The Bays Mountain Astronomy Club Newsletter

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Cosmic Reflections

William Troxel - BMAC Chair

Welcome to June 2023. Wow, this year is going fast!

We all know that we have a lot of things coming up in the next few months. Before I go into them I want to report on the May meeting. It was a wonderful meeting. You all know that May is the "Celebrate Student Project Month" and this year we welcomed a project from a local college student along with projects from local high school students. It goes without saying that each project was very well done and so interesting. I hope this is the start of many students every year coming and sharing their talents and interests with the club. I always look forward to them coming. Not just to see the presentation and hear the student share their journey, but to also getting to know the young students. I have included some pictures. If you were unable to come out and hear them, you missed a wonderful meeting with very talented presenters. I also want to send a big shout out to their teachers, Olivia and Tom for their willingness to encourage them to bring their projects for this celebration.

It's now time to talk about the June 2023 meeting. June is the annual Astronomy Jeopardy contest month. So, I wanted to tell you about the event.

- We will split up into two teams. Each member will receive the team's points so that they will have the points for the title of winner at the end of the year. Each member will receive a certificate at the annual dinner if they have the most points. So, the more monthly questions you answer, the more points you can get.
- There will be three rounds: jeopardy round, double jeopardy and final jeopardy. In order to get to play the final jeopardy round, your team will have to have a positive number of points after the 1st and 2nd rounds.
- There will be a time limit for each round of 20 minutes. For final jeopardy, your team will only have one minute to complete your response which must be in the form of a question.
- My hope is that this will be a way to have fun and open your mind to learning something new about astronomy. I hope it will encourage you to grow in the interest of our hobby of astronomy.
- This will be part of the monthly challenge questions which will add points to your total for the end of year award.

June is the club's annual election of Chairperson. I will be placing my name in for your consideration for the position. I encourage any of you to consider putting your name in as well. You will need to part of the volunteer program of Bays Mountain Park. Please check with Adam to get all the details to become part of the program.

I hope you will come out if you can and enjoy the Astropardy game and also express your vote. This is your club and your opinion is needed and important to help our club move into the future. I look forward to seeing each of you on Friday, June 2, starting at 7p.

Until then... Clear Skies!













BMAC Notes

Park Survey



ays Mountain Park Manager, Megan Krager, sent this message out to share:

Coyle & Caron, landscape architects, are creating a framework to collect information about the park to create a Park Improvement Plan. This PIP will help with future development of the habitats, walkways within the habitats, signage and guest flow. The PIP will help the park work towards becoming AZA accredited.

During phase I of the framework for the PIP, a survey is needed to generate info. Click <u>here</u> to link to that survey. Please take a few minutes and fill out the survey. This information will help the future of the park. Please share this survey with friends, family, neighbors or anyone you know. Last day to access the survey is June 4th. Please help us spread the word.

Astronomy Day 2023



e had a great day sharing our passion for the day and night sky on April 29. We were stationed at the Pavilion and had a constant flow of visitors of families. Total visitation was around 220. A big thank you goes out to BMAC volunteers Greg Penner, Michael Hopkins and Robin Byrne! They brought items to share, teach and make!



Making a rocket! Image by Robin Byrne.



Make a crater! Image by Robin Byrne.



Learning about the Webb Space Telescope! Image by Robin Byrne.

Astronomical League Convention 2023



STEM Day at Gray Elementary School

BMACer Michael Hopkins writes: Our Astronomy Club was represented at Gray Elementary School's STEM Activity Day. Grades Pre-K through 5th with over 250 youngsters passed through our club's astronomy presentation. Gave ten, 25 minute sessions tailored to the age group. You can just imagine the interesting questions from those kids! I was starting to lose my voice when we were done.



Michael sharing!

Kids at Bays Day

BMACer Michael Hopkins writes: This was our Club's booth which young and not so young enjoyed. An estimated 200 plus guests visited our booth. Of course, the little ones certainly enjoyed making craters in the sand box.



Michael's daughter and grandkids enjoyed visiting!



Adam shows off Michael's newest teaching aid, Solar System bottles. Each bottle had a proportional amount of water to demonstrate that planet's gravity field.

