

The Bays Mountain Astronomy Club Newsletter

A night sky photograph showing the Milky Way galaxy arching across the frame, with dark silhouettes of trees in the foreground.

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Cosmic Reflections

William Troxel - BMAC Chair



Happy New Year!

WOW it's 2023. I hope everyone had an awesome 2022 holiday time. I know we had a very cold Christmas. Snow was all across the country and may go down as the worst holiday snow in history.

I want to offer bragging rights out to the winners for the December end-of-year Challenge Questions. They were Robin and John. They get to hold the title winners of all of 2023. We will have another annual winner at the December 2023 meeting and crown the new winner. Study up on your facts so you can get the correct response for next year's questions. Congrats to Robin and John!

Nate Wentzel from Milligan University closed out 2022 with a wonderful program with some really interesting ideas and a great program. It was really fun, of course I only knew a few of the ideas he shared. Thanks again for being the speaker and presenting everyone with a great meeting!

January's annual dinner for BMAC members and their families is scheduled. BMACers will receive an e-mail with the information. Please know that you do not have to attend the annual dinner if you are uncomfortable due to Covid concerns.

I just want to thank everyone for your continued support of the BMAC. I hope that we continue to have favor from nature and our club is spared from issues with the any issues with Covid. I have to tell you that there is always a chance that we will have to cancel due to health issues.

I have been planning some of your the club's favorite events for the year's meetings and trying to come up with new things and even some twists to some of the older events we have had that many of you liked. I always want to encourage every member to be a part of the monthly meetings. Games, quizzes, contests all are welcome. This is your club as well.

Thanks again and see you in January! Until next time... Clear Skies!



Challenge Question victors Robin Byrne & John Hay.

BMAC Notes



BoBfest 2023



On January 28, 2023 doors on BoBfest 2023 will open at the West Wing of The Catawba Science Center at 8:30a with a welcome and announcements followed by the first presentation at 9:30a.

Our keynote speakers will be:

- Corrie Ann Delgado, Solar System Ambassador, "Through the Eyes of the James Webb Space Telescope"
- Michael Rehnberg, Meteorologist at Greenville-Spartanburg Office of the National Weather Service, "When Clear Skies Aren't Enough: Weather Forecasting for Amateur Astronomers."

As in recent years we will have afternoon table top talk breakouts, plenty of gastronomical goodies all day long, food trucks for lunch and door prizes galore to wrap up the day.

BoBfest Marketplace will be open all day too! A new feature this year will be an astrophotography display in honor of our friend, Barre Spencer, who we lost in June.

For more details, visit [here](#).

Stellar Observations

Greg Penner



Looking Forward to 2023



2022 was quite a year in Astronomy! NASA missions took center stage with the successful launch and deployment of the JWST and the Artemis 1 mission.

We saw some amazing images of far-away galaxies and nebulae from the JWST and fascinating views of our own Earth/Moon system from the Orion spacecraft. Now we turn our attention toward 2023 to see what exciting astronomical events we can put on our calendars.

Starting in January, we will see some pleasing planetary conjunctions starting with the evening of the 22nd when Venus and Saturn will draw to within 20 arcminutes of each other low in the western sky. They will be close enough to be visible within the same telescopic view. The Moon will only be one day past new and very low on the horizon. About a week later on the 30th, the Moon will have another close encounter with Mars. For those of us in East Tennessee, the Moon will once again miss occulting Mars by only 6 arcminutes. Back in December

there was a similar encounter in which the Moon occulted Mars for much of the U.S. north and west of Tennessee. This time much of the U.S. south and west of Tennessee will see the occultation. The near-miss should be a fascinating sight nonetheless. A telescopic view will show the reddish disk of Mars adjacent to craters on the Moon.

