BACK BAY observer

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

EPHEMERALS
april 2015

4/11, 7:30 PM
Skywatch
Northwest River Park

4/18, 6:30 PM
Nightwatch
Chippokes Plantation
Surry, VA

4/24, 8:00 PM
Garden Stars
Norfolk Botanical Garden

4/25, 8:00 AM
National Astronomy Day
Virginia Beach Central Library

5/07, 7:30 pm
BBAA Monthly Meeting
TCC Campus, VA Beach
Building J, Rm JC-13

Looking Up!

It's April, so bring on the warm weather! Every year April brings in many things: warmer weather, the Summer Triangle, and thunderstorms. But this April we also were dealt a huge sadness. On Saturday the 28th of March, the BBAA lost great friend and astrobuddy, Georgie "Double Star" June, to her long battle with cancer.

For those who knew Georgie, she loved astronomy and helping out with outreach events. As Ted Forte would say, she was the BBAA's "Chief Cheerleader". Georgie was always looking to make events more enjoyable. She will be sorely missed as will be her "Best Margarita Contests" at the East Coast Star Party.

One of Georgie's favorite things to do at each East Coast Star Party was get the rest of us to show her nice objects in the sky. It wasn't until yesterday when I picked up my copy of the Planetary Nebula Observing Guide (authored by our very own Ted Forte) that I realized Georgie had played a very big part in the creation of this Astronomical League Program that is owned by the BBAA and managed by Ted. I began thinking that it would be nice if we could start a monthly observation session to work on the program as a group, maybe at Chippokes. I still have not thought this through yet, but I think it would be a great tribute to our friend, Georgie. I'll keep you posted.

That is about all I have for this month, but I think that the term "Looking up" now can take on a new meaning in that when you look up at the night sky you may very well be seeing Georgie out there among the stars. Keep looking up folks!

Jim Tallman

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NASA's Space Place

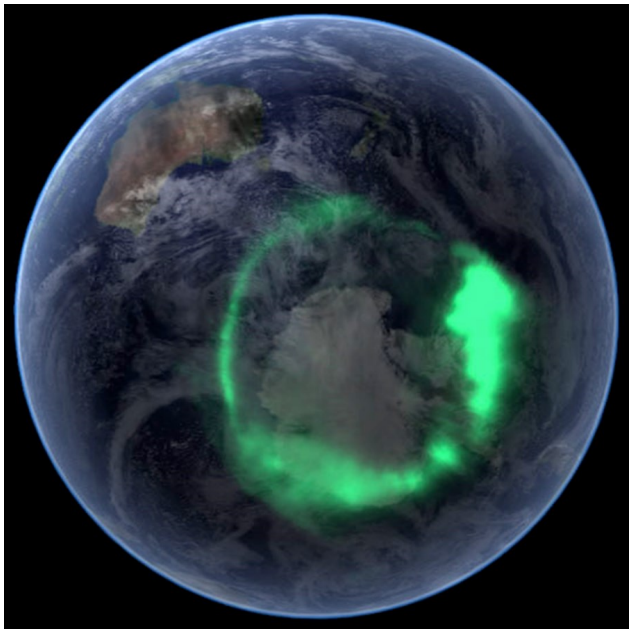
The Cold Never Bothered Me Anyway

By Dr. Ethan Siegel

For those of us in the northern hemisphere, winter brings long, cold nights, which are often excellent for sky watchers (so long as there's a way to keep warm!) But there's often an added bonus that comes along when conditions are just right: the polar lights, or the Aurora Borealis around the North Pole. Here on our world, a brilliant green light often appears for observers at high northern latitudes, with occasional, dimmer reds and even blues lighting up a clear night.

We had always assumed that there was some connection between particles emitted from the Sun and the aurorae, as particularly intense displays were observed around three days after a solar storm occurred in the direction of Earth. Presumably, particles originating from the Sun—ionized electrons and atomic nuclei like protons and alpha particles—make up the vast majority of the solar wind and get funneled by the Earth's magnetic field into a circle around its magnetic poles. They're energetic enough to knock electrons off atoms and molecules at various layers in the upper atmosphere—particles like molecular nitrogen, oxygen and atomic hydrogen. And when the electrons fall back either onto the atoms or to lower energy levels, they emit light of varying but particular wavelengths—oxygen producing the most common green signature, with less common states of oxygen and hydrogen producing red and the occasional blue from nitrogen.

