

REFLECTIONS / REFRACTIONS

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University Lowbrow Astronomers Monthly Newsletter

August 2022, Vol 46, Issue 8

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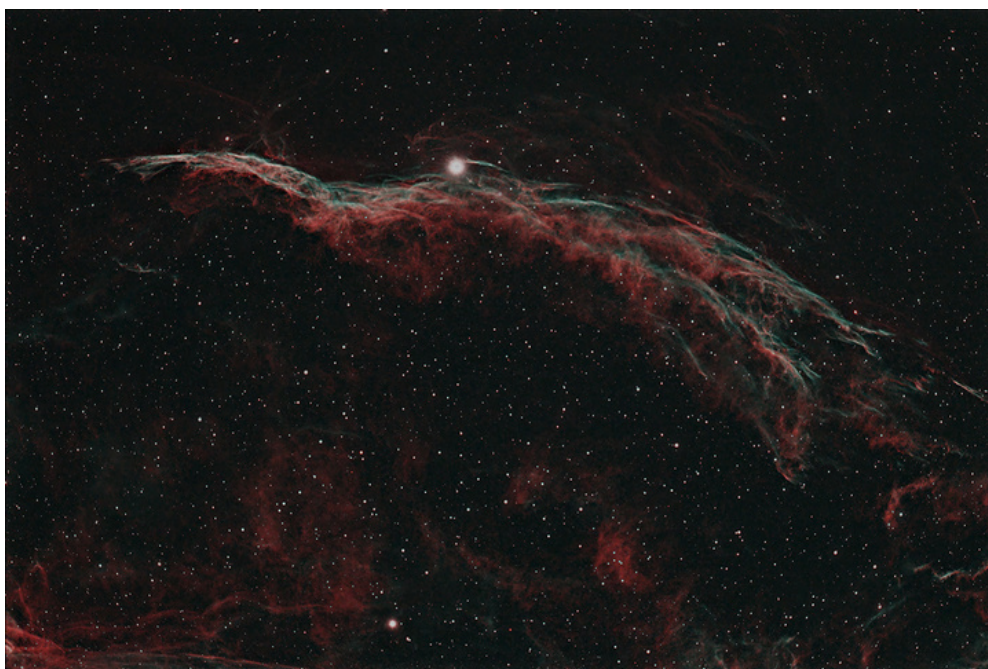
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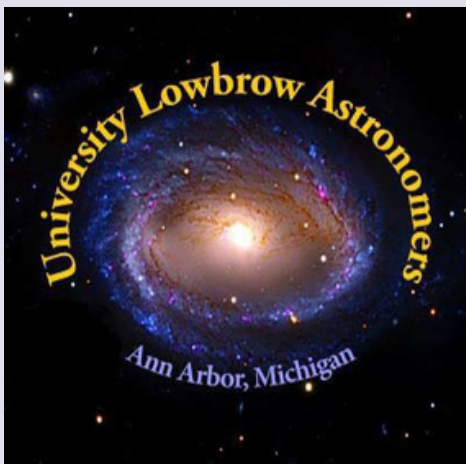
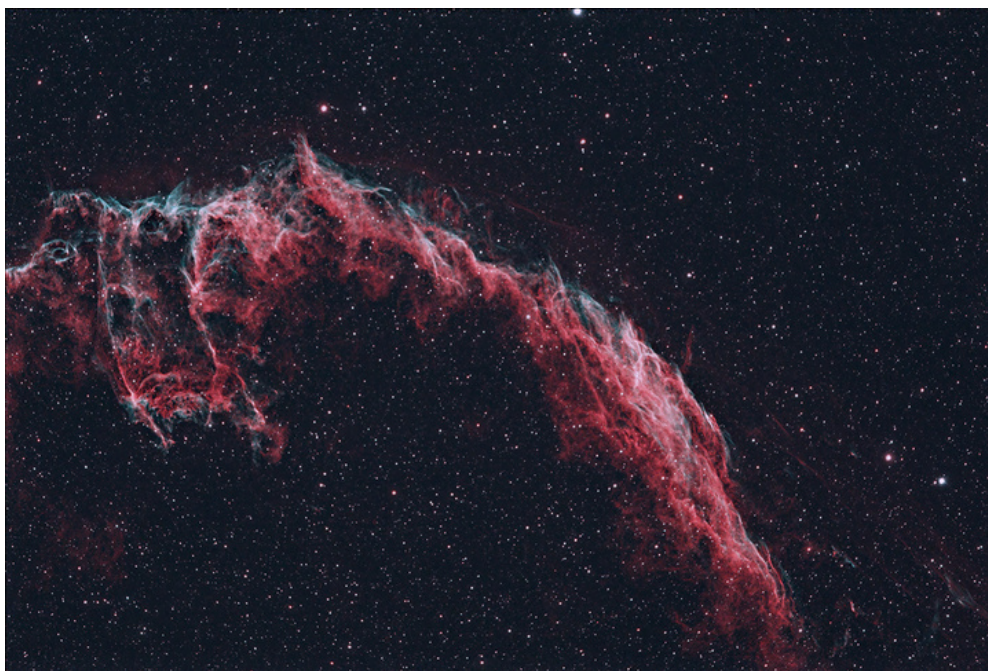
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EASTERN & WESTERN VEIL

BY CLAY KESSLER

NGC6960 above
NGC6992 below



THE QUEST FOR OrangePi

BY JEFF KOPMANIS

Goals

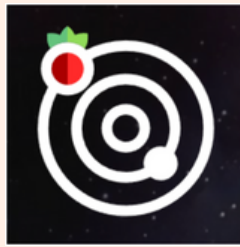
I'll begin by describing the beast I'm attempting to train. I have an iOptron ZEQ-25GT mount (center-balanced EQ + Goto), ZWO ASI294MC main camera and Svbony 165 30mm f/4 guide scope, and a ZWO ASI120MM-2 guide camera. I want to do long-exposure DSO photography with an f/5 Orion 120ST refractor. I was going batty taking care of the plethora of tasks manually. Reality says it would be wise to let my computer do the dreary work of auto-focus, auto-guide, plate-solving, and capture task sequences to let me concentrate on the image capture parameters.

Additionally, between the cold nights in the winter and the mosquito-infested summers, I'd really like to kick back to a comfortable indoor console and let the mosquitoes or icicles find another victim. The remote computer will need to be compact and energy efficient to use off an in-field battery.

Lastly, I'm a Quixotic believer in the (absurd?) notion that you can do astrophotography on a reasonable budget, so it eliminates the astronomy-specific remote computers due to their eye-opening sticker prices.

