

The ECLIPSE

December
2020

The Newsletter of the Barnard-Seyfert Astronomical Society

Next Membership Meeting:

December 16, 7:30 pm
Online meeting

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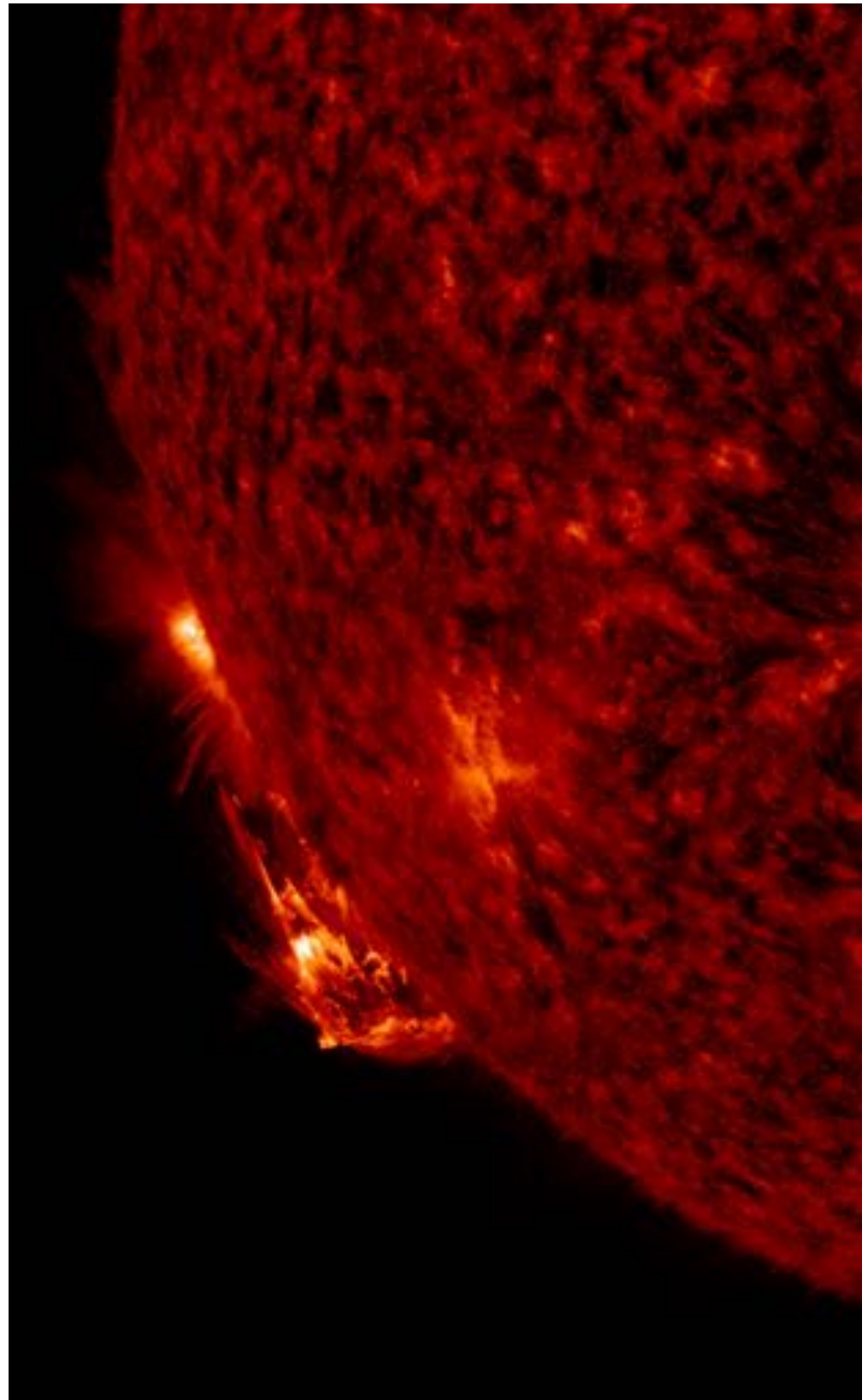
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BSASNashville.com





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From the President

It's finally here! The end of 2020! Let us all hope that 2021 is much better. As a final twist in our side, we cannot have our traditional potluck dinner this year because of covid. But we still have a virtual meeting planned. This month we thought about all of the new members and questions that usually get asked so we want to have a presentation and a Q&A session between our new members and our long-time members. This is your chance, even if you aren't a new member, to get your burning astronomy related questions answered. So please feel free to join in on the zoom meeting fun this month. I will send out a link to the meeting as the date gets closer.

