

The ECLIPSE

January
2021

The Newsletter of the Barnard-Seyfert Astronomical Society

Next Membership Meeting:

January 20, 7:30 pm
Online meeting

Topic TBD

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Officers

Keith Rainey
President

Keith.Rainey@gmail.com

Tom Beckermann
Vice President

tmbeckermann@gmail.com

Bud Hamblen
Secretary

wrhamblen@comcast.net

Theo Wellington
Treasurer

tmwellington@comcast.net

Gary Eaton
Ex-officio

gceaton@comcast.net

Directors at Large

Chip Crossman

chipcrossman@gmail.com

Thomas Gaudin

thomas.gaudin73@gmail.com

Drew Gilmore

eclipse@bsasnashville.com

K.C. Katalbas

hazeykc@gmail.com

Andy Reeves

reevesaf@gmail.com

Kathy Underwood

katy2222@comcast.net

From the President

We have a great club with a lot of great members. One of the things that the club needs is a Board of Directors to keep things running smoothly and keep the monthly programs coming. Our Board meets once a month, by Zoom currently, and meetings typically last an hour. The meetings are typically open to all members who want to attend, but we are looking for members to volunteer to be on the board. Right now, we are looking for 3 at-large members to serve 3-year terms. We understand that life changes and priorities change so if you volunteer and find that you can't complete your term, we understand. There is no contract involved.

Please take some time and consider if you would like to serve the club by being on the Board. We could use your fresh energy and ideas.

I am excited for this year and the many opportunities it brings for the club. I am hopeful that we will be able to open up our meetings and star parties and have some good old face-to-face encounters. There will be plenty of things to see this year. Let's hope the clouds stay away for all of them!

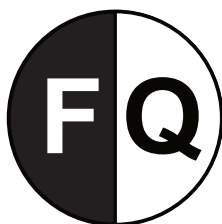
Keep staying safe out there!

Clear skies,

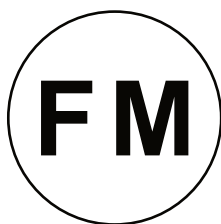
Keith Rainey



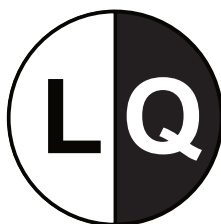
Dec 14
Jan 12



Dec 21
Jan 20



Dec 29
Jan 28



Dec 7
Jan 6

Happy Birthday, Proof of Earth's Rotation by Robin Byrne

As a kid, my family occasionally made trips to the Museum of Science and Industry in Chicago. A few of the exhibits always stood out, one being the Foucault Pendulum. It was always mesmerizing to watch the pendulum swinging back-and-forth, waiting in anticipation for the pendulum to knock down the next of the pins arranged in a circle around the periphery of the pendulum's swing. But it wasn't until I was in my college physics classes that I understood what the point of the pendulum display actually was.

Of course, the idea that Earth's rotation was the reason why objects rise and set in the sky had been known since the time of Copernicus. But if you are stuck on the surface of the Earth, how do you prove this? Léon Foucault was a French physicist who came up with the idea of using the pendulum, and on January 6, 1851, performed the first successful experiment proving Earth's rotation.

So, what's happening? Foucault made use of one of Newton's Laws - an object in motion remains in motion if no net external force acts upon it. In this case, the pendulum is the object in motion. Not only does Newton's First Law mean that the pendulum will keep moving, but also that the direction of motion won't change either, again, as long as no net force acts on it. So, when you set a pendulum in motion to swing back-and-forth, it will continue swinging (until friction slows it down), and the direction of its swing won't change. Now, you may be thinking, "Wait a minute! If the direction of motion doesn't change, why do those museum displays always show the pendulum slowly rotating around knocking down more and more of the pins?" Aha! Because it isn't the pendulum changing direction, but Earth rotating underneath the pendulum. Proof that Earth rotates! Sorry - not sorry - flat Earthers.

The easiest situation to picture is if you are at the North Pole. Set a pendulum in motion, where the center of the swing is directly above Earth's axis. Let's use a star as a reference point and say that the pendulum is swinging directly toward the star Sirius. That direction of the swing won't change, but Earth will spin beneath the pendulum, causing different parts of Earth to point toward Sirius over the course of one day. If you are standing to one side of the North Pole watching the pendulum, you will be carried in a circle over those 24 hours around the swinging pendulum, looking at it from different angles as the day progresses.

As you move farther from the poles, the motion becomes less and less noticeable, and will take longer and longer to complete one circle, until you reach the equator, where the pendulum will appear to move in a fixed straight line with no rotation.