But it wasn't until the 2000s that this picture was directly confirmed! NASA's Imager for Magnetopause-to-Aurora Global Exploration (IMAGE) satellite (which ceased operations in December 2005) was able to find out how the magnetosphere responded to solar wind changes, how the plasmas were energized, transported and (in some cases) lost, and many more properties of our magnetosphere. Planets without significant magnetic fields such as Venus and Mars have much smaller, weaker aurorae than we do, and gas giant planets like Saturn have aurorae that primarily shine in the ultraviolet rather than the visible. Nevertheless, the aurorae are a spectacular sight in the evening, particularly for observers in Alaska, Canada and the Scandinavian countries. But when a solar storm comes our way, keep your eyes towards the north at night; the views will be well worth braving the cold!



Auroral overlays from the IMAGE spacecraft.

Image credit: NASA Earth Observatory (Goddard Space Flight Center) / Blue Marble team.

To learn more about how to determine the Sun's "mood" each day, check out:

http://spaceplace.nasa.gov/solar-cycles

The Back Bay Amateur Astronomer's
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

President
Jim Tallman
president@backbayastro.org

Vice President
George Reynolds
vp@backbayastro.org

Treasurer
Chuck Jagow
treasurer@backbayastro.org

Secretary
Leigh Anne Lagoe
secretary@backbayastro.org

Webmaster
Curt Lambert
webmaster@backbayastro.org

ALCOR
Bill McLean
alcor@backbayastro.org

Librarian
Bill Newman
billn59@verizon.net

Scholarship Coordinator
Ben Loyola
benito@loyola.com

RRRT Coordinator
Lawrence "Bird" Taylor
Lawrence.W.Taylor@nasa.gov

Newsletter Editor
Paul Tartabini
bbaa.newsletter@gmail.com

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 May 7, 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

New Astronomical League Observing Programs

SKETCHING

The AL states that this award was not created for "artists", but was designed to help everyone learn how to become a better observer by sketching what they see. To qualify for the certificate and pin, observers must sketch 75 of 114 objects on a list that includes lunar and planetary features, double stars, nebulae, open and globular clusters and more. The site links to numerous sketching resources and tutorials.
https://www.astroleague.org/programs/two-view

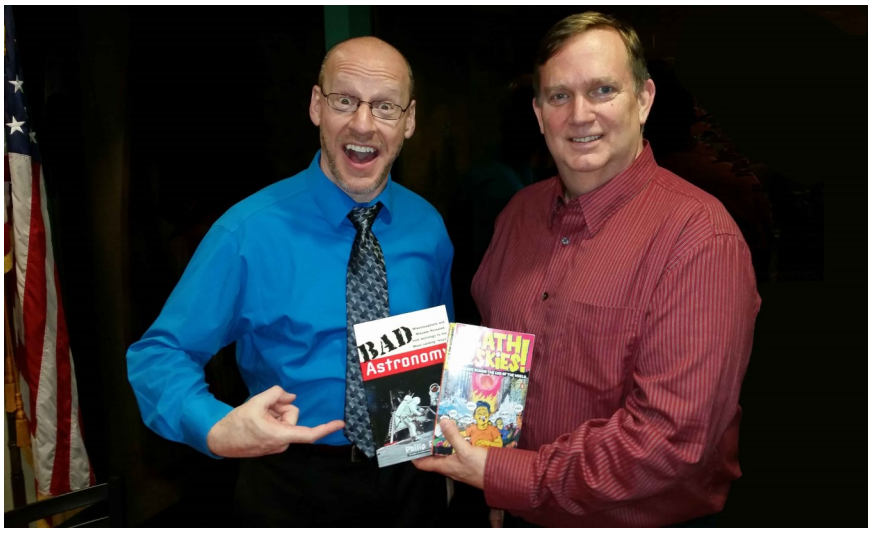
TWO IN THE VIEW

Don't you just love it when you can see two objects at the same time in the same field of view? A famous example is the Messier galaxy pair M81 & M82. If you are a two-for-one celestial bargain hunter at heart, then this observing program is for you. There are 114 of these "Two-in-the-View" sights on the Program Observing List (you must observe 100 of them to get the pin).
https://www.astroleague.org/programs/two-view

Bad Astronomy comes to Newport News

by Mark Croom & Lawrence "Bird" Taylor

It's not every day we are able to see an enthusiastic and charismatic speaker at a local venue on any topic, much less astronomy, but Phil Plait packed the house at Ferguson Center's Music & Theatre Hall on March 16, 2015 to a very appreciative crowd.



