BACK BAY observer

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

EPHEMERALS
august 2014

8/07, 7:30 pm
BBAA Monthly Meeting
Virginia Beach Planetarium
Plaza Middle School, VA Beach

8/08, 9:00 PM
Garden Stars
Norfolk Botanical Garden

8/15, 8:00 PM
Skywatch
Northwest River Park

8/22, 7:30 PM
Star Hike
Northwest River Park

8/23, 6:30 PM
Nightwatch
Chippokes Plantation
Surry, VA

Looking Up!

Well it is August, and Fall is coming; where has the time gone? Pretty soon it will be time for the East Coast Star Party again.

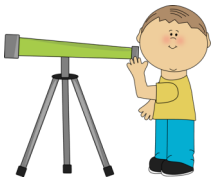
This month there are lots of interesting things to see in the sky. For those who are working on the AL Planetary Nebula Program, we can bag at least 31 of the 110 on the list to choose from. The Ring Nebula, M57, just happens to be one of those objects on the list, and who doesn't like to take a look at that one? The Perseids Meteor Shower should also give us a show on the night of August 12/13th, so let's hope that we can get a little clear sky to see what we can see.

For club events we have our monthly meeting on the 7th at Plaza Middle School in Virginia Beach, Garden Stars on the 8th, Sky Watch at NWRP on the 15th, and Star Hike (NWRP) on the 22nd, with Nightwatch at Chippokes rounding out the month. Wow, what a busy month it will be!

There are lots of things to do this month if we can get some nice weather for once. So cross your fingers everyone and have fun.

Until next month...

Jim Tallman



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NASA's Space Place

A Glorious Gravitational Lens

By Dr. Ethan Siegel

As we look at the universe on larger and larger scales, from stars to galaxies to groups to the largest galaxy clusters, we become able to perceive objects that are significantly farther away. But as we consider these larger classes of objects, they don't merely emit increased amounts of light, but they *also* contain increased amounts of **mass**. Under the best of circumstances, these gravitational clumps can open up a window to the distant universe well beyond what any astronomer could hope to see otherwise.

The oldest style of telescope is the refractor, where light from an arbitrarily distant source is passed through a converging lens. The incoming light rays—initially spread over a large area—are brought together at a point on the opposite side of the lens, with light rays from significantly closer sources bent in characteristic ways as well. While the universe doesn't consist of large optical lenses, **mass itself** is capable of bending light in accord with Einstein's theory of General Relativity, and acts as a *gravitational* lens!

The first prediction that real-life galaxy clusters would behave as such lenses came from Fritz Zwicky in 1937. These foreground masses would lead to multiple images and distorted arcs of the same lensed background object, all of which would be magnified as well. It wasn't until 1979, however, that this process was confirmed with the observation of the Twin Quasar: QSO 0957+561. Gravitational lensing requires a serendipitous alignment of a massive foreground galaxy cluster with a background galaxy (or cluster)in the right location to be seen by an observer at our location, but the universe is kind enough to provide us with many such examples of this good fortune, including one accessible to astrophotographers with 11" scopes and larger: Abell 2218.

Abel 2218. Image credit: NASA, ESA and Johan Richard (Caltech). Acknowledgement: David de Martin & James Long (ESA/Hubble).

Located in the Constellation of Draco at position (J2000): R.A. 16h 35m 54s, Dec. +66° 13' 00" (about 2° North of the star 18 Draconis), Abell 2218 is an extremely massive cluster of about 10,000 galaxies located 2 billion light years away, but it's *also* located quite close to the zenith for northern hemisphere observers, making it a great target for deep-sky astrophotography. Multiple images and sweeping arcs abound between magnitudes 17 and 20, and include galaxies at a variety of redshifts ranging from z=0.7all the way up to z=2.5, with farther ones at even fainter magnitudes unveiled by Hubble. For those looking for an astronomical challenge this summer, take a shot at Abell 2218, a cluster responsible for perhaps the most glorious gravitational lens visible from Earth!

