



# The ECLIPSE



The Newsletter of the Barnard-Seyfert Astronomical Society

Organized in 1928

September 2012

**The Membership meeting will be held on September 19, 2012 at the Cumberland Valley Girl Scout Council Building located at the intersection of Harding Place and Granny White Pike at 7:30 pm.**

Local BSAS member and astro-imager Brad Hill will present the September 19 membership meeting program on "Planetary Imaging." Come join us for an informative evening of helpful hints and guidelines about one of the fastest growing areas of amateur astronomy.

## Upcoming Events

Board of Directors Meeting, September 5 at the Cumberland Valley Girl Scout Building – 7:30 pm

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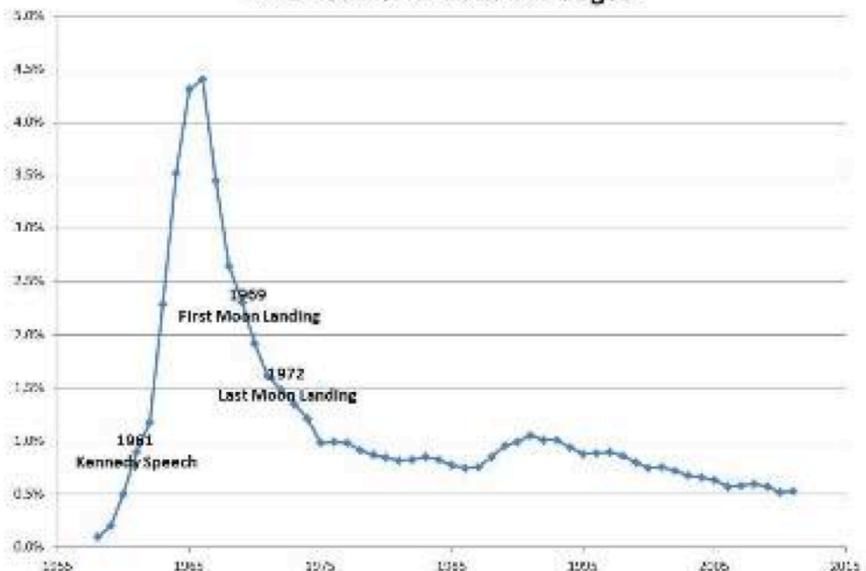
## FROM THE PRESIDENT

### U.S. Science Budgets: Time for a Real Debate

The U.S. political process is heating up as the major parties prep for the upcoming presidential and congressional elections. Passions run high and there's a great deal of debate about what, and how much, our federal government should do.

A quiet casualty of America's budget problems have been the NASA and National Science Foundation (NSF) budgets. The chart below speaks volumes regarding NASA: while the space agency's overall budget increased dramatically through the mid-1960s to fund development of the Gemini and Apollo missions, it's been falling ever since as a proportion of the overall federal budget. From an all-time high of 4.4% of the federal budget back in 1966, NASA's budget has been in steady decline. That decline finally reached a plateau at around 1% of the overall federal budget from 1975 to 1998, but has since dropped again, reaching a low this year of one-half of one percent (0.5%) of the federal budget for the first time since 1960 (chart from Universe Today news service). That's right, less than 50 cents of every 100 federal dollars goes to fund all of NASA.

NASA as a % of Federal Budget



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## Observing Highlights

### Moon phases

September 2012  
09/08 LAST Quarter  
09/15 NEW Moon  
09/22 FIRST Quarter  
09/29 FULL Moon

October 2012  
10/08 LAST Quarter  
10/15 NEW Moon  
10/21 FIRST Quarter  
10/29 FULL Moon

### Objects:

Globular Clusters  
M56, M71, M26, M22, M28,  
M54, M69, M70, M55, M75,  
M15, M2, M72, M30

Open Clusters  
M6, M7, M11 (Wild Duck),  
M26, M18, M23, M24, M25,  
M21, M73, M29, M39

Nebula  
M57 (Ring), NGC 6543 (Cat's  
Eye), NGC6826 (Blinking), M27  
(Dumbbell),  
M16 (Eagle), M17 (Swan), M20  
(Trifid), M8 (Lagoon), NGC7000  
(North  
America)

