

REFLECTIONS / REFRACTIONS

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University Lowbrow Astronomers Monthly Newsletter

February, 2025, Vol 49, Issue 2

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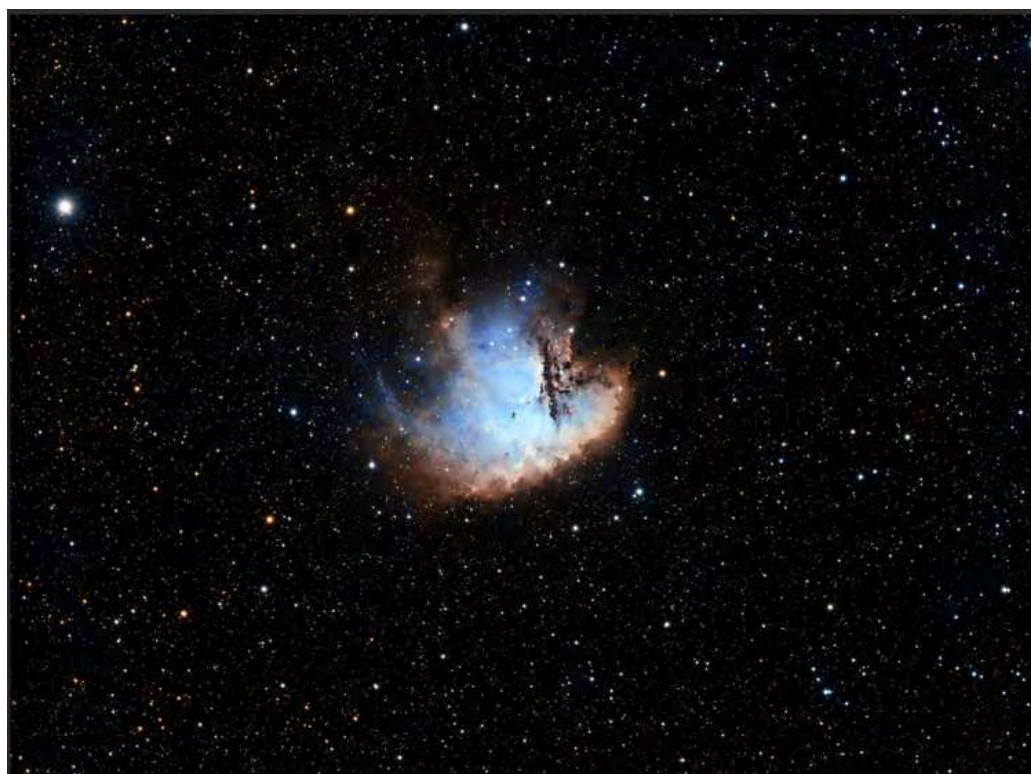
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NGC281 - PACMAN NEBULA BY GLENN KAATZ

NGC281, also known as the Pacman nebula, is in Cassiopeia and 9,500 light years away. It took me nearly two months to complete due to frequent cloudy skies, extreme cold, and competing projects. Here are the particulars:

- William Optics Zenithstar Z6111 refractor with a William Optics field flattened
- Celestron CGX mount
- ASI1600MM Pro main camera
- ASI 120MM mini guide camera
- William Optics 30mm guide scope
- ASIAir plus mini computer
- ZWO EAF Mini
- Baader 6.5 nm H alpha (35 five min subs), ZWO 7.0 nm OIII (31 five min subs), and ZWO 7.0 nm SII (27 five min subs) filters, for a total integration time of 7.75 hours
- Processing with Pixinsight, Photoshop, and RC Astro Sta, Noise, and Blur Xterminators ☐



SEESTAR S50 NEW USER EXPERIENCE

BY BRIAN OTTUM

This is a brief overview of my experience trying out the club's new "digital telescope."

OVERVIEW

I'm not the target market for this thing. I've been doing astrophotography long before there was a trash button. However, this device works like magic and causes hours of enjoyment. Simple, rather quick, and provides nice astrophotos (and observing). It is the perfect telescope for those cold Michigan nights with fleeting clear skies.