Learn about current efforts to study gravitational lensing using NASA facilities:

http://www.nasa.gov/press/2014/january/nasas-fermi-makes-first-gamma-ray-study-of-agravitational-lens/

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

BBAA Meetings

The BBAA meet the first Thursday of every month except for July. The next meeting will be held on August 7, 2014 in the Kiva Auditorium at Plaza Middle School located at 3080 South Lynnhaven Rd in Virginia Beach at 7:30 pm. George Reynolds will be presenting "Astronomy 101."

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

BBAA Astrophotography Showcase

The Needle Galaxy (NGC 4565) in Coma Bernices
***Details**: June 1, 2014 with Explore Scientific ED127 with Canon DSLR 1000D. Total exposure was 54 minutes at ISO 1600. Image by Jason Tackett.*

Another treasure from the spring East Coast Star Party captured by Jason Tackett on June 1, 2014. This delightful image of the Needle Galaxy instantly brings to mind thoughts of spaceships and flying saucers. If you look close, you may be able to spot a few more distant galaxies nearby.

This image is even more impressive if you consider that Jason hasn't been doing astrophotography very long. As a rank beginner he wrote a review of Jerry Lodriguss' book *A Guide to Astrophotography with Digital SLR Cameras* less than a year ago in the Sept. 2013 issue of *The Observer*.

Getting Started in Astronomy

Lesson 1

by George Reynolds

Editor's Note: The next BBAA meeting is on August 7, 2014 at Plaza Middle School in Virginia Beach. The featured speaker is our very own Solar System Ambassador, George Reynolds.

George has been in the BBAA since 2000 and currently serves as club Vice President. At Thursday's meeting George will be presenting "Astronomy 101 - An Introduction to the Basics of Observing the Sky". This will be a great opportunity for new members or potential members to learn about our fantastic hobby, so invite anyone with an interest. Experienced club members should be on hand to help answer questions after the meeting.

George has kindly written this article as a supplement to his talk. He encourages you to print it out and bring it to the meeting or read it afterwards for reinforcement.

Here is some advice I gave recently to a "newbie" starting out in astronomy. This advice was given in winter, near the first of January, 2013, so the constellations discussed are those you would see then. I have included an addendum near the end of the article that has some summer and fall constellations and objects that are visible now.

Getting started in astronomy can seem daunting, but there are many resources available to help you get going. Here are six simple steps that will put you on your way to becoming a real amateur astronomer:

Step 1: Get a pair of binoculars. A decent pair of 10x50 binos at Wal-Mart is about $35.

Step 2: Get a planisphere, or "star wheel". You can get a small one for $10 or a large one for $20 at Barnes & Noble.

Step 3: Check out a couple books from the library. My three favorites for starting out are, *Turn Left at Orion* by Guy Consolmagno, *Skywatch* by Terence Dickinson, and *The Backyard Astronomer's Guide*, by Terence Dickinson and Dan Davis, in that order.

Step 4: Go out in your back yard at night with binos and planisphere and learn your way around by identifying the constellations.

Step 5: Pick up a copy of an astronomy magazine. The two most well-known are *Astronomy Magazine* and *Sky & Telescope*. Most avid amateur astronomers subscribe to one or both of them.

Step 6: Find a local astronomy club and start asking questions.

You can start with your binoculars and planisphere or sky chart in your back yard, albeit light-polluted, and just see how many constellations you can identify. It's like going to a new town and getting a street map to learn your way around. Use the planisphere as your "street map" and see what landmarks (er, . . . skymarks?) you can find. It helps to know which way is north, so you can hold your planisphere in the right direction. Another good resource for starting out in astronomy is the book, *Turn Left at Orion* by Guy Consolmagno. You can check it out at the library.

