

The ECLIPSE

April
2016

The Newsletter of the Barnard-Seyfert Astronomical Society

Next Membership Meeting:

April 20, 2016, 7:30 pm
Cumberland Valley
Girl Scout Council Building
4522 Granny White Pike

Topic: "What's Up?" -
Gary Eaton and Terry Reeves
Details on page 5

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From the President:

Good news! You can now renew your membership online! You can use any credit card or your paypal account, but now you have an alternative to mailing in a check or paying in person at a meeting. You just go to our membership page <http://www.bsasnashville.com/membership/>. Look for the "Joining BSAS" section, go to the submit payment part. Use the drop down menu to choose your member level, and click Buy Now. Log into your Night Sky Network account and you can also make sure your information is correct and check when your renewal date is, as well as taking advantage of the resources on that site.

There are several daytime opportunities to spread astronomy in Middle Tennessee. April 2 we have a table at the Bells Bend Outdoor Recreation Festival, 9:00am - 3:30pm. April 23 is Earth Day at Centennial Park. Come on out and spend time talking about BSAS, astronomy, telescopes, light pollution...and just enjoying the day. Please let me know if you plan to be there what hours you can staff the table.

We had to cancel our January learn to use your new telescope workshop, so we will instead do this April 16th at the Warner Park Nature Center. From 2-4pm we have a classroom reserved to help get telescopes out of the box and closets and ready to view the night sky. Everyone is welcome to come and help OR come with questions about telescopes. We should have a few example telescopes set up, you can also bring your own. Later that evening (weather permitting) we'll have a star party at the Warner Park model airplane field, just down Old Hickory from the Nature Center (turn right onto Vaughn Road, the entrance is on the left).

It's not too late to come out to Pickett State Park for the Astronomy Weekend April 1-3, 2016. Call the park to see what is available, 931-879-5821.

Getting excited for the 2017 Eclipse? We'll shortly be only 500 days out. If you are not at Pickett, check out a free public talk at the Adventure Science Center on April 2nd at 1pm by Andrew Fraknoi, chair of the astronomy department



Officers

Theo Wellington
President

tmwellington@comcast.net

Gary Eaton
Vice-President

gceaton@comcast.net

Tom Guss
Treasurer

t_guss@bellsouth.net

Bud Hamblen
Secretary

wrhamblen@comcast.net

(no one)
Ex-officio

Directors at Large

Mike Benson
ocentaurus@aol.com

Spencer Buckner
BucknerS@apsu.edu

Jeffrey Horne
Jeffrey.Horne@gmail.com

Rob Mahurin
robert.s.mahurin@gmail.com

Kris McCall
planetmccall@gmail.com

Kathy Underwood
katy2222@comcast.net

Newsletter Editor
Drew Gilmore
eclipse@bsasnashville.com

Observing Highlights April and May

Open Clusters

M36, M37, M38, M35,
NGC2264 (*Christmas Tree*),
M41, M50, M47, M46, M93, M48,
M44 (*Beehive*), M67,
Mel111 (*Coma Star Cluster*),
NGC4755 (*Jewel Box Cluster*)

Nebulae

NGC1499 (*California*), M1,
M42 (*Orion*), M43, M78,
NGC2392 (*Eskimo*),
NGC3242 (*Ghost of Jupiter*),
M97 (*Owl*)

Multiple Star Systems

Beta Orionis (*Rigel*),
Alpha Geminorum (*Castor*),
Gamma Leonis (*Algieba*),
M40, Gamma Virginis (*Porrina*),
Alpha Canum Venaticorum
(*CorCaroli*),
Zeta Ursae Majoris (*Mizar*)

Variable Stars

R Leporis (*Hind's Crimson Star*),
U Orionis, L Puppis, R Leonis

Globular Clusters
M79, M53, M3

Galaxies

M81, M82,
NGC3115 (*Spindle Galaxy*), M95,
M96, M105, M108,
M65/M66/NGC3628 (*Leo Triplet*),
M109, M98, M99, M106, M61, M100,
M84, M85, M86, M49, M87,
M88, M91, M89, M90, M58, M68,
M104 (*Sombrero Galaxy*),
M59, M60, M94,
M64 (*Black-Eye Galaxy*),
M63 (*Sunflower Galaxy*),
M51 (*Whirlpool Galaxy*),
M83

