

The ECLIPSE

January
2017

The Newsletter of the Barnard-Seyfert Astronomical Society

Next Membership Meeting:
January 18, 2017, 7:30 pm
Glendale United Methodist
Church - Fellowship Hall
900 Glendale Lane

*Topic: How to Use Your Telescope
Details on page 8.*

In this Issue:

Observing Highlights	2
Happy Elisabeth Hevelius by Robin Byrne	3
Big Science in Small Packages by Marcus Woo	6
Board Meeting Minutes December 7, 2016	9
Membership Meeting Minutes December 21, 2016	11
Membership Information	12

From the President:

Greetings, I hope 2017 is off to a great start for you. BSAS finished 2016 with our enjoyable traditional potluck dinner and silent auction. We also heard from Dr. James Dickens from MBA, the TN coordinator for the Citizen CATE Experiment. For the August 21st total solar eclipse, volunteer observers will be strategically stationed along the path of totality to image the event. Then, images will be assembled into a continuous 90-minute movie of the solar corona. I can hardly wait to see the finished product.

At this month's member meeting we will hold our annual telescope clinic. Please join us as we "gear up" for what we hope will be clear skies ahead. We already have a full year of star parties on the BSAS calendar so please mark them down and plan to attend whenever possible.

The writing of this column marks a transition to a new BSAS board. Our thanks to last year's board members for their contribution: Theo Wellington served as President, Bud Hamblen as Secretary, Tom Guss as Treasurer and At Large members included Kris McCall, Kathy Underwood, Jeff Horne, Rob Mahurin, Spencer Buckner and Mike Benson. For 2017, Bud, Tom, Kathy, Rob, Spencer and Mike will ably continue in their positions with Theo returning as an Ex-Officio member. But, we also welcome new board members with Keith Rainey assuming the role of Vice President and with Todd Nannie and Drew Gilmore as At Large members. Drew is also our Webmaster. As I transition from Vice President to my new role as President, I do so with sincere appreciation for the opportunity. BSAS means so much to all of us and giving back through service on the board is a privilege.



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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

Last month's *Eclipse* incorrectly listed a star party date for February 8. The correct date is February 4.

Friday 1/6 6:30 pm to 8:30 pm	Public Star Party Bells Bend Outdoor Center
Saturday 1/28	Private Star Party Natchez Trace Parkway mile marker 435.3
Saturday 2/4 6:30 pm to 8:30 pm	Public Star Party Edwin Warner Park
Saturday 2/25	Private Star Party Natchez Trace Parkway mile marker 412 (Water Valley Overlook)



Jan 27
Feb 26



Jan 5
Feb 3



Jan 12
Feb 26



Jan 19
Feb 18

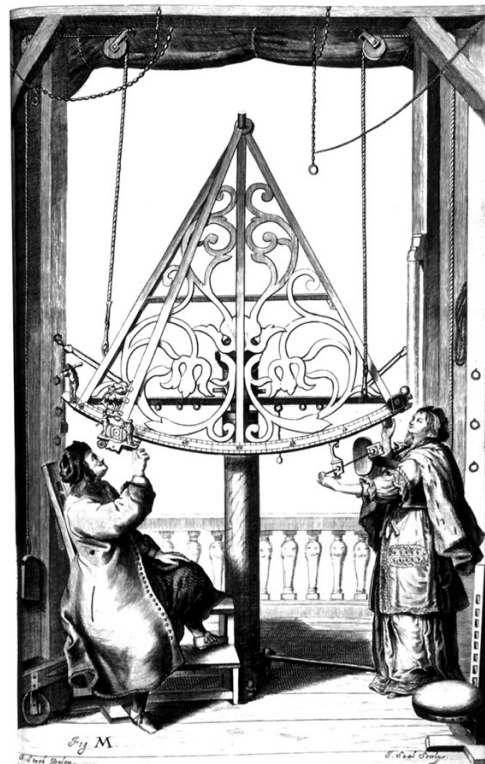
Happy Birthday Elisabeth Hevelius by Robin Byrne

This month we celebrate the life of a woman considered by many to be the first female astronomer. Elisabeth Catherine Koopman Hevelius was born January 17, 1647 in, what is now known as, Gdansk, Poland (the city was called Danzig at the time). Her father, Nicholas Koopman, was part of the rich merchant class. He married Elisabeth's mother, Joanna Mennings in 1633, living in Amsterdam and Hamburg before moving to Gdansk.

