



# BACK BAY observer

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

## EPHEMERALS april 2016

04/07, 7:30 PM  
BBAA Monthly Meeting  
TCC Campus, VA Beach  
Building J, Rm JC-13

04/08, 7:30 PM  
Cornwatch  
Cornland Park

04/09, 6:00 PM  
Nightwatch  
Chippokes Plantation

04/14, 6:00 - 7:45 PM  
Science Night  
Malibu Elementary School  
2809 Forehand Dr, Chesapeake, VA

04/16, 10:00 AM  
"Sun" Day  
Bells Mill Park  
Chesapeake, VA

04/30, 6:00 PM  
Skywatch  
Northwest River Park



## Looking Up!

Spring is springing up around us! For the first time in 29 years I have mowed my lawn before the first of April. With the onset of the cursed Day Light Saving Time, we feel our cherished long dark nights slipping away. The other morning during Dawn-Patrol, I stopped an insect from feeding upon me. But we welcome back to our evening skies big old Jupiter. I've been keeping tabs on old 'Jup' slipping away from the Dawn-Patrol skies. However, the wee hours of the morning are being graced with Saturn and Mars, so equilibrium is maintained.

We had an excellent couple of back-to-back outreach sessions last month at Deep Creek and Great Bridge elementary schools in Chesapeake. The first event was on a Monday night in Great Bridge and it looked like it was to be limited to an indoor presence only due to clouds; however, about a half hour into the event I spied sunlight outside as the sun was getting ready to set. I went outdoors and found a partial clearing around the moon. I quickly went inside and told everyone I was going to pull my truck around and set up the telescope so folks could see the moon. I set my 14" scope up in record time, and soon had a line of prospective observers. I believe I showed the moon to at least every elementary school kid and faculty member at least twice. Thanks go to Shawn Loescher, Jeff Goldstein, Mark Gerlach for their support.

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# March 4, 2016 Meeting Summary

Meeting was called to order at the TCC Planetarium at 7:30 PM by President Chuck Jagow.

## **RRRT Report (Lawrence "Bird" Taylor):**

- Carlos Salgado emailed Bird and mentioned that he's teaching an Astronomy class this semester. They're hoping to replace motors on the RRRT. Soon we will be submitting requests for special observations. Several false starts in the past, but this time it will begin to improve.

## **Scholarship Committee Report (Ben Loyola):**

- We will be giving a total of \$2,000 worth in May. \$1500 BBAA Fund and in memory of Georgie June \$500 scholarship in her name. Packets have gone out to all schools. Close deadline is March 2nd, and the Scholarship Committee will rank and stack then present checks in the near future.

## **Old Business:**

- Constitution change in work. Should be ready by the summer. Still waiting for inputs.
- Mt. Trashmore Star Party is a problem getting them to respond. Therefore, in lieu of them the City Park of Chesapeake is planning

a Space Movie so we can be a part of that (around June 18th).

- Sign up for the April 23rd dew heater / solar filter workshop on the database. Dew heaters will take the most time limited by the number of soldering stations. Very time consuming on last solar filter workshop. Chuck passed around his solar filter. We will figure out a new way of making it. We'll be using 5/8" weather stripping to secure the filters to your scope. (1/3 of the time will be saved using these materials).

## **Presentation: "How Do We Find our Way in the Wider Cosmos?" by Dr. Gene Tracy, Physics Professor, College of William & Mary**

- Dr. Tracy's superb presentation was given a rousing applause by meeting attendees when he was done, and concluded with numerous follow-up questions. He claimed he had many more slides. We loved it!
- Bill McLean announced an impromptu post-meeting dinner at Ruby Tuesday's, and the club invited Dr. Tracy to dinner, too.

Meeting adjourned at 8:53 PM.

Summary based on meeting minutes taken by Secretary Jeff Goldstein.

