REFLECTIONS / REFRACTIONS

University Lowbrow Astronomers Monthly Newsletter

November 2026, Vol 50, Issue 10

IN THIS ISSUE

Mineral Moon
by Cody Messer 1

Photometry with AAVSO
by Tim Miller 2

Speaker Schedule 5

What a Dark Sky Means
by Adrian Bradley 4

Photos by Club Members 7

AI In Amateur Astronomy (Cheyenne Astronomical Society) 10

Meeting Minutes 11

Club Information 13



MINERAL MOON

BY CODY MESSER

Target: Moon, waxing gibbous, 98.3% illuminated, age 14.4 days
Date/time: 24 Oct 2026, 20:59 to 21:21 EDT (00:59 to 01:21 UTC, 25 Oct)
Moon altitude: 35 to 39 degrees
Location: Michigan, USA (Bortle 5)

Equipment
Telescope: Askar FF80 (80 mm, 597 mm, f/7.5), native focal length
Camera: ZWO ASI585MC
Image scale: 1.0"/px
Capture software: SharpCap 4.1

MINERAL MOON continues, p. 9

PHOTOMETRY with the AAVSO

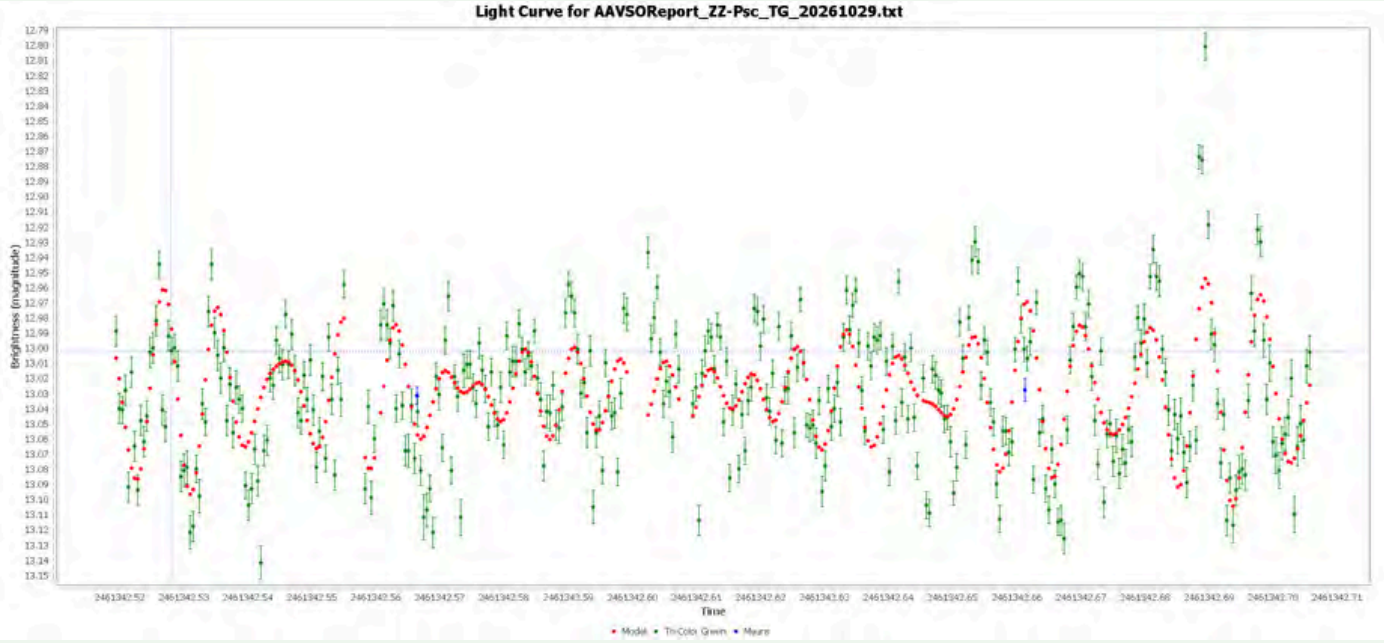
BY TIM MILLER

Last year at the 2025 Astronomy at the Beach, I was asking fellow Lowbrow Norbert Vance about opportunities for amateurs to participate in citizen science. He steered me in the direction of the American Association of Variable Star Observers (AAVSO). What started as a casual interest has evolved into a new avenue for my activity with the cosmos. What follows is a combination of what I am doing with the AAVSO, how participation works, a brief description of the equipment needed, and my own thoughts at this moment in time.

Stellar evolution has always been an area of interest to me. The more I learn, the more I understand that the pursuit of understanding how stars evolve, and how they came to exist in the state they are in at this moment in time, is paramount to understanding the evolution of the cosmos. Stars are the driving force and provide the energy and abundance of elemental and molecular diversity we find all around us. It is amazing to someone like me, who has an empirical mind but not the formal training in the math and processes involved in research, that the simple recording of data on the ariability of stars can be combined with so many other kinds of data gathered through space telescopes and specialized ground-based mountaintop telescopes. The combination of these data streams allows us to understand the internal structures and processes going on inside stars.

The purpose of the AAVSO is to assist in the data-gathering part. The equipment amateur astronomers use is well within the capabilities needed to gather scientifically accurate data for this purpose. In addition, the huge amount of data required to accurately map out the light curves of stars would not be financially practical using mountaintop telescopes alone. This makes the mission of the AAVSO all the more important.

The opportunities to participate in the AAVSO are many, from those who choose to make a sizable financial commitment to equipment capable of handling just about all kinds of data, from spectroscopy to multiple-band photometry, to those who wish to participate visually in estimating the brightness of stars, to myself, who is in the middle of the pack. For those who wish to go the visual route, the AAVSO provides a robust visual observation program complete with finder charts, an extensive searchable database, and special interest groups, each focused on a different kind of variable. The AAVSO also provides comprehensive guidance on the processes and skills needed. The Astronomical League also has a variable star program with its observations tied to the AAVSO. Check that out also if you are interested.