What's also here is the Jupiter-Saturn conjunction! This month on the 21st, the two planets will appear as one to the unaided eye. They will also be in the same telescopic field of view. I know Dyer observatory is planning on live streaming the event over the internet so check out their web page for more information.

While we are discussing live streaming, check out our Tennessee virtual star parties online. We usually have some representation on the star parties. Check our Facebook page for more information and details.

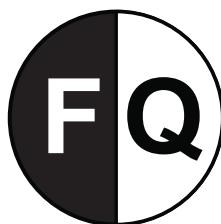
One last thing. It's that time where we have board members whose terms are up and this year, we have a board member who moved away so we have 3 openings for at-large board members. If you are interested in serving on the board, we would love to have you. You don't need any special skills or degrees, just an interest in helping the club move into the future. Please get with me if you have any interest in serving a 3-year term on the board.

Keep staying safe out there!

Clear skies,
Keith Rainey



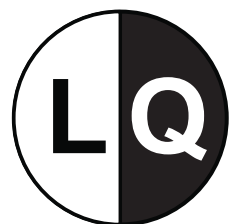
Dec 14
Jan 12



Dec 21
Jan 20



Dec 29
Jan 28



Dec 7
Jan 6

Happy Birthday, Isaac Newton by Robin Byrne

This month we celebrate the birth of a man whose contributions to science are phenomenal and who is the poster child for pandemic productivity .

Isaac Newton was born prematurely in Woolsthorpe, Lincolnshire, England on December 25, 1642 (the same year Galileo died). He was not expected to even live, but did survive, although sickly most of his childhood. Newton's father died before he was born, and his mother married an ill-tempered man who sent Newton to live with his grandmother. When Newton was 11 years old, his step-father died and Newton returned to his mother.

Newton was not a great student at first. However, over the years he improved to being top of his class. At the age of 16, Newton dropped out of school to help his mother with the farm. When Newton was 18, he entered Trinity College and received his Bachelor's Degree in 1665.

During the next two years, all public institutions (including the college) were closed due to the plague. Newton holed-up in his family's home and revolutionized science. Over this two year period of time, Newton laid the groundwork for all of his major discoveries: white light is composed of the colors of the spectrum; Newton's Three Laws of motion (an object at rest remains at rest and an object in motion remains in motion if no net force acts on it, $\text{Force} = \text{mass} \times \text{acceleration}$, and for every action there is an equal and opposite reaction); the law of gravity; and he developed calculus. What have you been doing with your life during these months of staying at home?

In 1667, Newton returned to Trinity College as a Fellow and became Lucasian Professor of Mathematics in 1669. Newton also served as Warder of the Mint for a number of years. In 1705, he was knighted and became SIR Isaac Newton.

A challenge had been put forth to members of the Royal Society to show that the elliptical orbits of planets were due to an attractive force from the Sun that dropped off at a rate proportional to the distance squared. Edmund Halley mentioned this problem to Newton, who replied that he had proven that years ago! After an early controversy, Newton was wary of publishing his work, so he had never shared his



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Isaac Newton, continued

findings. It was at Halley's insistence (and financial assistance) that Newton published his most famous work, *Principia*, in 1687. This was the book in which he made public his Laws of Motion and Law of Gravity.

Isaac Newton died on March 31, 1727 in London, England and is buried at Westminster Abbey. We have so much to be grateful for from this man who did so much. Despite all that he accomplished, Newton recognized how much more there is to know. He once said, "I do not know what I may appear to the world, but to myself I seem to have been only like a boy playing on the sea-shore, and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me."