## **Looking Up**, continued from [page 1](#)

The next day, Shawn Loescher, Leigh Anne Lagoe and I were at another elementary school in Deep Creek, and this time the skies were clear, very clear. The jet contrails were short and sweet indicating better viewing was in store. Like Monday we set up on the moon. I normally toss in my 30mm 2" eyepiece for viewing the moon. This afternoon I started with my 17mm Nagler that nearly filled the field of view with the Moon at a power of 112X. After a handful of folks looked I replaced the eyepiece with a 9mm eyepiece, which afforded a magnification of 210X. As the evening continued and darkness slowly came, I increased the magnification once again to 271X with a 7mm eyepiece, and ultimately ended up showing the last viewers a treat of the moon at 380X! It was freaking SPECTACULAR and these folks just looked and looked through the scope. One little boy was especially enamored and must have kept bouncing between Shawn and I all night.

My bride asked me a few days ago what kept me interested in this astronomy thing. I thought about it a bit and finally answered that I really enjoyed doing the outreach. I can truly say that, despite all of the setting up, tearing down, getting lost, getting clouded out, and really, really dumb questions. That moment when someone finally "gets it" and realizes that they are looking at something special, and it is real and not a picture in the book, that is the force that has kept me interested in this astronomy thing. I look forward to Boardwalk Astronomy during the summer, and I am truly upset when we have to call a Skywatch because of weather.

The warmer months are coming, and I whole-heartedly encourage everyone to come out and just try a little outreach. You do not have to be a walking encyclopedia of astronomical facts and lore, you just have to know a little - like those three stars there are

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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:  
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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 April 7, 2016 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](http://www.backbayastro.org)

Yahoo! Groups  
[tech.groups.yahoo.com/group/backbayastro](http://tech.groups.yahoo.com/group/backbayastro)

BBAA Observer Newsletter  
[www.backbayastro.org/observer/newsletter.shtml](http://www.backbayastro.org/observer/newsletter.shtml)

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the summer triangle, or that the moon is just about a quarter of a million miles away. And by little I do mean a little. I get asked tough questions all the time and I either just "wing-it" with a ball-park answer, or I pluck my trusty iPhone out with its "Sky Safari" App that can quickly find answers. I really enjoy putting a "time" perspective on things, such as when looking at the double star Albireo in the constellation Cynus, mentioning that the light left those two jewels about 34 years BEFORE the Mayflower landed at Plymouth Rock!

April brings us some interesting items including:

- The Lyrid meteor shower on the 22<sup>nd</sup> that will be all but washed out by the bright full moon.
- About mid-month, at early twilight, Mercury shines in the Northwest about ten degrees

above the horizon, the 18th will be its best showing, about 45 minutes after sunset.

- Planets: Jupiter is visible nearly all night long and on April 6/7 there are some interesting satellite events. Europa dips behind the gas giant and a few hours later Ganymede transits across the front.
- On April 24/25 the moon dances among Mars, Saturn and Antares.
- Saturn and Mars after Midnight.

The warmer months are coming, I was Dawn-Patrolling the other morning without a stocking cap and gloves, but soon it will be just shirtsleeves and bug-spray. Through the nebulae of gnats, keep looking up!

*Chuck Jagow*

# Astrophotography, the First Year

By Dan Pelzel

I have wanted to contribute something to our astronomy club's newsletter but being new to all of this, I wasn't sure I'd have anything of value to contribute. I decided to write about something I do know, and that's my own journey through getting my first telescope to getting an astro image that I can say I am happy with.

In April of 2014, at the tender age of 31, I got my first telescope, an Orion XT8. I have always had a love for science and I just loved looking at all of the beautiful deep space images from the Hubble Space Telescope. When I was very young my father had a telescope and, though I was too young to see much or appreciate what was there, I do recall being at a dark park and just being struck by the star filled sky, so many more stars than I was used to seeing from base housing.

