

The ECLIPSE

December
2018

The Newsletter of the Barnard-Seyfert Astronomical Society

Next Membership Meeting:

December 19, 2018, 6:30 pm

Cumberland Valley
Girl Scout Council Building
4522 Granny White Pike

Topic: *Potluck and Silent Auction;*
Dr. Billy Teets,
Vanderbilt University

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From the President

Greetings,

I trust each of you had a great Thanksgiving holiday and are looking forward to more time of celebration with friends and family in the weeks ahead. As most of you know, BSAS is managed by an eleven-member board of directors. With the new year right around the corner, it's time for BSAS to elect a new slate of board members. Each year we typically need officers and two new board members to serve three-year terms. It has been my honor to serve as President for the past two years, but I sense it is time for me to hand over the leadership of the organization. At our November meeting I presented the names and positions the board would like to nominate:

President	Keith Rainey
Vice President	Tom Beckerman (new)
Treasurer	Theo Wellington
Secretary	Bud Hamblen
At Large	Chip Crossman (new)
At Large	Andy Reeves (new)
At Large	KC Katablas
At Large	Johanna Keohane
At Large	Drew Gilmore
At Large	Todd Nannie
Ex-Officio	Gary Eaton

There were no other nominations submitted from the floor at the meeting. At our December 19th meeting we will vote on these names. Serving on the board takes time and commitment. We are thankful for their willingness. Many thanks also go to Tom Guss, Mike Benson and Spencer Buckner who will be rotating off the board. Their service has been invaluable and much appreciated.

Our December meeting will feature Dr. Billy Teets, Outreach Astronomer for Vanderbilt Dyer Observatory. And, we will hold our annual pot-luck dinner that evening. BSAS



Officers

Gary Eaton
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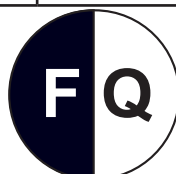
Venus and the Moon 12/3/18
Theo Wellington

Upcoming Star Parties

Saturday 12/8	Private Star Party Natchez Trace Parkway mile marker 412 (Water Valley Overlook)
Saturday 12/15 6:30 pm to 8:30 pm	Public Star Party Shelby Bottoms Nature Center
Saturday 1/5	Private Star Party Natchez Trace Parkway mile marker 435.3
Friday 1/11 6:30 pm to 8:30 pm	Public Star Party Bells Bend Outdoor Center



Dec 7
Jan 5



Dec 15
Jan 14



Dec 22
Jan 20



Dec 29
Jan 27

Happy Birthday Johannes Kepler by Robin Byrne

This month I get to honor the person responsible for my interest in astronomy. Johannes Kepler showed the world (and me) the orderly and beautiful way the planets behave in their orbits.

Johannes Kepler was born prematurely on December 27, 1571 in Weil der Stadt, Germany. His premature birth led to a lifetime of health problems. His family was poor. Under those circumstances, it was rare for a child to receive much education. Kepler was fortunate enough to take advantage of a government scholarship allowing intelligent, yet poor, children to go to college.

In 1587, Kepler began attending the University of Tübingen to study astronomy. He was fortunate to have as his instructor one of the few astronomers who believed in the Copernican system (all planets orbit the Sun and the Earth rotates on its axis) instead of the Ptolemaic system (everything orbits the Earth and the Earth is stationary). This early influence led to Kepler's later discoveries. In 1588, he received his Bachelor of Arts degree and, in 1591, his Master of Arts degree.

Kepler had originally planned to become a Lutheran minister and was planning to continue studying theology. However, a position at a nearby school for a math teacher opened up. Kepler's colleagues convinced him to take the position.

Kepler's mathematical interests were to lead to his first recognition. In 1595, he tried to relate the orbits of the planets around the Sun to the five geometric solids (pyramid, cube, octahedron, dodecahedron, and icosahedron). He thought he could represent each orbit by having a different solid placed between orbits. He published his work in 1596 in a book titled *Cosmographic Mystery*. Kepler sent copies to various people, including Tycho Brahe. Brahe was so impressed, he invited Kepler to join his research staff. When Brahe died a year later, Kepler took over his position as imperial mathematician.