SETUP

There are 3 sets of instructions in the box: a little "quick start", the full pages of ZWO instructions, and Jeff Kopmanis' careful instructions. The software steps took a bit of time. First, you download the SeeStar app to your phone. Then create a login, confirming with the number sent to your email address. Jeff had already charged up the scope (but note that you must supply one of the several AC plug-to-USB "A" charging adapters we all have around our houses).

I took the scope on my trip to Florida and set it up on the table outside so it had a wide view of the sky.

Connecting to the scope for the first time took a couple of minutes following the instructions. But no problems. It was fun to precisely level the scope, using the three red knobs and watching the app on my phone.

In strong twilight, I tried to point it at super bright and high Venus but it would not work. It was not quite dark enough to "plate solve" so it knows EXACTLY where it is pointing. (The first thing it does is compare a snapshot with the stored catalog of bright stars in all of the sky. If it is dark enough, and enough stars are in the snapshot, the software will find the match and tell the scope the RA and DEC coordinates of where it is pointing.) Years ago, with my remote control observatory, we did exactly this but it was a whole big thing.

Waiting a few minutes, I tried again and all went swimmingly. The image of Venus was a bit overexposed, and the autofocus had trouble getting it perfect. Jupiter and its moons were much more impressive. Once you have the image on your phone's screen, you can adjust



My first look was to use the "Scenery" mode to manually pan around. Here's a shot of a building five miles away. You could use this thing to get shots of distant wildlife.



the Brightness, Contrast, and Color Saturation. With Jupiter, it is fun to turn down the brightness and see the little cloud bands (but the moons disappear).

But this thing is designed for showing deep sky objects of medium size, not small (like the Ring Nebula), and not big (like the entire Andromeda galaxy or California Nebula). The field of view is 0.7deg wide by 1.3deg tall. So it fits one moon wide and two moons tall.

NEW USER EXPERIENCE continues p.3

PROBLEM POINTING

The first night, I noticed that when I hit "GOTO" to point to something new, the scope would go there, and the screen kept on reading that it was going there. But it never appeared to get there. So I would hit my phone's back button to force out of the GOTO mode. It was automatically taking a picture, so things seemed fine. Here's my first astrophotography (AP) shot, about 10 minutes on the Pleiades. Pretty darn good for moderately light polluted skies (Bortle 5). >>>

LEARNING MORE

I shot several objects over my first two nights. Being able to control the scope from inside would be a HUGE benefit in cold Michigan. I sat and read a book while doing a half hour exposure "stacking"! You should always use the longest exposure your tracking and sky permits. The scope allows you to switch from 10 sec to 20 sec to 30 sec. I found that I could do 20 sec but not always 30 sec. The internal light pollution filter is automatically

The little squiggles around the bright stars told me something. The 20-mph wind gusts were blowing the scope a bit, probably messing up the GOTO "plate solving." That's why it never confirmed the target. The problem seemed to go away the second night when the wind was only 10 mph gusts.

deployed. When I shot planets or the blue Pleiades, the filter indicator light was not "red" for On. But when I slewed to the Flaming Star Nebula, the filter was automatically moved into place internally. So the software likely takes into account the background sky brightness and the object being shot. Since the LP filter passes hydrogen alpha and oxygen III, the software wants to use it for those red emission nebulae we love so much. I don't think any of the documentation gets into this. But there are a LOT of insights you can find online.

The scope's internal battery seems to be able to last about 6-8 hrs in 55 F weather. My phone always had its display on and would last a bit less than that when working.

GOING TO THE MAX

You always want to take exposures for as long as you can, yielding a bright image. My testing was limited so far, but it seems there is an optimal exposure time that varies (by sky conditions, wind, and object location in the sky). Going up to half an hour is almost always a good idea. But after about an hour the scope had trouble stacking subsequent images - probably because of field rotation. When you have an Alt-Az scope, field rotation is a problem after a few minutes. This scope keeps slightly cropping to get rid of the trailed stars out at the periphery.

