The ECLIPSE

June 2021

The Newsletter of the Barnard-Seyfert Astronomical Society

Next Membership Meeting:

June 16, 7:30 pm
Online meeting

Topic TBD

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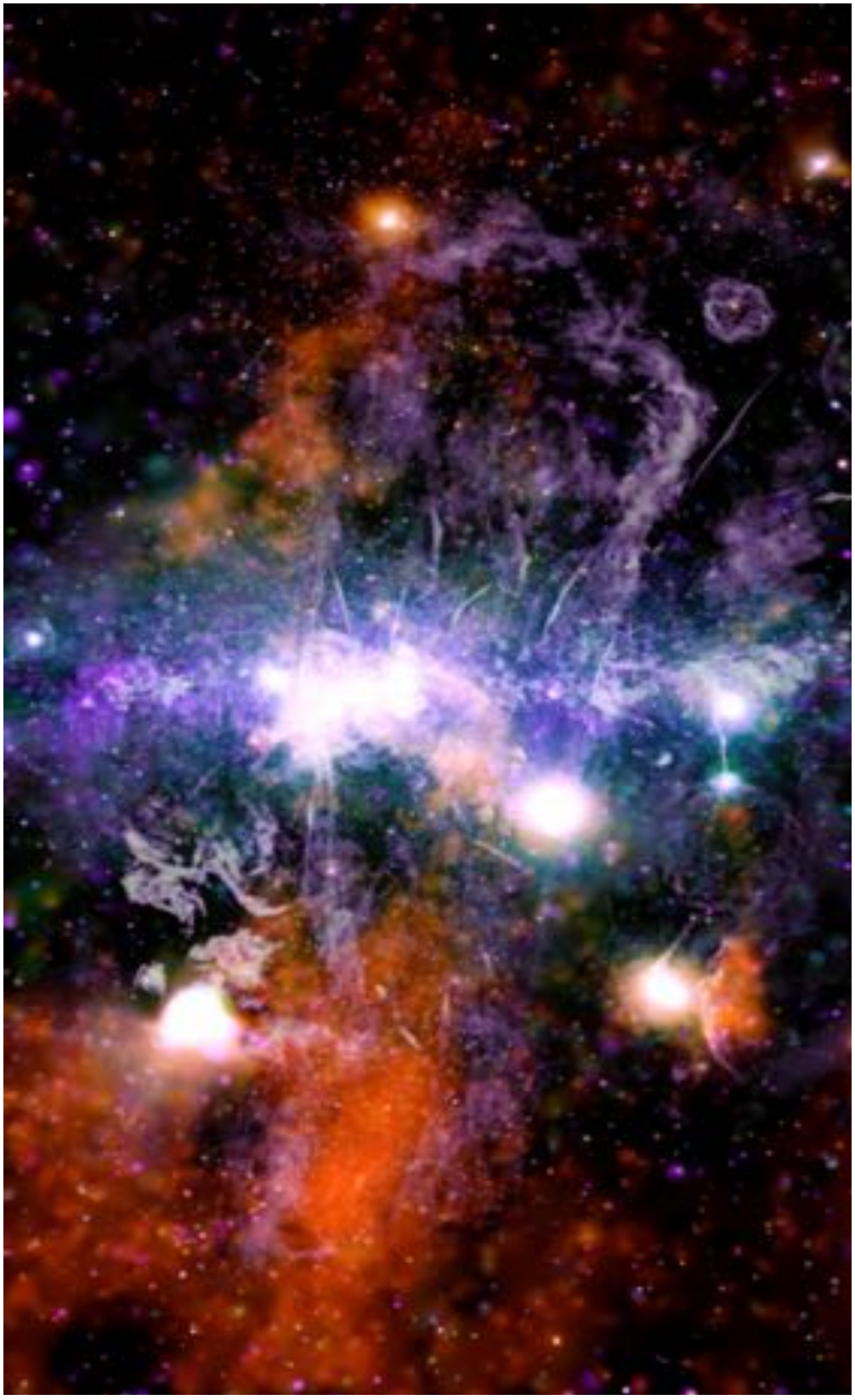

BSAS
Barnard-Seyfert Astronomical Society
BSASNashville.com

Barnard-Seyfert Astronomical Society

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HiRISE Camera on MRO Captures Curiosity Rover

The Curiosity rover has been exploring Gale Crater since 6 August 2012, and has driven more than 25 kilometers to date. The rover is currently ascending "Mount Mercou," a broad outcrop of rocks on the northern flank of "Mount Sharp" near the center of the crater.

