BACK BAY observer

The Official Newsletter of the Back Bay Amateur Astronomers
P.O. Box 9877, Virginia Beach, VA 23450-9877

EPHEMERALS
december 2015

12/03, 7:30 pm
BBAA Monthly Meeting
TCC Campus, VA Beach
Building J, Rm JC-13

12/05, 4:45 PM
Skywatch
Northwest River Park

12/12, 4:00 PM
Nightwatch
Chippokes Plantation

12/19, 12:00 PM
BBAA Anniversary Luncheon
Tripps Restaurant
101 Independence Blvd
Virginia Beach, VA

Looking Up!

Well, it is December again and another year is almost past. Over the year the BBAA has done quite a bit of outreach and has also gained many new members to the club. We've been to schools, libraries, parks, the Virginia Beach Boardwalk, and even concerts. We've had a great time sharing astronomy with the people of Hampton roads and others from all over the world.

This will be my last "Looking Up" column as I turn the reigns of President over to Chuck Jagow for the 2016 year. I have enjoyed serving as the president the last two years, and I've seen the club grow in size as well as experience. I know it will continue to thrive with Chuck at the controls. The BBAA would not be thriving without the hard work that all of the officers have done behind the scenes. It isn't just planning meetings that makes the BBAA strong. I'd like to thank George Reynolds (current VP) for keeping our events planned and manned, Chuck (currently Treasurer), for keeping us in the black, money wise, and Leigh Anne Lagoe (currently Secretary) for ensuring that the meeting minutes and other club administrative actions are done. With Chuck and Leigh Anne returning in 2016 to take up the #1 and #2 positions, I'm very sure the club will continue to move forward and grow.

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Looking Up, continued from page 1

Don't forget to get outside and watch the events that will happen in December, here are a couple that you don't want to miss:

- December 7 there is a conjunction of the Moon and Venus. The crescent moon will come within 2 degrees of the bright planet Venus in the early morning sky (see page 7 for more details).
- On December 13, 14 the Geminids Meteor Shower will peak on the night of the 13th and morning of the 14th.

So keep looking up, you never know what you might see.

Jim Tallman

November 5, 2015 Meeting Minutes

The meeting was called to order at 7:30 PM, in room JC10 at TCC in Virginia Beach, by Vice President George Reynolds.

Treasurer's Report:

- There is $2176.40 in the General Fund. $1142.67 in the Scholarship Fund, for a total amount of $3319.07.
- We have not yet received our check for Boardwalk Astronomy outreach.
- We currently have 135 total members.

ALCOR: Mary Giangregorio turned in her log for the Outreach Award.

Scholarship Report: Awaiting payment from Boardwalk Astronomy for total to be awarded for general scholarship fund. The Georgie June Scholarship is $500.

Observing Reports:

- The October Garden Stars was a success.
- The Taurid Meteor Shower is peaking.

New Business:

- Kunio Sayanagi has information on how amateur astronomers can get involved with NASA's Juno Mission. Workshop at the National Harbor to be held 11/6.
- Bill McLean will schedule our annual luncheon at Tripps Restaurant for December.

Cornland Park Special Use Permit:

- Chuck Jagow has received permission by the city of Chesapeake to use Cornland Park for BBAA member observing on the Fridays before and after a new moon.
- The special use permit is for 2016, beginning in January. Will need a copy of the permit and BBAA membership badge to use the park.

Election of Offiers:

Nominations were made from the floor:

- President: Chuck Jagow
- Vice President: Leigh Anne Lagoe
- Treasurer: Mark Gerlach
- Secretary: Jeff Goldstein

No additional candidates nominated. Vote: All in favor, none opposed.

Presentation: George Reynolds presented NASA's 3D Sun video, along with a quiz, and viewing the 3D STEREO image of the sun through 3D glasses.

Meeting adjourned at 8:53 PM.

November Minutes taken by Secretary Leigh Anne Lagoe.