Asterisms  
Cr399 (Coat Hanger)

Multiple Star Systems  
Double-Double (Epsilon Lyrae)  
Albireo (Beta Cygni)  
Gamma Delphini

Variable Stars  
Mu Cephei (Herschel's Garnet  
Star)

Planets  
Pluto, Uranus, Neptune

## Star Parties for months of September and October

Sep 15 Private Star Party at Natchez Trace Parkway mm 412  
(Water Valley Overlook)

Sep 21 Public Star Party at Bells Bend Nature Center 8:00 – 10:00  
pm  
Moon, double stars, star clusters, nebulae

Oct 13 Private Star Party at Natchez Trace Parkway mm 435.5

Oct 20 Public Star Party at Edwin Warner Park 8:00 – 10:00 pm  
Orionid meteors (finally a good year with minimal Moon),  
Moon, double stars, star clusters, nebulae

Oct 27 Private Star Party with Skeptical Inquirer staff at  
Sheraton Music City

## Happy Birthday Mars Global Surveyor

by Robin Byrne

This month we celebrate the accomplishments of a spacecraft that exceeded expectations. Launched in November of 1996, it was on September 11, 1997 that Mars Global Surveyor (MGS) arrived at Mars and entered into orbit. This was the first U.S. spacecraft to successfully visit Mars in 20 years.

Placed in a polar orbit around Mars, MGS was well-positioned to map out the entire planet, one north-south strip at a time. Initially, the orbit was highly elliptical, with a closest approach of 163 miles, and farthest distance of 33,570 miles. Using aerobraking (allowing the drag from Mars' atmosphere to slow the spacecraft down), MGS ultimately achieved an orbit that ranged from 68 to 280 miles each orbit, circling the planet in 2 hours. It was also placed so that each photographic pass occurred at 2:00 p.m. local time, resulting in every surface image having the same lighting conditions.

The MGS mission had four main questions it hoped to answer: did life ever exist on Mars?, what is the climate of Mars?, what is the geology of Mars?, and what information do we need to send people to Mars? Although originally a 2-year mission, due to extensions for an unprecedented total of 9 years 52 days of operation, the answers found were more than had been hoped for.

One of the most exciting discoveries occurred due to the extended time around Mars. Because this allowed the opportunity to view the same features multiple times, over the course of many years, MGS was able to show short-term changes to the surface of Mars. One case was a crater imaged in 1999, and then in 2005. The latter image showed streaks down the crater wall not there in the first image. Could these streaks be evidence for liquid water below the surface of Mars that seeped out through the crater wall? More evidence for Mars' watery past came in the discovery of hematite. This mineral forms in the presence of water. This finding helped determine where the Mars rover Opportunity would land, so that it could study the hematite directly. MGS also found the remnants of Mars' past magnetic field, which would have made the planet more suitable for life in the past. Not only did MGS find evidence for long-range planet-wide changes, but also found that Mars appears to be experiences climate change measurable over the few years in orbit. In particular, the amount of carbon dioxide present in the south pole's permanent ice cap decreased 3 Martian years in a row, suggesting increasing temperatures. Short-term weather was also studied. MGS studied how the winds on Mars form intricate features in sand dunes, and imaged streaks on the surface created by dust devils.

Mars Global Surveyor also performed a secondary duty not originally planned. The Mars Exploration Rovers (MER's), Spirit and Opportunity, landed on Mars in 2003 while MGS was still operational. This allowed MGS to act as a data relay station for the MER's for part of their mission. MGS even photographed Spirit on the surface of Mars and the tracks it left over its first 85 days on Mars.

Mars Global Surveyor came to an end ahead of its time, even for a spacecraft that had already outlived its original lifespan. Due to a series of programming errors, MGS moved the solar array too far and thought its gimbals were malfunctioning. To compensate, it used its gyros to rotate the entire spacecraft in order to point the solar panels back toward the Sun. In the process, it also exposed its last functional battery to the Sun's heat. This caused the battery to overheat and lose power. On November 2, 2006, MGS sent its last message to Earth.

