2  
M72, M75  
M30, M79

### Variable Stars

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

### Galaxies

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

### Open Clusters

M73, M29,  
M39, M52,  
NGC457 (*ET*),  
M103, NGC654, NGC663,  
NGC884/869 (*Double Cluster*),  
M34, M45, M36, M37, M38

### Nebulae

NGC7000 (*North America*),  
IC5146 (*Cocoon*),  
NGC7293 (*Helix*),  
M76 (*Little Dumbell*),  
NGC1499, (*California*),  
M1, M42 (*Orion*),  
M43, M78

## Upcoming Star Parties

Saturday 12/31	Private Star Party <a href="#">Natchez Trace Parkway mile marker 412</a> <a href="#">(Water Valley Overlook)</a>
Friday 1/6 6:30 pm to 8:30 pm	Public Star Party <a href="#">Bells Bend Outdoor Center</a>
Saturday 1/28	Private Star Party <a href="#">Natchez Trace Parkway mile marker 435.3</a>
Wednesday 2/8 6:30 pm to 8:30 pm	Public Star Party <a href="#">Edwin Warner Park</a>



Dec 29  
Jan 27



Dec 7  
Jan 5



Dec 13  
Jan 12

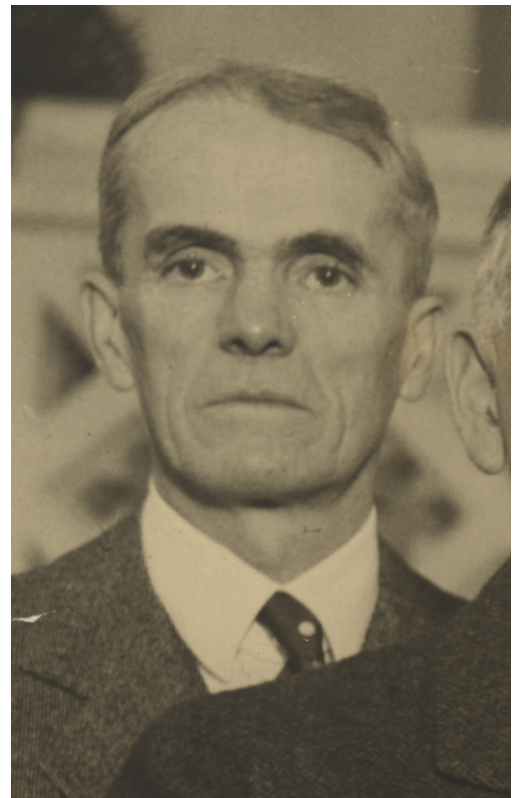


Dec 20  
Jan 19

## Happy Birthday Walter Sydney Adams by Robin Byrne

This month we celebrate the birthday of a man whose contributions to astronomy are as varied as they are important, and who also happens to share a birthday with me. Walter Sydney Adams was born December 20, 1876 in either Syria or Turkey, depending on which source you look at. His parents, Lucien and Nancy, were missionaries, so it's possible they had lived in both places. When Walter was eight years old, the family moved back to the United States.

Adams' formal education included high school in Vermont, first at St. Johnsbury Academy, and then the Phillips Academy, from which he graduated in 1894. His college education began at Dartmouth College, where he graduated with a Bachelor of Science in Astronomy in 1898. One of his professors, Edwin Frost, was moving on to Yerkes Observatory in Wisconsin and invited Walter to join him. Adams did, and his work earned him a Masters of Science in Astronomy from the University of Chicago in 1900. Adams then spent a year at the University of Munich in Germany until he was invited by George Ellery Hale to work as his assistant at Yerkes Observatory. For the next three years, Adams worked at Yerkes, where he was most interested in measuring the radial velocities of stars. In 1904, Hale invited Adams to join him at the new Mount Wilson Observatory in California.



At Mount Wilson, Adams began as Hale's deputy, but rose through the ranks to become the director of the observatory in 1923. Adams held that position for 23 years. One of his tasks at Mount Wilson was to oversee the establishment of the solar observatory, which was first used in 1912. Adams was also integral to the development of the 100 inch Hooker telescope, which saw first light in 1917.

When Adams first arrived at Mount Wilson, the 60 inch telescope was still under construction, so he made due with other equipment that was available. One of the first objects he studied was the Sun. Using photographs of the Sun, Adams was able to accurately measure the rotation rate of the Sun at different solar latitudes. Because the Sun is gaseous, it does not rotate as a solid body, but, instead, rotates faster at

continued on next page

### Walter Sydney Adams, continued

the equator than at the poles. This differential rotation had been known, but Adams was able to provide much more quantified measurements of the different rates. Adams also used spectroscopy to study sunspots. Working with Hale, they found that sunspots are cooler than the surrounding regions of the Sun, but have much stronger magnetic fields. Adams also studied the convection currents that occur just below the Sun's "surface."

