# The Bays Mountain Astronomy Club Newsletter

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# **Cosmic Reflections**

# William Troxel - BMAC Chair



reetings fellow BMACers!

Adam here again. Last month's meeting was a lot of fun! Those who attended each shared something about their favorite celestial object or constellation. I think we all learned something!

As you can see in the calendar and the BMAC notes, there are a number of public outreach opportunities coming up. If you have gone through the City's volunteer program, then please consider being a part of these.

November brings our annual StarFest event. Registrations have been coming in for this unique opportunity. Registration is open up through Oct. 13. We cannot accept registrations after that as we need to finalize all orders.

The next club meeting is Oct. 6. BMACer Robin Byrne, Associate Professor of Astronomy and Physics at NSCC, will speak about the life and work of Vera Rubin. See you then!

# **BMAC** Notes

## Annular Eclipse 2023 Notes



will direct your attention to the Park's <u>website</u> regarding observing opportunities for the public. It covers:

- About the eclipse
- Viewing at the Kingsport Library or the ETSU Campus
- Ways to view
- The gift shop has solar glasses for sale at \$2 each!

More information regarding viewing will be in a message to members. Make sure you read Greg's great article about the eclipse!



Upcoming Solar Eclipses October 14, 2023 & April 8, 2024

## StarFest 2023 Registration Open



earn all about this year's annual StarFest event <u>here</u>. This year's theme is: "Sky Tales - Telling the Stories of the Sky Through the World's Cultures." We've got

a great lineup of speakers, food and more!



This year's great T-shirt art!

# Sky News from the Astronomical League



he Astronomical League has a plethora of educational content to help you learn and enjoy the night sky more. The following inserts are just a tiny

bit of what they provide.



- **1** Extend a line north from the two stars at the tip of the Big Dipper's bowl. It passes by Polaris, the North Star.
- 2 Follow the arc of the Dipper's handle. It intersects Arcturus, the brightest star in the early October evening sky.
- **3** To the northeast of Arcturus shines another star of the same brightness, Vega. Draw a line from Arcturus to Vega. It first meets "The Northern Crown," then the "Keystone of Hercules." A dark sky is needed to see these two dim stellar configurations.
- 4 Nearly overhead lie the summer triangle stars of Vega, Altair, and Deneb.
- 5 High in the east are the four moderately bright stars of the Great Square. Its two southern stars point west to Altair. Its two western stars point south to Fomalhaut.

#### **Binocular Highlights**

A: On the western side of the Keystone glows the Great Hercules Cluster, a ball of 500,000 stars. B: 40% of the way between Altair and Vega, twinkles the "Coathanger," a group of stars outlining a coathanger. C: Sweep along the Milky Way for an astounding number of fuzzy star clusters and nebulae amid many faint glows and dark bays, including the Great Rift. D: The three westernmost stars of Cassiopeia's "W" point south to M31, the Andromeda Galaxy, a "fuzzy" oval. E: Between the "W" of Cassiopeia and Perseus lies the Double Cluster.



Astronomical League www.astroleague.org/outreach; duplication is allowed and encouraged for all free distribution.

### Navegando por el cielo nocturno de Octubre



#### Navegando por el cielo nocturno: simplemente comience con lo que sabe o con lo que puede encontrar fácilmente.

- Haz una línea hacia el norte desde las dos estrellas en la punta de la Osa Mayor. Pasa por Polaris, la estrella polar.
- 2 Siga el arco del mango de la Osa Mayor. Se cruza con Arturo, la estrella más brillante en el cielo de la noche de octubre.
- 3 Dibuja una línea desde Arturo a Vega. Un tercio del camino se encuentra "La Corona del Norte". Dos tercios de esa distancia llevan a la "piedra angular de Hércules." Se necesita un cielo oscuro para ver estas dos configuraciones estelares tenues.
- 4 Las estrellas del Triángulo de verano, Vega, Altair y Deneb, brillan en el Cenit.
- 5 En lo alto del Este se encuentran las cuatro estrellas brillantes de la Gran Cuadro de Pegaso. (5a) Sus dos estrellas occidentales apuntan al Sur hacia Fomalhaut. (5b) Sus dos estrellas meridionales apuntan al Oeste hacia Altair.