When Elisabeth was only a child, her fascination with astronomy began. Lucky for her, living in the same town was a world-renown astronomer, Johannes Hevelius. This young girl approached Hevelius, asking to learn about astronomy. He told her to come back when she was older. In 1662, at the age of fifteen, Elisabeth returned to the home of the, now widowed, Hevelius, and reminded him of his promise. Seeing that her enthusiasm for astronomy was genuine, Hevelius began tutoring Elisabeth in astronomy and the instruments he used. The more time they spent together, the more they realized that they were also falling in love. A year after they began working together, they married in St. Catherine's Church. Even though she was 16 and he was 52, their marriage was a happy one. They had four children: a son, who died young, and three daughters.

Elisabeth was known to be quite fluent in Latin. There is debate as to whether she learned it while growing up, or whether Johannes taught her. There is no doubt that he taught her the mathematics needed for his observations, so it would not seem unreasonable to conclude that he also taught her Latin. Elisabeth corresponded with many well known scientists of the time, always writing in Latin. Many of her letters have been preserved over the years, confirming her skill with Latin.

Johannes Hevelius, among his many accomplishments, published maps of the moon that were in much better detail than anything before seen. Using his telescopes, he drew maps of the moon's surface. It is not clear how much of this work was actually done by Elisabeth, but one can't help but think quite a bit, since she is known as "the mother of moon maps."



Elisabeth and Johannes Hevelius making observations.

Elisabeth Hevelius, continued

Hevelius's home was a complex of buildings, including his observatory. On September 26, 1679, it all burned to the ground. Ten days prior, he and Elisabeth had gone on a short trip out of town to rejuvenate. The horseman was sent back to the house. It is speculated that the horseman deliberately left a candle burning in the stables, which started the fire. Almost everything was lost, except for a few items neighbors and servants were able to save (though some are suspected of stealing as much as they saved). The house structures, observatory, and printing press were all lost. What was saved included most of his bound books, the manuscript for the book he was working on, much of their correspondence, and manuscripts from Johannes Kepler.

After Johannes Hevelius died in 1687, Elisabeth began compiling their mutual work into book form. The first book was published in 1687 and was titled "Stellarum Fixarum." This book explained the techniques they used to compile their data. Three years later, the other two books were completed: "Firmamentum Sobiescianum sive Uranographia," which was comprised of 56 star charts that were created based on their observations, and "Prodromus Astronomiae," which was a catalog of 1564 stars. The catalogue included star positions, which Johannes and Elisabeth determined using a sextant and quadrant combined with the known position of the Sun. Each star's apparent magnitude was given twice (first as determined by Tycho Brahe, and second as determined by Hevelius). The positional data in this catalog was so precise, the coordinates were used for making celestial globes for another 50 years - long after the invention of the telescope.

Elisabeth Hevelius died on December 22, 1693 at the age of 46. She was buried in the same tomb as Johannes. The mathematician Francois Arago wrote of Elisabeth, "A complimentary remark was always made about Madam Hevelius, who was the first woman, to my knowledge, who was not frightened to face the fatigue of making astronomical observations and calculations." In more recent times, Elisabeth has been remembered by the naming of an asteroid, 12625 Koopman, and a crater on Venus, Corpman. In 2006, the novel "The Star Huntress" was published, based on her life. Whether gazing at the Moon or using a star chart, take a moment to reflect on the woman who helped create these tools we take for granted.

References:

[Elisabeth Hevelius - Wikipedia](#)



A cosmic megamaser

This galaxy has a far more exciting and futuristic classification than most – it is a megamaser. Megamasers are intensely bright, around 100 million times brighter than the masers found in galaxies like the Milky Way. The entire galaxy essentially acts as an astronomical laser that beams out microwave emission rather than visible light (hence the ‘m’ replacing the ‘l’).