In 1910, Adams married Lilliam Wickham. Sadly, she died less than 10 years after the wedding. Two years after losing Lilliam, Adams married Adeline Miller with whom he had two sons: Edmund and John.

The 60 inch telescope was completed in 1908, and Adams quickly used it for his passion of spectroscopy, which he described as "the only fun I have." At first, Adams busied himself measuring the radial velocities of hundreds of stars and the spectra of novae. In 1915, Adams began investigating the companion star of Sirius, Sirius B. He was able to determine both the size and luminosity of this star. Adams found that it was not much bigger than Earth in size, yet the amount of light given off per unit area was brighter than the Sun, and the mass was similar to the Sun! He had measured the characteristics of the first known white dwarf star.

Working with Arnold Kohlschütter, they investigated F, G and K stars with known parallaxes, hence known distances. Knowing the distances, they were able to determine the absolute magnitudes of the stars. This allowed them to determine which of the stars were main sequence, and which were giants. Adams and Kohlschütter then compared the spectra of the stars. They found that the intensity and width of spectral lines correlated to the star's absolute magnitude. This could then be used to measure distances to stars too far to measure their parallax. With the start of World War I, Kohlschütter had to return to Europe. Adams continued with their work on his own, now incorporating B, A and M stars.

In 1925, Arthur Eddington was presenting at the International Astronomical Union's meeting in Cambridge, England. His talk was about relativity. During his presentation, Eddington dropped a bombshell: that morning he received a telegram from Adams. Adams was able to measure the gravitational redshift of light coming from Sirius B. Eddington had predicted that the redshift should be 20 km/s. Adams measured a value of 19 km/s - a very strong confirmation of general relativity theory.

continued on next page

### Walter Sydney Adams, continued

Later in his career, Adams continued with his love of spectroscopy, but now studying something other than stars. Looking at the spectra coming from interstellar gas clouds, Adams found spectral lines indicating the presence of cyanide (CN) and the hydrocarbon methylidyne (CH). Then Adams turned to the planets. With Theodore Dunham, they looked at the spectrum of Venus' atmosphere and found that it was composed of carbon dioxide. In 1941, Adams looked at the spectrum of the atmosphere of Mars, in particular, looking for evidence of water vapor and oxygen. He found no traces of either, which led Adams to conclude that there was no life on Mars. Not too surprising, that discovery made headlines.

In 1946, Adams retired, but he hardly stopped working. He continued conducting research at the Hale Solar Laboratory in Pasadena. He even played a role in the development of the 200 inch Hale telescope at the Mount Palomar Observatory. Adams continued doing research until his death on May 11, 1956 at the age of 79. Walter Adams not only was an exceptional research scientist, he also had a knack for explaining astronomy to the general public. For many decades, whenever space was in the news, odds are that the story included a quote from Adams. For someone who made so many important contributions to astronomy, it's a shame his name isn't better known. Whether you prefer looking at planets, like Venus and Mars, or stars or interstellar nebulae, the next time you gaze up at the heavens, take a moment to remember the man who helped us better understand it all - Walter Sydney Adams.

References:

[Walter Sydney Adams - Wikipedia](#)

[Walter Adams - biography.com](#)

[Walter Adams American Astronomer - britannica.com](#)

[Walter Sydney Adams 1928 Bruce Medalist](#)

[Walter S. Adams - NNDB](#)

[Obituary: Walter S. Adams, 1876 - 1956](#)

[Stratton, F. J. M.](#)

[The Observatory, Vol. 76, p. 139-140 \(1956\)](#)



"Supermoon" 11.14.2016 T Wellington

## Dimming stars, erupting plasma, and beautiful nebulae

By Marcus Woo

Planetary nebulae are shells of gas and dust blown off from a dying, giant star. Most nebulae aren't spherical, but can have multiple lobes extending from opposite sides - possibly generated by powerful jets erupting from the star. Using the Hubble Space Telescope, astronomers discovered blobs of plasma that could form some of these lobes.