Can you identify this object? (left) I did not have much experience with it., but I will christen it "The Little Rose." IC 410 is a star-forming nebula inside Auriga's pentagon. The newly born stars inside are NGC 1893.



NEW USER EXPERIENCE continues, p. 4

NEW USER EXPERIENCE continues from p. 3

Folks online talk about mounting the S50 equatorially and I'd love to try that.

Here are some shots with half-hour to hour exposures. All processing was in the app, with nothing done afterward.

As stated previously you can adjust Brightness, Contrast, Saturation, and Cropping. And you can also use an AI-driven denoise routine that is good but strong.

>> Here's an hour of exposure on M45. The scope is picking up a good amount of the blue reflection nebula and dust. But the bright stars bloat and you can see imperfect tracking in the little stars if you look really closely. But still a fine image.



<< The Horsehead and Flame, half hour exposure, suffered from the 20 mph wind gusts. You can see the problem with the stars. The scope's location on a rather-flimsy metal table also caused some shake.



>> Again on windy night one, I got a half hour on Orion Nebula. It did not greatly improve from just a 5 minute exposure, since it is such a bright object.



NEW USER EXPERIENCE
continues from p. 5

NEW USER EXPERIENCE continues from p. 4

CONCLUSIONS

Strengths:

- Instant gratification observing and imaging
- Technology that's indistinguishable from magic
- Extremely portable
- Rather easy to use the first night (very easy after that)

Weaknesses:

- If something is wrong, you don't always get the feedback on how to fix it
- Want more error messages
- Cannot seem to tweak the pointing so to better "compose the shot"
- Want more sophisticated image processing (like "stretching" and star minimizing, but likely available in a year or two)

The Chinese (ZWO, QHY, iOptron, Dwarf) are innovating at a fast pace. Astrophotography has become dramatically easier. I'm excited to see what the future brings.

NOTE: if you are interested in purchasing one of these new "digital telescopes" be sure to watch the YouTube recording of member Gary Nichols' wonderful December 20, 2024 talk. He covers all the major brands and models.

If you would like to borrow the club's SeeStar, email newsletter editor Amy Cantu (cantu.amy@gmail.com) ☐



My last shot is of M78. After about 45minutes the scope said it was having trouble stacking incremental images. Such an object really needs another hour, or darker skies.

UPCOMING SPEAKER SCHEDULE

February 21: Jeff MacLeod, NASA/JPL Solar System Ambassador

Topic: Apollo Mission Planning in 1962

March 21: Dr. Richard Goodrich

Topic: Fear and Loathing in the Heavens

April 18: Professor Gregory Tarle

Topic: Cosmologically Coupled Black Holes

May 16: Jim Shedlowski

Topic: The Many Dimensions of Russell Porter

June 20: Adam Kall (Kall-Morris, Inc.)

Topic: (Retrieval and effects of space debris)

July 18: Kristina Collins

Topic: Citizen Science Project to Monitor the Ionosphere

DRIVE FOR EQ MOUNT

BY DON FOHEY

I have an old Orion EQ mount that I use with my Coronado PST solar telescope. The motor driving the RA axis was powered by a standard-size 9V battery. It had an adjustable speed but even at the maximum setting, it would no longer track fast enough to keep the Sun in the field of view. So my winter project was to build a stepper motor drive for the EQ mount. I am not doing photography, I only need to keep the Sun in the field of view for observation.

I choose a commonly available NEMA 16 stepper motor with 200 steps per revolution from Adafruit. To drive the motor I choose a TB6612 stepper motor driver breakout board, also from Adafruit. Very little processing capability is required to control the motor. An 8-bit Arduino Pro Micro 5V 16Mhz processor from Sparkfun Electronics worked well.

