



The ECLIPSE



The Newsletter of the Barnard-Seyfert Astronomical Society

Organized in 1928

April 2013

The Membership meeting will be held on April 17, 2013 at the Cumberland Valley Girl Scout Council Building located at the intersection of Harding Place and Granny White Pike at 7:30 pm.

Dr. Neil Gehrels of the Goddard Space Flight Center will present a program on "Gamma Ray Bursts and the Birth of Black Holes."

Upcoming Events

Board of Directors Meeting, April 3 at the Cumberland Valley Girl Scout Building – 7:30 pm

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Eclipse photograph by
Francisco Diego

From the President

We can all do science!

One of the positive ways that the modern communication network connects us all is making it possible to do almost instant citizen science. For example, a generation ago it would have taken time for fireball reports to come out of Siberian Russia. Weeks, perhaps, not all that long ago. Today, the fireball is caught by multiple cameras and almost instantly posted to the world. March 23 a fireball streaked across the Eastern Seaboard here in the US, and reports again were almost instant. Some reports are not scientifically useful... "cool!" But enough know to post to the [American Meteor Society's](http://www.americanmeteorology.com) webpage giving time, location, direction and altitude that real science can be done on a near real time basis.

Want to discover an exoplanet? You can sift through the Kepler data yourself... <http://exoplanets.astro.yale.edu/science/citizenscience.php> Globe at Night is a project to document light pollution all over the world..and the next scheduled count of stars in the night sky is coming up March 31- April 9. <http://www.globeatnight.org/>

The Milky Way project lets you try to find structures in the infrared images from the Herschel and Spitzer space telescopes. Humans are still better at pattern matching than machines, and there are way too many images for the researchers to sift.

<http://www.milkywayproject.org/>

There are a lot of ways to get involved and do science. The amount of data that is being generated today from large telescopes and space probes is staggering, and there will be opportunities for anyone that would like to get involved to do so. And not just astronomy...other sciences are also involved in large citizen science projects.

You can be a weather spotter for the National Weather Service...they have free training sessions and believe that live spotters are still very valuable no matter how good the radars are. Report what you felt in an earthquake to the USGS. Measure daily precipitation and report to the [CoCoRaHS](http://www.coCoRaHS.org) network. There are opportunities out there for any age and interest level. Have fun, go out and do science!

Clear dark skies (in short supply lately!)

Theo Wellington

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Observing Highlights April & May

Moon phases

April 2013

04/02 LAST Quarter
04/10 NEW Moon
04/18 FIRST Quarter
04/25 FULL Moon

May 2013

05/02 LAST Quarter
05/09 NEW Moon
05/17 FIRST Quarter
05/24 FULL Moon

Objects:

Globular Clusters
M79, M53, M3

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)

Nebula

NGC1499 (California), M1, M42
(Orion), M43, M78,

NGC2392 (Eskimo), NGC3242 (Ghost of
Jupiter),
M97 (Owl)

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

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

Planets

Jupiter

Star Parties for months of April and May

Fri 4/5 Bowie Park 730 to 930 NM is 4/10 Moon,
Jupiter, Orion Nebula, Pleiades, etc

Sat 4/6 BSAS at Mark's or Trace NM is 4/10 Messier
Marathon Backup or mile marker 412 water valley overlook

Sat 4/13 ASC 730 to 1030 FQ is 4/18 2nd Saturday
- Astronomy Day - Moon, Jupiter, Orion Nebula, Pleiades, etc

Sat 4/20 N.B.F. State Pk 730 to 1030 FQ is 4/18 Nathan
Bedford Forrest S.P. for Waverly Elementary 2nd graders & families

Fri 5/3 Bells Bend 830 to 1030 LQ is 5/2 Jupiter,
Saturn, Beehive cluster, etc

Sat 5/11 BSAS trace NM is 5/10 mile marker
435.5

Sat 5/18 Long Hunter 830 to 1030 FQ is 5/18 Moon and
Saturn

Happy Birthday Pioneer 11

by Robin Byrne

This month we celebrate the anniversary of the launch of a little spacecraft that was a true pioneer. The plan to send two spacecraft to the outer solar system was approved in 1969. Three years later, the first of the pair was launched, and the following year, on April 6 1973, Pioneer 11 began its voyage to Jupiter and Saturn.

