

REFLECTIONS / REFRACTIONS

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University Lowbrow Astronomers Monthly Newsletter

July 2021, Vol 45, Issue 7

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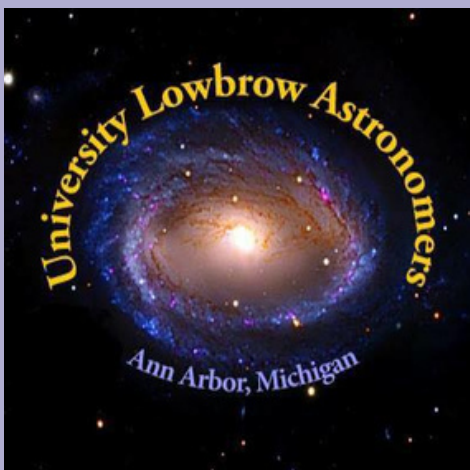
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JUNE 10 SOLAR ECLIPSE, BY ADRIAN BRADLEY

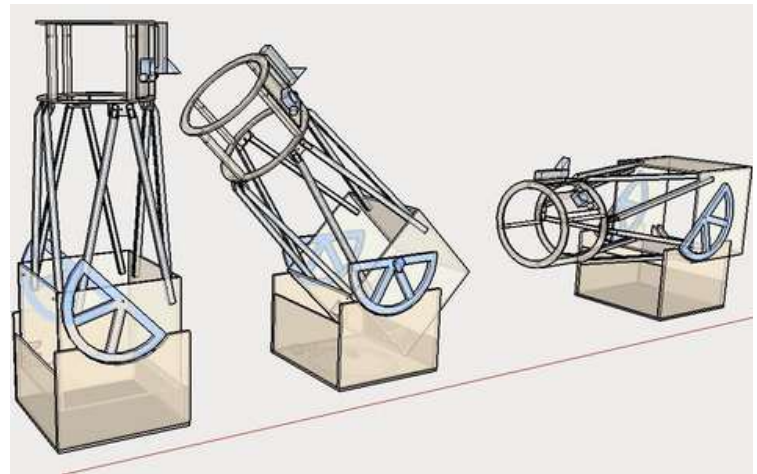
More photos of the eclipse pages 7 & 8



MY BIG BLUE DOB (PART 2) THE DESIGN

BY DON FOHEY

SketchUp2014 (that version was free), a 3D design tool was used to design every part of the telescope and to verify that everything would fit together and work properly. "The Dobsonian Telescope" by Kriege and Berry was helpful. The secondary cage clamp idea was taken from other telescope designs. I wanted the upper cage to nest inside the mirror box for transportation and storage. This made the mirror box bigger than necessary to hold the mirror. The first step is to work out the basic optical dimensional requirements. Stellafane's Newt for the Web (<https://stellafane.org/tm/newt-web/newt-web.html>) produces the table of dimensions used in the design. An important design constraint is the balance location of the altitude bearing. It determines the rocker box dimensions and other clearances. I created an extensive spreadsheet, a portion is included below, which listed or calculated the weight of every component and its location. It calculated the balance point from the bottom of the mirror box.



This turned out to be close to the actual point and balance only required a small weight at the bottom of the mirror box. I had forgotten to include the weight of the truss shroud and Kydex lining of the secondary cage.

**Newt for
the Web**

Dimensions for your Telescope

| Unit of Measure | inch |
|------------------------------|----------|
| Primary Mirror Diameter | 14.240 |
| Focal Length | 58.954 |
| Focal Ratio | 4.140 |
| Tube Inside Diameter | 15.500 ? |
| Tube Thickness | 0.250 |
| Focuser Minimum Height | 3.000 ? |
| Focuser Inside Diameter | 2.000 ? |
| Focuser Extra Travel | 0.250 ? |
| Focuser Camera Travel | 0.000 ? |
| Diagonal Minor Axis | 3.100 ? |
| Diagonal Offset | 0.187 |
| 100% Illumination Diameter | 0.473 ? |
| 75% Illumination Diameter | 1.870 ? |
| Front Aperture Diameter | 15.974 ? |
| Mirror Face to Focuser Hole | 47.704 |
| Focuser to Front End of Tube | 8.000 |
| Mirror Face to Back of Tube | 3.500 |
| Tube Length | 59.204 |

