

The ECLIPSE

September
2018

The Newsletter of the Barnard-Seyfert Astronomical Society

Next Membership Meeting:
September 19, 2018, 7:30 pm

Cumberland Valley
Girl Scout Council Building
4522 Granny White Pike

K.C. Katalbas: What's Up?

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From the (Vice) President

Hello everyone,

While Gary enjoys his newfound retirement (from work, not BSAS), I am filling in for this month's letter. I haven't done this before so forgive me if I ramble on a little bit. So what do I write about? How much I have spent in this hobby? Nope. I like being married. How the clouds won't go away for 5 days straight? Nope. Everyone knows that. Then it hit me! (with a little help from Theo). Night Sky Network!

As a club, we are trying to use this great tool more. Our new focus is the event planning and calendar tool. Believe it or not, we get asked to do a lot of different outreach events both public and private. We would compile a list and present them at the member meetings. However, some of the opportunities are really close to member meetings or some member that may want to do some outreach wasn't at that meeting and missed the chance. Or we would have many different people show interest but only two show up.

The NSN Event/Calendar Tool allows us to put events in the calendar for BSAS and ask for volunteers. If we know how many we need, we will put it but more are always welcome. If you see an event email come through your inbox that you are interested in helping with, click on the "More details" link in the email, choose the RSVPs tab, find your name in the list of members, click (Update) next to the Undecided entry for RSVP and update your RSVP. If you have RSVP'd and can't make it for any reason, go back to the site and un-RSVP by following the same steps but selecting that you cannot make it. This will help the board know if we have enough telescopes and better serve our community. When events draw closer, we can email the RSVP list with details, directions, etc. We can also use the RSVP list when we log the event to keep track of volunteer hours which helps the club get free stuff for outreach from the NSN!

The downside to this is that we will all start getting a few more emails from BSAS. I hope that this inconvenience will



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The first U.S. astronauts who will fly on American-made commercial spacecraft, to and from the International Space Station, wave after being announced, Friday, Aug. 3, 2018 at NASA's Johnson Space Center in Houston, Texas. The astronauts are, from left to right: Victor Glover, Mike Hopkins, Bob Behnken, Doug Hurley, Nicole Aunapu Mann, Chris Ferguson, Eric Boe, Josh Cassada and Suni Williams.

Image Credit: [NASA/Bill Ingalls](#)

Upcoming Star Parties

| | |
|--------------------------------------|---|
| Saturday 9/1 8:00 pm to 10:00 pm | Public Star Party Montgomery Bell State Park |
| Saturday 9/8 10:00 am to 4:00 pm | Solar viewing at Fairview Nature Fest Bowie Nature Park (Fairview) |
| Saturday 9/8 | Private Star Party Natchez Trace Parkway mile marker 435.3 |
| Saturday 9/15 8:00 pm to 10:00 pm | Public Star Party Cornelia Fort Airpark |



Sept 9
Oct 8



Sept 16
Oct 16



Sept 24
Oct 24



Sept 2
Oct 2

Book Review: Asteroid Hunters reviewed by Robin Byrne

About three years ago, Carrie Nugent was one of the guest speakers at StarFest. She generously sent a copy of her new book to Adam and me when it was published. I'm glad she did

