



Back Bay Observer

Dec
2019

The official newsletter of the Back Bay Amateur Astronomers

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Cover Image by Stu Beaber:
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The BBAA is a member organization of the Astronomical League.

LOOKING UP! — *a message from the president*

Image by: Free Photos on Pixabay

Another year has passed with hundreds of people attending our events and looking through our telescopes. I often run into people that have heard of the BBAA in this area. I wanted to thank everyone who has helped the club fulfill its motto of “Bringing astronomy to the people of Hampton Roads” over the last year. Our last event in November, some members of the club met at Cornland Park for the meteor shower that wasn’t. Even though the meteor

shower turned out to be a dud it was still a good time as it provided another opportunity to talk to the public about astronomy. We ended up having quite a few visitors show up too. After my last “Looking Up” article, I wanted to update everyone. My personal plans have changed for the time being and I won’t need to step down as president. Have a great 2020 and remember to keep “Looking Up.”

-Shawn Loescher



Cover Image NGC 1333 by Stu Beaber

Imaging Camera: ST-10XME

Imaging Scope: AT8RC

Guide Camera: Meade DSI Pro w/PHD software

Guide Scope: William Optics 66mm refractor

Mount: Losmandy G11/Gemini 1/tripod mounted

Object: NGC 1333 reflection nebula

Date: October 23, 2019

Location: SRSP

Filters: LRGB, Lum=12x10 minutes, RGB=6x5 minutes each

Comments: Taken at Ra 03 30 32 & Dec +31 28 59 with clear calm skies. Air 48F chip-10C & no Moon. FOV=21x32 armin and object about 6x6 arcmin. Object is ~1000 light years away from Earth in the constellation Perseus.



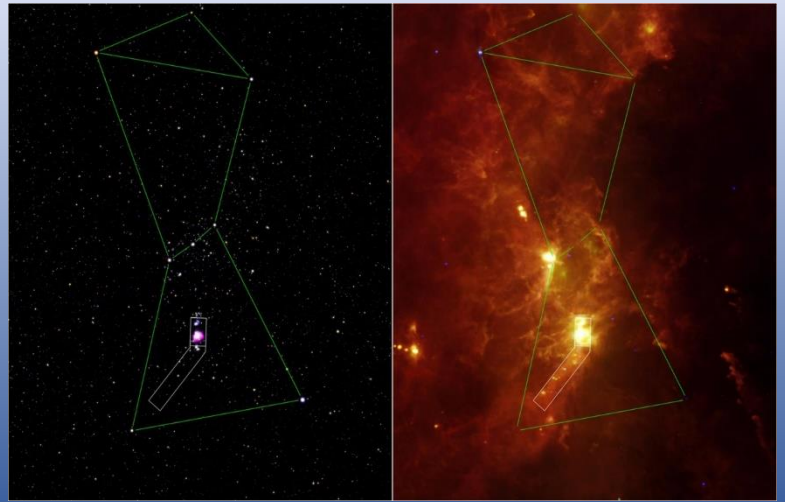
The Orion Nebula: Window into a Stellar Nursery

By David Prosper

Winter begins in December for observers in the Northern Hemisphere, bringing cold nights and the return of one of the most famous constellations to our early evening skies: Orion the Hunter!

Orion is a striking pattern of stars and is one of the few constellations whose pattern is repeated almost unchanged in the star stories of cultures around the world. Below the three bright stars of Orion's Belt lies his sword, where you can find the famous Orion Nebula, also known as M42. The nebula is visible to our unaided eyes in even moderately light-polluted skies as a fuzzy "star" in the middle of Orion's Sword. M42 is about 20 light years across, which helps with its visibility since it's roughly 1,344 light years away! Baby stars, including the famous "Trapezium" cluster, are found inside the nebula's whirling gas clouds. These gas clouds also hide "protostars" from view: objects in the process of becoming stars, but that have not yet achieved fusion at their core.

The Orion Nebula is a small window into a vastly larger area of star formation centered around the constellation of Orion itself. NASA's Great Observatories, space telescopes like Hubble, Spitzer, Compton, and Chandra, studied this area in wavelengths we can't see with our earthbound eyes, revealing the entire constellation alight with star birth, not just the comparatively tiny area of the nebula. Why then can we only see the nebula? M42 contains hot young stars whose stellar winds blew away their cocoons of gas after their "birth," the moment when they begin to fuse hydrogen into helium. Those gas clouds, which block visible light, were cleared away just enough to give us a peek inside at these young stars. The rest of the complex remains hidden to human eyes, but not to advanced space-based telescopes.