Outgoing Vice President, George Reynolds, prepares to demonstrate the use of 3D glasses to view three-dimensional images of the Sun at the November meeting. The images are from NASA's Solar TErrestrial RElations Observatory (STEREO) satellites.

The Back Bay Amateur Astronomers

Observer

The BBAA Observer is published monthly; the monochrome version is mailed to members who do not have internet access. Members who do have Internet access can acquire the full color version on the Internet at **http://www.backbayastro.org/observer/newsletter.shtml**

Please submit articles and items of interest no later than the date of the monthly meeting in order to be in the next month's edition.

Please submit all items to: bbaa.newsletter@gmail.com or BBAA Observer, P.O. Box 9877, Virginia Beach, VA

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BBAA Meetings

The BBAA meet the first Thursday of every month except for July. While school is in session, we meet at the VA Beach TCC Campus. The Dec. 3, 2015 meeting will be held at TCC in Virginia Beach, Building J, Rm JC-13 (or nearby room) at 7:30 PM. Directions are on our Night Sky Network page.

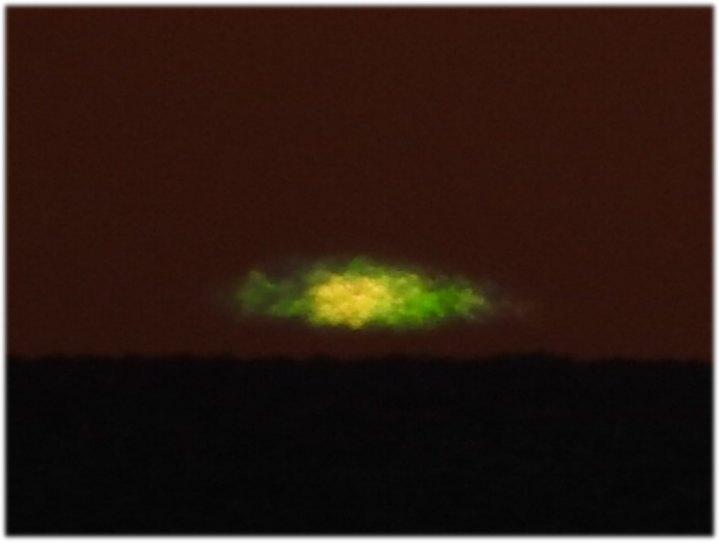
BBAA Internet Links

BBAA Website
www.backbayastro.org

Yahoo! Groups
tech.groups.yahoo.com/group/backbayastro

BBAA Observer Newsletter
www.backbayastro.org/observer/newsletter.shtml

Observer's Corner



THE ELUSIVE GREEN FLASH

Kent Blackwell managed to capture this fascinating image of a green flash at sunset. The phenomenon occurs just before sunrise and just after sunset, when atmospheric refraction causes the sunlight to separate out in different colors. Seeing a green flash is rare because one needs a clear, unobstructed horizon. Kent captured this image on a cruise ship while enroute from Cozumel, Mexico .

Image Credit: Kent Blackwell

Details:
Nikon P-610 Camera, 1440 mm focal length (35mm equivalent), 1/250-second exposure, F/6.5, ISO 100.

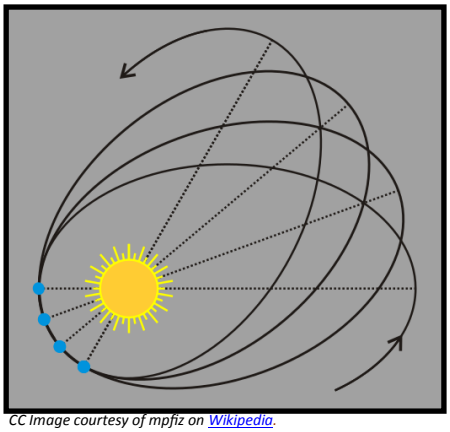
Solar System Log | Mercury

A fascinating and mysterious planet that will transit the sun in 2016

By Nick Anderson

Mercury is the innermost planet of the Solar System. It orbits the Sun in only 88 Earth days, about a quarter of Earth's orbital period. But due to a resonance between Mercury's orbit and rotation, in reference to the Sun, a Mercurian day lasts twice as long as a Mercurian year!