ZZ_Psc VStar Period Analysis 810, 790 and 610 second periods

PHOTOMETRY continues, p. 3

PHOTOMETRY continues...

Myself, I have been participating in two main areas. One of the things that has made this particularly interesting is that I have been able to use much of the same equipment I already had for astrophotography. I didn't start out with the intention of doing scientific photometry, and there has been a learning curve in adapting the equipment and developing the processing methods. However, it has been surprising to me just how capable this equipment is for gathering useful scientific data.

Using the astro imaging rig, I started doing single-target photometry within the special interest group of Long Period Variables (Mira-type stars). Most of these have been extensively studied and are no longer the focus of intensive research. However, these stars need to be continuously monitored, as some have begun to exhibit period changes even within the 100 years or so since their discovery and analysis. The Long Period Variable (LPV) group does just this: target the stars every 10 days or so and submit the analysis.

Researchers post Observing Campaigns within the organization. These "calls for data" vary from photometry to spectroscopy and have varying precision requirements. I am currently participating in the study of ZZ Psc, a benchmark 13th-magnitude white dwarf star for the accretion of rocky debris. The researcher has James Webb Space Telescope time coming up in the November new moon cycle and has requested ground-based observations with exposures of less than 40 seconds and a precision of 0.01 magnitude. I have managed to squeak in at a 0.008–0.009 magnitude error with these observations.

These are known as "time-series" observations, where the request is to image the target for as long as possible to allow for period analysis. ZZ Psc is exhibiting periods from 100 to 1,000 seconds, and the researcher reports that it may have over 100 superimposed periods within it. Thus, the JWST observations will be conducted at an extremely high cadence and accuracy. The ground-based observations are there to assist in the recognition of the longer primary oscillations of ZZ Psc. I will report more on this as the study evolves.

There are other calls for data. One example involves monitoring Cataclysmic Variables for what are called "low states," when the brightness of a star system drops significantly. In one current campaign, researchers are asking amateurs to monitor a list of 18 such systems and report when one enters a prolonged low state. This would trigger observations using the XMM-Newton X-ray space telescope. The researcher explains the importance of amateur observations in the request:

> ***"The program will be triggered when a pronounced low state, persisting for more than a week, is identified in one of these targets. In this effort, AAVSO observations would be extremely valuable, and I would be very grateful for the support of observers in monitoring these systems and helping identify a suitable trigger."***

This is another good example of how observations made by amateurs can play a part in research being conducted with major professional observatories.

The process used in the analysis is called Differential Photometry. Images need careful calibration to remove the effects of the camera's electronic noise and variations in sensitivity across the sensor. In my case, using a color camera, the images are calibrated using dark and flat frames, along with flat-darks. They are then debayered and plate-solved, with a calculation of airmass (a measure of the amount of atmosphere the light has traveled through, directly related to the altitude of the star in the sky).

The header of the FITS image must have keywords written for the observer code (AAVSO gives you a unique identifier for free), the object name, and the filter the image was taken with. AAVSO has an online application called VPhot, where these images are loaded for analysis.

Once an image is open, the target variables within the image are easily loaded and marked. Comparison stars of known magnitude, preferably with colors similar to the target variable, are also loaded. There is an aperture circle surrounding the variable and a second ring surrounding that. The program measures the ADU (digital counts from the pixels) inside the aperture, subtracts the background measured in the outer ring, and compares the result with comparison stars of known magnitude.

PHOTOMETRY continues, p. 4

The user also chooses one of the comparison stars to be a check star. The check star is measured against the other comparison stars in the same manner as the variable, and the result is compared with its own catalogued magnitude to help determine the accuracy of the measurements. This part is a relatively simple process.

For those doing visual observations, AAVSO provides charts with the target and comparison stars. The trained eye can then determine the magnitude of the target visually. For the time-series work, the same process is used, but the user determines the selection of comparison stars and a check star that gives the best results. The program then applies this to all the images for analysis.

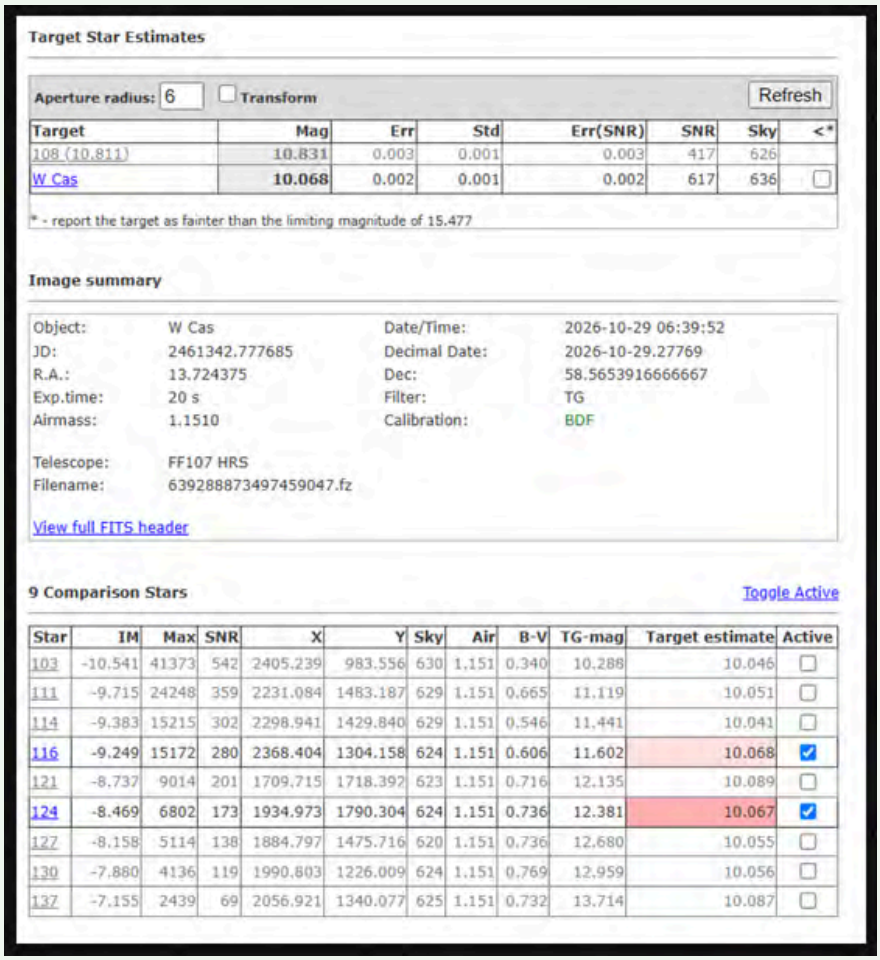
AAVSO provides an application called VStar for period analysis. I am in the beginning stages of learning this process. I have done a couple of analyses of ZZ Psc for the three largest periods found in the data. These are not necessarily the actual oscillations of the star, but rather simply what my data tells me. The researcher will be going through the thousands of observations to come to a conclusion on that question.