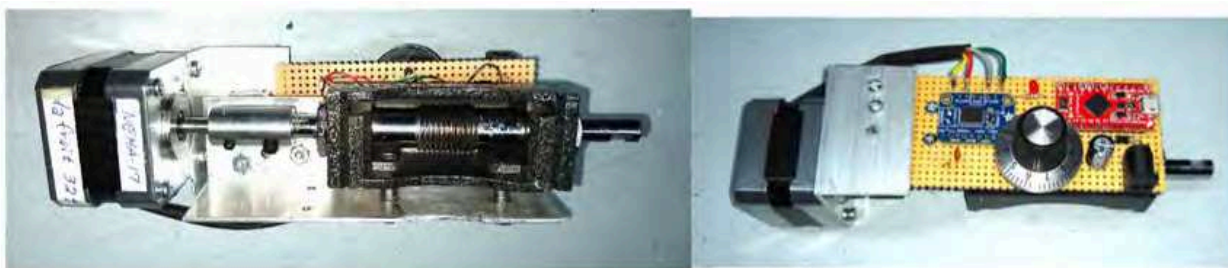
The Orion EQ mount has a worm and spur gear with a 144:1 reduction driving the RA axis. This is very standard for an EQ mount of that era in that a 1/10 rpm motor would drive the RA axis at a 24-hour per revolution rate. In order to drive the RA axis at sidereal rate I would need to move the motor one step every 2.992 seconds. Each step will move the telescope $360/(144*200) = 0.0125$ degrees. Since the sun's diameter is 0.5 degrees, one step will move 1/40 the diameter of the Sun. This is a small correction once every 3 seconds. This is easily accomplished by programming the Arduino using the provided stepper motor library.

I found in my box of parts a quadrature rotary switch with 24 detents. It also has a button depress switch. I incorporated it to help center the image in the field of view. The switch can be rotated CW or CCW and each



detent of the switch moves the motor 5 steps (CW or CCW), or 1/8 the diameter of the Sun. I may adjust this value when I field test the system. Depressing the knob changes the direction of rotation in case I take it to the southern hemisphere.

I have access to only rudimentary tools. So I mounted the motor and electronic board using 1-1/2 inch angle aluminum pieces which I hack sawed to size and hand drilled holes to bolt them together. The electronic components were hand-soldered. The coupler of the EQ RA drive shaft and the stepper motor were however beyond my ability so I asked a friend with a machine shop to make the shaft coupler. It was a fun project, now I just need a clear day to see how well it works. □



Motor: (<https://www.adafruit.com/product/324>).
TB6612: (<https://www.adafruit.com/product/2448>).
Arduino: (<https://www.sparkfun.com/pro-micro-5v-16mhz.html>).
Rotary Switch: <https://www.adafruit.com/product/377>

TREASURES OF THE MILKY WAY - UY SCUTI

BY ADRIAN BRADLEY

In the February, 2025 issue of Astronomy Magazine, you'll find an article titled "Treasures of the Milky Way." In it, you'll read about objects that you can explore within the area of the Milky Way that spans from Scorpius through the Galactic Center, up to the location of Serpens Cauda (tail of the serpent) which is opposite the area where Aquilla lies.

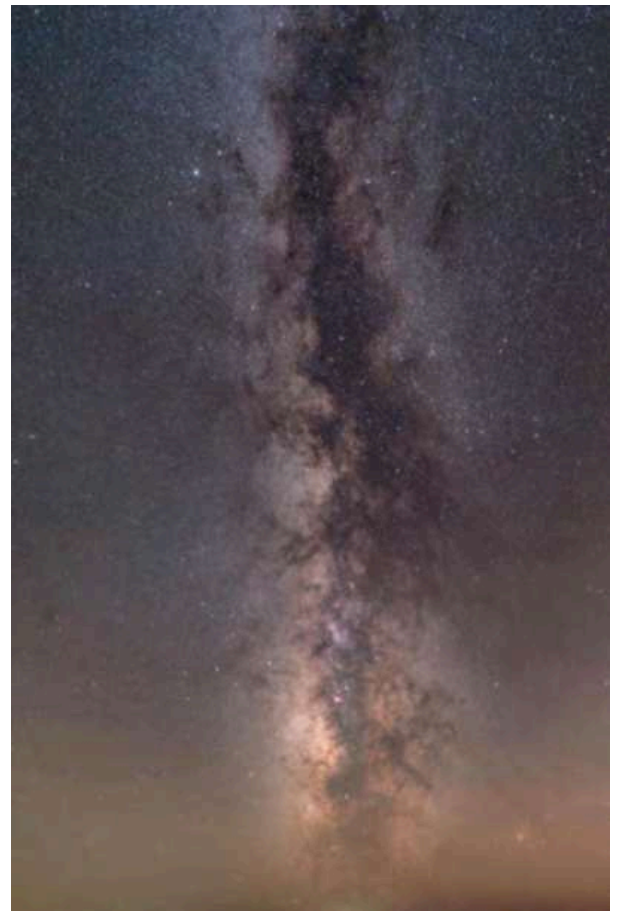
But it seems I overlooked a gem.