Mercury is a heavily cratered planet, and like the Moon it contains no notable atmosphere. For this reason, it has the highest surface temperature variation of any of the planets, ranging from 427°C (801°F) during the day to -173°C (-279°F) at night.

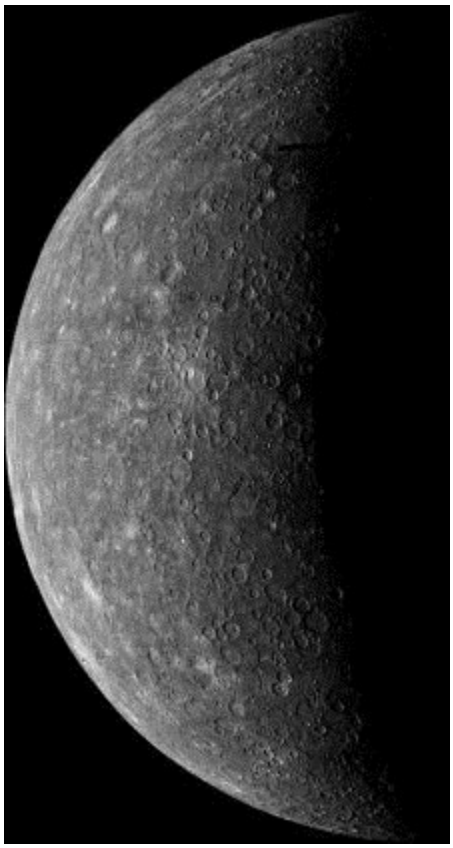


CC Image courtesy of mpfiz on Wikipedia.

An exaggerated display of Mercury's orbital precession.

It also has the highest orbital eccentricity among the 8 planets, taking it from 46,000,000 to 70,000,000 km (0.31 to 0.47 AU) away from the Sun. Its elongated orbit appears to slowly precess over time (see figure in left column below). Though a small deviation (less than 10 arcminutes per century), by 1859 it became clear to French mathematician Urbain Le Verrier (1811 – 1877) that Newton's laws of motion failed to account for 43 arcseconds of this precession! Given Verrier's successful use of celestial mechanics to independently discover Neptune in 1846 (by studying its gravitational effects on the orbit of Uranus), it was proposed that an additional planet might exist within Mercury's orbit to account for the precession's discrepancy. This hypothetical planet even received the name "Vulcan", but it was never found. Instead, it wasn't until Einstein's Theory of General Relativity (published in 1916) that this puzzle was finally resolved, by way of the curvature of spacetime by the Sun.

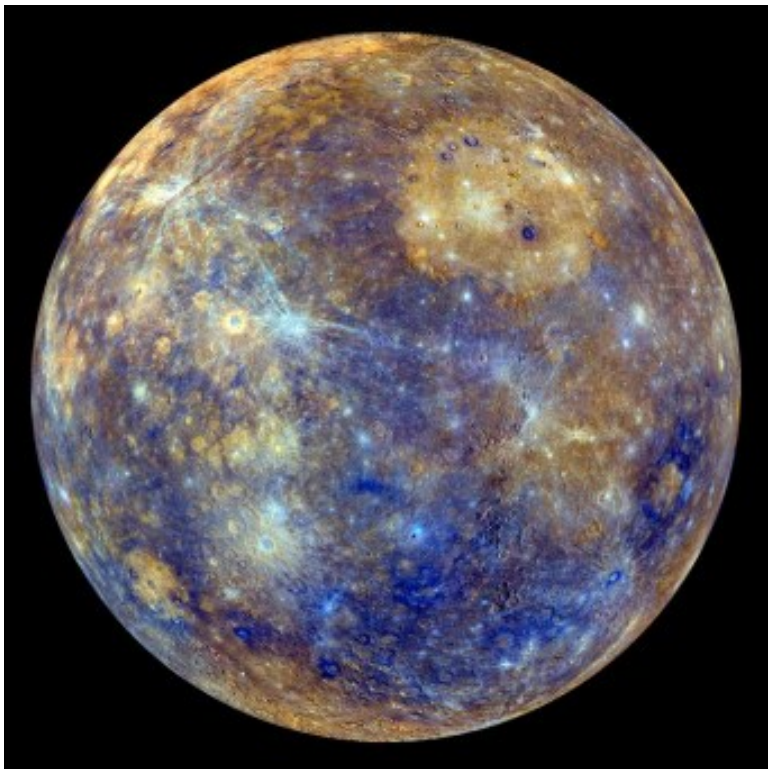
Due to the planet's proximity to the Sun, Mercury can attain a maximum separation of only 28 degrees as seen from the vantage point of Earth. This means it can typically be observed only during morning or evening twilight. The planet exhibits phases like Venus, though Mercury's disk appears smaller. Mercury appears brightest when its phase is near its fullest, reaching a theoretical peak apparent magnitude of -2.6 when it passes behind the Sun.