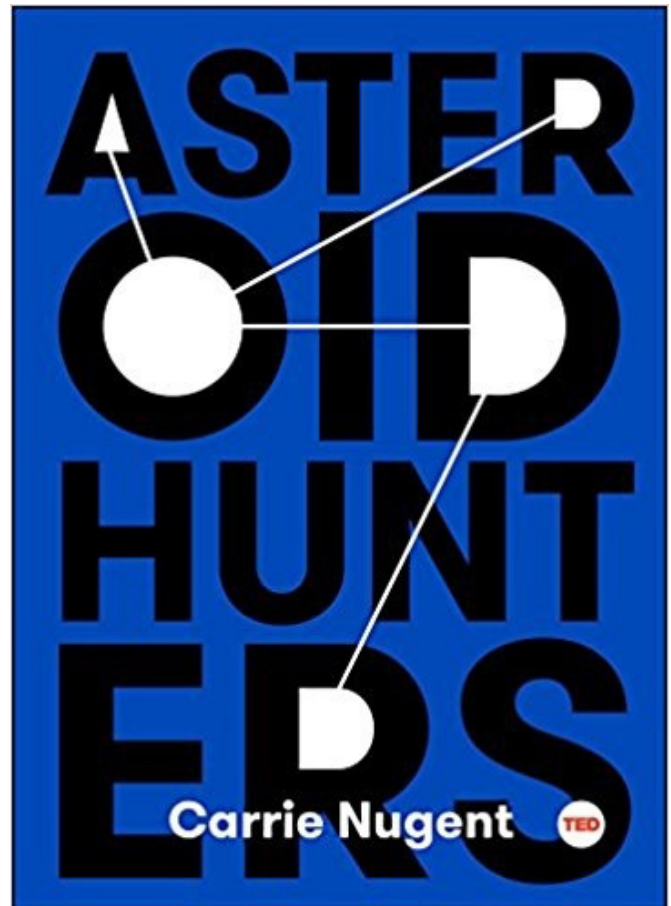
Asteroid Hunters is definitely geared to the novice, but anyone with an interest in astronomy will enjoy it. The book begins with basic information about asteroids, such as their definition and where they are found. This led to the topic of near Earth asteroids and what makes them of particular interest. That segued into impacts on Earth by asteroids, beginning with the woman in Alabama who was struck by a meteorite all the way up to the impact that wiped out the dinosaurs.

Next, Nugent discussed the process of hunting for asteroids. She began by listing the rules of asteroid hunting. This was the one place where I found fault. When you start a sentence with, "The first rule of asteroid hunting is ..." you should end it with "... you don't talk about asteroid hunting." Instead, the rule was to not look at the Sun. Granted, not looking at the Sun is important, but that could have been rule #2. Her next important rule was to share your observations with others. The reasons for this included the important role others play in confirming your discovery and being able to observe from other locations when you can't. These rules will reappear throughout the book when discussing various discoveries.

Once we learned the rules for hunting, Nugent discussed how asteroids have been discovered over the years. In the earliest days, it was by observing a patch of sky, drawing the stars you saw, and then going back a few days later to see if anything had changed. When Giuseppe Piazzi discovered the first asteroid, Ceres, he had great difficulty calculating the orbit, so he waited to share his discovery, wanting the orbit to be calculated first. The problem was, orbits close to perfect circles are relatively easy to compute from a few observations, but Ceres' orbit is more elongated, so the technique Piazzi was using wouldn't work. Once Piazzi decided to share his discovery, even without the orbit, the importance of sharing was reinforced. Hearing of the orbit problem, the mathematician Carl Friedrich Gauss decided to work on it. Not only did Gauss solve it, but he invented a new mathematical technique to do it: Fast Fourier Transforms.

With the rise of photography, the discovery of asteroids improved. Using essentially the same technique as before, photos were taken of the same part of the sky from a few days, to as little as a few hours, apart. The two images would be stacked in a stereo microscope. If something moved, it would create a 3D effect with the moving object appearing to float above or below the star images.

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Asteroid Hunters, continued

Today, CCD's and computers do the work. Many programs, including NEAT, Catalina Sky Survey, Pan-STARRS, LINEAR, and NEOWISE perform automated searches. In this case, images are taken of the sky with a span of time between images of the same section of sky. Then the computer analyzes the images. If it finds something that has changed, the images are sent to the scientists, who inspect the images individually. The human factor is needed since there are several things that could appear to behave like an asteroid, such as internal noise or cosmic rays.

Nugent shared her experiences working with NEOWISE. In one episode, a candidate was discovered by the computer. She and her colleagues inspected it. It was, indeed, a real asteroid. As they calculated the orbit, they first thought it was going to collide with Earth. After more observations, they found that it wasn't going to collide, but would come very close. With the advanced warning their program provided, it was possible to use radio telescopes to bounce radar off of the asteroid as it flew by, creating a surface map of the asteroid.

The potential of an asteroid impacting Earth was the final section of Nugent's book. For a very long time, most policy makers thought of asteroid impacts as something that happened in the distant past, not something to worry about. A couple things helped bring it to the attention of people outside of the sciences. The first was the impact of Comet Shoemaker-Levy with Jupiter. Suddenly we see that things still do crash into planets. The less scientific influence, but influence none-the-less, was the release of two films: Armageddon and Deep Impact. Suddenly the threat of an impact was on people's minds.