Stellar Observations

Greg Penner

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Near and Far in the Big Dipper



he Big Dipper is the most recognized star pattern (asterism) in the northern sky. Often, we find out that recognizable asterisms are actually unrelated stars at vastly different distances. But, of the seven stars that make up the Big Dipper, five are actually physically near to each other and members of the Ursa Major Moving Group (aka Collinder 285). This group of stars is the closest moving group to our Solar System at a distance of about 80 light years and part of what is known as the Local Bubble.



Big Dipper stars with proper motion and distances. Image from Stellarium with additions by Bob King.

Research indicates that around 500 million years ago, the future group of stars was born out of a dense cloud of dust and gas to form a compact open star cluster. Our current understanding says that open clusters have a lifespan of hundreds of millions of years before they are broken up by gravitational tides caused by passing molecular clouds. The number of stars making up the core group is 14, with over 40 additional stars composing a stream that stretches across the sky from Cepheus to Triangulum Australe. The actual area covered by the group is 30 by 18 light years. The accompanying chart shows the positions and names of the core stars, all of which can be viewed with a small telescope or binoculars.



Ursa Major Moving Group core members. Image from Stellarium with additions by Bob King.

An interesting target for amateur telescopes is the Mizar-Alcor system. Mizar and Alcor are a naked-eye double star and Mizar is a multiple star itself with the A and B components being 14.4 arcseconds apart, making a nice sight in a small telescope.



Mizar A & B and Alcor. Image by Greg Penner.

Knowing that the stars of the Dipper are only about 80 light years distant, think of them as a nearby window we can look through to see some far away sights at distances that stretch the imagination. Just outside of the bowl of the dipper are three fascinating objects that are listed in Charles Messier's list of non-cometary objects. The first is M97, also known as the Owl Nebula. Located about 2,000 light years away, this planetary nebula has a distinctive feature of two dark spots on a round "face," giving it the appearance of an owl. The "face" is an expanding shell of gas from a dying star, and the "eyes" are two jets of dusty material being emitted by the star. Viewing this nebula can be difficult in light-polluted skies, but if you can get to a semi-rural area with a 6 inch or larger telescope, you should be able to see the face (which appears about 5 times the size of Jupiter's disk). The "eyes" may be visible, especially with the help of either an Ultra High Contrast (UHC) filter or an Oxygen III (OIII) filter. The Owl Nebula is about 2 degrees southeast of the star Merak.



Owl Nebula and M108. Image by Miodrag Sekulic.

About a third of the way from the Owl to Merak, you will find the barred spiral galaxy M108, which is about 28 million lightyears from Earth. With a 6 inch or larger telescope, you should be able to see the galaxy as a cigar shape with a bright central bulge. From our vantage point we are seeing this galaxy edgeon, so you won't be able to make out the spiral arms. Telescopes of a larger aperture might show a mottled appearance.

The third object just outside the bowl of the dipper is another barred spiral galaxy, M109. This galaxy is easy to find as it is located only about a 1/2 degree southeast from magnitude +2.4 star Phecda. Since M109 is so close to Phecda, you will want to use a high enough power eyepiece to keep bright Phecda out of the view so it doesn't wash out the 10th magnitude galaxy. M109 is about 60 million light years away and, at magnitude +9.8, is the brightest member of the Ursa Major Galaxy Group. In deep images, graceful spiral arms and a central bar can be seen. With a large enough telescope, the view through the

eyepiece shows the bright central core surrounded by a fuzzy

haze.



M109. Image from Sloan Digital Sky Survey.

Within the bowl of the Dipper are a surprising number of fainter galaxies, which are still within reach of a 6 inch telescope under dark enough skies. My recently acquired Interstellarum Deep Sky Atlas shows over 30 galaxies within the bowl.



Chart from Interstellarum Deep Sky Atlas showing Big Dipper bowl with galaxies. The galaxies with bolder font should be visible in smaller telescopes.

One of the brightest of these is spiral galaxy NGC 3982, which is about 68 million light years away and +11.3 magnitude. This galaxy is a member of the aforementioned Ursa Major Galaxy Group. A beautiful, deep image by the Hubble Space Telescope clearly shows the face-on spiral with blue and pink star-forming regions. The bright core can be seen through amateur telescopes. I look forward to exploring in and around the bowl of the Big Dipper with a new appreciation for the nearby members of the Ursa Major Moving Group and the far away members of the Ursa Major Galaxy Group!



NGC 3982. Image from Hubble Space Telescope.