Kepler was in charge of making sense of Brahe's observations of Mars. But before he began working on this data, he wanted to first explore how light is refracted (bent) through Earth's atmosphere. This slight bending would change where an object is observed. By correcting for this bending, Kepler could state exactly where the planet was at any given time. In his publication, Kepler not only did this, but also explained how the human eye works and how telescope optics work.

Once these corrections were made, Kepler began work on the orbit of Mars. Up to this point everyone believed that the planets were perfect and moved in perfect circles. Try as he might, Kepler could not get the orbit of Mars to match



Johannes Kepler, continued

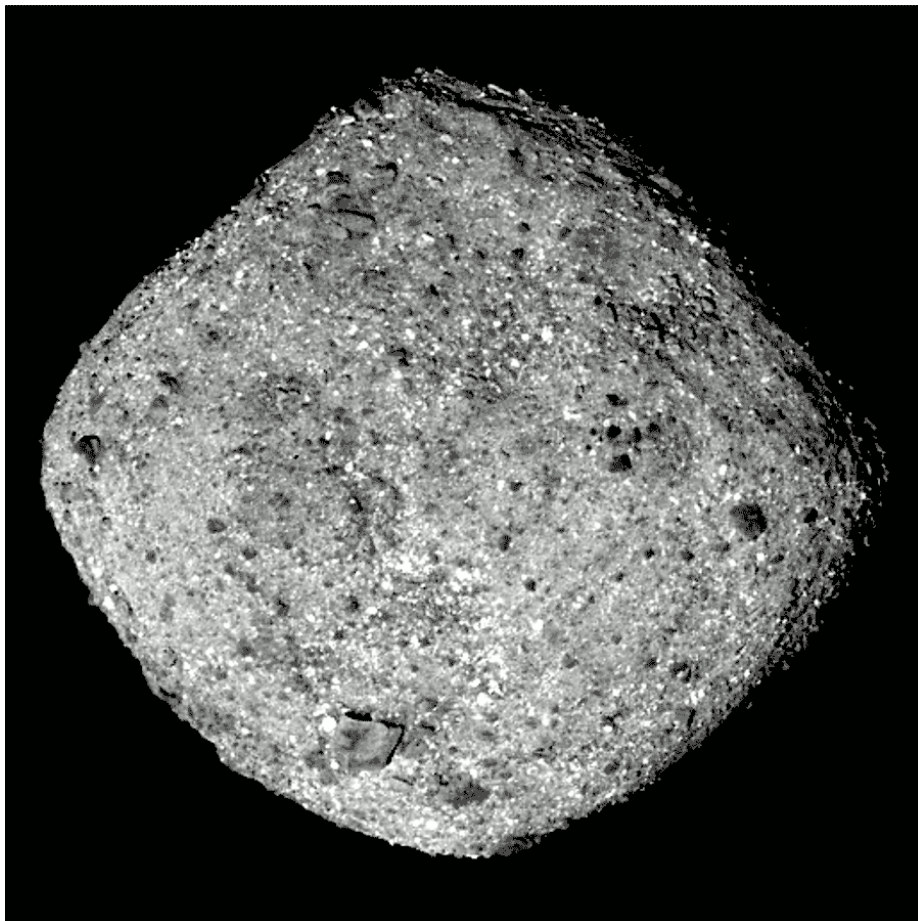
a circle perfectly. Not even by using circles on circles. Instead, what he found was that the orbit was an ellipse with the Sun at one focus. This statement, which applies to all planets, is known as Kepler's First Law. It was also thought that the planets would move at constant speeds. There is a constancy to how the planets move, but it is not their speeds. It turns out that if you connect the planet and the Sun with a line, as the planet orbits, the area swept out by the line sweeps out equal areas in equal times. This means that as the planet gets closer to the Sun, it moves faster, and as it gets farther, it moves slower. This is Kepler's Second Law and the astronomical idea that got me hooked. This was the first time I realized that objects behave in an orderly manner that can be described simply. These two discoveries were published in 1609 in a book titled *New Astronomy*. In 1619, Kepler published his Third Law relating a planet's distance and period of orbit: the square of the period is proportional to the cube of the distance.