First 10 rows of table used to compute balance point of telescope

| | Qty | Area | Thickness or length | Volume cu. inch | Material Density | Total Weight oz | Location from Bottom | Torque about zero | Balance Point |
|----------------------|-----|-------|---------------------|-----------------|------------------|-----------------|----------------------|-------------------|---------------|
| Upper Cage Ring | 1 | 82.47 | 0.38 | 30.93 | 0.365 | 11.29 | 59.19 | 668 | 16.10 |
| Lower Cage Ring | 1 | 82.47 | 0.38 | 30.93 | 0.365 | 11.29 | 47.31 | 534 | |
| Cage Strut | 4 | 0.94 | 11.50 | 10.78 | 0.258 | 11.13 | 53.25 | 592 | |
| Focuser Spacer | 1 | | | | | 1.80 | 52.00 | 94 | |
| Focuser Plate | 1 | 34.50 | 0.25 | 8.63 | 0.258 | 3.40 | 53.25 | 181 | |
| Telrad Plate | 1 | 34.50 | 0.25 | 8.63 | 0.258 | 2.23 | 53.25 | 118 | |
| Opposite Plate | 1 | 34.50 | 0.25 | 8.63 | 0.258 | 2.23 | 53.25 | 118 | |
| Spider | 1 | | | | | 8.15 | 57.25 | 467 | |
| Secondary Holder | 1 | | | | | 2.50 | 52.00 | 130 | |
| Secondary Dew Heater | 1 | | | | | 1.00 | 52.50 | 53 | |

Part 3:
The Mirror Cell,
page 3

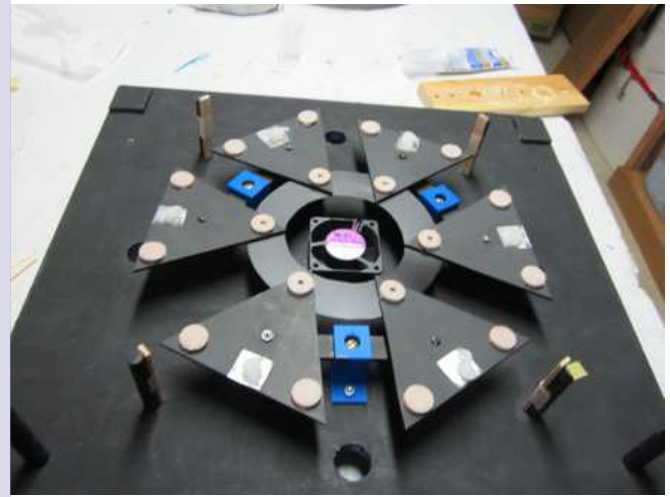
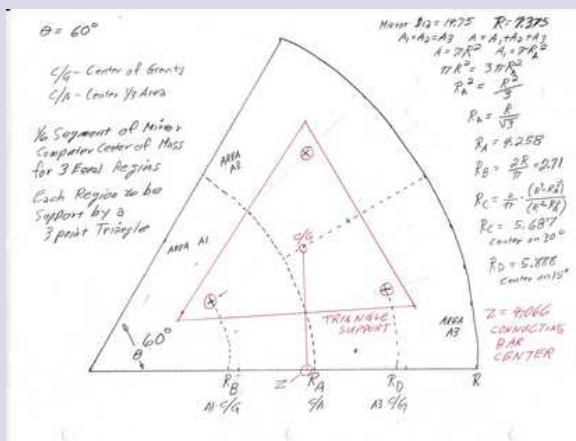
MY BIG BLUE DOB (PART 3) THE MIRROR CELL

BY DON FOHEY

The mirror cell is critical for a thin mirror. The 18 contact point cell is configured as 6 triangles each with 3 points of contact. The triangles are grouped in 3 pairs with each pair connected by a bar. The center of the three bars are connected to the tailgate board. This provides for three collimation adjustment points. There are many sources that will provide cell dimensions for various mirror sizes. However there is not a listing for a 14 3/4 mirror. I love geometry so I computed the exact dimensions for my 18 point cell. I calculated the center of equal area regions of the mirror to be supported by the points of the triangles.

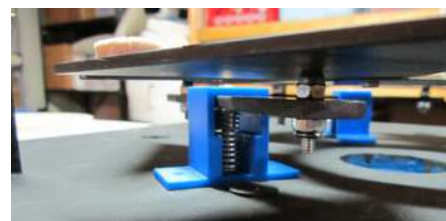
I designed my own method for the collimation adjustments. The triangles are attached to a bar and sit on the head of acorn nuts which permits them to pivot in any direction. This is a common technique and seems to work well. The bars are attached to a bolt and are captive by a 3D printed compression spring holder (blue in photo), The bolt goes thru the spring and thru a hole in the tailgate board where there is an adjustment knob. The adjustment knob provides for a view of the bolt and a clear indication of the amount of spring compression which is convenient. The original construction used a soft spring and the bar easily tilted from one side to another to allow distribution of weight between the two triangles. I replaced the spring with a stiffer one which resists the tilting motion of the bar. I believe this is a major problem and may be contributing to image flaws. I plan to rework this next winter.

Mirror cell worksheet with partial computations



I didn't like the conventional technique of constraining the mirror with a sling as the telescope is depressed in altitude. This may be fine for a thick heavy mirror, but seemed problematic for a 9 lb mirror. I decided on silicon adhesive. I put a dab on each triangle near the mirror circumference (visible in photo). I set the mirror on the cell. The weight of the mirror compressed the gooey silicon as the mirror came to rest on the felt pads. The intention was that the weight of the mirror would be totally on the felt pads and the curing silicon would only constrain the mirror moving laterally. We will see how this works. It may contribute to image quality if it significantly alters the weight distribution of the mirror on the cell. With the mirror glued in place, I saw no need for safety brackets just above the mirror. If I have image problems I will rework with a sling.