The ZWO ASIAir Plus system does indeed check off all of the boxes, and it's a "sanitary solution" and easy to use, but \$299 seems a little steep for a Raspberry Pi 4 system and a more limited selection of supported devices and controlled only on iOS or Android (no web or client modes).

Since I'm very familiar with the Raspberry Pi platform, I picked up the Canakit Raspberry Pi 4 8GB Basic Kit for \$90, RPi4 case for \$5, plus a 256GB 10x micro SD card for \$26. I got a fully functional high-efficiency 64-bit computer for \$121. Great! And it does...NOTHING. Obviously, you need to load that SD card with some software.



OS Loads: Strike 1: Astroberry Server

Our first contestant is the Astroberry Server load. It's free and contains everything you'll need for a fully automated astrophotography field computer. Boiled down, it contains the Raspbian OS, INDI driver libraries, the KStars/Ekos planetarium/control

package, PHD2 auto-guiding (optional) and FireCapture planetary capture software, all pre-configured and ready to roll. If you look at the listing of software and compare it to the Stellarmate OS package (below), it'll be hard to tell the difference. However, once the tires hit the road, perspective changes.

Astroberry's drawback after three tries turns out to be the OS configuration itself. Specifically, the wifi hotspot feature was difficult to configure so that it would come up reliably.

The astronomy configurations all worked fantastically, and exactly the same in every load I tried. Since a Raspberry Pi is relatively lightweight from a computational standpoint, performance was sluggish running the control software, driver server, VNC and web remote control servers, etc. It was overloading the wifi capability simply using the software in a remote fashion.

The real problems were that Astroberry's OS and networking just aren't production-ready and take some expert tinkering. Getting the wifi hotspot to work as reliably as the hardwire ethernet cable turned out to be elusive. I thought I was an expert since I've been a UNIX/Linux system administrator for (ack!) 30 years, but a solution was elusive.

Regroup. Simplify. Back-to-the-Basics.

OS Loads: Strike 2: Bare-bones Raspian + INDI libraries

My idea was to get the smallest OS possible on there, configure it as a wifi hotspot, and then add the INDI drivers so that the machine did nothing but

run the drivers to control the hardware. This is one of the interesting configurations of the INDI system...off-loading your driver control to the RPi and letting your laptop deal with all of the control issues remotely through wifi. I tried



THE QUEST FOR ORANGEPI continues, p. 3

THE QUEST FOR ORANGEPI continues

this configuration with the Astroberry load and it worked great.

I put aside the 256GB SD card and found a 32GB card laying around and loaded up Raspbian OS's most minimal load: Raspbian 64-bit OS Lite. This is also a free load!

The driver control portion worked brilliantly as advertised, but as with Astroberry, the wifi hotspot was once again the weak spot, even with by-the-book installation of a popular Linux hotspot management package.

Time to throw in the towel, cry "Uncle!" and fork out some money to use what other Lowbrow members have had success with.



HOME RUN: Stellarmate OS

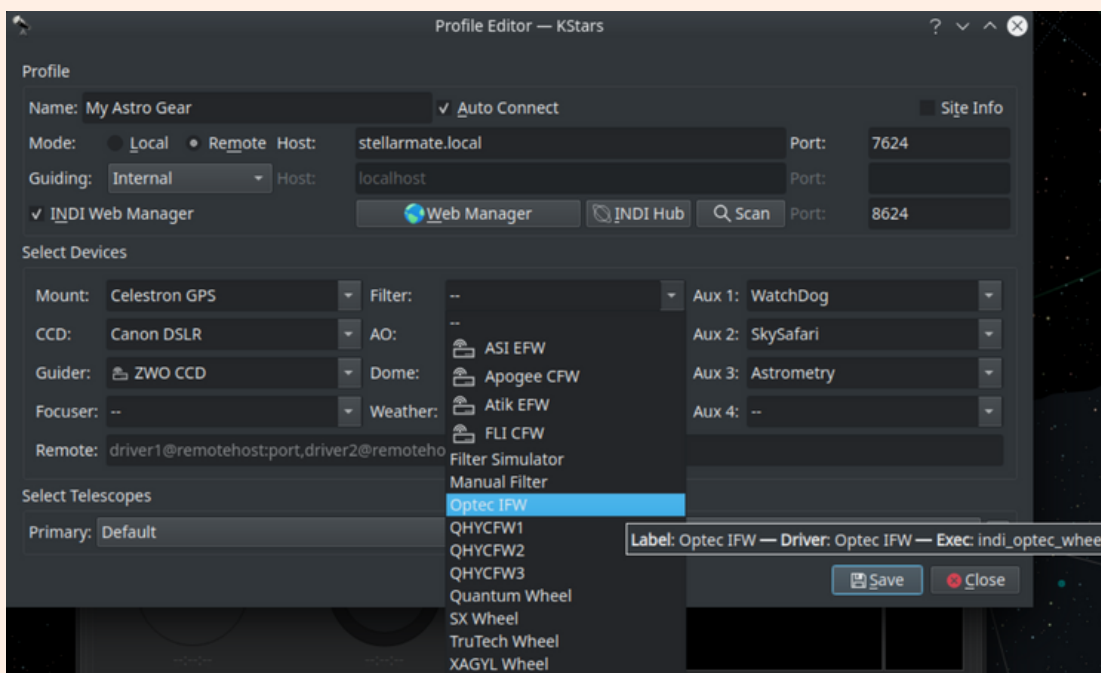
After loading and reloading my SD card 4 or 5 times, loading up StellarmateOS was like clockwork. Stellarmate OS (SOS?), like Astroberry, is a

complete OS and astronomy software build for a Raspberry Pi 4 (currently latest), and is available from the URL below for \$49. You may choose to have the Stellarmate folks build and load an RPi4 for you, which is called Stellarmate Plus Controller for \$229. If you're not technically inclined, this isn't a bad option, and it's

very similar in concept and capability to the ZWO ASIAIR Plus product (\$299-\$547). From a software standpoint, it strongly resembles the Astroberry load, but "beneath the hood" there are small touches that show off the extra polish of Ikarus Technologies. I chose to get just the OS load for \$49 since I already had a complete RPi4 system.

First, the wifi hotspot worked beautifully, although it does take 2 minutes or more to come up. This is because SOS is designed to cycle through the various network configurations (ethernet, USB, wifi client, and lastly, wifi hotspot) until one works. After struggling with the various Astroberry and Raspbian configurations, it works like magic.