Kepler's personal life was not nearly as orderly or well defined. He married three times. His first wife had died. Little mention is made of his second wife. Also, his mother was accused of being a witch. Thanks to Kepler's defense, his mother was acquitted. Even after death Kepler could get no peace. His grave was completely destroyed during the 30 Years' War.

Johannes Kepler brought astronomy into a new era by showing the orderly way planets behave. Meanwhile, I owe my career to Kepler for showing me how beautiful nature can be, and the amazing fact that we can describe it all with simple equations and ideas. Thank you Johannes Kepler.

Reference:

The New Encyclopaedia Britannica



After traveling through space for more than two years and over two billion kilometers, NASA's Origins, Spectral Interpretation, Resource Identification, Security-Regolith Explorer (OSIRIS-REx) spacecraft arrived at its destination, asteroid Bennu, on Monday, Dec. 3, 2018. The spacecraft will spend almost a year surveying the asteroid with five scientific instruments with the goal of selecting a location that is safe and scientifically interesting to collect the sample. OSIRIS-REx will return the sample to Earth in September 2023.

Credits: [NASA's Goddard Space Flight Center/University of Arizona](#)

Observe Apollo 8's Lunar Milestones By David Prosper

December marks the 50th anniversary of NASA's Apollo 8 mission, when humans first orbited the Moon in a triumph of human engineering. The mission may be most famous for "Earthrise," the iconic photograph of Earth suspended over the rugged lunar surface. "Earthrise" inspired the imaginations of people around the world and remains one of the most famous photos ever taken. This month also brings a great potential display of the Geminids and a close approach by Comet 46P/Wirtanen

You can take note of Apollo 8's mission milestones while observing the Moon this month. Watch the nearly full Moon rise just before sunset on December 21, exactly 50 years after Apollo 8 launched; it will be near the bright orange star Aldebaran in Taurus. The following evenings watch it pass over the top of Orion and on through Gemini; on those days five decades earlier, astronauts Frank Borman, Jim Lovell, and Bill Anders sped towards the Moon in their fully crewed command module. Notice how the Moon rises later each evening, and how its phase wanes from full on Dec 22 to gibbous through the rest of the week. Can you imagine what phase Earth would appear as if you were standing on the Moon, looking back? The three brave astronauts spent 20 sleepless hours in orbit around the Moon, starting on Dec 24, 1968. During those ten orbits they became the first humans to see with their own eyes both the far side of the Moon and an Earthrise! The crew telecast a holiday message on December 25 to a record number of Earthbound viewers as they orbited over the lifeless lunar terrain; "Good night, good luck, a merry Christmas and God bless all of you - all of you on the good Earth." 50 years later, spot the Moon on these holiday evenings as it travels through Cancer and Leo. Just two days later the astronauts splashed down into the Pacific Ocean after achieving all the mission's test objectives, paving the way for another giant leap in space exploration the following year.



Caption: Earthrise, 1968. Note the phase of Earth as seen from the Moon. Nearside lunar observers see Earth go through a complete set of phases. However, only orbiting astronauts witness Earthrises; for stationary lunar observers, Earth barely moves at all. Why is that?

Credit: Bill Anders/NASA

The Geminids, an excellent annual meteor shower, peaks the evening of December 13 through the morning of the 14th. They get their chance to truly shine after a waxing crescent Moon sets around 10:30 pm on the 13th. Expert Geminid observers can spot around 100 meteors per hour under ideal conditions. You'll spot quite a few meteors by avoiding bad weather and light pollution if you can,

continued on next page

Apollo 8, continued

and of course make sure to bundle up and take frequent warming breaks. The Geminids have an unusual origin compared to most meteor showers, which generally spring from icy comets. The tiny particles Earth passes through these evenings come from a strange “rock comet” named asteroid 3200 Phaethon. This dusty asteroid experiences faint outbursts of fine particles of rock instead of ice.

