The ECLIPSE

May 2018

The Newsletter of the Barnard-Seyfert Astronomical Society

Next Membership Meeting:
May 16, 2018, 7:30 pm

Cumberland Valley
Girl Scout Council Building
4522 Granny White Pike

"The Milky Way: A History of Our Understanding of the Galaxy We Live In"
– Dr. Spencer Buckner, Austin Peay State University

In this Issue:

Barnard-Seyfert Astronomical Society
bsasnashville.com

From the President

Greetings,

Thanks to everyone who participated in the telescope workshop held at our April meeting. By all accounts, it was a highly successful event. Various types of telescopes, from SCTs to dobsonians, were present along with different mounts and even binoculars were on hand for demonstration. There was great interaction between our members helping us all learn about the equipment we depend on to better connect with the night sky.

Having quality programs is one of the reason BSAS continues to grow. We now have close to 160 members. With so many new members, whether you are new to BSAS or a long-term member, my challenge to you is just the same. Try to get to learn the names of our members and get to know them better. You will discover BSAS is a special group. Our members have interesting backgrounds and life experiences they bring to enrich the organization. Amateur astronomy can certainly be enjoyed alone. I'm sure all of us have had special moments of solitude in the dark of night looking up at the vastness and wonder up above. But, there is no better way to enjoy the hobby than participating in a group like BSAS.

John and Melissa Walker have been very special members of BSAS for several years. But, just last week they moved away, prompting John to request sending you a personal word I am happy to provide:

> "Moving to Florida prompts me to thank BSAS for the many opportunities and pleasures of these 17 years. You guys do great work and it has been an honor to share your space and time. Melissa and I will miss your company and I hope we can meet up again - - maybe halfway? (Rainwater Observatory, spring 2019, comes to mind.)"

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BSAS
Barnard-Seyfert Astronomical Society

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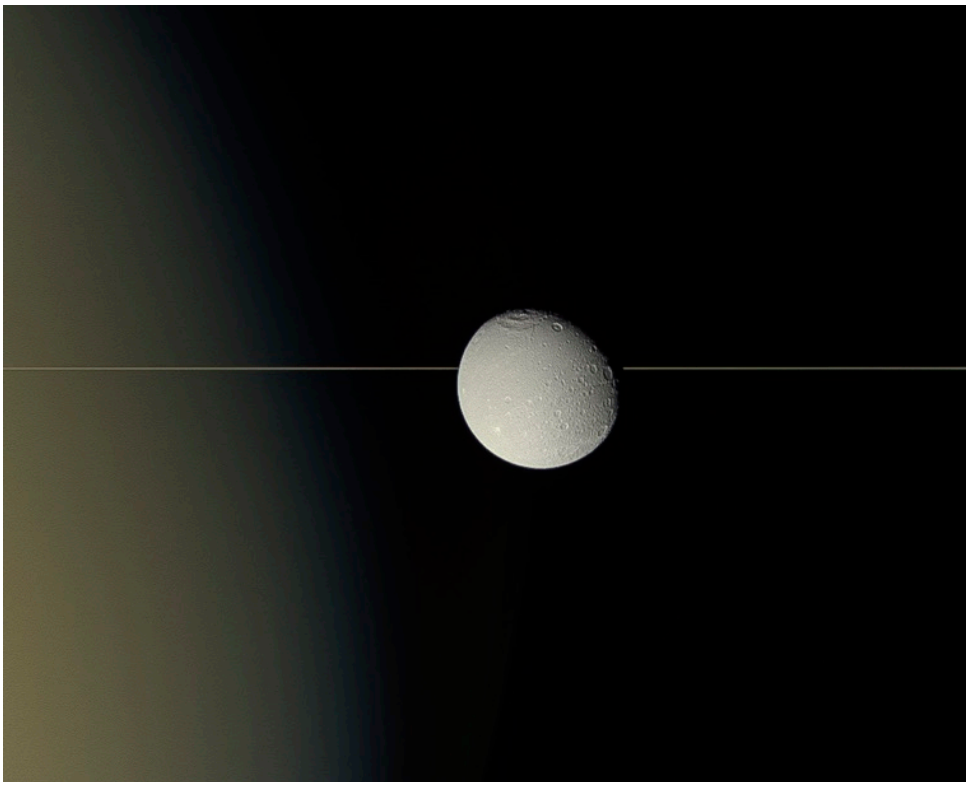
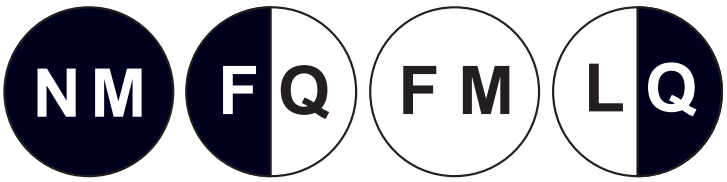