This image from NASA's Spitzer missions shows Orion in a different light – quite literally! Note the small outline of the Orion Nebula region in the visible light image on the left, versus the massive amount of activity shown in the infrared image of the same region on the right. Image Credit: NASA/JPL-Caltech/IRAS /H. McCallon. From bit.ly/SpitzerOrion

We put telescopes in orbit to get above the interference of our atmosphere, which absorbs many wavelengths of light. Infrared space telescopes, such as Spitzer and the upcoming James Webb Space Telescope, detect longer wavelengths of light that allow them to see through the dust clouds in Orion, revealing hidden stars and cloud structures. It's similar to the infrared goggles firefighters wear to see through smoke from burning buildings and wildfires.

Learn more about how astronomers combine observations made at different wavelengths with the Night Sky Network activity, 'The Universe in a Different Light,' downloadable from bit.ly/different-light-nsn. You can find more stunning science and images from NASA's Great Observatories at nasa.gov.

**This article was distributed by
NASA Night Sky Network**
Visit <https://nightsky.jpl.nasa.gov/>

MERCURY TRANSIT

By Kent Blackwell

Like most of us I was looking forward to the 2019 Mercury Transit beginning on the morning of November 11. First contact occurred at 7:30 am so I woke up at 5:30 am to get things ready for hosting the transit at the Chesapeake Planetarium. We didn't expect a big crowd since, to the public at least, a Mercury transit isn't particularly newsworthy. Planetarium director Dr. Robert Hitt and I prepared coffee, hot chocolate, donuts and other sweets for volunteers. We counted 9 telescopes, including the planetarium's Celestron C-14 fitted with a full aperture solar filter. At 125x it provided the best view, especially for the public. Mercury was still only a tiny black spot, looking like a pepper flake on a white dinner plate.

A Veterans Day Celebration got under way at the Civic Center at 11:00 am, only a block away and about 100 people stopped by to ask what we were viewing. Everyone was so pleased to have been able to witness such a relatively rare event. It's nice that many

youngsters were able to see it as well. The 10 year olds who saw it will be 40 when they have a chance to see it again from anywhere in the USA!

I was pleased to see so many BBAA members and other friends as well. It was also rewarding that a gentlemen drove all the way to the planetarium from Cleveland, Ohio to see the transit. Much of the US was cloudy, and it's indeed impressive he made the long trek. He had a very modest department store telescope, which he had purchased for his daughter. But after seeing Saturn last month, he wants to move to something more worthy. I gave him several suggestions, one being an Orion 10" Dobsonian telescope.

The morning hours gave the clearest views, but by noon a fairly thick haze rolled in. Just before it did, Jeff Edmondson, the weatherman from

Kent Blackwell has been observing the night sky over 50 years. Although his astronomical interests lie primarily in deep sky observing with large telescopes, he also enjoys splitting double stars with his 80mm and 100mm refractors.

Kent exclaims, "You can't ever have enough telescopes!"

Although his favorite is a homemade 25" f/5, he also enjoys his 4.5" Orion StarBlast mini-Dobsonian. Kent has been a volunteer at the Chesapeake Planetarium since 1970, and has hosted the East Coast Star Party in Coinjock, NC over a quarter century.



A veteran's day ceremony nearby made for plenty of passersby to view the transit at the Chesapeake Planetarium.

WAVY-TV stopped by and was impressed with the various views through our telescopes. By noon the haze was even thicker, but just before third contact the haze thinned a bit. Unfortunately the haze thickened again. After everyone packed up, the sky cleared. Isn't that always the way it is? With only a few of us remaining I swung my 4" TMB scope to Venus, appearing as a bright, but small point of light against a bright blue sky. I tried to see Jupiter, but very thin clouds eliminated any chances of seeing it in broad daylight.

Overall, it was a very successful viewing of a rare event. I'm looking forward to the next one, if I'm still on planet earth.





