WESTMINSTER ASTRONOMICAL SOCIETY, INC. (WASI)

Membership News

Volume 1 – Number 5 Fall 2023

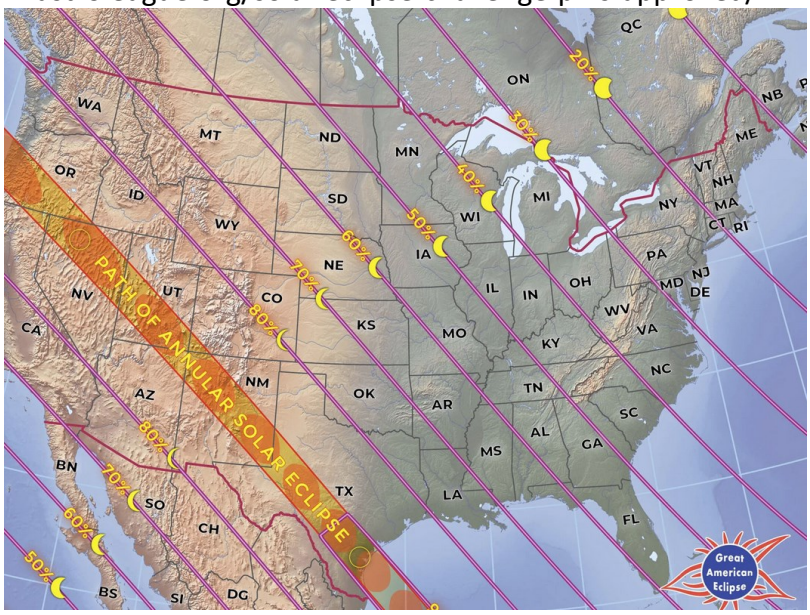
Message from our Society's President, Cindy Ward

Autumn is officially here, a time of year many of us relish for the abundance of great objects to view, while temperatures remain reasonably temperate. Spectacular Orion will be making a reappearance in the early evening, along with its neighbors Gemini and Taurus. If you're hosting outreach sessions you'll have plenty of targets to elicit "wows" from viewers. M42, the Great Orion Nebula, is perhaps one of the most spectacular objects and is accessible even with binoculars; a small telescope reveals much of its structure.

Do check out our monthly meetings and other activities at https://www.westminsterastro.org/. You can join us in person on the second Wednesday of each month at Bear Branch, or tune in electronically via Zoom.

Eclipse!

The annular solar eclipse is October 14. While it's only 30% here in Maryland you may still catch a glimpse. Be sure to use a proper solar filter, whether over your bare eyes, binoculars, or telescope. And the Astronomical League is offering a certificate for viewing the event— more info here: https://www.astroleague.org/solar-eclipse-challenge-pins-approved/



Book Review—Astronomy

Many of us enjoy learning as much as possible about this field. We're fortunate that there are a wealth of books available. One that presents itself as a textbook is quite accessible to the interested amateur. With the succinct title "Astronomy" this is a massive 1200 page tome that you can get as a free PDF here: https://openstax.org/details/books/astronomy .

(For those who prefer printed books, there's a link on that site to buy one for $50).

It was written by an army of authors, Andrew Fraknoi, David Morrison, and Sidney C. Wolff being the primary contributors.

Pretty much every aspect of this field is covered, with the exception of amateur observing. You'll learn about the planets and their formation, comets and asteroids, spectroscopy, and stars. Lots about stars, their birth, lifecycle and death. Galaxies and strange creatures like black holes and neutron stars are well covered, as is the Big Bang.

The book is aimed at people with no background in astronomy, so is sometimes rather elementary. But that morphs into detailed explanations of celestial events. There's enough information to make the reader, if not a pro, at least a highly-educated amateur. There is a little math, not enough for serious devotees, but the math-adverse can skip over those sections without missing much.

Direct and to the point: the book's cover has no frills but says it all.

As a college textbook each chapter ends with a lot of fluff you can skip over, like discussion questions and ideas for collaborative learning.

If there's any nits to pick, the printed version's lack of color pictures and tiny captions are frustrating.

It's an easy read (though long) that never bores. Highly recommended.

Science Corner— Quasars

Quasars are extremely-bright objects in the distant universe that have puzzled astronomers since they were first detected some 60 years ago. The general thinking is that these beasts are enormous black holes devouring a central region of a galaxy. One can shine as brightly as a trillion stars, yet they occupy a space about the size of our solar system.