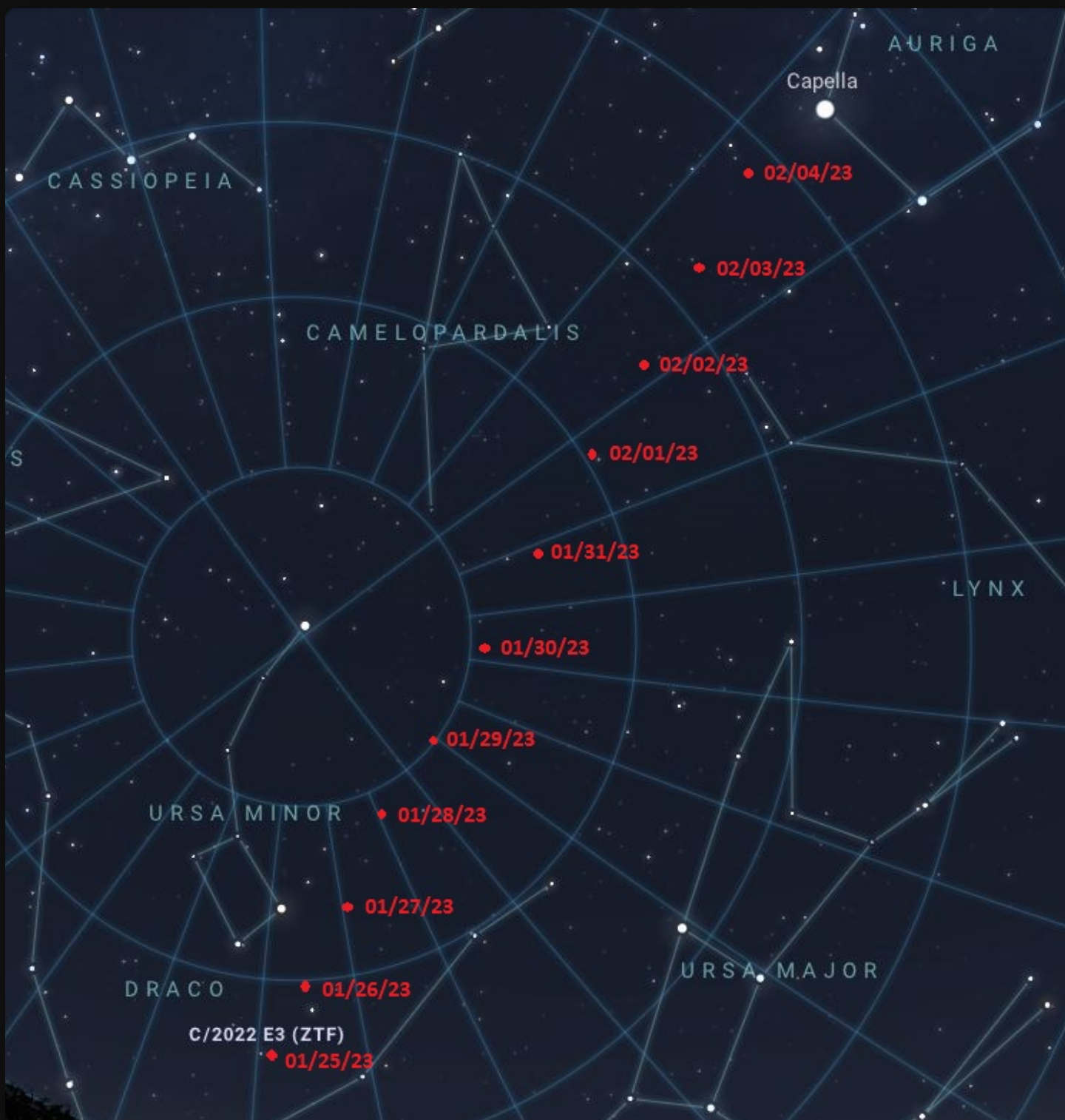


Venus, Saturn and Moon - from Stellarium



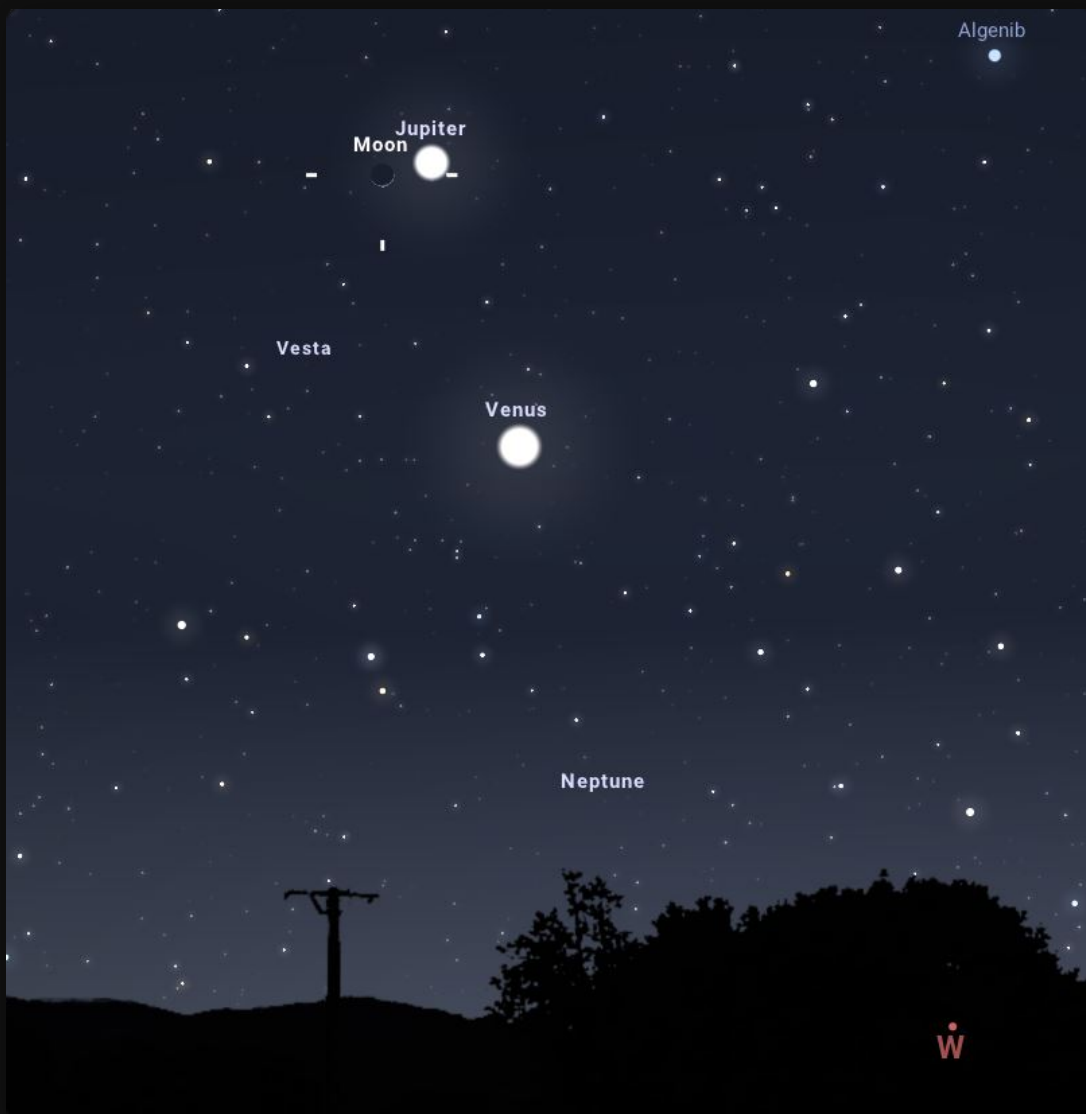
Moon and Mars - from Stellarium

A newly discovered comet is next on the agenda at the end of January and early February. Comet C/2022 E3 (ZTF) is a long period comet that was discovered by the Zwicky Transient Facility on March 2, 2022. As of mid-December, the comet has an apparent magnitude in the +8 to +9 range, but by the end of January it is projected to be in the +5 to +6 range, which would make it easily visible in binoculars. From about January 25th through February 3rd, the comet should be at its brightest and easiest to find as it works its way through the circumpolar region and then on to the winter constellation Auriga.