The Back Bay Amateur Astronomers met for our anniversary luncheon at Stripers, Waterside Drive in Norfolk. We had an excellent turnout to celebrate 41 years as a club! The results of the Georgie June Scholarship Fund Donation Drive Raffle are:

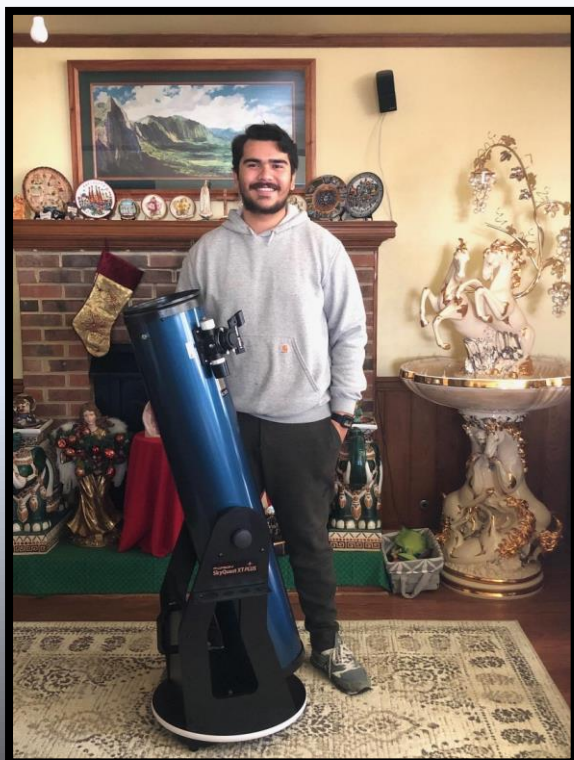
Orion XT8 dobsonian: Jared Austin

Canon 7D DSLR: Leigh Anne Lagoe

Celestron 114 EQ: Kelly Lenahan

Congratulations to the winners!

The raffle earned \$965 for the Georgie June Scholarship.



Jared Austin with his new Orion XT8 dobsonian.

Club Meetings

The Back Bay Amateur Astronomers meet on the first Thursday of each month from 7:30 – 9pm.

Typically, we meet at TCC Virginia Beach on the second floor of **Building J—the Science Building**, in room JC-11.

Occasionally, we meet at either TCC's planetarium on the first floor, or at the Plaza Middle School planetarium.

All meetings are free and open to the public. After normal business, there is usually a presentation.



The Chesapeake Planetarium offers free programs to the general public on Thursday nights at 8:00.

For reservations call Chesapeake Public Schools between 8:00 a.m. and 4:00 p.m. weekdays.

(757-547-0153) For more details, visit:

<https://cpschools.com/planetarium/public-programs/>



Our friends at VPAS (Virginia Peninsula Astronomy/ Stargazers) offer free star gazing at the Virginia Living Museum, beginning at sunset on the **second Saturday of every month.**

<https://thevlm.org/events/planetarium-shows/evening/>

Bringing Astronomy to the People of Hampton Roads



The Back Bay Amateur Astronomers, Inc. is a 501(c)(3) nonprofit organization dedicated to astronomy outreach.

We are a 100% volunteer-run organization that relies on our dedicated members to “*bring astronomy to the people of Hampton Roads.*”

Anyone who has volunteered at one of our events can tell you that it is incredibly rewarding to show the moon to someone who has never seen it through a telescope. You never know whom you’ll inspire to become the next great astrophysicist. At the very least, you may instill within someone a passion to look up at the sky.

Please help us achieve our mission and sign up to volunteer. **All experience levels welcome.**

See our monthly [calendar](#) for events.

Youth member and volunteer, Kaitlyn, aims her 4.5 inch dobsonian at the moon during our very busy Boardwalk Astronomy outreach event.

All members of all experience levels are able to “bring astronomy to the people of Hampton Roads.”



BBAA 2019 Outreach Report

For 2019, as of mid-December, the BBAA has over 600 hours of volunteer time between a total of 26 volunteers. Not including the thirty observing opportunities at Nightwatch and Cornwatch, we have held over 74 public outreach events. Not bad, considering we’ve had several events cancelled due to weather.