There are two basic equipment approaches for this work. The first would involve a monochrome camera with dedicated photometry filters. There are multiple bandpass filters for this work. These are quite expensive; a set of photometry filters can set you back about $3K.

The other route is to use a color camera. This is the route I am taking, where, after the calibration of the frames, the green channel is separated and used for the measurements. The blue and red channels can also be used, but this is not as prevalent. The green channel of a color sensor has a response somewhat similar to the standard Johnson V (green) photometry filter. The two are not exactly the same, but the green channel can still be used to gather useful photometric data.

The designation TG, for tricolor green, is put into the header of the FITS file prior to submission to VPhot for analysis. TG observations are reported as such, rather than as standard Johnson V measurements. Although some researchers might prefer one filter over another, there are campaigns where they welcome multiple bands.

AT RIGHT: VPhot Single Target Photometry Analysis Report.



Target Star Estimates

Aperture radius: 6 ☐ Transform Refresh

Target	Mag	Err	Std	Err(SNR)	SNR	Sky	<*
108 (10.811)	10.831	0.003	0.001	0.003	417	626	
W Cas	10.068	0.002	0.001	0.002	617	636	☐

* - report the target as fainter than the limiting magnitude of 15.477

Image summary

Object:	W Cas	Date/Time:	2026-10-29 06:39:52
JD:	2461342.777685	Decimal Date:	2026-10-29.27769
R.A.:	13.724375	Dec:	58.5653916666667
Exp.time:	20 s	Filter:	TG
Airmass:	1.1510	Calibration:	BDF
Telescope:	FF107 HRS		
Filename:	639288873497459047.fz		

View full FITS header

9 Comparison Stars Toggle Active

Star	IM	Max	SNR	X	Y	Sky	Air	B-V	TG-mag	Target estimate	Active
103	-10.541	41373	542	2405.239	983.556	630	1.151	0.340	10.288	10.046	☐
111	-9.715	24248	359	2231.084	1483.187	629	1.151	0.665	11.119	10.051	☐
114	-9.383	15215	302	2298.941	1429.840	629	1.151	0.546	11.441	10.041	☐
116	-9.249	15172	280	2368.404	1304.158	624	1.151	0.606	11.602	10.068	☑
121	-8.737	9014	201	1709.715	1718.392	623	1.151	0.716	12.135	10.089	☐
124	-8.469	6802	173	1934.973	1790.304	624	1.151	0.736	12.381	10.067	☑
127	-8.158	5114	138	1884.797	1475.716	620	1.151	0.736	12.680	10.055	☐
130	-7.880	4136	119	1990.803	1226.009	624	1.151	0.769	12.959	10.056	☐
137	-7.155	2439	69	2056.921	1340.077	625	1.151	0.732	13.714	10.087	☐

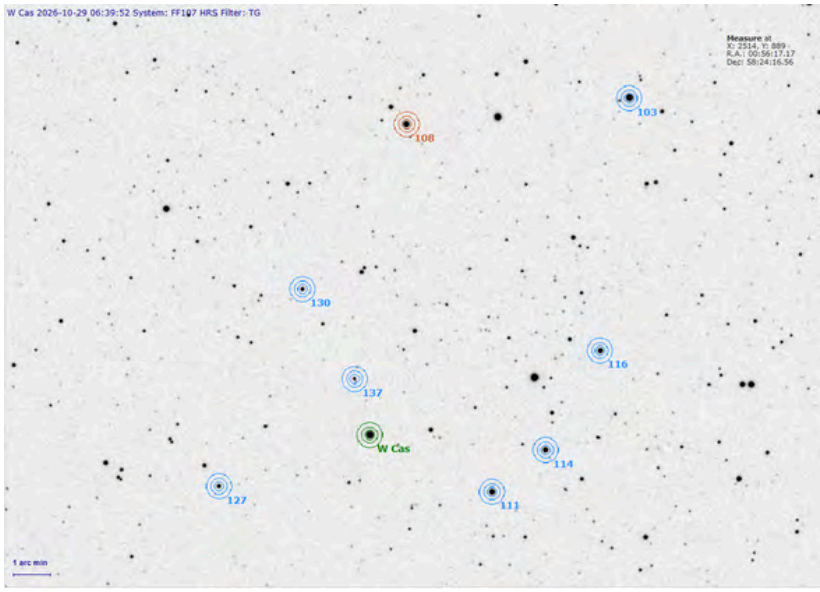
PHOTOMETRY continues, p. 5

PHOTOMETRY continues...