Comet C2022 E3 (ZTF) path - Stellarium image annotated by Greg Penner

The next planetary conjunction will bring together the three brightest night sky objects. On the evening of February 22nd, a very thin waxing crescent Moon (3 days past new) will be 1 degree away from Jupiter low in the western sky, while Venus will be about 5 degrees below them. Jupiter will be magnitude -2, and Venus will be a very bright magnitude -4.



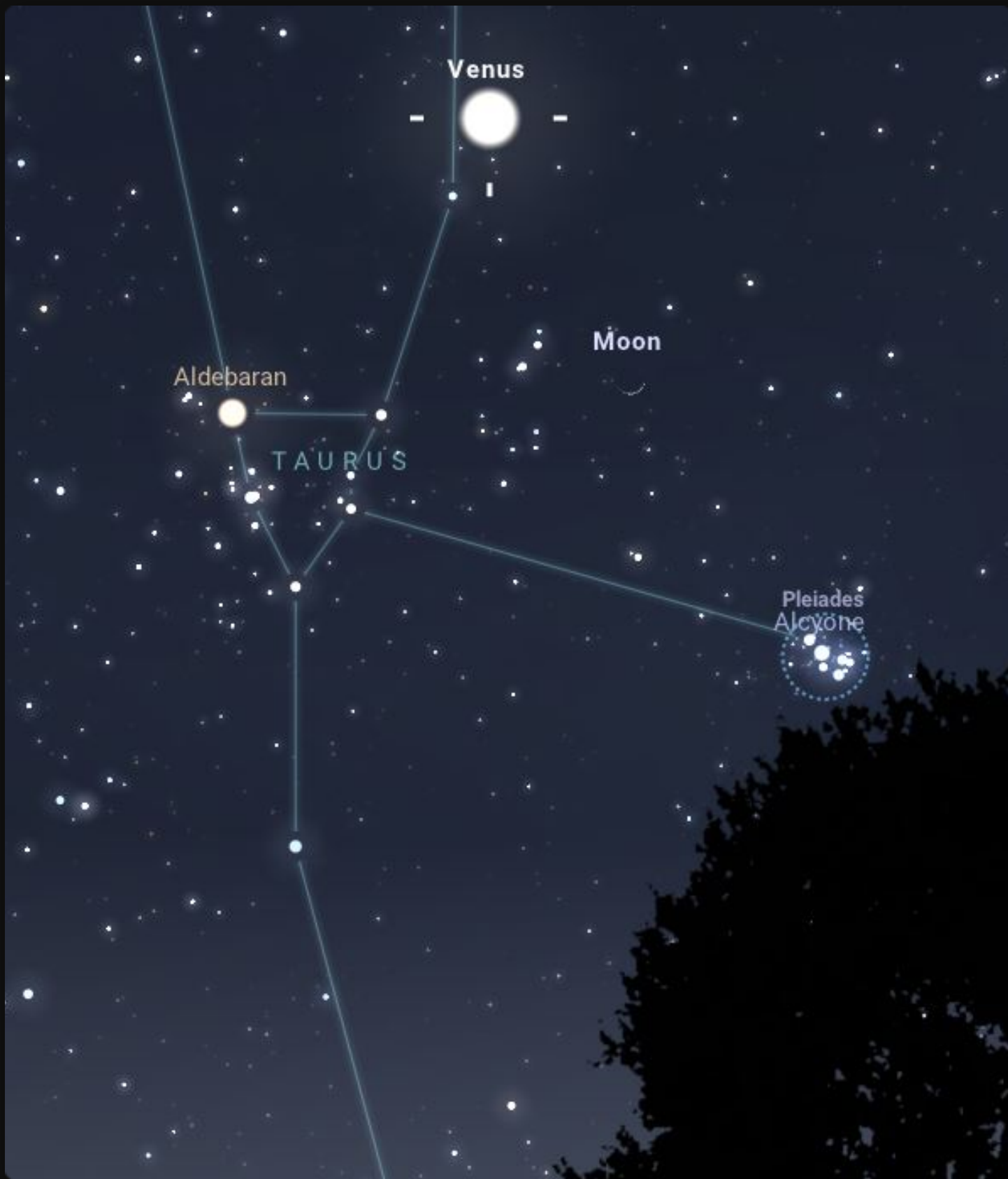
Moon, Jupiter and Venus - from Stellarium

The show is just beginning, however, because over the next few nights Venus will continue to move toward Jupiter, and on the evening of March 1st Venus will come within 1/2 degree (the diameter of the full Moon). This will make a beautiful sight for the naked eye or any type of instrument from binoculars to the largest telescope.



Jupiter and Venus - from Stellarium

Venus will continue to glide across the celestial sphere and guide our way to more sights in March and April. On the evening of March 29th, Venus will pass within about 2 degrees of Uranus. So take a look at Venus through binoculars, and you should see the pale green color of Uranus in the same field of view. Then, starting around April 8th, Venus will come within 5 degrees of the Pleiades star cluster and continue on a path between the Pleiades and the Hyades. Finally, on the night of April 22nd, the Moon will join the picture. Venus, the Hyades, and the Pleiades will form a triangular shape with the very thin (just past new) Moon between Venus and Pleiades. The Moon should also exhibit some earthshine, so the overall scene should be fantastic!