The constellation of Scutum the Shield sits within the galactic plane. From our angle in the sky it sits left of Serpens, the constellation from which Messier 16 can be found. For long time astronomers, we recognize Messier 16 as the Eagle Nebula, home of the Pillars of Creation.

What's so important about this region? Answer: The largest star known to us at the time of this writing (February 2025) sits in this region, hiding almost in plain sight: UY Scuti.

UY Scuti is a Pulsating Variable Star that sits between 8th and 10th magnitudes. As its name suggests, it sits in the constellation Scutum. It is a red supergiant of spectral type M41a lab. If it were to sit in the same location as our Sun, it would absorb all of our inner rocky planets with its photosphere extending to the orbit of Mars. Fortunately for us it is 5,900 light years away.

Those magnitudes make UY Scuti too faint for most human eyes, even in dark skies. However, It is a fairly easy target to go after in all other types of observing or imaging of the night sky, even Milky Way scapes. If you have ever taken a picture of the Milky Way as it rises, or stands vertically, you have indirectly imaged the region where UY Scuti sits.



Here is our well known 'Northern Bulge' region, stitched together with two different groups of stacked images from a Canon 6D. This camera was 'astro modified', i.e. the Infrared or H α filter removed in order for the camera to capture that frequency and assign it a pinkish color. It makes it easier to capture data in that spectrum of light. Do we have UY Scuti in this image? Let's zoom in (below left) and find out.



<< Not the clearest of images but UY Scuti is visible! To find it, find these 3 objects in the image first: M17, the pinkish blob at the bottom of the image (Omega/Swan Nebula), then go upper right of it to find the other bright pinkish blob. That will be M16, the Eagle Nebula. Directly across to the left of the Eagle Nebula are a pair of bright blue stars. The brightest of the two is Gamma Scuti.

These three form a diamond shape with UY Scuti. Look for the darkest red/crimson star sitting near the top middle of this image, near one of the many dark nebulae in this region. When you see this star, you are looking at UY Scuti. Looking at all four, you'll see the 'diamond' shape I'm referring to.

UY SCUTI continues, p. 8

UY SCUTI continues ...

If you are a landscape/wide field imager without a modified camera, might you still be able to image UY Scuti? Lets find out.

>> Here you have yet another of my Okie Tex Star Party captures, taken in September of 2024. The green skyglow is visible here. The camera used for this image was a stock Sony A7R4, not modified, with any filters removed. This was taken with a 24mm f/1.4 lens, from our observing location north of everyone else on the field. I'm pretty sure I tried to use tracking in this image, but it wasn't spot on. Still, it gives you a great idea of what the Milky Way looks like from the dark skies in Kenton, Oklahoma.



<< This closeup reveals a couple things, including my tracking error as the stars are shaped more like dashes than round points of light. But if you use the same method as earlier to locate UY Scuti, you will see a dark crimson dash of light. In other words, at 24mm, with reasonable focus and enough time tracked, you will still manage to nab UY Scuti.

So what if you don't have a tracker, and you don't have stacking software? All you can do is take a single image, say 10 seconds, with a stock camera and fast f/1.4 lens. Check out this selfie (below) that I took of myself at a Black Mesa State Park group campsite.

In dark locations it doesn't take much time to gather enough photons to image the Milky Way. In light polluted skies, your mileage may vary.

So did we still manage to get UY Scuti?



DARK SKY continues, p. 9

UY Scuti continues...