Upcoming Star Parties

Saturday 4/9	Private Star Party Natchez Trace Parkway mile marker 435.3
Saturday 4/16 8:30 - 10:30 pm	Public Star Party Edwin Warner Park
Saturday 5/7	Private Star Party Natchez Trace Parkway mile marker 412 (Water Valley Overlook)
Friday 5/13 8:30 pm - 10:30 pm	Public Star Party Bells Bend Outdoor Center



Apr 7
May 6



Apr 13
May 13



Apr 22
May 21



Apr 29
May 29

Book Review: A History of Pi

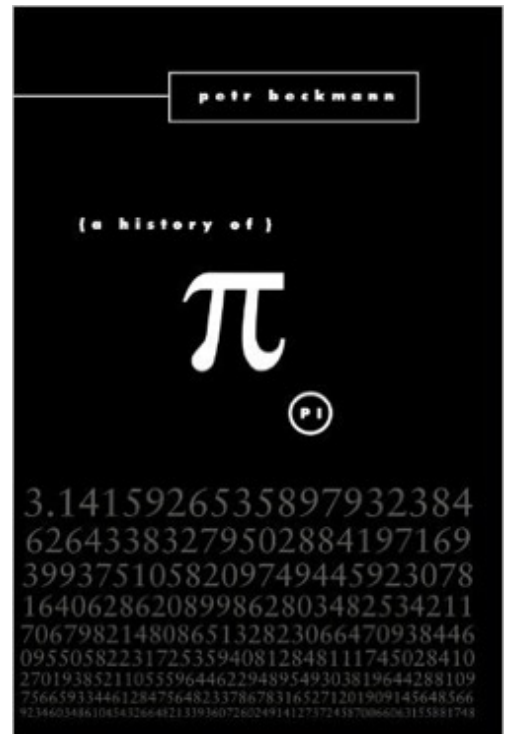
Reviewed by Robin Byrne

Let's take another trip to ye olde bookshelf and see what we might find. "A History of Pi" by Petr Beckmann is a look at how we determined the value of a number that is taken for granted. Beckmann is an electrical engineer with an interest in both mathematics and history. He takes us on an historical journey through the discoveries that ultimately lead to finding an accurate value for pi.

The earliest technique was likely a physical method. Draw a circle, use a piece of rope to measure the diameter, then see how many lengths of that rope would complete one trip around the circle. This would yield, approximately, a value of 3. Good enough for the time, and that value became the one used in the Bible. (As a side note, some state legislatures tried to pass a law fixing the value of pi to the Biblical amount. That didn't fly.)

The next method came along as mathematics advanced. The early Greeks were responsible for many discoveries in geometry, so it was natural that they would be interested in finding a more accurate value of pi. Their approach was to "square the circle," which means to find a geometrical shape (preferably a square) which has the same area as the given circle. Knowing the area would then allow for the determination of pi. Many versions of this were attempted for centuries, and many approximations for pi were found. All of these values were quite similar and acceptable for practical purposes. (Historical aside: You might think that because pi is a Greek letter, it must have been the Greeks who proposed the symbol. Instead, it was a little-known mathematician, William Jones, who first used it in one of his publications, in 1706. However, due to his obscurity, it didn't catch on until 1737, when Leonard Euler used the symbol in his writings.)

The third stage in the hunt for pi was to use mathematical equations to find its value. During the Renaissance, a wide variety of infinite series equations were developed, using trigonometry. This became the age of calculating, by hand, as many digits as possible. Various records were achieved and broken as each person took the challenge to more and more digits, reaching hundreds of decimal places.



A History of Pi, continued

With the development of calculus, more techniques (and digits) were discovered. Now the goal was to find a series that would converge on the value of pi in the fewest number of steps. A whole slew of Who's Who in mathematics worked on this problem, including Newton, Leibniz, Huygens, Pascal, Gauss, and Euler. Last came the era of computers, which can brute force their way to as many digits as desired. The current record is around 13 trillion digits.

