The Bays Mountain Astronomy Club Newsletter

October 2022

Kingsport, TN

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Cosmic Reflections

William Troxel - BMAC Chair

reetings and welcome fellow BMACers. October is here and the year is fast coming to its end. I wanted to send out a big thank you to Michael Poxon from the AAVSO for being our speaker last month. He had a very interesting topic and I know I learned a lot. Thank you again, Michael. For those that didn't attend, we met via Zoom as our speaker was from the UK!

With October here, that signals StarFest is coming up soon; the first weekend of November. I will just remind everyone that the October 14 deadline to register and to book your hotel room at the special rate is coming up very soon! Registrations continue to come in, so get yours in too! Follow the link down in the calendar for all the info and links to register.

You probably don't know that there is construction scheduled to occur in the Nature Center this winter. What is not known at this time is when it will start and how long it will take. The main work will be to remodel the main lobby, gift shop space and some of the office space behind it. The staff in those offices will

be temporarily moving downstairs in the Discovery Theater to be out of the way. That means that we will be meeting for a while in the Planetarium. [Ed.: Remember, no food nor drink!]

I wanted to talk a little bit about some of the upcoming meetings. In October, we will meet in the Planetarium with a show about the Sun, "Sunstruck." November will be StarFest, so there will not be a meeting at all. In December, we will meet and enjoy a presentation led by BMACer and Assistant Professor of Physics at Milligan University, Nate Wentzel, to end out the year. Of course, January will be the annual club member dinner. Details and date will be sent out closer to the end of 2022.

Thank you for being flexible during these very unusual times we are in. While I still can not tell what our club will look like in the future, one thing that seems to be certain is that we have to be ready to be flexible going forward. Thank you and keep looking up at the night sky.

Until Next time.... Clear Skies.

BMAC Notes

RASC Observer's Handbooks & Calendars

The RASC 2023 Observer's Handbooks (USA version) and Calendars are available for PRE-ORDER on the League Sales web store **here**.

League Sales sells these items each fall at a fantastic price with our members in mind. (Please note that the price did go up this year, due to a cost increase from the RASC. We kept the increase as minimal as we possibly could. This is the first price increase from the RASC in many years.)

Stock will come in typically in November and typically ship in December in time for Christmas.

We suggest ordering early to ensure availability, as stock will be limited once the order comes in. If we have your order early, then we will order enough product for you.

Observatory Cleaning & New Solar Pad!

big thank you goes to two BMACers, Michael Hopkins and William Troxel. It's been a while since the observatory had been cleaned as it's been closed for COVID-19. Their help had been amazing!

The observing programs are resuming now. SunWatch will be at the new observing solar pad by the dam. Those will go until the end of October. StarWatch will be the Saturday nights of October and November.

If you are interested in being a volunteer to help share the night sky with the public, please download the **volunteer application** and submit it to the Park's volunteer coordinator. Once approved, some training will follow.

We emptied the observatory to be able to clean it and everything inside. In the image is Mackenzie, the new planetarium intern, Adam in the background and Michael by the eyepiece case. Jason Dorfman is not in the image. Image by William Troxel.

William at the new solar pad. Image by Michael Hopkins.

William on the other side to show the solar pad's placement. Image by Michael Hopkins.