The rover is currently located near and above an approximately 6 meter-high cliff where it examined the exposed rocks.

The rover previously drilled into the rocks at the base of the cliff. Scientists are interested in comparing the rocks from the bottom to the top to investigate how any changes may relate to the appearance of the rocks exposed on the cliff face.

Credit: NASA/JPL/UArizona

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June 10 July 9	June 17 July 17	June 24 July 23	June 2 July 1, 31

Happy Birthday Earth's Circumference
by Robin Byrne

This month we celebrate the anniversary of an important measurement. Our story begins with Eratosthenes, who was born in 276 BCE in the city of Cyrene, which is now known as Shahhat, Libya. His education began locally until he went to Athens to study at the Lyceum. Eratosthenes is credited with many discoveries and writings, but was dubbed "Beta" by his peers because all of his work was good, but not great. Still, Eratosthenes was eventually noticed by Ptolemy, who invited him to come to Alexandria. Within a few years, the pharaoh appointed Eratosthenes to the position of Chief Librarian at the famed Library of Alexandria.

Eratosthenes

The idea that Earth was a spherical shape was first postulated by Pythagoras around 500 BCE, but with no proof of this concept. Aristotle first presented proof of Earth's shape almost 200 years later, citing such evidence as the shape of Earth's shadow during a lunar eclipse, the appearance of new constellations above the southern horizon as you travel farther south, and how a ship sailing out to sea will appear to sink hull-first from view. However, while the shape of Earth was now agreed upon, its size was not.

As the story goes, Eratosthenes had heard that there was a well in the city of Syene (modern-day Aswan, Egypt) in which there was no shadow at noon on the Summer Solstice, implying that the Sun was directly overhead on that day. Because Earth is curved, a location father north or south would not see the Sun directly overhead. Alexandria, being almost due north of Syene, gave Eratosthenes the opportunity to use geometry to measure Earth.

On the Summer Solstice of the year 240 BCE, Eratosthenes placed a stick of known length in the ground. At Noon, he measured the length of the shadow cast by the stick. From the length of the stick and the length of the shadow, he could determine the Sun's altitude in the sky. The shadow angle was found to be 7° 12' or 7.2°, so Syene, which would have a shadow angle of 0°, must be 7.2° south of Alexandria. This means that if you were to extend lines from Syene and Alexandria to the center of the Earth, they would form an angle of 7.2°. A complete circle has 360° in it, so if you divide that by 7.2° you get 50, thus 7.2° is 1/50th of a complete circle. This tells us that the distance from Syene to Alexandria is 1/50th of Earth's circumference.

The next step is to accurately measure the distance between the two cities. Eratosthenes hired professional surveyors, called bematists, who walk with strides of a precise length, to pace off the distance between the cities. Based on their measurements, Alexandria and Syene were found to be 5000 stadia apart. So if that is

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1/50th of Earth's circumference, then the circumference should be 50 x 5000 stadia, or 250,000 stadia. But, how big is that in modern units? There's debate about the size of one stadium, but it is agreed that it falls between 500 and 600 feet, giving the circumference value found by Eratosthenes values ranging from approximately 24,000 to 29,000 miles. The actual circumference of Earth is 24,900 miles, so Eratosthenes did pretty well!

The main reason Eratosthenes decided to measure the circumference was because he wanted to create a map of Earth. Using descriptions of landmasses found in some of the books in the Library of Alexandria, he created the first global map of the Earth. A three-volume set, titled "Geography," was published in which Eratosthenes described: the method used to determine the circumference, the process of using historical accounts to determine the size and location of landmasses, the division of Earth into different climate regions, plus images of his final maps, including grid lines to help in estimating distances between locations. Sadly, the original work has been lost, but it is referenced by other Greek scholars whose work has been preserved.

After Eratosthenes' measurement of Earth became known, others attempted to repeat his experiment. Posidonius used light from the star Canopus to perform a similar procedure in the cities of Rhodes and Alexandria. However, he used an incorrect value for the distance between the cities, which resulted in a circumference for Earth that was about 7000 miles too small. However, this smaller value is the one that Ptolemy used in his writings on geography. Interestingly, it was this smaller circumference value that gave Christopher Columbus the idea that he could easily sail around the globe. Would Columbus have begun his journey if he had known the correct, larger circumference of Earth?