In order to achieve the various scientific objectives, the Pioneer spacecraft carried a wide array of scientific instruments. The Helium Vector Magnetometer was used to map out the magnetic field of Jupiter and Saturn. The Quadrispherical Plasma Analyzer measured charged particles originating in the solar wind. The Charged Particle Instrument and the Cosmic Ray Telescope both were used to detect and measure cosmic rays. There were a variety of devices designed to detect charged particles. The Meteoroid Detectors recorded impacts from small particles during the trip to the Jovian planets, and a second device imaged nearby small meteoroids and more distant asteroids. The Imaging Photopolarimeter was responsible for the images obtained of the planets. And the Infrared Radiometer is what was used to measure the cloud top temperatures of the planets and Titan.

Almost exactly one year after launch, Pioneer 11 became only the second spacecraft to fly through the Asteroid Belt. Because the two Pioneers would be the first to make this journey, studying the belt's structure was an important objective that would help future missions to the outer solar system, such as the Voyagers, Galileo, Cassini, and New Horizons.

While Pioneer 10 would be the first to Jupiter, Pioneer 11 would follow-up on its fly-by in November of 1974. Flying as close as 26,600 miles from the cloud tops (three times closer than Pioneer 10), Pioneer 11 obtained detailed images of the Great Red Spot, took the first images of Jupiter's polar regions, and measured the mass of Callisto. During the fly-by, Pioneer 11 was traveling faster than any manmade object had ever moved, at a rate of 171,000 km/h (106,000 mph). This extra speed minimized the effects of radiation as it traveled through Jupiter's magnetic field and the charged particles trapped there. A gravity assist from Jupiter was then used to send the spacecraft on to its next objective: Saturn.

On July 31, 1979 Pioneer 11 became the first spacecraft to visit Saturn. At its closest approach, it flew within 21,000 km from Saturn's cloud tops. At Saturn, Pioneer 11 would study its magnetic field, measure the temperature of both Saturn and Titan, study the composition and structure of Saturn's upper atmosphere, provide detailed information about the ring system, and determine accurate masses of Saturn and its moons. While Pioneer 11 was traveling toward Saturn, both Voyager 1 and 2 had already begun their journey to the outer solar system. Voyager 2 was scheduled to travel through Saturn's rings plane. In order to be sure that maneuver was safe, Pioneer 11 got to blaze the trail and test it out first. Finding no damaging particles along the path gave Voyager the go ahead to stay on course. Had the trajectory been altered, Voyager 2 would not have been able to go on to visit Uranus and Neptune.

While at Saturn, Pioneer 11 had an unexpected close encounter with one of Saturn's moons, coming within 4000 km (2500 miles). However, which moon it was is unknown, because there are two moons that follow the same orbital path: Epimetheus and Janus. Pioneer 11 is credited with discovering Epimetheus plus one other small moon, as well as being the first to image the F ring. Pioneer 11 also confirmed that Saturn has a magnetic field.

On October 5, 1979 Pioneer 11 began the last phase of its journey - to leave the solar system. Heading in the direction of the galactic center, it was the fourth spacecraft to cross Neptune's orbit in 1990 (Pioneer 10 went first, and both Voyager spacecraft were traveling faster). Pioneer 10 and 11 each carry a gold covered plaque conveying a message to any life form that may one day find it. On the plaque are the images of a man and woman, Earth's location in the solar system, and the solar system's location in the galaxy.

Because the power source for the Pioneers were radioisotope thermoelectric generators (RTG's), they were able to continue operating for a very extended period of time. The last signal from Pioneer 11 was detected on November 30, 1995. Based on its motion, Pioneer 11 is now a little over 87 Astronomical Units (AUs) from the Sun (more than twice Pluto's distance) and continues to recede at a rate of 2.4 AUs per year.

The second spacecraft to fly through the Asteroid Belt, the second to visit Jupiter, and the first to visit Saturn - this little spacecraft certainly lived up to its name of Pioneer. While Saturn continues to grace our morning skies, and as you gaze at its beauty, pause to reflect on how much we now know because of the spacecraft that have visited there. And it all began with one Pioneer.

References:

Pioneer 11 - Wikipedia

http://en.wikipedia.org/wiki/Pioneer_11

NASA Solar System Exploration: Missions: By Target: Saturn: Past: Pioneer 11

http://solarsystem.nasa.gov/missions/profile.cfm?MCode=Pioneer_11&Display=ReadMore

NASA - NSSDC - Spacecraft - Details

<http://nssdc.gsfc.nasa.gov/nmc/spacecraftDisplay.do?id=1973-019A>

Your Daily Dose of Astonishment

By Diane K. Fisher

As a person vitally interested in astronomy, you probably have the Astronomy Picture of the Day website at apod.nasa.gov set as favorite link. APOD has been around since practically the beginning of the web. The first APOD appeared unannounced on June 16, 1995. It got 15 hits. The next picture appeared June 20, 1995, and the site has not taken a day off since. Now daily traffic is more like one million hits.