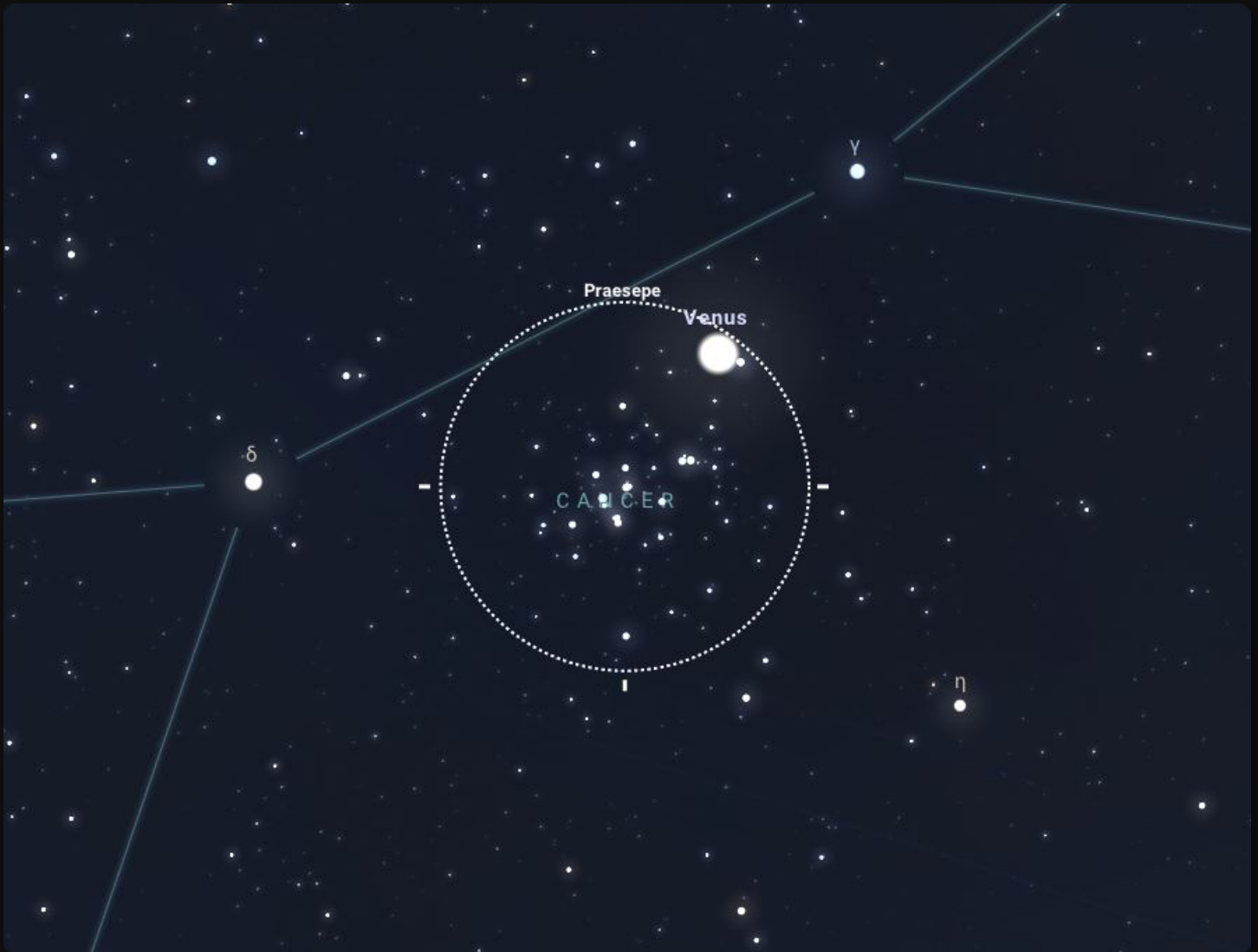
Venus, Hyades, Pleiades and Moon - from Stellarium

As we move into summer, the month of June will feature two planets paying a visit to the "Beehive" star cluster. On the nights of June 1-2, Mars will dive right through the middle of the Beehive. On a typical evening, a telescopic view of the Beehive displays dozens of stars in the +6 to +8 magnitude range. The addition of the reddish disk of Mars shining at magnitude +1.5 should be a really nice sight! With so many stars in the vicinity, will Mars occult any of them as it passes through the neighborhood? Watching this event over a couple of nights should answer that question.



Mars in the Beehive - from Stellarium

On the nights of June 12-13, Venus will traverse along the outskirts of the Beehive instead of through the middle as Mars did. Venus will be very bright at magnitude -4.25, showing off to the comparatively dimmer members of the Beehive.



Venus in the Beehive - from Stellarium

In August we are in for a real treat as the 1st quarter Moon passes through the constellation Scorpius and occults the bright star Antares and, for telescopic observers, also occults a globular star cluster. Antares is the brightest star in Scorpius (the 15th brightest in the night sky) shining with a reddish color at magnitude +1. On the night of August 24th around 10:50p EDT, the dark edge of the waxing 1st quarter Moon will pass in front of Antares. This should be a great sight to see such a bright star wink out of view so suddenly! The event will occur only 13 degrees above the horizon. Earlier in the evening around 9:10p, the Moon will pass in front of globular cluster NGC 6144, taking about 15 minutes to completely cover the star cluster. The apparent magnitude of the cluster is about +9.5, so I'm not sure how visible it will be considering the brightness of the nearby Moon, but it will be interesting to have a look prior to the Antares occultation.



Moon occults Antares and NGC 6144

The highlight of the fall observing season, which will likely garner national news headlines, will take place during the daytime on October 14th. An annular eclipse will occur on this date along a path from southern Oregon, through Nevada and the Four Corners region, then into west and south Texas. This type of eclipse, also referred to as the "Ring of Fire," occurs when the Moon is near its apogee (furthest point from the Earth), so its apparent diameter is too small to completely cover the Sun. For those of us who experience the eclipse here in East Tennessee, the Sun will be only about 40% covered at maximum around 1:00 - 1:30p. If you're able to make a trip out west to see the "Ring of Fire," I'm sure it would be worth the trip!

Finally, doing a quick internet search of "NASA mission in 2023" gives some very interesting results. There will be multiple small lunar lander missions with a variety of science objectives. The Moon is quickly becoming a very active place in support of the ongoing development of the Artemis program! Also, OSIRIS-REx will be returning a sample to Earth from the asteroid Bennu. The sample was obtained in 2020, and the spacecraft will return the

sample to Earth on September 24th. SpaceX is supposedly planning a six day crewed mission to fly around the Moon and back in 2023 using the new Starship spacecraft. The Starship has yet to make any test flights, so it will be interesting to see if that mission can happen in 2023.