The first thing I did with my telescope was learn the dreaded "new gear curse." The days after receiving my new telescope were a rain soaked mess. The second thing I did with my telescope was find the Moon. "WOW!" I shouted with laughter. I couldn't believe my eyes! "Look at all those craters, there are craters inside of craters!" I had to share this! People had to know about this! A metal tube and two mirrors is all you need to see this? So I grabbed my iPhone and stuck the camera lens to the eyepiece. I had just taken my first astrophoto! The flood gates opened and I had found a sub-hobby in astronomy, astrophotography. I posted my Moon picture on my Facebook and all of my friends and family were enthralled.

I quickly discovered sub-specialties of astrophotography. There was planetary, there was solar, there was deep sky objects, some guys did mostly galaxies, others mostly nebulae. With every niche, specialized equipment. With all of the specialized equipment, there was one constant requirement, tracking. The Earth rotates and with that objects in the sky move throughout the night. Pushing a Dobsonian



*Dan's first astrophoto, a lovely lunar shot courtesy of his iPhone.*

telescope, while holding an iPhone to the eyepiece and trying to capture images is very difficult. I needed a way to track objects in the sky. Fortunately I found a used NexStar 8 (the original one from 2000) on Craig's List. I now had the ability to track objects and capture better photos.



*Being able to track objects with his NexStar8 opened up a whole range of new targets.*

While planetary and lunar imaging was fun, I wanted to capture the pretty, colorful images I saw growing up that were taken by telescopes like Hubble. I found online message boards full of advice and other amateurs who were taking

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stunning photos. It became apparent, my trusty iPhone wasn't going to be adequate for imaging galaxies and nebulae. I learned there were two types of cameras, the common Digital Single-Lens Reflex (DSLR) camera, and the astronomy specific Charge-Coupled Device (CCD) camera. The cost difference between the two was astonishing. I was able to find a refurbished DSLR for under \$300. With my new/used AltAz mount, DSLR and the needed adapters I was off to the races.

The Trifid Nebula, M20, was my first target, an object I had just learned about at a recent Skywatch, thanks to our own Leigh Anne Lagoe. It is such a beautiful target, and interesting too. It's noted for having all three types of nebulosity: reflection, emission and dark nebulae. So from my light polluted backyard, and with a mount not equipped to handle the weight of the telescope and camera, I somehow got M20 into my frame. I shot 18 frames at 10 seconds each. Without knowing a thing about calibration frames, I took my 18 frames and plugged them into a stacking program. After pushing some buttons and playing around in a free image processing program, I had my first deep sky image. I had goosebumps! I had captured M20. I couldn't believe I had done it. I could see my image wasn't nearly as good as other people on the message boards, but we all have to start somewhere. There was a lot wrong with this image, but it was mine.

I continued to learn from others on the message boards about what kind of gear worked and what didn't. My mount was all wrong, and my telescope wasn't ideal. If it's not apparent to you yet, this can become a very expensive hobby. An equatorial mount is what I needed if I was to take

the pretty pictures. So after selling some stuff on eBay I had enough for a new equatorial mount. My collection of gear was growing, but more importantly so was my understanding of how to capture and process images. There was more to it than just attaching a camera to a telescope and pressing the button. There was aligning the mount, there was polar alignment, there was guiding, there was collimation, calibration frames, countless programs and then the art and science of putting it all together to come out with a pretty image. I was starting to get fairly good images and I could see improvement with every new target.

Eight months after I had taken my first M20 image, I began gathering data for another pass at M20. At our East Coast Star Party and over the next couple of months I was able to capture about 3 hours worth of data. A year after my first M20, using the same telescope and camera, but a better mount and a bit more knowledge, I had an image of M20 that I could be proud of. Sure there are better images, taken with more expensive setups, but this was mine, taken with affordable, mostly used, consumer grade equipment and a year's worth of knowledge.

Astrophotography can be an intimidating, complicated, and extremely expensive hobby. It's not something that has to be out of reach, it's something that can be tamed with persistence, patience, and passion. There are some incredible talented imagers in our club and plenty of knowledge to be gleaned from them. I hope you enjoyed my first year as much as I have.