You can also look for comet 46P/Wirtanen while you're out meteor watching. Its closest approach to Earth brings it within 7.1 million miles of us on December 16. That's 30 times the average Earth-Moon distance! While passing near enough to rank as the 10th closest cometary approach in modern times, there is no danger of this object striking our planet. Cometary brightness is hard to predict, and while there is a chance comet 46P/Wirtanen may flare up to naked eye visibility, it will likely remain visible only via binoculars or telescopes. You'll be able to see for yourself how much 46P/Wirtanen actually brightens. Some of the best nights to hunt for it will be December 15 and 16 as it passes between two prominent star clusters in Taurus: the Pleiades and the V-shaped Hyades. Happy hunting!

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.org 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!



A Soyuz booster rocket launched the Soyuz MS-11 spacecraft from the Baikonur Cosmodrome in Kazakhstan on Monday, Dec. 3, 2018, carrying Soyuz Commander Oleg Kononenko of Roscosmos, and astronauts Anne McClain of NASA and David Saint-Jacques of the Canadian Space Agency into orbit to begin their six and a half month mission on the International Space Station.

Image Credit: [NASA/Aubrey Gemignani](#)

DEEP SKY DAZE
by Mike Benson
ocentaurus@aol.com

This column has been absent for the past two months due to health problems. I have recovered now and will present the final chapter of the Messier list. This should have been in the October issue, so the objects will all be in the western sky and will need to be picked off pretty early in the evening before they drop below the horizon.

It's time for a last look at Saturn for a while as it starts the month low in the west and mostly in the dusk. By mid-month it will be too low to capture. It will be a while before its reappearance in the morning sky, so enjoy it now.

Mars is nearly due south much of the month and presents a nice target, although a small one as the disk shrinks from 9" to 7½" during December. Uranus and Neptune are both in the same general area.

It's a great month for observers of Algol's minimum in brightness. You have four evening opportunities. Minimum occurs as follows:

12/2 – 8:53 pm EST
 12/5 – 7:42 pm
 12/19 – 10:47 pm
 12/22 – 10:36 pm

The longest night of the year is on 12/22.

Hopefully, we all know the Summer Triangle. With the exception of the final Messier object and its associated clusters, tonight's tour will be within the boundaries of that asterism. Find Altair, the most southerly, and the second brightest of the Triangle. The name means "Flying Eagle", and it is usually said to represent the eye of Aquila. It's an unusual star in that it rotates very rapidly, completing a revolution every 6.5 hours. As a result its equator has about twice the diameter of a line drawn around it through the poles. Imagine; a sun that looks like a pincushion! From Altair, shift 10° due north where you will find Sagitta, the arrow, pointing NE. Binoculars will make this an easy find. **M-71 (NGC 6838)** is located about midway between Gamma (the tip of the arrow), and Delta (the middle star in the constellation). It's a bit south of a line connecting the stars. At 9 Mag it's fairly bright and resolves pretty well in a light bucket. This globular cluster is not round and in some conditions, almost looks like a rich, open cluster.

Now center your scope on Gamma and shift north three degrees, and a bit east for **M-27 (NGC 6853)**, the Dumbbell Nebula. I don't need to describe it, just sponge in those beautiful photons! While you're in the area, use your binoculars again to find the **Coathanger** (Brocchi's Cluster). This beautiful asterism is about 2° wide and can be found about 4° NW of the two stars marking the feathers on Sagitta.

For the next object, **M-56 (NGC 6779)**, we jump out of the Great Rift and into the Milky Way, so there will be a bit of star hopping. Find Albireo (Beta Cygni), the head of the Swan and enjoy the blue/gold contrast of this binary. Then swing 2° NW to 5 Mag 2 Cygni. Continue about the



Brocchi's Cluster

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DEEP SKY DAZE, continued

same distance, but a bit more to the west to find this globular. I've seen it listed both 8 and 10 Mag. The former is probably the visual figure, because it's not all that difficult to see. I started to get some resolution in my 8" at 200X. Clint Bach did about as well in his 12.5. The difference was the seeing. His was average and my night was one of the better ones.

