REFLECTIONS / REFRACTIONS

University Lowbrow Astronomers Monthly Newsletter

April 2023, Vol 47, Issue 4

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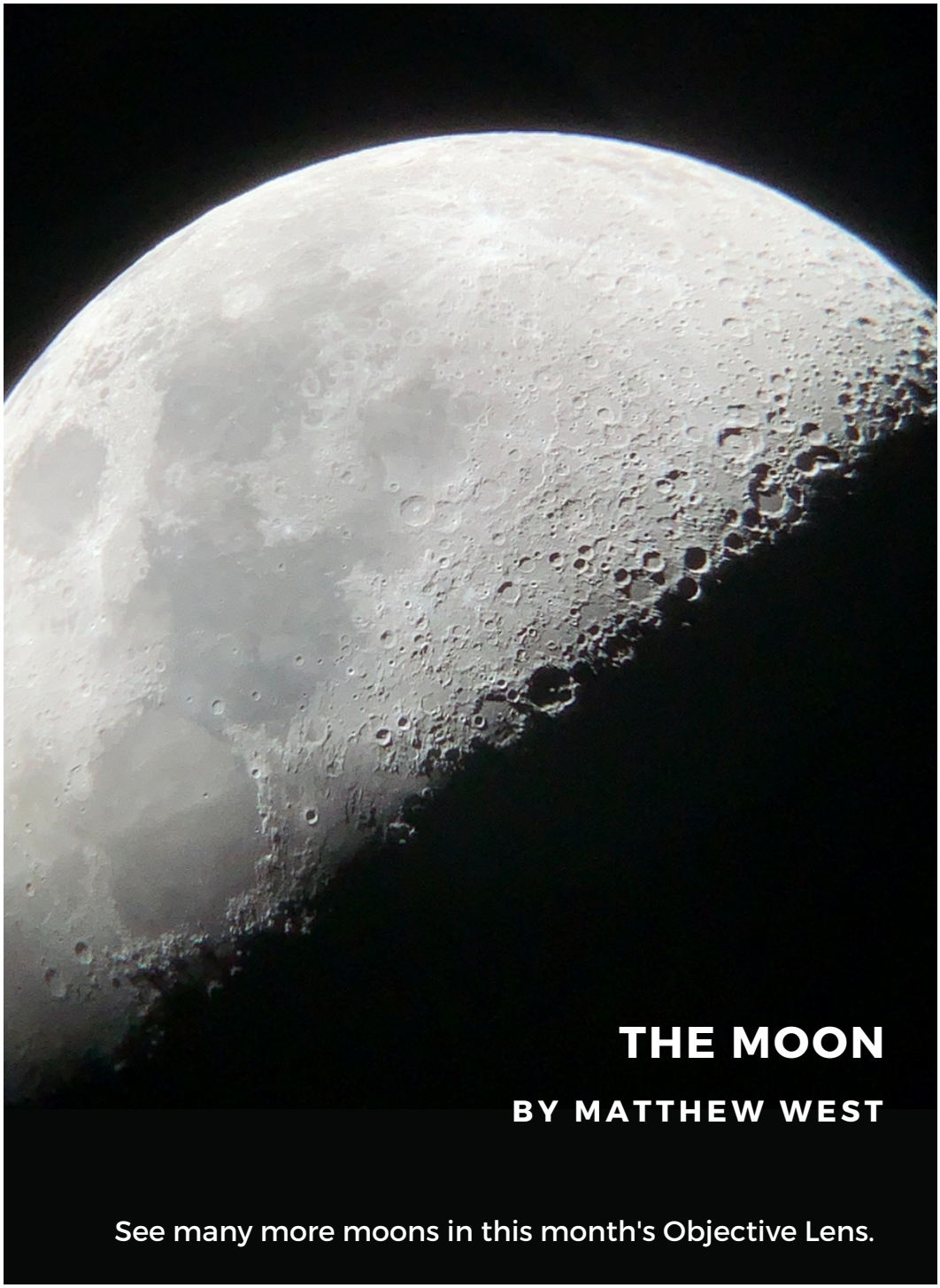


THE MOON

BY MATTHEW WEST

See many more moons in this month's Objective Lens.

2023 OBSERVING AT PEACH MOUNTAIN

BY JIM FORRESTER

Slowly, slowly, slowly spring is coming to Ann Arbor. April evening temperatures will still be chilly, but well above freezing. And with the warming, the photon-starved emerge to gorge on the wonders of the night sky.

Two programs will launch this month to serve both members and the public alike.

The 2023 Open House schedule begins with events on April 15 and April 22. As the pandemic has all but obliterated our public events over the past three years, a review is in order. The public is invited beginning at sunset and, nominally, the evening ends at 12:30 AM. However, the night often runs later to accommodate late arrivals and allow members -- many of whom can only come out on weekend nights -- to observe much later. Whether an evening's event is to take place is announced with an email by 4:00 PM on the day of the event with an updated recording on the Lowbrow Hotline.

Two members are responsible for each Open House. The **Open House Coordinator (OHC**) makes sure cars are properly parked and all guests are welcomed; oriented to the property (where the scopes are set up, how to find the Observatory); and informed of star party etiquette. The **McMath Operator** runs the big scope and maintains order in the building.

Here are some particulars:

1) The public (and members without equipment) park on the grass shoulder below the crest of the hill. Traffic cones, placed in the road by the OHC, designate the limit of vehicular traffic. Cars are parked nosing into the woods to limit the effect of their lights when exiting.

2) Star Party Etiquette consists of a series of "don'ts" along with a few "dos."

A. Vehicle speed on the Hill is walking speed. It is impossible to see pedestrians at higher speeds.

B. No alcohol or fire of any kind (smoking, fireworks); controlled substances; or firearms are permitted.

C. No white lights. This degrades night vision and reduces one's ability to see the stars in the sky as well as pick up the detail of images in the telescope. Well-adapted night vision also aids in walking over the Hill's rough ground. Dim, red flashlights are the only illumination allowed.

D. No running. This mostly applies to children as they bore easily waiting for the sky to darken. We don't want equipment damaged or people being damaged by running into equipment.

E. Ask permission to look through the equipment. Not every operator is ready to entertain visitors, so ask first.

F. Masking. The University no longer requires masks, but due to the tight environment in the Observatory and the age of many Operators, we ask that you wear masks in the building. At your own scope, mask if you feel the need, but don't expect the same of visitors.

G. Leave pets at home.

3) Not all of this is the responsibility of the OHC. All members are expected to help when asked.