But the more interesting question for mathematicians moved from calculating more and more digits, to determining what kind of number is pi? Fairly early on, it was found that pi was not rational, which means it cannot be determined by a simple ratio of two numbers (that's why they resorted to various infinite series to find the value). The next question was whether pi was transcendental, which means it is not even the root of an algebraic equation. It turns out that pi is, indeed, transcendental. One consequence of that discovery is the conclusion that you can never "square the circle." So much for the early attempts.

Overall, I enjoyed this book, with some caveats. First, it's a topic I hadn't even considered as an area of discovery. We take pi so much for granted that it feels like we've always known its value. Also, the mathematical history is interesting and reveals topics I had not encountered before. However, if equations give you the willies, you may want to give this book a pass. Honestly, I glossed over the equations without losing the gist of what was going on. Beckmann tends to assume the reader has more than the average amount of mathematical knowledge and seems to leave out the kinds of details that would have made following the equations an easier process. So, I recommend just looking the other way when the equations crop up. My second concern has to do with Beckmann's occasional political commentaries. The book was written in 1971, and Beckmann was originally from Czechoslovakia before taking residence in the United States. During this time, Czechoslovakia was under communist rule, and that has clearly influenced Beckmann's view of politics. In particular, he has a very negative reaction to any society under a similar system of government and immediately dismisses any advancements made in those countries. Expect periodic tirades against totalitarianism.

So, is "A History of Pi" a book for you? If you enjoy the history of discovery and can tolerate discussions of math (with occasional political rants), you will likely enjoy it. If the mention of math gives you the hives, walk away and don't look back.