A new paper (https://doi.org/10.1093/mnras/stad455) shows that quasars are formed when two galaxies collide. Gravitational forces push enormous amounts of gas toward supermassive black holes at the center of the galaxy system that results from the collision. Before the gas is consumed by the hungry black hole, a huge amount of energy is released, forming the quasar.

Our own Milky Way will eventually collide with Andromeda, and may form a quasar. But don't add this to your worry list as it's not expected to happen for about 5 billion years.

Though the light from some quasars we see today left their progenitors ten or 12 billion years ago, amazingly even with amateur equipment astrophotographers can capture those aged photons. Give it a try! You can find a list of them in the Million Quasars catalog here: http://quasars.org/

Why Hotter Stars Are Brighter

The Spring issue of this newsletter said the Wolf-Rayet star WR124 is 562,000 times brighter than our sun. And it's hot, too, at 44,700 degrees (compared to our sun's 5,700). A WASI member asked how it could be just eight times hotter than Sol but so much brighter.

First, "degrees" in astronomy always means degrees kelvin (K). Kelvin degrees are the same size as those in centigrade, but start at absolute zero. So 0K is –273C or –459 Fahrenheit. The temperature where water freezes is 273K, or 0C, or 32F.

The Stefan-Boltzmann Law states that the luminosity of a star (technically, a black-body radiator) is proportional to the temperature (in K) raised to the fourth power. Increase the temperature a little, and the star gets much, much brighter. At 8 times the sun's temperature, WR124's luminosity (in watts per square meter) is 8^4, or 4096 times as bright.

But it's bigger, too—11.93 times the radius of the sun. A bigger star emits more light. Surface area is proportional to the square of the radius; 11.93 squared, times the 4096 brightness per square meter factor, gives us a number pretty close to the 562,000.

However, most of that brightness is invisible to our eyes, as it is in the ultraviolet. Wein's Displacement Law tells us that the peak wavelength for a star (again, technically a black-body radiator) is about 2,900,000/T, where T is the temperature in kelvin. WR124 peaks at 65 nanometers, a wavelength about ten times shorter than what our eyes can see. And even if we could see that, the atmosphere blocks those wavelengths. Another reason for space-based observatories.

The Stupid Award

Ray Sterner, a former WASI member, thinks he deserves a medal for being the stupidest person in the world. Alas, in astronomy, we've all earned that! Here's his story:

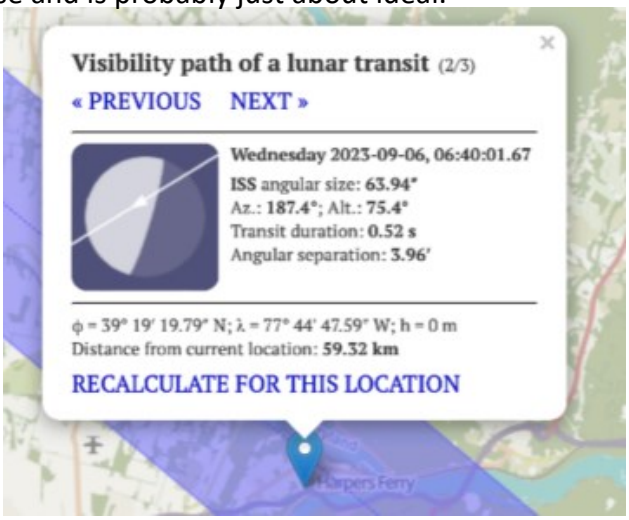
Today, 2023 Sep 06, I earned the stupidest person in the world award, at least for the day. I had been planning for this day for days (I don't mean winning the award). It was triggered by an email from Jon Gwinn, he sent a picture of the International Space Station (ISS) crossing the crescent moon, a really good photo, clearly through a telescope and clearly in at least a somewhat blue sky. There was no extra info with the photo, but it was very good. That reminded me that I had a link to a website to search for ISS crossings of the moon or sun, https://transit-finder.com. I had used this site before and was able to catch a video of the ISS crossing the sun some years ago. I don't remember the details, some time in October 2020, but the sun was in the afternoon sky, well after noon, and we went to a park, maybe west of Frederick to try to catch it on video. I did catch it but didn't see it at first when checking the video. The ISS was pretty tiny and quickly crossed the sun, almost unnoticeably if not looking carefully, and there were thin moving clouds to distract. I extracted a snippet from the video and slowed it down, that was interesting. The camera was my iPhone 7 with an adapter to look through the eyepiece tube of my Orion Short Tube 80 mm refractor with a solar filter, 400 mm FL. It was hard to do, there is no manual focus on the phone, not in the built in app. Focus could be locked but it was very easy to lose it. I tried again another time with a better camera, a Canon T3i with a T-adapter looking through the 80 mm telescope, but couldn't get that camera to do video without its lens and missed that transit.