Like the Astroberry loads, Stellarmate OS uses the same INDI Web Manager tool to choose your drivers and start up the INDI server. Once you have your server running, you can choose to use KStars/Ekos from the RPi4 (via VNC or Web remote control), or connect to it remotely from any Windows/Mac/Linux box that has KStars/Ekos loaded. In the latter case, just connect to the stellarmate Wifi network, and use stellarmate.local as your INDI server. Now you're ready to start gathering photons! I have a capture of a typical INDI configuration below to give you an idea of how things look. Frankly, the INDI driver collection is very thorough, so you should be able to find just about anything. The INDI Web Manager is a tool available on your browser to essentially do the same thing without calling up KStars/Ekos—useful if you intend on using things remotely.



THE QUEST FOR ORANGEPI continues, p. 4

THE QUEST FOR ORANGEPI continues

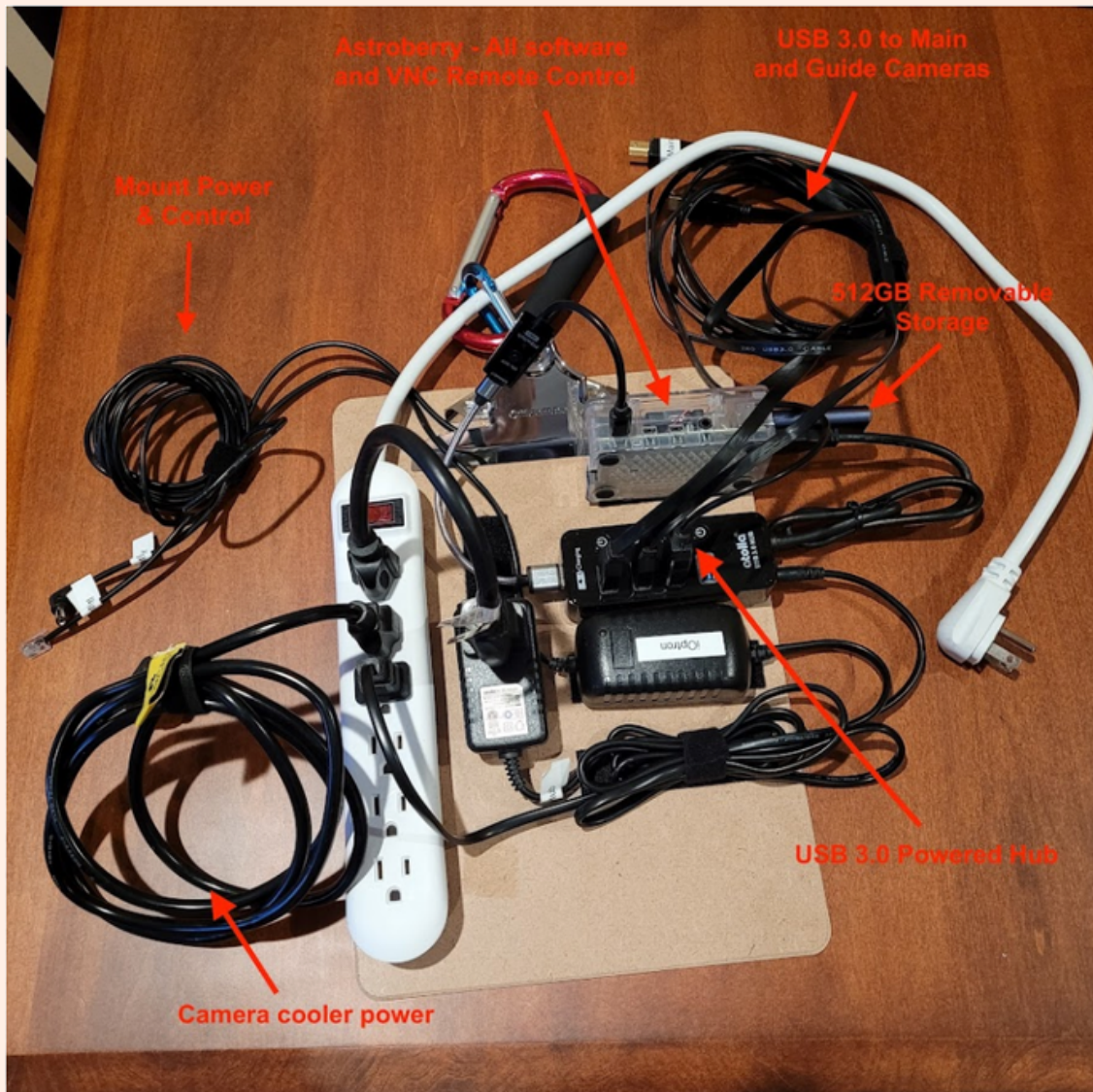
Final Thoughts

I've tested all of the individual pieces of this system and between the polish that comes with going with Stellarmate OS and the feature-complete suite of observatory tools that is KStars/Ekos, it will be a great choice to get into some automation without spending a whole lot of money on hardware and software. Stellarmate has managed to smooth out the rough spots in the networking and setup, and combined extensive device support with INDI and access to their Support folks is hard to beat for \$49. Keep in mind that astrophotography is complex, but I found KStars/Ekos keeps the various facets organized and, as best as possible, from being overwhelming.

My total cost was about \$170, which was only a little over half of the price of a ZWO ASIAir Plus yet with comprehensive device support, flexible connectivity and usage options, and gobs more storage card space. I'm just waiting on my next available clear night to drag out my rig. My final pic is of a clipboard where I've mounted all of my control gear so that I can hang it below the tripod and plug into my battery pack.■

Web URLs

- Canakit RPi4-8GB Basic Kit: <https://www.canakit.com/raspberry-pi-4-8gb.html>
- Astroberry Server: <https://www.raspberrypi.com/software/>
- Raspbian 64-bit OS Lite: <https://www.raspberrypi.com/software/operating-systems/>
- Stellarmate OS: <https://stellarmate.com/products/stellarmate-os.html>
- INDI Libraries and KStars/Ekos: <https://indilib.org/>
- ZWO ASIAIR Plus: <https://astronomy-imaging-camera.com/product/asi-air-plus>



A NARROWBAND FILTER COMPARISON

BY HOWARD RITTER

Urban light pollution is the bane of visual observers and imagers alike when faint deep-sky objects (DSOs) are the target. Although filters to reduce the effect of light pollution are available, the trend toward LED fixtures has sharply limited their efficacy for two reasons: LED emissions are broad-spectrum, overlapping all of the visible wavelengths of deep-sky objects (DSOs) and having no dominant lines to notch out. And because of their low costs of operation, they've been made brighter and more numerous than before.