While there are some misguided souls who have been convinced the Earth is flat, we've known for almost 2500 years that the Earth is, roughly, spherical. And, more amazingly, we've known its approximate size for almost all of that time. Thanks to Eratosthenes, we truly have a good measure of the situation.

References:

Eratosthenes - Wikipedia

This Month in Physics History: June, ca. 240 B.C. Eratosthenes Measures the Earth; APS News; American Physical Society

Bematist - Wikipedia

Astrophotography With Your Smartphone
By David Prosper

Have you ever wanted to take night time photos like you've seen online, with the Milky Way stretched across the sky, a blood-red Moon during a total eclipse, or a colorful nebula? Many astrophotos take hours of time, expensive equipment, and travel, which can intimidate beginners to astrophotography. However, anyone with a camera can take astrophotos; even if you have a just smartphone, you can do astrophotography. Seriously!

A small tripod for a smartphone. They are relatively inexpensive – the author found this at a local dollar store!

Don't expect Hubble-level images starting out! However, you can take surprisingly impressive shots by practicing several basic techniques: steadiness, locked focus, long exposure, and processing. First, steady your smartphone to keep your subjects sharp. This is especially important in low light conditions. A small tripod is ideal, but an improvised stand, like a rock or block of wood, works in a pinch. Most camera apps offer timer options to delay taking a photo by a few seconds, which reduces the vibration of your fingers when taking a shot. Next, lock your focus. Smartphones use autofocus, which is not ideal for low-light photos, especially if the camera readjusts focus mid-session. Tap the phone's screen to focus on a distant bright star or streetlight, then check for options to fine-tune and lock it. Adjusting your camera's exposure time is also essential. The longer your camera is open, the more light it gathers - essential for low-light astrophotography. Start by setting your exposure time to a few seconds. With those options set, take a test photo of your target! If your phone's camera app doesn't offer these options, you can download apps that do. While some phones offer an "astrophotography" setting, this is still rare as of 2021. Finally, process your photos using an app on your phone or computer to bring out additional detail! Post-processing is the secret of all astrophotography.

You now have your own first astrophotos! Wondering what you can do next? Practice: take lots of photos using different settings, especially before deciding on any equipment upgrades. Luckily, there are many amazing resources for budding astrophotographers. NASA has a free eBook with extensive tips for smartphone astrophotography at bit.ly/smartastrophoto, and you can also join the Smartphone

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Astrophotography project at bit.ly/smartphoneastroproject. Members of astronomy clubs often offer tips or even lessons on astrophotography; you can find a club near you by searching the "Clubs and Events" map on the Night Sky Network's website at nightsky.jpl.nasa.gov. May you have clear skies!

The Moon is large and bright, making it a great target for beginners. The author took both of these photos using an iPhone 6s. The crescent moon at sunset (left) was taken with a phone propped on the roof rack of a car; the closeup shot of lunar craters (right) was taken through the eyepiece of a friend's Celestron C8 telescope.

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!

Next BSAS Membership Meeting:

Wednesday, June 16, 7:30 pm Central
online on Zoom

Topic TBD

Zoom link will be posted to bsasnashville.com

Barnard-Seyfert Astronomical Society
Minutes of a Regular Meeting of the Board of Directors
Held On Wednesday, May 5, 2021

The regular meeting of the Board of Directors of the Barnard-Seyfert Astronomical Society was held May 5, 2021, online. Logged in were board members Tom Beckerman, Chip Crossman, Tony Drinkwine, Bud Hamblen, Keith Rainey and Theo Wellington, and guest Osvaldo Gonzalez (Oz). Keith called the meeting to order at 7:30 PM. Keith asked for a vote to adopt the February, 2021, minutes as printed in the May, 2021, issue of the Eclipse, and the minutes were adopted by voice vote. Theo reported the Suntrust balance to be $12,104.85 and the PayPal balance to be $57.65. Poster sales stand at 34. The post office box for the club has been renewed for another year.

Keith reported there were 190 members.

Theo reported that there were 1,933 likes and 2,061 followers on Facebook, and 275 followers on Twitter. The April 17 virtual star party has had 403 views so far. The March 13 virtual star party is up to 436 views.

Oz described a NASA outreach program for the James Webb Space Telescope, scheduled for launch on October 31, 2021. NASA will provide outreach materials for organizations volunteering to present programs on the Webb telescope. The club can recruit volunteers to make presentations to schools and similar groups. One fun part of the program is to demonstrate detection of IR light from a TV remote or an IR LED by a smartphone camera. The board agreed to ask Oz to apply to NASA for this program.