Member nights are held at the discretion of the Key Holders and Officers. Since the Club only has 3 keys, and by agreement with the University only the Key Holders can possess their key, not every dark of the moon or clear night will be covered. But we'll make every effort to do so. The Key Holders are me, Observatory Director Jack Brisbin, and President Charlie Neilsen.

Notice of Member Nights is sometimes given well in advance, sometimes on the day of the event. Events are confirmed via email same day along with an opening time. The North Territorial Road gate will be false-locked. You are expected to close the gate behind you. The same rules of etiquette apply; most important, keep vehicle speed to walking speed. It's best to arrive before dark with equipment. If you do come late, stop before reaching the top of the Hill and find someone to walk you onto the field. You are welcome to observe adjacent to the Observatory or from the field next to the radio telescope.

Astrophotographers: You are welcome. Please give the evening's organizer advance notice that you are coming as it is usually best to separate the APs from the visual observers.

We're packing up by 2:00 AM on most Member Nights.

The 2023 Peach Mountain Open House Schedule:

April 15, 22	July 15, 22	October 7, 14
May 13, 20	August 12, 19.	November 4, 18
June 17, 24	September 9, 16	

Finally, let the Officers know if you would like to train to use the McMath or the 17.5-inch Dobsonian. We'll be glad to show you everything. These are fine instruments and they are begging to be used. ■

FROM THE DESK OF THE NORTHERN CROSS OBSERVATORY

BY DOUG BOCK

March 27-28, 2023

I collected data centered around M 100 to capture Ceres as it moved during the night. Messier 100 is a grand design intermediate spiral galaxy in the southern part of the northern Coma Berenices. It is one of the brightest and largest galaxies in the Virgo Cluster and is approximately 55 million light-years from our galaxy. Its diameter is 107,000 light years and about 60% as large.

Ceres is a dwarf planet in the asteroid belt between the orbits of Mars and Jupiter. It was the first asteroid discovered, on 1 January 1801, by Giuseppe Piazzi at Palermo Astronomical Observatory in Sicily when it was announced as a new planet.

Ceres is not a planet because it does not dominate its orbit, sharing as it does with the thousands of other asteroids in the asteroid belt and constituting only about 40% of the belt's total mass. ■

This is 68 x 120 second light frames, 24 dark frames, 64 flat frames. William optics 105mm f/7 APO refractor, ZWO asi2600mc pro camera, Losmandy G11 mount. Processed and plate solved in PixInsight.

INTRO TO ASTROPHOTOGRAPHY: TELESCOPES

BY JEFF KOPMANIS

Astronomy and astrophotography really boil down to two things: First, the object you're trying to photograph; and second, the tools you're using to see it. The tools include your telescope, tripod and mount, camera, and the software you use to capture the image and process it. Your technique and experience will make a difference in how well your final photos turn out. While you might get lucky with quick choices, success is often determined by thoughtful choices and diligence in their use.

If you're interested in taking shots of swaths of the night sky, a DSLR (digital single-lens reflex) camera with a wide-angle lens will work just fine. The Milky Way is a perfect example of this type of shot. My friend Adrian Bradley took the photo of the Milky Way (above right) from Michigan's Lake Hudson State Park with his DSLR on a tracking mount.

If you want to take pictures of smaller chunks of the sky, you'll want to "zoom in" to make these objects fill your field of view (FoV) as best you can. Telescopes take the place of the camera lens in this situation. And that said, all types of telescopes will do this basic zooming, but there are pros and cons with each type. Picking the right tool for the job will get you the results you're after.

There are a number of terms and concepts that help to describe the capabilities and limitations of each design so I'll be introducing those along the way in the description of each type of telescope.

Refractors

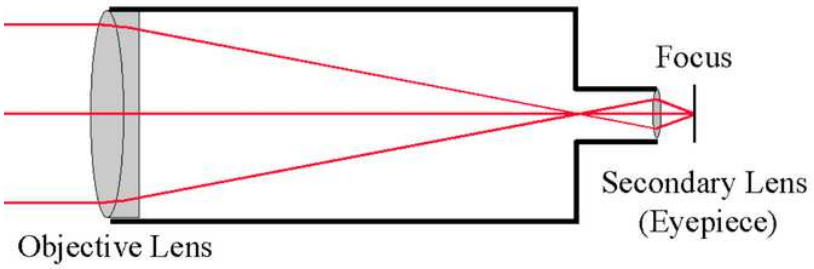
A refractor telescope is the one that everyone thinks of when they think of a telescope. Galileo invented the refracting telescope in 1609 and spent a lifetime discovering objects in the heavens. With his refractor, he researched the Moon, discovered Jupiter and its moons, and discovered the rotation of the Sun. A refracting telescope is the simplest design and I'll use it as an example to explain some of the characteristics common to all types of telescopes.

Photo of Milky Way at Lake Hudson, by Adrian Bradley

All telescopes have an eyepiece at one end. In refractors, the big end of the optical tube has one or more lenses that are referred to as the objective lens. When there is more than one lens, they are usually fused together for better optical qualities. The size, referred to as the aperture, and the shape or curvature of this lens will determine the view you get. You can think of a telescope as a light bucket, where the bigger the aperture, the more light you'll catch in the bucket.

The curvature of the objective lens will determine how wide the swath of sky is that the telescope can collect. A wide-angle lens might capture 65 degrees or more of the sky while a more focused lens might only deliver a few degrees, which is a very tiny patch of the sky. Most telescopes have relatively narrow views of less than 3 degrees.

Light comes in through the objective lens and is focused near the eyepiece, which then refocuses and sizes the image so that it projects onto your eye.



Light path of a refractor telescope. (Courtesy: OSU http://www.astronomy.ohio-state.edu/~pogge/Ast161/Au06/Unit4/telescopes.html)

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A typical refractor telescope. This is a "long tube" variety.

Refractors come in two styles, long and short, which is called the focal length of the telescope. In all telescopes, the shorter the tube, the less distance light has to travel, and therefore the quicker the system delivers light to your eye or camera sensor. This tube length, when divided by the aperture size will give you the focal ratio of the telescope. For example, if a telescope that is 2000mm long has a 200mm objective lens, it has a focal ratio of f/10. The smaller the focal ratio, the quicker the telescope delivers the image to your eye or camera sensor. This applies to ALL types of telescopes. This speed is a big factor in determining how long you need to expose your camera sensor to get a usable image, or if your eye will be able to see anything at all.

Short-tube refractors are considered fast, with focal ratios less than f/6, and they have wider views of the sky than other types due to the curvature of the objective lens needed to focus its light in that short distance. Short-tube refractors are usually used for imaging larger structures in the sky (wider field of view) or very dim objects (fast focal ratios). Conversely, longer-tube refractors with slower focal ratios (f/8 and above) will excel at getting detailed images of planets, the moon, and the brighter, smaller deep-space objects (DSOs).