This megamaser is named IRAS 16399-0937, and is located over 370 million light-years from Earth. This NASA/ESA Hubble Space Telescope image belies the galaxy’s energetic nature, instead painting it as a beautiful and serene cosmic rosebud. The image comprises observations captured across various wavelengths by two of Hubble’s instruments: the Advanced Camera for Surveys (ACS), and the Near Infrared Camera and Multi-Object Spectrometer (NICMOS).

Credit: [ESA/Hubble & NASA](#), Acknowledgement: [Judy Schmidt](#)

Big Science in Small Packages

By Marcus Woo

About 250 miles overhead, a satellite the size of a loaf of bread flies in orbit. It's one of hundreds of so-called CubeSats—spacecraft that come in relatively inexpensive and compact packages—that have launched over the years. So far, most CubeSats have been commercial satellites, student projects, or technology demonstrations. But this one, dubbed MinXSS (“minks”) is NASA’s first CubeSat with a bona fide science mission.



Launched in December 2015, MinXSS has been observing the sun in X-rays with unprecedented detail. Its goal is to better understand the physics behind phenomena like solar flares - eruptions on the sun that produce dramatic bursts of energy and radiation.

Astronaut Tim Peake on board the International Space Station captured this image of a CubeSat deployment on May 16, 2016. The bottom-most CubeSat is the NASA-funded MinXSS CubeSat, which observes soft X-rays from the sun—such X-rays can disturb the ionosphere and thereby hamper radio and GPS signals. (The second CubeSat is CADRE – short for CubeSat investigating Atmospheric Density Response to Extreme driving - built by the University of Michigan and funded by the National Science Foundation.) Credit: ESA/NASA

Much of the newly-released radiation from solar flares is concentrated in X-rays, and, in particular, the lower energy range called soft X-rays. But other spacecraft don't have the capability to measure this part of the sun's spectrum at high resolution—which is where MinXSS, short for Miniature Solar X-ray Spectrometer, comes in.

Using MinXSS to monitor how the soft X-ray spectrum changes over time, scientists can track changes in the composition in the sun's corona, the hot outermost layer of the sun. While the sun's visible surface, the photosphere, is about 6000 Kelvin (10,000 degrees Fahrenheit), areas of the corona reach tens of millions of degrees during a solar flare. But even without a flare, the corona smolders at a million degrees—and no one knows why.

One possibility is that many small nanoflares constantly heat the corona. Or, the heat may come from certain kinds of waves that propagate through the solar plasma. By looking at how the corona's composition changes, researchers can determine which

continued on next page

Big Science in Small Packages, continued

mechanism is more important, says Tom Woods, a solar scientist at the University of Colorado at Boulder and principal investigator of MinXSS: “It’s helping address this very long-term problem that’s been around for 50 years: how is the corona heated to be so hot.”

The \$1 million original mission has been gathering observations since June.

The satellite will likely burn up in Earth’s atmosphere in March. But the researchers have built a second one slated for launch in 2017. MinXSS-2 will watch long-term solar activity—related to the sun’s 11-year sunspot cycle—and how variability in the soft X-ray spectrum affects space weather, which can be a hazard for satellites. So the little-mission-that-could will continue—this time, flying at a higher, polar orbit for about five years.

If you’d like to teach kids about where the sun’s energy comes from, please visit the [NASA Space Place](http://spaceplace.nasa.gov).

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 to explore space and Earth science!



Send your cool astrophotos to
eclipse@bsasnashville.com!

From the President, continued

I'm sure I speak for all of the new board when I suggest that you share ideas with us. Are there particular programs you would enjoy? Do you have ideas for public outreach or know of creative ways to attract more people to our star parties? A stated goal of several past presidents has been to see more young people join our organization. How do you think we can accomplish that in 2017? BSAS has a bright future as long as we continue to adapt and grow. Having your participation in helping set our course for 2017 and beyond is welcome and essential for our future. Let us hear from you soon.

Gary Eaton

Next BSAS meeting
January 18, 2016, 6:30 pm
Glendale United Methodist Church - Fellowship Hall
900 Glendale Lane

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.