A History of Pi by Petr Beckmann, St Martin's Press, 1971

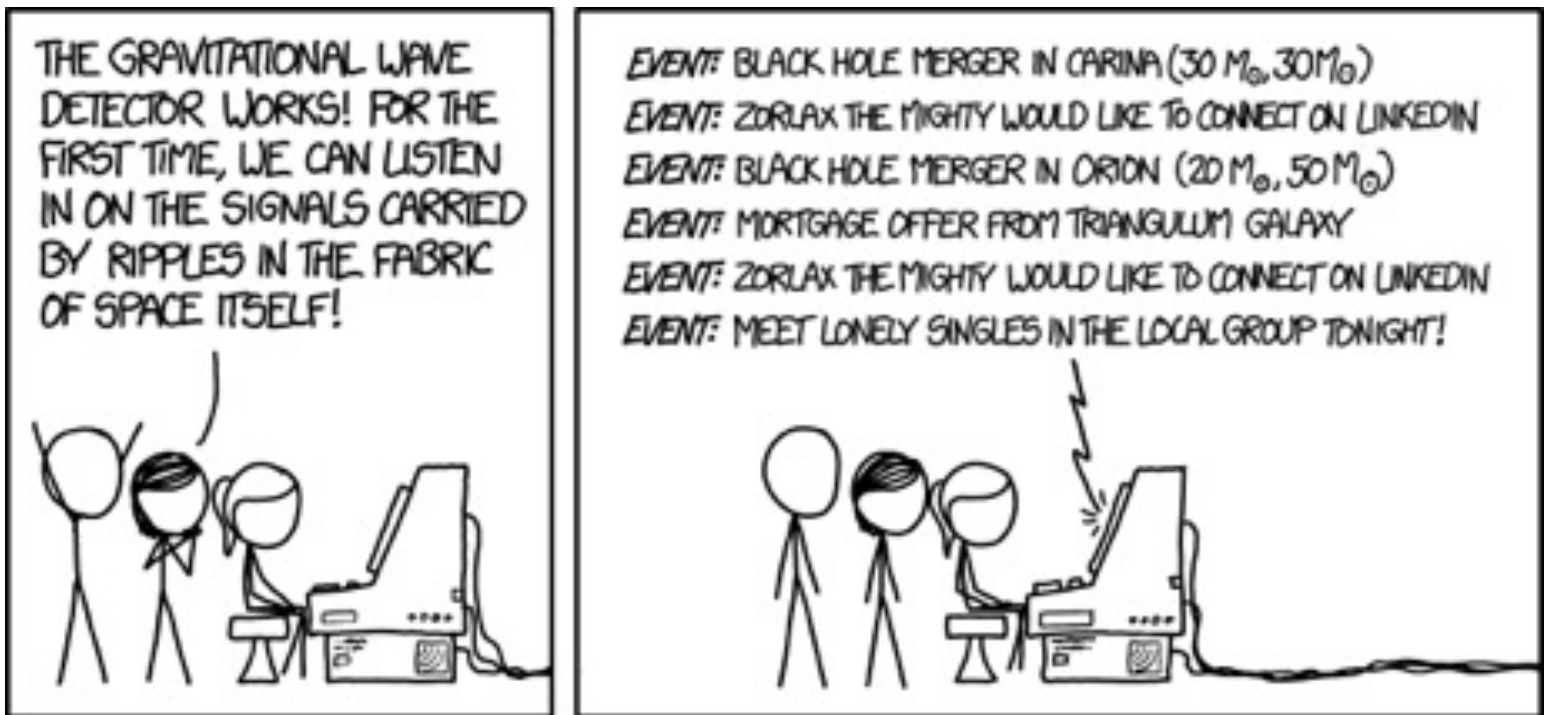
From the President, continued

astronomy department at Foothill College and the co-author of Solar Science: Exploring Sunspots, Seasons, Eclipses, and More. I would also encourage everyone to check out eclipse related sites like eclipse2017.org and greatamericaneclipse.com as well as NASA's page eclipse.gsfc.nasa.gov/SEmono/TSE2017/TSE2017.html to become familiar with the circumstances and resources available...we are all involved in promoting and explaining this once in a lifetime event!

Clear skies,

Theo Wellington

xkcd



<http://xkcd.com/1642/>

Next BSAS meeting
 April 20, 2016, 7:30 pm
 Cumberland Valley Girl Scout Council Building
 4522 Granny White Pike

Topic: "What's Up?" - BSAS members Terry Reeves and Gary Eaton will show us what objects are interesting in the current night sky and tips on how to find them.

**Barnard-Seyfert Astronomical Society
Minutes of a Regular Meeting of the Board of Directors
Held On Wednesday, March 2, 2016.**

The regular meeting of the Board of Directors of the Barnard-Seyfert Astronomical Society was held March 2, 2016, at the Girl Scouts of Middle Tennessee office, 4522 Granny White Pike, Nashville, TN 37204. Present were Mike Benson, Spencer Buckner, Gary Eaton, Tom Guss, Bud Hamblen, Kathy Underwood and Theo Wellington. A quorum being present, Theo Wellington called the meeting to order at 7:35 PM. Spencer Buckner made a motion to adopt the minutes of the February board meeting as printed in the March, 2016, edition of the *Eclipse*. Kathy Underwood seconded, and the minutes were approved by a unanimous voice vote. Tom Guss reported that there was \$1,619.74 in the equipment account and \$1,946.93 in the regular account.

The upcoming 2016 Middle Tennessee Science and Engineering Fair came up for discussion. Theo Wellington proposed that the society offer prizes for astronomy related presentations as in previous years.

Resolution 2016-03-02: Resolve to offer at the 2016 Middle Tennessee Science and Engineering Fair prizes for astronomy-related presentations. First prize is \$100.00 and 1 year membership in the society. Second prize is \$50.00. Motion made by Spencer Buckner and seconded by Gary Eaton was passed by unanimous voice vote. The event is scheduled for March 18-19, 2016, at Wedgewood Academic Center, Belmont University, Nashville, TN.

There being no further business, Spencer Buckner moved for adjournment, Gary Eaton seconded, and the meeting was adjourned at 8:15 PM.

Respectfully submitted,

Bud Hamblen
Secretary

**Show your club pride!
BSAS t-shirts available in Large and X-Large.
\$15, ask at member meeting or star party!**



**Barnard-Seyfert Astronomical Society
Minutes of the Monthly Membership Meeting
Held On Wednesday, March 16, 2016.**

The Barnard-Seyfert Astronomical Society held its monthly membership meeting at the Girl Scouts of Middle Tennessee, 4522 Granny White Pike, Nashville, Tennessee, on Wednesday, March 16, 2016. 28 members and guests signed in. Theo Wellington called the meeting to order at 7:35 PM and recognized our guests. Theo asked for a motion to approve the minutes of the February meeting as presented in the March issue of the *Eclipse*. Chuck Schlemm so moved, Spencer Buckner seconded, and the minutes were approved by voice vote.