PUBLIC EVENT	# of events
Skywatch	6
Saturday SUN Day	7
Boardwalk Astronomy	4
Garden Stars	8
Library Events	10
School Events	7
Club meetings/picnic	11
Special Community Requests	22
Total Lunar Eclipse Event	1
Meteor Shower Event	1
Mercury Transit Event	2
TOTAL # PUBLIC EVENTS	79

Museo Galileo

By Thomas Flatley

Early last year, there was a conversation in my house that went sort of like this:

My wife says, “What are we doing for our 30th anniversary?”

I think: *Uh-oh, here we go...*

“Why don’t we go to Italy?” my wife says.

Who am I? Donald Trump?

While she’s saying, “We can go to all those art galleries and eateries and shopping and...”

I’m thinking: *I could go on scavenger hunts for sundials and meridian lines on ancient Roman streets and... Oh, there’s the Galileo Museum!*

“Say no more honey,” I say. “You’ve convinced me.”

The Galileo Museum, or *Museo Galileo*, in Florence, is three floors of scientific instruments of the Medici and Lorraine Grand Duke collections. They range from warfare, navigation, medical, to astronomy. It used to be called the History of Science Museum, but the name changed in 2010. Out of the 1,000 items on display, only a small section consists of truly original Galileo instruments. But that doesn’t stop you from gawking at everything else.

For example, the Santucci Sphere is one of the first things you see walking into the museum. The Antonio Santucci’s Ptolemaic armillary sphere from 1593 is the largest existing in the world with a 6.5 foot diameter. This is only one of dozens of celestial and terrestrial globes, spheres and armillarias present.

The Precision Instrument section held these telescopes from the early 1800s.

Behind my wife (happily there for scale) is the Amici II telescope. That’s 10.5 feet of comet-seeking and double-star-observing magic. Giovanni Battista Amici tested the quality of the objectives he produced by using them for observations of double stars or other objects that were particularly difficult to separate. Next to that is an 18th century 2500mm (length) octagonal tube Newtonian. On the far right sits an 18th century cylindrical 1750mm (length) Newtonian.



The Antonio Santucci's Ptolemaic armillary sphere at Museo Galileo in Florence, Italy.



Left to right: The 10.5-foot Amici II telescope; 18th century 2500mm octagonal tube Newtonian & 1750mm cylindrical Newtonian

Moving into the Galileo section, we found this display case called “Perfecting the Telescope” with various scopes from a span of 100 years starting from Galileo’s immediate successors. That one in the middle extends up to 40 feet and is made of wood, cardboard and Italian leather.

Figure 4 shows the two original Galileo telescopes and objective piece. The telescope on top was made by Galileo and consists of a main tube and two smaller housings in which the objective and the eyepiece are mounted. The main tube consists of two semicircular tubes held together with copper wire. It is covered with paper. The objective measures 51 mm in diameter, and is biconvex, but the radii of curvature of the surfaces of the two faces are not equal; the focal length is 1,330 mm, and the thickness at the center is 2.5 mm. The eyepiece is plano-concave and measures 26 mm in diameter; the concave side, facing the eye, has a 48.5 mm radius of curvature, the thickness at the center is 3.0 mm, and the focal length -94 mm (the negative focal length means that the lens is diverging). The instrument's magnification is 14 and its field of view 15'. In 1611, Prince Federico Cesi suggested calling this instrument *telescopio* [from the Greek *tēle* ("far") and *scopeo* ("I see")]. (reference museogalileo.it)

The second telescope was also made by Galileo, consisting of a main tube with separate housings at either end for the objective and the eyepiece. The tube is formed by strips of wood joined together. It is covered with red leather (which has become brown due to the passage of time) with gold tooling. The plano-convex objective, with the convex side facing outward, has a diameter of 37 mm, an aperture of 15 mm, a focal length of 980 mm, and a thickness at the center of 2.0 mm. The original eyepiece was lost and was replaced in the nineteenth century by a biconcave eyepiece with a diameter of 22 mm, a thickness at the center of 1.8 mm, and a focal length of -47.5 mm (the negative focal length means that the lens is diverging).



“Perfecting the Telescope” display at Museo Galileo.



Two original Galileo telescopes.