So triggered by Jon's email I searched for some transits within 80 km of home (the default) and found a promising one that crossed Harpers Ferry. I zoomed in and found a possible observing site, the parking lot of the Quality Inn. The event was a lunar transit, at 6:40 AM so I thought we should stay there overnight. I watched the forecast for a few days, it looked perfect, really clear. The the best location is the transit center line, where it appears to cross the center of the moon, and that line passed just to the west of the parking lot, close enough to be about as good as possible. There was a solar flare a day or so before the event and they effect satellites by heating the atmosphere and puffing it up, increasing drag. Drag on satellites actually makes them go faster because they drop into a lower, faster orbit. When I checked after the orbital elements had been updated, the transit from that location was earlier as expected, by about 2 seconds. This shifted the center line from just to the west of the parking lot to a bit farther to the east (because the earth rotates toward the east under the almost fixed orbit in space and if the satellite is early the earth hasn't rotated as far so the ground track is east of where it would have been) but still very close. The whole event lasted 0.52 seconds (center line was 0.54 seconds), but this was for the full disk of the moon, but the phase was almost last quarter so I figured I had about 0.3 seconds of the ISS over the bright part of the moon. I checked the day before the event and the weather was still looking perfect so I made a reservation that afternoon (yesterday as I write this). I thought about going early and visiting Harpers Ferry but it was very hot so I didn't rush. We stopped for lunch and got to the motel a few hours after checkin time.

We had the ideal room, right at the end of the hall by an exit door on the first floor. I backed the car into the closest parking spot, not far outside the door. That evening I got the equipment set up in the room. I had been worried about the moon's altitude above the horizon, 75 degrees, and a few days earlier had checked if I could even do that. I could if I offset the camera on the gimbal so it was off balance without the knobs tightened. Even so I was sure it would be very awkward to get and keep the moon in the field. But this is the best case and for our area it has to be the moon, not the sun (which doesn't get that high in the sky around

here). When the ISS passes straight overhead it is closest so looks the biggest. Straight up would be very hard to handle with the tripod and gimbal that I have, the zenith is the pole for an altazimuth mount. But 75 degrees is a good compromise and is probably just about ideal.

[Here is a map] for this event, the marker is in the motel parking lot:



On the above map the most important value is the time (I knew that). The second most important is the ISS angular size, 63.94 arc seconds, this is big. About as big as it gets. This was the ideal event and I would calculate what fraction of the moon's size the ISS was if I wasn't so cranky right now. The weather was perfect. The location, almost right outside our motel door, was perfect. The one thing that was less than perfect was the time. Not because it was early, but because the sky was pretty bright at that time and the ISS would not be visible. I would not be able to watch it coming toward the moon but would be working blind, relying only on the clock, like flying a plane on instruments. But I had a good clock, the Emerald Sequoia app. When we were leaving the house I had jumped out of the car and ran back in the house to grab the iPad because I planned to use my phone as a shutter release for the camera and needed an extra screen for the clock. So we had everything that was needed and everything was going very well.