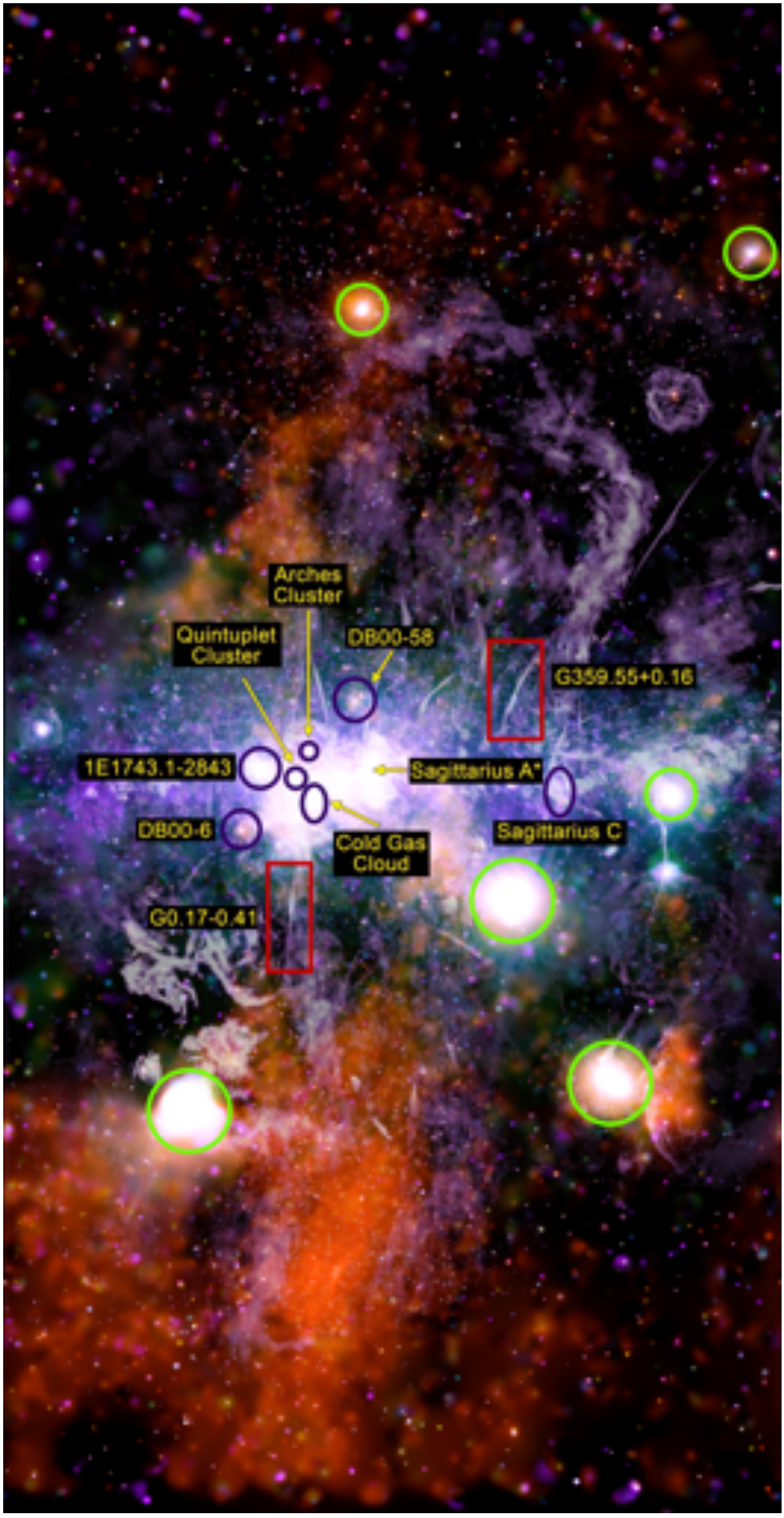
Future meeting topics include a presentation on the Mars rover Perseverance helicopter Ingenuity.

There being no further business, the meeting was adjourned at 8:00.

Respectfully submitted,

Bud Hamblen
Secretary

There was no membership meeting in May 2021.