References:

The New Encyclopaedia Britannica, 1995

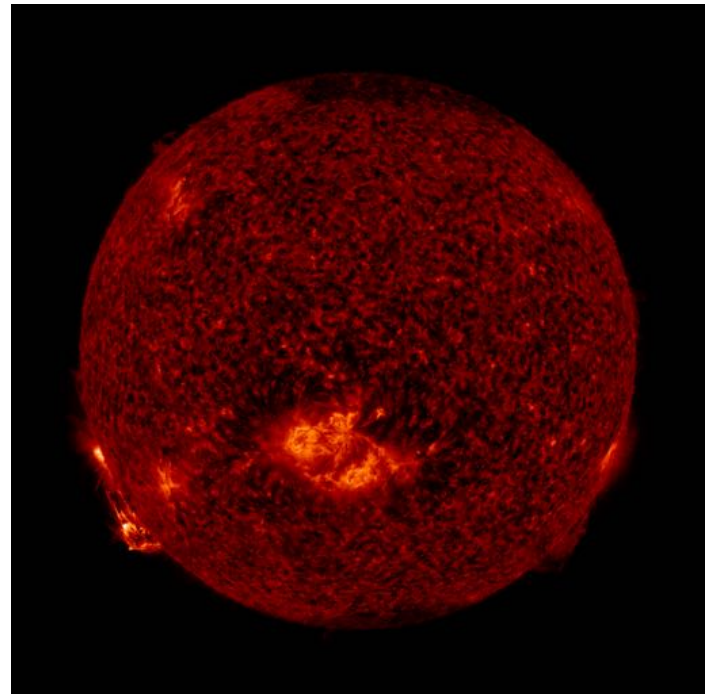
Astronomy & Space, From the Big Bang to the Big Crunch by Phillis Engelbert, 1997

On the Cover: This imagery captured by NASA's Solar Dynamics Observatory shows a solar flare and a subsequent eruption of solar material that occurred over the left limb of the Sun on November 29, 2020.

While the solar material didn't head toward Earth, it did pass by some spacecraft: NASA's Parker Solar Probe, NASA's STEREO and ESA/NASA's Solar Orbiter. Equipped to measure magnetic fields and the particles that pass over them, we may be able to study fast-moving solar energetic particles in the observations once they are downloaded. These sun-watching missions are all part of a larger heliophysics fleet that help us understand both what causes such eruptions on the Sun -- as well as how solar activity affects interplanetary space, including near Earth, where they have the potential to affect astronauts and satellites.

See video at <https://svs.gsfc.nasa.gov/13778>

Credit: NASA/GSFC/SDO



Visitors to Both Jupiter and Saturn by David Prosper

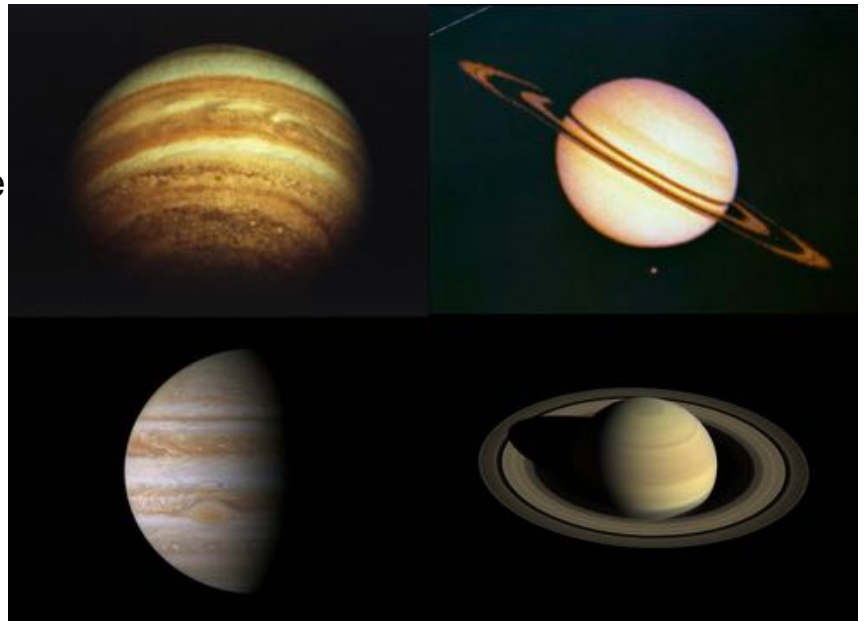
Have you observed Jupiter and Saturn moving closer to each other over the past few months? On December 21, the two worlds will be at their closest, around 1/5 of a full Moon apart! While the two gas giants may appear close, in reality they are hundreds of millions of miles apart. Despite this vast distance, a select few missions have visited both worlds by using a gravity assist from giant Jupiter to slingshot them towards Saturn, saving time and fuel.