Obviously, someone is responsible for picking, posting, and writing the detailed descriptions for these images. Is it a whole team of people? No. Surprisingly, it is only two men, the same ones who started it and have been doing it ever since.

Robert Nemiroff and Jerry Bonnell shared an office at NASA's Goddard Space Flight Center in the early-90s, when the term "World Wide Web" was unknown, but a software program called Mosaic could connect to and display specially coded content on other computers. The office mates thought "we should do something with this."

Thus was conceived the Astronomy Picture of the Day. Now, in addition to the wildly popular English version, over 25 mirror websites in other languages are maintained independently by volunteers. (See http://apod.nasa.gov/apod/lib/about_apod.html for links). An archive of every APOD ever published is at <http://apod.nasa.gov/apod/archivepix.html>. Dr. Nemiroff also maintains a discussion website at <http://asterisk.apod.com/>.

But how does it get done? Do these guys even have day jobs?

Dr. Nemiroff has since moved to Michigan Technological University in Houghton, Michigan, where he is professor of astrophysics, both teaching and doing research. Dr. Bonnell is still with NASA, an astrophysicist with the Compton Gamma Ray Observatory Science Support Center at Goddard. APOD is only a very small part of their responsibilities. They do not collaborate, but rather divide up the calendar, and each picks the image, writes the description, and includes the links for the days on his own list. The files are queued up for posting by a "robot" each day.

They use the same tools they used at the beginning: Raw HTML code written using the vi text editor in Linux. This simple format has now become such a part of the brand that they would upset all the people and websites and mobile apps that link to their feed if they were to change anything at this point.

Where do they find the images? Candidates are volunteered from large and small observatories, space telescopes (like the Hubble and Spitzer), and independent astronomers and astrophotographers. The good doctors receive ten images for every one they publish on APOD. But, as Dr. Nemiroff emphasizes, being picked or not picked is no reflection on the value of the image. Some of the selections are picked for their quirkiness. Some are videos instead of images. Some have nothing to do with astronomy at all, like the astonishing August 21, 2012, video of a replicating DNA molecule..

Among the many mobile apps taking advantage of the APOD feed is Space Place Prime, a NASA magazine that updates daily with the best of NASA. It's available free (in iOS only at this time) at the Apple Store.

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.



Caption:

The January 20, 2013, Astronomy Picture of the Day is one that might fall into the “quirky” category. The object was found at the bottom of the sea aboard a Greek ship that sank in 80 BCE. It is an Antikythera mechanism, a mechanical computer of an accuracy thought impossible for that era. Its wheels and gears create a portable orrery of the sky that predicts star and planet locations as well as lunar and solar eclipses.

**Barnard-Seyfert Astronomical Society
Minutes of the Regular Meeting of the Board of Directors
Held On Wednesday, March 6, 2013**

The board of directors of the Barnard-Seyfert Astronomical Society (BSAS) met in regular session at the Cumberland Valley Girl Scout Council Building in Nashville, Tennessee on Wednesday, March 6th, 2013. A sign-in sheet was passed around in lieu of a roll call. Board members Joe Boyd, Dr. Spencer Buckner, Bill Griswold, John Harrington, Melissa Lanz, Bob Norling, Bob Rice, Poppy Simmons, and Theo Wellington were present. Board members Steve Cobb and Kris McCall were absent. A quorum being present and since President Theo Wellington had not yet arrived, Vice-President Joe Boyd called the meeting to order at 7:32 P.M.

Joe Boyd asked for corrections to the minutes of the previous board meeting held on February 9, 2013 and, there being none, declared them to be approved as published in the February 2013 edition of the Society's *Eclipse* newsletter. Treasurer Bob Norling reported that the BSAS had \$1,812.76 in its regular checking account and \$1,233.13 in its equipment account.

Joe Boyd promptly turned the meeting over to President Theo Wellington upon her arrival and she announced these upcoming star parties:

- Mar 09 – Messier Marathon @ Mark Manner's Spot Observatory,
- Mar 16 – Public star party @ Long Hunter State Park from 7:30 to 9:30 P.M.,
- Apr 05 – Public star party @ Bowie Nature Park from 7:30 to 9:30 P.M.,
- Apr 13 – Public star party @ The Adventure Science Center from 7:30 to 10:30 P.M., and
- Apr 20 – Public star party @ Nathan Bedford Forest State Park from 7:30 to 10:30 P.M.