I have created a set of Python scripts that use Siril's functions to do the batch processing. I would be happy to share these with any who want to begin this. I can see some very good uses of smart telescopes for this work. There are a few observers I have come across on the forums who are using smart telescopes for this purpose. Smart telescopes can save the raw frames without the scope doing any processing. From this point, the workflow becomes the same.

In conclusion, observing variables and participating in the programs from the AAVSO is turning out to be an interesting way to observe and learn about the cosmos and contribute to research. Honestly, I am at the edge of the field where the weeds just begin. I am open to having my brain picked by any of you who may be interested in this manner of observing. ❑

For more information, see aavso.org



VPhot Single Observation Main Photometry screen

UPCOMING SPEAKER SCHEDULE

November 20: Sebastian Garcia

Topic: Telescopius Software Update

December 18: Jim Shedlowski

Topic: From Peenemunde to the Moon

January 15: Cayanne Matt

Topic: Evolution of scaling relations between galaxy properties and supermassive black hole mass

February 19: Dr. Edwin (Ted) Bergin, UofM Astronomy Chair

Topic: PRIMA mission update

March 19: TBA

April 16: TBA

WHAT A DARK SKY MEANS: FEATURING THE DARK SKIES OF OKIE-TEX

BY ADRIAN BRADLEY

If you are a longtime club member, you have been asked to join a small contingent of Lowbrows for a trek across the country to a little spot in Kenton, Oklahoma. At the not-so-world famous Camp Billy Joe, The Oklahoma City Astronomy Club holds an 8-day event called the Okie-Tex Star Party (OTSP).

"But why?" You may ask. "Isn't it dark enough in the northern parts of Michigan? Won't I see the same sky out there that I can see over the lakes here? Why travel ~1900 miles one way for that when I can just take a lot more frames and longer exposures here – or do some great visual stuff in Northern Michigan at the Great Lakes Star Gaze? I mean, I can see all kinds of stuff through the scope and get really good images there! I don't have to travel as far and I can see the Milky Way clearly!"

You wouldn't be far from wrong.

But I think you would still be missing out!

Below I have a couple of images and used the same method for getting them. A stack of 60 frames, taken at 10 seconds per frame, ISO 6400, f/2.8, on a tripod, using the same modified Canon 6D and 16-35mm f/2.8 at 16mm. I picked a dark area on the side of the road in Kansas, about 44 miles out from Kansas City. Visually I could see both the large and small Saggitarius Star Clouds (the latter also known as M24), M6 and M7, some dust lanes within the Scutum Region, the CoatHanger, and the Andromeda Galaxy – all naked eye. To me this describes well the type of skies we see in northern Michigan, so I thought it made a good comparison shot.

Then, stopping around 44 miles from Kenton, Oklahoma, I took the same type of image with the same settings and processing methods (using Photoshop to bring out the Milky Way a little more, then Lightroom Classic for tweaking both the foreground and sky in the same manner.) I even tried to take the image of the Milky Way at the same time of night.



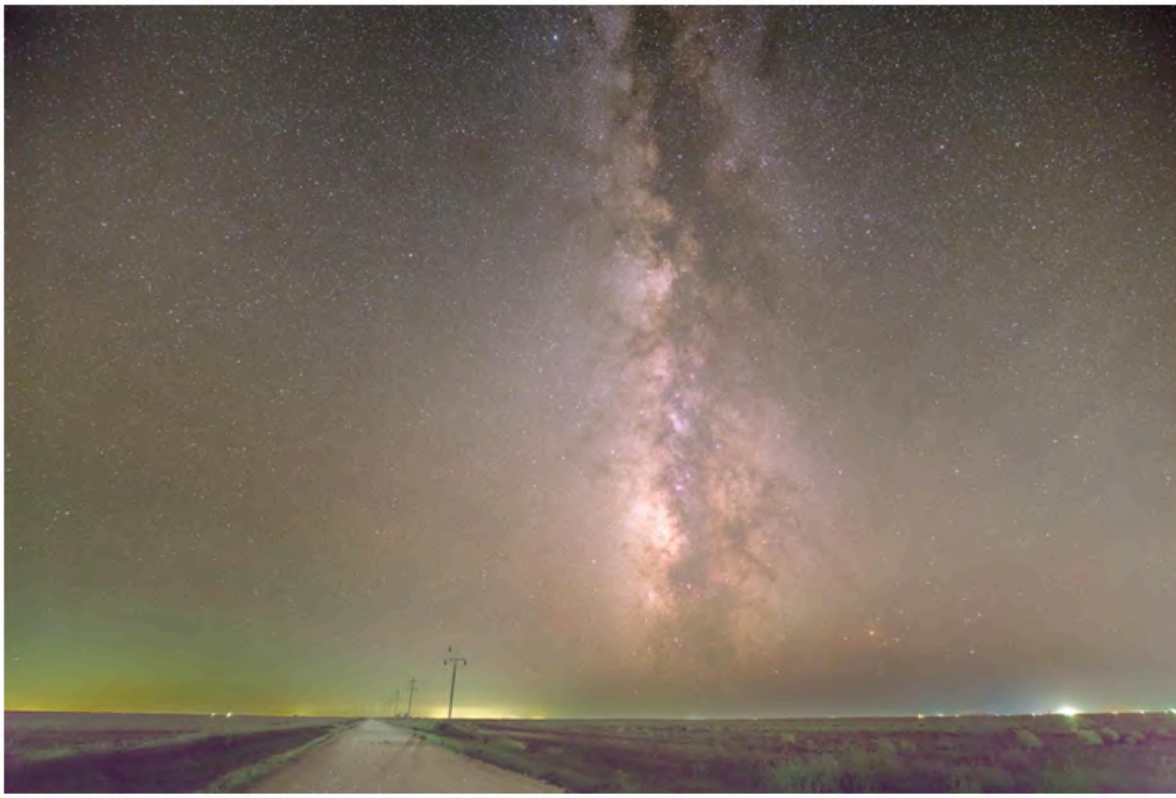
Side of the road somewhere in Southeastern Kansas

WHAT A DARK SKY MEANS continues., p. 7

WHAT A DARK SKY MEANS continues...

