

The ECLIPSE

April
2022

The Newsletter of the Barnard-Seyfert Astronomical Society

Next Membership Meeting:

April 20, 7:30 pm
Cumberland Valley
Girl Scout Council Building
4522 Granny White Pike



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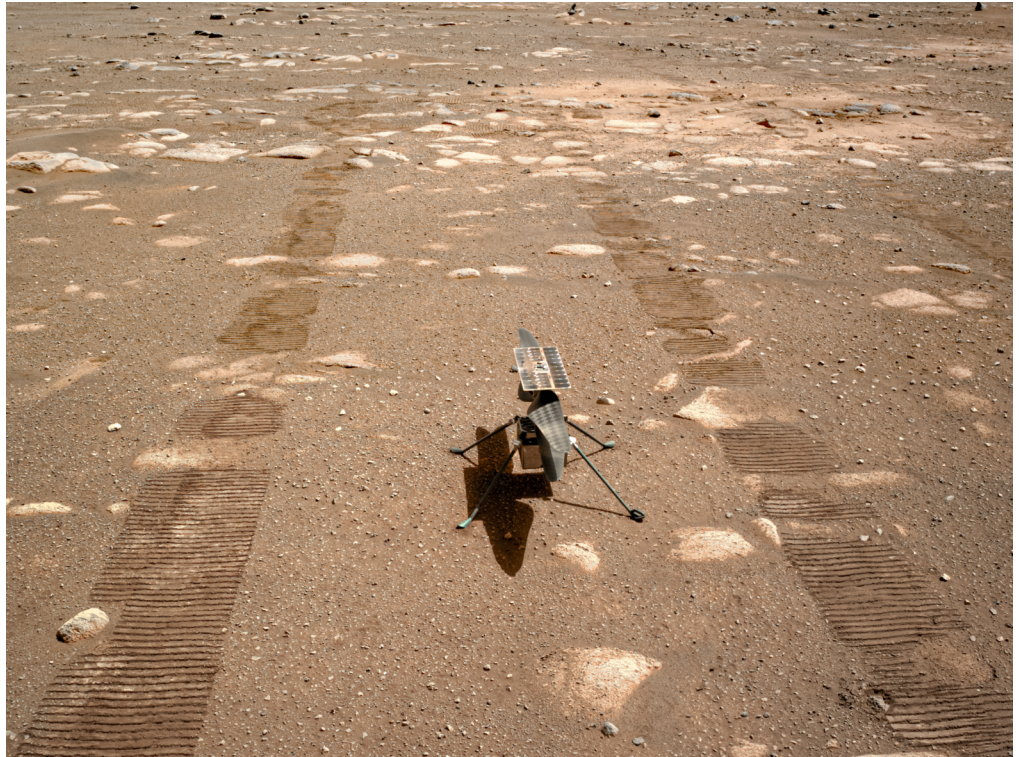
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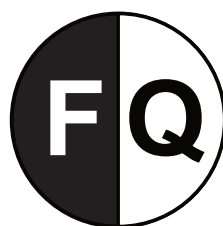
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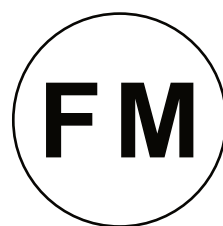
On the Cover: Mars2020 Navcam, Sol 44. Credit: [NASA/JPL-Caltech/Kevin M. Gill](#)



**Apr 1, 30
May 30**



**Apr 9
May 8**



**Apr 16
May 15**



**Apr 23
May 22**

Happy Perihelion Anniversary, Comet Hale-Bopp By Robin Byrne

This month we celebrate the closest approach to the Sun of one of the best comets in recent history. Our story begins with the discovery of the comet. On July 23, 1995, both Alan Hale and Thomas Bopp independently observed an object in the sky, appearing near the globular cluster, M70. Alan Hale realized it was something he hadn't seen in the same part of the sky a few days prior, and after revisiting M70 a couple hours later, saw that the object had slightly moved. After a check of known comets showed nothing in the region, he emailed the Central Bureau for Astronomical Telegrams with his discovery. Meanwhile, Thomas Bopp didn't have a telescope of his own, and was observing with a friend. Through the friend's telescope he spotted the object, and found nothing on his star charts that could be in the observed location. He took



Credit: E. Kolmhofer, H. Raab; Johannes Kepler Observatory, Linz, Austria

the Central Bureau for Astronomical Telegrams' name literally, and sent them a telegram. Brian Marsden had been over the Bureau since 1968, and was amused by receiving a telegram, saying, "Nobody sends telegrams anymore. I mean, by the time that telegram got here, Alan Hale had already e-mailed us three times with updated coordinates." The next day, it was confirmed to be a new comet, and was designated C/1995 O1.