The first image of Mercury by NASA's Mariner 10 spacecraft. The picture was taken on March 24, 1974 from a distance of 3.3 million miles. Mariner 10 was the first spacecraft to fly past Mercury, and its primary mission was to measure Mercury's environment, surface, atmosphere, and body characteristics. Source: NASA.

Continued on page 5

Mercury, continued from page 4



The difficulties of observing Mercury have understandably made it far less examined than most of the other planets. To date, only two spacecraft missions have involved the study of Mercury. Mariner 10 performed three flybys of the planet in 1974 and 1975 (as well as one of Venus) before running out of fuel, fixing the probe in a solar orbit. MESSENGER became the first spacecraft to orbit Mercury in 2011, and ultimately met its fateful end in April 2015 when it deorbited as planned, impacting Mercury's surface. Tentatively, it will not be until at least 2024 that another orbiter visits Mercury: BepiColumbo of the European Space Agency (ESA).

A false color image of Mercury taken by MESSENGER in 2013, enhanced to show physical features. Images credit: NASA / Johns Hopkins University Applied Physics Laboratory/Carnegie Institution of Washington.

TRANSIT OF MERCURY

May 9, 2016
Save The Date

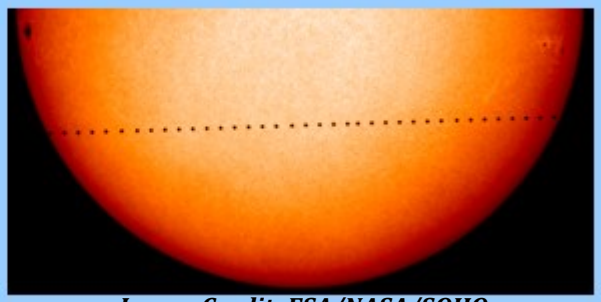


Image Credit: ESA/NASA/SOHO

Since Nick brought up Mercury, it is worth noting that 2016 brings us another exciting astronomical event to look forward to -- a Transit of Mercury! On May 9, 2016, Mercury will pass in front of the Sun, and for once, the entire East Coast, including Hampton Roads, is well positioned to see the entire transit. Of course, whether or not skies are clear that day is another matter.

From Earth, only transits of Mercury and Venus are possible, and Venus transits are much more rare (typically 2 per century compared to 13 per century for Mercury). For the Venus transit in 2012, BBAA members were out in force. It is a good bet that they will be out for the 2016 Mercury transit as well, so save the date and stay tuned!