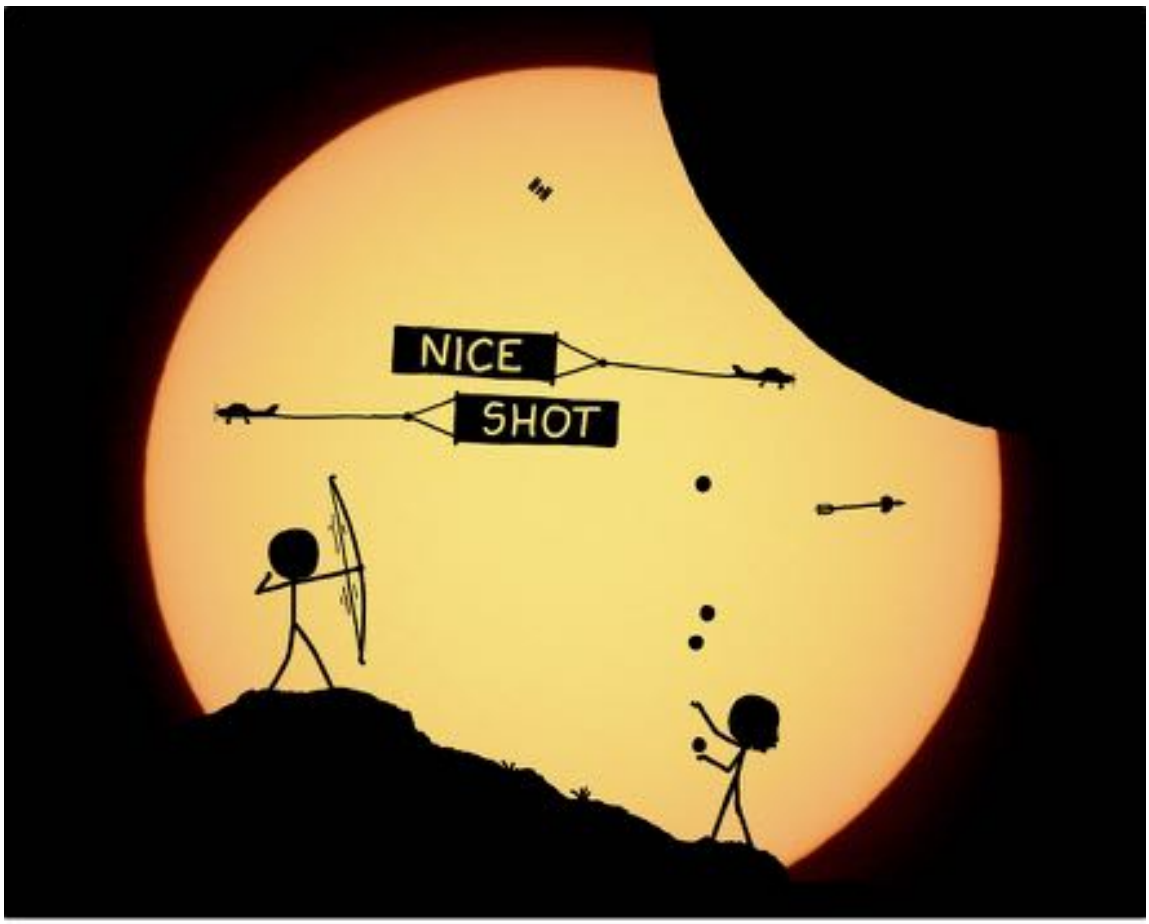
On the Cover: Threads of superheated gas and magnetic fields are weaving a tapestry of energy at the center of the Milky Way galaxy. A new image of this new cosmic masterpiece was made using a giant mosaic of data from NASA's Chandra X-ray Observatory and the MeerKAT radio telescope in South Africa.

The new panorama of the Galactic Center builds on previous surveys from Chandra and other telescopes. This latest version expands Chandra's high-energy view farther above and below the plane of the Galaxy — that is, the disk where most of the Galaxy's stars reside — than previous imaging campaigns. In the image featured in our main graphic, X-rays from Chandra are orange, green, blue and purple, showing different X-ray energies, and the radio data from MeerKAT are shown in lilac and gray. The main features in the image are shown in a labeled version.

Credit: X-ray: NASA/CXC/UMass/ Q.D. Wang; Radio: NRF/SARAO/ MeerKAT

More info >

xkcd



OUR ASTROPHOTOGRAPHY COMMUNITY'S
ONE-UPSMANSHIP IS GETTING OUT OF HAND.

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.

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.