Refractors tend to be relatively heavy for their size and have a practical size limit of around 6" in aperture. The cost of the lens increases dramatically as the size increases. In spite of these deficiencies, refractors are virtually maintenance-free and very durable.

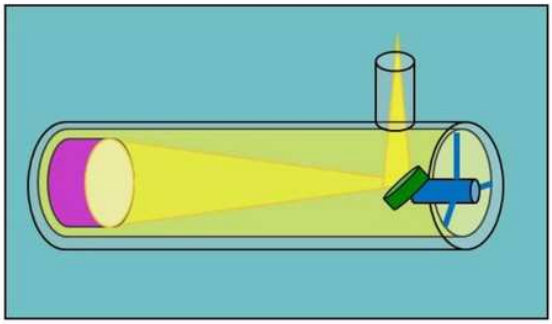
As light is bent while passing through the glass lens in a refractor, blue-hued colors do not match up with other colors and produce a side effect called chromatic aberration. This is a fancy way of saying that you will get blue or purple halos around bright objects. To correct this problem, designers use a third lens in the objective (known as a triplet) and make them out of more exotic low-dispersion glasses. This eliminates the problem, but as you might suspect it adds significantly to their cost.

Whew! Still with me? It gets easier from here on out!

Photo of the Great Orion Nebula displaying chromatic aberration (blue and purple halos) around bright stars. Taken by Jeff Kopmanis in Ypsilanti, Michigan

Reflectors

A reflector telescope uses mirrors to focus and bend the incoming light to your eyepiece or camera sensor. It was first invented by John Gregory in 1663 independent of the more widely attributed invention of Issac Newton in 1668. Modern reflecting telescopes are known as Newtonian. The aperture in a reflector refers to the size of the main convex mirror that directs incoming light to a flat secondary mirror which directs the light to your eyepiece.



The light path of a reflecting telescope. Light enters through the opening in the right side of this drawing.

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An Orion reflector telescope

As with a refractor, a reflector telescope has a direct path to the eyepiece, which is mounted on the side of the telescope tube. From the refractor discussion above, you'd be correct in guessing that reflecting telescopes have relatively low focal ratios and are considered fast telescopes. Additionally, no light is lost when it passes through the telescope (since it has no lenses internally) until it gets to the eyepiece. Both of these attributes make them excellent at observing or photographing dim objects in the skies.

One of the main advantages of reflecting telescopes is that mirrors are much cheaper to manufacture than lenses. So it's possible to purchase very large apertures (up to 24" mirrors) in a telescope without having to sell your house.

On the downside, reflecting telescopes need to have their mirrors aligned (collimated) frequently or the image quality suffers. The design is generally considered to be less durable than refractor or Cassegrain types of telescopes.

The thin supports that carry the secondary mirror can produce optical effects in brighter stars that appear to twinkle, which are known as diffraction spikes. Reflectors tend to be very bulky to transport, even though they're not particularly heavy compared to other designs. Because the mirrors are out in the open, they are subject to dust, dirt, dew, and other moisture and require periodic cleaning.

Cassegrains

Cassegrain telescopes are hybrid designs that combine mirrors and lenses. The first notion of these hybrid designs is attributed to Laurent Cassegrain in an excerpt from a letter that was published in 1672. They deliver apertures larger than refractors (commonly up to 12") and use mirrors to fold and focus the light resulting in a very compact design, often not much more than 18" long. Focal lengths aren't considered fast (typically f/10 to f/16), but reasonable enough that a focal reducer can change an f/10 to an f/6.3, thereby giving you roughly a 35% improvement in speed and field of view.

There are two main types of Cassegrains: the Schmidt and the Maksutov ("Mak"):

- Schmidt types are lighter and can be made in larger sizes than the Maksutov, but they require occasional collimation since they have a secondary mirror.

- Maksutov types are often heavier and generally don't come larger than 5–6 inches in aperture. They do not require collimation since the objective lens has a fixed secondary mirror on the rear surface of the objective lens, so there is nothing to adjust. Consequently, it is also relatively complex to grind and therefore more expensive. Maks have slower focal ratios and a relatively small aperture for their focal length.

Cassegrain telescopes: Schmidt (left) and Maksutov (right). Note the mount for the secondary mirror in the corrector plate in the Schmidt compared to the mirrored area in the middle of the Maksutov

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Pros and Cons

Here are some handy pro/con lists:

Refractors
Pro: Rugged, no collimation necessary
Pro: Fast focal ratios
Pro: Short-tube varieties offer wide fields of view and even faster focal ratios

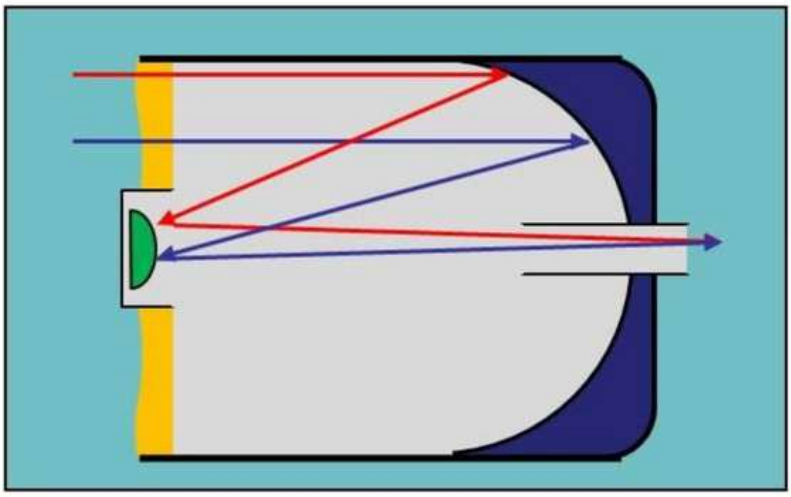
Con: Chromatic aberration (color distortion at th edges)
Con: Relatively expensive ($/inch-of-aperture) due to size of objective lens
Con: 5" practical maximum aperture
Con: Long-tube refractors can be very long, heavy and cumbersome

Reflectors
Pro: Inexpensive
Pro: Time-tested design (since Newton)
Pro: Fast focal ratios
Pro: Great for DSOs
Pro: Apertures get really big! (24" or more)

Con: Bulky to transport
Con: Diffraction spikes
Con: Periodic collimation required
Con: Periodic cleaning of primary and secondary mirrors required
Con: Less durable than other designs

Cassegrains
Pro: Inexpensive for under 12" apertures
Pro: Long/slow focal ratios
Pro: Great for planetary imaging (Sun, Moon, planets, bright DSOs)
Pro: DSOs bring extra challenges due to field of view and focal ratio
Pro: Compact compared to refractors of the same size

Con: Somewhat heavy and bulky
Con: Get expensive after 8"
Con: Maximum practical aperture of 12"
Con: Schmidt cassegrains need occasional collimation



The light path of a Schmidt cassegrain telescope. Light is "folded" to shorten the physical tube length and with the corrector (yellow), it addresses the chromatic aberration of refractors.