At the time of discovery, Hale-Bopp was 7.2 Astronomical Units from the Sun (an Astronomical Unit is the average distance between the Earth and Sun). This was farther than any other comet discovered by an amateur. Located between the orbits of Jupiter and Saturn, Hale-Bopp already showed signs of having a coma, which is unusual for such a large distance from the Sun. It was later determined that the comet's nucleus is about 60 kilometers across (about 36 miles), which makes it roughly 6 times larger than Halley's Comet. Being so large and bright, while still far from the Sun, created the hope that it would be a good comet to observe. However, comets are notorious for disappointing observers, so the optimism was cautious. Like David Levy once said, "Comets are like cats: they have tails, and they do

precisely what they want.”

Less than a year after discovery, in May 1996, Hale-Bopp was bright enough to be viewed without a telescope or binoculars, and by January 1997, it was bright enough to be seen easily, even in large light-polluted cities. With the growth of the internet, web pages devoted to Hale-Bopp were overwhelmed by the number of views, and this helped create a huge interest in the comet by the general public. The closer Hale-Bopp got to the Sun, the brighter it became, as well as developing its tail. In February of 1997, the tail became easily visible, and was clearly divided into two components: the dust tail and the ion tail.

The hope and expectation was that Hale-Bopp would reach its brightest when it was closest to the Sun on April 1, 1997. For a change, this comet not only met, but exceeded expectations, reaching magnitude -1.8 during perihelion. The only star brighter than that is Sirius. The tail extended over 40 degrees in length. For observers in the Northern Hemisphere, Hale-Bopp was placed in the sky where it could be observed all night long during its perihelion passage, providing spectacular views.

After perihelion, Hale-Bopp moved to the Southern Hemisphere skies, but quickly faded, so the views were not as impressive. By December of 1997, the comet was no longer visible to the unaided eye. In total, Hale-Bopp had naked-eye visibility for over 18 months, breaking the record set by the Great Comet of 1811, which was “only” visible to the naked eye for 9 months. Telescopic observations by professional astronomers continued through 2012, when it was 33.2 AU from the Sun.

Hale-Bopp is considered to have a long-period orbit, meaning it takes over 200 years to orbit once around the Sun. That places its original home in the Oort Cloud. Hale-Bopp’s orbital period has changed, due to interactions with the larger planets in the solar system, especially Jupiter. From analysis of its orbital path, astronomers estimate that Hale-Bopp last visited Earth’s skies in the year 2215 BC, which implies an orbital period of over 4000 years. That passage brought it close to Jupiter, which affected its orbital path, and it was further altered by the 1996-1997 visit, with another close encounter with Jupiter. Hale-Bopp’s orbit will now take a little over 2500 years before returning to our skies.

Professional astronomers had a fantastic opportunity to learn more about comets from Hale-Bopp during its passage. One surprise was finding that, in addition to the dust and ion tails, Hale-Bopp had a sodium tail. While not visible optically, the tail did appear when the proper filters were used. Sodium had been detected in the coma of other comets, but this was the first time it was found to extend out into its own tail. Another discovery was a much higher than expected abundance of heavy water (water made from deuterium instead of hydrogen). The expectation was based on the amount of heavy water found on Earth, since it’s thought that comets were the main source of water on Earth. However, if Hale-Bopp is a typical example of comets, then at least some of Earth’s water had to originate someplace other than comets. Based on some of the elements detected in Hale-Bopp, it is estimated that the nucleus had only experienced temperatures in the range of 20- 40 Kelvin. This implies that it formed in the Kuiper Belt, but migrated outward to the Oort Cloud.