Pioneer 11 was the first mission to visit both worlds! Launched in 1973, the probe flew past Jupiter in late 1974, passing just 26,400 miles above its stormy clouds. In 1979, it became the first spacecraft to encounter Saturn. Pioneer 11 took the first up-close photos of Saturn and its satellites, and made many exciting discoveries, including the detections of its magnetic field and a faint “F” ring, before departing Saturn and eventually, the solar system.

The Voyager missions quickly followed up, taking a “Grand Tour” of the four largest and most distant planets in our solar system. Both probes were launched within two weeks of each other in 1977.

Voyager 1 flew past Jupiter in March 1979, discovering Jupiter’s faint ring and two new moons, along with active volcanoes on Io’s surface! The probe then flew past Saturn in November 1980, discovering five new moons, a new “G” ring, mysterious ring “spokes,” and “shepherd moons” shaping the rings. After a brief encounter with Titan revealed evidence of complex organic chemistry and liquid on the moon’s frigid surface, Voyager 1 was flung out of the plane of the solar system. Following close behind, Voyager 2 took detailed photos of Jupiter’s moons and cloud tops in July 1979. Flying past Saturn in August 1981, Voyager 2 measured the thickness of Saturn’s rings and took detailed photos of many of its moons. This second explorer then captured images of Uranus and Neptune before leaving our solar system.

Cassini-Huygens was the last mission to visit both worlds. Launched in 1997, the mission flew past Jupiter in late 2000 and took incredibly detailed photos of its stormy



The difference in technology between generations of space probes can be stunning! The top two photos of Jupiter and Saturn were taken by Pioneer 11 in 1974 (Jupiter) and 1979 (Saturn); the bottom two were taken by Cassini in 2000 (Jupiter) and 2016 (Saturn). What kinds of photos await us from future generations of deep space explorers?

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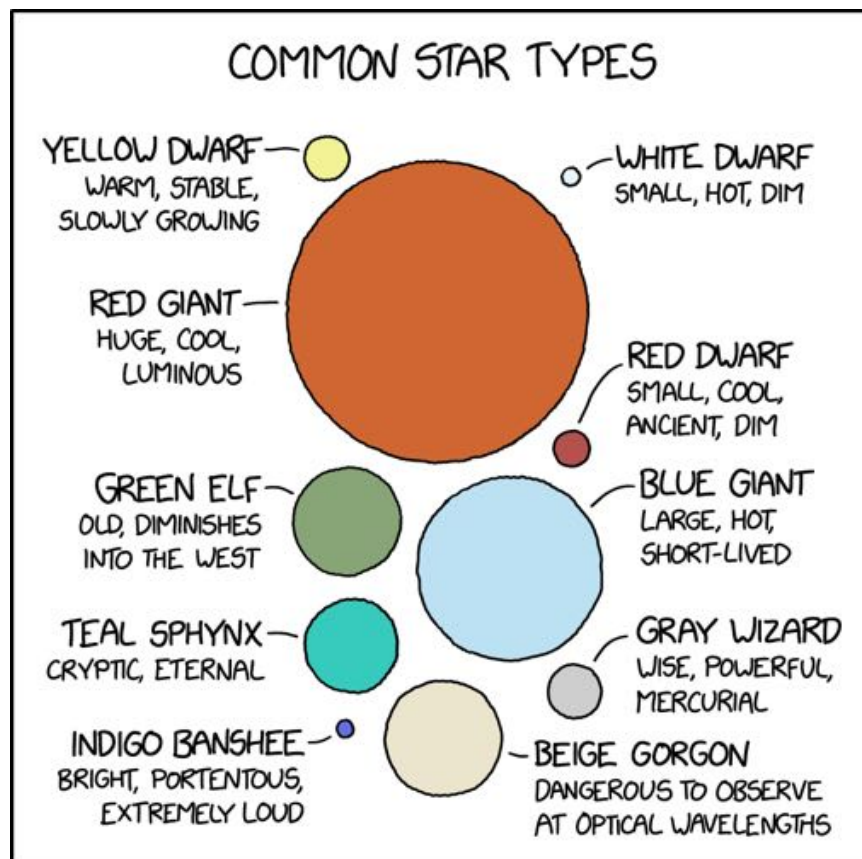
Jupiter and Saturn, continued

