



The Bays Mountain Astronomy Club Newsletter

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Cosmic Reflections

William Troxel - BMAC Chair



reetings and hello BMAC members. I hope everyone made it through the weather issues that forced us to cancel the March meeting.

Because of this change, the topics for the upcoming meetings have shifted. In April, we'll have Dr. Erba and her research students, Grace Anderson and Trevor Cox, present on Astronomy in Appalachia. It will be followed by the monthly challenge question. In May, we'll have our student presentation month featuring the students from North Greene High School mentored by BMACer Olivia Kuper. They will present their NITARP research and their research conducted for the Southern Appalachian Science and Engineering Fair at UTK.

It will be followed by the monthly challenge question. June will include the Annual Astronomy Jeopardy Game - Full Version followed by our annual election for the 2023/24 BMAC Chairman. July will be our annual club member's picnic.

Please remember that the spring StarWatch programs have started. If you have gone through the volunteer program with the city and training by the planetarium staff, you are welcome to come out and help. Please be sure and check the newsletter for the times. The SunWatch program for the general public has also started up this spring. Again, if you are city volunteer with staff training, you are welcome to help out. Contact Jason or Adam with any questions.

I'm looking forward to the upcoming events and activities. Please make a note of the changes to the meetings and mark your calendar. Looking forward to seeing each of you at the meetings.

Until then... Clear Skies!

BMAC Notes



Outreach at John Adams Elementary School

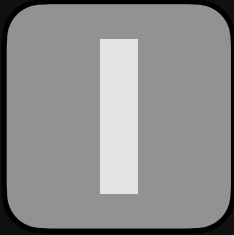


MACer Michael Hopkins reports:

All went well for the STEAM evening for the John Adams Elementary School on Feb 16th. The count was estimated at 325 attendees (Students, parents and staff). Using the constellation presentation board across from our club's tables in the gymnasium, the youngsters were able to find the Taurus constellation through the telescope which was very popular. A very busy 2 hours with so many folks visiting the presenters from a wide range of weather, space and technology learning activities.



Moon, Jupiter & Venus



It was a beautiful view of Jupiter, the Moon and Venus that was visible Wednesday night (2/22/23), BMACer Tom Rutherford reports. This image was taken from the ETSU Observatory.



Jupiter, the Moon and Venus, 2/22/23. Image by Tom Rutherford.

Stellar Observations

Greg Penner



Looking for Supernovae



he last time a supernova was definitively observed in our home Milky Way galaxy was 1604. The so-called Kepler's supernova was named for German astronomer Johannes Kepler, who described it in his book *De Stella Nova*. The exploding star was located about 20,000 light years away in the direction of the constellation Ophiuchus. Visible during the day for over three weeks, the supernova reached a magnitude of -2.5 and was recorded by European, Chinese, Korean and Arabic observers.



Kepler's drawing of SN 1604 from De Stella Nova. It's the "star" labeled with a capital N at the foot of Ophiuchus.