Definitely one of the most bizarre and sad associations with Hale-Bopp is the connection to the Heaven’s Gate cult. It all began with an amateur astronomer’s picture of the comet that

showed a fuzzy oval next to Hale-Bopp, which led to various people thinking he captured a UFO following the comet. Many professionals pointed out that the object was a known, faint star (SAO141894), but that didn't deter the UFO enthusiasts. Among the enthusiasts were members of the Heaven's Gate cult, who believed they would, upon death, leave their physical bodies, enter the spaceship, and then pass through Heaven's Gate, which would take them to a higher level of existence. In March 1997, 39 members of Heaven's Gate committed suicide by drinking poison.

Comet Hale-Bopp was likely the most-observed comet of all time. With so many months of visibility, combined with the publicity it received in the media and internet, everyone knew about it and could easily see it. It is estimated that almost 70% of Americans had observed the comet by the time it reached perihelion. I clearly remember observing this comet for many months. It was such a beautiful sight in the night sky. Being visible to the naked eye for so long, it became an old friend to either briefly glance at, or spend a longer time visiting with a telescope or binoculars. Comet Hale-Bopp very rightly deserves the nickname as The Great Comet of 1997.

References:

[Wikipedia - Comet Hale-Bopp](#)

[Comet Hale-Bopp: Facts about the bright and tragic comet, by Elizabeth Howell and Daisy Dobrijevic, February 9, 2022](#)

Next Membership Meeting:

Wednesday April 20, 7:30 pm

Cumberland Valley
Girl Scout Council Building
4522 Granny White Pike

Guest speaker:

John Briggs from the Astronomical Lyceum in Magdalena ,NM

xkcd

OPEN THIS PICTURE
FULLSCREEN ON YOUR
PHONE AND HOLD IT
AT ARM'S LENGTH.



THERE ARE
50,000 GALAXIES
IN THIS CIRCLE.

ASTRONOMY FACT: THERE
ARE TOO MANY GALAXIES.

Advanced Catspotting: Lynx and Leo Minor

By David Prosper

Many constellations are bright, big, and fairly easy to spot. Others can be surprisingly small and faint, but with practice even these challenging star patterns become easier to discern. A couple of fun fainter constellations can be found in between the brighter stars of Ursa Major, Leo, and Gemini: Lynx and Leo Minor, two wild cats hunting among the menagerie of animal-themed northern star patterns!

Lynx, named for the species of wild cat, is seen as a faint zigzag pattern found between Ursa Major, Gemini, and Auriga. Grab a telescope and try to spot the remote starry orb of globular cluster NGC 2419. As it is so distant compared to other globular clusters - 300,000 light years from both our solar system and the center of the Milky Way - it was thought that this cluster may be the remnants of a dwarf galaxy consumed by our own. Additional studies have muddied the waters concerning its possible origins, revealing two distinct populations of stars residing in NGC 2419, which is unusual for normally-homogenous globular clusters and marks it as a fascinating object for further research.

Leo Minor is a faint and diminutive set of stars. Its “triangle” is most noticeable, tucked in between Leo and Ursa Major. Leo Minor is the cub of Leo the Lion, similar to Ursa Minor being the cub to the Great Bear of Ursa Major. While home to some interesting galaxies that can be observed from large amateur scopes under dark