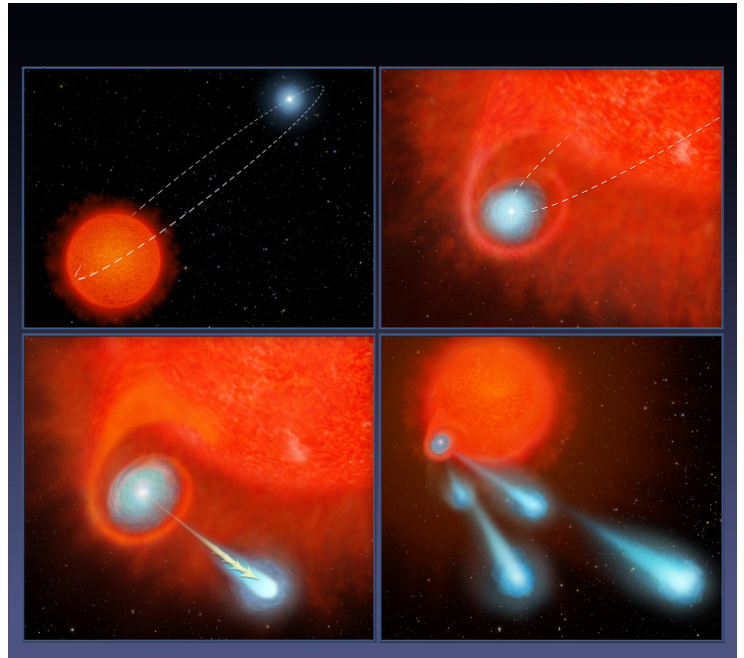
Boasting intricate patterns and translucent colors, planetary nebulae are among the most beautiful sights in the universe. How they got their shapes is complicated, but astronomers think they've solved part of the mystery - with giant blobs of plasma shooting through space at half a million miles per hour.

Planetary nebulae are shells of gas and dust blown off from a dying, giant star. Most nebulae aren't spherical, but can have multiple lobes extending from opposite sides - possibly generated by powerful jets erupting from the star.

Using the Hubble Space Telescope, astronomers discovered blobs of plasma that could form some of these lobes. "We're quite excited about this," says Raghvendra Sahai, an astronomer at NASA's Jet Propulsion Laboratory. "Nobody has really been able to come up with a good argument for why we have multipolar nebulae."

Sahai and his team discovered blobs launching from a red giant star 1,200 light years away, called V Hydrae. The plasma is 17,000 degrees Fahrenheit and spans 40 astronomical units - roughly the distance between the sun and Pluto. The blobs don't erupt continuously, but once every 8.5 years.

The launching pad of these blobs, the researchers propose, is a smaller, unseen star orbiting V Hydrae. The highly elliptical orbit brings the companion star through the



Boasting intricate patterns and translucent colors, planetary nebulae are among the most beautiful sights in the universe. How they got their shapes is complicated, but astronomers think they've solved part of the mystery— with giant blobs of plasma shooting through space at half a million miles per hour.

continued on next page

## Planetary Nebulae, continued

outer layers of the red giant at closest approach. The companion's gravity pulls plasma from the red giant. The material settles into a disk as it spirals into the companion star, whose magnetic field channels the plasma out from its poles, hurling it into space. This happens once per orbit- every 8.5 years - at closest approach.

When the red giant exhausts its fuel, it will shrink and get very hot, producing ultraviolet radiation that will excite the shell of gas blown off from it in the past. This shell, with cavities carved in it by the cannon-balls that continue to be launched every 8.5 years, will thus become visible as a beautiful bipolar or multipolar planetary nebula.

The astronomers also discovered that the companion's disk appears to wobble, flinging the cannonballs in one direction during one orbit, and a slightly different one in the next. As a result, every other orbit, the flying blobs block starlight from the red giant, which explains why V Hydrae dims every 17 years. For decades, amateur astronomers have been monitoring this variability, making V Hydrae one of the most well-studied stars.

Because the star fires plasma in the same few directions repeatedly, the blobs would create multiple lobes in the nebula - and a pretty sight for future astronomers.

---

If you'd like to teach kids about how our sun compares to other stars, please visit the NASA Space Place.

This article is provided by NASA Space Place.  
With articles, activities, crafts, games, and lesson plans, NASA Space Place encourages everyone to get excited about science and technology.  
Visit [spaceplace.nasa.gov](http://spaceplace.nasa.gov) to explore space and Earth science!



Send your cool astrophotos to  
[eclipse@bsasnashville.com](mailto:eclipse@bsasnashville.com)!



### From the President, continued

host an event. There are lots of opportunities to share your enthusiasm about astronomy with our community that day. (Libraries can request solar glasses through a NASA program... email me for more information!)

There will be some binocular/small telescope comets coming up this spring, so check the BSAS facebook page for information when those become visible. We try to keep you up to date with what is going on in the sky.