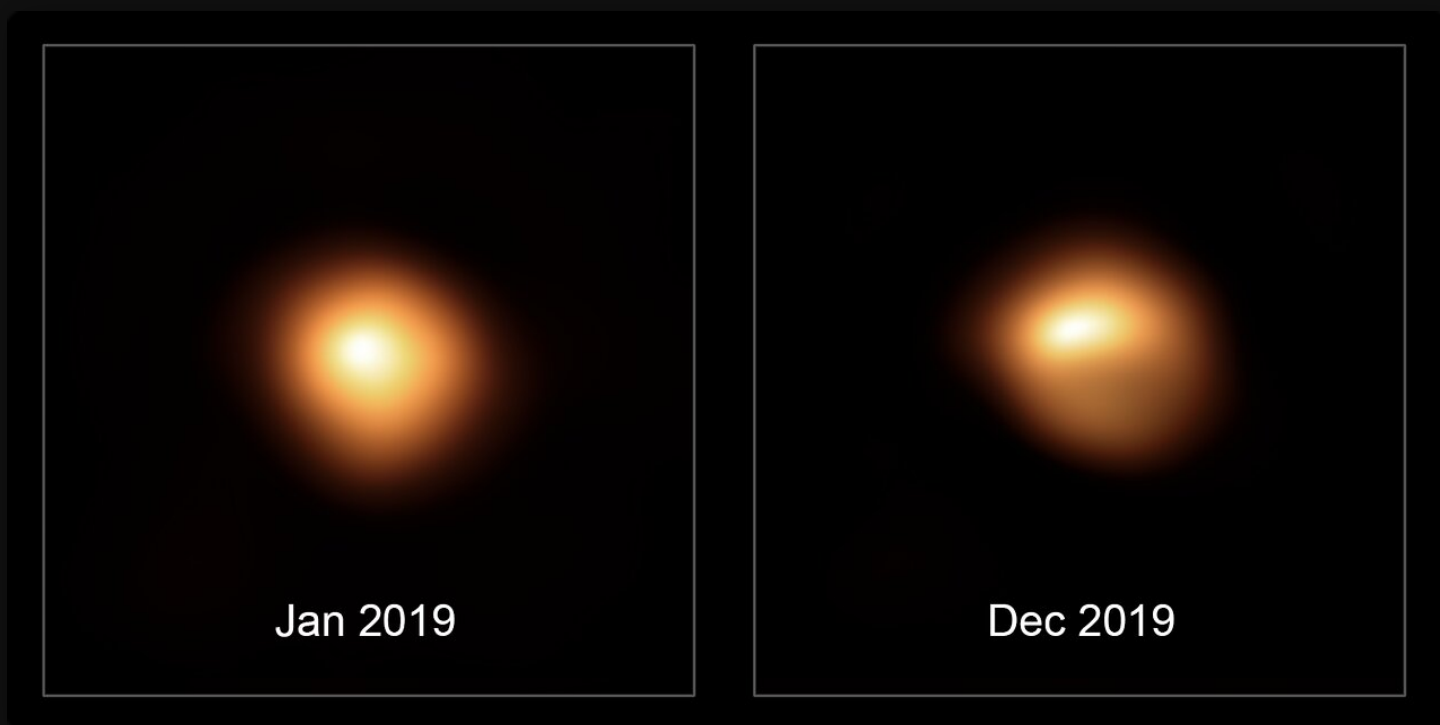
More recently, astronomers have used NASA's Chandra X-ray Observatory to observe the remnants of the explosion in which material is still seen blasting away faster than 20 million miles per hour! Astronomers now know that the supernova was a Type 1a supernova in which a small, dense white dwarf star exceeds a critical mass limit after interacting with a companion star and undergoes a thermonuclear explosion, sending the remains of the white dwarf outward at incredible speeds. The Chandra observations followed 15 "knots" of debris glowing in X-rays. The fastest knot was traveling at a speed of 23 million miles per hour, the fastest ever detected in X-rays in a supernova remnant.



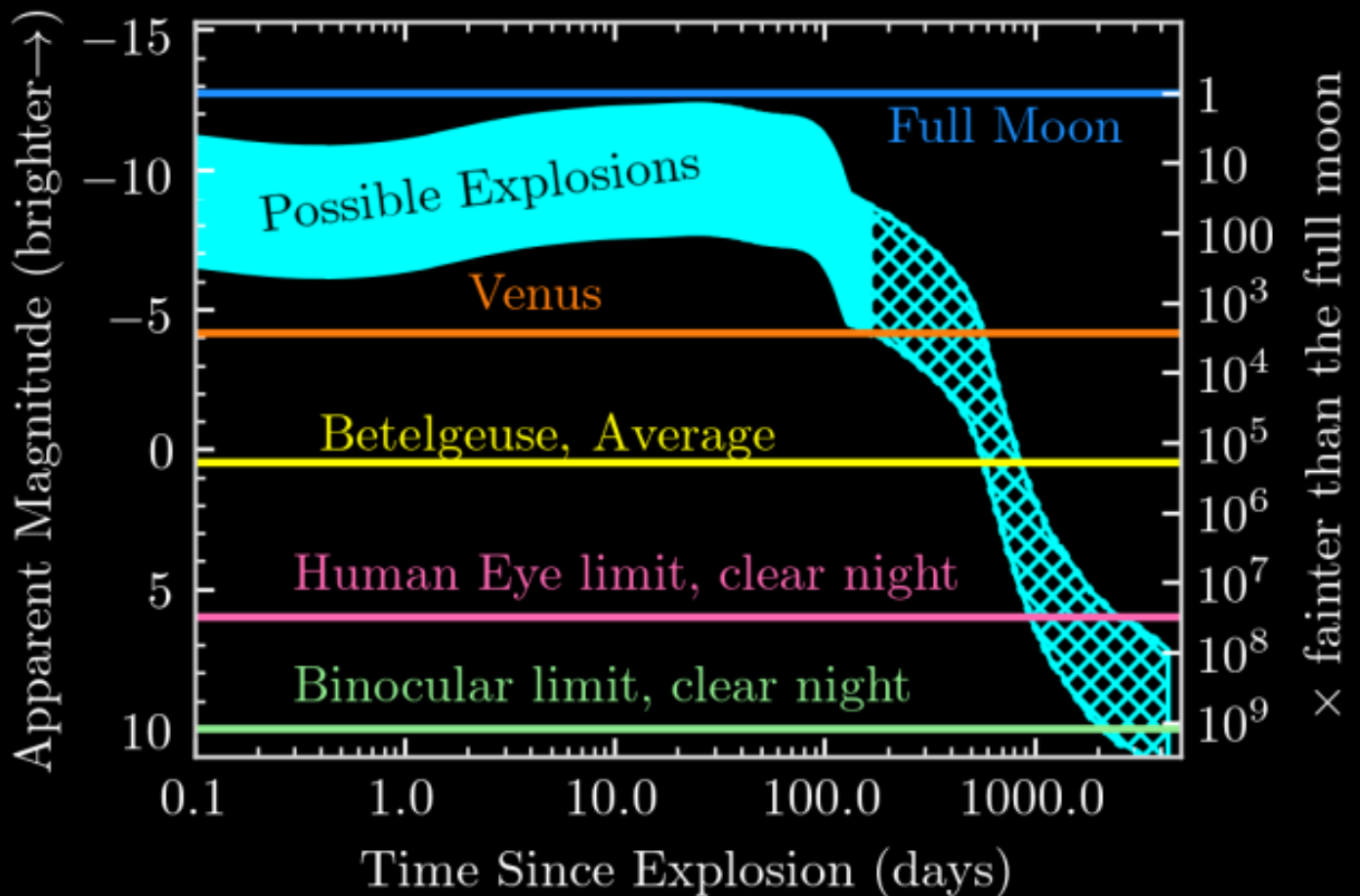
Chandra X-ray Observatory image of SN 1604 remnant.