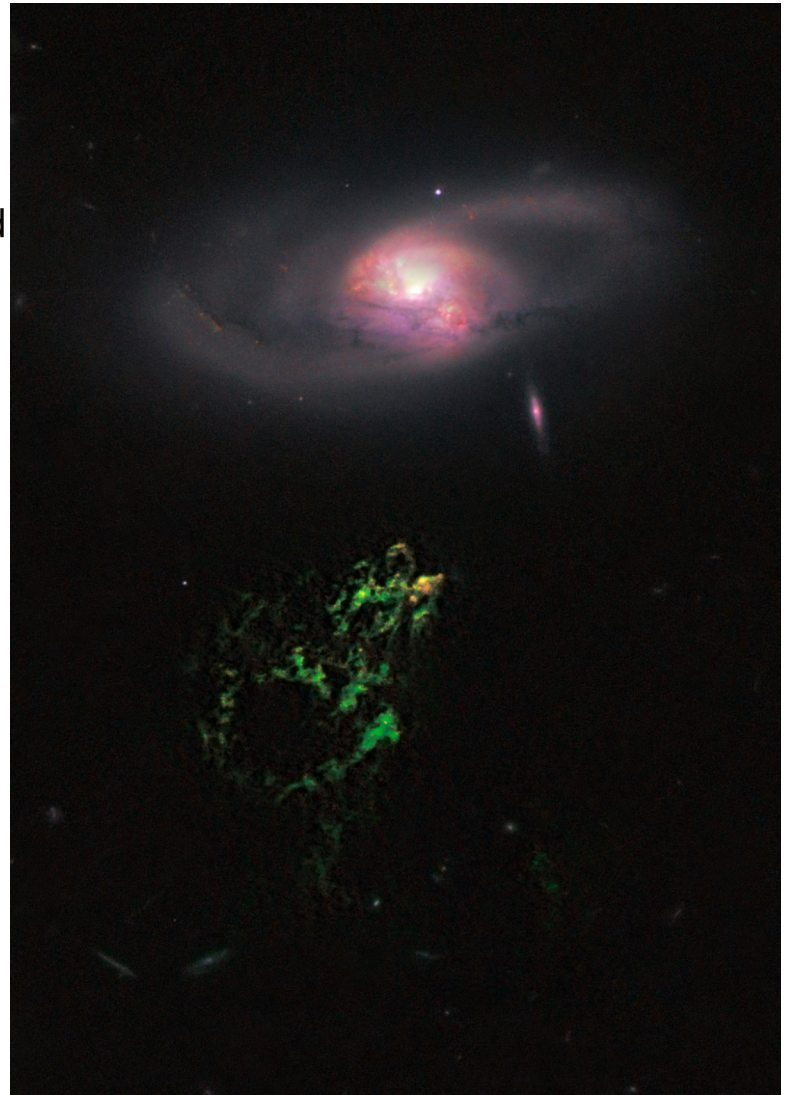


Map of the sky around Lynx and Leo Minor. Notice the prevalence of animal-themed constellations in this area, making it a sort of celestial menagerie. If you are having difficulty locating the fainter stars of Leo Minor and Lynx, don't fret; they are indeed a challenge. Hevelius even named the constellation as reference to the quality of eyesight one needs in order to discern these faint stars, since supposedly one would need eyes as sharp as a Lynx to see it! Darker skies will indeed make your search easier; light pollution, even a relatively bright Moon, will overwhelm the faint stars for both of these celestial wildcats. While you will be able to see NGC 2419 with a backyard telescope, Hanny's Voorwerp is far too faint, but its location is still marked. A few fainter constellation labels and diagrams in this region have been omitted for clarity.

Image created with assistance from Stellarium

skies, perhaps the most intriguing object found within Leo Minor's borders is Hanny's Voorwerp. This unusual deep-space object is thought to be a possible "light echo" of a quasar in neighboring galaxy IC 2497 that has recently "switched off." It was found by Hanny van Arkel, a Dutch schoolteacher, via her participation in the Galaxy Zoo citizen science project. Since then a few more intriguing objects similar to Hanny's discovery have been found, called "Voorwerpjes."

Lynx and Leo Minor are relatively "new" constellations, as they were both created by the legendarily sharp-eyed European astronomer Johannes Hevelius in the late 1600s. A few other constellations originated by Hevelius are still in official use: Canes Venatici, Lacerta, Scutum, Sextans, and Vulpecula. What if your eyes aren't quite as sharp as Johannes Hevelius – or if your weather and light pollution make searching for fainter stars more difficult than enjoyable? See if you can spot the next Voorwerp by participating in one of the many citizen science programs offered by NASA at science.nasa.gov/citizenscience! And of course, you can find the latest updates and observations of even more dim and distant objects at nasa.gov.



Hanny's Voorwerp and the neighboring galaxy IC 2497, as imaged by Hubble. Credits: NASA, ESA, W. Keel (University of Alabama), and the Galaxy Zoo Team

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!