As I write this, the Mars Curiosity Rover successfully landed on Mars just a few hour ago. So aptly named, because we are, indeed, "curious" about our neighbor planet. With each orbiter and lander we send, we find another piece in the puzzle, slowly building up a complete picture of this other

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world. Should we ever send men to Mars (and I sincerely hope we do), the reason why it will be successful will be due to all of our unmanned pioneers that blazed the way. Mars Global Surveyor was, arguably, one of the more successful of those pioneers, and here's wishing Curiosity as much success in its mission.

#### References:

Mars Global Surveyor

<http://mars.jpl.nasa.gov/mgs/overview/>

Mars Global Surveyor: Science

<http://mars.jpl.nasa.gov/mgs/science/>

NASA - Mars Global Surveyor Mission Highlights

[http://www.nasa.gov/mission\\_pages/mgs/mgs-20070413a.html](http://www.nasa.gov/mission_pages/mgs/mgs-20070413a.html)

NASA - Report Reveals Likely Causes of Mars Spacecraft Loss

[http://www.nasa.gov/mission\\_pages/mgs/mgs-20070413.html](http://www.nasa.gov/mission_pages/mgs/mgs-20070413.html)

Mars Global Surveyor - Wikipedia

[http://en.wikipedia.org/wiki/Mars\\_Global\\_Surveyor](http://en.wikipedia.org/wiki/Mars_Global_Surveyor)

It's past time for a real debate on the NASA budget. Some oppose spending any money whatsoever on NASA, in the belief that all space exploration is a waste of money. Such people forget that NASA's budget also covers many earth sciences programs, including multiple satellites that monitor our globe for changes in the environment and climate. They also overlook the fact that NASA's existence helps create new technologies here on earth, technologies that make the U.S. the leading technological nation on Earth and help us create and retain high-paying jobs.<sup>1</sup> NASA also helps attract young people into the engineering, science and math careers that will help maintain the U.S. technological lead.

The biggest share of NASA's budget has typically been spent on manned space missions. In a difficult but probably correct decision, the Obama Administration in 2010 cancelled the highly capable but ruinously expensive space shuttle program. The U.S. is temporarily left without a means to launch its astronauts into orbit, but that void will likely soon be filled by private companies such as SpaceX, which is already working to "man-rate" its Dragon capsule for use by astronauts. With luck, the privatization of manned missions to the International Space Station will save very substantial money and leave NASA with enough money to perfect its heavy-duty Orion space capsule and, eventually, a launch system for it.

Ironically, the greatest damage to NASA is happening in its unmanned planetary science program. Earlier this year, NASA withdrew the last of its funding from the European Space Agency's ambitious ExoMars missions slated for launch in 2014 and 2016. It's just been announced that the planetary sciences budget will take a massive 20% hit for 2013. Some of the budgetary damage can be blamed on massive cost overruns in the Webb Space Telescope (scheduled for launch in 2018), but it's sad to see NASA forced to sacrifice multiple planetary missions for the foreseeable future to save one space telescope. I sure hope the Curiosity rover currently rolling around on Mars—a triumph of U.S. and NASA

## A Brand New Age: Queue Observing at Mt. Paranal

By Dr. Marc J. Kuchner

First a caravan of white observatory cars arrives, winding up the narrow road to the 2600m- (~8500-foot-) high summit. Then the shutters around the domes open, and rays from the setting sun alight on colossal mirrors and metal struts. It's the beginning of another busy night at Mt. Paranal, Chile, where I am learning about new, more efficient ways of managing a modern observatory.

I stepped into the observatory's control room to soak up some of the new, unfamiliar culture. Here, under florescent lights and drop ceilings are banks of computer screens, one bank to control each of the four big telescopes on the mountaintop and a few others too. At each bank sits two people, a telescope operator and an astronomer.