Note the differences in color and structure of the Milky Way taken outside of Kenton (right), as opposed to that spot in Kansas (previous page).

"So what's the difference, other than a blotchy, noise-ridden foreground that's flat and almost lifeless? In the Kansas image you have trees and signs of life along that highway. I think the first shot is better! And what the heck is that green stuff on the lower left?



Side of the road in Oklahoma near Kenton

That can't be aurora since you're facing south..."

Raise your hand if you were thinking exactly that after looking at the two pictures. You wouldn't necessarily be wrong.

But now look at the Milky Way in both pictures. One barely sticks out of the sky background, with a midnight blue sky color. The other features a brighter galactic plane with more pinkish Ha color and dust lanes that are a shade darker than the sky itself, which has a greyish tone. This is an indicator that more starlight from this part of the Milky Way is making it to Earth, and into your retinas and camera sensors.

Look up what those sky colors mean in terms of Bortle zones. You'll find that one corresponds somewhere between 3-5, and the other corresponds to 2. Greyish skies used to correspond to Bortle 1, but that scale has been shifted in some texts to indicate a Bortle 2 sky now.

The Difference

Once you get to the Panhandle of Oklahoma, you are at roughly 4400ft of elevation. This means clear nights will automatically have more transparency – you are higher up compared to sea level – and that means less atmosphere to go through when looking up. It makes a difference in how much of the Milky Way is naked eye visible to most humans.

Your limiting magnitude based on your eyesight may not change much. Like myself, even in skies as dark as in Kenton and Black Mesa, Oklahoma, I still have trouble viewing the 5th magnitude star, Anwar El Farkadain, in the bowl of the Little Dipper. But I was able to use averted vision to spot M13 and M33. The other objects that I could also see in Kansas (and therefore northern Michigan) skies were of course still visible and easily spotted.

The photons do not move any faster or differently down to Kenton, Oklahoma. They have less competition from other light sources washing them out. That means, visual astronomy becomes easier as DSOs exhibit more of their characteristics, such as spiral arms in galaxies, or color in some planetary nebulae. For those who now want to look for objects that are much fainter than back home in Michigan, the light from those faint objects is less likely to be washed out. A keen and experienced visual eye can now spot those fainter fuzzies of a higher number magnitude (remember, +16 is faint, -12 is the moon near full.

Many visual observers bring along a list of faint objects in space that are washed out by skies back here in Michigan. While the skies are not always pristine, they are devoid of nearby city light. The amount of DSO nebulosity/glow that can be viewed is greater.

WHAT A DARK SKY MEANS continues.,p. 8

As for imaging, it takes less overall integration time to get the same data. This also means you can stretch the capabilities of your rig to get more detail on everything from dust lanes to inner regions of planetaries and other small DSOs. While you may never get quite as much data as the space telescopes and professional observatories, such as those at Kitt's Peak, you can still gather more data on your favorite targets than you usually get – or you can go after new targets that seemed to be too faint for your rig back home here in Michigan. The portable smartscopes that have come out at the time of this writing are great travel buddies to these dark skies. Given some hours of time, you may get more detail than you imagined your smart scope could get.

In Conclusion

Pockets of dark skies like these are becoming fewer and farther between with big businesses lighting up the night for one reason or another. Even just outside of Black Mesa, you can see bright lights sitting on farmland, overlooking a drainage ditch. It would take many more lumens – those of a large enough city like East Lansing, MI – for a place like Kenton/Black Mesa to lose it's dark status and change the sky color. My hopes are that it never happens and we continue to have the opportunity to go see what 'truly dark skies' looks like. ❑



In Black Mesa, the Milky Way appears even with a waxing crescent moon. Image taken with a 4 second exposure, ISO 6400, f/2.8. The moon glows with longer exposures, but doesn't wash out the Milky Way. This is another way to tell how dark a sky is.

A FEW PHOTOS FROM CLUB MEMBERS



TIM MILLER: Above, M16, taken at OTSP. FF 107 scope, FL = 749, 2x Drizzle, about 3h27m total integration, combination of 60, 120 and 240 s subs. This one behaved much better with the SyQon and Veralux tools. I did about 1/3 of the subs with broadband and the remainder with the Antlia Triband filter. This gave some depth to the color palate.



GINIA FORRESTER. Above, M33, the Triangulum Galaxy

Below left: Milky Way on the first night at OTSP



MINERAL MOON continues from p 1

Acquisition
Mode: lucky imaging, SER video, RAW8, 2200x2160 ROI
Gain 99, exposure 1.75 ms, ~47 fps
Captured: 6,000 frames (3 videos x 2,000)
Stacked: best 1,800 frames (30%)
Calibration: 50 darks, 50 flats, 50 dark flats

Processing
Siril 1.4 plus custom Python (NumPy/OpenCV)
- Frame quality scoring and selection
- Sub-pixel alignment and stacking
- R/B realignment for atmospheric dispersion (0.7 px)
- Blue halo matching to suppress false color around bright features
- Multi-scale wavelet sharpening (luminance)
- Color separated from luminance, denoised, then saturation boosted ~22x ❑

AI IN AMATEUR ASTRONOMY

Lowbrow member **R. Stencel** recommends the following talk and materials on how AI might be used in observing preparation, execution, and reporting results. The talk is from the Cheyenne, Wyoming Astro society (CAS). Below is a link to the talk on YouTube and some screenshots from their presentation. ❑