The instrument's magnification is 21 and its field of view 15'. (reference museogalileo.it)

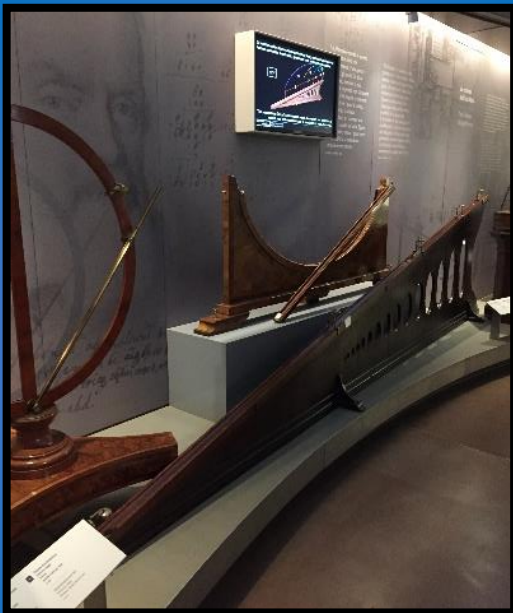
At the bottom of the photo are objective lenses used by Galileo for many observations in 1609-1610 (it was difficult getting all three pieces in the photo). In 1610, he was the first to observe Jupiter's moons, which he called the "Medicean Planets." He announced his great discovery in *Sidereus Nuncius* (The Starry Messenger), published in Venice the same year. Galileo donated the lens of the telescope with which he made the discovery to Grand Duke Cosimo II. In 1677, the Medici commissioned Vittorio Crosten to build the ebony frame in which the lens has since been preserved. (reference museogalileo.it)

The Science of Motion room had various inclined planes, pendulums and Brachistochronous falls. Most of these apparatus were from the 18th and 19th centuries and not Galileo's timeframe. The museum does state that no documents prove that Galileo actually performed these experiments but that these items were used to demonstrate the observable effects of physical principles discovered by Galileo.

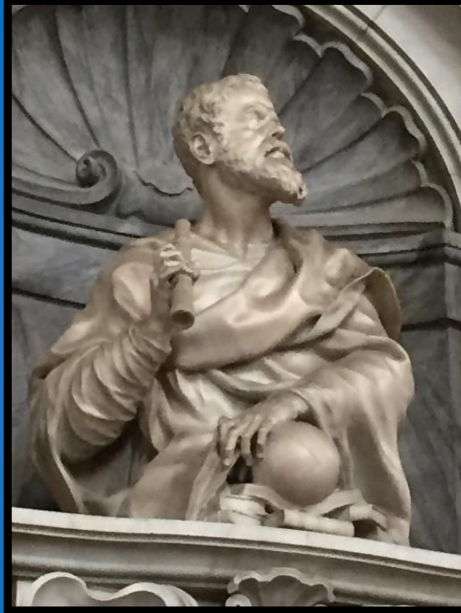
There was a room with these toys in which you could roll the balls, swing the pendulums and see how they really worked. It might have been for kids, but there were many adults *experimenting* with them – me included.

Of course, I had to see Galileo's tomb in the Basilica di Santa Croce just a couple of blocks away. The elaborate tomb is directly across from Michelangelo's tomb who died several days before Galileo's birth. Some believe that Michelangelo's spirit left him to enter Galileo's. However, Galileo's body wasn't interred there until 1737 after quite a bit of controversy. In the same tomb with him is Galileo's daughter, Sister Maria Celeste.

So if there are any major milestones coming up in your life that force you away from your telescope and BBAA events, by all means, go where your spouse suggests. Just don't let on about your ulterior motives.

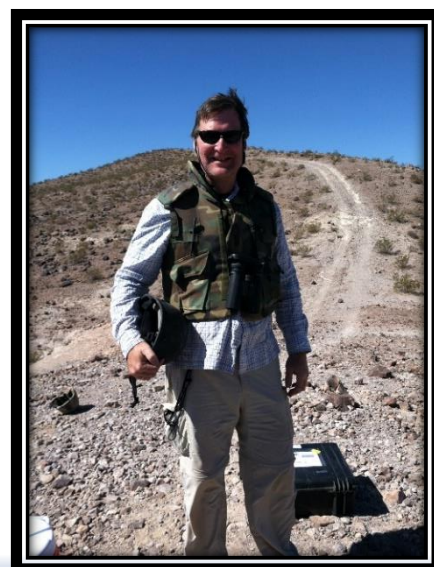


The "Science of Motion" room at Museo Galileo.