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, December 7, 2016.**

The regular meeting of the Board of Directors of the Barnard-Seyfert Astronomical Society was held December 7, 2016, at Glendale United Methodist Church, 900 Glendale Lane, Nashville, TN 37204. Present were Mike Benson, Spencer Buckner, Gary Eaton, Tom Guss, Bud Hamblen and Rob Mahurin (by telephone). Gary called the meeting to order at about 7:45 PM. Gary then asked for a motion to approve the minutes for the November 2, 2016, board meeting that were circulated to the board by email. Spencer so moved, Tom seconded, and the minutes were approved by voice vote. Tom reported that there was \$3,405.13 in the checking account and \$1,619.95 in the savings account.

Gary noted that he planned to be at Pickett State Park on December 31, 2016. Attendance at the Water Valley Overlook on December 31 was expected to be sparse. The next public star party is scheduled for January 6 at Bells Bend from 6:30 to 8.

Paul Lewis is unable to make a presentation at the December 21 meeting, but James Dickens from MBA is available to talk about the Citizen Cate eclipse project. The telescope clinic is scheduled for January 6.

The shipment of 3,750 eclipse glasses is in. We paid 35 cents per pair. We previously set aside up to 12 free pairs per member as a membership benefit. Extra glasses are to be sold. The average retail selling price currently is \$2 per pair.

The Natchez Trace permit is in. We should have at least one copy with the group using the Natchez Trace sites.

We noted with sadness the death of Bob Norling.

The proposed schedule for 2017 public star parties was discussed. The dates for public star parties and some other events look like the following:

- 1 / 6 - Bells Bend
- 2 / 4 - Warner Park
- 3 / 4 - Shelby Bottoms
- 3 / 24-26 Pickett Astronomy Weekend
- 3 / 31 - Bowie
- 4 / 22 - Earth Day
- 4 / 28 - Bells Bend
- 5 / 13 - Long Hunter
- 6 / 3 - Cornelia Fort
- 7 / 1 - Warner Park
- 8 / 11 - Bowie
- 8 / 12 - Picket State Park

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

- 8 / 21 - We will be where we will be
- 8 / 25 - Bells Bend
- 9 / 30 - Warner Park (Fall Astronomy Day)
- 10 / 20 - Bowie
- 10 / 28 - Long Hunter (International Observe the Moon Night)
- 11 / 11 - Shelby Bottoms
- 12 / 8 - Bells Bend
- 12 / 31 - Pickett New Years Eve hike (nearly full Moon)

There being no further business, Spencer moved for adjournment, Gary seconded, and the meeting was adjourned at about 8:20 PM.

Respectfully submitted,

Bud Hamblen

[xkcd](#)



**Barnard-Seyfert Astronomical Society
Minutes of the Monthly Membership Meeting
Held On Wednesday, December 21, 2016.**

The Barnard-Seyfert Astronomical Society held its annual dinner and silent auction, and monthly meeting at the Glendale United Methodist Church, 900 Glendale Lane, Nashville, Tennessee, on Wednesday, December 21, 2016. 25 members were present.

Thanks to the many members brought food to the dinner.

Following the dinner Theo Wellington called the meeting to order at 7:40pm. Theo asked for a motion to approve the minutes of the November meeting as printed in the December Eclipse. Chuck Schlemm so moved, Todd Nannie seconded, and the minutes were approved by unanimous voice vote.

Theo announced scheduled events:

- Private star party at Natchez Trace Water Valley Overlook, Saturday, 12/31/16.
- Public Star Party at Bells Bend Outdoor Center, Nashville, TN, Friday, January 6, 2017, 6:30-8:30pm.
- Private star party at Natchez Trace Mile Marker 435.3, Nashville, TN, Saturday, 1/28/17.
- First Night Hike at Pickett State Park, Jamestown, TN, on 12/31/16.

Theo presented Gary Eaton the rubber gavel for his new term as club president. Gary presented Theo a certificate in recognition of her service as president of the club.

Mike Benson presented Theo the Astronomical League Outreach Award certificate and pin.

Dr James Dickens presented a talk on the Citizen CATE (Continental America Telescopic Eclipse Experiment) project to make a continuous movie of the solar corona during the entire 90 minutes the eclipse is visible in the USA on August 21, 2017.

The RASC Handbook and the eclipse glasses have been received.

The silent auction concluded after the talk.

There being no further business, the meeting was adjourned at 8:48pm.

Respectfully submitted,

Bud Hamblen

Secretary



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 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.