So, what do we do if there's an asteroid on a collision course with Earth? Nugent discussed different possibilities. The goal is to slightly nudge the asteroid long before the predicted impact. If the course is changed early enough, only a small deviation would be sufficient to avoid hitting Earth. But how do you nudge an asteroid? You could send a spacecraft to slam into it, but the spacecraft would need to be either very large, or moving very fast to have much of an effect. Instead of a spacecraft, we could explode a nuclear bomb near the asteroid, using the expelled radiation to provide the needed push. Another possibility is to put a spacecraft in orbit around the asteroid and use its gravity to slightly change the asteroid's trajectory. The one technique that Nugent clearly didn't have much faith in is the idea of coating one side of the asteroid with a material that has a different reflectivity than the other side, and use radiation pressure from the Sun to move the asteroid.

In all these scenarios, their effectiveness largely depends upon the structure of the asteroid. Some are solid bodies, but other are described as "rubble piles." Which one it turns out to be is important to know before deciding how to move it. Another problem is if the asteroid is rotating quickly. That will change the amount of effect a push has on its motion, since some of the force will be interacting with the rotation instead of the trajectory. This emphasizes the importance of finding asteroids early so that we have time to study them and learn as much as possible.

Overall, Asteroid Hunters was a very good book and a quick read. Other than the missed opportunity to reference Fight Club, Asteroid Hunters by Carrie Nugent is a great read for either pro's or beginners.

References:

Asteroid Hunters by Carrie Nugent; Ted Books Simon and Schuster, 2017.

DEEP SKY DAZE
by Mike Benson
ocentaurus@aol.com

September is sometimes a great month to observe. Skies start to lose the summers' humidity and viewing is easier in the cooler weather. There are still planets to observe in the early evening. Venus is low in the west and gradually sinking to become the morning star in a few weeks. On 9/1 she is only about a degree from Spica. On the 7th Algol will shine at minimum brightness for two hours centered around 9:30 CDT and again on the 27th around 11 pm. Mars is starting to fade and Jupiter and Saturn are still visible, though Jupiter is sinking into the west.

Our star hop will be brief this time and will include objects in Cassiopeia, Andromeda, Triangulum and Pisces. Enjoy.

Let's start easy. Most of us know how to find **M-31 (NGC 224)**, the Great Andromeda Galaxy, by following the pointer in Cassiopeia south, almost to the more northerly arc of stars which delineate Andromeda. At 3.5 magnitude and $1^\circ \times 3^\circ$, a moderately dark sky will reveal a patch of haze to the naked eye. Moving to the telescope and gradually increasing the power will disclose a wealth of detail to most amateur instruments.

M-32 (NGC 221), at magnitude 8.2, is not quite 0.5° due south of the core of its parent galaxy. It's a small, bright elliptical with some noticeable central condensation. Recent studies suggest that it harbors a pretty good sized black hole at its center. A half degree WSW of M-32 is a patch of nebulosity labeled **NGC 206**. In reality it's a huge, quite young, star cloud located in the disk of M-31. There are countless faint stars and several hundred stars at least 10,000 times brighter than our sun in an area about $3,000 \times 1,500$ light years. NW of the core of M-31 (about 0.5° NNE of the star cloud) is a dark lane curving north of the nucleus, and about a degree due north of the star cloud is a second small, elliptical, companion galaxy.

Numerically, **M-110 (NGC 205)** is the final Messier object. It never appeared on any of the comet finder's official lists, but it is known that he observed the object, so it was recently added to the list. Also listed as NGC 205, it is almost twice the apparent size of M-32, emitting 0.25 magnitude less light, making it more difficult to see.



M-110

The Andromeda Galaxy has two other fairly large elliptical companions. **NGC 185** is the brighter of

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DEEP SKY DAZE, continued

NGC 147

these. About 10th magnitude, it is nearly the same apparent size (a bit more oblong) and a magnitude and a third fainter than M-110. It is located nearly 6.5° north of M-110. On a transparent night it's a fairly easy object in an 8" telescope. Another 1.5 magnitude fainter, **NGC 147** is located a degree WNW of 185. A small, faint blob, it is interacting with its nearby neighbor as well as M-31. These two objects are actually found within the boundaries of Cassiopeia.