Maybe there is a park or an open field somewhere nearby where you could go for slightly darker skies, and to continue identifying the constellations to learn your way around the night sky. Once you are acquainted with the constellations and where they are (even what season they appear in) you can use a list from the Astronomical League (www.astroleague.org). Lists usually identify an object by which constellation it is in; e.g., The Ring Nebula (a.k.a. "M57") is located

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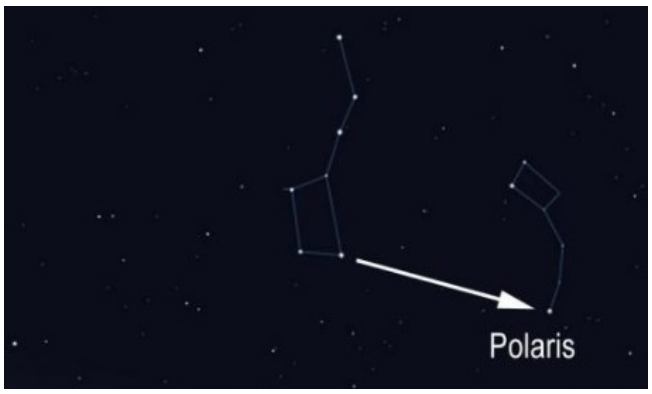
in the constellation Lyra, which happens to be a summer-to-late fall constellation. On January evenings it will be low on the western horizon or below after 8:00 pm, so it would not be the best object to try to find then. On the other hand, you might try for M45, The Pleiades (a.k.a. The Seven Sisters, a.k.a. "Subaru" in Japanese), located in the constellation Taurus, which is an excellent binocular object, a lovely open cluster of stars. Jupiter will be in Leo during January 2014, and is the brightest object in the night sky after the Moon. Another good "target" would be M42, the Great Orion Nebula, in, of course, the constellation Orion, which is a winter/early spring constellation. M42 is the tip of Orion's "sword", hanging down from the three stars we call Orion's "belt". The Andromeda Galaxy (M31), the nearest galactic neighbor to our own Milky Way Galaxy, can be found in the constellation Andromeda, but is best located by starting at a corner of "The Great Square of Pegasus".

Try to identify the most obvious winter constellations: Orion the Hunter, Cassiopeia the Queen, Gemini the Twins (to the left of Orion), Taurus the Bull (to the right of Orion), Auriga the Charioteer, and Pegasus the Winged Horse, and perhaps Perseus the Hero. Once you have learned them, use them as guides to help you find less obvious constellations, using your planisphere or a star chart.

Be aware that Ursa Major, the constellation containing the Big Dipper, is low on the horizon at 8 pm in January, but gradually rises throughout the night. You can find the Big Dipper's "pointer stars", the two stars in the end of the "cup" of the dipper, to locate Polaris, the North Star, which is the last star in the handle of the Little Dipper, a.k.a. Ursa Minor. The North Star is not all that obvious in a light-polluted sky. Contrary to some popular misconceptions, Polaris is NOT the brightest star in the sky. It ranks about 48th in brightness, compared to other stars. Sirius, the truly brightest star in the sky, is in the constellation Canis Major and is above the eastern horizon at 8 pm, and rises steadily higher throughout the night. Canis Major (the Big Dog) and Canis Minor (the Little Dog, containing the bright star Procyon) are Orion's "hunting dogs" and they follow him around the night sky. Lepus the Hare is the rabbit they are chasing, located just below Orion.



The Big Dipper's "pointer stars" help to locate the pole star, Polaris, (Courtesy: NASA)

George at the Telescope.

I hope these hints help you get started in your quest to learn and enjoy amateur astronomy. As I explained recently to a class of 3rd- and 4th-graders, astronomy is the study of celestial objects outside Earth's atmosphere, and "amateur" is from the French, meaning "lover". We LOVE studying and observing the stars, planets, and other night-sky objects.