*These images of M20 show Dan's impressive progression in astrophotography beginning with his first attempt on the left and culminating with the splendid image on the right that was taken only a year later. Dan has shown that with hard work and some careful bargain hunting on the used market, beautiful astro images are within reach for anyone.*



# Gravitational Wave Astronomy Will Be The Next Great Scientific Frontier

By Dr. Ethan Siegel

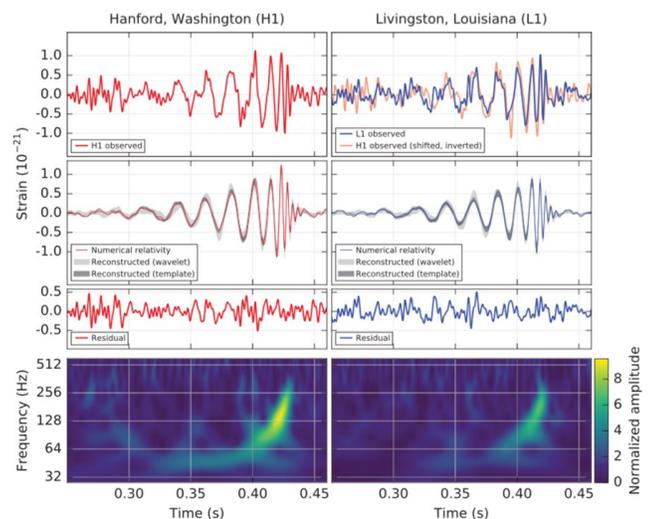
Imagine a world very different from our own: permanently shrouded in clouds, where the sky was never seen. Never had anyone see the Sun, the Moon, the stars or planets, until one night, a single bright object shone through. Imagine that you saw not only a bright point of light against a dark backdrop of sky, but that you could see a banded structure, a ringed system around it and perhaps even a bright satellite: a moon. That's the magnitude of what LIGO (the Laser Interferometer Gravitational-wave Observatory) saw, when it directly detected gravitational waves for the first time.

An unavoidable prediction of Einstein's General Relativity, gravitational waves emerge whenever a mass gets accelerated. For most systems, like Earth orbiting the Sun, the waves are so weak that it would take many times the age of the Universe to notice. But when very massive objects orbit at very short distances, the orbits decay noticeably and rapidly, producing potentially observable gravitational waves. Systems such as the binary pulsar PSR B1913+16 [the subtlety here is that binary pulsars may contain a single neutron star, so it's best to be specific], where two neutron stars orbit one another at very short distances, had previously shown this phenomenon of orbital decay, but gravitational waves had never been directly detected until now.

When a gravitational wave passes through an objects, it simultaneously stretches and compresses space along mutually perpendicular directions: first horizontally, then vertically, in an oscillating fashion. The LIGO detectors work by splitting a laser beam into perpendicular "arms," letting the beams reflect back and forth in each arm hundreds of times (for an effective path lengths of hundreds of km), and then recombining them at a photodetector. The interference pattern seen there will shift, predictably, if gravitational waves pass through and change the effective path lengths of the arms. Over a span of 20 milliseconds

on September 14, 2015, both LIGO detectors (in Louisiana and Washington) saw identical stretching-and-compressing patterns. From that tiny amount of data, scientists were able to conclude that two black holes, of 36 and 29 solar masses apiece, merged together, emitting 5% of their total mass into gravitational wave energy, via Einstein's  $E = mc^2$ .

During that event, more energy was emitted in gravitational waves than by all the stars in the observable Universe combined. The entire Earth was compressed by less than the width of a proton during this event, yet thanks to LIGO's incredible precision, we were able to detect it. At least a handful of these events are expected every year. In the future, different observatories, such as NANOGrav (which uses radiotelescopes to the delay caused by gravitational waves on pulsar radiation) and the space mission LISA will detect gravitational waves from supermassive black holes and many other sources. We've just seen our first event using a new type of astronomy, and can now test black holes and gravity like never before !