For these reasons, it is becoming more popular among imagers, and even visual observers, to use narrowband filters when the target is the type of DSOs called emission nebulae. These are gaseous nebulae whose atoms are stimulated to emit light in just a few specific wavelengths called emission lines. Well known examples are the Dumbbell Nebula, M27, the Ring Nebula, M57, the Orion Nebula, M42, and the Veil Nebula.

In the last few years, I have accumulated three dual-narrowband filters that pass H-alpha and O-III wavelengths with different degrees of restriction, but had never done a systematic comparison of the results and had no good feel for their relative advantages and disadvantages. I recently remedied that by imaging the Dumbbell Nebula using these filters as well as a broad-spectrum light-pollution-suppression filter and, of course, no filter at all. I was interested in seeing three things: how well the filters would suppress the light pollution of the background sky, how they would alter the color of the sky, and how well they would improve contrast and make the DSO stand out against the sky. Here are the results.

These images [next page] are stacks of 30 minutes of cumulative exposure in each case. All images are unprocessed, just as they come from my DSLR camera at ISO 6400.

The filters are (passband half-widths per mfr.):

- Optolong L-eXtreme, a narrowband filter for H-alpha (7nm) and H-alpha (7nm)
- IDAS NBZ, a narrowband filter for Ha (3nm) and OIII (7nm)

- Optolong L-eNhanche, a wider narrowband filter for H-alpha and OIII/H-beta (width not given)
- IDAS LPS-P2, a broadband light-pollution-suppression filter that notches out wavelengths emitted by mercury and sodium lamps

Stars, unlike emission lines, are suppressed in proportion to the tightness of the passbands of the filters. This is inevitable as the narrowband filters block roughly 90% to 97% of the continuous spectrum of starlight. The presence of an abundant star background, or not, will play a role in esthetic appreciation of the image of an emission nebula.

On the other hand, since the sky background resulting from urban light pollution also has a broadband continuous spectrum, the less restrictive filters will show the background sky to some degree while giving it a color cast by removing all wavelengths except for those falling within their wider passbands. Post-processing can remove much of this background, but removing all of it makes for an unrealistic appearance and can amplify noise. The nebular emission lines, on the other hand, are represented as they actually are. As a result, a color correction to render the residual sky background a neutral grey will introduce error in the colors of the nebula.

So the really narrowband filters eliminate the colored sky background but also eliminate a lot of stars, while the broader filters show lots of stars but color the background sky. Which is preferable? Ya pays yer money and ya makes yer choice.

From the images, it's obvious that the narrowest filter, as judged by the sky background, is the L-eXtreme and the next narrowest the NBZ. This is contrary to expectations, as the narrower passband for H-alpha claimed for the NBZ (3nm v. 7nm) ought to yield a darker sky than the L-eXtreme.

Next is the L-eNhanche, as expected, given its much broader passbands as shown on the Optolong website.

Widest, also as expected, is the LPS-P2. This filter actually passes most light pollution except for notches centered on mercury and sodium lines, which unfortunately no longer dominate urban lighting. Still, there's some improvement.

FILTER COMPARISON continues, p. 6

FILTER COMPARISON continues ,,,

The first goal here was to compare the native results of identical exposures of the same emission nebula made through different filters. But the name of the game isn't an unprocessed, arbitrarily exposed image, it's seeing the best image that can be persuaded, squeezed, stretched and otherwise wrung out of an optimally exposed image file with an armamentarium of digital torture devices like PixInsight, Astro Pixel Processor, Photoshop, and Topaz DeNoise AI and Sharpen AI. That game will be reported on in a future article. ■



L-eNhance. Stars dropping out, intensely blue background. Histogram peaks in lower half. Might benefit from longer individual exposure time.



No filter. Lots of stars, nice neutral background sky. Histogram peaks near center.



NBZ. Fewer stars still, but little sky background, with little color. Histogram peaks in lowest quartile. Would benefit from much longer exposure time.



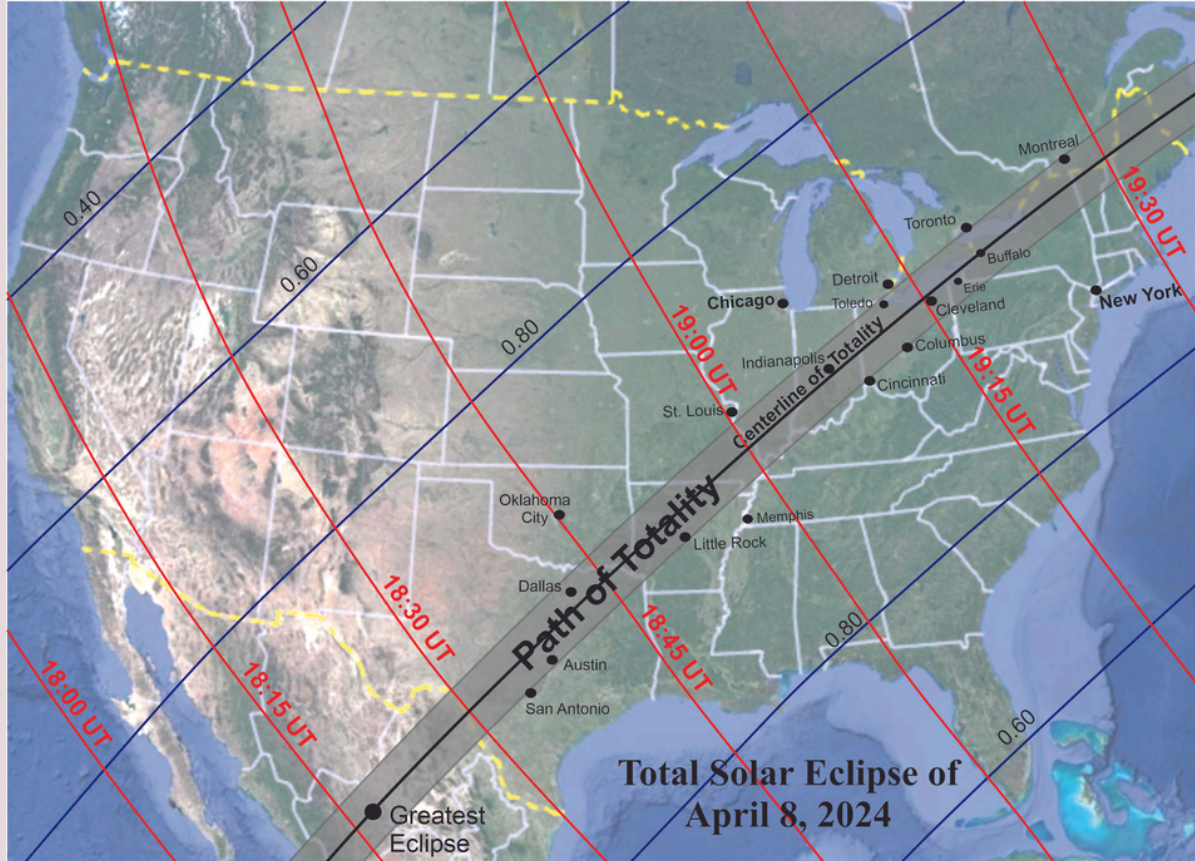
LPS-P2. Still lots of stars, but a bluish background. Histogram peaks near center.