Phil Plait and Mark Croom on at the Virginia Living Museum book signing, following Plait's presentation at Ferguson Center. Mark is holding both of Phil's print books, "Bad Astronomy" from 2002 and "Death from the Skies" published in 2009.

As a popularizer of all things astronomical, Phil has appeared often on television, from late night talk shows to numerous episodes of *How the Universe Works*, and his down-to-earth style is quite refreshing.

His last print book, Death from the Skies!: The Science Behind the End of the World (2009, Penguin Books) explains in a technically well thought out yet somehow uplifting manner, several ways we might all die -- from celestial events ranging from the "city killer" level that would decimate localized regions, all the way to global extinction events. Wisely, his talk focused on a single method, asteroid impacts, as this is the one we are most able to influence. And the topic is timely, as NASA announced only days beforehand the mission architecture selected as a stepping stone toward developing asteroid redirect capabilities in the future.

Phil's talk was rich with anecdotes and references to movies and other stories that (mostly) got it wrong, while pointing out a few Hollywood efforts that mostly got it right. His stories of the immense power of the relatively insignificant objects that caused Meteor Crater, the Tunguska Event, and the multi WWII A-bomb class explosion in 2013 over Chelyabinsk – a town of millions secretly held by Russia that no one knew of, and the indigenous population's extensive deployment of dash-cams for insurance claim protection – had us afraid and laughing at the same time.

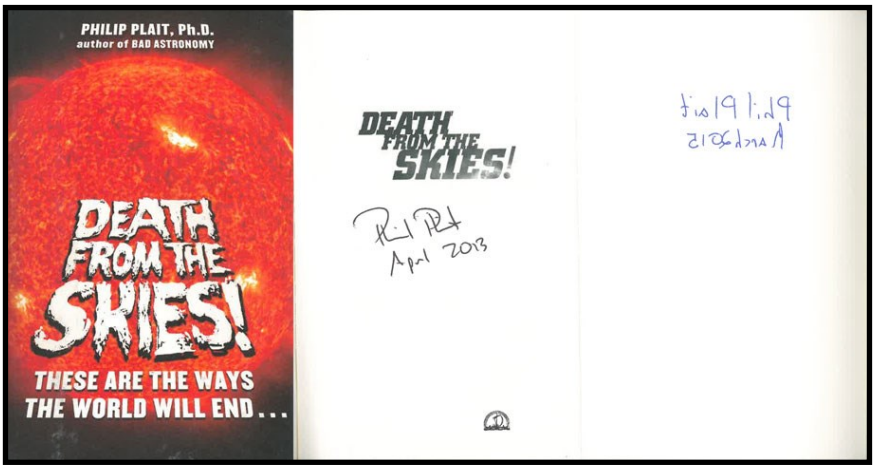
He was even so generous as to circulate an impressively large iron Campo de Cielo meteorite specimen to the large audience. The venue was booked behind Phil's talk, so we had to move before many of the questions could be addressed. Fortunately, Virginia Living Museum's Astronomy Curator Kelly Herbst had originally planned to host Phil at VLM so the event was transported over there for what was to be a book signing and an observing session. However, the response for both of his print books, including the 2002 Bad Astronomy: Misconceptions and Misuses Revealed, from Astrology to the Moon Landing "Hoax" (Wiley publishing; his initial popular book that debunks many astronomical exaggerations, myths, or outright falsehoods, and is his claim to fame a la www.badastronomy.com) and follow-up discussions were so numerous, Phil didn't get to take a break to observe until over two hours later.

Continued on page 5

Phil Plait, continued from page 4

Several folks bought and read his books before Phil's talk, and still the VLM nearly exhausted their supply that night! Bird Taylor bought what was supposed to be a new book and, when received, the pages were marked as if it were a used book. Indeed it was, as evidenced by Phil's signature to its prior owner in the front cover! Bird, being Bird, got Phil to sign it again in reverse on the back cover. I suppose he didn't mind since Bird presented him with a rose-colored model of the comet nucleus currently being visited by the Rosetta mission: 67P/Churyumov–Gerasimenko which, although not an asteroid, was presented nonetheless by Phil as yet another potential means of our species' demise. We are all hoping we can be smarter than the dinosaurs. One way to get smarter is to watch Phil's excellent short online segments of Crash Course Astronomy featured on YouTube.

Special thanks to our AstroBuddies at the VLM for hosting such an exciting event. Thanks to all of BBAA members that attended with family and friends, and kudos to those that brought scopes to share the night sky with all that made it over to the VLM on the Observation Deck.