#### Puntos destacados con binoculares





#### **ASTRONOMICAL LEAGUE Double Star Activity**





#### **Otros Soles: Gamma Andromedae** Cómo encontrar Gamma Andromedae en una tarde de Octubre

Mira al noreste. Encuentra el Gran Cuadrado y la curva de estrellas que se extiende hacia la parte inferior izquierda. Gamma es la tercera estrella de la cadena y es tan brillante como las estrellas principales de la Osa

Mayor. Desde la "W" de Cassiopeia, Gamma se encuentra en la parte inferior derecha.

Gamma Andromedae A-B separación: 9.7 sec A magnitud: 2.3 B magnitud: 5.0 PA: 63° A & B color:

naranja, azul

Ampliación sugerida: >40x, Apertura sugerida: >50 mm 63° Ε 1º campo de visión

### Texas Star Party Solar Eclipse Event



SP is hosting a total solar eclipse and star party event to view the 2024 total solar eclipse. Eclipse viewing will be at Latham Springs Camp and Retreat Center, Aquilla, Texas. Latham Springs is located just west of the centerline with the duration of totality being 4 minutes and 23.5 seconds.

TSP's event venue location is 25 miles southwest of Hillsboro, Texas (ranked the 7th best location to view the solar eclipse by Astronomy magazine).

Booking an event pass will give participants five days and four nights (4/5-4/9/2024) of accommodations and meals (RV and Campers - meals are not included but meal plans are available for purchase) to prepare for and view the solar eclipse, as well as enjoy a casual star party deep in the heart of Texas!

TSP has numerous volunteer opportunities available, and participating volunteers will have added benefits provided by TSP that the non-volunteering attendee will not receive with their "Event Pass" purchase.

For additional information regarding TSP's eclipse and star party offering and volunteer opportunities, please click <u>here</u>.

# Stellar Observations

Greg Penner

# All Eyes (Properly Filtered) Look Sunward!

he Sun takes center stage on October 14th for the "Great Annular Eclipse of 2023." If you are able to position yourself along a line from south Texas, through the New Mexico four corners region, southern Utah, northern Nevada and on to the Oregon coast, you will get a view of the "ring of fire" solar eclipse. Most places across the U.S. will get to see a significant partial eclipse, with our East Tennessee region receiving a 43% eclipse. This will also serve as a reminder to make plans now for the Total Solar Eclipse coming to the U.S. in about six months on April 8, 2024. It seems unlikely that there will be a lot of people making travel plans across the U.S. to see the annular eclipse. For the most part, people will view whatever level of partial eclipse is occurring in their home location. However, the 2024 total eclipse will likely see multitudes of travelers on the road over the weekend before the Monday, April 8th big day. So it makes

sense to start planning now if you plan to get inside the path of totality.



Annular/Partial Solar Eclipse Map for October 2023 - by Michael Zeiler



Total Solar Eclipse <u>Map</u> for April 2024 - by Michael Zeiler

For the 2024 Total Eclipse, the likely best place to view totality will be in Texas. April in the Lone Star state typically sees nice weather, and the eclipse occurs in the early afternoon before possible afternoon thunderstorms form. Additionally, Texas has an excellent network of highways and rural "farm to market" roads that can be very useful if last minute weather problems require a rapid relocation to find clear skies. If a trip to Texas is not practical, the shortest distance to the path of totality for people in East Tennessee would be about a six hour drive to southern Indiana or along the Indiana/Ohio border region. Here is a link to an interactive map where you can select locations inside the eclipse path to determine duration of eclipse at that location. At the time I am writing this article in mid-September, I checked room availability at a couple hotels in southern Indiana and found no vacancies for April 7/8. So now is the time to make plans if you want to view totality in 2024!