A few years ago the star Betelgeuse caught the attention of astronomers and the public. The star positioned at the left shoulder of Orion the Hunter was dimming dramatically, and some wondered whether it might be the precursor of a supernova explosion. Astronomers say that Betelgeuse is due to go supernova sometime in the next 100,000 years, but alas, this was not the occasion. With all of the speculation about what a Betelgeuse supernova would look like, some graduate students at University of California, Santa Barbara created simulations to answer that question. Compared to the 20,000 light year distant Kepler supernova, Betelgeuse is only about 650 light years away. Their results indicated that the Betelgeuse supernova would shine about as bright as the half moon, although concentrated into a point of light, thus the supernova would shine brightly enough to be seen during daylight for about a year! That also means the brightness of the supernova at night would be like bright moonlight every night for a year or more. Think about how that would affect astronomers (amateur and professional) trying to observe faint objects at night. Much

research would have to be put on hold, or at least redirected toward the Betelgeuse event!



Betelgeuse dimming in 2019 - taken with the SPHERE instrument on ESO's Very Large Telescope.



Betelgeuse supernova simulation (the chart and the following attribution info was taken from an article on Astronomy.com) Astronomers used a software program called MESA+STELLA to simulate what humans might see when the star Betelgeuse explodes. They also included observations gathered during Supernova 1987A, which exploded in the Large Magellanic Cloud. Jared Goldberg/University of California, Santa Barbara/MESA+STELLA.

Although we may not see a nearby supernova in our home galaxy during our lifetimes, supernovae can be observed in other galaxies. Much progress has been made by professional and amateur astronomers in discovering and following extra-galactic supernovae in recent years. I recently found a [website](#) that actively monitors and updates the latest supernovae discovered in other galaxies. On this web page, you will find a list of the currently observable supernovae, along with information on their location, reference images, and their last reported brightness. Most of the supernovae listed are magnitude +14 or dimmer, but occasionally you will find one in the +13 or +12 range, which is bright enough to be seen with an 8 inch (possibly even 6 inch) aperture telescope, depending on sky darkness. If you want to make observations through your own telescope to search for extra-galactic supernovae, [here](#) is a good article with suggestions on techniques and a list of candidate galaxies to observe.

The really fun and fascinating aspect of astronomy is that we are always expecting the unexpected. Stars that suddenly dim or brighten, comets that brighten unexpectedly or even crash into planets, asteroids that explode into Earth's atmosphere, all these events we have witnessed in recent decades. There will come a day that a bright supernova will appear in our daytime sky again, but until then we can enjoy the search and the anticipation.