2023 will definitely be a year to look forward to with some fascinating sights in the sky and missions to the Moon. We also should start seeing some solid scientific results from the JWST that likely will alter our understanding of the Cosmos in some way. Wishing everyone a successful and Happy New Year!

The Queen Speaks

Robin Byrne



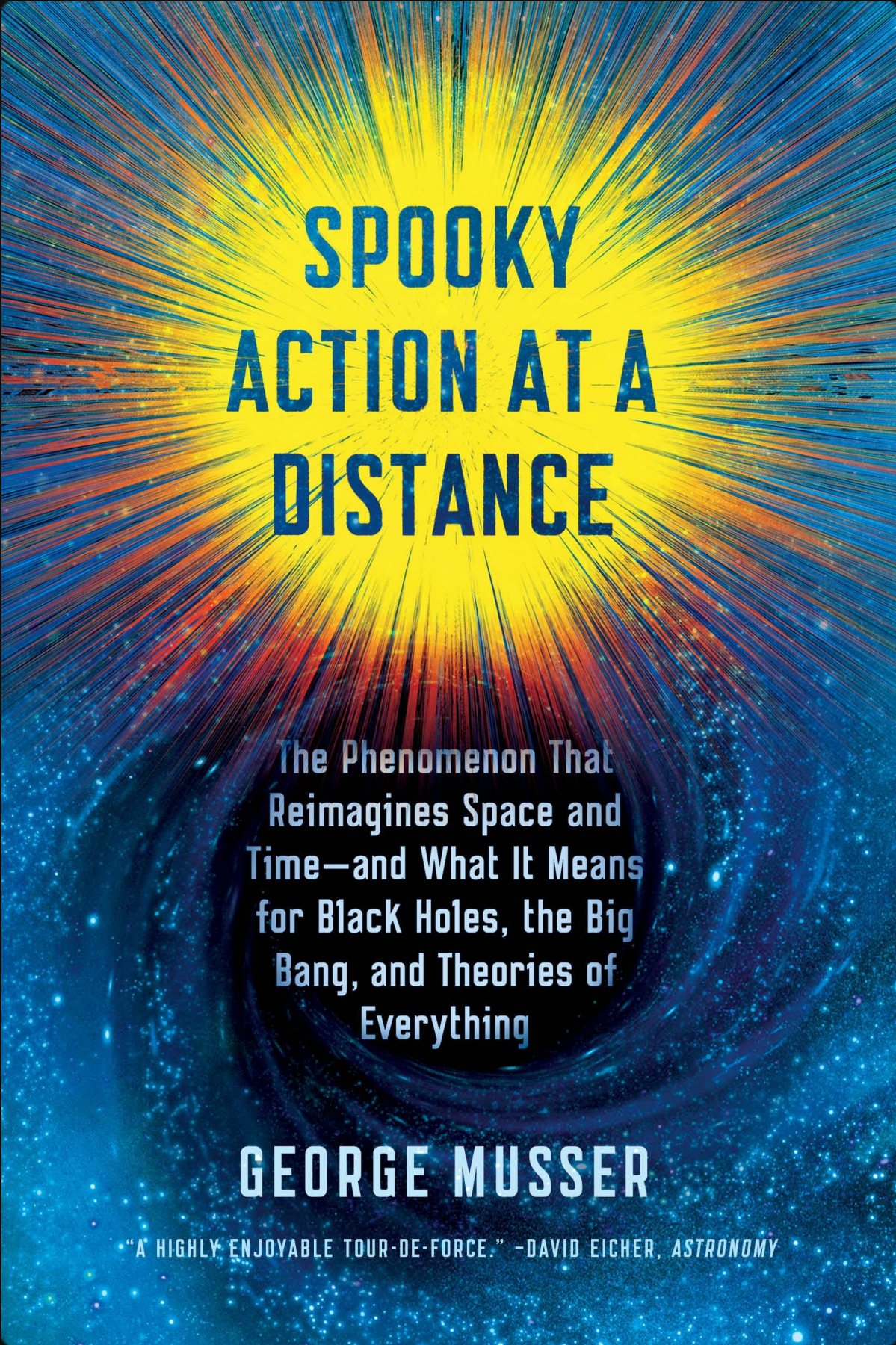
Book Review: Spooky Action at a Distance



hen the announcement for the Nobel Prize in Physics was made, I was excited to hear that John Clauser, Alain Aspect and Anton Zeilinger won for their experiments that helped prove quantum entanglement. That inspired me to read a book in my collection: "Spooky Action at a Distance: The Phenomenon That Reimagines Space and Time - and What it Means for Black Holes, the Big Bang, and Theories of Everything" by George Musser.

That title alone sounds ambitious, and so is the book. There is much that Musser wanted to say about this topic, and he attempts to cover it all. He begins with the concept of nonlocality, which is the idea that two separate particles can influence each other and is the basis of the entanglement experiments that won the Nobel Prize. Honestly, this was the part I was hoping the book would primarily cover, since I knew very little about it. Alas, that was not meant to be.

Musser takes this idea, and runs with it in all sorts of directions. He draws parallels with other areas of physics where objects can interact without touching, such as gravitation and electromagnetism. Then he delves into the history of the field of quantum mechanics and the wide variety of ideas that have been explored since the early 20th century. From there, Musser looked at modern physicists and their various approaches to quantum physics, ultimately ending with theoretical ideas about whether space and time actually exist. With so many different ideas being presented, I was left wondering what the author hoped to convey.



SPOOKY ACTION AT A DISTANCE

The Phenomenon That
Reimagines Space and
Time—and What It Means
for Black Holes, the Big
Bang, and Theories of
Everything

GEORGE MUSSER

“A HIGHLY ENJOYABLE TOUR-DE-FORCE.” —DAVID EICHER, *ASTRONOMY*

Book Cover to “Spooky Action at a Distance.”

