The Bays Mountain Astronomy Club Newsletter

February 2021

Kingsport, TN

Table of Contents

Cosmic Reflections

William Troxel - BMAC Chair

Greetings and welcome to 2021! I hope my letter finds each of you well and as happy as possible. We did not have a Zoom meeting in January so I have nothing to report. Instead, I am reflecting a bit on the past year. We all know that 2020 was not like any other year. Everything changed, everything. The normal is no longer the normal. The world is still being held in the grip of the world-wide pandemic. While the world has a vaccine that should control the Covid-19 virus, most of us, most likely over 90% of our club, has not yet received the 1st shot. The other day I was thinking about thoughts / words to attach to 2020. While I do not like them, thoughts like "I am afraid" (more than a few times I was very afraid) "I am having trouble seeing the light at the end of the tunnel" (sometimes I still do). Words like MAD, frustrated and discouraged are just a few that I have felt. I decided that I was not going to allow this feeling, these words and thoughts, to follow me into 2021. About a week ago, I was surfing on YouTube and found a group of videos that were talking about some of the advancements in astronomy, even with the whole planet being held in grip of the world pandemic, was still able to share with the world. I realized that was a light. I am not sure what our club will look like in the near future or even the distant future. One thing is for sure, it has changed. What that change will be I can not say, no one can. Now comes the hard part. We have to continue to wait. I have written this many times and I want you each to know I totally believe this: "We will get through this together." I believe this will make our club stronger. Please stay safe, continue to learn and grow in our hobby of ASTRONOMY.

Our February Zoom meeting will be held on Friday, February 5, 2021. BMACers will be sent the link to join. I have a lot of things for us to enjoy as a club. First, our main speaker will be Michael Schwartz from Tenagra Observatories LTD in Nogales, AZ. His topic is "Searching for Superstars." Michael was the 3rd amateur astronomer to discovery the extragalactic supernova back in 1997. He will be sharing how it happened, some history and how he got into our field. I hope you will sign on and be a part of this program. He will start his presentation a little bit after 7 p.m.

I want to have time after the main presentation for anyone that has a show and tell to have it ready to share with the club if you want. We will also have some fun with the questions that we'll run during the meeting. The topic will be new astronomy discoveries of 2020. So

be sure and get out your Sky & Telescope, Astronomy, Amateur Astronomy and connect with your astronomy professor and teachers. Remember, I may throw in a few misleading questions so be sure and read the entire question before you click on the answer you think. I will share the answers with the group and they will also be in next month's newsletter.

Thank you and please be safe and I hope to see each of you on Zoom on Friday, February 5, 2021. Remember, the channel will be open at 6:30 p.m. and remain open for 30 minutes after the meeting finishes for any member that wishes to visit.

Until next time… Clear Skies!

Reminder: A New Way to Renew

In last month's newsletter, it was announced that until the Park gets a stable, online membership renewal system with payment options, we will manually create a PayPal invoice for you to renew your club membership. You can still pay by phone, mail or in person, though this is by far more convenient. You will receive up to three reminders to renew over three months. Though, all the renewals except one sent so far have been paid within two days of invoice!

Request: Please Send in Your Creativity!

This is your newsletter. Please send in your content to share with the other members. Since these newsletters are posted online, they are accessed by many other people outside of the club, too! You may not realize who or how many others you can be a source of inspiration. So, please send in your art, pictures, articles, how-tos, musings, etc. to share!

Celestial Happenings

Jason Dorfman

With the arrival of February, we reach the middle of the winter season with its clearer skies and wondrous celestial delights. As twilight fades and the dark of night begins, Orion sits almost due south. Colorful stars and beautiful nebulae await your discovery within this favorite of the Winter sky. To the upper right of Orion lies Taurus the Bull, where we find the Hyades and Pleiades star clusters. To his lower left is Sirius, the brightest star in our night sky.

The number of daylight hours will increase by an hour this month. The Sun will rise at 7:31 a.m. and set at 5:56 p.m. on the first. By month's end, it will rise a half hour earlier and set a half hour later. Though there are no exciting planetary or celestial events this month, there is still plenty to see and a much anticipated event in space exploration occurs later this month.

Planets

Our planetary viewing this month begins with two challenging observations. First up is the planet closest to the Sun, Mercury. On the 1st, look to the WSW a half hour after sunset about 6° up from the horizon. Binoculars will help reveal this small world from the fading twilight. On this night, Mercury glimmers at magnitude +1.5 and is just a thin crescent only 14% lit spanning a mere 9" across the sky. As the month continues on, your chances to catch this elusive world diminish rapidly as Mercury quickly dives down towards the setting Sun.