Have some gear you don't use or astronomically themed items you would like to donate? Bring those to the silent auction at the December potluck dinner along with your favorite dessert or side dish. The auction benefits the club's equipment account. Remember that the meeting starts early with dinner at 6:30pm, December 21. Bring a friend and we'll enjoy some good fellowship and food.

Looking forward to a great New Year of astronomy,

Theo Wellington



New observations from the NASA/ESA Hubble Space Telescope have revealed the intricate structure of the galaxy NGC 4696 in greater detail than ever before. The elliptical galaxy is a beautiful cosmic oddity with a bright core wrapped in system of dark, swirling, thread-like filaments.

[Image credit: NASA, ESA, Andy Fabian](#)

**Next BSAS meeting**  
**December 21, 2016, 6:30 pm**  
**Glendale United Methodist Church - Fellowship Hall**  
**900 Glendale Lane**

*Potluck Dinner and Silent Auction at 6:30*  
*BSAS provides meat and drinks, bring a side dish / dessert*

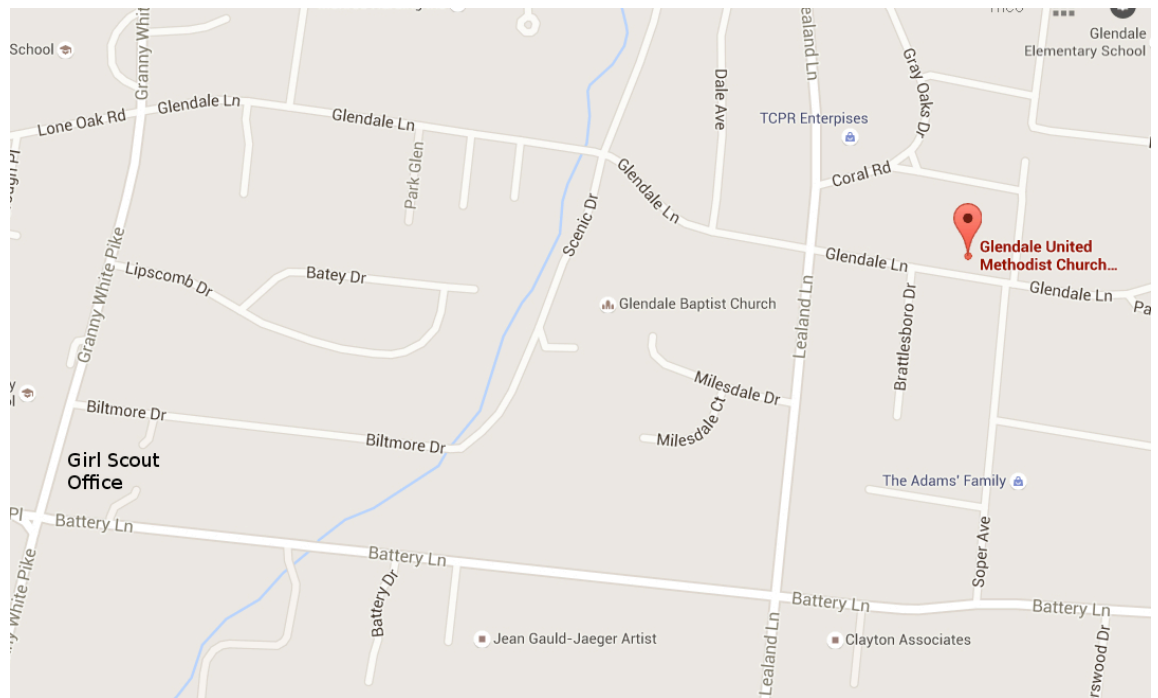
*Also bring items for the silent auction table....anything from books to gear to astronomically themed clothing items. Proceeds benefit our equipment account.*

*Speaker: "Dr. James Dickens, Tennessee coordinator for the Citizen CATE Eclipse project. Jim is a physics and astronomy teacher at Montgomery Bell Academy and leads several extracurricular activities such as Science Olympiad."*

**NOTICE: the location for our board and member meetings has changed!**

The Girl Scouts are renovating, so we will be at the [Glendale United Methodist Church, 900 Glendale Lane, Nashville 37204](#).

It's just around the block from the Girl Scout office.



**Barnard-Seyfert Astronomical Society**  
**Minutes of a Regular Meeting of the Board of Directors**  
**Held On Wednesday, November 2, 2016.**

The regular meeting of the Board of Directors of the Barnard-Seyfert Astronomical Society was held November 2, 2016, at Glendale United Methodist Church, 900 Glendale Lane, Nashville, TN 37204. Present were Mike Benson, Spencer Buckner, Gary Eaton, Kathy Underwood, Bud Hamblen (by phone) and Theo Wellington. Theo called the meeting to order at about 7:45 PM. Theo asked for a motion to approve the minutes for the October 5, 2016, board meeting as printed in the November 2016 issue of the *Eclipse*. Spencer so moved, Mike seconded, and the minutes were approved by unanimous voice vote.