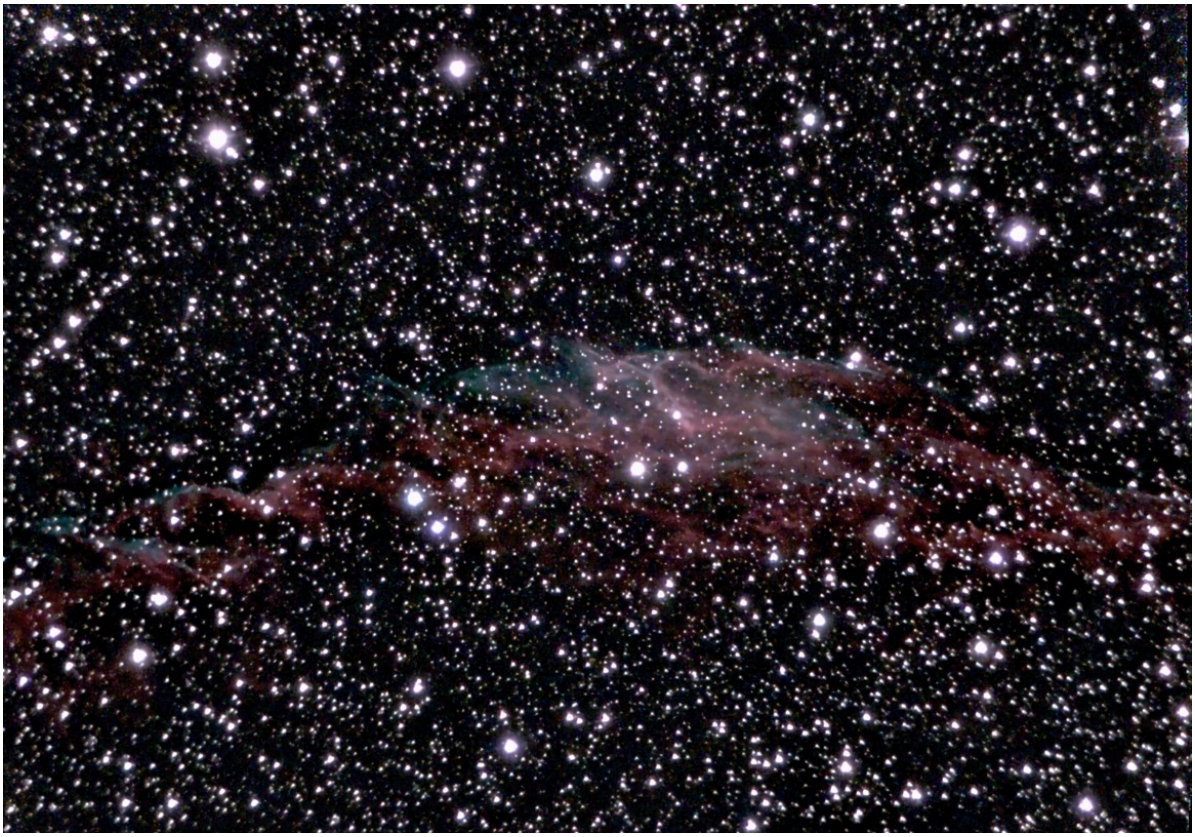
The next morning the alarm went off at 5:30 AM and I got dressed and stepped outside to see how it was. The moon was a waning gibbous, almost last quarter, high in the perfectly clear but starting to turn blue sky. I had originally planned to get out with the equipment by about 6:00 AM and practice, but I piddled around packing up stuff and finally the room clock said I had 10 minutes so I rushed the equipment out the door. I had no trouble at all getting the moon in view and zoomed in and checked the focus. I have focus peaking turned on and it showed the moon was in as good of focus as I've ever seen it so I didn't touch that. I dialed the manual exposure values to 1/8000 second. That was way faster then needed I think, but I still don't know what I need to avoid motion blur of the ISS (I should have worked that out ahead of time). I was using AutoISO. Should have set that manually. Then I got the iPad clock up, the app is good to a few milliseconds normally. I noticed I only had a couple minutes to go, I had been looking at the motel clock and it was slow. I tried to use the Sony remote shooting app but couldn't get it to connect. It always has trouble connecting but almost always does after a few tries. While trying to connect I saw I was out of time and had missed the event. ***I had missed the perfect event.*** Almost everything had gone right and I blew it. I could try to blame it on the motel clock, or the finicky Sony app, but no, it was just plain stupidity. I could have just held the shutter button for a few seconds (I wanted 5 before and 5 after (if we didn't see it)). At 1/8000 second camera shake would not have been an issue at all. I should have been out getting ready at 6:00 AM as planned. Or at least a lot earlier than I was. I could have tried some test shots and seen that the Auto-ISO was not the best. 1/2000 second would have been more than enough, even 1/1000 s.

So I won the world's dumbest person award. At least for today.