M-57 (NGC 6720) is known to almost anyone who knows how to point a telescope. The Ring Nebula is to be found midway between the stars marking the end of the parallelogram in Lyra, furthest from Vega.

Swing back into Cygnus to Gamma, the central star in the Northern Cross asterism. **M-29 (NGC 6913)** is about 1.5° SSE of this star. This open cluster is small and a bit of a hunt through the Milky Way. About a half degree NNE of Gamma is Herschel's **NGC 6910**, an even more difficult find. This open cluster has a remarkable double star whose dim, rosy secondary stuck out at me for some reason. Also there's lots of nebulosity.

Finally, head for Deneb, the most northeasterly of the Triangle. Swing SE across **NGC 7000** (North American Nebula). Trace the shapes of the Gulf of Mexico and Florida, at least. Then find Xi Cygni to the east of the Nebula. **M-39** is almost 7 degrees NE of Xi. It's so large, I found it most interesting in my 8X50 finder scope. It's triangular in shape. About 1.5° SSW is **NGC 7082**, large and rich; and to close, **NGC 7062**, a small, dim open cluster, but very pretty on a good night, is about 1° SW of 7082.



M-29



M-56

If you have saved the articles since November 2017, you have a complete set of data for the Messier objects. A bit of work and you can present your written observations to me for vetting and a Messier Program pin and certificate. If you are missing segments, they are available on our website: www.bsasnashville.com/eclipse/.

Once again, if you have ideas for future articles, please email me at: ocentaurus@aol.com.

I wish you all a Merry Christmas and a Happy New Year.

Image Credits:

[Brocchi's Cluster](#): Petr Novák

[M-56](#): Hewholooks

[M-29](#): Js Schulman555

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

The regular meeting of the Board of Directors of the Barnard-Seyfert Astronomical Society was held November 7, 2018, at the Girl Scout Center, 4522 Granny White Pike, Nashville, TN 37204. Signing in were board members Mike Benson, Spencer Buckner, Gary Eaton, Drew Gilmore, Bud Hamblen, K C Katalbas, Keith Rainey and Theo Wellington. A quorum was present and Gary called the meeting to order at 7:30 PM. Gary asked for a motion to adopt the minutes of the October 3, 2018, board meeting as published in the November, 2018, edition of the Eclipse. Theo so moved, Keith seconded, and the minutes were adopted without further discussion, by unanimous voice vote. The checking account had \$4,574.15 and the savings account had \$4,157.28. There was \$329 in the PayPal account. There were 142 members.

Spencer will present on astronomy toys for Christmas at the November general meeting.

The silent auction will be held at the December meeting. The club will provide entre'es, soft drinks, ice, plates, napkins, cups, plasticware. Members will provide side dishes and desserts.

Ron Ladd has a home about 2 miles from the Natchez Trace Water Valley Overlook that might be available to host a club event.

On social media, it was noted that the BSAS has 1,431 Facebook followers and 1,384 likes.

New brochures have been ordered.

Nominations for the board included:

Keith Rainey, President
Tom Beckerman, Vice President
Theo Wellington, Treasurer
Bud Hamblen, Secretary
Chip Grossman, at-large
Andy Reeves, at-large
Gary Eaton, ex-officio

There being no further business, Gary asked for a motion to adjourn. Spencer so moved, Theo 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, November 28, 2018.**

The Barnard-Seyfert Astronomical Society held its monthly general meeting at the Girl Scout Center, Nashville, Tennessee, on Wednesday, November 28, 2018. Twenty-two members and guests signed in. President Gary Eaton called the meeting to order at 7:30 PM. Gary asked for a motion to adopt the minutes of the October 17, 2018, meeting and the minutes were adopted without discussion. Bud Hamblen reported that there was \$4,574.15 in the checking account and \$4,157.55 in the savings account. Gary Eaton recognized visitors Gary, Dave and Michelle.

Gary announced the board's nominations for new officers and at-large members:

Keith Rainey, President
Tom Beckerman, Vice President
Theo Wellington, Treasurer
Bud Hamblen, Secretary
Chip Grossman, At-Large
Andy Reeves, At-Large

and asked for other nominations from the floor. None were offered. The final vote will be held at the December general meeting on December 19, 2018.