Dione on the Edge - Saturn's moon Dione drifts before the planet's rings, seen here almost edge on. For all their immense width, the rings are relatively paper-thin, about 30 feet in most places. NASA/JPL-Caltech/Space Science Institute

Upcoming Star Parties

Friday 5/11 8:30 pm to 10:30 pm	Public Star Party Bells Bend Outdoor Center
Saturday 5/12	Private Star Party Natchez Trace Parkway mile marker 435.3
Saturday 5/19 8:30 pm to 10:30 pm	Public Star Party Long Hunter State Park
Saturday 6/16	Private Star Party Natchez Trace Parkway mile marker 412 (Water Valley Overlook)



May 15
Jun 13

May 21
Jun 20

May 29
Jun 27

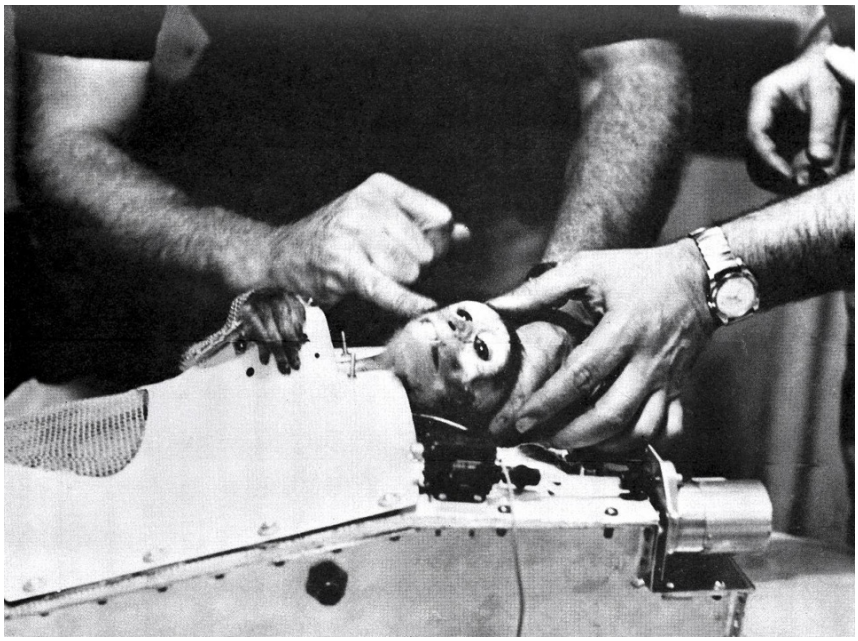
May 7
Jun 6

Happy Birthday Bioflight 2
by Robin Byrne

This month we celebrate the anniversary of an important milestone in space flight and honor the passengers on that flight.

The use of animals for testing the viability of sending humans into space began as early as 1935. Dr. Harry Armstrong used animals in ground-based altitude and acceleration experiments. This led to the first sub-orbital animal flight in 1949. However, it wasn't until 1952 that the animals on board returned alive.

As the space race heated up, it became even more important to send a human safely into space. Vital to that goal was the development of the Jupiter rocket. The development of rockets began as a military priority with the development of the Redstone rocket during a project led by Werner Von Braun from 1952 - 1955. The Redstone was then lengthened and mated with solid fuel upper stages to become the Jupiter rocket.