After Foucault's initial experiment, he performed a public demonstration of the pendulum in February of 1851 at the Paris Observatory. The most famous of his pendulums was set up in the Pantheon in Paris a few weeks later. This pendulum was suspended on a 220 foot long wire with a



Léon Foucault

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Earth's Rotation, continued

lead bob weighing 62 pounds. At the latitude of Paris, the pendulum made one complete rotation in 31 hours 50 minutes. An exact replica of the original pendulum has been on display at the Pantheon since 1995.

One of the more unusual locations for a Foucault pendulum was the Amundsen-Scott South Pole Station. A new station was under construction, so while it was still mostly empty, the crew made use of a six-story staircase. Using a 55 pound bob at the end of a 108 foot long wire, they confirmed the Earth's rotation is approximately 24 hours. Isn't it nice to know we've been right all this time?

So, the next time you visit a museum or science center with a Foucault pendulum display, you can now not only enjoy watching the motion, but also be able to impress those around you by explaining that you are watching Earth rotate under the pendulum.

References:

[Foucault Pendulum - Wikipedia](#)



On the Cover: *Jupiter, left, and Saturn, are seen after sunset from Alexandria, Va., Tuesday, Dec. 22, 2020. The two planets are now slowly separating from each other in the sky, after appearing a tenth of a degree apart during the "great conjunction" on December 21. Photo Credit: (NASA/Joel Kowsky)*

Check Your Sky's Quality with Orion! by David Prosper

Have you ever wondered how many stars you can see at night? From a perfect dark sky location, free from any light pollution, a person with excellent vision may observe a few thousand stars in the sky at one time! Sadly, most people don't enjoy pristine dark skies – and knowing your sky's brightness will help you navigate the night sky.

The brightness of planets and stars is measured in terms of apparent magnitude, or how bright they appear from Earth. Most visible stars range in brightness from 1st to 6th magnitude, with the lower number being brighter. A star at magnitude 1 appears 100 times brighter than a star at magnitude 6. A few stars and planets shine even brighter than first magnitude, like brilliant Sirius at -1.46 magnitude, or Venus, which can shine brighter than -4 magnitude! Very bright planets and stars can still be seen from bright cities with lots of light pollution. Given perfect skies, an observer may be able to see stars as dim as 6.5 magnitude, but such fantastic conditions are very rare; in much of the world, human-made light pollution drastically limits what people can see at night.

Your sky's limiting magnitude is, simply enough, the measure of the dimmest stars you can see when looking straight up. So, if the dimmest star you can see from your backyard is magnitude 5, then your limiting magnitude is 5. Easy, right? But why would you want to know your limiting magnitude? It can help you plan your observing! For example, if you have a bright sky and your limiting magnitude is at 3, watching a meteor shower or looking for dimmer stars and objects may be a wasted effort. But if your sky is dark and the limit is 5, you should be able to see meteors and the Milky Way. Knowing this figure can help you measure light pollution in your area and determine if it's getting better or worse over time. And regardless of location, be it backyard, balcony, or dark sky park, light pollution is a concern to all stargazers!

How do you figure out the limiting magnitude in your area? While you can use smartphone apps or dedicated devices like a Sky Quality Meter, you can also use your own eyes and charts of bright constellations! The Night Sky Network offers a free printable Dark Sky Wheel, featuring the stars of Orion on one side and Scorpius on the other, here: bit.ly/darkskywheel. Each wheel contains six "wedges" showing the stars of the constellation, limited from 1-6 magnitude. Find the wedge containing the faintest stars you can see from your area; you now know your limiting magnitude! For maximum accuracy, use the wheel when the constellation is high in the sky well after sunset. Compare the difference when the Moon is at full phase, versus new. Before you start, let your eyes adjust for twenty minutes to ensure your night vision is at its best. A red light can help preserve your night vision while comparing stars in the printout.

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Jupiter and Saturn, continued

Did you have fun? Contribute to science with monthly observing programs from Globe at Night's website (globeatnight.org), and check out the latest NASA's science on the stars you can - and can't - see, at nasa.gov.

This article is distributed by NASA Night Sky Network. The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, and more! You can catch up on all of NASA's current and future missions at nasa.gov. With articles, activities and games NASA Space Place encourages everyone to get excited about science and technology. Visit spaceplace.nasa.gov to explore space and Earth science!