Because he tried to cover so much material in a comparatively short book (roughly 200 pages), the author couldn't go into much detail about any one idea. The price of that brevity was the source of my confusion. Of the many ideas discussed, Musser didn't go into enough depth for me to understand what was really being talked about. He relied on simplistic analogies that didn't really clarify. I was left with a vague notion of the concepts, but nothing more. That's a shame, since I truly wanted to understand. Whether this brevity was the author's original intent, or whether it was the work of editors, I can't say, but whoever is responsible did the reader a disservice.

My guess is that someone very familiar with quantum physics and its history would enjoy this book. They would already know the ideas being discussed and would appreciate the historical context, as well as the journey through the many iterations of ideas.

However, for someone like me, who has no background in quantum physics, "Spooky Action at a Distance" was a confusing

and frustrating read. At every turn, just as I was hoping to grasp the ideas, we were off onto something new and different. There just wasn't enough explanation to make it enjoyable or understandable. So, sadly, I cannot recommend "Spooky Action at a Distance" by George Musser. Maybe the latest Physics Nobel Prize award will inspire a better writer to tackle this subject.

References:

Spooky Action at a Distance: The Phenomenon That Reimagines Space and Time - and What it Means for Black Holes, the Big Bang, and Theories of Everything by George Musser, Scientific American/Farrar, Strauss and Giroux, 2015.



The Space Place - NASA Night Sky Network

David Prosper

Spot the Messenger: Observe Mercury



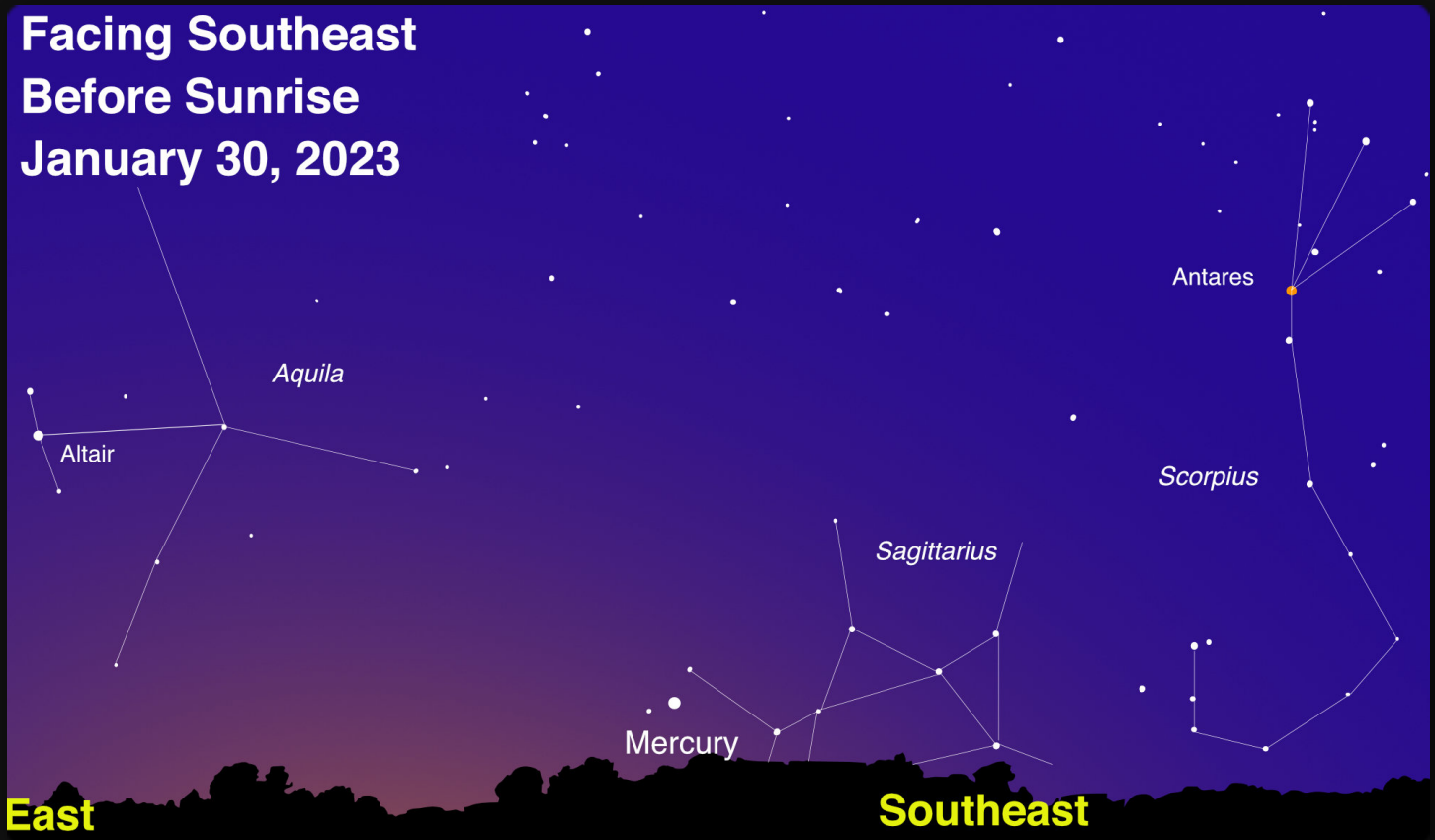
Most planets are easy to spot in the night sky, but have you spotted Mercury? Nicknamed the Messenger for its speed across the sky, Mercury is also the closest planet to the Sun. Its swift movements close to our Sun accorded it special importance to ancient observers, while also making detailed study difficult. However, recent missions to Mercury have resulted in amazing discoveries, with more to come.