atmosphere and faint rings. Cassini entered into Saturn's orbit on July 1, 2004. The Huygens probe separated from Cassini, landing on Titan to become the first probe in the outer solar system. Cassini discovered geysers on Enceladus, fine details in Saturn's rings, many more moons and "moonlets," the changing oceans of Titan, and seasonal changes on Saturn itself. After revolutionizing our understanding of the Saturnian system, Cassini's mission ended with a fiery plunge into its atmosphere on September 15, 2017.

What's next for the exploration of the outer worlds of our solar system? While Juno is currently in orbit around Jupiter, there are more missions in development to study the moons of Jupiter and Saturn. Discover more about future NASA missions to the outer worlds of our solar system at [nasa.gov](https://www.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](https://www.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!

xkcd



Barnard-Seyfert Astronomical Society Minutes of the Monthly Membership Meeting Held On Wednesday, November 11, 2020

The regular meeting of the Board of Directors of the Barnard-Seyfert Astronomical Society was held November 11, 2020, online. Logged in were Tom Beckermann, Chip Crossman, Gary Eaton, Drew Gilmore, Bud Hamblen, Keith Rainey, 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 September 2, 2020, minutes as printed in the October issue of the Eclipse. Bud so moved, Chip seconded and the minutes were adopted by voice vote. Theo reported that the total bank balance was \$10,946.44 (\$4,578.07 savings, \$6,368.37 in checking) and that the PayPal balance was \$513.10. Drew was reimbursed for another year of web hosting. The RASC Handbooks have been ordered. Thirty-three posters have been sold. Keith reported that there were 170 members.

The upcoming meeting for November will be "All I Want for Christmas ..." by Dr Spencer Buckner on Zoom.

The possibility of presenting meetings on Facebook Live was brought up.

Gary and Theo were working on upcoming virtual star parties. The most recent virtual star party had 471 viewers. A very close conjunction of Saturn and Jupiter will occur on December 21, which may be an occasion for a virtual star party if the weather allows. Dyer appears to be a good location for this.

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

Respectfully submitted,

Bud Hamblen
Secretary

Next Membership Meeting:

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

Gary Eaton:
*"A Beginner's Guide to Seeing
25 Amazing Objects in the Night Sky"*

Zoom link will be posted to bsasnashville.com

Barnard-Seyfert Astronomical Society Minutes of the Monthly Membership Meeting Held On Wednesday, November 18, 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, November 11, 2020. About 20 participants zoomed in.

Keith Rainey called the meeting to order at 7:30 PM and asked for a vote to adopt the minutes for the September meeting. Theo Wellington moved the question, Dr Spencer Buckner seconded, and the minutes were adopted. Theo Wellington reported that there was \$10,790.46 in the Suntrust account and \$532.07 in the PayPal account. Keith reported that there were 171 members. Theo reported that there were 1,876 “likes” and 2,009 “follows” for the BSAS on Facebook, and 258 followers on Twitter.