Since the upcoming solar eclipses will be directing so much attention toward our nearest star over the next six months, what are some observing projects that can be undertaken related to the Sun? For the upcoming October 14th annular eclipse (partial in East Tennessee), a simple project is to observe the eclipse with proper eclipse glasses or a projection method, and note the time of first contact (when the Moon first touches the Sun), maximum eclipse, and the point of final contact (when the Moon ceases to cover any part of the Sun). I plan to observe the event with a 90mm refractor using a tightly fitting glass solar filter over the objective (front lens) of the telescope. The Sun is currently reaching toward a peak in its 11 year cycle of magnetic activity. According to a recent article in the journal "Science," the Sun is reaching levels not seen in 20 years and solar maximum may arrive within the next year. Sunspot activity should really be picking up, so observing the Sun through a filtered telescope could reveal some sights like the accompanying image from a partial eclipse in 2014.



October 2014 Partial Solar Eclipse with Sunspots - by Greg Penner using a Nikon D40 camera, Takahashi 90mm refractor fitted with a Thousand Oaks Type 2+ solar filter.



Greg Penner's telescope with solar filter.

Another fun project related to the Sun is to make an analemma. An analemma is the "figure 8" shape that is created by the shadow of an object projected onto a flat surface by the Sun over the course of an entire year. The analemma shape is a result of the changing altitude of the Sun in our sky as the tilted Earth revolves around the Sun over a year. If you place a pole in the ground next to flat pavement, and at the same time of day (local solar noon is best) at regular intervals throughout the year (e.g. - once per week) mark on the pavement the location of the shadow of the top of the pole. After a year there will be a figure eight shape on the pavement. <u>Here</u> is a great source for more information about the analemma. This is a project I have always wanted to try but haven't yet. Maybe this will be the year!



Analemma shadow diagram - by R.L. McNish, Royal Astronomical Society of Canada.

If you are up for some real solar observation challenges, the Astronomical League website has some observing programs for analemmas, solar eclipses and Sunspots. Each of these programs has detailed descriptions for what is required to complete the programs and receive certificates. Hopefully, during this solar eclipse "season," you can take some time to get more familiar with the big star at the center of our Solar System!

[Ed.: Instead of writing a separate article, I felt it was important to keep the solar information together in one place. Here are a number of personal notes about the Sun to add to Greg's excellent article:

Regarding the 43% eclipse for the Tri-Cities, this refers to the "obscuration." This is a measure of the amount of surface area of the Sun that is covered by the Moon. This is a more understandable measure for us and the general public instead of the 54% "magnitude" of the eclipse for the Tri-Cities. That is a measure of the diameter of the Sun that is covered. Eclipse glasses? We've got them for sale at the Park's gift shop. Only \$2 each!

A note about Greg's comment about a tight-fitting filter on his telescope. He is 100% correct, especially if anyone else may be in contact with your telescope or if there is a wind. I have seen filters with shallow rims and loose fit just blow off the end of a scope. We've modified our solar filters for the Park's scopes by drilling three holes in the side of the filter cell and drilling and tapping into the dew shield. Then we use small thumbscrews to fully lock the filter in place. The filter cannot be removed unless you unscrew the three thumbscrews. If you don't want to go that far, I'd suggest tape around the filter cell and dew shield to keep it secure on your scope. Also watch for anyone wanting to poke their finger through the filter.

And don't forget about those finder scopes or Telrads! Finder scopes are tiny telescopes and should be covered or removed. Telrads will have their bullseye reticle melted.