Tom Guss reported that the society has \$1,768.17 in the regular account and \$1,519.74 in the equipment account. Theo announced that on-line membership dues payment is now live through the Night Sky Network. Click on the Become a Member link on the society's web page, bsasnashville.com, to start. Frank La Varre will be at the University of Scouting event, March 19, to represent the BSAS. The Middle Tennessee Science and Engineering Fair will be at Belmont University March 18-19. The BSAS is offering prizes for the top two entries relating to astronomy.

Theo announced upcoming events:

A lot is happening on April 2:

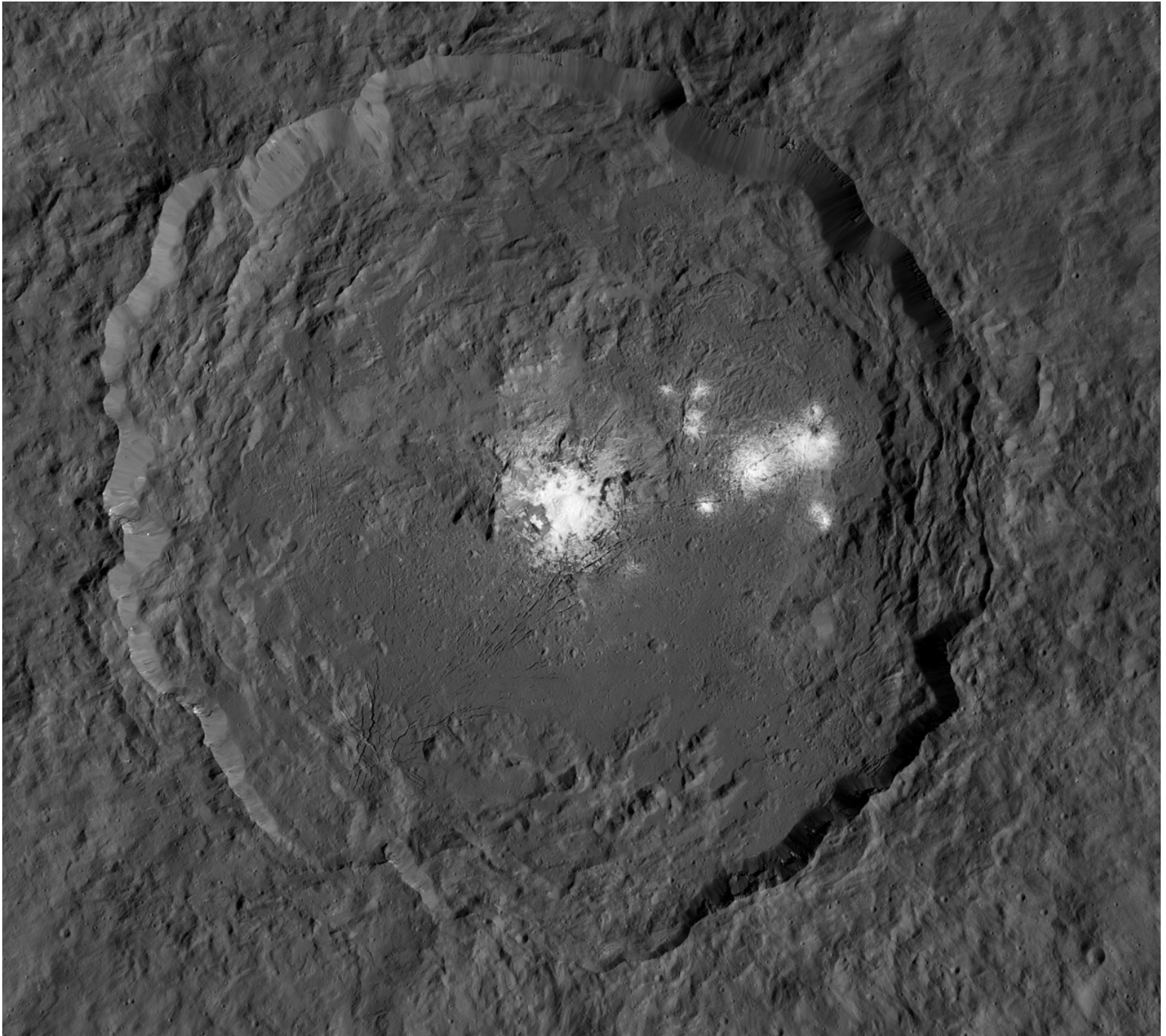
- **April 1-3:** Pickett's Astronomy Weekend, Pickett CCC Memorial State Park, Jamestown, TN.
- **April 2:** 6th Annual Nashville Outdoor Recreation Festival & Expo, Bells Bend Outdoor Center, Nashville, TN. Astronomy Day, Nathan Bedford Forrest State Park, Eva, TN. Talk by Dr Andrew Fraknoi, professor of astronomy at Foothill College, Los Altos Hills, CA, and past president of the Astronomical Society of the Pacific, Adventure Science Center, Nashville, TN.
- **April 9:** Private Star Party, Natchez Trace Mile Marker 435.3.
- **April 16:** Telescope workshop 2-4pm, Edwin Warner Park Nature Center. This is a rain-or-shine indoor event that was postponed from the regular meeting night in January because of bad weather.
- **April 16:** Public Star Party 8:30-10:30pm, Edwin Warner Park Special Events Field, Nashville, TN.