NASA's Space Launch System (SLS) rocket with the Orion spacecraft aboard is seen atop a mobile launcher at Launch Complex 39B, Monday, April 4, 2022, as the Artemis I launch team conducts the wet dress rehearsal test at NASA's Kennedy Space Center in Florida. Ahead of NASA's Artemis I flight test, the wet dress rehearsal will run the Artemis I launch team through operations to load propellant, conduct a full launch countdown, demonstrate the ability to recycle the countdown clock, and drain the tanks to practice timelines and procedures for launch. Photo Credit: [\(NASA/Joel Kowsky\)](#)

Barnard-Seyfert Astronomical Society Minutes of a Regular Meeting of the Board of Directors Held On Wednesday, March 2, 2022

The regular meeting of the Board of Directors of the Barnard-Seyfert Astronomical Society was held March 2, 2022, online, Dr. Tom Beckermann presiding. Logged in were Tom Beckermann, Cory Buckner, Chip Crossman, Tony Drinkwine, Oz Gonzalez, Bud Hamblen, Andy Reeves and Theo Wellington. An on-line quorum being present, Tom called the meeting to order at 7:30 PM.

Tom asked for a motion to adopt the minutes of the board meeting on February 2, 2022, as printed in the March, 2022, issue of the Eclipse and the minutes were adopted unanimously.

Treasurer's Report: The Truist (formerly SunTrust) balance was \$12,471.53. Paypal balance was \$ 156.31

Social media and outreach report: The Facebook page was liked by 1,983 and followed by 2,117. Twitter had 288 followers.

The next public star party is scheduled for March 12 at the Bells Bend Outdoor Center.

The Messier Marathon is scheduled for April 2 (with a fall ahead date of April 1 if the April 2 weather forecast looks poor) at Ron Ladd's farm.

The topic for the March 16 meeting will be running a Messier Marathon.

Zoom security will be improved for subsequent general meetings.

There being no further business, the meeting adjourned at 8:45 PM.

Respectfully submitted,

Bud Hamblen
Secretary

Barnard-Seyfert Astronomical Society Minutes of the Monthly Membership Meeting Held On Wednesday, March 16, 2022

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, March 16, 2022, Tom Beckermann presiding. 20 participants zoomed in.

Tom called the meeting to order at 7:30 PM and asked for a motion to adopt the minutes of the February 16, 2022, meeting as published in the March issue of the Eclipse. Theo Wellington so moved, Terry Reeves seconded, and the minutes were adopted by a show of hands.

Treasurer's report: Theo Wellington reported the Truist (formerly SunTrust) bank balance to be \$12,239.51 (\$4,578.07 in the equipment fund and \$7,661.44 in the general fund). The PayPal balance was \$ 501.23. The club paid the Girl Scouts of Middle Tennessee \$1,050.00 for use of the Girl Scout Center for in-person meetings. The April meeting is planned to be at the Girl Scouts.

Membership report: Tom reported that there were approximately 200 members.

Social media report: Theo reported that the Facebook page was liked by 1,994 and followed by 2,130. Twitter had 290 followers.

Outreach: The BSAS is sponsoring awards for astronomy related projects at the Middle Tennessee Science and Engineering Fair, March 25-26. The Girl Scouts are asking for help with an astronomy event on April 20.

Star parties: The public star party at the Bells Bend Nature Center, scheduled for March 12, had to be canceled due to unseasonable cold weather. The Messier Marathon is scheduled for Ron Ladd's property on April 2, with a fall-forward date of April 1, if the forecast for Saturday appeared bad. Ron will be providing information on location and access. A public star party is scheduled for April 9 at Shelby Bottoms Nature Center. A private star party is scheduled for April 30 at the Water Valley Overlook, Natchez Trace Mile Marker 412.

Theo presented "Running the Messier Marathon". The Messier Marathon was invented in the mid-1970s, when it was noticed by several amateur astronomers that it was possible to see all 110 Messier objects in a single night at the full moon nearest the March equinox. There are several published guidebooks for the Messier Marathon and the Astronomical League has Messier object observing programs.

There being no further business, the meeting was adjourned at about 8:30 PM.
Respectfully submitted,

Bud Hamblen
Secretary



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.