L-eXtreme. The fewest stars, but virtually no background to need removal or neutralization. Histogram peaks in lowest quintile. Would benefit from much longer exposure time.

MAP OF APRIL 8, 2024 SOLAR ECLIPSE

BY CHARLES
STEELE



TITAN OCCULTS A STAR

BY BRIAN OTTUM

IT TAKES A LOT TO GET ME OUT OF BED AT 4:30 AM.

This morning [July 9] I did something I never do – get up before dawn. But Bob King at S&T’s website alerted me to a very cool event. Titan occulted a star! It was one of the more impressive visual sights I’ve seen this entire year.

My adventure started two evenings ago, when I set up my “Lowbrow Rig” in the back yard. It’s called the “Lowbrow Rig” because I purchased the mount (iOptron AZ Pro) and scope (Sky-Watcher 180mm f/15 maksutov) from Lowbrow friends Jeff K. and Awni H., respectively. The mount is solid and the GOTO and tracking work great. The scope is designed for high-powered viewing of the solar system. Anyway, I spent the evening studying the first quarter moon (Apennine mountains, smooth floor of Plato, Alpine Valley and Straight Wall). Then I watched the dark limb eclipse a star in the blink of an eye.

This morning, I stumbled outside and turned on the mount. It twirled all around in azimuth to start the calibration, then pointed to Jupiter, asking me to center it for final calibration. Dang, behind a tree. So I hit the “back” button and it slewed to Saturn. A few taps left/right, up/down to center Saturn and tracking began. I could see that the 9th magnitude star in Capricorn was the same brightness as Saturn’s moon Titan, and was located close by. A nice “double star.” While Titan slowly closed the gap over the next twenty minutes, I inspected Saturn to see the Cassini Division and the Crepe Ring. Iapetus, Dione, and Rhea were easy. Mimas and Enceladus were lost in Saturn’s glare.

At 5am, Titan and the star were just 2” apart. Within a few minutes, they merged into a single point. Then at 5:15am, Titan dimmed a bit as the star was covered up. Titan brightened a bit at 5:19 when the star re-emerged (but still appeared as one with Titan). The sky was brightening, so I turned off the rig and attempted to get back to sleep.

Note: this is my first newsletter offering in a long time that does NOT feature a picture! ■

FROM THE DESK OF THE NORTHERN CROSS OBSERVATORY

BY DOUG BOCK

This past month I've been collecting data on Comet C/2017 K2 (Panstarrs) as it approached Earth at about 170 million miles. It is on it's way to perihelion on December 19, 2022, but "whizzed" by us on July 14th, 2022. I took this sequence with the William Optics 105mm f/7 APO refractor and the ZWO asi2600mc pro camera. Each frame contains multiple light frames stacked on the comet core, thus the star trails.

This comet is an Oort cloud comet that was discovered in May of 2017 when it was beyond Saturn at about 16 AU. The coma developed to about 81,000 miles wide according to EarthSky.org, as it heated up coming into the inner solar system. It's distance from us however never gave it a chance to achieve naked eye magnitudes. It is still a telescopic comet as it heads south through Ophiuchus, towards Scorpius.

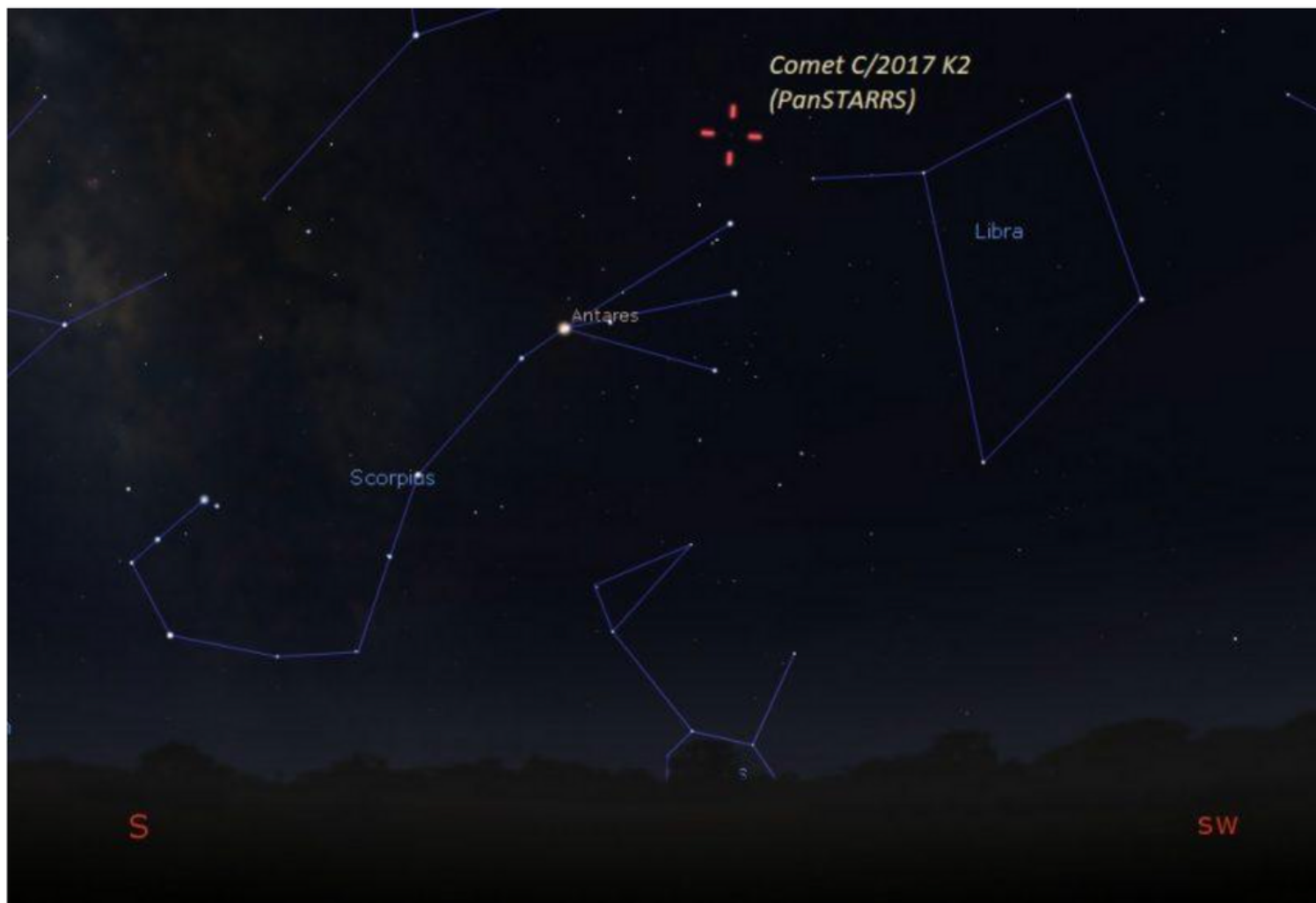
The images were taken on June 16th, June 22nd, June 23rd, June 27th, and July 10th of this year.