I'll put in my 2¢ here regarding filter material. There are a lot of options out there. My personal favorite is AstroSolar 5.0 Safety Film from Baader Planetarium. This is a German company and you can get the material in the states through Astro-Physics. I've made a bunch of solar filter cells with this material. The 5.0 refers to the neutral density level of the film. It properly reduces the brightness of the Sun 100,000 times for safe viewing through telescopes, binoculars and unaided eye. You may see another version of this material for sale with a lower density level that is for photography <u>only</u>. I would stick with density 5.0. The material looks like mylar, but it is very different. The filtering is sandwiched between two layers of optically clear film. Because it is neutral density, it doesn't color the image like other filters. The Sun's peak wavelength is in the yellow range of the spectrum, but the Sun is still a blackbody with emission at all wavelengths. The Sun's Photosphere is actually white and that is what you'll see. With the film being optically clear, you'll see a much higher contrast image than other filters. Depending on the telescope and seeing conditions, you will see more than

you're used to. With good optics and good seeing, viewing granulation is common. Granulation refers to the Moon-sized heat cells that cover the Photosphere. High contrast telescopes and good seeing will also reveal very tiny dark spots where the heat cells converge. These cooler convergences can be described as "peppering." Another Photosphere feature to look for is faculae. These are hotter regions, and will look brighter. They are easiest to see along the limb of the Sun.

Getting back to the filter material, upon copying the weblink for this filter material, I see that it is not sold out. I remember that the Park purchased one of the last solar filter cells about six weeks before the 2017 eclipse. Solar glasses ran out about a month before the eclipse. If you are going to get this material or another filter, don't wait. The popularity of the 2024 eclipse will guarantee that all filter sources will run out well in advance of the eclipse. It will also take a few hours to properly make a cell to hold the film, so don't procrastinate and expect to make a cell at the last minute.]

# The Queen Speaks

### Robin Byrne

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# Book Review: We Have No Idea: A Guide to the Unknown Universe



hen I came across a book titled "We Have No Idea: A Guide to the Unknown Universe," I knew I had to read it. Written by Daniel Whiteson, a particle physicist from the University of California at Irvine, and illustrated by Jorge Cham, the creator of PHD Comics, this book is filled with great information, while managing to be entertaining at the same time.

The entire book is devoted to topics that are still being studied, are not yet fully understood, and are at the heart of some of the most interesting questions currently being asked. Among the questions discussed are: what is dark matter, what is dark energy, what is mass, why does gravity behave differently from the other forces, what is space, what is time, how many dimensions are there, where did all the antimatter go, how big is the Universe, and many more. The short answer to all of the questions asked in the book is, "We have no idea."



The cover to "We Have No Idea: A Guide to the Unknown Universe" Of course, if that answer were entirely true, there wouldn't be much left to write. In each chapter, we learn about what is currently known, what we think we know, or, at least, what we have observed. Then we are taken on a journey of how we might one day be able to figure out the answer, and what some possible answers could be.

The writing style is very readable and fun. Humor is used quite a bit, causing the reader to grin while simultaneously trying to wrap their brain around some complex concepts. The illustrations by Cham add another level of humor, while also helping to break the chapters into manageable parts and providing a chance to process what was just read.

As I read this book, it occurred to me that it would make a great source for a lecture series all about the things we don't understand. TED Talk anyone?

Whether you are a true science nerd, or just science curious, you will find something to enjoy and laugh about in "We Have No Idea: A Guide to the Unknown Universe." I highly recommend it.

### References:

We Have No Idea: A Guide to the Unknown Universe by Jorge Cham and Daniel Whiteson; Riverhead Books, 2017.

# The Space Place MASA Nigh Network

Vivian White

# From Galileo to Clipper, Exploring Jupiter's Moons



We, too, are made of wonders, of great and ordinary loves, of small invisible worlds, of a need to call out through the dark.

From In Praise of Mystery: A Poem for Europa by Ada Limon



#### Europa: NASA/JPL-Caltech/SETI Institute

The Bays Mountain Astronomy Club Newsletter

As autumn begins, if you're up late, you may notice a bright point of light rising in the east. Look a bit closer, with a pair of binoculars, and you'll notice it's not a star at all. While stars look point-like no matter how big your backyard telescope [Ed.: or magnification], this light appears as a disk under closer examination. Even more curious, you will likely see a line of smaller dots on one or both sides. Congratulations! You've rediscovered the king of the planets - majestic Jupiter - and its four largest moons.