On May 28, 1959, a Jupiter Intermediate Range Ballistic Missile provided by a U.S. Army team in Redstone Arsenal, Alabama, launched a nose cone carrying Baker, A South American squirrel monkey and Able, An American-born rhesus monkey. This photograph shows Able after recovery of the nose cone of the Jupiter rocket by U.S.S. Kiowa. Credit: NASA

In December 1958, the first Bioflight mission carried a squirrel monkey named Gordo using a Jupiter rocket. During the flight, his heart rate, heart sounds, body temperature, blood pressure and radiation exposure were monitored. However, he did not survive the flight.

On May 28, 1959, Bioflight 2 was launched from Launch Complex 26, again using a 60 foot tall Jupiter rocket. Housed in a 250 pound nosecone was an all-female crew. Abel was a reddish-brown, 7 pound rhesus monkey who was born in Kansas. Baker was a one pound, long-tailed squirrel monkey born in the Peruvian jungle and brought to the United States when she was very young. The names Abel and Baker were taken from an outdated international code. If the person who had named them has been up-to-date, they would have been named Alpha and Bravo.

These two monkeys were chosen from an elite group of candidates. They were picked for their ability to endure hours of confinement and the stresses of acceleration, deceleration, and weightlessness. During the flight, their biomedical conditions were monitored by the Army Medical Service and Army Ballistic Missile Agency, Army Ordnance Missile Command, with the cooperation of the USN School of Aviation Medicine, and the USAF School of Aviation Medicine. Also during the flight, Abel was trained to tap a switch when a red light flashed, so data was gathered on how well she could perform simple tasks while in flight. They reached an altitude of

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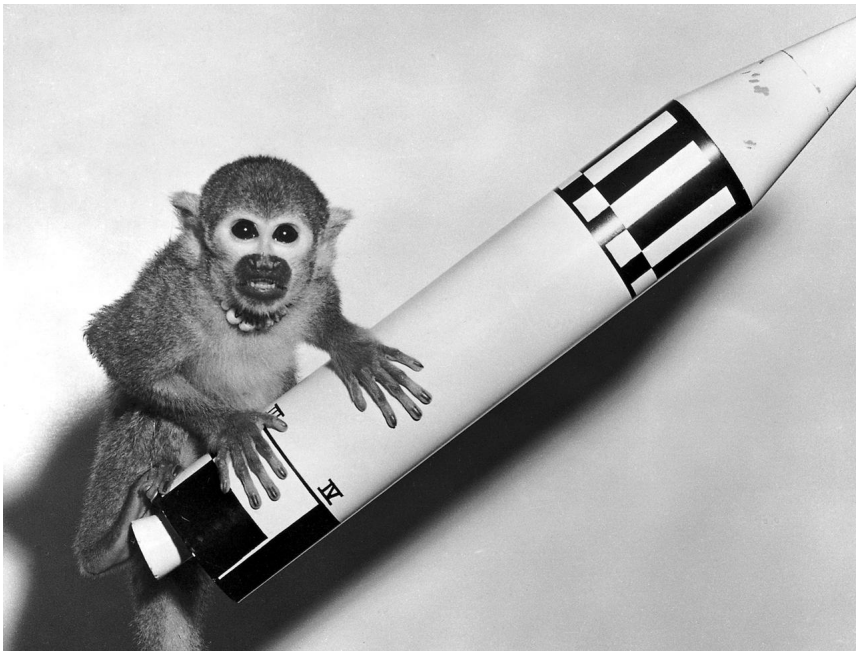
Bioflight 2, continued

300 miles, traveling at speeds up to 10,000 miles per hour. They withstood up to 38 g's, and were weightless for about 9 minutes.