Mercury can be one of the brightest planets in the sky - but also easy to miss! Why is that? Since it orbits so close to the Sun, observing Mercury is trickier than the rest of the "bright planets" in our Solar System: Venus, Mars, Jupiter and Saturn. Mercury always appears near our Sun from our Earth-bound point of view, making it easy to miss in the glare of the Sun or behind small obstructions along the horizon. That's why prime Mercury viewing happens either right before sunrise or right after sunset; when the Sun is blocked by the horizon, Mercury's

shine can then briefly pierce the glow of twilight. Mercury often appears similar to a “tiny Moon” in a telescope since, like fellow inner planet Venus, it shows distinct phases when viewed from Earth! Mercury’s small size means a telescope is needed to observe its phases since they can’t be discerned with your unaided eye. Safety warning: If you want to observe Mercury with your telescope during daytime or before sunrise, be extremely careful: you don’t want the Sun to accidentally enter your telescope’s field of view. As you may already well understand, this is extremely dangerous and can not only destroy your equipment, but permanently blind you as well! That risk is why NASA does not allow space telescopes like Hubble or the JWST to view Mercury or other objects close to the Sun, since even the tiniest error could destroy billions of dollars of irreplaceable equipment.

Sky Guide: Mercury

**Facing Southeast
Before Sunrise
January 30, 2023**

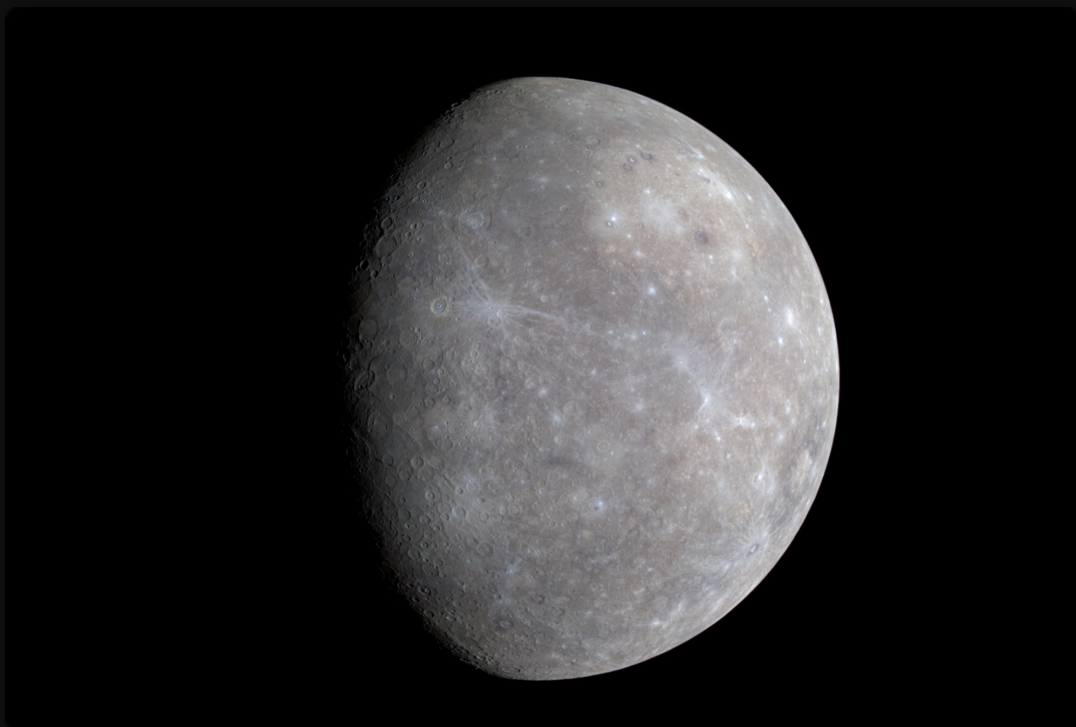


Mercury reaches maximum western elongation on the morning of January 30, which means that your best chance to spot it is right before sunrise that day! Look for Mercury towards the southeast and find the clearest horizon you can. Observers located in more southern latitudes of the Northern Hemisphere have an advantage when observing Mercury as it will be a bit higher in the sky from their location, but it's worth a try no matter where you live. Binoculars will help pick out Mercury's elusive light from the pre-dawn glow of the Sun. Image created with assistance from Stellarium.

Despite being a small and seemingly barren world, Mercury is full of interesting features. It's one of the four rocky (or terrestrial) planets in our Solar System, along with Earth, Venus, and Mars. Mercury is the smallest planet in our Solar System and also possesses the most eccentric, or non-circular, orbit of any planet as well: during a Mercurian year of 88 Earth days, the planet orbits between 29 million and 43 million miles from our Sun - a 14-million-mile difference! Surprisingly, Mercury is not the hottest planet in our Solar System, despite being closest to the Sun; that honor goes to Venus, courtesy of its thick greenhouse shroud of carbon dioxide. Since Mercury lacks a substantial atmosphere and the insulating properties a layer of thick air brings to a planet, its temperature swings wildly between a daytime temperature of 800 degrees Fahrenheit (427 degrees Celsius) and -290 degrees Fahrenheit (-179 degrees Celsius) at night. Similar to our Moon, evidence of water ice is present at Mercury's poles, possibly hiding in the frigid permanent shadows cast inside a few craters. Evidence for ice on Mercury was first detected by radar observations from Earth,

and followup observations from NASA's MESSENGER mission added additional strong evidence for its presence. Mercury sports a comet-like tail made primarily of sodium which has been photographed by skilled astrophotographers. The tail results from neutral atoms in its thin atmosphere being pushed away from Mercury by pressure from the nearby Sun's radiation.

Mercury from Space



Mercury is hot, small, and heavily cratered across its gray surface, as seen in this image from NASA MESSENGER. Mercury is the most heavily cratered planet in our Solar System, since it lacks either a substantial atmosphere or geologic activity to erode surface features like craters, similar in certain aspects to the surface of our own Moon.