Continuing their current terms are:

Drew Gilmore
K C Katalbas
Johanna Keohane
Todd Nannie

Gary Eaton will be an ex-officio member.

Gary announced a private star party on December 8 at Natchez Trace Mile Marker 412 (Water Valley Overlook) and a public star party on December 15 at Shelby Bottoms Nature Center.

Gary announced the annual pot-luck dinner at the December general meeting, and asked for members to bring side dishes and desserts. The annual silent auction will be held during the meeting and members were asked to bring items to donate to the auction.

Dr Spencer Buckner presented "All I Want for Christmas ..."

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

Respectfully submitted,

Bud Hamblen
Secretary

From the President, continued

will provide the meats and drinks. The meeting will start an hour earlier than usual (6:30 PM) to allow plenty of time for socializing around the meal. We will also hold our annual silent auction as a fundraiser for BSAS. If you have any astronomy related items you can donate, that would be great. Our members love all things astronomy related: telescopes, eye pieces, accessories, astrophotography gadgets, astronomy books and magazines, whatever. It's a great cause and your generosity is appreciated.

If you purchased an RASC Observer's Handbook for 2019 or Astronomy Magazine's Deep Space Mysteries 2019 Calendar through BSAS and were not able to pick it up at the November meeting, we will have them available for you at the December meeting. To prevent having extra copies, we did not order any extra copies so if you did not order through BSAS, and still want one, you will need to handle that yourself.