The entire flight lasted about 15 minutes. Splashdown was in the Atlantic Ocean, about 1500 miles downrange. For the first time, the animal astronaut crew returned alive. After the mission, Abel was taken by the Army to Fort Knox, Kentucky. On June 1, Abel was being operated on to remove the electrode instrumentation that had been implanted for the flight. She reacted to the anesthesia and died. Her body is now on display at the Smithsonian's Air and Space Museum in Washington, DC.



Monkey Baker, payload of Jupiter (AM-18), poses on a model of the Jupiter vehicle, May 29, 1959. Credit: NASA

Baker's fate was a happier one. She was taken by the Navy to Pensacola, Florida, where she took up a husband. In 1971, the couple moved to the Alabama Space and Rocket Center in Huntsville, Alabama, where she was a favorite attraction for the many visitors. She died in 1984 at the age of 27. She was the longest-lived squirrel monkey known. Her grave stone maker is inscribed, "First U.S. animal to fly in space and return alive."

This flight was an important step toward putting a man in space. If it had not been for the things we learned from these animal flights, we may not have been willing to ever send a human. We owe a great debt of thanks to all of the animal astronaut pioneers, and especially to Abel and Baker.

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"The Milky Way: A History of Our Understanding of the Galaxy We Live In"
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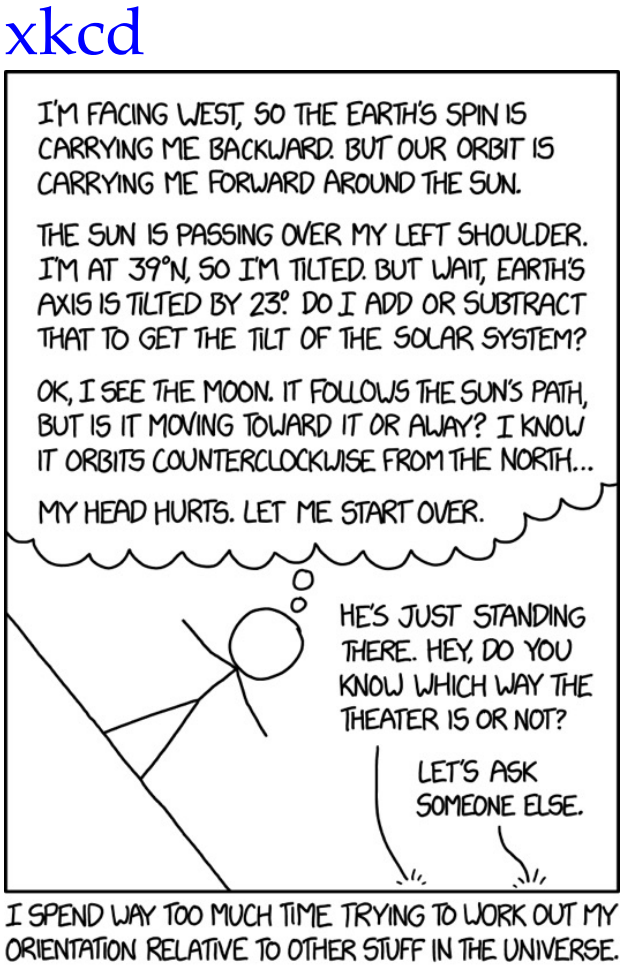
Middle Tennessee Science and Engineering Fair Awards

Each year a few BSAS members take a look at astronomy related projects submitted to the Middle Tennessee Science and Engineering Fair. We award a first and second place award of $100 and $50 respectively, and each winner gets a year long BSAS membership as well. Some years there are no projects, but the last few years have seen a resurgence in astronomy projects.

This year our first place award went to Caleigh Elizabeth Dennis of Harpeth Hall for her project on Rotation of Galaxy Clusters, and second place to Julie An and Jack Allen for Variation Periodicity of Pulsar Scintillations. These two projects were also the first and second place winners from the fair in the Physics and Astronomy categories.

There were also two other interesting projects at the fair. Maya Reilly, an eighth grade student, made a study of chicken behavior during the total eclipse. Aylor Jake Huneycutt is looking forward to exploring Mars via drone, his project involved building a drone capable of flight under Martian conditions.