Right: *Bird Taylor's copy of "Death from the Skies" with TWO signatures by the author: one for a previous owner in the front cover, and one for Bird, reversed, in the back cover. A one-of-a-kind signature for a one-of-a-kind guy!*

Left: Bird presented Phil Plait with a three dimensional model of the nucleus of Comet 67P/Churyumov–Gerasimenko which is currently being visited by the Rosetta spacecraft.

The model geometry is freely available from the European Space Agency web site. After scaling and manipulating the model for use in a 3D printer, Bird created enough copies so that William & Mary, CNU, HU, NSU, JMU, UVA, VLM, Portsmouth Catholic, the Jones Planetarium, the NASA Chief Scientist, and Phil Plait could each have one. Most were printed in pink and a few in red in honor of the ROSE-etta satellite orbiting the comet. 😄

Outreach Report: Plaza Middle School Science Fair

By George Reynolds

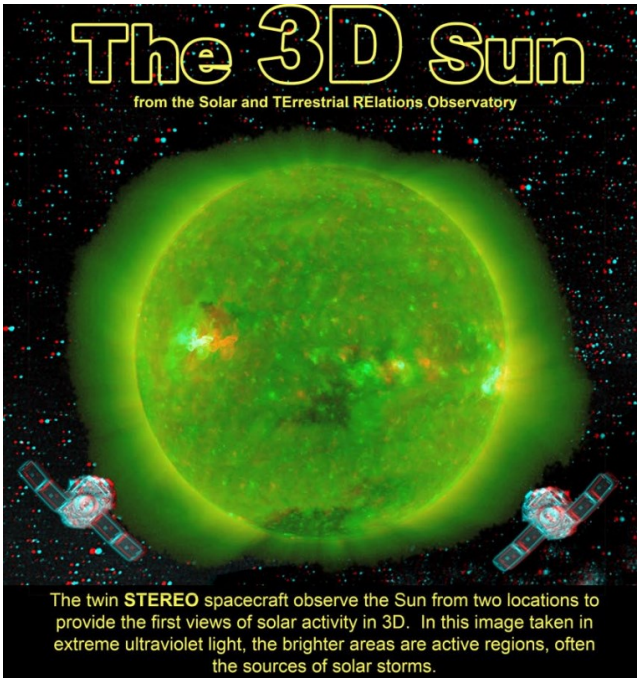
On Wednesday (3/18/15) Leigh Anne Lagoe and I participated in the annual Plaza Middle School Science Fair. The gym was full of students' exhibits, but I had time to only look at a few. I got a chuckle from one student's hypothesis, that the "shape of the Moon" is what affects the ocean tides.

Leigh Anne spent most of her time outside, showing the Sun in the PST until it got too low, and then as darkness approached, showing Jupiter in her 8" Dob. The attendees kept her busy until at least 15 minutes after the fair officially closed at 8pm. I heard a number of "wows" from the kids and adults who saw Jupiter, with all four Galilean moons on the same side, lined up in a very nice row.

Inside, I had a table set up, with some NASA pictures of the planets and space missions and a looping slide show on a laptop showing the BBAA and our activities, set to "Star Wars" music. I heard a lot of "wows" and "awesomes" from students and parents looking at *The 3D Sun*, a NASA poster created from images taken by the STEREO spacecraft, and viewed with red & blue 3-D glasses. The Sun appeared to bulge out, protruding from the flat poster, an effect that surprised and delighted those who looked at it.

I was able to "network" with the Civil Air Patrol officers set up at the table next to ours. They were making and demonstrating toy aircraft and rockets, one of which landed perfectly on our BBAA table. We may be giving the C.A.P. cadets an astronomy demonstration later this year.

Leigh Anne and I had a good time, and we were thanked profusely by the organizer, science teacher Alexandra Khalaf, and other teachers and helpers.



Among the various display materials that George and Leigh Anne shared with the crowd at Plaza Middle School was a 3D Sun Poster courtesy of NASA's STEREO mission. The twin STEREO spacecraft observe the Sun from two locations and the images are combined to provide the first views of solar activity in 3D. This image was taken in extreme ultraviolet light, the brighter areas are active regions, often the sources of solar storms.

Courtesy: stereo.gsfc.nasa.gov

Club News

Please give a warm BBAA welcome back to the area to long time member

Herb Teuscher

Herb is returning to the area from New York. He directed the Virginia Beach City Public Schools Planetarium from its opening in 1969 until his retirement in June of 2001. We look forward to seeing Herb more often now that he is close by!