Stellar Observations

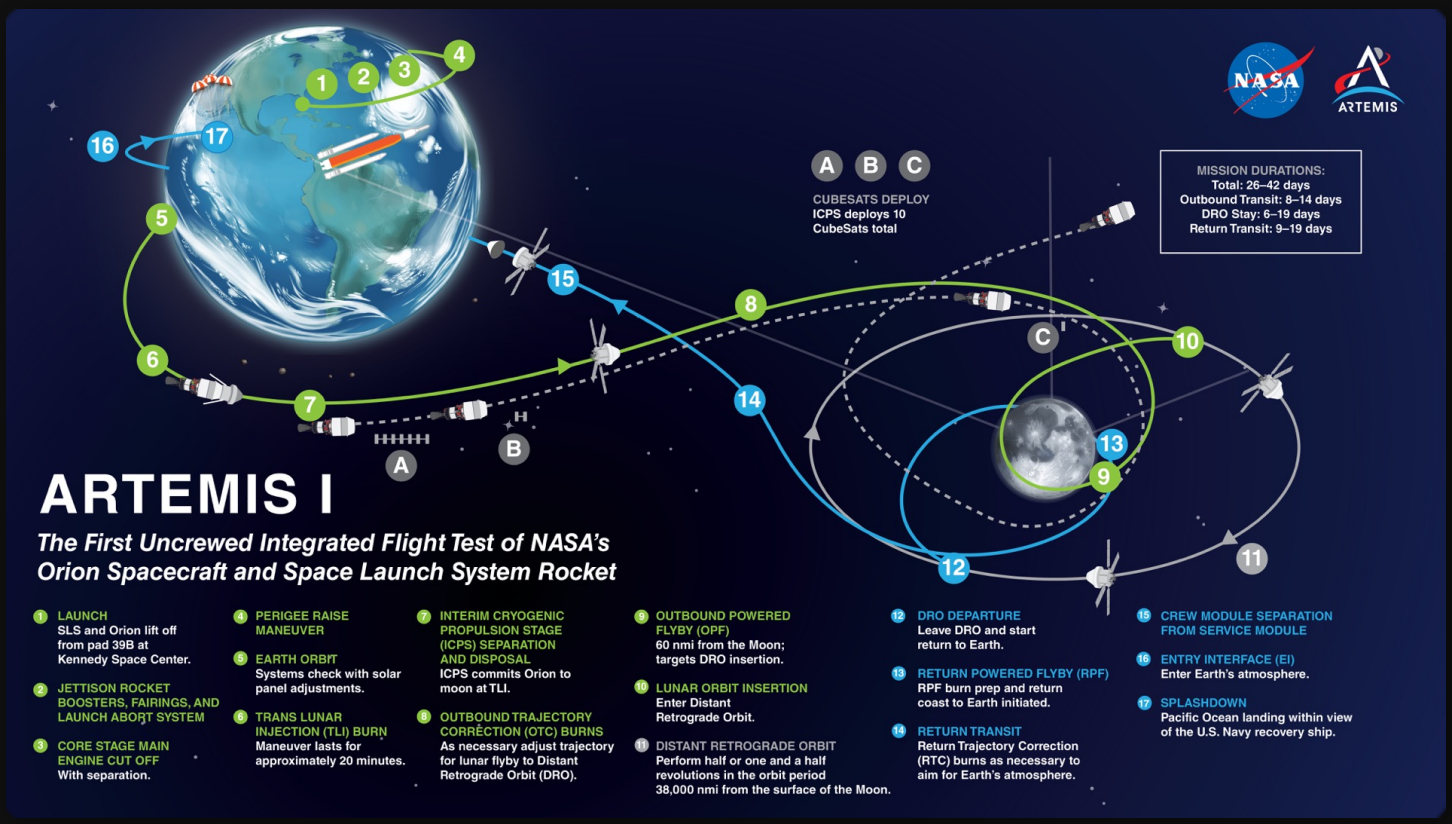
Greg Penner

October Sky

The title of this month's article alludes to the 1999 film "October Sky" about young Homer Hickam who takes up the hobby of rocketry. Eventually, Hickam enjoyed a successful career at NASA contributing to the Space Shuttle and International Space Station programs. NASA's latest rocket program will likely be on display in the October sky of 2022 with the projected launch of Artemis 1. As of the writing of this article in mid-September, the latest launch date is set for September 27th with a backup date of October 2nd. If the launch is successful on either of those dates, then the month of October will see the Artemis 1 mission proceed for the next 26-42 days according to NASA's Artemis 1 map. NASA states that

> Artemis I will be the first integrated flight test of NASA's deep space exploration system: the Orion spacecraft, Space Launch System (SLS) rocket and the ground systems at Kennedy Space Center in Cape Canaveral, Florida. The first in a series of increasingly

complex missions, Artemis I will be an uncrewed flight that will provide a foundation for human deep space exploration, and demonstrate our commitment and capability to extend human existence to the Moon and beyond.