Even in this very rough and noisy starfield >>, UY Scuti shows up! The Swan and the Eagle barely have any nebulosity to them, Gamma Scuti and the bright star next to it (known as V432 Scuti by the way) look like rugby balls, and there is a crimson dash completing the diamond at the top of this picture. It only takes 10 seconds to image the light coming from UY Scuti.

USE UY SCUTI FOR OUTREACH

UY Scuti makes for a good outreach object in the spring and summer months. Instruments of all sizes and kinds should be able to capture photons from this big bright supergiant. You can set up the viewing by asking your guests if they want to see the largest known star in our galaxy and proceed to show them this star via the eyepiece, or via a live view where it's color should help it stand out in the star field -- along with being within a dark nebula (LDN 399 for reference).

Then you can proceed to tell them about how big it is, and how much of the solar system it would swallow up if placed in the same spot as our Sun. As a reminder, it's photosphere extends to the orbit of Mars.

Information on UY Scuti was gathered from https://en.wikipedia.org/wiki/UY_Scuti and Sky Safari Pro 7. Much more information is available about this supergiant online via the references in the Wikipedia article.

It is worth noting that in an online article I read from an author that the constellation of Scutum (the Shield) was a Southern Hemisphere Object. Well, it is at certain times of the year when they are able to see the galactic center. But it is not an exclusively southern hemisphere object at all. This constellation is directly next to Serpens Cauda, the location of M16. There are only a couple months a year when Scutum is not visible to us. As the galactic core returns to the sky, so does Scutum, and UY Scuti with it. □



Size comparison by S. Clester, Astronomy Trek

JOIN ONLINE CLASS WITH ASTRONOMER DEAN REGAS

You are invited to an online class with Astronomer Dean Regas

When: Feb 11, 2025 07:00 PM Eastern Time

Topic: Pluto Love

Pluto, everyone's favorite planet, dwarf planet, or kuiper belt object. Whatever it is, people love Pluto (even grumpy astronomer Dean Regas). Dean shares the history behind this oddball object and flies you closer to explore the misunderstood world and welcomes special guest Kevin Schindler from the Lowell Observatory.

Join that night with this link:

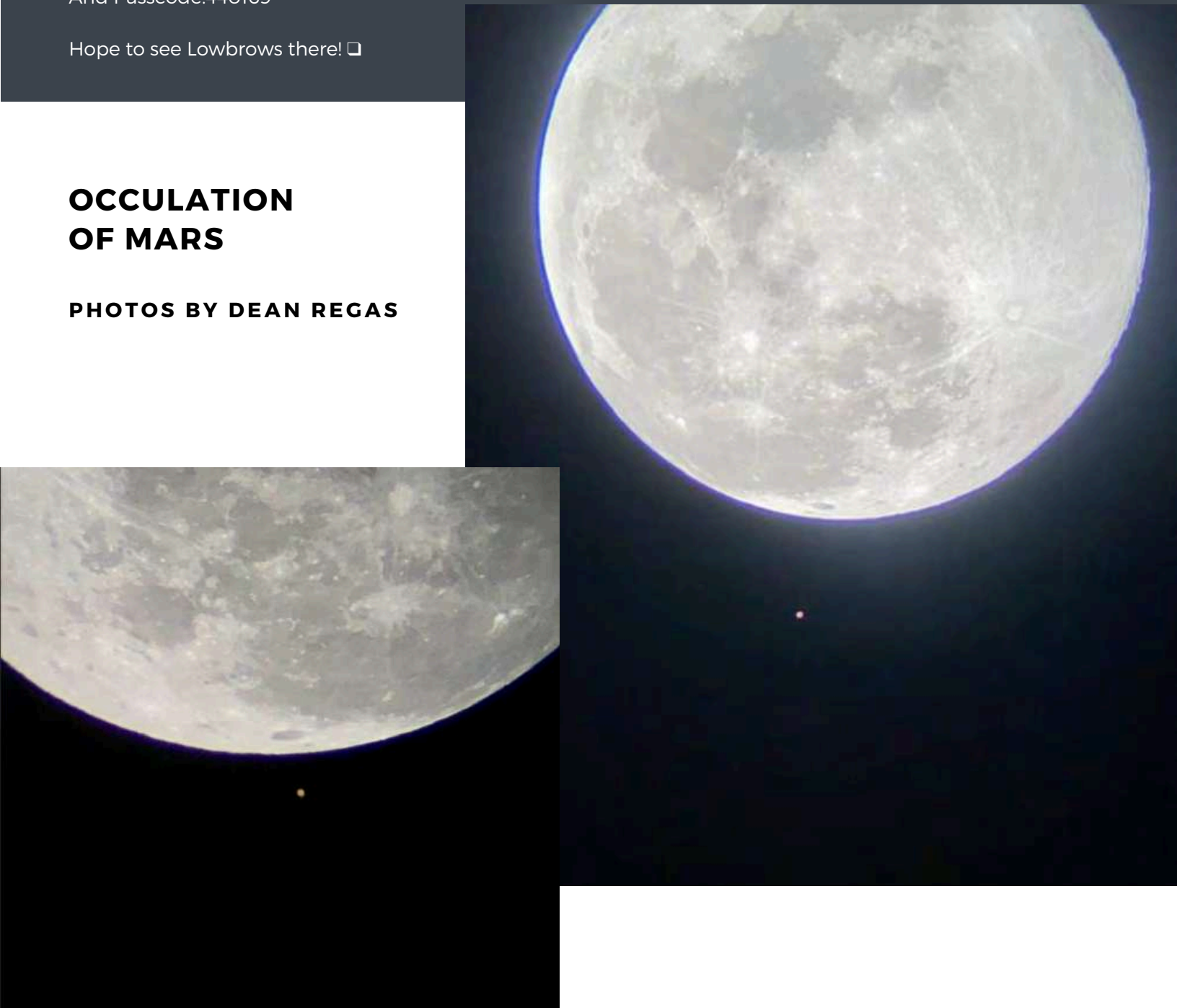
<https://us06web.zoom.us/j/81359838969?pwd=C9HewPAdwPccH1E5NoGnoJKZX97DkW.1>

And Passcode:440169

Hope to see Lowbrows there! ☐

OCCULTATION OF MARS

PHOTOS BY DEAN REGAS



A FEW PHOTOS BY CLUB MEMBERS

MARS, by Joseph Blackmer



M106 BY AWNI HAFEDH

Reprocessed two years worth of data for that target.

40x300s of (Ha) data on 3/2021 using ASI183MM camera (which I sold)
81x180s of (Lum) data on 3/2021 using ASI533MC
81x180s of (Lum) data on 4/2023 using ASI533MC
With a total exposure of 11.4 hours

Equipment used:

Celestron 9.25" with 0.7x reducer
ZWO ASI183MM and ASI533MC Camera
Astronomik Ha, L filter
iOptron CEM60 mount



**SUN PILLAR and SUN DOG,
by Doug Scobel**

Our meeting at the Detroit Observatory was called to order by Charlie Nielsen at 7:35 PM.

Returning U of M Physics Professor David Gerdes gave a very interesting talk about "What's beyond Neptune?" covering his team's search for Kuiper Belt objects. This is a continuation of his quest for finding important signals hidden in large quantities of very noisy data. His earlier work was with CERN, combing through voluminous data to help discover the top quark. This work helped find a target for the New Horizons spacecraft against the backdrop of the milky way and hundreds of KBOs. Perhaps most interesting is the specialized stacking of images to find moving objects that are too faint to see in any single image.

Our business meeting began at 8:55 PM

Charlie mentioned that Glencairn elementary school in East Lansing asked the lowbrows to be present for their science night on Wednesday, February 26, 2025. Several members attended last year, and while the crowd and tight space were challenging, it was very rewarding to share astronomy with the students. We are looking for new volunteers to help share our fascination with the night sky with these young minds. Several lowbrows volunteered. Charlie thought the new club SeeStar telescope might be a useful addition. The event is on our calendar.