Conclusion

I'll admit this article went longer than I'd have hoped, but splitting the various types of telescopes into separate articles seemed like a bad idea since many of the concepts are used for all three types.

Hopefully, you've gained some insight into the different characteristics and capabilities of each type of telescope, so that when you want to look at Jupiter or the Orion Nebula, you'll have some idea of which tool to pick out of your toolbox! ■

Back Issues of Club Publications Now Available!

A big thanks to Jeff Kopmanis for updating the members-only section of our current site with back issues of Reflections and the Objective Lens. Jeff has also included them - plus our latest publication, Backfocus - in a Publications section on our new website at:
https://lowbrows.club/publications

(Note: The site overhaul is still a work in progress.)

OVER THE HORIZON

BY JACK SPRAGUE

The Moon Phases:

06 Apr	Thursday	Full Moon	Rise 19:45 (5th)	Set 07:27
13 Apr	Thursday	3rd Quarter	Rise 03:39	Set 12:25
20 Apr	Thursday	New Moon	Rise 07:01	Set 21:15
27 Apr	Thursday	1st Quarter	Rise 11:09 (26th)	Set 03:10

A special event this month: the Lyrid meteor shower comes to call on the 21st through the 23rd (+/-) of the month when we have a 9% moon (22nd) here at Peach Mountain. The volume of strikes looks to be around twenty per hour but that is a fairly variable number. The radiant – the center of the shower – is at RA 18hr 10' x Dec 34˚.

This year's advantage is that this small moon will rise at 07:58 on the 22nd but set 23:39 meaning the dark of the night will be free of any but stars, Starlink, and the DTW traffic.

I am going to try an all-sky automated monitoring technique if clouds allow. We'll see how it goes. I am going to try 10-second exposures once a minute for four hours. If it works, I'll have lovely traces against mostly round stars. If it fails? Only electrons were inconvenienced.

This month, I am highlighting some objects of interest from the higher azimuth around our meridian. Last month we focused on the lower azimuth objects so it is only fair.

Observing: (all times EST)
Average Sunrise 06:50, Sunset 20:20.

Planetary Outlook April 15 (shamelessly borrowed from timeanddate.com).
Mercury – meridian 14:42 (rise 07:27 set 21:58) difficult viewing.
Venus – meridian 16:12 (rise 08:38 set 23:47) good viewing.
Mars – meridian 18:47 (rise 11:04 set 02:30) average viewing.
Jupiter – meridian 13:25 (rise 06:54 set 19:57) extremely difficult viewing.
Saturn – meridian 10:27 (rise 05:06 set 15:47) average viewing.
Uranus – meridian 15:01 (rise 07:55 set 22:06) extremely difficult viewing.
Neptune – meridian 11:48 (rise 05:56 set 11:48) extremely difficult viewing.

Meridian Constellations as of 15 April – 22:00 hours.
(-), (--) represent a positional modifier to constellations and objects east of the meridian by less than an hour and more than an hour. (+), (++) represent a positional modifier to objects west of the meridian by less than an hour and more than an hour, respectively.
I mention here a few objects contained in the constellations which I find meaningful. The list is in no way comprehensive!

-- Southern Horizon --

Hydra

C59 / NGC 3242 - planetary nebula. "Ghost of Jupiter." It is a rewarding but difficult object at 25" of diameter. A magnitude 11 white dwarf is in the center for those with large light buckets. The nebula itself is visible with a wide-field scope despite its size as its brightness is somewhere near Mag 8.7. (10hr 24' 46" x -18˚ 38').

M48 / NGC 2548 - open cluster. At a distance of 2400 ly, this cluster of faint stars (80 from Mag 8 to 13) was originally recorded by Messier in 1771 at a position off by 5˚! Caroline Herschel observed what would become NGC 2548 in March of 1773. William – her brother – included the object in his catalog as H VI-22. Eventually, astronomers came to reason Caroline's object and Messier's were indeed the same. Size approx. 30' in diameter. Mag 5.8. (8hr 13.7' x -5˚ 45').

M68 / NGC 4590 - globular cluster. This holds thousands if not a million stars in an area roughly 100 light years in diameter. Though at a distance of 33.6K ly, the visible dimension seems 11' in size. As a globular cluster, the stars are locked in a mutual gravitational embrace. I see perhaps 45 distinct stars and a huge "ball" of stellar light in the center. The Hubble Space Telescope which has a somewhat better resolving power than my consumer-grade model shows a star field as dense as salt poured on black velvet. It is worth looking up in the NASA Hubble archives. Stunning. (12hr 39.5' x -26˚ 45'). A good southern exposure is de rigueur for this one.

M83 / NGC 5236 - mixed spiral galaxy. This is a binocular gem. Just barely visible to the naked eye in a dark site, this is a showpiece in a 4" class refractor. Mag 7.6 with dimensions of 15' x 13', it benefits from EAA and AP work due to bright star-forming regions. (13hr 37' x -29˚ 52').

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Sextans

C53 / NGC 3115 - lenticular galaxy. The "Spindle Galaxy." This is a bright inclined (24˚) galaxy that does well at a moderate magnification. It is 7' x 3.5' in size and a brightness of Mag 9.9. Messier missed the object in his catalogue. At a magnification of 100x, the core is a clearly defined concentric halo around a spot-like singular point of light. (10hr 5' 12" x -7˚ 43').

Leo

M105 / NGC 3379 - elliptical Galaxy. (usually with NGC 3384 // NGC 3389) . The "other" Leo triplet. With a wide field scope, capturing these three in one image is quite possible. To my eye, they are small in binocular views but it is possible. It is in the 4" class refractor (or smaller if cropped with a sensor of sufficiently small pixel size) where they shine. M105 is 38M ly distant, shines at Mag 9.3, and has a size of approximately 4' x 4'. The black hole in the center of the galaxy is believed to be on the order of 50M solar masses! (10hr 47.8' x 12˚ 35').