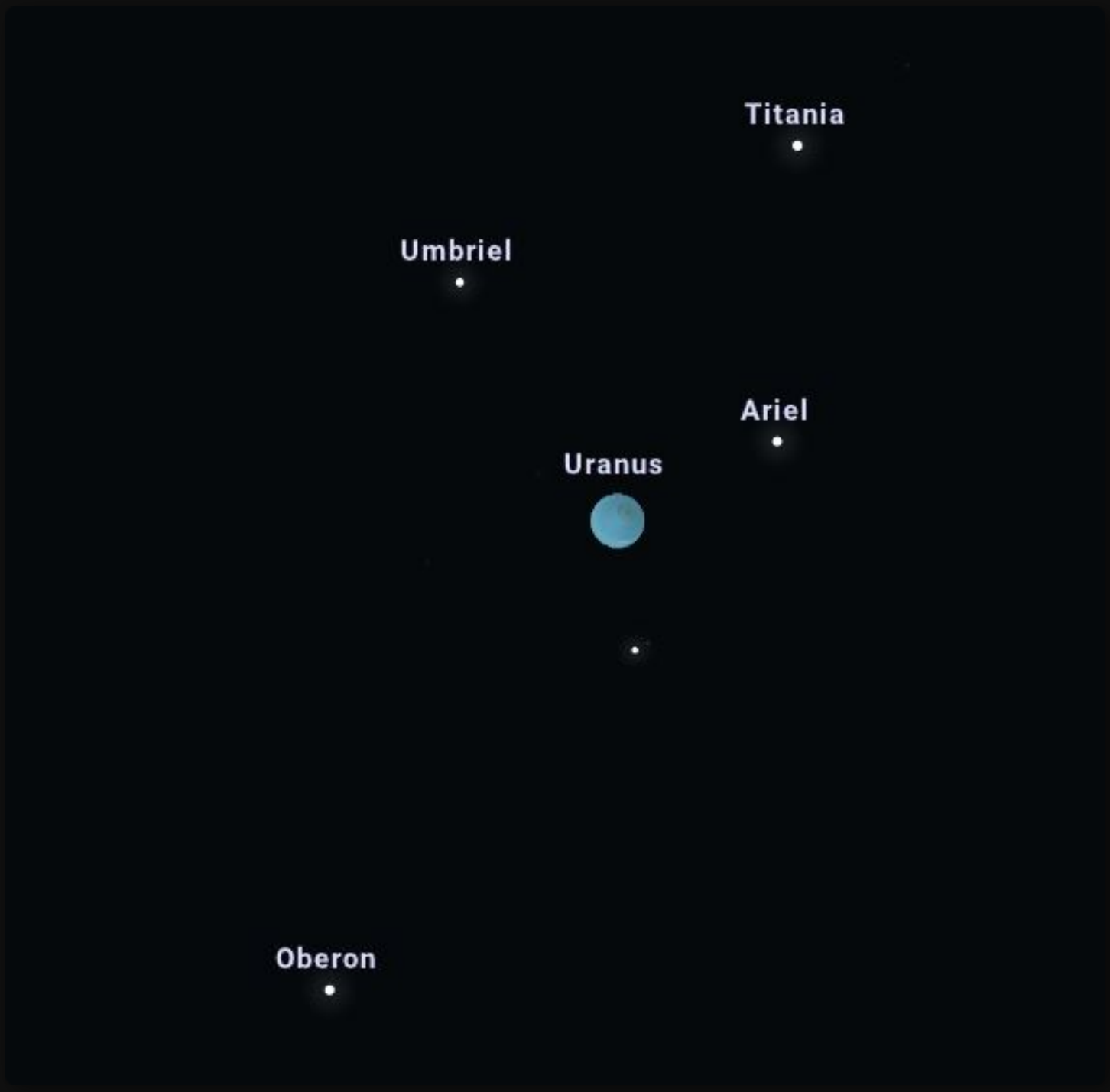


Artemis 1 Mission Map - by NASA.

While we follow exciting updates about the Artemis mission, we can check out some fascinating celestial sights in the October sky. First up is a close meeting between a small rocky body and a big gas giant. Of course “small” and “big” are relative terms, and things often appear differently than they really are. During the night of October 11-12, the waning gibbous Moon will pass less than ¼ degree from the planet Uranus as viewed from East Tennessee. People in the western U.S. will see the Moon occult Uranus. The Moon’s apparent diameter in our sky is about ½ degree, which is almost 500 times larger than the 3.8" apparent diameter of Uranus. Although in reality, Uranus’ actual diameter is about 31,000 miles, which is almost 15 times larger than the 2,100 mile diameter of the Moon. As you are gazing at the close encounter of the “huge” Moon versus “tiny” Uranus, you may get an appreciation for the vast distance difference as the Moon is only 240,000 miles away, while Uranus is nearly 1.8 BILLION miles away! Also notice the color difference between the two bodies. The Moon has its familiar shades of gray while Uranus has a pleasing blue-green color caused by the abundance of

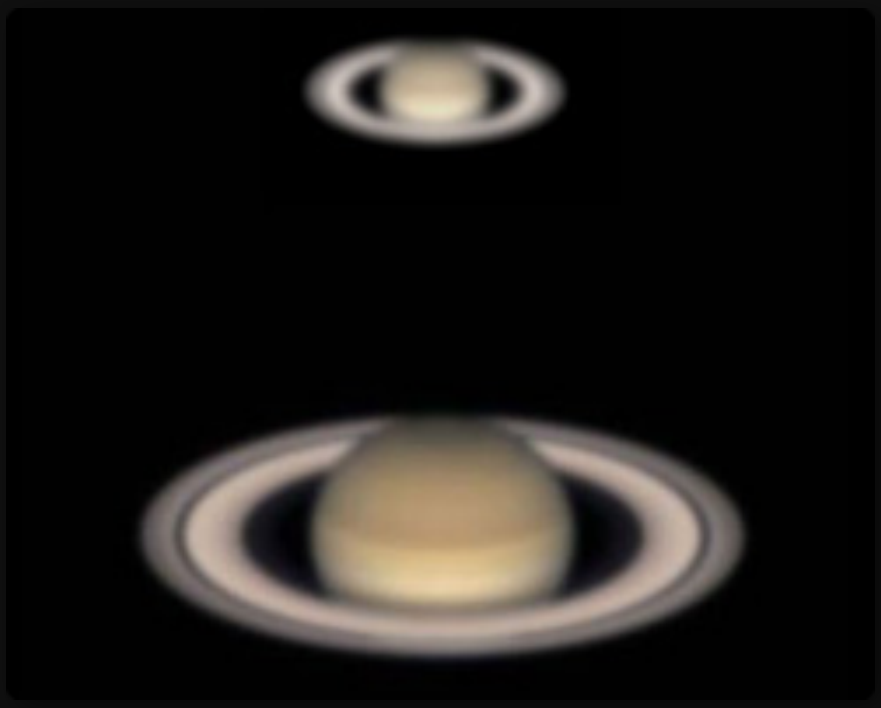
methane in its atmosphere. Finally, if you have a large enough telescope such as an 8" aperture or more, you might be able to identify a couple of Uranus' own moons. Titania and Oberon are the two largest moons and should be visible in an 8" or larger telescope. For help in identifying Uranian moons, follow this link.