Our Solar System Is *Almost* Normal, But Not Quite

By Dr. Ethan Siegel

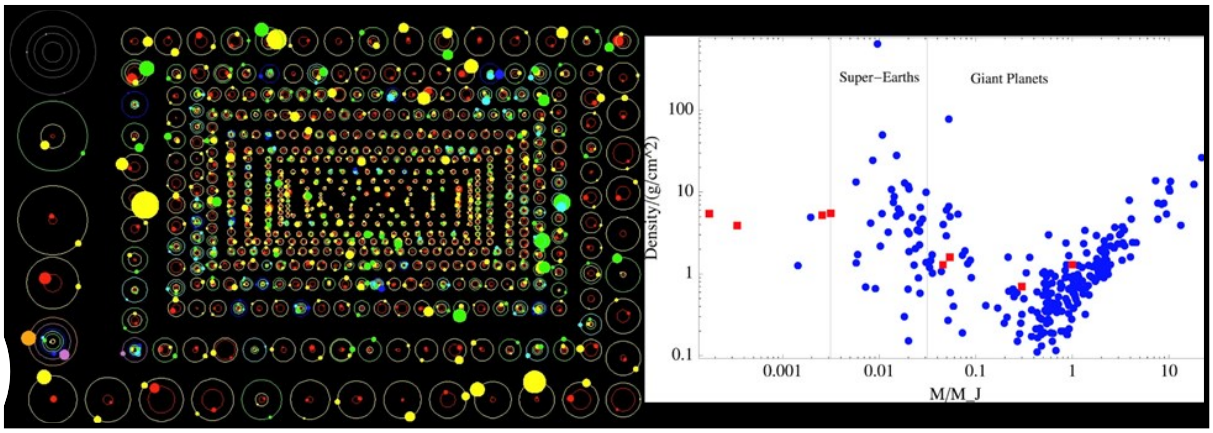
It was just over 20 years ago that the very first exoplanet was found and confirmed to be orbiting a star not so different from our own sun. Fast forward to the present day, and the stellar wobble method, wherein the gravitational tug of a planet perturbs a star's motion, has been surpassed in success by the transit method, wherein a planet transits across the disk of its parent star, blocking a portion of its light in a periodic fashion. Thanks to these methods and NASA's Kepler spacecraft, we've identified many thousands of candidate planets, with nearly 2,000 of them having been confirmed, and their masses and densities measured.

The gas giants found in our solar system actually turn out to be remarkably typical: Jupiter-mass planets are very common, with less-massive and more-massive giants both extremely common. Saturn—the least dense world in our solar system—is actually of a fairly typical density for a gas giant world. It turns out that there are many planets out there with Saturn's density or less. The rocky worlds are a little harder to quantify, because our methods and missions are much better at finding higher-mass planets than low-mass ones. Nevertheless, the lowest mass planets found are comparable to Earth and Venus, and range from just as dense to slightly less dense. We also find that we fall right into the middle of the "bell curve" for how old planetary systems are: we're definitely typical in that regard.

But there are a few big surprises, which is to say there are three major ways our solar system is an outlier among the planets we've observed.

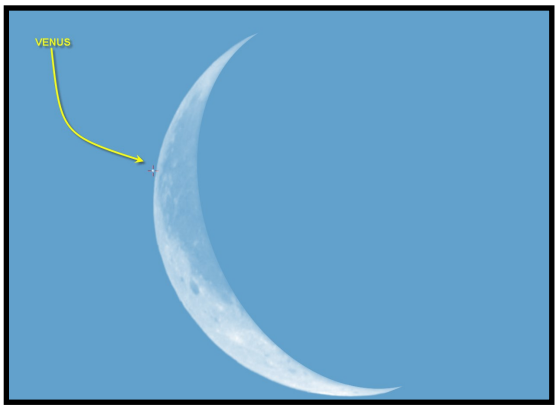
- All our solar system's planets are significantly farther out than the average distance for exoplanets around their stars. More than half of the planets we've discovered are closer to their star than Mercury is to ours, which might be a selection effect (closer planets are easier to find), but it might indicate a way our star is unusual: being devoid of very close-in planets.
- All eight of our solar system's planets' orbits are highly circular, with even the eccentric Mars and Mercury only having a few percent deviation from a perfect circle. But most exoplanets have significant eccentricities, which could indicate something unusual about us.
- And finally, one of the most common classes of exoplanet—a super-Earth or mini-Neptune, with 1.5-to-10 times the mass of Earth—is completely missing from our solar system.