M66 / NGC 3627, M65 / NGC 3623, NGC 3628 – the Leo Triplet. Despite their close framing, these three galaxies do not appear to be interacting as there is no evidence of tidal forces within the copious dust streams each possesses. In fact, the amount of dust makes resolution of detail difficult. Try near-IR to detect more of the spiral arm development. There are also H-alpha starburst areas that can be highlighted using filters. Discovered by Mechain in 1780, M66 lies 33M ly distance, has a size of 8.3' x 4', and a brightness of Mag 8.9. (11hr 20.2' x 12˚ 59').

M95 / NGC 3351, M96 / NGC 3368 - spiral galaxies. These are binocular objects highly inclined which at moderate size (7.8' x 4.6' and 6.9' x 4.6') prove quite satisfying to observe. Consider them showpieces for the neighbors out on spring evening walks. Visually, they yield good detail of their structure in the eyepiece. EAA and AP only increase the depiction of structure. Starburst activity in both galaxies can be highlighted using H-alpha filters. (10hr 44' x 11˚ 42' and 10hr 46.8' x 11˚ 49').

Cancer(+)

M 44 / NGC 2632 – open cluster. "The Beehive Cluster" or Praesepe (manger as in donkey from the Latin). Famous. This cluster is made for binocular observation at 1.5˚ across and Mag 3.7. More than 75 stars from the 12th magnitude make up this lovely treat. Galileo was the first to resolve the stars as a true cluster in 1610 with his newly invented telescope. (8hr 40.1' x 19˚ 59').

M 67 / NGC 2682 – open cluster. One of the oldest clusters known, between 3 and 5 billion years of age! Open clusters normally are in the hundreds of millions of years in age. More than 500 members comprise the cluster spread over a 30' diameter. (8hr 50.4' x 11˚ 49').

Lynx (+)

Caldwell 25 / NGC 2419 – globular cluster. One of the most remote clusters directly associated with the Milky Way, C25 lies 270K ly distant. Nevertheless, work in the past fifteen years shows that the cluster is indeed tightly bound to the Milky Way. C25 requires good magnification to resolve and a favorable moon phase as it is both dim and small. It is a Mag 10.4 object of size approximately 4.5'. Tightly bound, the stars do present a lovely reward for the patient observer. (7hr 38' 8.5" x 38˚ 52' 55").

Ursa Major

Lalande 21185 – red dwarf. Mag 7.5. This is the 4th nearest star to our sun at an 8.1 ly distance. (11hr 3.2' x 35˚ 58'). The other closer stars are Alpha Centauri (a triplet), Barnard's Star, and Wolf 359 in Leo. This is the brightest red dwarf we in the northern hemisphere can resolve.

Groombridge 1830 (Argelander's Star) – a runaway star! Mag 6.45. Twenty-eight light years distant, 1830 has the 3rd fastest proper motion ever observed after Barnard's Star and Kapteyn's Star. Being farther away than this pair implies 1830 has an even higher velocity. 1830 moves at 7.04" each year! It is a halo object in the Milky Way and as old as the stars in globular clusters. (11hr 52' 59" x 37˚ 43' 7").

Zeta Ursae Majoris / 79 Ursae Majoris – famous, historic double star. The pair Mizar and Alcor (Mag 2.3, 4.0) are separated at 14.4". Mizar is a double itself which has a companion Mizar B at 4th magnitude. Alcor and Mizar B are all spectroscopic binaries so the pair represents 6 stars in total! Mizar is the historic member of the pair: the first double star determined by telescope (Ricioli 1662); the first star captured by photograph (Bond, 1857); and the first spectroscopic binary detected (Pickering, 1889). (13hr 23' 55" x 54˚ 55' 31").

M81 / NGC 3031 – spiral galaxy. Both M81 and M82 were discovered by Bode in 1774 and added to the catalog by Messier in 1781. M81 is the broad spiral of the pair. Visual under dark skies, binocular, wide-field, and deep-field examination all delight. (9hr 55.6" x 69˚ 04').

M82 / NGC 3034 – galaxy (12.0' x 5.6'). "The Cigar Galaxy" presents as a long, slim object. See M81 above for observing. At 300mm f/l, the FOV should capture both galaxies in one frame. (9hr 55.8' x 69˚ 41').

M108 / NGC 3556 – spiral galaxy. A low inclination presents a wonderful edge-one image of size 8.1' x 2.1'.

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Discovered by Mechain in 1781 or '82, the galaxy presents as a mottled halo with several distinctive knots. In my eyes, the galaxy appears to have a textured appearance similar to a gray bedspread after my wife's orange mackerel has made a nest and then sprinted away as cats are wont to do. The almost-folds create a subtle disuniformity that is somehow quite attractive – the bedspread and galaxy, not the cat. (11hr 11.5' x 55° 40').

M97 / NGC 3587 – planetary nebula. "The Owl Nebula." At Mag 9.9 and a size of 202", this nebula is one of the more attainable of its ilk. Dark ovals in the nebula suggest the eyes of an owl's face. Try 125x magnification. (11hr 14.8" x 55° 01').

M109 / NGC 3992 – spiral galaxy. Nicely inclined so as to present a lovely profile with deep delineation of the spiral arms, at Mag 7.8 and a size of 7.6' x 4.3' this is a lovely optical object with well-adjusted eyes. It is also very nice as a showpiece for EAA. The swirling arms emerge from the background in an entrancing manner that leaves the audience wishing for more and more detail. O'Meara treats M109 as a ho-hum spiral (yawn) but I have had more dynamic engagement from friends and family over this object than any other I've shown (excepting the moon ... people love the moon!). At 185K ly across, it is the most massive member of the M81 group. (11hr 57.6' x 53° 23').

M101 / NGC 5457 – spiral galaxy. "The Pinwheel Galaxy." Huge object. Binocular for sure. Discovered in 1781 by Messier. This presents with a broad (26.0 ' x 26.0') inclined face which when observed will instantly resolve the question of its informal naming origins. If you were writing space opera, then you'd want this as a cover illustration! 25M ly distant it satisfied the "far, far away" criteria for a fantasy. (14hr 3.2' x 54° 21').

Arp 313 - NGC 3991, NGC 3994, NGC 3995 – a galaxy trio! These are challenging objects but rewarding nonetheless. The brightest at Mag 12.4 deserves EAA and AP treatment for the cluster. The halo-and-core collection is a favorite of mine. The NGC 3995 group is a group of interacting galaxies and 3995 itself is distorted with trails of active star-forming regions. Try this with an H-alpha filter for highlights. (11hr 57.6' x 32° 17').