There are two final objects to be hunted down tonight. Both are face-on spiral galaxies, with a low surface brightness and difficult under any sky conditions less than perfect. First is **M-33 (NGC 598)**, an oblong, nearly a degree wide on its long axis and about 40' on

its short axis. Located SE of M-31, it is nearly as far south of Mirach (β Andromedae) as M-31 is, north. A member of the Local Group of galaxies, M-33 (also called the Pinwheel Galaxy) is a bit more distant than M-31, and smaller than Andromeda or the Milky Way. This galaxy brightens a little toward its core and it is that brightness the observer usually sees. The arms are dim and become visible only after careful observation. Because of its size and low surface brightness, the Pinwheel is often more easily found, first, in a pair of binoculars. Once found, though, spend some time with it, because any scope 8" or larger will yield clouds of stars and nebulosity after some concentration of the part of the viewer.

Finally we move to what many have called the most difficult of the Messier objects. **M-74 (NGC 628)** has a total magnitude of 11.2 spread over an area 12' X 12', which makes it pretty dim. It's located about 1.5° ENE of Eta (ϵ) Piscium, 15° almost due south from M-33.

I searched for several weeks in September and October 1988 before I finally found it. This was in my first year of active observing. It took a night of better than average seeing at a very dark site before my untrained eye was able to pick this faint fuzzy out of the murk. This open spiral galaxy has a bright nucleus that can appear nearly stellar unless you look



M-74

DEEP SKY DAZE, continued

carefully for the fuzz. Scopes larger than 8" will see considerable detail in the arms, once you find the galaxy.

Next month will be the final one for our Messier search. For me, earning the AL Messier pin was a great learning experience. I learned how to use my telescope and I began to learn how to see through the lens of my instrument. Documenting my work and getting that Messier Award and pin was a dream fulfilled. I hope others catch the observing fever, too.

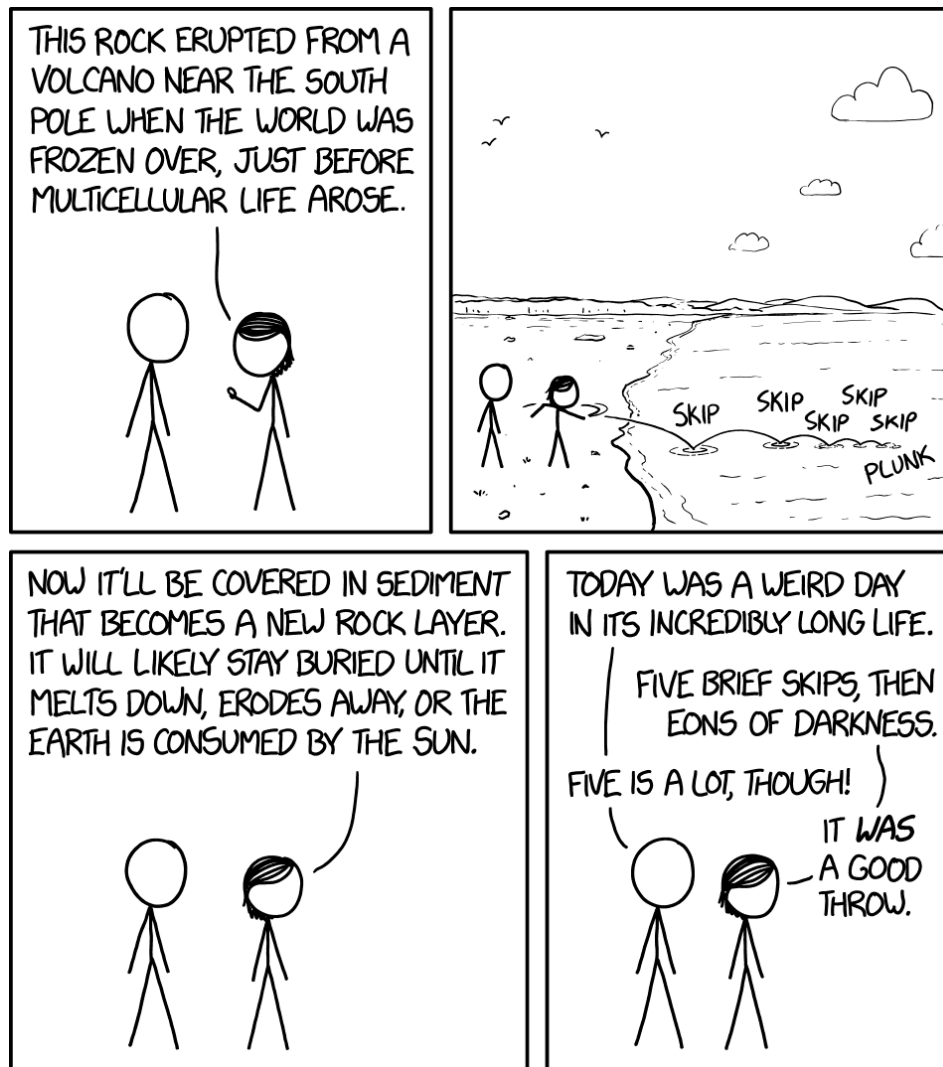
I wish you all clear skies and a complete electrical blackout whenever you want to observe.