NORTHERN CROSS OBSERVATORY continues, p. 9

NORTHERN CROSS OBSERVATORY continues ...

This chart shows where it will be on August 13th, 2022, for those who wish to go out and take it in. You can also check out Comets | TheSkyLive.com for further information. ■



UPCOMING MEETING SPEAKER SCHEDULE

AUGUST 19: Professor Karim Jaffer, John Abbott College. Topic: **Pending**

SEPTEMBER 16: Note: Meeting Cancelled: Professor Nicolle Zellner, Albion Physics Dept, will be at Astronomy at the Beach

OCTOBER 21: Associate Professor Elena Gallo, U of M Dept of Astronomy. Topic: **Seeing and Hearing Black Holes, (big and small)**

NOVEMBER 18: Professor Neil Cornish, Montana State University. Topic: **Pending**, but about **Gravitational Waves**

DECEMBER 16: Fred Schebor. Topic: **The Artsy-Meaningless Slide Show**

JANUARY 20: Dr. Guy Consolmagno, Director of the Vatican Observatory. Topic: **Pending.**

PANORAMA AT PEACH MOUNTAIN, by Adrian Bradley

Milky Way photography often marries a beautiful foreground landscape with the Milky Way as part of the backdrop of the night sky.

But they can also be guides for visual astronomers and classic astrophotographers alike if there is enough detail.

In this image below, taken from our own Peach Mountain, there are several star clusters and nebulae that are visible along the plane of our galactic center. A couple is seen to the right of the galactic plane as well, in Scorpius.

During this night the sky quality meter showed that at the zenith, Peach Mountain reached a Bortle 4 quality. This surprised me as I typically think of Peach Mountain as a Bortle 5 site overall.

This is a 'short' list from the bottom of the image to the top. Some of these will require a Ha or Oiii filter to observe visually. Others can be seen naked eye and the rest with binoculars or a small telescope.

Stars of the Scorpion's 'stinger': Shaula and Lesath. Fuyue to the left is also visible. IC 4628 (Prawn Nebula) got lost in the glow of light pollution.

NGC 6334 - Cat's Paw
SH2-157 - Lobster Claw
B273

M6 - Butterfly

M7 - Ptolemy

Large Sagittarius Star Cloud surrounding the Galactic Center SgrA*

Lots of Dark Nebulae around the 'Dark Horse Nebula'

M22 - Globular Cluster

M8 - Lagoon

M20 - Trifid

M23 - Open Cluster

Small Sagittarius Star Cloud

B92 - Black Hole Nebula (within the small Sagittarius Cloud)

M25 - Open Cluster

M17 - Omega, Swan

M16 - Eagle Nebula

NGC6604 - open cluster above Eagle Nebula

LDN394 - Dark Nebula next to NGC6604

B312 - Dark Nebula to the left of M17

NGC6645 - Below B312

LDN410 - last Dark Nebula around the top of the image

... and in Scorpius, M4 and NGC6144 make an appearance. You can also see the structure of the Rho Ophiuci complex. ■



LOWBROW TELESCOPERS, WE NEED YOU AT AATB!

Astronomy at the Beach is back to a real in-person event this year. In 2019 we had 50+ telescopes and a couple thousand people, and we are going for that again. Please plan to bring your passion and equipment to Island Lake State Rec Area the weekend of Sept 16-17.

<https://www.facebook.com/events/1662635794136389/1662640544135914/?ref=newsfeed>

WHERE: "Island Lake Picnic Grounds" inside Island Lake State Recreation Area, Brighton. You need a license plate "Recreation Passport" to get in (or get one at gate for \$17).

WHEN: Arrive to get set up prior to the 7:40pm sunset

HOW: As usual, we'll be setting up between the beach, the pavilion and the parking lot. Park will have employees to point you in the right direction, and handcarts to borrow. Sorry but you'll have to bring your own electrons, we have no electrical plug-ins. Use your red lights. Be ready to explain what you are viewing, especially to those waiting in line.

WHAT: Suggested targets in chronological order after 7:40pm sunset - Vega, double stars (Albireo, dbl-dbl, Mizar-Alcor), star clusters (Coathanger, M11, M13), Saturn low in SE, dying star nebula (M57 the ring, M27 the dumbbell), stellar nursery nebula (M8 lagoon, M20 trifold, M17 omega/swan, M16 eagle), Andromeda Gx (clears trees 10), Jupiter (clears trees after 11). All manner of instruments are valued, from binoculars to a refractor to a big dob!

IF CLOUDS or RAIN: Talks will still take place in the tent.

QUESTIONS? Contact Brian Ottum

UPCOMING TOPICS FOR THE OBJECTIVE LENS

BY JACK SPRAGUE

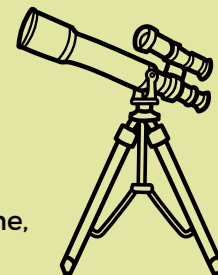
A reminder to members: all pictures are encouraged in the Objective Lens. While there is a theme, what we desire to record are objects and activities of our members. Gear photos, observers observing photos, and astronomical objects are all welcome in any season!

September - Lunar Photos! Craters, phases, the terminator, the whole moon, conjunctions with other bodies, nightscapes, reflections, moons other than Earth's own - the works! Astrophotographers spend a fair effort planning "around" our moon to acquire specific images. Let's celebrate the moon this September.

October - Planets, planets, planets! 2022 has been an especially good year for planetary observation, near occultations, conjunctions, and multiple planets simultaneously visible. Looking to September, there are close approaches of the Moon and both Saturn and Jupiter. (both under 4° of arc at the closest approach)

November: Long duration astronomical photos. Yes - star trails. Complete transversals as well as partial "artsy" images, objects against the curtain of night (Russian space junk, Elon's space junk aka Starlink, domestic aircraft, UAP, the ISS) are most welcome.