Ursa Minor

Polaris – binary star. The bright cephid variable visible from Earth with a periodicity of 3.97 days varying in magnitude between 1.97 and 2.0. No, I cannot resolve the difference either! 432 ly distant, Polaris is the 48th brightest star as seen from Earth (a useful fact to point out to the neighbors). Nevertheless, due to the importance of cephid variables as standard candles in the evolving understanding of glactic existance (see Henrietta Swan Leavitt, Edwin Hubble, and the postulate of galaxies), taking a minute to observe Polaris directly connects the observer to the modern history of galaxies, the universe, and almost everything we now know of the sky. Herschel first recorded the secondary of Polaris 18" away in his observations of 1780 (primary- yellowish, secondary – white). The primary we know as the pole star is an F8 supergiant with a luminosity of 9000 suns!

Cepheus

C1 / NGC 188 – open cluster. O'Meara relates that the Caldwelll catalog opens with a whisper. In a barren desert of bright stars, C1 is a forgotten sidenote to the collection of objects in and around the Milky Way. The cluster is one of the oldest open clusters at 6B – 7B years of age only 5800 ly distant! The size is approximately 15' in diameter. (0hr 47.5' x 85° 14.5').

C2 / NGC 40 – planetary nebula. Tiny and faint, the "Bow-Tie Nebula" resulted from a Wolf-Rayet star that shed its outer layer 5800 years ago which is several hundred years before the first dynasty in Egypt. The size is 38" x 35" and the brightness is Mag 12.3. (0hr 13' x 72° 31' 19").

C4 / NGC 7023 – reflection nebula. "The Iris Nebula." Be aware, many catalogs misidentify the object as a star cluster dating back to 1931 and Per Collinder. A 4" class refractor brings out a degree of definition to the nebula. Dimensions are approximately 10' x 8'. (21hr 1.6' x 68° 10').

Barnard 169 / 170 / 171 – several dark nebula in close association. Dramatic against the Milky Way starfield, these three dark nebulae make a striking "maw" of a beast in my eyes. Massive magnification is not required but my eyes benefit from EAA techniques at twelve to fifteen minutes of total integration. Very good dark skies may allow eyepiece viewing. Your eyes may be better than mine so please don't discount visual techniques. Two 9th-magnitude stars are at the B170/B171 junction. (B169 21hr 58.9' x 58°47'; B170 at 21hr 58.9' 58° 59'; and B171 at 22hr 3.5' x 58° 52').

C9 / Sharpless2-155 – emission nebula. "The Cave Nebula." The cave nebula properly is a dark cloud in a large emission area. A UHC filter is recommended in some texts to bring out the faint contrast of the nebula against the background. This is a poor visual

OVER THE HORIZON continues, p. 11

object. EAA and AP work best concentrating the light. (22hr 56.8' x 62° 37').

C12 / NGC 6946 – spiral galaxy. "The Fireworks Galaxy." At 11.2' x 8.8' in size and a brightness of Mag 8.8, the galaxy is a showpiece. This is a highly inclined object presenting nearly face-on. Heavy dust from the Milky Way degrades its illumination from our perspective and high magnification only amplifies this attenuation. Try low-power 40x eyepieces in 4" class scopes or employ EAA and AP techniques. The many, many regions of star formation benefit from H-alpha filters for the highlights. The "fireworks" name comes from the large number of supernovae detected over the years including an event in 1980 producing a new star at Mag 11.4. (20hr 34.9' x 60° 09').

Barnard 150 – dark nebula! This is an extended dark field against an otherwise brightly populated background of stars. I find it quite serpent-like and see a dragon in an oriental-stylized rendering. It makes me wonder if – under dark skies – such anomalous objects influenced the style of art through association. Size is 60' x 3'. (20hr 50.6' x 60° 18').

Mu Cephei – "Hershel's Garnet Star." This variable changes in magnitude from 3.4 to 5.1 over a 730-day period. The reddish color is most intense during a minima which occurred in January of this year (sorry – slow on the draw!). At 730 days, this still should have good color! This is one of the largest of all known stars. If Mu Cephei were in the place of the sun, its surface would extend past the orbit of Jupiter! There is also evidence that the star is now fusing helium to carbon. (21hr 43.5' x 53° 47').

NGC 7354 – planetary nebula. Super Challenge Object! Size 20". This beastie requires significant magnification and light-gathering power. The Edge 9.25/11/14 or CDK 14+ are all in this class. I suppose the Mead 10" would do as well (I have little experience with the Mead series so I postulate based on images I see on Astrobin). Large heavy powerful scopes are needed in my estimation as I have been defeated twice in an attempt to render this in any detail with a 1m f/l. Try 250x for a magnification and go from there. OIII should enhance the nebulosity against the inky background. On the other hand, significant dust interferes with our observation and so a near-IR approach could be better above 642nm. The inner shell is notably only 2500 years in age. Herschel discovered the nebula in 1787 which is a testament to his fantastic eyesight! I find the double shell effect entrancing though alas, I have to use the HST image for my own satisfaction. Maybe this year! [Or I break down and buy the 9.25" Edge – don't tell Mrs. Beagle Meadows Observatory.] (22hr 40.4' x 61° 17').

Lacerta

C 16 / NGC 7243 – open cluster. In binoculars or in a 4" class refractor with a 23x magnification, the cluster leaps to view as a loose assemblage as rice on a dark kitchen floor. Mag 6.4 and a size of 30'. (22hr 15' x 49° 54').

-- Northern Horizon -- ■

UPCOMING MEETING SPEAKER SCHEDULE

April 21: Jeff Morgenthaler, Ph.D, Planetary Science Institute.
Topic: ***Studying Volcanic Activity on Jupiter's Moon Io Using Equipment You Can Buy at a Camera Shop***

May 19: Buddy Stark, Planetarium Manager, U-M Museum of Natural History.
(Visit to the U-M Museum of Natural History Museum Planetarium)

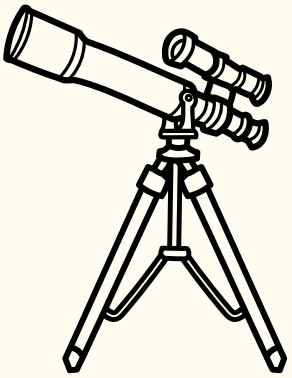
June 16: Jim Shedlowski.
Topic: ***Orbital Light Pollution***

July 21: Norbert Vance, Director of Sherzer Observatory @ EMU.
Topic: ***Updated Planetarium***

August 18: Tamas Gombosi, UM Center for Space Environment Modeling
Topic: **TBA**

September: TBA

UPCOMING TOPICS FOR THE OBJECTIVE LENS



BY JACK SPRAGUE

Objective Lens Update:
All images are welcome. And while we have a monthly theme, we'll love any submissions. Images submitted will be included in 'The Objective Lens" and in the annual Backfocus compilation without any rights transfer beyond your permission to allow The University Lowbrow Astronomers the use of your image for inclusion in these two documents.