Image Credits:

[M110](#), [M74](#): National Optical Astronomy Observatory/Association of Universities for Research in Astronomy/National Science Foundation

[NCG 147](#): Ole Nielsen

xkcd



A Trip Through the Milky Way

By Jane Houston Jones and Jessica Stoller-Conrad

Feeling like you missed out on planning a last vacation of summer? Don't worry—you can still take a late summertime road trip along the Milky Way!

The waning days of summer are upon us, and that means the Sun is setting earlier now. These earlier sunsets reveal a starry sky bisected by the Milky Way. Want to see this view of our home galaxy? Head out to your favorite dark sky getaway or to the darkest city park or urban open space you can find.

While you're out there waiting for a peek at the Milky Way, you'll also have a great view of the planets in our solar system. Keep an eye out right after sunset and you can catch a look at Venus. If you have binoculars or a telescope, you'll see Venus's phase change dramatically during September—from nearly half phase to a larger, thinner crescent.

Jupiter, Saturn and reddish Mars are next in the sky, as they continue their brilliant appearances this month. To see them, look southwest after sunset. If you're in a dark sky and you look above and below Saturn, you can't miss the summer Milky Way spanning the sky from southwest to northeast.

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This illustration shows how the summer constellations trace a path across the Milky Way. To get the best views, head out to the darkest sky you can find. Credit: NASA/JPL-Caltech

A Trip Through the Milky Way, continued

You can also use the summer constellations to help you trace a path across the Milky Way. For example, there's Sagittarius, where stars and some brighter clumps appear as steam from a teapot. Then there is Aquila, where the Eagle's bright Star Altair combined with Cygnus's Deneb and Lyra's Vega mark what's called the "summer triangle." The familiar W-shaped constellation Cassiopeia completes the constellation trail through the summer Milky Way. Binoculars will reveal double stars, clusters and nebulae all along the Milky Way.

Between Sept. 12 and 20, watch the Moon pass from near Venus, above Jupiter, to the left of Saturn and finally above Mars!

This month, both Neptune and brighter Uranus can also be spotted with some help from a telescope. To see them, look in the southeastern sky at 1 a.m. or later. If you stay awake, you can also find Mercury just above Earth's eastern horizon shortly before sunrise. Use the Moon as a guide on Sept. 7 and 8.

Although there are no major meteor showers in September, cometary dust appears in another late summer sight, the morning zodiacal light. Zodiacal light looks like a cone of soft light in the night sky. It is produced when sunlight is scattered by dust in our solar system. Try looking for it in the east right before sunrise on the moonless mornings of Sept. 8 through Sept 23.

You can catch up on all of NASA's current—and future—missions at www.nasa.gov.

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**Next BSAS meeting
September 19, 2018, 7:30 pm**

**Cumberland Valley
Girl Scout Council Building
4522 Granny White Pike**

K.C. Katalbas: What's Up?