Like planetary bookends, icy Neptune, the most distant planet, is the second of our challenging observational targets. Shining dimly at magnitude +7.95 in the northeast corner of Aquarius, observing it will require binoculars or a telescope. You'll also want dark skies, so start looking an hour and a half after sunset about 16° above the WSW horizon. Neptune will appear as a small, bluish dot spanning only 2" in diameter. Neptune will descend lower towards the horizon each night, becoming a difficult telescopic target by mid-month as the atmospheric turbulence from its low, Earthly altitude distort your views.

Next, we turn our gaze a bit further up and to the east into the constellation of Aries. There we find another distant ice giant, the planet Uranus, in the southwest corner of the ram.

Uranus sits almost 60° high in the southwest an hour and a half after sunset, an altitude that allows for less atmospheric disturbance of your views. Look for a small, bluish-green disk spanning about 3.5". At magnitude +5.8, it is just beyond our ability to observe it naked-eye, so you'll need some assistance. It won't reach the western horizon until after midnight, so you'll have ample time to explore this unique world. As we reach the end of the month, Uranus will stand 36° high as night begins and will set around 11 p.m.

Mars is located just 6.5° east of Uranus when February begins, but will move swiftly eastward over the month, crossing into Taurus on the 23rd and ending the month about 3° south of the Pleiades star cluster. Though we continue to move further away from the Red Planet, Mars is still easy to spy with its orangish hue. Over the month, its magnitude will fade slightly from +0.5 to +0.9. With a telescope, you'll observe a small gibbous orb looking 90% lit. The disk of Mars will continue to decrease a bit from 7.8" to 6.4" during the month.

In the morning skies, we have a changing of the guard occurring this month. Venus has been the prominent morning target for the last several months, but is lost in the morning twilight as February begins and it continues on its way around the far side of the Sun. The gas giants, however, which had everyone's focus on the Winter Solstice and descended into the evening twilight last month, will be rising out of the early morning twilight this month. Swift Mercury, which we spied in the evening sky at the start of the month, will end the month in the morning sky. Look to the east on the morning of the 21st for Mercury and Saturn rising together side by side with matching magnitude +0.7 brightnesses. The pair, separated by roughly 4°, will be 5° high slightly south of due east 40 minutes before sunrise.

Luna

February begins with a waning gibbous Moon rising in the east after 10 p.m. This will provide us with some moonless evening for the first half of February. New Moon is on the 11th. On the 18th, a nearly 3rd quarter Moon lies 3.5° south of Mars. Full Moon occurs on the 26th.

Perseverance Landing on Mars

This month, we have an exciting event in space exploration - Perseverance, the next NASA Mars rover, is scheduled to land in Jezero Crater on February 18th. In many ways, the Perseverance rover is a duplicate of the Curiosity rover, which landed on Mars back in 2012. It has the same overall design, though with new and improved instrumentation, and will use the same crane lowering system to land the rover on the surface of Mars. Another new element of this mission is that Perseverance will prepare samples in tubes and leave them on the surface to be picked up by future sample return missions that are in the planning stages. If you've never tuned in to follow a NASA launch or landing event, this is a good one to start with. I remember getting caught up in the anticipation and excitement along with the NASA researchers as they waited for confirmation of the Curiosity rover touching down on the surface back in 2012. I'll definitely be tuning in for this one!

Thanks for reading! Wishing you all clear skies ahead.

An illustration of NASA's Perseverance rover landing safely on Mars. Hundreds of critical events must execute perfectly and exactly on time for the rover to land safely on Feb. 18, 2021.

***Entry, Descent, and Landing**, or "EDL," begins when the spacecraft reaches the top of the Martian atmosphere, travelling nearly 12,500 mph (20,000 kph). EDL ends about seven minutes after atmospheric entry, with Perseverance stationary on the Martian surface.*

At about 6,900 feet (2,100 meters) above the surface, the rover separates from the backshell, and fires up the descent stage engines. As the descent stage levels out and slows to its final descent speed of about 1.7 mph (2.7 kph), it initiates the "skycrane" maneuver. About 12 seconds before touchdown, roughly 66 feet (20 meters) above the surface, the descent stage lowers the rover on a set of cables about 21 feet (6.4 meters) long. The rover unstows its mobility system, locking its legs and wheels into landing position.