We all have session photos of something lovely when there in the middle of a five-minute exposure is Delta 2234 on its way to LAX. Some of these images turn out surprisingly attractive though at the time they are "weeds" in our manicured lawn. Now is the call: send us your weeds! (That's weeds .. not weed. Had to make that clear. It is Ann Arbor.)

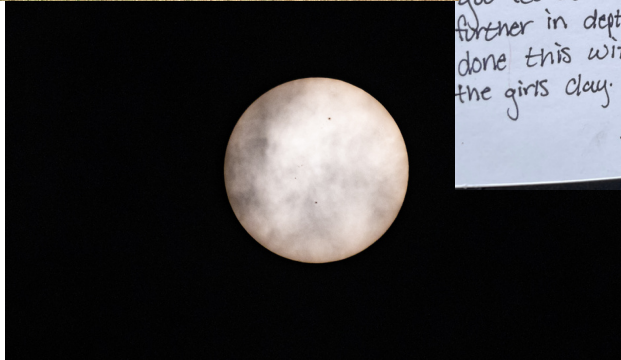


A few photos from Girl Scout Sun and Astronomy Day

Thanks to Adrian Bradley and new member Tisa Allen for helping out!



Dear Adrian + Tisa,
 Thank you so much for taking your time to teach the girls about the sun. We are very thankful that you let us use your equipment to learn further in depth. We couldn't have done this without you guys. You made the girls day.
 Yours in Scouting,
 2022 Day camp Leadership Team

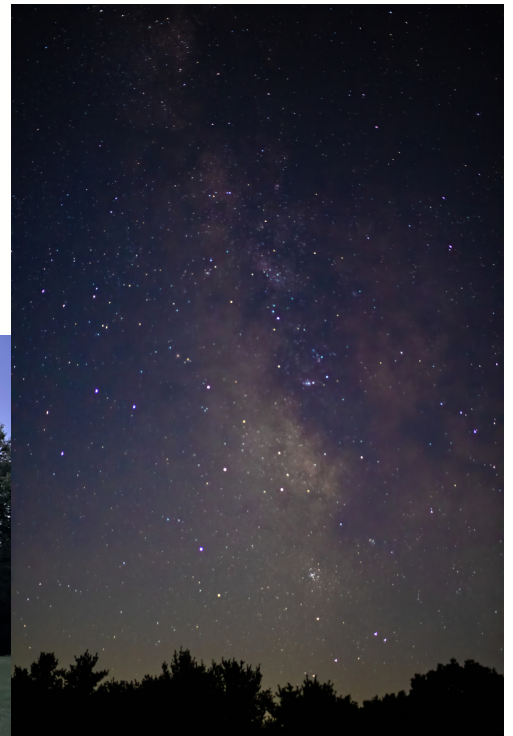


A few photos from Ann Arbor Camera Club's visit to Peach Mnt

Thanks go Ginia Forrester for setting this up and for several Club members for helping out. (Additional photos appear in this month's Objective Lens.)



Left: Photo of galactic center by Jeff Kopmanis, from his cellphone!



Above: Photo by Ginia Forrester

Right: Photo of setup near the Observatory, by Amy Cantu



Lowbrow Meeting Minutes
July 15, 2022

The meeting was hosted by Norb Vance Sherzer Hall at Eastern Michigan University. It was also attend remotely via ZOOM. President Charlie Nielsen began the meeting at 7:37pm.

Norb Vance gave a presentation titled "Points North, An update from Northern Michigan" which was a summary of his recent travels in Michigan. He visited the Headlands Dark Sky Park near Mackinaw, the Central Michigan University's Biological Station on Beaver Island. and the Enerdyne store in Suttons Bay. He also visited locations in western Michigan near Fremont. Eastern Michigan's Fish Lake site was discussed briefly. The Great Lake Star Gaze to be held Sept 22nd - Sept 25th was recommend. He concluded about 8:30pm.

President Charlie Nielsen reported:

- Public Open Houses will be held August 20th and 27th (weather permitting), using the COVID protocol adopted for members night which includes proof of vaccination, the wearing of mask in the observatory and at telescopes if requested by the operator.
- An event is scheduled at Westland Library for Sept 30th. It will begin at 7:30pm and end at 9:30pm
- Speakers are required for most dates next year. There was a discussion with members suggesting various speaker possibilities.

Adrian Bradley reported:

- He has conduction public outreach at Lake St. Clair Metro Park offering solar viewing with an HA solar telescope. He will give a presentation on processing nightscapes to the RASC /Montreal Center on Saturday.
- Two of s Milky Way photos won imaging awards in a two different categories.
- He is a member of other organization and will pursue possible speakers from their resources.
- Astronomy at the Beach plans are moving forward, he has placed the order for the event tent.

Jim Forrester reported:

- He has conducted 10 members only night at Peach Mt. He has had company for everyone. Jack Brisbin had opened the McMath Observatory for several of them.
- The Ann Arbor Photo Club is scheduled for the first clear night of July 23, 29th or 30th. The club maintains a list of vaccinated members. He expects an attendance of 12 to 20. The photo club members have been requested to arrive during daylight between 8:00 and 8:30pm. they will be checked in and will drive up the hill. Members arriving later will find the gate false locked. He request members to bring tracking mounts as some would like to use mounts to take pictures of the Milky Way. Adrian volunteer to bring his and Brian Ottum may bring a couple. Jack will open the McMath for observing. They would also like share views in member telescopes, Don Fohey will set up the club 17", Jim his StarMaster, other member scopes would be appreciated.

Doug Scobel reported:

- We have 190 memberships. This count also includes ten memberships that would have expired but for grace extended due to COVID-19 pandemic considerations.
 - That grace period is ending so I have contacted those members for dues payment.
 - So far we have three renewals and one who declined.
- We have \$13,010.09 in the treasury.
- Since our June meeting we spent:
 - \$32.03 for printing and mailing paper copies of the newsletter.
 - \$15.85 for our AT&T open house "hotline".
 - \$500.00 donation to GLAAC in support of Astronomy at the Beach 2022.
 - \$9.45 to mail a t-shirt to June's guest speaker Dr. Zachary Costan.
 - Sent \$317.50 to the Astronomical League for July 2022 through June 2023. All but \$10.00 of that was money collected from members for their A.L. membership.
- Coming up this month:
 - Send our annual donation to the International Dark Sky Association. A vote was taken at the meeting upping our annual donation from \$100.00 to \$250.00.
 - Send a gift certificate to July speaker Norb Vance to a restaurant of his choice.