ADDENDUM:

Summer Constellations to identify with a planisphere, naked eye, and binoculars:

Lyra (mentioned above) the Lyre or Harp, Cygnus the Swan, and Aquila the Eagle. The three brightest stars in these constellations make up the asterism "The Summer Triangle", which is visible from mid-summer through late fall. Those three stars are Vega in Lyra (the brightest star in the summer sky), Deneb in the tail of the Swan Cygnus, and Altair, in Aquila. Boötes the herdsman (the "ice cream cone"), with its bright orange giant star Arcturus. Hercules, with

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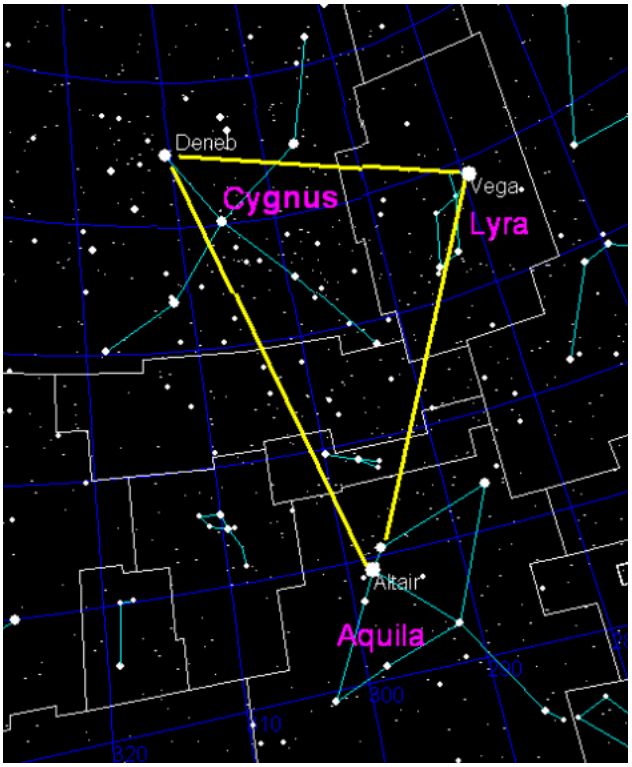
globular clusters M13 and M92; Corona Borealis; Cassiopeia the Queen; dim Cepheus the King; and Perseus the Hero, with the "Double Double" open star clusters. Then there are Scorpius the Scorpion, Sagittarius the Archer (a.k.a. "the Teapot"), Serpens the Serpent, and Ophiuchus the Serpent-bearer.

Small but interesting constellations are Delphinus the Dolphin, Sagitta the Arrow, and Vulpecula the Fox. A star chart shows individual stars, star clusters, galaxies, and nebulae in each of the constellations. Once you get familiar with the constellations, you can observe "deeper" into those objects.



The "Summer" Triangle can be seen a long time after summer. Why not plan on observing it over the coming months to see how far past summer you can spot it?

Autumn Constellations and Stars:

Some of the summer sights, like the constellations of the Summer Triangle and the circumpolar constellations, are also visible in autumn. Add to these Pegasus the Winged Horse, Pisces the Fishes, Andromeda the Maiden (daughter of Queen Cassiopeia and King Cepheus), Auriga the Charioteer with its bright star Capella, Aries the Ram, and Triangulum the Triangle, with the Triangulum Galaxy. The Andromeda Galaxy, nearest neighbor to our own Milky Way Galaxy, is in Andromeda, just 2.5 million light-years (LY) away.

Until the early 20th century, other galaxies were unknown, and our Milky Way was thought to be the universe. Hence the term "galaxy", derived from the word for "milk". See the side bar below for an extragalactic word study:

GALAXY and its derivation:

Source: Reader's Digest Oxford Complete Wordfinder, (c) 1996 Oxford University Press, Inc.; also published as The Oxford Dictionary and Thesaurus

lacto -- prefix (comb. form) meaning "milk"

lactose -- noun, a sugar that occurs in milk, and is less sweet than sucrose

lactic -- adj., of, relating to, or obtained from milk

lactase -- n., any of a group of enzymes that catalyze the hydrolysis of lactose to glucose and galactose

galaxy -- n., any of many independent systems of stars, gas, dust., etc., held together by gravitational attraction; often capitalized, the Galaxy, it means the Milky Way galaxy, of which our solar system is a part; [ME f, OF galaxie f. med L galaxia, LL galaxias f Gk f gala galaktos milk].