Until we develop the technology to probe for lower-mass planets at even greater distances around other star systems, we won't truly know for certain how unusual we really are!



Images credit: NASA / Kepler Dan Fabricky (L), of a selection of the known Kepler exoplanets; Rebecca G. Martin and Mario Livio (2015) ApJ 810, 105 (R), of 287 confirmed exoplanets relative to our eight solar system planets .

A Couple Don't-Miss Astronomy Events in December!



Lunar Occultation of Venus

On December 7 sky watchers in Hampton Roads will have an opportunity to see a lunar occultation of the planet Venus during the daytime! Yes, you should be able to see this, although binoculars will greatly help. The image to the left shows the position of Venus minutes before it will be blocked by the Moon. In Virginia Beach first contact will occur at 12:43 PM when the Moon is at an altitude of 20 degrees. Third contact, when Venus begins to reemerge from behind the Moon, will occur at 1:58 PM, but will be more difficult as the Moon will be a fairly low 7 degrees in altitude by that time. Arrange your lunch so you can see this occultation and you just may be able to mark another item off your astronomy bucket list!

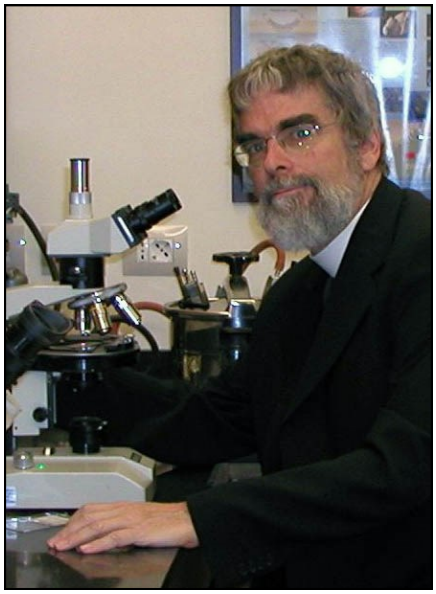
Image used by permission from wargrafix, http://www.astrobin.com/229862/0/

Comet Catalina

If you like comets, then you will be pleased to know that you have received an extra present this Christmas, Comet C/2013 US10 Catalina! Catalina should be an easy binocular comet from December 7-24 and then again after December 31 (when the Moon gets out of the way). In early December the comet is best seen about 90 minutes before sunrise. As the month continues it will get much higher before dawn. Look for it on New Year's morning, assuming you did not have too much fun the night before, when it will be about a half degree from Arcturus.

Mark Your Calendars: Brother Astronomer Comes to Hampton

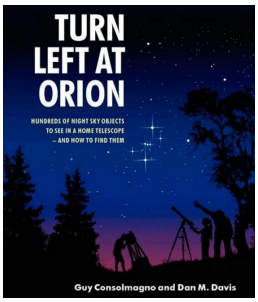
Vatican Astronomer Guy Consolmagno to speak at Catholic Speaker Series