The Basilica de Santa Croce in Florence, Italy.

Thomas Flatley is a Kempsville resident and government slacker (GS) working test and evaluation. He used to do his stargazing from a cockpit, but now only from the ground with an XT8i, binos, or eyeballs. Work sends him to exotic places like Yuma, 29 Palms, and Rapid City, SD, but they have nice dark skies.



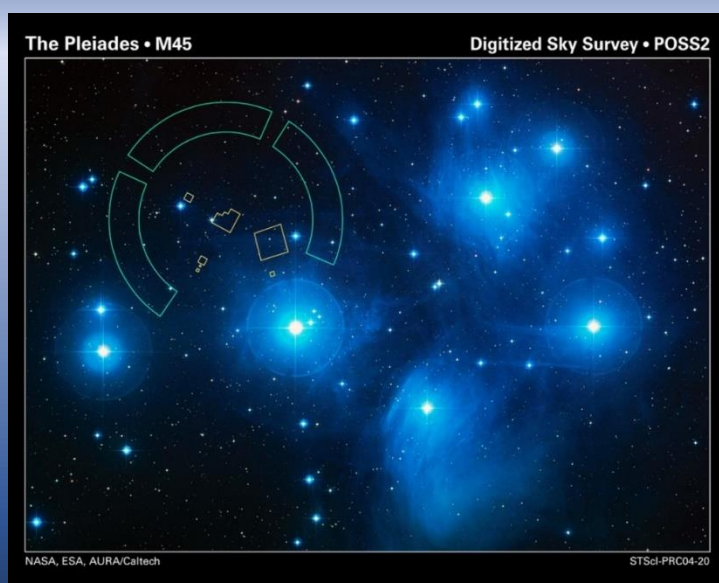


Spot the Young Stars of the Hyades and Pleiades

By David Prosper

Orion is the last of a trio of striking star patterns to rise during the late fall and early winter months, preceded by the diminutive Pleiades and larger Hyades in Taurus. All three are easily spotted rising in the east in early January evenings, and are textbook examples of stars in different stages of development.

As discussed in the previous article, the famous Orion Nebula (M42), found in Orion's "Sword," is a celestial nursery full of newly-born "baby stars" and still-incubating "protostars," surrounded by the gas from which they were born. Next to Orion we find the Hyades, in Taurus, with their distinctive "V" shape. The Hyades are young but mature stars, hundreds of millions of years old and widely dispersed. Imagine them as "young adult" stars venturing out from their hometown into their new galactic apartments. Bright orange Aldebaran stands out in this group, but is not actually a member; it just happens to be in between us and the Hyades. Traveling from Orion to the Hyades we then find the small, almost dipper-shaped Pleiades star cluster (M45). These are "teenage stars," younger than the Hyades, but older than the newborn stars of the Orion Nebula. These bright young stars are still relatively close together, but have dispersed their birth cocoon of stellar gas, like teenagers venturing around the neighborhood with friends and wearing their own clothes, but still remaining close to home - for now. Astronomers have studied this trio in great detail in order to learn more about stellar evolution.



Close-up of the Pleiades, with the field of view of Hubble's Fine Guidance Sensors overlaid in the top left, which helped refine the distance to the cluster. The circumference of the field of view of these sensors is roughly the size of the full Moon. (Credit: NASA, ESA and AURA/Caltech)

Figuring the exact distance of the Pleiades from Earth is an interesting problem in astrometry, the study of the exact positions of stars in space. Knowing their exact distance away is a necessary step in determining many other facts about the Pleiades. The European Space Agency's Hipparcos satellite determined their distance to about 392 light years away, around 43 light years closer than previous estimates. However, subsequent measurements by NASA's Hubble Space Telescope indicated a distance of 440 light years, much closer to pre-Hipparcos estimates. Then, using a powerful technique called Very Long Baseline Interferometry (VLBI), which combines the power of radio telescopes from around the world, the distance of the Pleiades was calculated to 443 light years. The ESA's Gaia satellite, a successor to Hipparcos, recently released its first two sets of data, which among other findings show the distance close to the values found by Hubble and VLBI, possibly settling the long-running "Pleiades Controversy" and helping firm up the foundation for follow-up studies about the nature of the stars of the Pleiades.