The Dark Sky Wheel, showing the constellation Orion at six different limiting magnitudes (right), and a photo of Orion (left). What is the limiting magnitude of the photo? For most observing locations, the Orion side works best on evenings from January-March, and the Scorpius side from June-August.



The magnificent central bar of NGC 2217 (also known as AM 0619-271) shines bright in the constellation of Canis Major (The Greater Dog), in this new image taken by the NASA/ESA Hubble Space Telescope. Roughly 65 million light-years from Earth, this barred spiral galaxy is a similar size to our Milky Way at 100 thousand light-years across. Many stars are concentrated in its central region forming the luminous bar, surrounded by a set of tightly wound spiral arms.

The central bar in these types of galaxies plays an important role in their evolution, helping to funnel gas from the disc into the middle of the galaxy. The transported gas and dust are then either formed into new stars or fed to the supermassive black hole at the galaxy's centre. Weighing from a few hundred to over a billion times the mass of our Sun, supermassive black holes are present in almost all large galaxies.

This image was colourised with data from the Panoramic Survey Telescope and Rapid Response System (Pan-STARRS).

Credit: [ESA/Hubble & NASA](#), J. Dalcanton

Acknowledgement: Judy Schmidt (Geckzilla)

Barnard-Seyfert Astronomical Society Minutes of a Regular Meeting of the Board of Directors Held On Wednesday, December 6, 2020

The regular meeting of the Board of Directors of the Barnard-Seyfert Astronomical Society was held December 6, 2020, online. Logged in were Chip Crossman, Gary Eaton, Bud Hamblen, Keith Rainey, Andy Reeves and Theo Wellington. A quorum being present, Keith called the meeting to order at 7:30 PM. Keith asked for a vote to adopt the November 11, 2020, minutes as printed in the December issue of the Eclipse. Theo so moved, Andy seconded and the minutes were adopted by voice vote. Theo reported that the bank balance was \$10,796.56. Theo reported that the RASC Handbooks were in and emails were being sent to those who ordered handbooks. Keith noted that there were about 161 members.

The upcoming December meeting will be presented by Gary Eaton and will be on an introduction to amateur astronomy. The January meeting is to be the telescope workshop.

The St Louis Astronomical Society is promoting "Lights Out Heartland". Night time lighting is affecting migratory birds on the Mississippi Flyway. Heather at Shelby Bottoms is going to have a Spring migration festival.

Thomas Gaudin had resigned from the board owing to graduate studies away from Nashville. K C Katalbas and Drew Gilmore are in the last year of their three year term.

There being no further business, Keith asked for a motion to adjourn and Theo seconded. The meeting was adjourned at 8:15.

Respectfully submitted,

Bud Hamblen
Secretary

Next Membership Meeting:

Wednesday, January 20, 7:30 pm Central
online on Zoom

Topic TBD

Zoom link will be posted to bsasnashville.com

Barnard-Seyfert Astronomical Society Minutes of the Monthly Membership Meeting Held On Wednesday, December 16, 2020

Because monthly in-person meetings are suspended due to the COVID-19 epidemic, the Barnard-Seyfert Astronomical Society held an on-line meeting via Zoom on Wednesday, December 16, 2020. About 20 participants zoomed in.

Tom Beckermann called the meeting to order at 7:30 PM and asked for a vote to adopt the minutes for the November meeting. Theo Wellington moved the question, Andy Reeves seconded, and the minutes were adopted. Theo Wellington reported that there was \$10,780.56 in the Suntrust account and \$652.57 in the PayPal account. Theo reported that the RASC Handbooks were in. Members should contact her with their delivery instructions. 33 Hatch Show Print posters have been sold. There were 2,016 “follows” for the BSAS on Facebook, and 264 followers on Twitter. Billy Teets, Vanderbilt Dyer Observatory, will live stream views of the Great Conjunction of Jupiter and Saturn.

Gary Eaton presented “A Beginner’s Guide to Viewing the Top 30 Most Amazing Objects and Events in the Night Sky.”

The being no further business, the meeting was adjourned at 8:15 PM.