Moon and Uranus - from Stellarium



Uranus Moons at time of Uranus/Moon encounter - from Stellarium

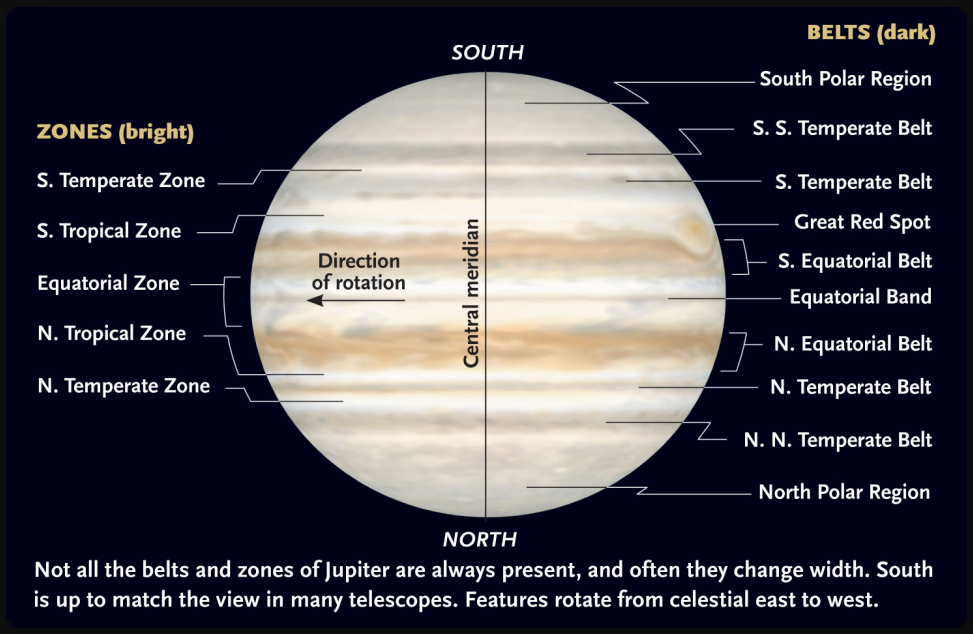
This year’s October sky is also a great time to view the two largest planets of our Solar System, Jupiter and Saturn. Saturn will be due south and highest in the sky around 9p in early October. Any size telescope will show Saturn’s famous rings. A good 3"-4" diameter telescope will show the rings as distinctly separate from the disk of the planet. A 6"-8" telescope should reveal the Cassini division between the two main rings. This size telescope will also give a great 3-D impression of the planet and ring system.



Saturn's appearance through a 4" telescope (top) and an 8" or larger telescope (bottom) - Sky & Telescope Illustration; Source: NASA/ Hubble Space Telescope

By mid to late October, Jupiter will be due south and highest in the sky around 11p. Jupiter is a fun target to view through a telescope because you can actually watch things happen. So many of the objects we look at in the night sky are fairly static and unchanging (at least on human time scales), but Jupiter is like a mini Solar System with action taking place all of the time. If your first view of Jupiter through your telescope is with a low-power eyepiece, you will likely notice not only the disk of the planet but four other pinpoint lights lined up on either or both sides. These are the four moons discovered by Galileo; Io, Europa, Ganymede and Callisto. From night to night (and even hour to hour), you can watch the movement of these moons as they revolve around Jupiter and rearrange themselves according to their differing speeds and orbits. Sometimes you can even catch one or more moons casting a shadow onto the surface of Jupiter or disappearing behind Jupiter and later reappearing on the other side. A great resource to help you track all of this Galilean moon activity is the “Phenomena of Jupiter’s Moons” chart in every issue of Sky & Telescope (S&T)

magazine or on their **website**. Focusing on the planet's disk at a higher magnification should show you some of the cloud banding and other atmospheric features (depending on seeing conditions and telescope aperture). The famous Great Red Spot is typically the main feature to look for and once again each issue of S&T has a chart to help you locate that Jovian storm. Jupiter makes one complete rotation every 10 hours, so the surface features will move noticeably over just an hour or two of observing time. Also, because of this fast rotation, Jupiter is somewhat oblate in shape like a ball that is being squished down.



Jupiter's Bands - Sky & Telescope illustration

During the month of October, Mars is gradually becoming more prominent in the sky as Earth travels its orbit and catches up to the red planet. On October 1 Earth is still over 75 million miles from Mars, but by October 31 we are about 57 million miles away and drawing closer every day. The effect is for Mars to get brighter in the sky from magnitude -0.6 to -1.2. In the telescope eyepiece, the disk of Mars grows noticeably from 11.9" to 15". Mars will really start to take center stage in the sky in November and December as it gets ever brighter and larger and even has a close encounter with the Moon.

As we watch events like Earth's Moon "visiting" Uranus and Mars in the night sky and the Artemis 1 test flight, remember that NASA's current plan for manned exploration is to visit the Moon using the Artemis rocket program with a manned landing within the next 4-5 years. But, this is just a stepping stone and proving ground for the larger goal of landing humans on Mars sometime in the 2030s. Enjoy the October sky with anticipation for what the future brings!

Editor's Notes: I don't like to interject in an article, but this excellent article by Greg is providing a great segue to a number of items I'd like to add.

I was fortunate enough to meet Homer Hickam very recently at a conference. He spoke about his home town and being inspired by the space program to go into science as a career. I was even more fortunate enough because he and his wife sat at our table during dinner!

There are two apps that I've used for many years that can be of assistance. They are both free and work on an iPad and iPhone.

The first app is called **Gas Giants**. It will show the four planets along with their brighter moons. But, set the date/time and telescope and eyepiece parameters, it will display a matched view! Simple and very effective.