You can learn more about the Pleiades in the Universe Discovery Guide at bit.ly/UDGMarch, and find out about missions helping to measure our universe at nasa.gov.

Locate Orion rising in the east after sunset to find the Orion Nebula in the "Sword," below the famous "Belt" of three bright stars. Then, look above Orion to find both the Hyades and the Pleiades. Binoculars will bring out lots of extra stars and details in all three objects, but you can even spot them with your unaided eye!



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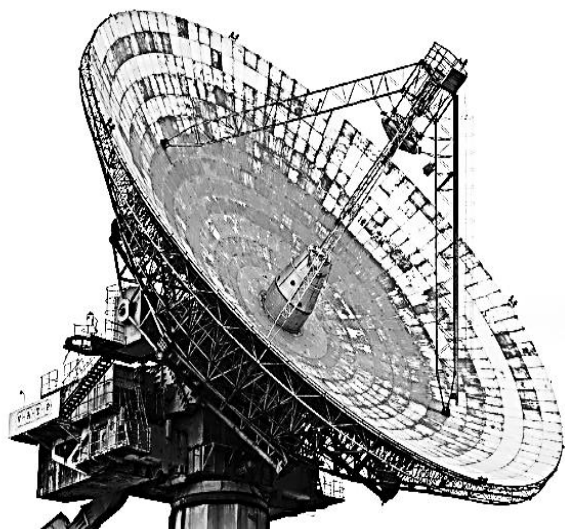
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Tell us about it!

Whether you're a seasoned astro-photographer or a beginner enjoying your first view through a telescope, we'd love to hear about your experience at club events or doing astronomy-related activities on your own. Please submit your articles and/or photographs for publication in the Observer.

Email editor@backbayastro.org

Upcoming Events

Dec 27	Dusk-Dawn	Cornland Park, Chesapeake	Cornwatch	BBAA members-only observing
Dec 28	Dusk-Dawn	Chippokes Plantation, Surry	Nightwatch	BBAA members-only observing
Jan 3	8-10PM	Chippokes Plantation, Surry	Quadrantid Meteor Shower	Public observing
Jan 9	7:30-9PM	TCC Virginia Beach, Science Bldg J	BBAA Club Meeting	Club business followed by presentation
Jan 11	10AM-1PM	Elizabeth River Park, Chesapeake	Saturday "SUN" day	Public solar viewing
Jan 17	Dusk-Dawn	Cornland Park, Chesapeake	Cornwatch	BBAA members-only observing
Jan 18	5-9PM	Northwest River Park, Chesapeake	Skywatch	Public observing
Jan 24	6:30- 8:30PM	Lone Star Lakes Park, Suffolk	Galaxies Night Hike	Public observing
Jan 24	Dusk-Dawn	Cornland Park, Chesapeake	Cornwatch	BBAA members-only observing
Jan 25	Dusk-Dawn	Chippokes Plantation, Surry	Nightwatch	BBAA members-only observing
Jan 30	7-8:30PM	Norfolk Botanical Gardens	Garden Stars	Public observing

February

Feb 4	3-4PM	Ocean Lakes Elem, Virginia Beach	Elementary Enrichment Classes	1-hour astronomy class
Feb 6	7:30-9PM	TCC Virginia Beach, Science Bldg J	BBAA Club Meeting	Club business followed by presentation
Feb 8	8-11PM	NC Cooperative Extension, Barco, NC	BSA Freeze-o-ree	Boy scout observing/merit badges
Feb 8	10AM-1PM	Elizabeth River Park, Chesapeake	Saturday "SUN" day	Public solar viewing
Feb 14	Dusk-Dawn	Cornland Park, Chesapeake	Cornwatch	BBAA members-only observing
Feb 15	5:30-9PM	Northwest River Park, Chesapeake	Skywatch	Public observing
Feb 21	Dusk-Dawn	Cornland Park, Chesapeake	Cornwatch	BBAA members-only observing
Feb 22	Dusk-Dawn	Chippokes Plantation, Surry	Nightwatch	BBAA members-only observing



Check for details, updates, cancellations, and more on our website
www.backbayastro.org
 Click on our [event calendar](#).