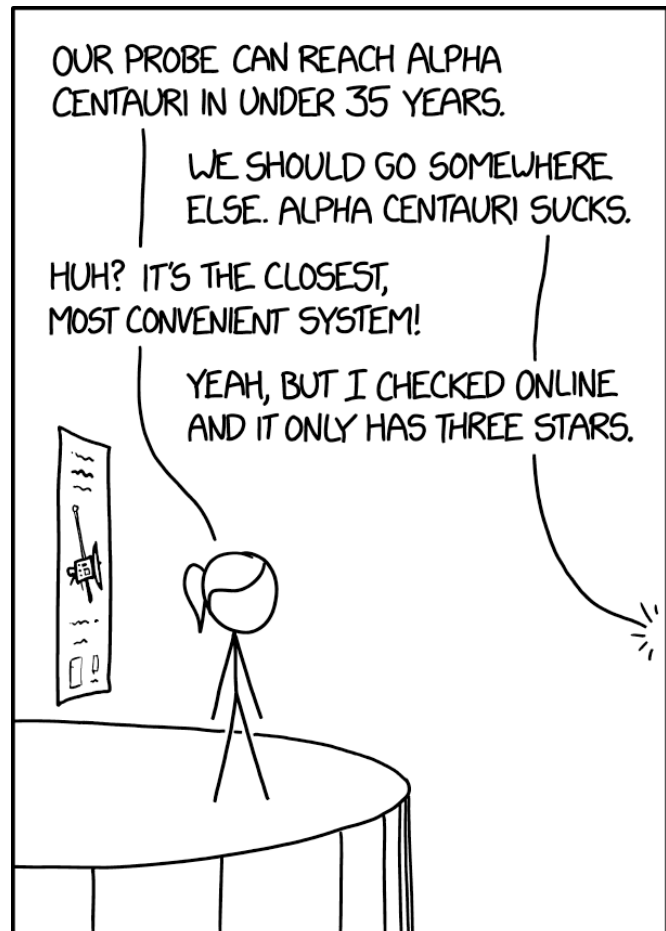
Gary Eaton

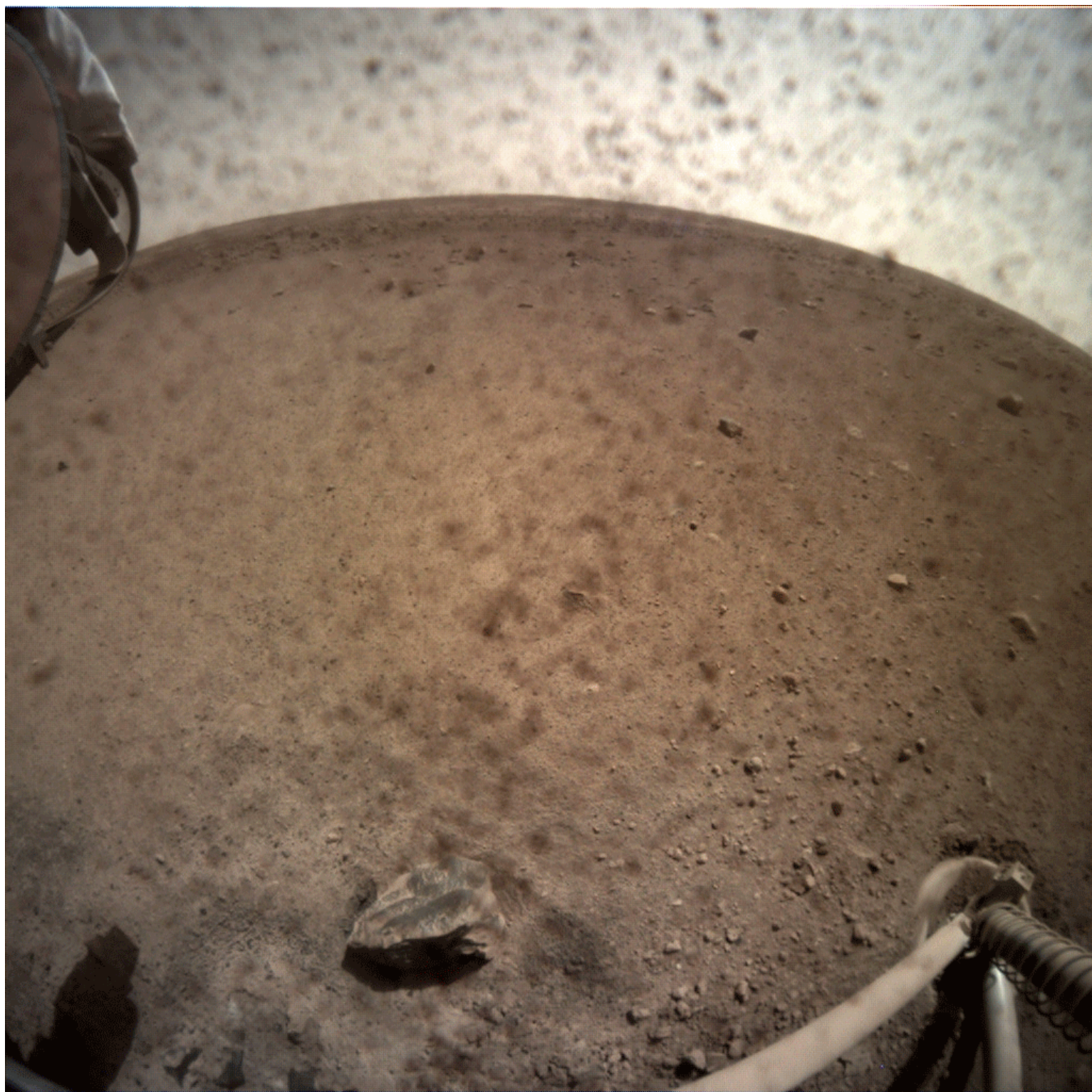
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**Next BSAS meeting
December 19, 2018, 6:30 pm**

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

*Annual Potluck and Silent Auction
Dr. Billy Teets, Vanderbilt University*





NASA's InSight spacecraft flipped open the lens cover on its Instrument Context Camera (ICC) on Nov. 30, 2018, and captured this view of Mars. Located below the deck of the InSight lander, the ICC has a fisheye view, creating a curved horizon. Some clumps of dust are still visible on the camera's lens. One of the spacecraft's footpads can be seen in the lower right corner. The seismometer's tether box is in the upper left corner.

Credit

[NASA/JPL-Caltech](#)



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.