Gary Eaton and Theo Wellington had a great time talking to the students and reviewing their projects. Hopefully some of these bright young scientists will be able to discuss their projects at a future BSAS meeting.



DEEP SKY DAZE
by Mike Benson

It's May and the weather is beginning to improve, hopefully. The planets are beginning to show their faces. Venus is well up in the west at dusk, and about 80% lit, as it rounds the sun and arcs toward us. The fun in watching Venus is in its changing shape and size as it moves toward inferior conjunction. The moon and Venus are 6° apart on the 17th and make a nice pair.

Jupiter reaches opposition on the 8th of May and will therefore be good viewing from about 10 PM. The dance of the Galilean moons is a great show. The internet sports position charts as well as magazines like Astronomy and Sky & Telescope.

Mid-May, Saturn rises around 11 PM and Mars follows an hour and a half later. Viewing them will make a very late night, but as Mars begins its climb to its best opposition in 15 years, now is a good time to start keeping tabs on the progress.

This month's Messier ramble will take us from Hydra in the south to Coma Berenices in the north.


M-48

We'll start with **M-68** (**NGC 4590**), in Hydra; but to get there it's best to start with **β Corvi**, the 2.6 magnitude star marking the SE corner of the trapezoid making up the constellation's primary asterism. From β drop SSE about 3 degrees to a 5th magnitude double star. M-68, at 8th magnitude, is a fairly easy find about 30' NE of that star. If you had a dark sky, you would find a bright center with a sprinkling of 13th magnitude stars well resolved, around the core. Under May observing conditions it will probably be a faint, mostly unresolved haze, at best.

Next, move back to β Corvi and swing about 9 degrees due east to γ Hydrae. About 5 degrees SSE are a pair of 6th magnitude stars about 1/2 degree apart. They're oriented NW-SE. About a degree SE of the more southerly of this pair is **M-83** (**NGC 5236**), a large oval about 10' x 8'. This spiral galaxy is nearly face-on. It has a truly stellar core and a lot of central condensation. Under good viewing conditions even a moderately sized instrument will display some bright clumps, and I have been able to make out some structure in the arms through my 8" SCT. This is one you may want to return to at some more auspicious time (like 5 AM, about mid-December), to get a better look.

Back to Corvus. This time find **δ** and **η**, which mark the beak of the Crow. Use a finder scope and look about 2 degrees due north of η for an isosceles triangle of stars with the apex pointing NE. Continue

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DEEP SKY DAZE, continued

NE past a tight group of 6-7 magnitude stars. You'll find the "Sombrero" galaxy (**M-104** or **NGC 4594**) 1 degree ENE of these stars. And what a find! This spiral is nearly edge on, with just enough tilt so as to display the bright, non-stellar center and a dense equatorial dust band. It's about 5 times as long as it is wide.


M-61

With this galaxy we're barely out of Corvus and into Virgo. Continuing north we move to just south of the Realm of the Galaxies for another spiral galaxy–10th magnitude **M-61** (**NGC 4303**). About 10 degrees N of M-104 is **γ Virginis**. Some 8 degrees west and about a degree north is **η Virginis**. Your finder should show a 5th magnitude star due north 3.5°. M-61 is a degree NNE of that star. We're looking almost straight down on this spiral. It has a stellar core and should exhibit some patches of haze in its arms.

We need to make a detour for the next object. Drop south about half the distance between M-61 and η Virginis. This should put you around +2 degrees. Maintaining that declination, head 45 degrees east into Serpens Caput and you're on top of **M-5** (**NGC 5904**). It's about 8 degrees SW of **α Serpentis**. This globular cluster is one of my favorites. It's half the size of the full moon, nearly round and not quite as condensed as M-13. Because it's not as dense at the core, stellar resolution is much easier. For some reason, that makes it seem the more beautiful of the two, to me.