The next planned public star parties are November 18 at Bowie Nature Park and December 3 at Shelby Bottoms, weather permitting. A private star party is planned on November 26 at the Natchez Trace MM 435.3 parking pulloff.

Spencer and Theo are scheduled to speak at the November 16 meeting. Paul Lewis from UTK has health issues and is unable to come to the December potluck; Dr. James Dickens from Montgomery Bell has agreed to speak.

Todd Nannie volunteered to serve on next year's board as well.

Eclipse glasses have been ordered. We got an excellent price (0.35 ea). We'll have enough for members and some to sell if we want.

We also have the new permit for next year's private star parties at the Natchez Trace.

The proposed public star party schedule (amended after talking to Bells Bend):

Jan 6 Bells Bend  
Feb 4 Warner Park  
Mar 4 Shelby Bottoms  
Mar 31 Bowie  
April 28 Bells Bend  
May 13 Long Hunter  
June 3 Cornelia Fort?  
July 1 Warner Park  
Aug 11 Bowie  
Aug 12 Pickett will likely have a Perseid event  
Aug 21 Eclipse Day!  
Aug 25 Bells Bend  
Sep 30 Warner Park Fall Astronomy Day  
Oct 20 Bowie  
Oct 28 Long Hunter (Int'l Observe The Moon night)  
Nov 11 Shelby Bottoms  
Dec 8 Bells Bend

continued on next page

## Minutes of a Regular Meeting of the Board of Directors, continued

Although Pickett usually has a star party on December 31st along with a first night hike, in 2017 the Moon will be nearly full. Astronomy weekend at Pickett will be March 24-26. Earth Day is April 22, we've gone to Centennial Park for this.

Reminded that we should mention the silent auction in the newsletter.

There being no further business, Spencer moved for adjournment, Gary seconded, and the meeting was adjourned at about 8:45 PM.

Respectfully submitted,

Theo Wellington

### Next year's board:

**President**  
Gary Eaton

**Vice President**  
Keith Rainey

**Treasurer**  
Tom Guss

**Secretary**  
Bud Hamblin

**At large:**  
Kathy Underwood  
Rob Mahurin  
Spencer Buckner  
Mike Benson  
Todd Nannie  
Drew Gilmore

**Past President ex-officio**  
Theo Wellington



BSAS member Robert Norling passed away on September 24, 2016. A long time member, Bob had recently served on the BSAS Board as BSAS treasurer for seven years. We'll miss his unfailingly positive attitude and support! Our condolences go out to his wife Betty Ann and his family.

**Barnard-Seyfert Astronomical Society  
Minutes of the Monthly Membership Meeting  
Held On Wednesday, November 16, 2016.**

The Barnard-Seyfert Astronomical Society held its monthly membership meeting at the Glendale United Methodist Church, 900 Glendale Lane, Nashville, Tennessee, on Wednesday, November 16, 2016. Nineteen members signed in. Theo Wellington called the meeting to order at 7:45pm. Theo asked for a motion to approve the minutes of the October meeting as printed in the November *Eclipse*. Chuck Schlemm so moved, Joe Boyd seconded, and the minutes were approved by unanimous voice vote. Tom Guss reported that there was \$1,620.05 in the savings account and \$3,405.13 in the checking account.

Theo asked for a motion to elect en bloc the slate of candidates for officers and directors nominated by the board. Curt Porter so moved, Joe Boyd seconded, and the new officers and directors were elected by unanimous voice vote.

Theo announced scheduled events:

Public star party at Bowie Nature Park, Fairview, TN, Friday, 11/18/16, 6:30-9 PM.

Private star party at Natchez Trace mile marker 435.3, Saturday, 11/26/16.

Public star party at Shelby Bottoms Nature Center, Nashville, TN, Saturday, 12/3/16, 6:30-8:30 PM.

First Night Hike at Pickett State Park, Jamestown, TN, on 12/31/16.

Dr Spencer Buckner presented astronomy toys for Christmas. Theo continued with astronomy toys for solar observing.

Joe Boyd presented an update on the Nashville chapter of the International Dark-Sky Association. Join the IDA to be part of the Nashville chapter.

Theo presented an update on the December meeting and urged members to donate items for the silent auction.

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

Respectfully submitted,

Bud Hamblen

Secretary



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) 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](mailto:info@bsasnashville.com).