As soon as the rover senses that its wheels have touched the ground, it cuts the cables connecting it to the descent stage. This frees the descent stage to fly off to make its own uncontrolled landing on the surface, a safe distance away from Perseverance.

NASA's Jet Propulsion Laboratory in Southern California built and will manage operations of the Mars 2020 Perseverance rover for NASA.

*For more information about the mission, go **here**.*

Credit: NASA/JPL-Caltech

The Queen Speaks

Robin Byrne

Book Review: Astrophysics for Kids

Many years ago, I had signed up through a web page called Fab Fems to be available as a mentor to young women interested in astronomy as a career. After some activity at first, years went by without hearing anything from them. Last summer, out of the blue, I received an email through the site that was from the mother of a young woman who was looking for a mentor. That young woman was Hansa Giridhar.

The e-mail included a link to a web page about Hansa. At the age of 13, she had already written a book titled A.I. for Kids, participated in many science fairs and STEM activities, and created a web forum to help young women improve their communication skills and confidence. After reading all of this, I felt it would have been more appropriate for Hansa to mentor ME! Over the summer we met multiple times via Zoom, discussing astronomy topics, career advice, and life in general. She was also working on her second book, and I gave advice on what she had written, plus providing clarification on some of the topics.

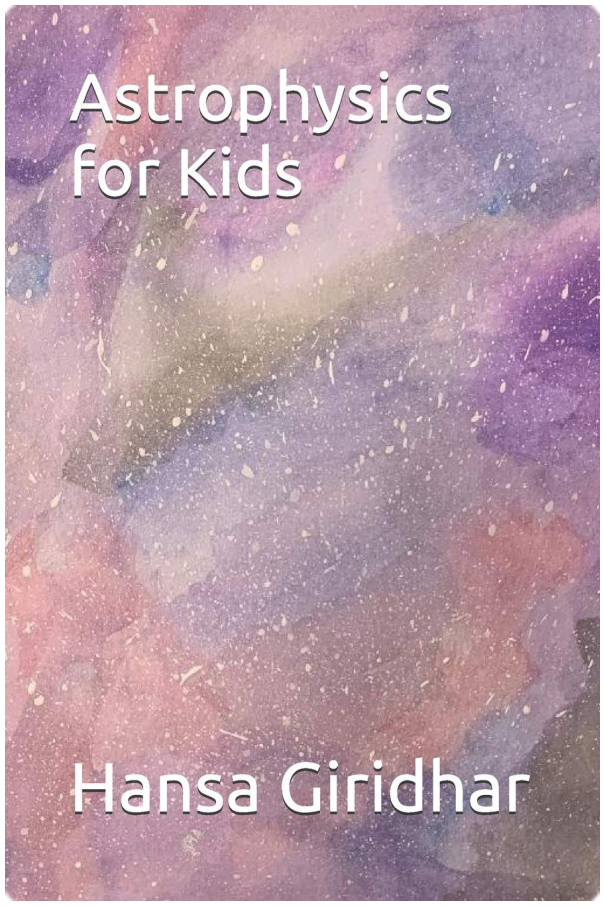
The result of all of Hansa's efforts, and my minimal input, was a book titled Astrophysics for Kids. At only 31 pages in length (plus three pages for the glossary), it is a very brief introduction to a handful of topics that give an overview of major ideas in astrophysics. She discusses everything from the Big Bang to dark matter and dark energy, and even exoplanets. Each short chapter covers the basics in an easy-to-understand style. Perfect for a young reader. While Hansa did test the book out on her nine-year old sister, I would suggest kids of about 12 or older would be the appropriate target audience. It would also make a good starting point for any adult interested in learning a little about astrophysics.

There are only three illustrations in the book, but they were all drawn by Hansa as well, and all well done. Each one does a good job helping to visualize the topic being discussed.

I fully admit that I am biased, but Astrophysics for Kids is a lovely book for getting a first little dip of the toe into the vast ocean of astronomy and astrophysics.

References:

Astrophysics for Kids by Hansa Giridhar, Amazon Self Publishing, 2020



The Cover to Astrophysics for Kids by Hansa Giridhar - Image from Amazon.

The Back to Astrophysics for Kids by Hansa Giridhar - Image from Amazon.

The Space Place - NASA Night Sky Network

David Prosper

Landing On Mars: A Tricky Feat!