The Queen Speaks

Robin Byrne

Book Review: The Day the World Discovered the Sun

iven the vast number of books about the history of science and exploration that I have ordered over the years, it's no wonder that Amazon recommended I should get "The Day the World Discovered the Sun: An Extraordinary Story of Scientific Adventure and the Race to Track the Transit of Venus" by Mark Anderson. While the title may go overboard on its word count, the book itself is a fun and interesting read.



Cover to the book "The Day the World Discovered the Sun"

The author chronicles multiple expeditions for observing both the 1761 and the 1769 Venus transit events. We meet several people who will make the observations, including such notable names as Captain James Cook, Maximilian Hell, as well as the team of Charles Mason and Jeremiah Dixon, who are better known for their surveying endeavors. Other lesser known though equally skilled astronomers we meet were: Jean-Baptiste Chappe, Nevil Maskelyne, and Charles Green.

The ultimate goal of the observations were to determine the distance to the Sun. This required observing the transits from widely separated points on Earth in order to measure the Sun's parallax. Key moments during the transit, when each edge of Venus touches an edge of the Sun (the points of contact), must be precisely timed. By comparing these measurements taken at various locations, the different angles of observation will lead to the Sun's distance. This, in turn, will then give actual distances within the Solar System. Prior to this point in history, all we knew were the relative sizes of the planets' orbits compared to Earth's, such as Mars being roughly 1.5 times farther from the Sun than Earth. What we didn't know was how many miles that corresponded to. It was Edmund Halley who had predicted, prior to his death in 1742, that the Venus transits of 1761 and 1769 would be the ideal opportunity to take the measure of our Solar System. And so it was that teams from all over the world cooperated to observe these events to the best of their abilities.

In addition to the observations of the transits, the book covers so much more. For each expedition, we travel along with the teams to their far-flung destinations. And the destinations, by necessity, were widely located in places where the transits would be at their most extreme of either shortest or longest in duration. So we find ourselves in places as far north as Siberia to as far south as Tahiti. But we also experience the trials and tribulations of getting to these places and all the adventures along the way. And boy were there adventures!

Mark Anderson also does a good job of placing these quests in context of both political and scientific events of the time.

Politics placed limitations on where people could travel. If your nation was in conflict with another, you were not welcome in their country or any of their colonies. If you were in the good graces of a sovereign, they would likely help smooth your travels to your destination. Scientifically, all of these observations required not just observing the transit, but also precisely determining the local time and the geographical coordinates of your observing post. These various voyages were all occurring at the same time that there was a competition, of sorts, for finding the best method of determining your longitude while at sea. Each of the voyages tested various proposed techniques, to varying degrees of success. And so we see how the astronomers made multiple observations each day of the Sun's, Moon's, and various stars' positions in the sky, as well as watching the moons of Jupiter as they pass in front of or behind the planet. Each observation was then followed by a series of calculations. All to better determine local time and longitude. A ponderous endeavor!

Ultimately, the 1761 observations were not very useful (other than as a learning experience), but the 1769 efforts were very beneficial. They provided measurements precise enough to be within 96-98% of the actual value of the Sun's distance. Pretty impressive. Beyond measuring our Solar System, these expeditions led to other benefits, such as: better techniques for measuring longitude (which meant fewer ships lost at sea), discovery of new places on the globe (such as New Zealand), and finding a way to avoid scurvy on long voyages.

All in all, I thoroughly enjoyed reading "The Day the World Discovered the Sun" by Mark Anderson and highly recommend it. Lots of interesting people and events, woven together nicely for a complete picture of the Venus transits, along with all that went into actually observing them. Like so many things in life, it's not so much the destination as the journey.

References:

The Day the World Discovered the Sun: An Extraordinary Story of Scientific Adventure and the Race to Track the Transit of Venus by Mark Anderson, Da Capo Press, 2012.

The Space Place MASA Nights

Metwork

David Prosper

The Bays Mountain Astronomy Club Newsletter

Look Up in the Sky - It's a Bird

Τ

heresa Summer

Bird constellations abound in the night sky, including Cygnus, the majestic swan. Easy to find with its dazzling stars, it is one of the few constellations that look like its namesake and it is full of treasures. Visible in the Northern Hemisphere all summer long, there's so much to see and even some things that can't be seen. To locate Cygnus, start with the brightest star, Deneb, also the northeastern most and dimmest star of the Summer Triangle. The Summer Triangle is made up of three bright stars from three different constellations - read more about it in the September 2022 issue of Night Sky Notes. Deneb is an Arabic word meaning "the tail." Then travel into the triangle until you see the star Albireo, sometimes called the "beak star" in the center of the Summer Triangle. Stretching out perpendicular

from this line are two stars that mark the crossbar, or the wings, and there are also faint stars that extend the swan's wings.