The Queen Speaks

Robin Byrne



Happy Birthday Judith Resnik



his month we celebrate the life of a woman who accomplished much in a tragically short amount of time. Judith Arlene Resnik was born in Akron, Ohio on April 5, 1949. Judy showed an early aptitude for math, solving problems even before starting kindergarten. Raised in an observant Jewish household, Judy celebrated her Bat Mitzvah in 1962, at a time when this was uncommon.

When Judy was in high school, her parents divorced, and she was placed in her mother's custody. For a variety of reasons, Judy and her mother didn't get along. When she was 17, Judy went to court to be placed in her father's custody, instead. She won her case, and happily lived with her father, his new wife and her two new stepsisters.

An outstanding student, Judy received a perfect score on her SAT exam - the only woman to do so that year. She was also talented at playing the piano, earning an acceptance to the

Juilliard School of Music to become a concert pianist. However, Judy ultimately chose to study mathematics at the Carnegie Institute of Technology. By her sophomore year, Judy discovered a passion for electrical engineering and changed her major. She graduated in 1970 with a Bachelors Degree in Engineering.

That same year, Judy married Michael Old, a fellow Engineering major. They both were hired by RCA in Moorestown, New Jersey. Judy worked on designing circuitry for missiles and radar systems. Some of the rocket and radar systems she developed were for NASA. In 1971, Judy began working on a Masters Degree at the University of Maryland. At the same time, her husband began studying at Georgetown in the Law School, so they moved to Washington, D.C. After completing her Masters, Judy began her pursuit of a doctorate in electrical engineering, studying the effects of electrical currents on the retina while she worked at the National Institute of Health. During this time, she and Michael divorced.

Dr. Resnik reunited with an old boyfriend from high school, who told her that NASA was seeking women applicants for their astronaut program. Judy was already interested in space travel due to having met a few former astronauts (Michael Collins and John Glenn), plus being inspired by Nichelle Nichols of Star Trek fame. At her boyfriend's suggestion, in 1977 Judy earned a pilot's license to increase her chances of being accepted into the space program. That same year she graduated with her doctorate. In January, 1978, Dr. Judith Resnik was named as one of six women and 29 men in the newest group of astronauts specifically chosen to fly on the Space Shuttle. This was the first time women were picked to be astronauts.



S78-35305 (21 Sept. 1978) --- Astronaut Judith A. Resnik, mission specialist. Photo credit: NASA

During her training at NASA, Judy developed the procedures and software for the Remote Manipulator System (later known as the Canadarm) that would be used to deploy payloads from the Shuttle into space, or to retrieve satellites from orbit. She also worked on other software and hardware systems designed for the Shuttle. The one part of her new job that did not come naturally to her were public appearances and interviews. This was the main reason she was not chosen to be the first woman in space - Sally Ride was more comfortable dealing with the media attention that would accompany the milestone.

Judy Resnik's first Shuttle flight would be in August, 1984 aboard the maiden voyage of the Space Shuttle Discovery. The flight was delayed three times, including one delay that occurred only seconds before launch, but ultimately got off the ground on August 30. With the successful launch, Judy Resnik became the second American woman (and the first Jewish woman) in space. During the mission, she used the Canadarm to deploy satellites and a solar sail to test its ability to capture the Sun's energy. Also during the mission, footage was filmed for

the IMAX documentary "The Dream is Alive." Resnik's weightless hair became an iconic part of the film. After spending 144 hours in orbit, the crew landed at Edwards Air Force Base on September 5.



View of Mission Specialist Judith Resnik sitting on the floor of the mid deck. Beside her on a notebook is a note which says "Hi Dad." Above her head on the mid deck lockers are various stickers such as "Beat Army," "Beat Navy" and "Air Force: a great way of life." Beside her is a [sticker] which reads "I love Tom Selleck." 8 September 1984

Resnik's next assignment was to fly aboard the Space Shuttle Challenger as part of the STS-51 crew. Resnik would be tasked with photographing Halley's Comet, as well as delivering another satellite to orbit. This flight was also to be the first mission carrying a teacher to space, Christa McAuliffe. Although Resnik was part of the team that recruited teachers for the program, she had private doubts about taking non-astronauts on Shuttle flights. However, since NASA wanted a female astronaut with flight experience aboard with McAuliffe, Resnik was chosen for the mission. After one flight delay, Challenger launched on January 28, 1986 at 11:38 am EST. Within a minute of launch, an O-ring in one of the solid rocket boosters failed, leading to a catastrophic explosion. It was later determined that the crew were alive until the crew cabin hit the water at a speed of 207 mph, killing all on board.