The second app is called **Moon Globe**. It does what it says. It shows the Moon phase correctly and even adjusts for libration and angular size. You can toggle the labels for the craters.

The Queen Speaks

Robin Byrne

Happy Birthday Gregorian Calendar

This month, we celebrate the anniversary of the creation of the calendar we still use today. But to understand how this calendar came to be, we must first look at what came before...

As early as 3000 BCE, the Egyptians had used the annual flooding of the Nile to mark the passing of the year. On average this occurred every 365 days, leading to the Egyptians establishing a calendar based on a year of 365 days.

While this calendar mostly worked, after a while, it began to drift relative to the seasons. In 45 BCE, during the reign of Julius Caesar, a modification of the calendar was developed to fix it. In this new Julian Calendar, every fourth year would have an extra day (a leap year), making a year, on average, 365.25 days in length.

The Julian calendar worked well for a while, but still wasn't perfect. Over the following years, the Catholic Church rose to

power. The date for one of the most important Christian holidays, Easter, was dependent upon the calendar and the seasons being aligned. The date for Easter is set as being the first Sunday after the first full moon, after the Spring Equinox. The Church had set March 21st as the official date for the equinox. However, due to Earth's orbital period actually being 365.242196 days in length instead of 365.25 days, the calendar once again was shifting relative to the seasons. Now that it affected when people celebrated an important event, it became even more imperative to get a calendar that had a higher degree of accuracy.

On February 24th, 1582, Pope Gregory XIII issued a decree to develop a better calendar. Aloysius Lilius was an Italian doctor, astronomer and philosopher. He was aware of the problems with the Julian calendar and began to work out a solution. His ideas were presented by his brother to Pope Gregory XIII, who passed it along to the calendar reform committee. The solution Lilius came up with was to reduce the number of leap years. Instead of having 100 leap years every 400 years, his version

would have only 97 in the same span of time, resulting in an average year length of 365.2425 days. Ultimately, the rule became that there would be a leap year every 4 years, with the exception of most century years. For century years to be a leap year, it must also be divisible by 400. Our most recent century year, 2000, is divisible by 400. It was a leap year, but the years 2100, 2200, and 2300 will not be leap years. The year 2400 will be the next time a century year will also be a leap year.

By the time the new calendar had been developed and agreed upon, astronomical Spring Equinox differed from the calendar date of March 21st by several days. Lilius proposed to adjust to the new calendar gradually by not having any leap years for 40 years, at which point the calendar and equinox would align properly. An alternate suggestion, made by Christopher Clavius, was to simply eliminate 10 days from a single year. It was this second proposal that was chosen. The Gregorian calendar was first put in use the day after Thursday, October 4th, 1582, on what would now be Friday, October 15th.

Because this calendar was developed by the Catholic Church and was considered a religious calendar, only countries that were predominantly Catholic adopted it at first. Protestant countries, such as England and its colonies, didn't think it was appropriate for their civil calendar to be dictated by the Pope, who they suspected of a plot to regain control, so they did not immediately make the switch. Gradually, though, everyone did adopt the Gregorian calendar. In the case of England and the American colonies, it was adopted in 1752, at which time 11 days had to be skipped, resulting in September 2nd 1752 being followed by September 14th. The last country to adopt the Gregorian calendar as their civil calendar was Turkey, in 1927, at which point 13 days had to be skipped.

While certainly an improvement over the Julian calendar, the Gregorian calendar is still not a perfect approximation of a true year, differing by 0.000304 days per year. Meaning that, roughly, every 3030 years, the Gregorian calendar will have drifted from the true year by 1 day. However, compared to the Julian calendar's error of 1 day for every 128 years, it is a vast

improvement. John Herschel, in the 19th century, proposed a further modification, by implementing a rule where century years that are multiples of 4000 would NOT be leap years, creating a year of 365.24225 days in length. This has been supported and proposed at various times since, but has not been officially adopted.

Whether it is a paper calendar hanging on a wall, or an electronic version on your phone and computer, everyone takes the calendar for granted. Making plans for a future event, such as a doctor's appointment, a birthday, or StarFest, we jot it into our calendar and know when that event will occur. However, we rarely consider what was involved in creating the calendar we use today. So take a moment to thank Lilius and Pope Gregory XIII for the useful tool we reference almost daily.

References:

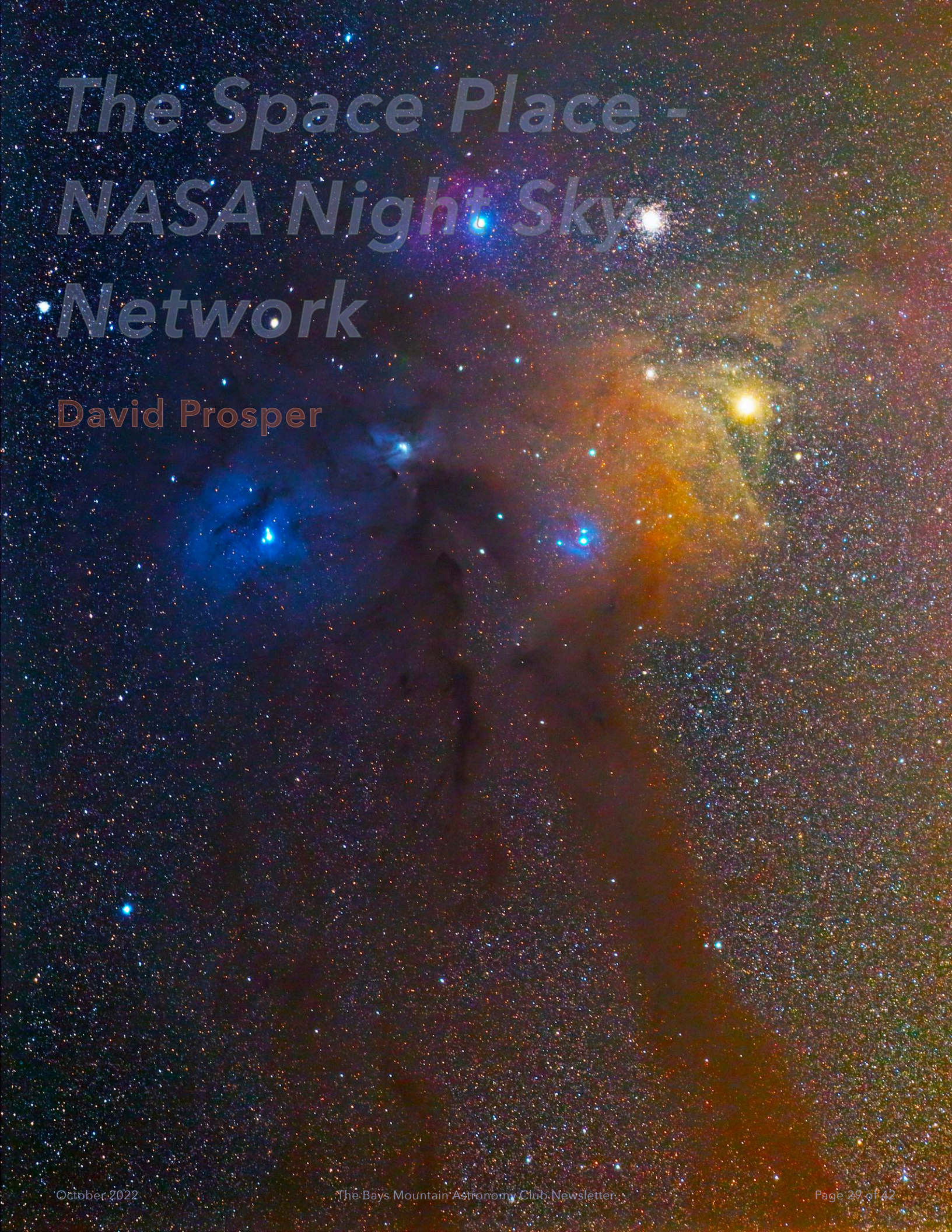
Gregorian Calendar - Wikipedia

Gregorian Calendar Reform: Why Are Some Dates Missing? by Konstantin Bikos and Aparna Kher