The layout of this workspace was not unfamiliar to me. But the way these Mt. Paranal astronomers work certainly was. When I was cutting my teeth at Mt. Palomar observatory in California, I would only go to the telescope to take my own data. In stark contrast, everyone observing at Mt Paranal tonight is taking data for someone else.

The Mt. Paranal astronomers each spend 105 nights a year here on the mountain performing various duties, including taking data for other astronomers. The latter, they call "executing the queue." Headquarters in Germany decides what parts of the sky will have priority on any given night (the queue). Then the Mt. Paranal astronomers march up the mountain and carry out this program, choosing calibrators, filling the log books, and adapting to changing conditions. They send the data back to headquarters, and from there it makes its way out to the wider astronomical community for study.

This new way of working allows the Mt. Paranal astronomers to specialize in just one or two telescope instruments each. Surely this plan is more efficient than the old-fashioned way, where each of us had to learn every instrument we used from scratch—sifting through manuals at 3:00 AM when the filter wheel got stuck or the cryogen ran out, watching precious observing time tick away. Here at Mt. Paranal, much of the work is done in a big room full of people, not off by yourself, reducing some dangers of the process. Also, queue observing cuts down on plane travel, an important step for cutting carbon emissions.

It's a brand new age, I thought as I watched the giant domes spin in the silent, cold Chilean night. And maybe with queue observing, some of the romance is gone. Still, my colleagues and I couldn't help saying as we stared out across the moonlit mountains: I can't believe how lucky we are to be here.

*Dr. Marc J. Kuchner is an astrophysicist at the Exoplanets and Stellar Astrophysics Laboratory at NASA's Goddard Space Flight Center. NASA's Astrophysics Division works on big questions about the origin and evolution of the universe, galaxies, and planetary systems*

engineering—lasts a long time, because it may not have company from any other NASA rovers any time soon.<sup>1</sup>

Some of you may be thinking, well, at least we have a lot of Earth-bound U.S. observatories that are producing cutting-edge science. True enough, but a National Science Foundation task force just took a hard look at the NSF's projected (and shrinking) budgets for the next few years and concluded that NSF funding for all of the following will likely have to end: Kitt Peak Observatory, the McMath-Pierce Solar Telescope, the global Very Long Baseline Array and, just up the road from us, the Green Bank (radio) Telescope in West Virginia. These cuts will preserve funding for some new facilities (like the Large Synoptic Survey Telescope), but overall the NSF budgetary trend is down, down, down for years to come.

In closing, the U.S. government faces a massive budget crisis. The big demographic bulge of aging baby boomers like me will make it tougher and tougher to fully sustain treasured social programs like Social Security and, especially, Medicare in coming years. And lingering economic problems will likely continue cutting into the tax revenues the federal government would normally receive. Some very hard choices are therefore going to have to be made if huge federal budget deficits are to be closed, or at least greatly reduced. But radically cutting the budgets of two science agencies that help assure the U.S. economy a technological edge is not the way to build a better, more prosperous future for our country.

Clear skies,  
John

As more than one commentator has noted, a lot of NASA's work is conducted in space, but all the agency's money gets spent on Earth.

Yes I know—the gallant little Opportunity rover is still alive and kicking nine years into its scheduled

## Tennessee Fall Star Gaze

Tennessee Fall Star Gaze (TFSG), September 14 to 16, is held at one of Tenn. darkest sky sites. With 26,000 acres and 1800 feet above sea level, Fall Creek Falls State Park (FCFSP) has a very prominent Milky Way and is one of the premier observation sites in the state of Tenn. You may camp, stay at the Inn, or spend the night observing on the field. The Inn has a weekend astro lodging package for two, which includes a breakfast bar, both mornings for (\$85.42 per night, total \$170.84). The observation field is within walking distance of the Inn and is well suited for all types of observing. In case of bad weather we will have a program in the Cascade room at the Inn. For more information contact Lloyd Watkins 615-293-7160 C or 615-823-3005. E-mail [watkinslk@comcast.net](mailto:watkinslk@comcast.net) FCFSP web site <http://tn.gov/environment/parks/FallCreekFalls/>

## Barnard-Seyfert Astronomical Society Minutes of a Regular Meeting of the Board of Directors Held On Wednesday, August 1, 2012

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 August 1, 2012. A sign-in sheet was passed around in lieu of a roll call. Board members Dr. Spencer Buckner, Joe Boyd, Steve Cobb, Bill Griswold, John Harrington, Melissa Lanz, Kris McCall, Bob Norling, Curt Porter, Bob Rice, and Theo Wellington were present. All board members being in attendance, President John Harrington called the meeting to order at 7:38 P.M.