Backfocus -- our collection of images from the "Objective Lens" photo roll -- is in production (see box below). For size and distribution ease, it is being produced in quarterly increments and will be released as each quarter's volume is complete. While it was intended to release all 4 volumes for the '22-'23 year in April, vocational and real-life concerns have made that schedule somewhat ambitious. The four volumes should all be completed "this spring" using the Michigan spring season as a guide.

Thanks to the membership for the indulgence in this first production schedule which turned out to be more demanding than anticipated. Then, aren't all new product releases in that same boat?

May – Observing partners. Mine have tails. Yours may have s'mores-smeared faces. Observing (whether visual or in image capture) brings late nights and solitude. Our partners break the solitude. Let's see them!

June – Planetary nebula images. It's showtime!

July – Let's return to a popular topic of last summer with the stunning skyscapes of Michigan with daytime -- clouds and weather appreciated – or nightscapes. Spring is lovely in Michigan and so in this issue, we embrace those things that suggest the joy of the non-parka months. Daffodils and stars? Why not! Dogwoods at dusk? Absolutely! The squall line threatening to turn cabin opening weekend into a card-playing huddle by the woodstove? Let's get those in there, too. Stellar objects are also welcome. ■

BACKFOCUS

A special thanks to Jack Sprague for putting together our first issue of ***Backfocus***, a compilation of member photos featured in the Objective Lens. ***Backfocus*** will be issued quarterly. A link went out through email. It's also available on our new club website currently in progress:

https://lowbrows.club/publications

Big Moon - LIVE!

Stop by Ann Arbor's Downtown library branch on **April 25** (if cloudy, then the next clear night that week) to hear Club Member **Brian Ottum** talk about the moon while he projects it onto the library's big lobby screen from his telescope out on the sidewalk.

More info at: **https://aadl.org/node/613283**

Vatican Observatory Foundation

Congratulations to Adrian Bradley!

Adrian's application to become an Ambassador to the Vatican Observatory has been approved by both members of the Observatory and the Archdiocese of Detroit.

Adrian joins Bob Trembly of the Warren Astronomical Society and William Finn of the Ford Amateur Astronomy Club in this capacity.

ANNUAL TREASURER'S REPORT

BY DOUG SCOBEL

Treasurer's Report for Fiscal Year April 1, 2022 to March 31, 2023
Doug Scobel, Treasurer

Overview:

We have $13,991.37 in the treasury, an increase of $1476.05 over last year.

We have 198 memberships, an increase of 21 over last year. Our membership categories break down as follows:

- 45 Family/Individual (23%)
- 102 Senior (age 55+) (52%)
- 7 Student (3%)
- 30 Reside outside of Michigan's lower peninsula (15%)
- 14 Lifetime/Honorary/Hardship (7%)

We are no longer "carrying" any memberships due to COVID-19 considerations.

Note: Because of space limitations in the newsletter this report is necessarily brief. If you have questions or would like further detail about anything outlined here then please do not hesitate to contact me.

Balance Sheet:

Income Expenses

Dues collected $3,725.00 Open house "hotline" $205.15 Extra for mailed newsletter $18.00 Newsletter printing/mailing $327.46 Astronomical League $420.00 Astronomical League $317.50 Donations $150.50 Donations $810.00 Shirt/Cap member sales $307.00 Shirt/Cap club order (n/a) $0.00 Shipping/mailing $146.99 Shipping/mailing $222.75 RASC publications sales $810.00 RASC publications cost $880.00 Miscellaneous $3.00 Miscellaneous $417.85 Observatory/equipment $873.73 Guest speaker expenses $50.00

Total Income $5,580.49 Total Expenses $4,104.44

Balance 01 April 2022 $12,515.32 Shirt Inventory 37 Income $5,580.49 Cap Inventory 20 Expenses $4,104.44
Balance 31 March 2023 $13,991.37

Net Increase (Decrease) $1,476.05
Income and Expenses Details:

TREASURER'S REPORT continues, P.

The disparity between newsletter payments and outlay is due to the club phasing out the printed and mailed version of the newsletter.* Because we are no longer offering the printed and mailed version, we are no longer asking for the extra $18.00 per year to cover costs associated with it. But those who have already paid extra will continue to receive the newsletter in the mail until their subscription runs out. Thus, we are still incurring those costs. The one $18.00 that we received was because we still mentioned the mailed newsletter on our website (it has been subsequently removed) and one new member included it with their dues payment.

*The extra $18.00 we have been charging does not come close to covering actual printing and mailing costs. Also, formatting for black-and-white printing imposes significant compromises quality-wise on the color electronic version. If you feel you absolutely must have a printed version every month then contact either myself or newsletter editor Amy Cantu. We will provide suggestions regarding how you can make that happen.

This year 41 Lowbrows are also Astronomical League members, an increase of 11 compared to last year. The difference between what members paid and what we paid out is the $10.00 annual fee that the A.L. charges its member societies, and several members paid ahead for multiple years' worth of A.L. membership.

Donations we received consisted mainly of $100.00 from Westland Library as a "thank you" for a program we did for them. The rest were smallish donations from several members that included them with their dues payments. All these donations from members add up and are greatly appreciated!

We had three donations going out - our annual $250.00 to the International Dark Sky Association (up from $100.00 in previous years), $500.00 to the Great Lakes Association of Astronomy Clubs (GLAAC) in support of the annual Astronomy at the Beach star party, and our $60.00 annual donation to sponsor the Peach Mountain Clear Sky Chart.

Members bought $307.00 worth of shirts and caps. I will double check quantities on hand, and going forward, the club may have to order certain items and sizes to shore up our inventory.

Shipping/Mailing income was payment from a few members for shipping Lowbrow apparel and RASC items that they purchased. Similarly, shipping and mailing expenses were for mailing those items, plus mailing shirts and caps to some of our guest speakers.

In a departure from previous years, we ordered our 2023 issues of the Royal Astronomical Society of Canada (RASC) calendars and handbooks from the Astronomical League, instead of directly from RASC. The difference between what members paid and what they cost is because the club pays for two handbooks for club use.

Miscellaneous income was from the sale of three sheets of red "Rubylith" film. Thanks, Jack – every dollar helps!

Miscellaneous expenses were $182.00 for the annual rental of our USPS post office box, and $229.13 for costs associated with beginning the process of transitioning our club website to a new site hosted by WordPress.