Video of the presentation:
https://www.youtube.com/watch?v=E8UrFM6HSY4

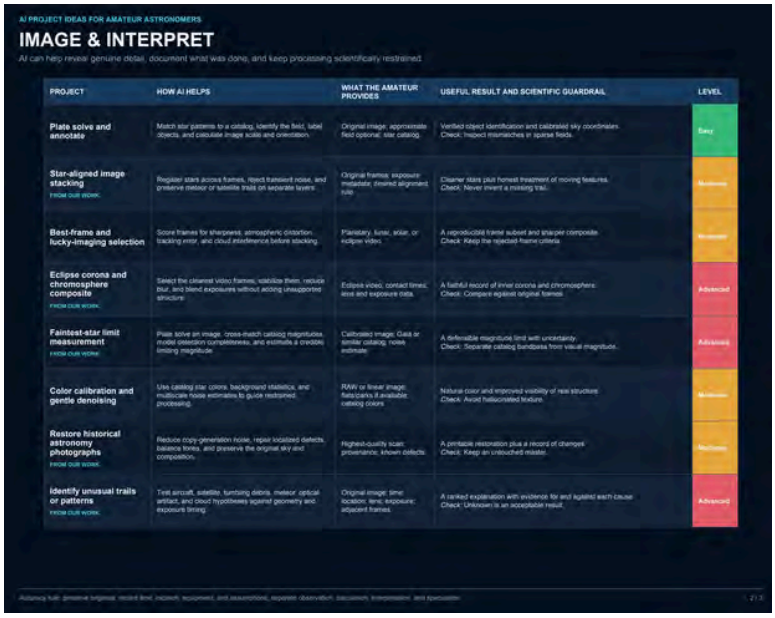


AI PROJECT IDEAS FOR AMATEUR ASTRONOMERS

OBSERVE & PLAN

AI can turn a location, date, and equipment list into a personalized observing opportunity.

PROJECT	HOW AI HELPS	WHAT THE AMATEUR PROVIDES	USEFUL RESULT AND SCIENTIFIC GUARDRAIL	LEVEL
Personal sky planner	Build a nightly list from location, horizon, Moon phase, object altitude, equipment, and available time.	Location; date; horizon; binocular or telescope limits.	A ranked plan with observing windows and finder notes. Check: Verify coordinates and time zone.	Easy
Naked-eye planet conjunctions FROM OUR WORK	Search many years for two- or three-planet groupings that fit inside chosen angular circles and meet visibility constraints.	Location; date span; circle size; Sun elongation; horizon.	A short event calendar with separation, altitude, azimuth, and brightness. Check: Recompute near the event.	Moderate
Asteroid occultation calendar FROM OUR WORK	Filter occultations by star magnitude, asteroid size, predicted track, altitude, twilight, and observer location.	Coordinates; date range; magnitude cutoff; prediction catalog.	A practical target list with uncertainty and timing needs. Check: Tracks can shift before the event.	Moderate
Total-eclipse frequency maps FROM OUR WORK	Count and map paths of totality over centuries, test city-distance rules, and locate unusually frequent or sparse regions.	Ephemerides; map boundaries; time interval; distance rule.	Heat maps, rankings, and recurrence statistics. Check: Long-range Delta-T uncertainty matters.	Advanced
Meteor-shower session planner	Combine radiant position, Moon interference, expected rates, local darkness, and camera field of view.	Location; shower; camera/lens; sky quality; forecast.	Best observing interval, pointing direction, and capture settings. Check: Zenithal rates are not guaranteed counts.	Easy
Comet and asteroid visibility	Rank targets by magnitude, angular motion, altitude, Moon distance, and suitability for visual or photographic observing.	Orbital catalog; equipment aperture; limiting magnitude.	A changing watch list with finder charts and revisit dates. Check: Comet brightness is uncertain.	Moderate
Satellite and re-entry investigation	Compare an observed trail with satellite passes, aircraft geometry, exposure timing, and possible re-entry reports.	Exact time; location; image; exposure; calibrated field.	Candidate matches and motion estimates. Check: Identification requires timing and geometry.	Moderate
Seeing and transparency forecast	Combine weather profiles, jet-stream winds, cloud cover, humidity, smoke, and local observing history.	Forecast soundings; satellite data; local observing log.	A probability-based choice of targets and equipment. Check: Local seeing can defeat broad forecasts.	Moderate