John Harrington asked for corrections to the minutes of the previous board meeting held on July 11, 2012 and, there being none, pronounced them to be accepted as published in the August 2012 edition of the *Eclipse* newsletter. Treasurer Bob Norling reported that the Society had \$1,868.23 in its regular checking account and \$1,016.00 in its equipment account. Mr. Norling also announced that the new 2013 edition of Kalmbach Publishing Company's *Deep Space Mysteries Calendar* would be available to members at the 2012 edition's discounted price.

John Harrington announced these upcoming star parties:

- Aug 10 – Public star party at Bowie Nature Park (Fairview) at 8:30 P.M.
- Aug 11 – Telescope Clinic (7:00 P.M.) and public star party (8:30 P.M.) at Edwin Warner Park.  
(Thanks to Kris McCall, BSAS members can stay late to see the Perseid meteor shower.)
- Aug 18 – Private star party at mm 435.5 on the Natchez Trace Parkway.
- Sep 15 – Private star party at mm 412 (Water Valley Overlook) on the Natchez Trace Parkway.
- Sep 21 – Public star party at Bells Bend Nature Center at 8:00 P.M.

Theo Wellington handed out the BSAS business cards that she designed and purchased online. These display the Society's logo, basic information, and email address and will be given to the public at star parties and other outreach functions. John Harrington commented that he had seen favorable comments from viewers on the BSAS' Facebook site. Mr. Harrington encouraged board members to bring tools, artificial stars, spare batteries, and other useful items to the August 11 telescope clinic at Edwin Warner Park. He also suggested publicizing this outreach on TNAstro, CitySearch Nashville, and other web-based sites. Melissa Lanz commented that the BSAS should discontinue using the CitySearch Nashville website to publicize club activities since that organization no longer accepts public events.

John Harrington announced that he had purchased new batteries and pads for the club's Automated External Defibrillator (AED) at a cost of \$149.00 and \$75.00 respectively. Curt Porter suggested that the club seek out members to be trained and certified to operate the AED. John Harrington put this suggestion into motion that was seconded by Joe Boyd and subsequently approved by a unanimous voice vote.

John Harrington reported that BSAS members had received an invitation to attend the ScopeOut Astronomy Fair at the Cincinnati Observatory on Saturday, September 8, 2012. Mr. Harrington also reported that club members had received an invitation from Mount Lemmon SkyCenter in Arizona to attend a CCD image processing workshop on November 6-9, 2012. The cost of the workshop is \$875.00 including accommodations. In addition, he reported that he had received an inquiry regarding planning for the upcoming 2017 total solar eclipse and suggested that the Adventure Science Center would be a great location for observing that event. He also noted that he had sent a thank you letter to Camp Idyllwild for their recent \$200.00 donation to the BSAS. Lastly, he said that would send the board a draft copy of his letter to Alan Traino regarding starting a Midwest Astronomy Fair.

Since there was no additional business to discuss, President John Harrington declared the meeting to be adjourned at 8:15 P.M.