Navy divers recovered the remains of all the crew members. Resnik's remains were cremated and buried at Arlington National Cemetery on May 20, 1986. Many posthumous accolades were awarded Resnik, including her elementary

school being renamed in her honor. There are also craters on both the Moon and Venus that bear her name. The Institute of Electrical and Electronics Engineers (IEEE) created the IEEE Judith A. Resnik Award for contributions to space engineering, and the Society of Women Engineers created the Resnik Challenger Medal, which is awarded annually to "... a woman who has changed the space industry..."

Judy Resnik was a pioneer for female astronauts. She helped set the stage for the upcoming Artemis missions, which will see the first woman on the Moon. Whether you are observing the Moon, Venus, or watching the progress of NASA's next step in human spaceflight, take a moment to remember one of our fallen heroes who lost her life in the pursuit of expanding our human presence in space - Judy Resnik.

References:

Judy Resnik - Wikipedia

Judith Resnik by Lynn Cohen - Jewish Women's Archive

Biography of Judith Resnik, Second American Woman in Space
by Carolyn Collins Peterson - ThoughtCo



The Space Place - NASA Night Sky Network

David Prosper

Solar Eclipses Are Coming!



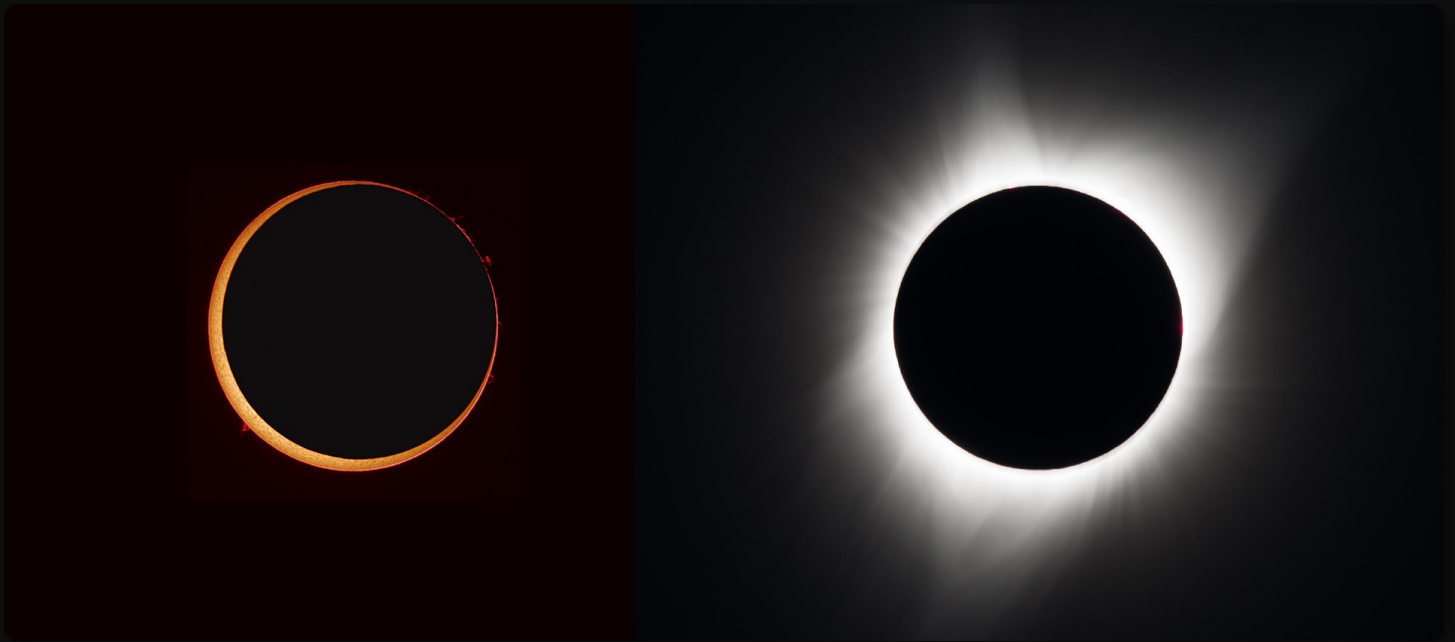
Have you ever witnessed a total solar eclipse? What about an annular solar eclipse? If not, then you are in luck if you live in North America: the next twelve months will see two solar eclipses darken the skies for observers in the continental United States, Mexico, and Canada!