The Perseverance rover and Ingenuity helicopter will land in Mars's Jezero crater on February 18, 2021, NASA's latest mission to explore the red planet. Landing on Mars is an incredibly difficult feat that has challenged engineers for decades. While missions like Curiosity have succeeded, its surface is littered with the wreckage of many failures as well. Why is landing on Mars so difficult?

Mars presents a unique problem to potential landers as it possesses a relatively large mass and a thin, but not insubstantial, atmosphere. The atmosphere is thick enough that spacecraft are stuffed inside a streamlined aeroshell sporting a protective heat shield to prevent burning up upon entry - but that same atmosphere is not thick enough to rely on parachutes alone for a safe landing, since they can't catch sufficient air to slow down quickly enough. This is even worse for larger explorers like Perseverance, weighing in at 2,260 lb. (1,025 kg). Fortunately, engineers have crafted some ingenious landing methods over the decades to allow their spacecraft to survive what is called Entry, Descent, and Landing (EDL).

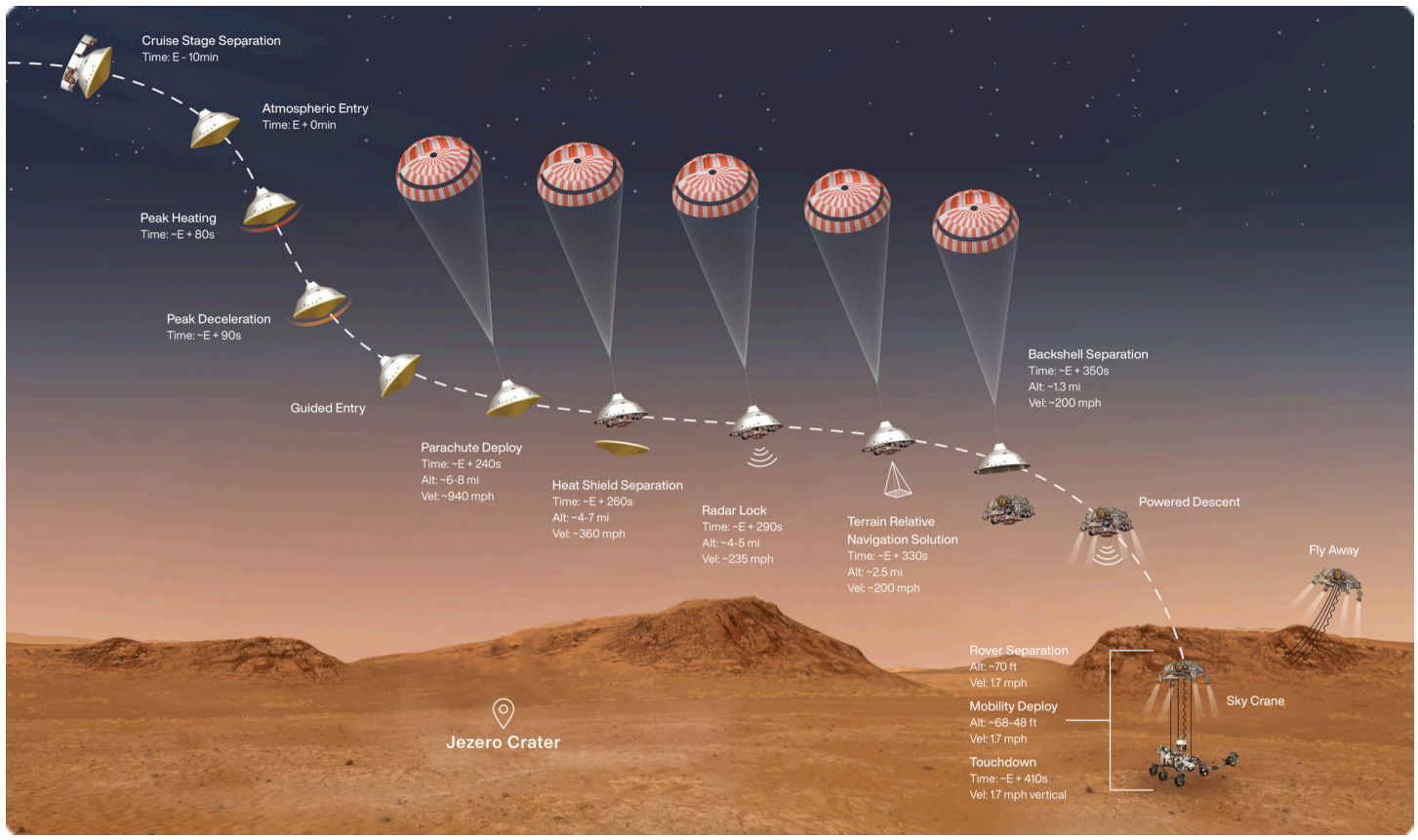
The Viking landers touched down on Mars in 1976 using heat shields, parachutes, and retrorockets. Despite using large parachutes, the large Viking landers fired retrorockets at the end to land at a safe speed. This complex combination has been followed by almost every mission since, but subsequent missions have innovated in the landing segment. The 1997 Mars Pathfinder mission added airbags in conjunction with parachutes and retrorockets to safely bounce its way to a landing on the Martian surface. Then three sturdy "petals" ensured the lander was pushed into an upright position after landing on an ancient floodplain. The Opportunity and Spirit missions used a very similar method to place their rovers on the Martian surface in 2004. Phoenix (2008) and Insight (2018) actually utilized Viking-style landings. The large and heavy Curiosity rover required extra power at the end to safely land the car-sized rover, and so the daring "Sky Crane" deployment system was successfully used in 2012. After an initial descent using a massive heat shield and parachute, powerful retrorockets finished slowing down the spacecraft to