Astrophotos From Our Members

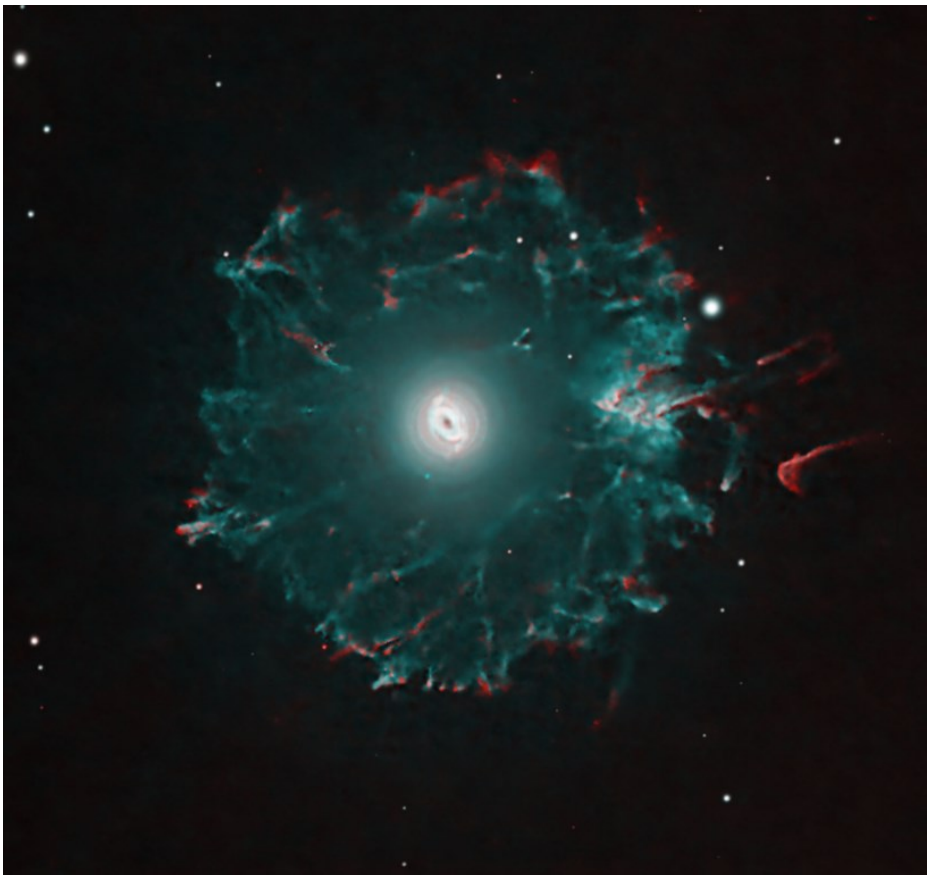
NGC7822, a young star forming complex in the constellation of Cepheus . By Jackie Donaldson

The Cygnus Wall . By Jackie Donaldson



The Eastern Veil, 49 minutes with eVscope2. By Laurie Ansorge

The Bubble Nebula. By Mikey Mangieri. 30 hours of integration time.



The Cat’s Eye Nebula. By Mikey Mangieri. 14 hours of integration time.

M51—The Whirlpool Galaxy. By Mikey Mangieri. 7 hours of integration time.

M31 using EAA with a RASA8. 145 fifteen-second exposures. By Michael Newman, who gave a talk about EAA (Electronically-Assisted Astronomy) at our September meeting.

I'm submitting this to remind us all that regular photography equipment can provide exceptional results. This was taken with an iPhone 14 without any special apps. It was taken at Garden of the Gods State Park in Colorado just outside Colorado Springs. It includes the Big Dipper and a Star-link Satellite train. By Joe Annelli

Skip Bird at the Cherry Springs Star Party.

Skip Bird at the Almost Heaven Star Party.

WASI FAQs

Newsletter - Please send pictures, articles, and ideas for the newsleter to jack@ganssle.com.

Facebook - We're active and sharing images on our Facebook page, found here: https://www.facebook.com/groups/wasi.contact/

Join/Renew membership link: https://www.westminsterastro.org/join-wasi/

If you've already entered your contact information (renewing), skip the "database" link: https://paypal.me/WAstroSInc

Dues are payable via PayPal on the link above, by check or cash (and through your bank's on-line bill payment). Membership Dues are $25/year for individuals or family, and youth under 18 is $5/year.

- On time payment means eligibility for the annual incentive .
- Keep access to the members-only groups.io pages/information
- Receive members-only access/notifications on Night Sky Network
- Keep/get discount rates for popular astronomy magazines
- Borrow from the WASI scope/literature library

Files and club member correspondence & wiki links are found here: https://westminsterastro.groups.io/g/main. Remember to set your communication preferences.

Outreach/event calendar is found on: https://nightsky.jpl.nasa.gov/index.cfm. Set your communication preferences here as well.

Changed address, email or phone? Please update your information and send a message to the webmaster and/or treasurer@westminsterastro.org.

We meet monthly on the 2nd Wednesday of the month:
Back to Basics from 7:15 PM − 7:30PM; General Meeting 7:30PM − 9:30PM
Bear Branch Nature Center Carroll County; 300 John Owings Rd.; Westminster, MD 21158
Website: https://www.westminsterastro.org/ (Zoom info for hybrid meetings)