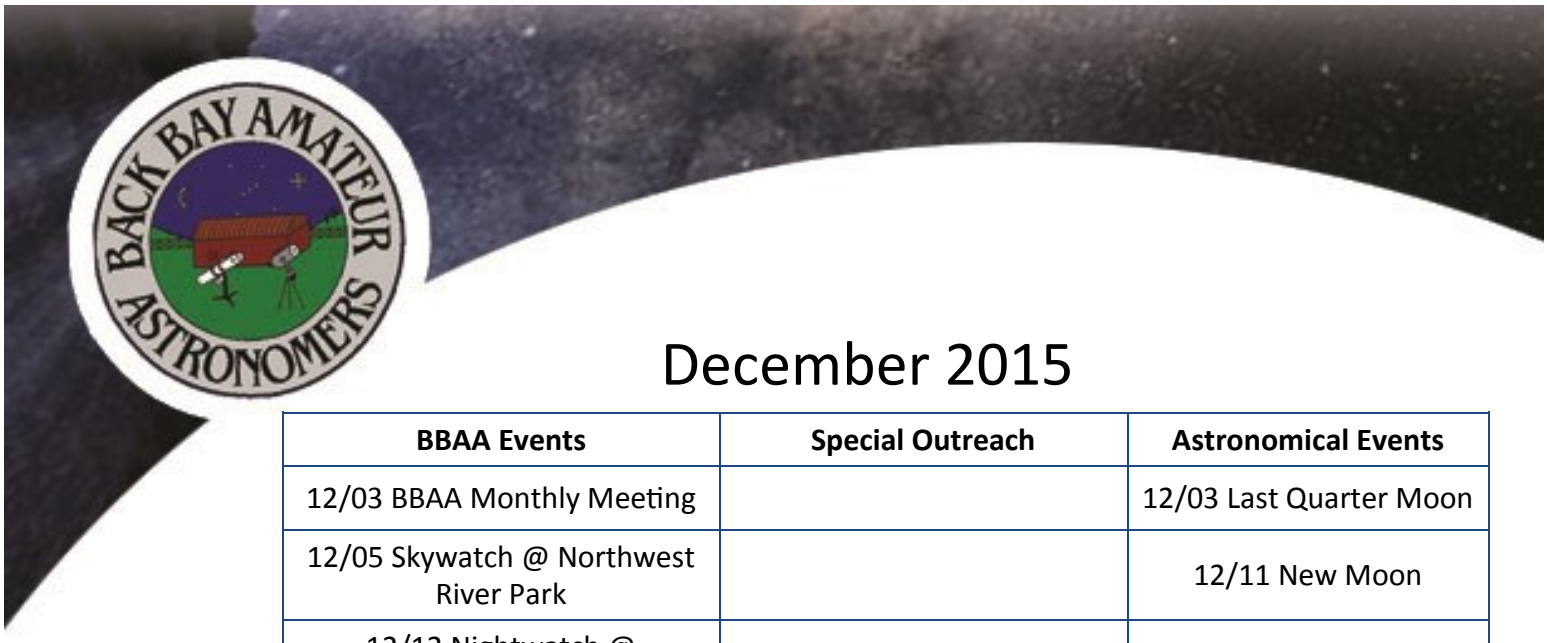
CC Image courtesy of Robert Macke, wikipedia.

Brother Guy Consolmagno, the director of the Vatican Observatory and the well known author of six popular astronomy books including such standards as *Turn Left at Orion* and *Brother Astronomer*, will be speaking in Hampton on March 4, 2016. Br. Consolmagno's talk is called "Faith and Science" and is sponsored by the Bishop Keane Institute, a ministry of Immaculate Conception Catholic Church in Hampton, Virginia. Information and tickets can be obtained at:

http://keaneinstitute.org/guy-consolmagno/



Note: A review of *Brother Astronomer* by George Reynolds was published in the March 2013 issue of The Observer.



December 2015

BBAA Events	Special Outreach	Astronomical Events
12/03 BBAA Monthly Meeting		12/03 Last Quarter Moon
12/05 Skywatch @ Northwest River Park		12/11 New Moon
12/12 Nightwatch @ Chippokes Plantation		12/14 Geminids Peak
		12/18 First Quarter Moon
12/19 BBAA Anniversary Lunch Tripps Restaurant, VA Beach		12/24 Full Moon

Sneak Peek into January

Sat 1/02/2016 Skywatch at Northwest River Park, 3:30 pm
Thu 1/07/2016 Monthly Meeting, Plaza Middle School, 7:30 pm
Fri 1/08/2016 Observing session at Cornland Park, 4:30 pm
Sat 1/09/2016 Nightwatch at Chippokes Plantation, 4:30 pm
Thu 1/14/2016 Garden Stars at Norfolk Botanical Gardens
Sat 1/30/2016 Skywatch at Northwest River Park, 5:00 pm