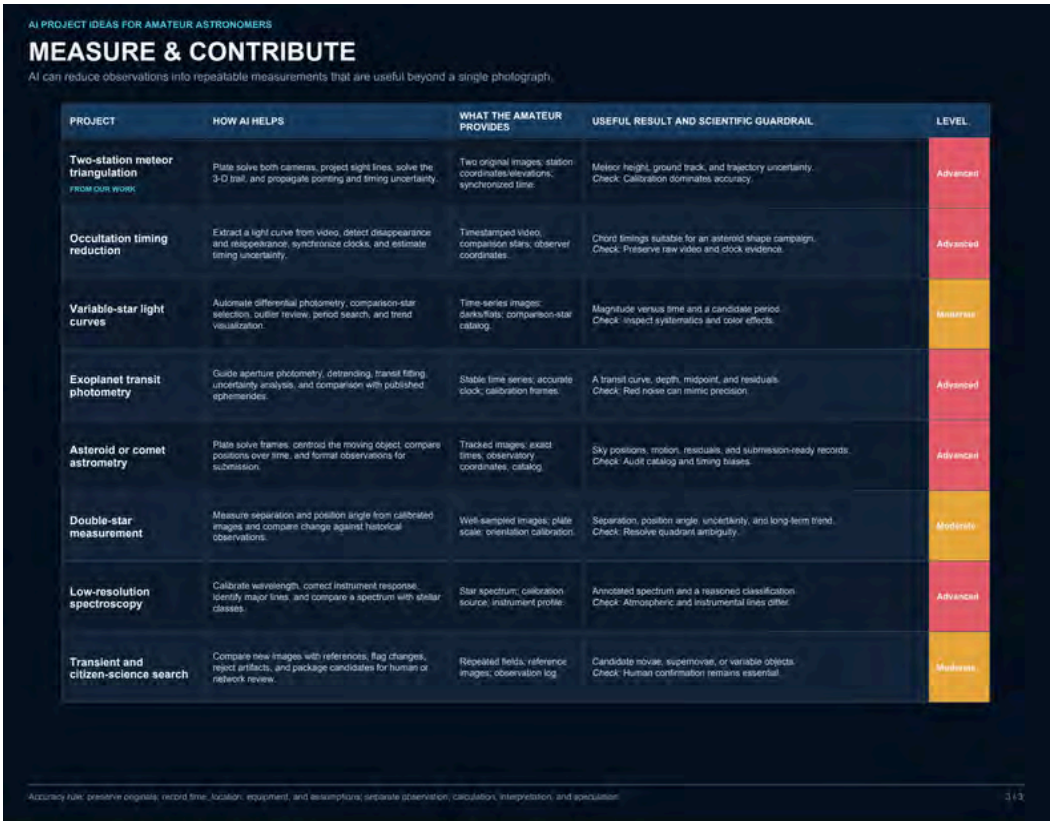


AI PROJECT IDEAS FOR AMATEUR ASTRONOMERS

IMAGE & INTERPRET

AI can help reveal genuine detail, document what was done, and keep processing scientifically restrained.

PROJECT	HOW AI HELPS	WHAT THE AMATEUR PROVIDES	USEFUL RESULT AND SCIENTIFIC GUARDRAIL	LEVEL
Plate solve and annotate	Match star patterns to a catalog, identify the field, label objects, and calculate image scale and orientation.	Original image; approximate field optional; star catalog.	Verified object identification and calibrated sky coordinates. Check: Inspect mismatches in sparse fields.	Easy
Star-aligned image stacking FROM OUR WORK	Register stars across frames, reject transient noise, and preserve meteor or satellite trails on separate layers.	Original frames; exposure metadata; desired alignment rule.	Cleaner stars plus honest treatment of moving features. Check: Never invent a missing trail.	Moderate
Best-frame and lucky-imaging selection	Score frames for sharpness, atmospheric distortion, tracking error, and cloud interference before stacking.	Planetary, lunar, solar, or eclipse video.	A reproducible frame subset and sharper composite. Check: Keep the rejected-frame criteria.	Moderate
Eclipse corona and chromosphere composite FROM OUR WORK	Select the cleanest video frames, stabilize them, reduce blur, and blend exposures without adding unsupported structure.	Eclipse video; contact times; lens and exposure data.	A faithful record of inner corona and chromosphere. Check: Compare against original frames.	Advanced
Faintest-star limit measurement FROM OUR WORK	Plate solve an image, cross-match catalog magnitudes, model detection completeness, and estimate a credible limiting magnitude.	Calibrated image; Gaia or similar catalog; noise estimate.	A defensible magnitude limit with uncertainty. Check: Separate catalog bandpass from visual magnitude.	Advanced
Color calibration and gentle denoising	Use catalog star colors, background statistics, and multiscale noise estimates to guide restrained processing.	RAW or linear image; flats/darks if available; catalog colors.	Natural color and improved visibility of real structure. Check: Avoid hallucinated texture.	Moderate
Restore historical astronomy photographs FROM OUR WORK	Reduce copy-generation noise, repair localized defects, balance tonks, and preserve the original sky and composition.	Highest-quality scan; provenance; known defects.	A printable restoration plus a record of changes. Check: Keep an untouched master.	Moderate
Identify unusual trails or patterns FROM OUR WORK	Test aircraft, satellite, tumbling debris, meteor, optical artifact, and cloud hypotheses against geometry and exposure timing.	Original image; time; location; lens; exposure; adjacent frames.	A ranked explanation with evidence for and against each cause. Check: Unknown is an acceptable result.	Advanced



AI PROJECT IDEAS FOR AMATEUR ASTRONOMERS

MEASURE & CONTRIBUTE

AI can reduce observations into repeatable measurements that are useful beyond a single photograph.

PROJECT	HOW AI HELPS	WHAT THE AMATEUR PROVIDES	USEFUL RESULT AND SCIENTIFIC GUARDRAIL	LEVEL
Two-station meteor triangulation FROM OUR WORK	Plate solve both cameras, project sight lines, solve the 3-D trail, and propagate pointing and timing uncertainty.	Two original images; station coordinates/elevations; synchronized time.	Meteor height, ground track, and trajectory uncertainty. Check: Calibration dominates accuracy.	Advanced
Occultation timing reduction	Extract a light curve from video, detect disappearance and reappearance, synchronize clocks, and estimate timing uncertainty.	Timestamped video; comparison stars; observer coordinates.	Chord timings suitable for an asteroid shape campaign. Check: Preserve raw video and clock evidence.	Advanced
Variable-star light curves	Automate differential photometry, comparison-star selection, outlier review, period search, and trend visualization.	Time-series images; darks/flats; comparison-star catalog.	Magnitude versus time and a candidate period. Check: Inspect systematics and color effects.	Moderate
Exoplanet transit photometry	Guide aperture photometry, detrending, transit fitting, uncertainty analysis, and comparison with published ephemerides.	Stable time series; accurate clock; calibration frames.	A transit curve, depth, midpoint, and residuals. Check: Red noise can mimic precision.	Advanced
Asteroid or comet astrometry	Plate solve frames, centroid the moving object, compare positions over time, and format observations for submission.	Tracked images; exact times; observatory coordinates; catalog.	Sky positions, motion, residuals, and submission-ready records. Check: Audit catalog and timing biases.	Advanced
Double-star measurement	Measure separation and position angle from calibrated images and compare change against historical observations.	Well-sampled images; plate scale; orientation calibration.	Separation, position angle, uncertainty, and long-term trend. Check: Resolve quadrant ambiguity.	Moderate
Low-resolution spectroscopy	Calibrate wavelength, correct instrument response, identify major lines, and compare a spectrum with stellar classes.	Star spectrum; calibration source; instrument profile.	Annotated spectrum and a reasoned classification. Check: Atmospheric and instrumental lines differ.	Advanced
Transient and citizen-science search	Compare new images with references, flag changes, reject artifacts, and package candidates for human or network review.	Repeated fields; reference images; observation log.	Candidate novae, supernovae, or variable objects. Check: Human confirmation remains essential.	Moderate