Newsletter editor Amy Cantu asked to please send in articles and photos for upcoming newsletters. A member in the zoom chat suggested publishing the newsletter quarterly. More discussion will follow on the frequency of newsletters.

VP Don Fohey has scheduled Professor Emeritus Greg Tarle to give a talk at our April meeting. Professor Tarle has worked on dark energy surveys and very interesting telescope designs. He may present via Zoom.

Lowbrow member Jim Shedlowsky brought up a January 16th article in the Detroit News about the current state and history of the Hulbert McMath observatory buildings also on Peach Mountain. He agreed to give a talk on this during our May meeting.

Treasurer Doug Scobel reported via email that:

- We have 214 memberships.

- He paid our usual monthly bill to AT&T for our Open House "hotline".

- He reimbursed observatory director Jack Brisbin \$245.96 for the new observatory heater.

Jeff Kopmanis said there are only a few RASC calendars and handbooks available, please email him if you would like to purchase them. The club seestar telescope is available to loan to members. Jeff has created a spreadsheet to track equipment loans in the members section of our website. Last year Jack Brisbin wrote up the borrowing agreement rules and created a

signout form for equipment loans.

Observatory Director Jack Brisbin showed a printed list of 17 pieces of equipment available to loan out, with the status of each and who has them. He also showed the loan agreement that is signed by the borrower.

Jack showed a product announcement for the Pegasus Astro SmartEye Hybrid Smart Eyepiece. The smart eyepiece could be an addition to the McMath telescope for image enhancement, digital astrophotography, and sharing the current view to a cell phone or tablet. It also connects to SkySafari software. The "pre-order" price is \$1600. We will wait for reviews and feedback before we consider purchasing.

Jack had a copy of the three page Detroit News article about the Hulbert McMath observatory and showed them via the document camera.

The electric heaters in the observatory are working and we will see how they perform during the upcoming cold weather.

VP Ken Cook reported he has two speakers available and will coordinate with them for dates. Ken also reported that Christine Cook has been checking on our listings in the Ann Arbor Observer. We had a visitor attend this meeting because of our notice in the Observer.

Don Foley mentioned that no one asked to borrow the new SeeStar. Perhaps we need a reminder about our equipment loan program.

Don noted that the impromptu Leslie Park event in December for the conjunction of the planets was well received.

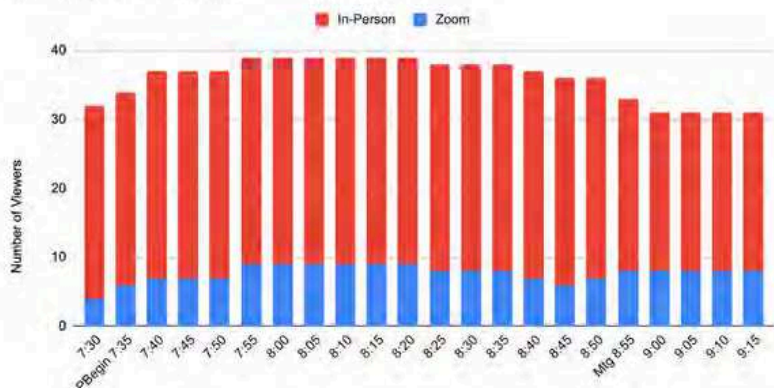
At 9:19 PM Kurt Hillig made, and Jack Brisbin supported a motion to adjourn.

Minutes respectfully submitted,
Ken Cook, VP

Max	9	30
Percent	23.08%	76.92%
Total	39	

Meeting Attendance

January 17, 2025 - David Gerde - What's Beyond Neptune?



PLACES & TIMES

Monthly meetings of the University Lowbrow Astronomers are held on the third Friday of each month at 7:30 p.m. The location is usually the Judy & Stanley Frankel Detroit Observatory. The Observatory is located at 1398 E. Ann St., Ann Arbor. The Ann Street Parking Structure (M86), the Catherine Street Structure (M5), the Glen Street Structure (M61), and the School of Public Health II Lot are usually open after 6:00 p.m. Mon-Fri. The M86 structure is closest to the Detroit Observatory.

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

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.

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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