Look up after sunset during summer months to find Cygnus! Along the swan's neck find the band of our Milky Way Galaxy. Use a telescope to resolve the colorful stars of Albireo or search out the open cluster of stars in Messier 29. Image created with assistance from Stellarium: stellarium.org From light-polluted skies, you may only see the brightest stars, sometimes called the Northern Cross. In a darker sky, the line of stars marking the neck of the swan travels along the band of the Milky Way. A pair of binoculars will resolve many stars along that path, including a sparkling open cluster of stars designated Messier 29, found just south of the swan's torso star. This grouping of young stars may appear to have a reddish hue due to nearby excited gas.

Let's go deeper. While the bright beak star Albireo is easy to pick out, a telescope will let its true beauty shine! Like a jewel box in the sky, magnification shows a beautiful visual double star, with a vivid gold star and a brilliant blue star in the same field of view. There's another marvel to be seen with a telescope or strong binoculars - the Cygnus Loop. Sometimes known as the Veil Nebula, you can find this supernova remnant (the gassy leftovers blown off of a large dying star) directly above the final two stars of the swan's eastern wing. It will look like a faint ring of illuminated gas about three degrees across (six times the diameter of the Moon). [Ed.: The Cygnus Loop is extremely faint as it has a very low surface brightness. It is faintly visible in binoculars and a telescope in very dark skies. Using averted vision is necessary.]

Speaking of long-dead stars, astronomers have detected a highenergy X-ray source in Cygnus that we can't see with our eyes or backyard telescopes, but that is detectable by NASA's Chandra X-ray Observatory. Discovered in 1971 during a rocket flight, Cygnus x-1 is the first X-ray source to be widely accepted as a black hole. This black hole is the final stage of a giant star's life, with a mass of about 20 Suns. Cygnus x-1 is spinning at a phenomenal rate - more than 800 times a second - while devouring a nearby star. Astronomically speaking, this black hole is in our neighborhood at only 6,070 light years away. It poses no threat to us. It just offers a new way to study the Universe!



While the black hole Cygnus x-1 is invisible with even the most powerful optical telescope, in X-ray, it shines brightly. On the left is the optical view of that region with the location of Cygnus x-1 shown in the red box as taken by the Digitized Sky Survey. On the right is an artist's conception of the black hole accreting material from its massive blue companion star. (Credit: NASA/CXC)

Check out the beautiful bird in your sky this evening, and you will be delighted to add Cygnus to your go-to summer viewing <u>list. Find out NA</u>SA's latest methods for studying <u>black holes</u>.

This article is distributed by NASA Night Sky Network

The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit <u>nightsky</u> to find local clubs, events, and more!

BMAC Calendar & More

Calendar:



MAC Meetings:

- Friday, June 2, 2023 7p Astronomy Jeopardy. This will be a full game. There will be 3 rounds and winners will receive an additional 4,000 points!
- Friday, August 4, 2023 7p Topic TBA.
- Friday, September 1, 2023 7p Topic TBA.
- Friday, October 6, 2023 7p BMACer Robin Byrne will present "Vera Rubin: The Woman and the Observatory."
- Friday, December 1, 2023 7p Topic TBA.
- Friday, February 2, 2024 7p Topic TBA.
- Friday, March 1, 2024 7p Topic TBA.
- Friday, April 5, 2024 7p Topic TBA.
- Friday, May 3, 2024 **7p** Topic TBA.
- Friday, June 7, 2024 7p Topic TBA.
- Friday, August 2, 2024 7p Topic TBA.



- Every clear Saturday & Sunday 3p-3:30p March-October By the Dam
 - View the Sun safely with a white-light view if clear.; Free.
 - You must have completed the Park Volunteer Program in order to help with the public program. If you have, and have been trained, please show up at least 30 minutes prior to the official start time.



tarWatch:

- October 7 & 14, 2023 7:30p
- October 21, 28 & November 4, 2023 7p
- November 11, 18 & 25, 2023 6p
 - View the night sky with large telescopes at the observatories. If poor weather, an alternate live tour of the night sky will be held in the planetarium theater. Free.
 - You must have completed the Park Volunteer Program in order to help with the public program. If you have, and have been trained, please show up at least 30 minutes prior to the official start time.