University Lowbrow Astronomers
Oct 16 meeting minutes.
Recorded by Don Fohey

The October meeting was held at the Judy & Stanley Frankel Detroit Observatory. President Charles Nielsen began the meeting at 7:35pm. He introduced Jim Shedlowski who was to talk about Peenemunde, where the father of all modern rocketry, the German V-2 was developed. He will also have a sequel in December. Jim's presentation was titled. "Peenemunde...The Birthplace of Space Travel."

Charlie began the business meeting at 8:50pm.

President Charlie Nielsen Reported:

There is a planned Peach Mt. Open house in November and Lowbrows will be needed to help.

He received letter from Br. Guy and the Vatican Observatory thanking the Lowbrows for our club's latest donation of $400.

He had a note from John Wallbank the president of GLAAC for the Lowbrows contribution and member participation in the Astronomy at the Beach event.

He thanked Ken Cook for recruiting Dr. Ed Bergin, Chair of the UofM Astronomy Department for our February speaker. He explained we have no speakers scheduled for March or beyond and asked members to help recruit future speakers. Don Fohey said he would again try and recruit astrophysicist Ethan Siegel.

Observatory Director Jack Brisbin Reported:

The Wasp/Hornet nest has be eradicated from the observatory. He received several stings in the process. All is well with the observatory.

Online Coordinator Jeff Komanis Reported:

He officially retired from UofM on Oct 8th. His UofM authorizations have been disabled. We can continue to use the UofM email system that we currently use. Our UofM Zoom license is no longer valid. Tonight we are using WhereBy.com for video conferencing. It seems to work just fine and we are likely to continue with it. Whereby.com is $10.99/month. Another system that may be tried is GotoMeeting.

Vice President Ken Cook Reported:

The October 3rd Open House at Peach Mt. was a success with many Lowbrows and public attending.

Vice President Don Fohey Reported:

He held a members only night at Peach Mt. on Wednesday Oct 7th. Jack Brisbin had the observatory open and 9 Lowbrows enjoyed the evening.

Member Doug Warshow gave an astronomy puzzle book and electronic editions of Sky and Telescope to two members.

The meeting adjourned at 9:10pm

Treasurer Doug Scobel Reported via email:

- We have 211 memberships.
- I made our usual monthly payment each month to AT&T for our Open House "hotline".
- I purchased Tele Vue 17.3 mm and 10 mm Delos eyepieces, and a Tele Vue 2.5x Powermate, all from Enerdyne in Suttons Bay, MI. They are to be used with the telescope donated to the club by Lowbrow member Dr. Stanley Watson. The total cost was $1,065.28. All three were delivered to Lowbrow Tim Miller, who is the current custodian of that telescope.
- I reimbursed Tim Miller $156.17 for two equipment cases to hold the telescope and the eyepieces.
- I reimbursed observatory director Jack Brisbin for wasp and hornet spray and a heat lamp for the observatory.
- I pre-ordered 23 each of the 2027 editions of the RASC observer's handbooks and calendars, for purchase by members. The cost was $1081.00. Jeff Kopmanis has graciously volunteered to distribute them again this year, some time in December. As of this writing we have 13 handbooks and 14 calendars available to reserve.

As always, the records I keep are open for any and all Lowbrow members to examine.

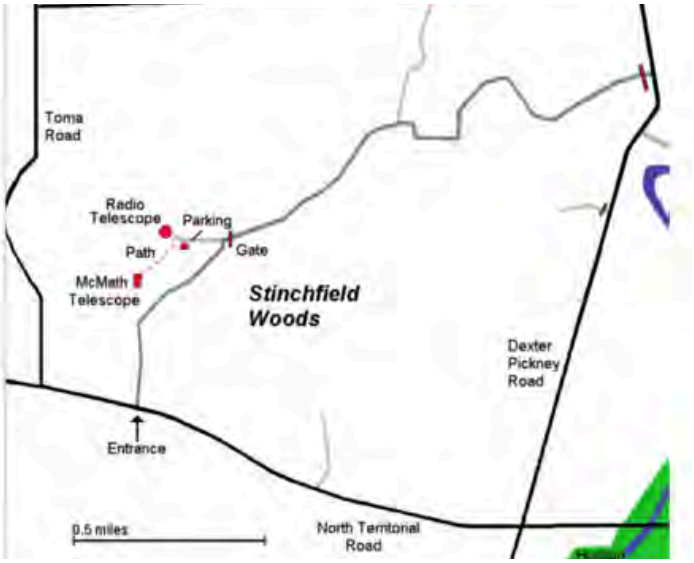
Max	**3**	**25**
Percent	10.71%	89.29%
Total	28	



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.

Telephone Numbers:

President:	Charlie Nielsen (734) 747-6585
Vice President:	Don Fohey
	Brian Ottum
	Ken Cook
	Tim Miller
Treasurer:	Doug Scobel
Observatory Director:	Jack Brisbin
Newsletter Editor:	Amy Cantu
Key-holders:	Jim Forrester
	Jack Brisbin
	Charlie Nielsen
Webmaster:	Barry Chapman
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