Observatory and equipment expenses consisted mainly of about $740.00 for refurbishment and upgrades for the club's 17.5" Dobsonian telescope (new batteries, charger, and dew control). The rest was for general observatory expenses and to repair the two-track road to the observatory.

Our only guest speaker expense was for a gift certificate for July speaker Norbert Vance, of Eastern Michigan University's Scherzer Observatory fame. ■

General Meeting of the University Lowbrow Astronomers
March 17, 2023.

Charlie Nielsen (President):

Charlie introduced the speaker, Dr. Mojtaba Akhavan-Tafti, Assistant Research Scientist, UM Climate and Space Sciences and Engineering.

Dr. Mojtaba Akhavan-Tafti gave the talk, "Parker Solar Probe: Mission Design and Scientific Discoveries."

Charlie Nielsen:

This is our last meeting in Angell Hall, next month we will meet at the Detroit Observatory. Charlie discussed the issue of where to park. Jeff and Charlie will send out information on parking.

Jack Brisbin (Obseratory Director):

The M86 parking lot is one block from the Detroit Observatory and is a good place to park. This is reserved parking from 6AM to 6PM, but we can park in this lot after 6PM as long as people leave before 6AM.

Charlie Nielsen:

In April the club has officer elections. We will need to have nominations for officer positions.

Dave Snyder (Vice President):

Nothing

Adrian Bradley (Vice President):

Adrian had a presentation for the Warren Astronomical Society. He showed some astrophotos from really dark sites that showed how bright the Milky Way is in some regions. These photos were taken with a max reading of 21.99 on the SQM (Sky Quality Meter). Adrian noted that since 2015 SQM readings have been dropping (getting worse).

We will be going back to the Okie-Tex Star Party this year. It is earlier than in previous years, so it likely will be hotter.

There is an annular solar eclipse later this year which runs through Texas and a total solar eclipse in 2024 that runs from Texas through Ohio.

Amy Cantu (Newsletter Editor):

Nothing.

Jack Brisbin:

There has been power loss at the observatory as well as snow. Everything was working last time Jack was there (on March 11).

Jim Forrester (Vice President):

Dmitri Tsahelnik and Jim were at the observatory. On the road from North Territorial to the observatory, there is a bank of snow impassable without a 4-wheel drive vehicle. Some trees that were blocking the road

have been removed, but other trees are unstable and could fall at any time, possibly blocking the road again. Until this is dealt with, we shouldn't be holding open houses at Peach Mountain.

Jim had planned to take the 17 1/2" to Lake Hudson, but right now he can't get to the observatory building in his van.

There is a possibility of going to Lake Hudson for the Messier Marathon this weekend (likely to be clear on Sunday, Saturday doesn't look good).

If the situation with the trees has been dealt with, open Houses in April shouldn't be a problem. The grounds are in good shape.

(There was a discussion among club members about tree removal).

Douglas Scobel (Treasurer):

We have 199 memberships and $13,849.57 in the treasury.

Besides our usual monthly costs for the Open House "hotline" and printed newsletter printing and mailing costs, our recent expenditures were:

$321.66 for refurbishment of the club's 17.5" telescope, the largest cost being for the Kendrick dew controller for the eyepiece and finderscopes.

$229.13 for costs to begin migrating our aging website to the forthcoming "new and improved" WordPress based site.

Now that we are phasing out the printed and mailed version of the newsletter, we need to ensure that all the latest editions of the newsletter can be found on our website. The last one that appears on the members-only page is the March 2022 issue.

I will send a size large T-shirt to tonight's guest speaker Dr. Mojtaba Akhavan-Tafti when I get back to Michigan late April.

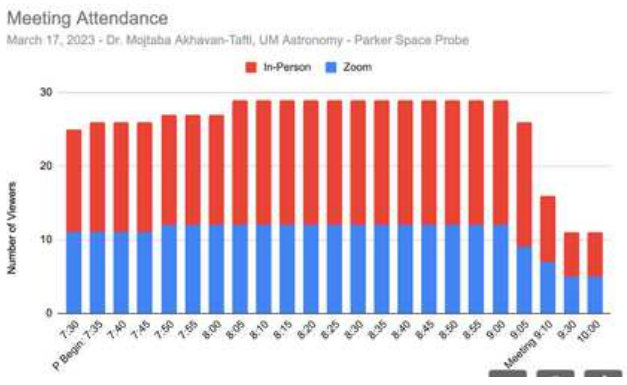
Jeff Kopmanis (Online Coordinator):

We have a WordPress site on HostGator with URL https://lowbrows.club. This is preliminary. A site using WordPress will be easy to update, and will allow more people to make updates (currently only people with umich.edu IDs can make updates).

Right now lowbrows.org points to the old site, when we are ready it can point to the new site. Need to decide if we want to keep lowbrows.club (we paid one year for the domain lowbrows.club, but could renew it).

There were 29 attendees for the current meeting, 12 attended with zoom, 17 were live.

The zoom meetings are recorded, and there are people who watch these recordings. It is worthwhile to make these recordings.



Charlie:

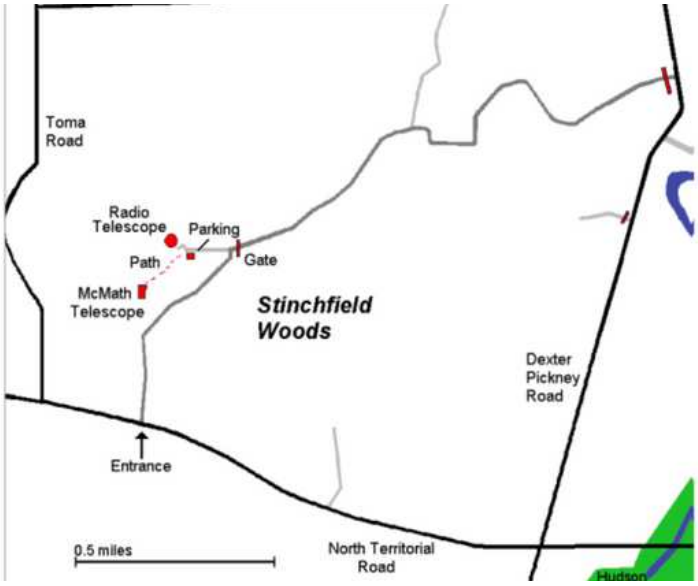
Adjourned Meeting.

Submitted by Dave Snyder.

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.

MEMBERSHIP

Annual dues are $30 for individuals and families, or $20 for full time tudents 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.

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

Email to all members
Lowbrow-members@umich.edu

University Lowbrow Astronomers
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Ann Arbor, MI 48113

STAMP