• Annual Club Picnic - July 2023 - Day & Time TBD

 Site location will be sent directly to full BMAC members. BMACers and their families are welcome to enjoy an evening of astronomythemed games and activities along with a potluck dinner and observing.

• StarFest 2023 - November 3, 4 & 5, 2023

- Our 38th annual astronomy convention / star gathering for the Southeast United States. Three days of astronomy fun, 5 meals, 3 keynote speakers, unique T-shirt and more!
- Pre-registration by Oct. 13, 2023 with full payment is mandatory for attendance. Sorry, no walk-ins nor "visits."
- Link for all the StarFest info including registration and hotel reservation links.
- BMAC Dinner January 2024 Day & Time TBD
 - Look for an e-mail with the latest information.
- Astronomy Day May 18, 2024 1p-4p; 8:30p-9:30p
 - Come help share the fun of astronomy with the public. There will be tables with different themed topics plus solar and night viewing.

Regular Contributors:



William Troxel



Greg Penner



Robin Byrne



Adam Thanz



obin Byrne has been writing the science history column since 1992 and was chair in 1997. She is an Associate Professor of Astronomy & Physics at Northeast State Community College (NSCC).

reg Penner is a semi-retired architect living in the Tri-Cities area since 2018. He G has enjoyed astronomy since childhood when he received a "department store telescope" and viewed Saturn for the first time. He has been a member since 2018.



dam Thanz has been the BMAC Newsletter Editor for all but a small number of issues since 1992. He is the Planetarium Director at Bays Mountain Park and an astronomy adjunct instructor at NSCC since 2000.

Connection:

B ays Mountain Astronomy Club:

- 853 Bays Mountain Park Road; Kingsport, TN 37650
- (423) 229-9447 Park Site Club Site
- Newsletter edited by Adam Thanz



- Dues are highly supplemented by the Bays Mountain Park Association and volunteerism by the club. As such, our dues are kept at an extremely low cost.
- \$16 / person / year
- \$6 / each additional family member
- Note: if you are a Park Member (which incurs a separate, additional fee), then a 50% reduction in BMAC dues are applied.
- Dues can be paid in many ways. The easiest way is to pay via the CivicRec online portal. If you are a current member, please log in with your e-mail address and reset your password if you have not already done so. You can then update your membership. Here's the direct <u>link</u>. If you want to add family members, then add them via the internal link. You can also pay at the gift shop, by mail or over the phone.

Chapter Background Image Credits:

- Cover image of Southern Milky Way by Adam Thanz.
 - Sony A7ii with Zeiss Batis 2.8/18 lens, f/2.8, 8 sec., ISO 6,400, August 9, 2020.
- Table of Contents image of Comet NEOWISE (C/2020 F3) by Adam Thanz
 - Sony A7ii with Sony FE 2.8/90 Macro G OSS lens, f/2.8, 8 sec., ISO 4,000, July 15, 2020.
- Cosmic Reflections image of the Summer Triangle area of the Milky Way by William Troxel.
 - Image captured July 23, 2016.
- BMAC Notes painting of the Moon with moon glow by Christa Cartwright.
 - Painting based on a photograph of the Moon Christa captured July 2020.
- Stellar Observations image of Crescent Nebula by David Reagan.
 - This image was taken with a 140mm refractor in his suburban backyard using an AstroPhysics 900 mount, 8.7 hours of 5 minute Ha and OIII subexposures, combined in AstroPixelProcessor as an HOO image and processed in Lightroom and Photoshop. Image captured in 2022.
- The Queen Speaks image of a solar halo by Robin Byrne.
 - iPhone 7, June 8, 2020.
- The Space Place NASA Night Sky Network image of the Rho Ophiuchi cloud complex by Brandon Stroupe.
 - Canon 6D with Canon 2.8/70-200mm lens, f/2.8 @200mm, 20 x 120 sec. exposures, ISO 1,000, stacked in Deepsky Stacker, processed in Adobe Photoshop CC, Skywatcher Star Adventure mount, September 19, 2015.
- BMAC Calendar & More image of the Moon by Greg Penner.
 - *iPhone shooting through a 9mm eyepiece and 12.5*" Truss Tube Dobsonian @212x.
- All background images used with permission by their authors.