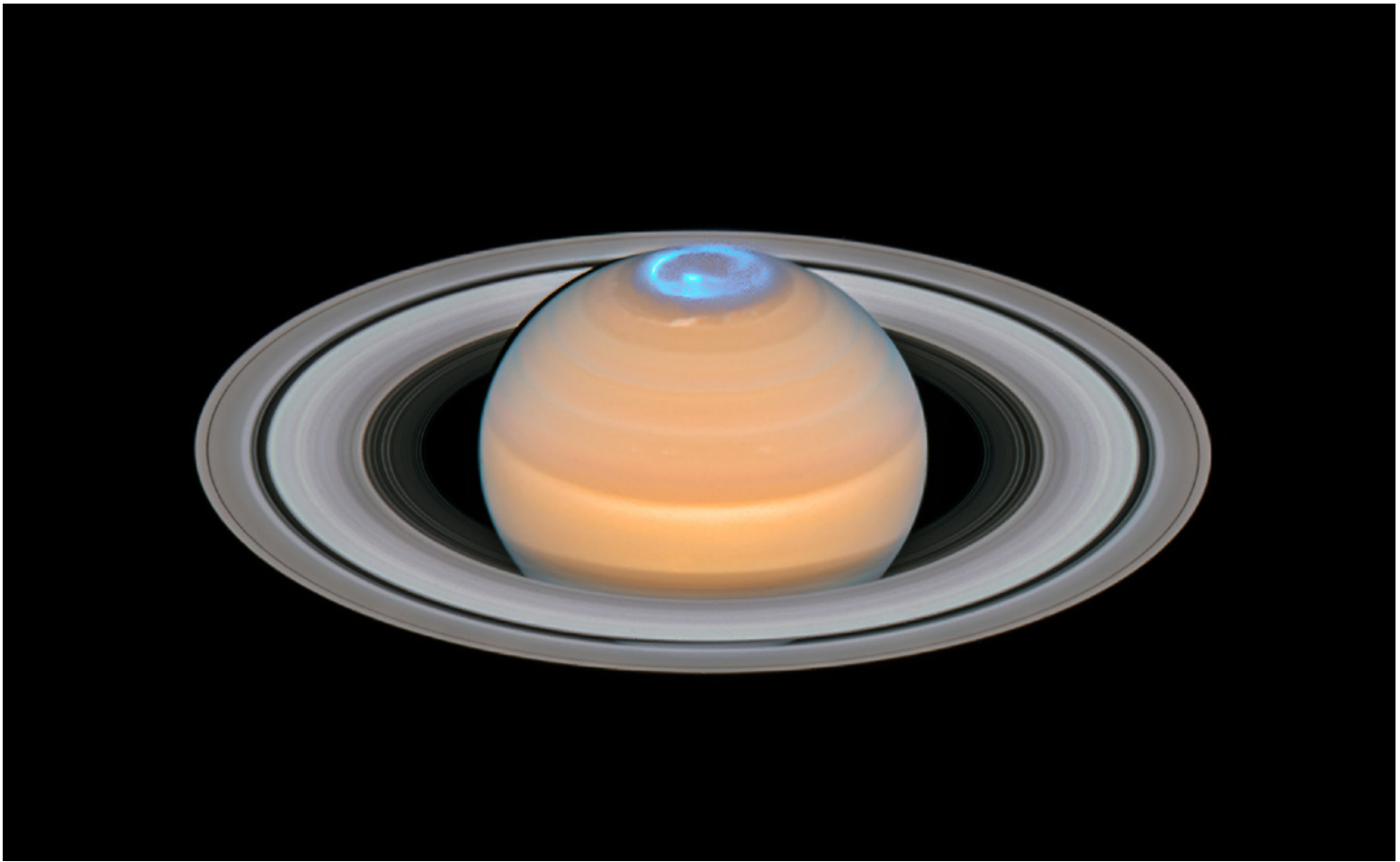
From the President, continued

not be so much that it detracts from our effort to provide astronomy outreach to our communities. We are trying to get more people involved and we realize that not everyone can make all (or any) of the meetings - the Events Calendar on NSN seems to be a fair trade-off.

We are always open to suggestions too, so if you have one let us know! You can email, snail mail, post on Facebook, post on Google Groups, or show up at a Board Meeting.

Enough rambling for now. Have a great, cloud free month with super seeing!

Keith Rainey

**Saturn and its northern auroras (composite image)**

This image is a composite of observations made of Saturn in early 2018 in the optical and of the auroras on Saturn's north pole region, made in 2017. In contrast to the auroras on Earth the auroras on Saturn are only visible in the ultraviolet — a part of the electromagnetic spectrum blocked by Earth's atmosphere — and therefore astronomers have to rely on space telescopes like the NASA/ESA Hubble Space Telescope to study them.

Credit:

[ESA/Hubble](#), [NASA](#), [A. Simon \(GSFC\)](#) and the [OPAL Team](#), [J. DePasquale \(STScI\)](#), [L. Lamy \(Observatoire de Paris\)](#)

Barnard-Seyfert Astronomical Society
Minutes of a Regular Meeting of the Board of Directors
Held On Wednesday, August 1, 2018.