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Ori. \* \* 🔿 \* \* Occ.

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Ori.

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Galileo's drawings of Jupiter and its Medicean Stars from Sidereus Nuncius. Image courtesy of the History of Science Collections, <u>University of Oklahoma Libraries</u>

Galileo famously chronicled the four moving dots near Jupiter and surmised that they were orbiting the distant world. While Jupiter has well over 80 discovered moons as of September 2023, these brightest four are called the "Galilean Moons" - Io, Europa, Ganymede, and Callisto. (Great mnemonics exist to remember these in order of distance from Jupiter, such as "I Eat Green Caterpillars.") You can follow these like Galileo did, using stargazing apps or the handy image below. A favorite beginning observing challenge is to track the movement of the Galilean Moons over the course of many nights. Even within a few hours, you will notice them moving in relation to Jupiter, just as Galileo did.



The position of the Galilean Moons of Jupiter in September & October 2023.

Fast forward 414 years, and NASA will be sending a robotic mission to investigate the surface of one of these distant worlds. The <u>Europa Clipper Mission</u> is launching to the cold, icy moon in 2024, to begin orbiting in 2030. With its salty oceans covered by ice, Europa was chosen as an excellent location to continue the search for life outside of Earth. Clipper will be the largest spacecraft ever sent to another planet, designed to withstand Jupiter's punishing radiation. Once it arrives at Jupiter in 2030, NASA plans to do about 50 flybys of Europa, mapping almost the entire surface of this watery world.

What was once only dreamed of in the small telescope of Galileo, or in great works of fiction, NASA is turning our wildest imagination into reality. One of the celebrated quotes from the classic novel 2010: Odyssey Two warns, "All these worlds are yours, except Europa. Attempt no landing there." Science fiction fans can feel relieved knowing that writer Arthur C. Clarke gave his blessing for the Europa Clipper mission. Join the Europa Message in a Bottle Campaign to send your name with the spacecraft, hear the rest of the poem by the US Poet Laureate, and learn more about the wonders of space travel with the <u>Clipper Mission</u>

<u>Watch</u> a wonderful Clipper webinar with Dr. Cynthia Phillips, planetary geologist with the mission.

### This article is distributed by NASA Night Sky Network

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

# BMAC Calendar & More

# Calendar:



### MAC Meetings:

- Friday, October 6, 2023 7p Planetarium BMACer Robin Byrne will present "Vera Rubin: The Woman and the Observatory."
- Friday, December 1, 2023 7p Topic TBA.
- Friday, February 2, 2024 7p Topic TBA.
- Friday, March 1, 2024 7p Topic TBA.
- Friday, April 12, 2024 7p Topic TBA.
- Friday, May 3, 2024 7p Topic TBA.
- Friday, June 7, 2024 7p Topic TBA.
- Friday, August 2, 2024 7p Topic TBA.



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



#### tarWatch:

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





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

- Our 38th annual astronomy convention / star gathering for the Southeast United States. Three days of astronomy fun, 5 meals, 3 keynote speakers, unique T-shirt and more!
- Pre-registration by Oct. 13, 2023 with full payment is mandatory for attendance. Sorry, no walk-ins nor "visits."
- Link for all the StarFest info including registration and hotel reservation links.

#### • BMAC Dinner - January 2024 - Day & Time TBD

• Look for an e-mail with the latest information.

### • Astronomy Day - May 18, 2024 - 1p-4p; 8:30p-9:30p

• Come help share the fun of astronomy with the public. There will be tables with different themed topics plus solar and night viewing.

### • Annual Club Picnic - July 2024

 Date and 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



Greg Penner



Robin Byrne



Adam Thanz

illiam 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.

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

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



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

### **Connection:**

**B** ays Mountain Astronomy Club:

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



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

# Chapter Background Image Credits:

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