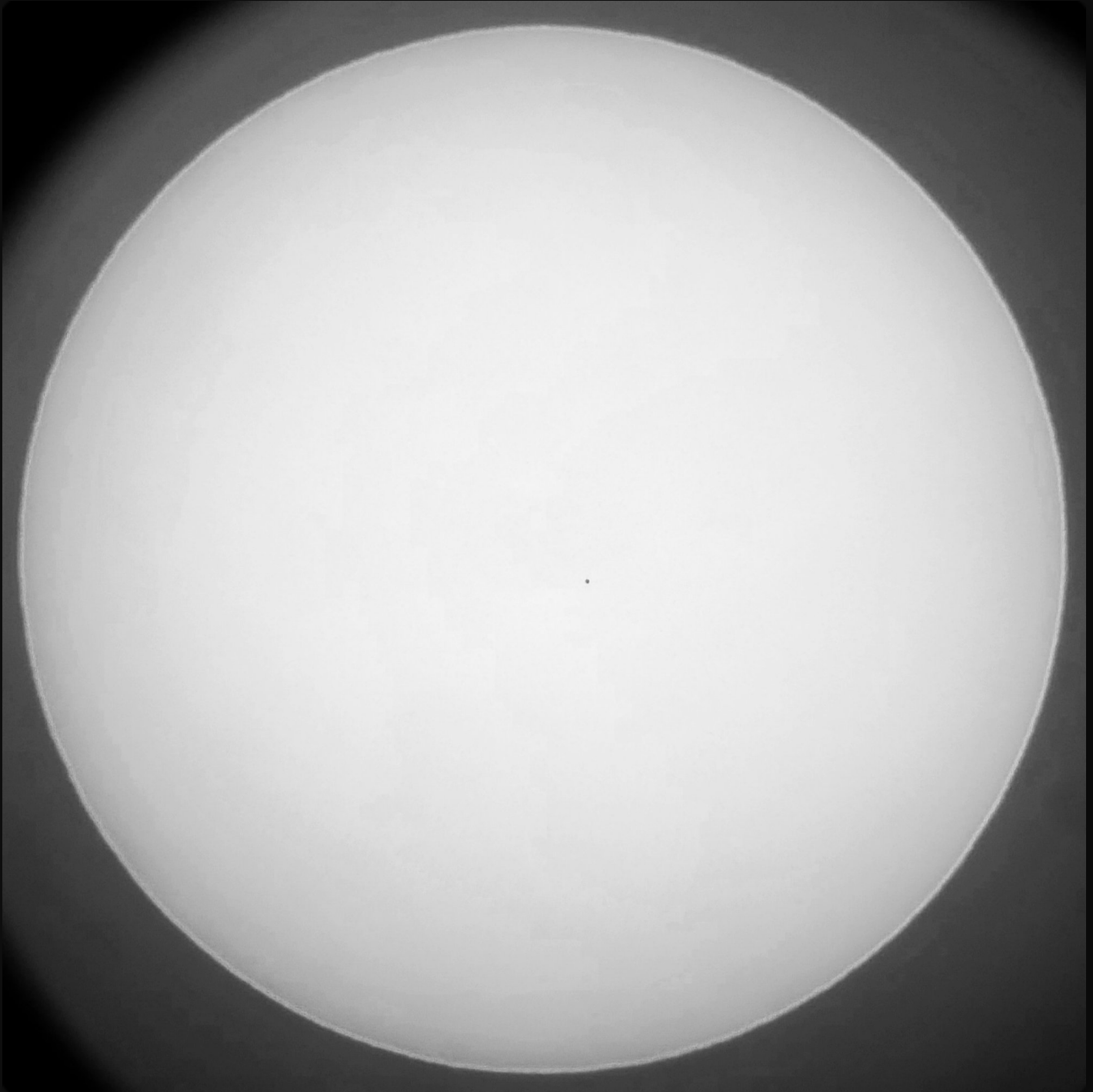
Credit. Carnegie Source

NASA's Mariner 10 was Mercury's first robotic explorer, flying by three times between 1974-1975. Decades later, NASA's MESSENGER first visited Mercury in 2008, flying by three times before settling into an orbit in 2011. MESSENGER thoroughly studied and mapped the planet before smashing into Mercury at mission's end in 2015. Since MESSENGER, Mercury was briefly visited by BepiColombo, a joint ESA/JAXA probe, which first flew by in 2021 and is expected to enter orbit in 2025 - after completing six flybys. Need more Mercury in your life? Check out NASA's discoveries and science about Mercury [here](#), and visit the rest of the universe at [NASA](#).

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 [nightsky](#) to find local clubs, events, and more!

Mercury Transit



On rare occasion, Earthbound observers can observe Mercury, like Venus, transiting the Sun. Mercury frequently travels between Earth and the Sun, but only rarely does the geometry of all three bodies line up to allow observers from Earth to view Mercury's tiny shadow as it crosses our star's massive disk. You can see one such event in this photo taken by Laurie Ansorge of the Westminster Astronomical Society on November 11, 2019. If you missed it, set a reminder for Mercury's next transit: November 13, 2032.

BMAC Calendar & More



Calendar:



MAC Meetings:

- Friday, February 3, 2023 - 7p - Topic TBA.
- Friday, March 3, 2023 - 7p - Topic TBA.
- Friday, April 7, 2023 - 7p - Topic TBA.
- Friday, May 5, 2023 - 7p - Topic TBA.
- Friday, June 2, 2023 - 7p - Topic TBA.
- Friday, August 4, 2023 - 7p - Topic TBA.
- Friday, September 1, 2023 - 7p - Topic TBA.
- Friday, October 6, 2023 - 7p - Topic TBA.
- Friday, December 1, 2023 - 7p - Topic TBA.



unWatch:

- 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:

- March 4 & 11, 2023 - 7p
- March 18 & 25, 2023 - 8p
- April 1, 8, 15, 22 & 29, 2023 - 8:30p
- 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.



Special Events:

- **BMAC Dinner - January 2023 - Day & Time TBD**
 - Look for an e-mail with the latest information.
- **Astronomy Day - April 29, 2023 - 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.
- **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 astronomy-themed 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.](#)

Regular Contributors:



William Troxel



Robin Byrne



Greg Penner



Adam Thanz

William is the current chair of the club. He enjoys everything to do with astronomy, including sharing this exciting and interesting hobby with anyone that will listen! He has been a member since 2010.

Robin 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).

Greg Penner is a semi-retired architect living in the Tri-Cities area since 2018. He 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.

Adam 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:

Bays Mountain Astronomy Club:

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

Dues:

- 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 [link](#). 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.**