Egyptian Calendar - Wikipedia

The Space Place - NASA Night Sky Network

David Prosper



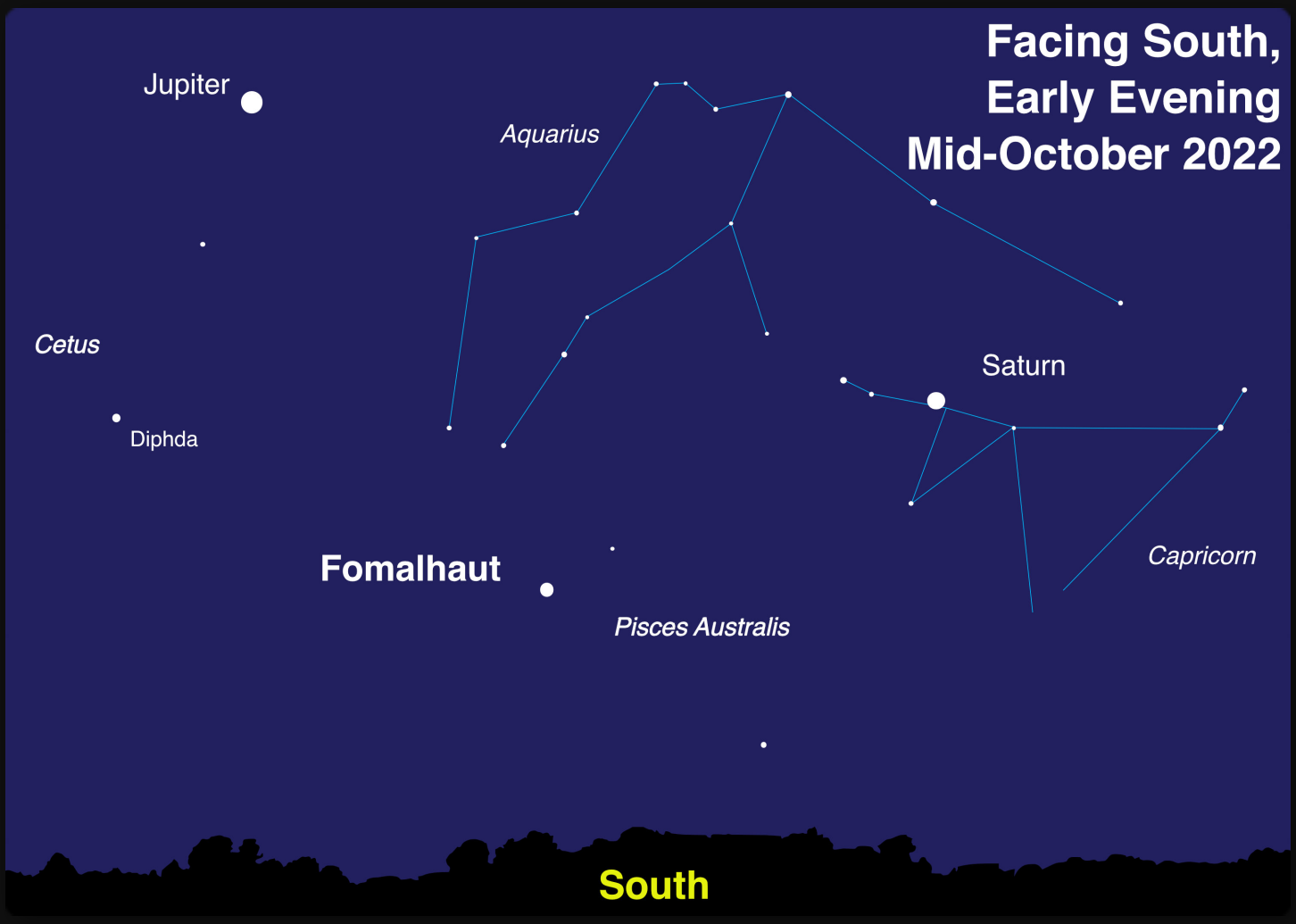
Fomalhaut: Not So Lonely After All

Fall evenings bring a prominent visitor to southern skies for Northern Hemisphere observers: the bright star Fomalhaut! Sometimes called “The Autumn Star,” Fomalhaut appears unusually distant from other bright stars in its section of sky, leading to its other nickname: “The Loneliest Star.” Since this star appears so low and lonely over the horizon for many observers, is so bright, and often wildly twinkles from atmospheric turbulence, Fomalhaut’s brief but bright seasonal appearance often inspires a few startled UFO reports. While technically not of this world – Fomalhaut is about 25 light years distant from our Earth – it has been extensively studied and is a fascinating, and very identified, stellar object.

Fomalhaut may appear solitary, but it does in fact have company. Fomalhaut’s entourage includes two stellar companions, both of which keep their distance but are still gravitationally bound. Fomalhaut B (aka TW Piscis Austrini, not to be confused with former planetary candidate Fomalhaut b*),

is an orange dwarf star almost a light year distant from its parent star (Fomalhaut A), and Fomalhaut C (aka LP 876-10), a red dwarf star located a little over three light years from Fomalhaut A! Surprisingly far from its parent star – even from our view on Earth, Fomalhaut C lies in the constellation Aquarius, while Fomalhaut A and B lie in Piscis Australis, another constellation! – studies of Fomalhaut C confirm it as the third stellar member of the Fomalhaut system, its immense distance still within Fomalhaut A's gravitational influence. So, while not truly "lonely," Fomalhaut A's companions do keep their distance.

Sky Map: Find Fomalhaut



Sky map of the southern facing sky for mid-latitude Northern Hemisphere observers. With Fomalhaut lying so low for many observers, its fellow member stars in the constellation Piscis Australis won't be easily visible for many without aid due to a combination of light pollution and atmospheric extinction (thick air dimming the light from the stars). Fomalhaut is by far the brightest star in its constellation, and is one of the brightest stars in the night sky. While the dim constellations of Aquarius and Capricorn may also not be visible to many without aid, they are outlined here. While known as the "Loneliest Star," you can see that Fomalhaut has two relatively close and bright visitors this year: Jupiter and Saturn! Illustration created with assistance from Stellarium.