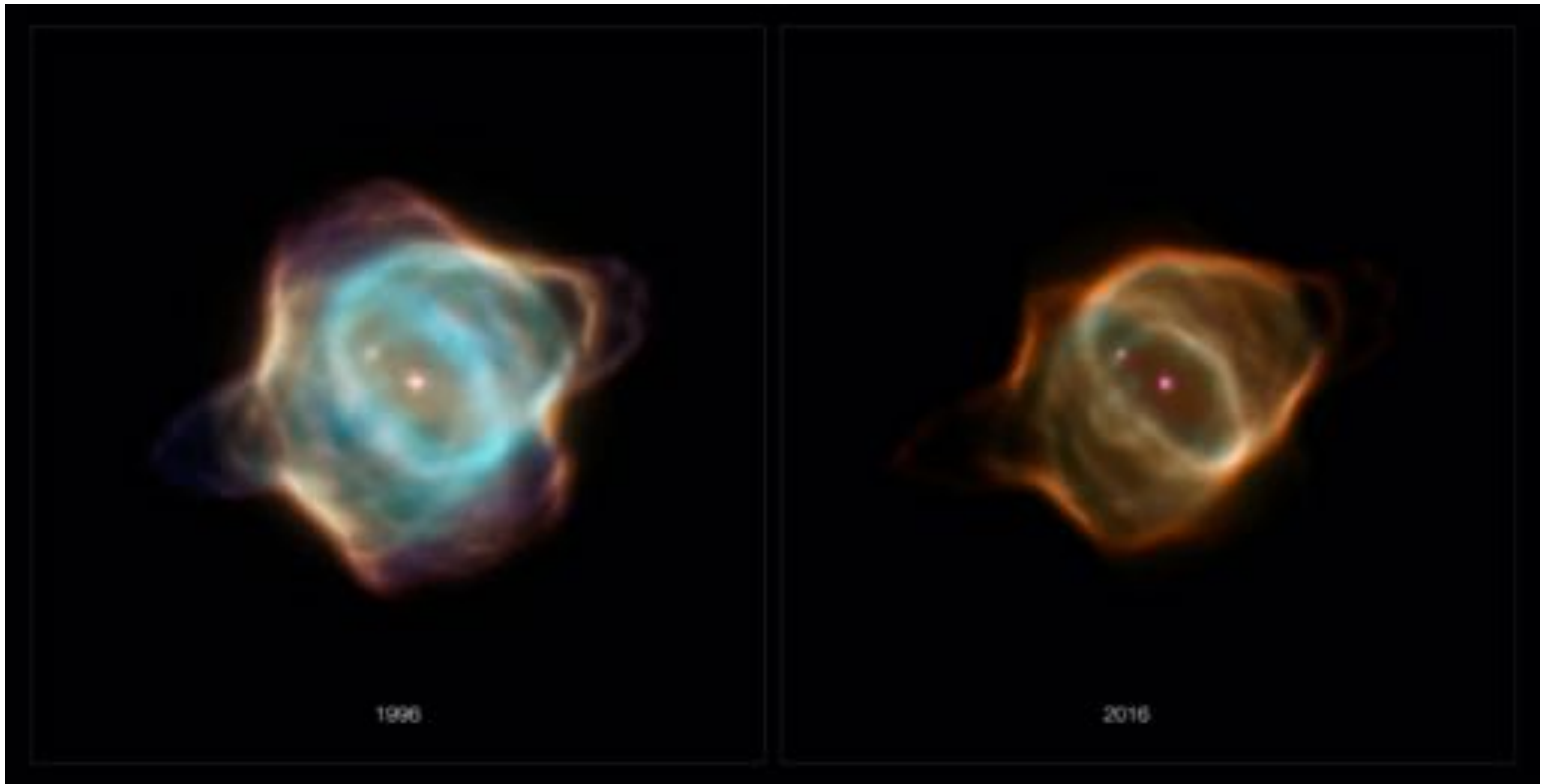
Spencer presented “All I Want for Christmas ...”, suggestions for fun astronomy toys.

The being no further business, the meeting was adjourned at 9 PM.

Respectfully submitted,

Bud Hamblen

Secretary



Archival data from the NASA/ESA Hubble Space Telescope reveal that the nebula Hen 3-1357, nicknamed the Stingray nebula, has faded precipitously over just the past two decades. Witnessing such a swift rate of change in a planetary nebula is exceedingly rare, say researchers.

These images captured by Hubble in 1996 (left), when compared to Hubble images taken in 2016 (right), show a nebula that has drastically dimmed in brightness and changed shape. Bright blue shells of gas near the centre of the nebula have all but disappeared, and the wavy edges that earned this nebula its aquatic-themed name are virtually gone. The young nebula no longer pops against the black velvet background of the distant Universe.

Credit: NASA, ESA, B. Balick (University of Washington), M. Guerrero (Instituto de Astrofísica de Andalucía), and G. Ramos-Larios (Universidad de Guadalajara)



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.