Respectfully submitted,  
Bob Rice, Secretary

## Barnard-Seyfert Astronomical Society Minutes of the Monthly Membership Meeting Held On Wednesday, August 15, 2012

President John Harrington called the meeting to order at 7:46 P.M. on August 15, 2012 at the Cumberland Valley Girl Scout Council Building in Nashville, Tennessee and welcomed members and visitors. Treasurer Bob Norling reported that the BSAS had \$1,868.23 in its regular account and \$1,016.00 in its equipment account. John Harrington announced these upcoming star parties:

- Aug 18 – Private star party at mm 435.5 on the Natchez Trace Parkway. (NOTE: *May change to Sun 19 if weather looks unpromising*)
- Sep 15 – Private star party at mm 412 (Water Valley Overlook) on the Natchez Trace Parkway.
- Sep 21 – Public star party at Bells Bend Nature Center from 8:00 – 10:00 P.M.
- Oct 13 – Private star party at mm 435.5 on the Natchez Trace Parkway.
- Oct 20 – Public star party at Edwin Warner Park from 8:00 – 10:00 P.M.
- Oct 27 – Private star party with Skeptical Inquirer staff at Sheraton Music City.

John Harrington reported that the BSAS had received an invitation to attend the ScopeOut Astronomy Fair at the Cincinnati Observatory on November 6-9. Mr. Harrington also reminded members about the new “Swap And/Or Shop” section in the *Eclipse* newsletter. Member John Walker announced that the Cumberland Astronomical Society had invited BSAS members to attend an upcoming star party with them on Saturday August 18.

John Harrington introduced Dr. Scott Hawley, Assistant Professor of Physics at Belmont University, who delivered the evening’s program on “The Eve of Gravitational Wave Astronomy.” Dr. Hawley began by briefly describing earlier theories of gravitation – including those of Aristotle and Sir Isaac Newton – and ended with Dr. Albert Einstein’s currently accepted theory of General Relativity (GR). He explained that a central feature of GR involved motion through a curved space/time continuum of four dimensions – height, width, depth, and time. He noted that, just like black holes and gravitational lensing, gravitational waves were also predicted by GR. Gravitational waves, Dr. Hawley said, were ripples in space/time created by accelerating mass but, as of yet, no device has been designed to detect them. Suspected sources of gravitational waves include supernova explosions, black holes, and merging galaxies.

Dr. Hawley stated that photo interferometry using lasers may prove to be a promising technique for detection. Two systems using this methodology called LIGO – for Laser Interferometry Gravitational-Wave Observatory - are located in Livingston, Louisiana and in southwestern Washington state. An Advanced LIGO system is scheduled to be operational in 2017 at the Washington state site. Joint plans between NASA and ESA are underway to create an even more advanced system using earth-orbiting satellites called LISA (Laser Interferometer Space Antenna) in the future. One of the main objectives of GW research is to detect information from shortly after the Big Bang when the universe was still transparent that photons simply can’t provide. The hope is that GW research may provide a completely new way of observing the universe just as radio astronomy did in the 1950s. Dr. Hawley closed his presentation with a lengthy and enthusiastic question and answer session with the audience.

Since there was no further business to discuss, President Harrington declared the meeting to be adjourned at 9:05 P.M.

Respectfully submitted,  
Bob Rice, Secretary

## Become a Member of the BSAS!

Download and print the Application for membership from [www.bsasnashville.com](http://www.bsasnashville.com) (Adobe® Acrobat Reader® required).

Then fill it out and bring it to the next monthly meeting or mail it along with your first year's membership dues to:

BSAS  
P.O. Box 150713  
Nashville, TN 37215-0713

Annual dues, which include membership in the BSAS and Astronomical League, and subscriptions to their newsletters, are:

**\$20** Individual  
**\$30** Family  
**\$15** Senior (+65)  
**\$25** Senior Family (+65)  
**\$12** Student\*

\* To qualify, you must be enrolled full time in an accredited institution or home schooled.

All memberships have a vote in BSAS elections and other membership votes.

Also included are subscriptions to the BSAS and Astronomical League newsletters.

### IMPORTANT DUES INFORMATION

To find the expiration date for your current membership, visit our web site at <http://www.bsasnashville.com> and click the Renewals link.

There will be a two month grace period before any member's name is removed from the current distribution list.

## About Our Organization

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 [www.bsasnashville.com](http://www.bsasnashville.com). If you need more information, write to us at [info@bsasnashville.com](mailto:info@bsasnashville.com) or call John Harrington at (615) 739-4500.

[BSAS on Facebook](#)

## 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 Lonnie Puterbaugh at 615-661-9540.