Theo presented a talk on the Juno mission to Jupiter. The spacecraft will arrive at Jupiter on the 4th of July. Mission goals include mapping the gravity and magnetic fields of Jupiter in part to determine the inner structure of Jupiter (is there a silicate core?), determining the amount of water in the atmosphere and gathering data on the deeper layer of the atmosphere. The spacecraft will have an eccentric orbit around Jupiter to minimize the time spent inside Jupiter's radiation belts (like the Earth's Van Allen belts) and has electronics hardened against radiation.

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

Respectfully submitted,

Bud Hamblen
Secretary



Occator Crater, measuring 57 miles (92 kilometers) across and 2.5 miles (4 kilometers) deep, contains the brightest area on Ceres. This region has been the subject of intense interest since Dawn's approach to the dwarf planet in early 2015.

Dawn's close-up view reveals a dome in a smooth-walled pit in the bright center of the crater. Numerous linear features and fractures crisscross the top and flanks of this dome. Prominent fractures also surround the dome and run through smaller, bright regions found within the crater.

The images used to make this mosaic were taken from Dawn's low-altitude mapping orbit (LAMO), 240 miles (385 kilometers) above Ceres.

[Image credit: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA/PSI](#)



Donald Horne 3/21/2016

Moon and Jupiter on 3/21/16, by BSAS Member Donald Horne

Send your cool astrophotos to
eclipse@bsasnashville.com!



APRIL 2, 2016 FROM 9:00AM-3:30PM
BELLS BEND OUTDOOR CENTER

6th ANNUAL

NASHVILLE OUTDOOR RECREATION Festival & Expo

For more information, call 615-862-4187, [facebook](#) Bells Bend Park, [twitter](#) @NashOutdoor

ACTIVITIES

8:00am	Kids Trail Run sponsored by Nashville Running Company
9:00am	Animal Education, Walden's Puddle
10:15am	Kayak Gear 101, Jackson Kayak
10:30-3pm	Hayrides by the Friends of Bells Bend Park
11:30am	Fly-tying with Local Expert, Marty Heil
12:45pm	Fitness Boot Camp, Centennial Sportsplex
All Day	Food & Beverage available for purchase from the Scottsboro Tractor Club
All Day	Archery and Atlatl
All Day	Guided Hikes
All Day	Live Music coordinated by Friends of Bells Bend Park
All Day	Kids Fun Zone

EXHIBITORS



15th ANNUAL NASHVILLE
EARTH DAY
FESTIVAL
 April 23, 2016 Centennial Park 11 AM - 6 PM



Free Event with Educational Exhibits, Green Market, Food Trucks & More!

**Live Music - The Wood Brothers
 With SHEL and Mr. Steve & Friends**

Brought to you by



Ajax Turner, Coca-Cola Bottling, Dynamic Recycling, Land of Nod, oneCITY, Walk/Bike Nashville

www.nashvilleearthday.org



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 or call Theo Wellington at (615) 300-3044.

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.