Joe Boyd announced that Scott Kardel had been granted oversight for individual chapters of the International Dark-Sky Association (IDA) and that a new chapter handbook for this organization had been released. Mr. Boyd also announced that a list of members who had dropped out would soon be available. Poppy Simmons asked what assistance the IDA had available for municipalities and Mr. Boyd replied that they have model ordinances, guidelines, and a very informative website. Theo Wellington reported that on March 2, 2013 BSAS Past-President Terry Reeves spoke to a "Scouting University" for adult Boy Scout volunteers in Nashville regarding astronomy activities for scouts. Ms Wellington announced that more information regarding the visibility of comet PanSTARRS might be available next week. She also noted that there was a possibility of a comet striking Mars next year.

Theo Wellington announced that the 61st annual Middle Tennessee Science and Engineering Fair (MTSEF) will be held on March 21-22, 2013 at Austin Peay State University (APSU) in Clarksville, Tennessee. She noted that, as one of the judges, BSAS Past-President Dr. Spencer Buckner would let us know if any astronomy-related projects were entered. Joe Boyd commented on the special section of articles on youth and astronomy in the March 2013 edition of the Astronomical League's *Reflector* magazine. Theo Wellington stated that she was still working on ideas for college student memberships to present to the board. Poppy Simmons suggested that the BSAS and a hiking group that she knew about might be good prospects for a meeting to explore ways of combining their mutual enjoyment of the outdoors.

Theo Wellington commented that the BSAS' Facebook site was a good medium for announcing star parties. Bill Griswold reported that Mike Benson, the BSAS' Astronomical League Correspondent, had sent a list to that organization reporting 73 members. Mr. Griswold noted that, although the acoustics were generally good in our board meeting room, some individuals who wore hearing aids had a more difficult time hearing presentations in the larger and more open membership meeting room. He suggested that acquiring small lapel clip-on microphones for use in that room might improve this situation. Theo Wellington commented that the board should look into acquiring a rental locker for the BSAS' loaner and other equipment. She also noted that the club still needed an inventory of that equipment.

Since there was no further business to discuss, Bob Norling moved that the meeting be adjourned. Bill Griswold seconded his motion that passed by a unanimous voice vote of the board at 8:27 P.M. without additional discussion.

Respectfully submitted,
Bob Rice, Secretary

Douglas S. Hall, professor of physics and astronomy, emeritus, and former director of [Vanderbilt Dyer Observatory](#), died March 16 after a brief illness. He was 72.

Hall was a distinguished astronomer and scientist credited with several significant discoveries. He and his student researcher became the first to measure the mass and diameter of a very young double star, and then to demonstrate observationally that such very young stars assume a flat, toroidal shape during their early stages. "My analysis has revealed, quite unexpectedly, that one of the two stars is shaped like a doughnut, presumably as a result of extremely rapid spinning," Hall told the *Tennessean* in 1971. The discovery made national news headlines.

Hall was the co-discoverer of star spots (similar to sunspots) on stars, proposing that such spots were responsible for variations in the stars' brightness. His work was key to establishing the origin of variability on close binary stars known as RS Canum Venaticorum variable stars. His working definition for them is still used today.



In addition to his many research interests, Hall served as director of Dyer Observatory for more than 15 years. His role at Dyer not only allowed him to do hands-on research, but it also made him the public face of all things celestial in the Nashville area.

Hall loved to share his knowledge with people, recalled Rocky Alvey, who was hired by Hall in 2000 and today is director of Dyer. "He was a very gentle, wonderful man—we're about public outreach here—and he was great with the public," Alvey said. "Some of my best memories are of hearing him get questions at public nights, or when we'd get calls about a meteor or something someone saw in the sky. Some of the questions were very out there, about UFOs or such, and he always dealt with them with a lot of tact or a little humor. He never made the person feel like they'd asked a stupid question."

That joy of sharing astronomy with the public also was evident in his work with amateur astronomers. Hall encouraged backyard astronomers to contribute to his research and other scientific knowledge. He is credited for forging bonds between professional and amateur astronomers and was the founder and longtime leader of the International Amateur–Professional Photoelectric Photometry Group.

"He was the first astronomer to actively recruit and train amateur astronomers to make the kind of measurements needed to gather data," said Gregory Henry, one of Hall's graduate students who is now astronomer at the Center of Excellence in Information Systems at Tennessee State University. "This is now common, these citizen scientists, amateurs who are commonly assisting with scholarly research. He mentored amateur astronomers and harnessed the capabilities of what was there."

A native of Kentucky, Hall studied chemistry at Swarthmore College before turning to his lifelong passion of astronomy. While earning a master's and doctorate in astronomy at Indiana University, he spent his summers studying and working at Harvard College Observatory and Kitt Peak National Observatory in Arizona. He joined Vanderbilt's College of Arts and Science in 1967 as assistant professor of astronomy and was later promoted to professor. He was named professor of physics and astronomy, emeritus, in 2002, upon his retirement from Vanderbilt. Douglas Hall became a member of the Barnard-Seyfert Astronomical Society soon after joining Vanderbilt in 1967.