NASA's Space Place

The Invisible Shield of our Sun

By Dr. Ethan Siegel

Whether you look at the planets within our solar system, the stars within our galaxy or the galaxies spread throughout the universe, it's striking how empty outer space truly is. Even though the largest concentrations of mass are separated by huge distances, interstellar space isn't empty: it's filled with dilute amounts of gas, dust, radiation and ionized plasma. Although we've long been able to detect these components remotely, it's only since 2012 that a manmade spacecraft -- Voyager 1 -- successfully entered and gave our first direct measurements of the interstellar medium (ISM).

What we found was an amazing confirmation of the idea that our Sun creates a humongous "shield" around our solar system, the heliosphere, where the outward flux of the solar wind crashes against the ISM. Over 100 AU in radius, the heliosphere prevents the ionized plasma from the ISM from nearing the planets, asteroids and Kuiper belt objects contained within it. How? In addition to various wavelengths of light, the Sun is also a tremendous source of fast-moving, charged particles (mostly protons) that move between 300 and 800 km/s, or nearly 0.3% the speed of light. To achieve these speeds, these particles originate from the Sun's superheated corona, with temperatures in excess of 1,000,000 Kelvin!

When Voyager 1 finally left the heliosphere, it found a 40-fold increase in the density of ionized plasma particles. In addition, traveling beyond the heliopause showed a tremendous rise in the flux of intermediate-to-high energy cosmic ray protons, proving that our Sun shields our solar system quite effectively. Finally, it showed that the outer edges of the heliosheath consist of two zones, where the solar wind slows and then stagnates, and disappears altogether when you pass beyond the heliopause.

Unprotected passage through interstellar space would be life-threatening, as young stars, nebulae, and other intense energy sources pass perilously close to our solar system on ten-to-hundred-million-year timescales. Yet those objects pose no major danger to terrestrial life, as our Sun's invisible shield protects us from all but the rarer, highest energy cosmic particles. Even if we pass through a region like the Orion Nebula, our heliosphere keeps the vast majority of those dangerous ionized particles from impacting us, shielding even the solar system's outer worlds quite effectively. NASA spacecraft like the Voyagers, IBEX and SOHO continue to teach us more about our great cosmic shield and the ISM's irregularities. We're not helpless as we hurtle through it; the heliosphere gives us all the protection we need!

Want to learn more about Voyager 1's trip into interstellar space? Check this out: http://www.jpl.nasa.gov/news/news.php?release=2013-278

Image credit: Hubble Heritage Team (AURA / STScI), C. R. O'Dell (Vanderbilt), and NASA, of the star LL Orionis and its heliosphere interacting with interstellar gas and plasma near the edge of the Orion Nebula (M42). Unlike our star, LL Orionis displays a bow shock, something our Sun will regain when the ISM next collides with us at a sufficiently large relative velocity.

August 2014

BBAA Events	Special Outreach	Astronomical Events
8/07 BBAA Monthly Meeting		8/10 Full Moon
8/08 Garden Stars @ Norfolk Botanical Gardens	8/05 Boardwalk Astronomy, 24th St, VA Beach Oceanfront	8/12-13 Perseids Meteor Shower
8/15 Skywatch @ Northwest River Park		8/17 Last Quarter Moon
8/23 Nightwatch @ Chippokes Plantation	8/22 Star Hike @ Northwest River Park	8/25 New Moon

Sneak Peek into September

Tue 9/02/2014 Boardwalk Astronomy, 24th St. VA Beach, 6:00 pm
Thu 9/04/2014 Monthly Meeting, TCC, 7:30 pm
Fri 9/05/2014 Garden Stars at Norfolk Botanical Gardens, 8:00 pm
Fri 9/19/2014 Skywatch at Northwest River Park, 7:00 pm
Sat 9/27/2014 Nightwatch at Chippokes State Park, Surry VA.