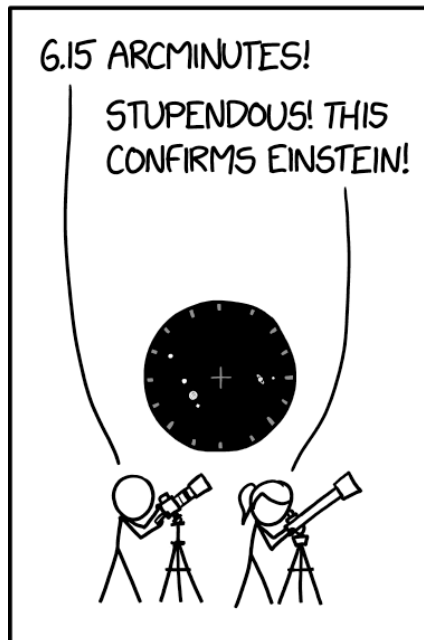
Respectfully submitted,

Bud Hamblen

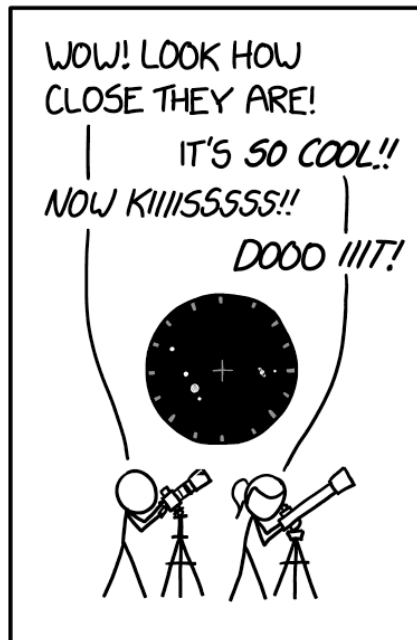
Secretary

xkcd

WHAT PEOPLE IMAGINE
ASTRONOMERS OBSERVING
A CONJUNCTION ARE LIKE



WHAT THEY'RE
ACTUALLY LIKE





In honor of the club's 90th anniversary we partnered with Hatch Show Print to create a unique poster that would honor the achievement of the club. For those who don't know Hatch Show has been making posters for a variety of events and concerts for 140 years. In all that time we are their first astronomy club.

On the poster at the center is the moon. This was made from a wood grained stencil that the shop has used for over 50 years. To contrast that the telescope that the people are using is a brand new stencil made for our poster. The poster has three colors. First the pale yellow color of the moon was applied. Next the small stars, circles, and figures at the bottom were colored in metallic gold. The third color is

a blue for the night sky. Where it overlaps with the metallic gold it creates a darker blue leaving the figures at the bottom looking like silhouettes. This was a one time printing so the 100 that we have are all that will be printed.

The prints are approximately 13 3/4" x 22 1/4" and are available for \$20 at our membership meetings, or \$25 with shipping by ordering through bsasnashville.com. Frame not included.



Become a Member of BSAS!
Visit bsasnashville.com to join online.

All memberships have a vote in BSAS elections and other membership votes. Also included are subscriptions to the BSAS and Astronomical League newsletters.

Annual dues:

Regular: \$25
Family: \$35
Senior/Senior family: \$20
Student*: \$15

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

About BSAS

Organized in 1928, the Barnard-Seyfert Astronomical Society is an association of amateur and professional astronomers who have joined to share our knowledge and our love of the sky.

The BSAS meets on the third Wednesday of each month at the Cumberland Valley Girl Scout Building at the intersection of Granny White Pike and Harding Place in Nashville. Experienced members or guest speakers talk about some aspect of astronomy or observing. Subjects range from how the universe first formed to how to build your own telescope. The meetings are informal and time is allotted for fellowship. You do not have to be a member to attend the meetings.

Membership entitles you to subscriptions to *Astronomy and Sky & Telescope* at reduced rates; the club's newsletter, the *Eclipse*, is sent to members monthly. BSAS members also receive membership in the Astronomical League, receiving their quarterly newsletter, the *Reflector*, discounts on all astronomical books, and many other benefits.

In addition to the meetings, BSAS also sponsors many public events, such as star parties and Astronomy Day; we go into the schools on occasion to hold star parties for the children and their parents. Often the public star parties are centered on a special astronomical event, such as a lunar eclipse or a planetary opposition.

Most information about BSAS and our activities may be found at bsasnashville.com. If you need more information, write to us at info@bsasnashville.com.

Free Telescope Offer

Did someone say free telescope? Yes, you did read that correctly. The BSAS Equipment & Facilities Committee has free telescopes ranging in size from 2.6" to 8" that current members can actually have to use for up to 60 days at a time. We also have some other items in the loaner program such as a photometer, H-alpha solar telescope, educational CDs, tapes, DVDs, and books. Some restrictions apply. A waiting list is applicable in some cases. The BSAS Equipment Committee will not be held responsible for lost sleep or other problems arising from use of this excellent astronomy gear. For information on what equipment is currently available, contact info@bsasnashville.com.