The regular meeting of the Board of Directors of the Barnard-Seyfert Astronomical Society was held August 1, 2018, at the Girl Scout Center, 4522 Granny White Pike, Nashville, TN 37204. Signing in were members Mike Benson, Spencer Buckner, Gary Eaton, Drew Gilmore, Bud Hamblen, K C Katalbas, Johanna Keohane, Keith Rainey and Theo Wellington, and guests Meghan Keohane and Kate Green Smith (Youth Services Coordinator, Tennessee State Library and Archives). A quorum was present and Gary called the meeting to order at 7:30 PM.

Ms. Smith discussed the summer reading program for 2019, which will have the theme, Space. Libraries collaborating in the summer reading program are looking for assistance with programs relating to the theme. Assistance is most needed for smaller libraries. There also was discussion of a possible telescope library program similar to those already existing in other states. The club may be able to provide telescope modification assistance, training assistance and maintenance assistance. Fundraising would be by the libraries involved.

Gary asked for a motion to approve the minutes of the July 11, 2018, board meeting as published in the August issue of the Eclipse. Spencer so moved, Theo seconded, and the minutes were adopted without discussion, by unanimous voice vote. Bud reported that there was \$4,316.03 in the checking account and \$4,157.28 in the savings account. Keith reported that there was about \$750 in the PayPal account, and that the membership was 137.

K C Katalbas will present a What's Up at the September general meeting.

The telescope set-up for the star party on July 20 at Bells Bend Outdoor Center had to be canceled because of severe weather warnings. Theo Wellington was able to make an indoor presentation and do some naked eye star gazing for the public.

A star party is scheduled at Shelby Bottoms Nature Center for August 4 to make up for the July 20 Bells Bend Outdoor Center star party.

New brochures will be ordered at a cost of approximately \$80. Gary asked for a motion to approve the order. Spencer so moved, Johanna seconded and the motion carried unanimously.

Monique Johnson Hodge communicated through Theo that the astronomy weekend at Pickett State Park is on for September 7 through 9. The group camp is available.

There being no further business, Gary asked for a motion to adjourn. Keith so moved, Drew seconded, and without objection the meeting was adjourned at 9:15 PM.

Respectfully submitted,

Bud Hamblen

Secretary

**Barnard-Seyfert Astronomical Society
Minutes of the Monthly Membership Meeting
Held On Wednesday, August 15, 2018.**

The Barnard-Seyfert Astronomical Society held its monthly meeting at the Girl Scout Center, Nashville, Tennessee, on Wednesday, August 15, 2018. Thirty-five members and guests signed in. Keith Rainey called the meeting to order at 7:30 PM. Keith asked for a motion to adopt the minutes of the July 18, 2018, meeting as printed in the August issue of the Eclipse. Chuck Schlemm so moved, Lonnie Puterbaugh seconded, and the minutes were adopted, without discussion, by voice vote. Keith reported that there were 137 members.

Keith reported that BSAS members participated in the Adventure Science Center Super Science Saturday Blast Off event. Keith displayed photos by David Reagan and Tom Beckermann of the Milky Way taken at Rocky Mountain National Park, and asked members to send in more photos of their own.

Keith announced the upcoming public star party for August 17 at Bowie Nature Park. Additional opportunities will be at the Girl Scout Camp Sycamore on August 25, at Cheekwood on September 23 from 6:30 to 9:00 PM for the Japanese Lunar Festival, at Pickett State Park on October 13 for Fall Astronomy Day, at Hayshed Farms in Kingston Springs on October 12 and 13 for the Hoedown on the Harpeth (See Chuck Schlemm if interested), at Montgomery Bell State Park on September 1 (See Chuck) and at Bowie Nature Park on September 8 for the Fairview Nature Festival (solar viewing).

Maya Reilly presented a systematic study of hen behavior during the August 21, 2017, total solar eclipse, contrasting the behavior of domestic hens at two different sites: one that had a total eclipse and one the had only a partial eclipse.

Theo Wellington presented the current state of dark skies over Tennessee.

Oz Gonzales (Adventure Science Center) that Joseph Pelfrey (NASA) would be at the Adventure Science Center on August 18 at 2 PM to talk about space exploration.

There being no further business, Keith asked for a motion to adjourn. Oz so moved, Melissa Lanz seconded, and the meeting was adjourned at about 8:50 PM.

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.

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.