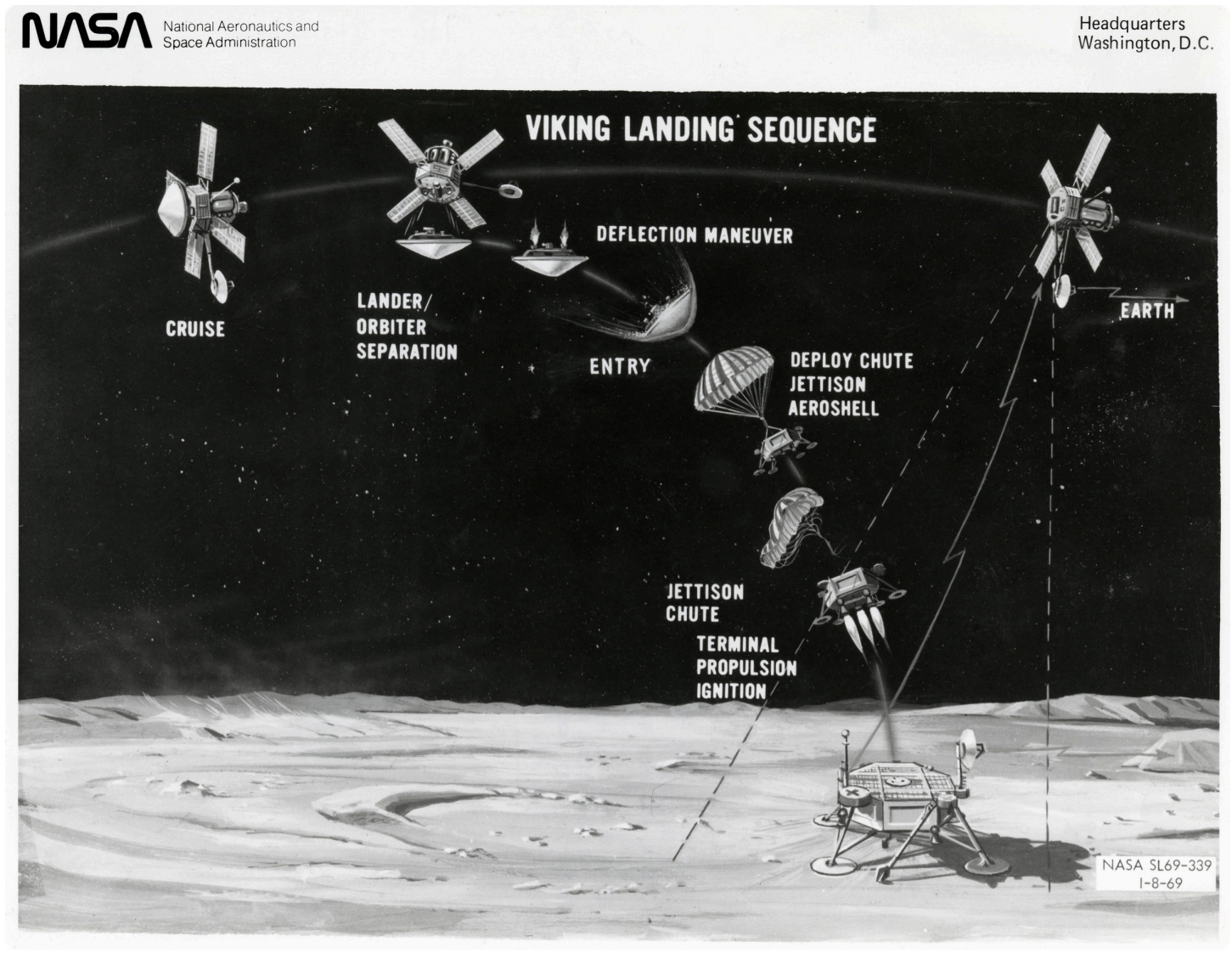
about 2 miles per hour. The Sky Crane then safely lowered the rover down to the Martian surface using a strong cable. Its job done, the Sky Crane then flew off and crash-landed a safe distance away. Having proved the efficacy of the Sky Crane system, NASA will use this same method to attempt a safe landing for Perseverance this month!