Jack Brisbin reported:

- The observatory is ready for the Ann Arbor Photo Club and Open House events.
- He delivered the loan of the club 8" Starfinder telescope to Steve and Matthew West.
- Plane Wave will host a public open house and science exposition on Oct1st and Oct2nd.
- Some work has been done to cut back brush in the area used for parking along the road before the top of the hill, additional work is required.

Jeff Kopmanis reported:

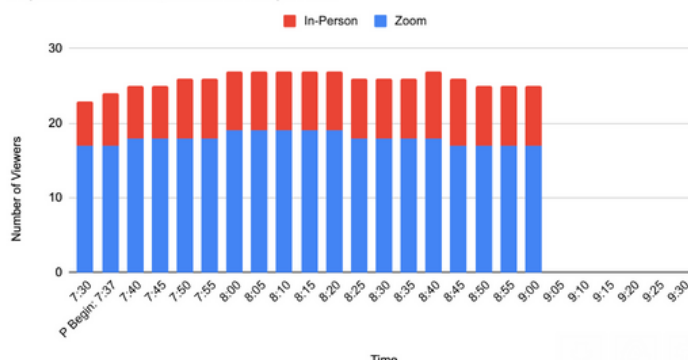
- 9 people had attended the meeting in person and 18 attended via ZOOM.
- Astronomy at the Beach will be Sept. 16th and 17th. from 6pm to 11pm. There will be a full program with kid activities, solar viewing and displays with presentations in the tent.

Norb Vance gave a personal and video tour of the Sherzer Observatory, the 10" APO telescope, roof mounted telescopes and views from the roof. The meeting ended about 9:30pm

| | | |
|---------|--------|--------|
| Max | 19 | 9 |
| Percent | 67.86% | 32.14% |
| Total | 28 | |

Meeting Attendance (@402 Shertzer Hall, EMU)

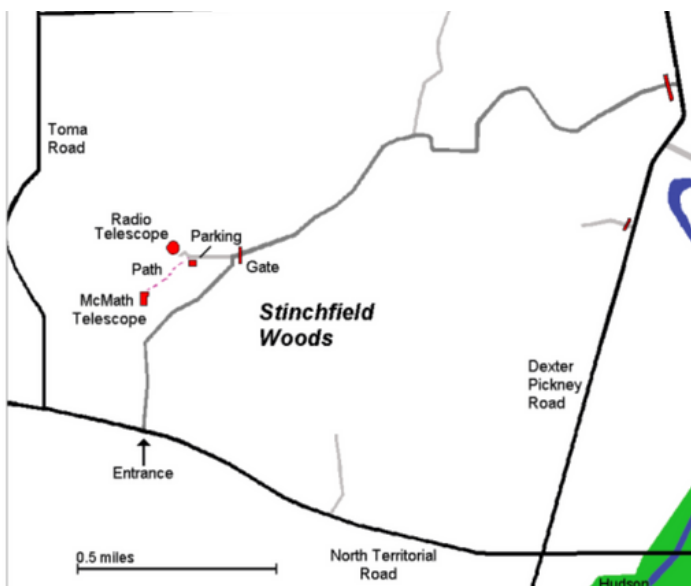
July 2022 - Norb Vance, EMU Observatory Director



PLACES & TIMES

Monthly meetings of the University Lowbrow Astronomers are held the third Friday of each month at 7:30 p.m. The location is usually Angell Hall, ground floor, Room G115. Angell Hall is located on State Street on the University of Michigan Central Campus between North University and South University Streets. The building entrance nearest Room G115 is the east-facing door at the south end of Angell Hall.

Peach Mountain Observatory is the home of the University of Michigan's 25-meter radio telescope and McMath 24" telescope, which is maintained and operated by the Lowbrows. The entrance is addressed at 10280 North Territorial Road, Dexter MI, which is 1.1 miles west of Dexter-Pinckney Rd. A maize and blue sign marks the gate. Follow the gravel road to the top of the hill to a parking area south of the radiotelescope, then walk about 100 yards along the path west of the fence to reach the McMath Observatory.



PUBLIC OPEN HOUSE / STAR PARTIES

Public Open Houses / Star Parties are generally held on the Saturdays before and after the New Moon at the Peach Mt. Observatory but are usually canceled if the forecast is for clouds or temperatures below 10 degrees F. For the most up-to-date info on the Open House / Star Party status call: (734) 975-3248 after 4 pm. Many members bring their telescope to share with the public and visitors are welcome to do the same. Mosquitoes can be numerous, so be prepared with bug repellent. Evenings can be cold so dress accordingly.

Lowbrow's Home Page
<http://www.umich.edu/~lowbrows/>

MEMBERSHIP

Annual dues are \$30 for individuals and families, or \$20 for full time students and seniors age 55+. If you live outside of Michigan's Lower Peninsula then dues are just \$5.00. Membership lets you access our monthly newsletter online and use the 24" McMath telescope (after some training). Dues can be paid by PayPal or by mailing a check. For details about joining the Lowbrows, contact the club treasurer at: lowbrowdoug@gmail.com

Lowbrow members can obtain a discount on these magazine subscriptions:

Sky & Telescope - \$43.95/year

Astronomy - \$34.00/year, \$60.00/2 years or \$83.00/3 years

Newsletter Contributions:

Members and non-members are encouraged to write about any astronomy-related topic. Contact the Newsletter Editor: Amy Cantu cantu.amy@gmail.com to discuss format. Announcements, article, and images are due by the 1st day of the month as publication is the 7th.

Telephone Numbers:

| | |
|-----------------------|--------------------------------|
| President: | Charlie Nielsen (734) 747-6585 |
| Vice President: | Adrian Bradley (313) 354-5346 |
| | Jim Forrester |
| | Brian Ottum |
| | Dave Snyder |
| Treasurer: | Doug Scobel (734) 277-7908 |
| Observatory Director: | Jack Brisbin |
| Newsletter Editor: | Amy Cantu |
| Key-holders: | Jim Forrester |
| | Jack Brisbin |
| | Charlie Nielsen |
| Webmaster: | Krishna Rao |
| Online Coordinator: | Jeff Kopmanis |

A NOTE ON KEYS: The Club currently has three keys to the Observatory and the North Territorial Road gate to Peach Mountain. University policy limits possession of keys to those whom they are issued. If you desire access to the property at an unscheduled time, contact one of the key-holders. Lowbrow policy is to provide as much member access as possible.

Email to all members
Lowbrow-members@umich.edu



University Lowbrow Astronomers