Solar eclipse fans get a chance to witness an annular eclipse this fall. On Saturday, October 14, 2023, the Moon will move exactly in front of the Sun from the point of view of observers along a narrow strip of land stretching across the United States from Oregon to Texas and continuing on to Central and South America. Since the Moon will be at its furthest point in its orbit from Earth at that time (known as apogee), it won't completely block the Sun; instead, a dramatic "ring" effect will be seen as the bright edge of the Sun will be visible around the black silhouette of the Moon. The distinct appearance of this style of eclipse is why it's called an annular eclipse, as annular means ring-like. If you are standing under a tree or behind a screen

you will see thousands of ring-like shadows projected everywhere during maximum eclipse, and the light may take on a wan note, but it won't actually get dark outside; it will be similar to the brightness of a cloudy day. This eclipse must only be observed with properly certified eclipse glasses, or other safe observation methods like pinhole projection or shielded solar telescopes. Even during the peak of the eclipse, the tiny bit of the Sun seen via the "ring" can damage your retinas and even blind you!

Just six months later, a dramatic total solar eclipse will darken the skies from Mexico to northeast Canada, casting its shadow across the USA in a strip approximately 124 miles (200 km) wide, on Monday, April 8, 2024. While protection must be worn to safely observe most of this eclipse, it's not needed to witness totality itself, the brief amount of time when the Moon blocks the entire surface of the Sun from view. And if you try to view totality through your eclipse viewer, you won't actually be able to see anything! The Moon's shadow will dramatically darken the skies into something resembling early evening, confusing

animals and delighting human observers. You will even be able to see bright stars and planets - provided you are able to take your eyes off the majesty of the total eclipse! While the darkness and accompanying chilly breeze will be a thrill, the most spectacular observation of all will be the Sun's magnificent corona! Totality is the only time you can observe the corona, which is actually the beautiful outer fringes of the Sun's atmosphere. For observers in the middle of the path, they will get to experience the deepest portion of the eclipse, which will last over four minutes - twice as long as 2017's total solar eclipse over North America.



Photos of an annular total solar eclipse (left) and a total solar eclipse (right). Note that the annular eclipse is shown with a dark background, as it is only safe to view with protection – you can see how a small portion of the Sun is still visible as the ring around the Moon. On the right, you can see the Sun's wispy corona, visible only during totality itself, when the Moon completely – or totally – hides the Sun from view. A total solar eclipse is only safe to view without protection during totality itself; it is absolutely necessary to protect your eyes throughout the rest of the eclipse! Credits: Left, Annular Eclipse: Stefan Seip (Oct 3, 2005). Right, Total Eclipse, NASA/Aubrey Gemignani (August 21, 2017)



This detailed solar eclipse map shows the paths of where and when the Moon's shadow will cross the USA for the upcoming 2023 annular solar eclipse and 2024 total solar eclipse, made using data compiled from multiple NASA missions. Where will you be? This map is very detailed, so if you would like to download a larger copy of the image, you can do so and find out more about its features [here](#).

Credits: NASA/Scientific Visualization Studio/Michala Garrison; eclipse calculations by Ernie Wright, NASA Goddard Space Flight Center.

While some folks may be lucky enough to witness both eclipses in full - especially the residents of San Antonio, Texas, whose city lies at the crossroads of both paths - everyone off the paths of maximum eclipse can still catch sight of beautiful partial eclipses if the skies are clear. The Eclipse Ambassadors program is recruiting volunteers across the USA to prepare communities off the central paths in advance of this amazing cosmic ballet. Find more information and apply to share the excitement [here](#). NASA has published a fantastic [Solar Eclipse Safety Guide](#) which can help you plan your viewing. And you can find a large collection of solar eclipse resources, activities, visualizations, photos, and more from [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!

BMAC Calendar & More



Calendar:



MAC Meetings:

- Friday, April 7, 2023 - 7p - Astronomy in Appalachia: Inherited Perspectives on Our Night Sky by Dr. Christiana Erba (Research Assistant Professor, Dept. of Physics & Astronomy, ETSU) & research students Grace Anderson and Trevor Cox. The monthly challenge question follows.
- Friday, May 5, 2023 - 7p - Students from North Greene High School will present their science projects. The monthly challenge question follows.
- 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 - 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:

- **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:

ays Mountain Astronomy Club:

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

ues:

- 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.**