Coma Star Cluster

For the remainder of the objects, we return to just north of the center of the **Coma cluster** and shunt our way north toward the handle of the dipper in Ursa Major. On a fairly good night you should be able to see the hazy patch of stars which constitute Berenices' hair. This group of stars is known as the **Coma Star Cluster** and carries the catalog name **Melotte 111**. It contains about 35 stars and–spread over 5 degrees–is best seen in a pair of binoculars. At a distance of about 250 light years it's the third closest open cluster. Only the Ursa Major group and the Hyades appear to be closer. Large and bright, elliptical galaxy **M-85** (**NGC 4382**) is about 10 degrees south of **Gamma Comae Berenices**, the brightest of the stars in that group (although it does not appear to be an actual member of the cluster), just NNE of a 5th magnitude star. The galaxy is pretty featureless except for considerable central condensation. If the sky is fairly dark, try for 12th magnitude **NGC 4394** a few arc minutes east and a bit north. It's on the Herschel 400 list.

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DEEP SKY DAZE, continued

If you can handle it lock down the declination and shift east 11-12 degrees to **α Comae**, the most southerly star in the trio that usually defines the constellation. **M-53** (**NGC 5024**)– rich, compressed; with many stars at 12th magnitude or so resolved – is less than 1 degree NE, and **NGC 5053**, another of the Herschel 400, is about a degree and a half due east of the star. These two globulars will be seen together if your eyepiece has a field a bit over a degree. A nice pair!

About 5 degrees NW of α, near 5th magnitude triple star **35-Comae Berenices** is **M-64** (**NGC 4826**), the bright oval with the black eye. I love it! While you're in the vicinity hop NW to Gamma and about 2 degrees before you get there is one of the most astounding, edge-on spirals in the sky, **NGC 4565** is half a lunar diameter long, but only 1' wide. Use averted vision and a bit of nudging to test the full extent of this beauty.

NGC 4565

Next find **β Comae**, and head due east until you intersect a line between Arcturus and Cor Caroli. Your finder or a pair of binoculars should give you a bright, fuzzy spot, which turns into showpiece globular cluster **M-3** (**NGC 5272**) when you add some magnification. Find your own superlatives!

That will be all for this session. Clear Skies!

Image Credits

M-68, M-61: Atlas Image courtesy of 2MASS/UMass/IPAC-Caltech/NASA/NSF.
Coma Star Cluster: Roberto Mura
NGC 4565: Ken Crawford

This colorful image, taken by NASA's Hubble Space Telescope, celebrates the Earth-orbiting observatory's 28th anniversary of viewing the heavens, giving us a window seat to the universe's extraordinary tapestry of stellar birth and destruction.

At the center of the photo, a monster young star 200,000 times brighter than our Sun is blasting powerful ultraviolet radiation and hurricane-like stellar winds, carving out a fantasy landscape of ridges, cavities, and mountains of gas and dust.

This mayhem is all happening at the heart of the Lagoon Nebula, a vast stellar nursery located 4,000 light-years away and visible in binoculars simply as a smudge of light with a bright core. NASA, ESA, and STScI

Barnard-Seyfert Astronomical Society
Minutes of a Regular Meeting of the Board of Directors
Held On Wednesday, April 7, 2018.

The regular meeting of the Board of Directors of the Barnard-Seyfert Astronomical Society was held April 4, 2018, in the City Center at the Girl Scouts Center, 4522 Granny White Pike, Nashville, TN 37204. Present were board members Mike Benson, Spencer Buckner, Gary Eaton, Bud Hamblen, K C Katalbas, Johanna Keohane, Keith Rainey and Theo Wellington, and guest Meghan Keohane. A quorum being present, Gary called the meeting to order at 7:30 PM. Gary asked for a motion to approve the minutes of the March 7, 2018, meeting. Spencer so moved, Mike seconded and the minutes were approved by voice vote. Bud reported that there was $4,266.03 in the checking account and $4,157.02 in the savings account. There was $1,023.97 in the PayPal account. Keith reported that there were 155 members, of which 130 were current on dues.

Theo reported that the cloudy-night presentation she and Lonnie Puterbaugh made at Shelby Bottoms Nature Center on March 24 was attended by about 15 or 20 visitors.