***This figure shows the data (top panels) at the Washington and Louisiana LIGO stations, the predicted signal from Einstein's theory (middle panels), and the inferred signals (bottom panels). The signals matched perfectly in both detectors. Image credit: Observation of Gravitational Waves from a Binary Black Hole Merger B. P. Abbott et al., (LIGO Scientific Collaboration & Virgo Collaboration), Physical Review Letters 116, 061102 (2016).***

# A Long-Standing Observing Plan

By Kent Blackwell



Stargazing has been a lifelong passion of mine since before most of you reading this were born. I've seen lunar eclipses. I've seen solar eclipses. I've seen comets come and go. I've seen meteor showers, some better than expected (Leonids, 1998), some disappointing. I've seen occultations. I've seen numerous nebulae. I've seen countless star clusters. Is there anything I haven't seen? Yes, there is, all the NGC galaxies in all the constellations visible from my northern latitude observing location. Thus began my quest over a decade ago.

Some of those galaxies were easy targets, but the majority were anything but easy. My routine is to choose one constellation at a time, whenever it is conveniently placed in the sky. Therein lies the problem.

Obviously, I'm not able to observe every night. Sometimes weather prevents that. More often than not, a social happening gets in the way. So, I find myself having to wait for another night. The fainter galaxies require observing during periods of new moon, which further hinders the time I have under the stars. Often, when I do get back to that constellation, it has drifted behind a tree in the western horizon. What does that mean? It means I have to wait until next year!

I can tell you this; it took three years to log all 353 NGC galaxies just in Leo alone. Another group that took a long time were the galaxies in Ursa Major. So far I've logged 379 Ursa Major NGC galaxies, with five more to go.

I know you're probably wondering what about the galaxy rich region of Virgo? I tend to shy away from Virgo because it's so congested but so far I've seen 514, with 109 left.

I find it preferable to pick a constellation that isn't so crowded with galaxies. It's easier because I otherwise get sidetracked seeing galaxies listed in other catalogs such as IC (Index Catalog) and other esoteric catalogs. I don't ignore them, I log them, and that takes time.

I could go on and on with stories about my quest, but it's rewarding to think about all those galaxies up there that I have yet to see. At the present time I've logged over 4400 NGC galaxies, with 800 to go. Will I see those before I pass on to greener pastures? If so, will I start a new quest to track down all the IC galaxies? If I do, I'll probably finish that just in time for the next Venus transit.



## April 2016

BBAA Events	Special Outreach	Astronomical Events
04/07 BBAA Monthly Meeting		04/07 New Moon
04/08 Cornwatch @ Cornland Park	4/14 Science Night, Malibu E.S.	04/10 Moon occults Aldebaran
04/09 Nightwatch @ Chippokes Plantation		04/14 First Quarter Moon
04/16 "Sun" Day @ Bells Mill Park, Chesapeake, VA		04/22 Full Moon
04/30 Skywatch @ Northwest River Park	04/27 Stargazer Party, Knotts Island Elementary Library	04/29 Last Quarter Moon

### Sneak Peek into May

Thu 5/05/2016 Monthly Meeting, Tidewater Community College, 7:30 pm  
 Fri 5/06/2016 & 5/13/2016 Observing session at Cornland Park  
 Sat 5/07/2016 Nightwatch at Chippokes Plantation  
 Mon 5/09/2016 Transit of Mercury, VA Beach Boardwalk @ 24th St, 6:00 am - 3:00 pm  
 Thu 5/12/2016 Garden Stars, Norfolk Botanical Gardens, 8:30 pm  
 Sat 5/14/2016 National Astronomy Day and "Sun" Day at Bells Mill Park, 10:00 am  
 Tue 5/17/2016 Boardwalk Astronomy, VA Beach Boardwalk @ 24th St, 6:00 pm  
 Sat 5/28/2016 Skywatch at Northwest River Park, 6:30 pm