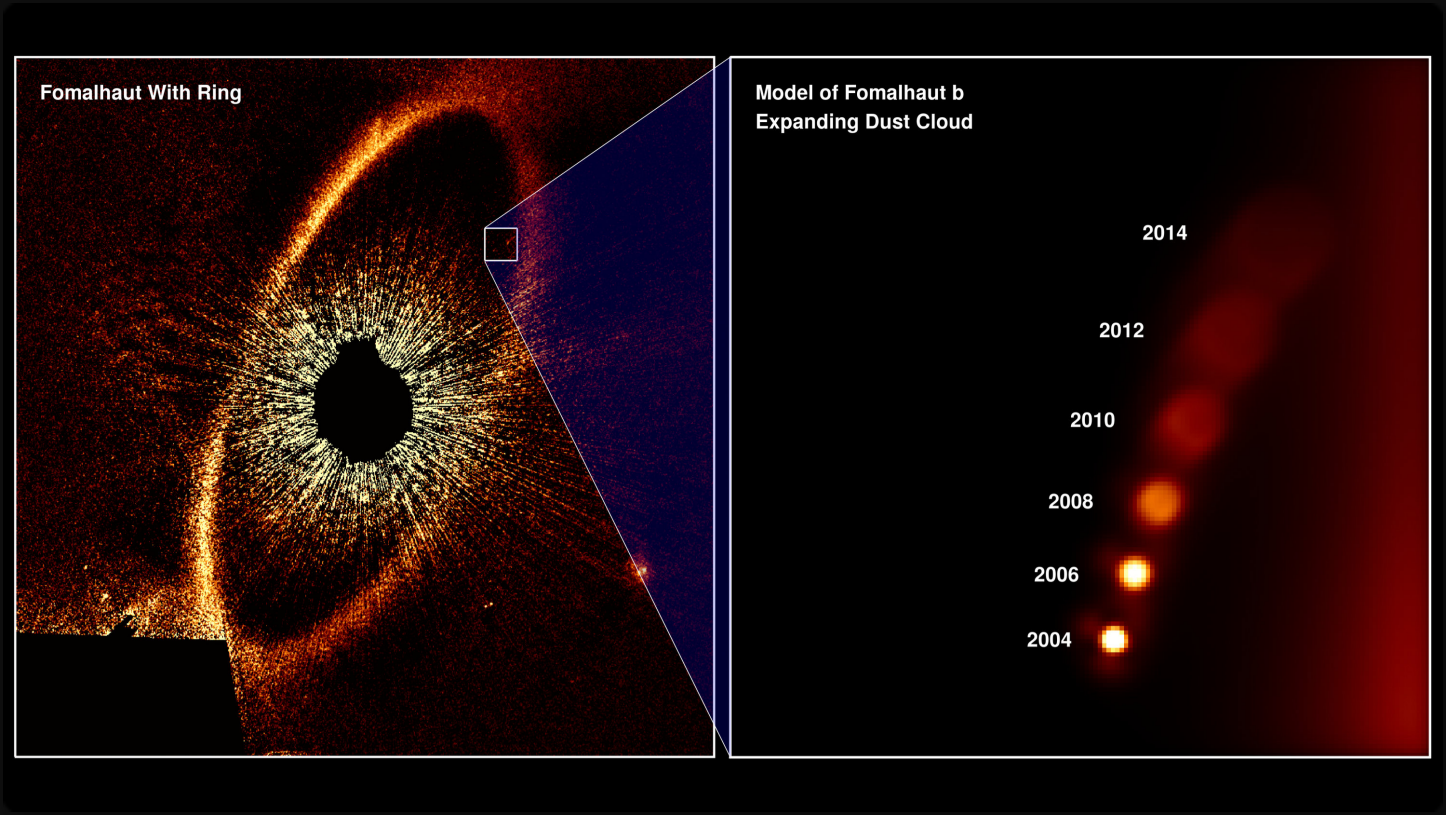
Fomalhaut's most famous feature is a massive and complex disk of debris spanning many billions of miles in diameter. This disk was first detected by NASA's IRAS space telescope in the 1980s and first imaged in visible light by Hubble in 2004. Studies by additional advanced telescopes, based both on Earth's surface and in space, show the debris around Fomalhaut to be differentiated into several "rings" or "belts" of different sizes and types of materials. Complicating matters further, the disk is not centered on the star itself, but on a point approximately 1.4 billion miles away, or half a billion miles further from Fomalhaut than Saturn is from our own Sun! In the mid-2000s a candidate planetary body was imaged by Hubble and named Fomalhaut b. However, Fomalhaut b was observed to slowly fade over multiple years of observations, and its trajectory appeared to take it out of the system, which is curious behavior for a planet. Scientists now suspect that Hubble observed the shattered debris of a recent violent collision between two 125-mile wide bodies, their impact driving the remains of the now decidedly non-planetary Fomalhaut b out of the system! Interestingly

enough, Fomalhaut A isn't the only star in its system to host a dusty disk; Fomalhaut C also hosts a disk, detected by the Herschel Space Observatory in 2013. Despite their distance, the two stars may be exchanging material between their disks - including comets! Their co-mingling may help to explain the elliptical nature of both of the stars' debris disks. The odd one out, Fomalhaut B does not possess a debris disk of its own, but does host at least one suspected planet.

While Hubble imaged the infamous "imposter planet" of Fomalhaut b, very few planets have been directly imaged by powerful telescopes, but NASA's James Webb Space Telescope will soon change that. In fact, Webb will be imaging Fomalhaut and its famous disk in the near future, and its tremendous power is sure to tease out more amazing discoveries from its dusty grains. You can learn about the latest discoveries from Webb and NASA's other amazing missions **here**.

*Astronomers use capital letters to label companion stars, while lowercase letters are used to label planets.

Fomalhaut with Ring



The magnificent and complex dust disk of the Fomalhaut system (left) with the path and dissolution of former planetary candidate Fomalhaut b displayed in detail (right). ***Image credits****: NASA, ESA, and A. Gáspár and G. Rieke (University of Arizona).*

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, October 7, 2022 - 7p - Planetarium Theater. We'll see "Sunstruck" and enjoy another trivia question to earn bragging rights. Please, no food nor drink in the theater.
- Friday, December 2, 2022 - 7p - Planetarium Theater. Nate Wentzel, BMACer and Assistant Professor of Physics at Milligan University, will present.
- 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.

SunWatch:

- Every clear Saturday & Sunday - 3p-3:30p - March-October - At 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.

StarWatch:

- October 1 & 8, 2022 - 7:30p
- October 15, 22, 29 & November 5, 2022 - 7p
- November 12, 19 & 26, 2022 - 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.

Special Events:

- **StarFest 2022 - November 4, 5 & 6, 2022**
  - Our 37th 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. 14, 2022 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 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 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.

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 Association 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, *through the gift shop*, by mail, over the phone or in person.

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.**