NASA's Space Place

The Heavyweight Champion of the Cosmos

By Dr. Ethan Siegel

As crazy as it once seemed, we once assumed that the Earth was the largest thing in all the universe. 2,500 years ago, the Greek philosopher Anaxagoras was ridiculed for suggesting that the Sun might be even larger than the Peloponnesus peninsula, about 16% of modern-day Greece. Today, we know that planets are dwarfed by stars, which themselves are bound together by the billions or even trillions into galaxies.

But gravitationally bound structures extend far beyond galaxies, which themselves can bind together into massive clusters across the cosmos. While dark energy may be driving most galaxy clusters apart from one another, preventing our local group from falling into the Virgo Cluster, for example, on occasion, huge galaxy clusters can merge, forming the largest gravitationally bound structures in the universe.

Take the "El Gordo" galaxy cluster, catalogued as ACT-CL J0102-4915. It's the largest known galaxy cluster in the distant universe. A galaxy like the Milky Way might contain a few hundred billion stars and up to just over a trillion (1012) solar masses worth of matter, the El Gordo cluster has an estimated mass of 3 × 1015 solar masses, or 3,000 times as much as our own galaxy! The way we've figured this out is fascinating. By seeing how the shapes of background galaxies are distorted into more elliptical-than-average shapes along a particular set of axes, we can reconstruct how much mass is present in the cluster: a phenomenon known as weak gravitational lensing.

That reconstruction is shown in blue, but doesn't match up with where the X-rays are, which are shown in pink! This is because, when galaxy clusters collide, the neutral gas inside heats up to emit X-rays, but the individual galaxies (mostly) and dark matter (completely) pass through one another, resulting in a displacement of the cluster's mass from its center. This has been observed before in objects like the Bullet Cluster, but El Gordo is much younger and farther away. At 10 billion light-years distant, the light reaching us now was emitted more than 7 billion years ago, when the universe was less than half its present age.

It's a good thing, too, because about 6 billion years ago, the universe began accelerating, meaning that El Gordo just might be the largest cosmic heavyweight of all. There's still more universe left to explore, but for right now, this is the heavyweight champion of the distant universe!

Learn more about "El Gordo" here:
http://goo.gl/Hf43ui

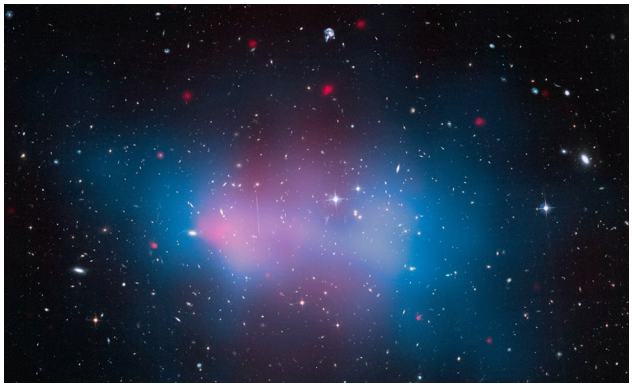


Image credit: NASA, ESA, J. Jee (UC Davis), J. Hughes (Rutgers U.), F. Menanteau (Rutgers U. and UIUC), C. Sifon (Leiden Observatory), R. Mandelbaum (Carnegie Mellon U.), L. Barrientos (Universidad Catolica de Chile), and K. Ng (UC Davis). X-rays are shown in pink from Chandra; the overall matter density is shown in blue, from lensing derived from the Hubble space telescope. 10 billion light-years distant, El Gordo is the most massive galaxy cluster ever found .

NASA's Space Place

April 2015

BBAA Events	Special Outreach	Astronomical Events
4/02 BBAA Monthly Meeting		4/04 Full Moon
4/11 Skywatch @ Northwest River Park		4/11 Last Quarter Moon
4/18 Nightwatch @ Chippokes Plantation		4/18 New Moon
		4/22-23 Lyrids Meteor Shower
4/24 Garden Stars @ Norfolk Botanical Gardens	4/25 National Astronomy Day, VA Beach Central Library	4/25 FirstQuarter Moon

Sneak Peek into May

Thu 5/07/2015 Monthly Meeting, TCC, 7:30 pm
Sat 5/09/2015 Skywatch at Northwest River Park, 7:00 pm
Fri 5/14-17/2015 East Coast Star Party, Coinjock, NC.
Tue 5/26/2015 Boardwalk Astronomy, VA Beach Boardwalk @ 24th St, 6:00 PM