He is survived by his wife, Mimi Kemp Hall; two sons, Bruce Douglas Hall and Brandon Scott Hall; one sister, Joan Wise and a brother, Thomas H. Hall.

**Barnard-Seyfert Astronomical Society
Minutes of the Monthly Membership Meeting
Held On Wednesday, March 20, 2013**

President Theo Wellington called the meeting to order at 7:45 P.M. on Wednesday, March 20, 2013 at the Cumberland Valley Girl Scout Council Building in Nashville, Tennessee and welcomed members and visitors. Ms Wellington asked for corrections to the minutes of the previous membership meeting held on February 16, 2013 and, there being none, then asked for a motion to approve these minutes as published in the March 2013 edition of the Society's *Eclipse* newsletter. Steve Cobb so moved, John Harrington seconded his motion, and the minutes were approved by a unanimous voice vote of the membership. Treasurer Bob Norling reported that the Society had \$1,942.76 in its regular account and \$1,233.13 in its equipment account.

Theo Wellington announced these upcoming star parties and other events:

- Apr 05 – Public star party at Bowie Nature Park from 7:30 PM to 9:30 PM,
- Apr 06 – Messier Marathon retry at Mark Manner's Spot Observatory,
- Apr 14 – Public star party at the Adventure Science Center from 7:30 PM to 10:30 PM,
- Apr 20 – Public Star Party at Nathan Bedford Forest State Park from 7:30 to 9:30 PM, and
- May 25 – Public star party at Bells Bend Park from 6:30 PM to 10:30 PM.

Ms Wellington announced that the Cumberland Astronomical Society, located in Gallatin, TN, will hold its annual Tennessee Spring Star Party at Fall Creek Falls State Park on May 10-12, 2013. In addition, she announced that a Cub Scout group in Murfreesboro had requested an astronomy-related activity sometime during April 11-25, 2013. She also noted that Pickett State Park had requested assistance with achieving the Dark Sky Park Designation from the International Dark-Sky Association and suggested that a date needed to be set for accomplishing this. Lastly, she announced that that Dr. Neil Gehrels of the Goddard Space Flight Center will present a program on "Gamma Ray Bursts and the Birth of Black Holes" at the April 17, 2013 membership meeting.

Theo Wellington introduced Dr. Terry Reeves, a BSAS Past-President, and Steve Wheeler, an astro-imager and past BSAS *Eclipse* newsletter editor, who delivered the evening's program on "What's Up in the Spring Sky." The presentation included photos of the described objects – many of which were taken by Mr. Wheeler – along with detailed finder charts. Mr. Wheeler began the presentation with these objects for the naked eye and binoculars:

- Satellite observing including the International Space Station, Hubble Space Telescope, & iridium flares,
- NASA's app for missions & the HeavensAbove website were given as observing sources for the above mentioned objects,
- Comets – included a photo of PanSTARRS,
- M44 – the Beehive or Praesepe open cluster in Cancer,
- M67 – open cluster in Cancer, and
- M3 – globular cluster in Canes Venatici.

Dr. Terry Reeves continued with these objects for telescopic viewing:

- Jupiter – great naked eye object in Taurus & also good in telescopes of all sizes,
- Saturn – will soon be the next “showcase” in western Libra,
- M1 – Crab nebula supernova remnant,
- Rigel – bright double star in Orion at 9 seconds in separation,
- Sigma Orionis – multiple star system in Orion,
- M79 – globular cluster in Lepus,
- R Leporis – Hind’s Crimson Star – a variable carbon star,
- M41, M46, M47, M50, & M93 – open clusters in or around Canis Major,
- NGC 2264 – Christmas Tree cluster in Monoceros,
- Rosette Nebula – also in Monoceros,
- NGC 2392 – Eskimo Nebula in Gemini,
- NGC 2683 – The UFO Galaxy,
- M65, M66, & NGC 3628 – Leo Triplet galaxies,
- Algeiba – yellow & orange double star in Leo,
- M81 & M82 – spiral & irregular galaxies in Ursa Major, and
- M51 – Whirlpool spiral galaxy in Ursa Major.

Dr. Reeves and Mr. Wheeler graciously answered questions from the audience at the conclusion of their presentation.

Since there was no further business to discuss, the meeting was adjourned at 9:10 P.M.

Respectfully submitted,
Bob Rice, Secretary