You can watch coverage of the Mars Perseverance landing starting at 11:00 a.m. PST (2:00 p.m. EST) on February 18 **here**. Touchdown is expected around 12:55 p.m. PST (3:55 p.m. EST). NASA has great resources about the Perseverance Rover and accompanying Ingenuity helicopter **here**. And of course, find out how we plan to land on many different worlds 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!





Illustrations of the Entry, Descent, and Landing (EDL) sequences for Viking in 1976, and Perseverance in 2021. Despite the wide gap between these missions in terms of technology, they both performed their landing maneuvers automatically, since our planets are too far apart to allow Earth-based engineers to control them in real time! (NASA/JPL/Caltech)

BMAC Calendar & More

Calendar:

MAC Meetings:

- Friday, February 5, 2021 - 7p - Via Zoom - Social time 30m before and after meeting. Michael Schwartz from Tenagra Observatories LTD in Nogales, AZ will be speaking. His topic is “Searching for Superstars.”
- Friday, March 5, 2021 - 7p - Via Zoom - Social time 30m before and after meeting. Topic TBA.
- Friday, April 2, 2021 - 7p - Via Zoom - Social time 30m before and after meeting. Topic TBA.
- Friday, May 7, 2021 - 7p - Via Zoom - Social time 30m before and after meeting. Topic TBA.
- Friday, June 4, 2021 - 7p - Via Zoom - Social time 30m before and after meeting. Topic TBA.

unWatch:

- **Cancelled until further notice.**
- Every clear Saturday & Sunday - 3p-3:30p - March-October - On the Dam
  - View the Sun safely with a white-light & Hα view if clear.; Free.

tarWatch:

- **Cancelled until further notice.**
- March 6 & 13, 2021 - 7p
- March 20 & 27, 2021 - 8p

- April 3, 10, 17 & 24, 2021 - 8:30p
- October 2 & 9, 2021 - 7:30p
- October 16, 23, 30 & November 6, 2021 - 7p
- November 13, 20 & 27 - 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, please show up at least 30 minutes prior to the official start time.

pecial Events:

- **All special events are cancelled until further notice.**
- **Astronomy Day - May 15, 2021 - 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 2021 - Day TBD - 6p**
    - 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.
    - **Please bring a dish to share and bring your own chair.**
- **StarFest 2021 - October 29, 30 & 31, 2021**
    - Our 37th annual astronomy convention / star gathering for the Southeast United States. Three days of astronomy fun, 5 meals, 4 keynote speakers, unique T-shirt, and more!
    - **Pre-registration by Oct. 8, 2021 with full payment is mandatory for attendance. Sorry, no walk-ins nor "visits."**
    - MeadowView Marriott special hotel **rate**.
    - **StarFest Link**

Regular Contributors:

William Troxel

Robin Byrne

Jason Dorfman

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).

Jason Dorfman works as a planetarium creative and technical genius at Bays Mountain Park. He has been a member since 2006.

Adam Thanz has been the BMAC Newsletter Editor for all but a 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 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 Association member (which incurs a separate, additional fee), then a 50% reduction in BMAC dues are applied.
- Dues can be paid in many ways. For renewals, you will be sent an e-mail with an invoice and a direct link to pay online. You can also pay by mail, over the phone or in person at the gift shop.

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.
- **Celestial Happenings image of sunset at the Bays Mountain Park Lake during a twilight kayak program by Jason Dorfman.**
  - Image captured October 1, 2020.
- **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.**