Bringing telescopes to the July 27 Full Moon Pickin' Party, Percy Warner Park, as a club event was discussed.

The BSAS awared prizes for astronomy related Middle Tennessee Science and Engineering Fair presentations. The first prize was awarded to Caleigh Elizabeth Dennis. The second prize was shared by the team of Julia An and Jack Edward Allen. Muti Yang, who won a BSAS award last year, also made a presentation at this year's MTSEF. Maya Schone Reilly made a presentation at the MTSEF on the effect of the total solar eclipse on domestic hen behavior and will be invited to the August 2018 membership meeting.

Johanna noted that the Coopertown Barrel Festival will be an opportunity for outreach on June 2. There will be a charge of about $45 for booth space. Given that this will allow the club to reach new people, Gary asked for a motion to defray the booth fee. Spencer so moved, and Johanna seconded. The motion was carried by voice vote.

There being no further business, Gary asked for a motion to adjourn. Keith so moved, Theo seconded, and the meeting was adjourned at 9 PM.

Respectfully submitted,

Bud Hamblen

Secretary

Barnard-Seyfert Astronomical Society
Minutes of the Monthly Membership Meeting
Held On Wednesday, April 18, 2018.

The Barnard-Seyfert Astronomical Society held its monthly meeting in the City Center of the Girl Scout Center, Nashville, Tennessee, on Wednesday, April 18, 2018. Twenty-eight members and guests signed in. Keith Rainey called the meeting to order at 7:30 PM. Keith asked for a motion to approve the minutes of the March 21, 2018, meeting as published in the April Eclipse, the minutes were approved by unanimous voice vote. Bud Hamblen reported that there was $5,241.03 in the checking account and $4,157.02 in the savings account.

Keith announced upcoming public star parties:

Friday, 4/20/2018 from 8:30 to 10:30 PM at Bowie Nature Park.
Friday, 5/11/2018 from 8:30 to 10:30 PM at Bells Bend Outdoor Center.
Saturday, 5/19/2018 from 8:30 to 10:30 PM at Long Hunter State Park.

The program for the evening was the annual telescope workshop, postponed from the canceled January meeting. Members and guests formed small groups to show new telescope owners how to use their equipment.

Frank LaVarre pointed out that the Boy Scouts had a 14" Celestron Schmidt Cassegrain telescope in a permanent dome at the Lattimer Boy Scout Reservation near Spencer, Tennessee, and were looking for volunteers to assist with operating the telescope. He also had available for free short-end rolls of paper on cardboard cores.

The meeting was adjourned at about 9:00 PM.

Respectfully submitted,

Bud Hamblen
Secretary

From the President, continued

> "Failing that, and in the (slightly) longer term, billions of years hence, some quirky Cataclysmic event and our remaining protons and neutrons are smashed into quarks and they possibly bump in to one another, why we can say "hi". I read that this force disintegration requires +/- one quadrillion degrees, so WEAR SHORTS!! ... BRING ICE!!"
>
> "Finally, please take care of yourselves and heed the sage advice of our wooly Tennessean forebears: "Keep yer powder dry and thumbprints off yer Naglers!" Clear Skies!"

Indeed, they will be missed. Let's not miss developing other relationships within BSAS in the days ahead.

Gary Eaton

Encapsulated in its payload fairing NASA's Interior Exploration using Seismic Investigations, Geodesy and Heat Transport, or InSight, Mars lander is transported to Space Launch Complex 3 at Vandenberg Air Force Base in California. InSight will be the first mission to look deep beneath the Martian surface. It will study the planet's interior by measuring its heat output and listen for marsquakes. The spacecraft will use the seismic waves generated by marsquakes to develop a map of the planet's deep interior. The resulting insight into Mars' formation will provide a better understanding of how other rocky planets, including Earth, were created. InSight is scheduled for liftoff May 5, 2018. NASA/Leif Heimbold

Barnard-Seyfert Astronomical Society

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.