I measured the hole location for the collimation bolts wrong, ugh!. The triangle spacing isn't exact, I will fix that in a winter rework. This error may also contribute to image quality. The tailgate attaches traditionally.



Mirror Cell Mounting and Adjustment. Note 3D printer spring holder



Collimating Knob

Part 4: Construction - next month!

LIVE AND INTERACTIVE STAR PARTIES

BY BRIAN OTTUM

At the age of 12, I saw a total lunar eclipse and got hooked on astronomy. I read every astronomy book I could find at my school and at my local library. There were ever-larger telescopes to get. I have always loved sharing my passion with the public, doing star parties all around the U.S. For an entire summer, I was a volunteer “Night Sky” ranger at Bryce Canyon National Park. I helped a state park achieve IDA “dark sky preserve” status. A few years ago, I installed a remote-control astrophotography telescope in the New Mexico desert. Taking images of space is fun but sharing with the public is even more rewarding. So the pandemic pushed me to start doing online star parties that are both live and interactive.

The online star parties use YouTube Live, a platform that is well-known to the public and easy to use. To make a professional presentation, OBS Studio (free software) is great for assembling various small windows on my screen – one showing my face narrating, one for the night’s agenda, one for a live shot of the scope moving, and a big window showing the planetarium program and live image. Out in the desert, a PC controls the telescope & camera. A “remote desktop” program is then used to display that distant PC on the PC that is doing the broadcasting. These both require reliable broadband Internet connections.

My rig is optimized for rapid image acquisition. The computerized mount is a PlaneWave L-350, which can slew from one horizon to the other in seconds. The telescope is a fast f/5 reflector, 250mm aperture. The camera is a Canon 5DmkIII, with a near-IR modification for H α sensitivity.



ABOVE: On site; BELOW: On the radio



Each session is focused on a single theme, such as “Tour of the Universe,” “Treasures in Orion,” or “The Christmas Star Conjunction.” Hours of planning go into the selection of objects to show and the narration to use for each. I do not use a script, but I do have points to make.

Each session starts with a narrated 2-minute video introducing me and the remote observatory. A short drone video clip does a great job showing the telescope in the desert. Then we are ready to show a live video of the computerized mount slewing the telescope around the sky.

STAR PARTIES continues, p. 5

LEFT: Online, in ridiculous hat, operating telescope in New Mexico from remote desktop

STAR PARTIES, cont.

At this point, viewers are usually starting to ask questions in the chat. It is hard for me to focus on both the telescope operation and coherent narration, so I have an assistant (my wife) that monitors the chat and alerts me to new questions that have popped up. I try to answer all questions and keep the session as interactive as possible.

The session proceeds with telling the object we are going to see, clicking on its location in the sky map, watching the telescope slew, and starting the 30-second exposure (ISO 6400). During the exposure, I explain the object and answer questions. Once the exposure is finished, the cursor points to various features for further explanation – for example, dark spots in a nebula where stars are being born.

Showplace objects, like Orion Nebula or Andromeda Galaxy, are worth fifteen minutes. But usually, I like to move from object to object in a couple of minutes. The full session lasts about 90 minutes. If there is time near the end, I open it up to audience requests and we take pictures of what they want to see. Recently, they requested shots of Thor's Helmet, The Cat's Eye, and other planetary nebulae.

My experience doing these sessions, as well as watching dozens of similar sessions has resulted in some recommendations. Most importantly, it is critical to focus on the astronomy and not the technology. The public is not nearly as fascinated in the technology as we are. Move along quickly, so the audience does not get bored. Make it interactive, so the public can participate. Tell a story. Increase your audience by taking advantage of an upcoming sky event that will be discussed on social media (a planetary conjunction, asteroid fly-by, new comet, eclipse, supernova, or new astronomical discovery). Finally, it is good to follow "KISMIF" – keep it simple, make it fun.

Don't let the technology come between you and the story. Don't fiddle with settings, or else your audience will pull out their phones. Don't have glitches or delays (these are sometimes unavoidable but can be minimized with lots of practicing ahead of time). Don't use black & white images – the public is used to and wants full color. Don't use jargon – use simple language as much as possible. And finally, don't be boring. I wear a different ridiculous hat for each session.



TRIFID & LAGOON NEBULAE by Doug Bock

'This month I did some more testing, as I switched out the Canon T3i camera for my ZWO asi071mc PRO camera, connected to the Canon 300mm f/4 lens. I borrowed a coupler ring that allows for remote focusing. This way I can use the astrophotography cameras cooled to a temperature of 0C and automatically keep focus and running this way with Sequence Generator Pro as the automation software. Piggybacked on the 10" provides auto-guiding. The testing went well. The target this month was In the region of the Milky Way where the Trifid and Lagoon Nebula are located. I collected 60 x 120 second light frames, 50 flats and 24 dark frames to generate this 2-hour integrated image.

The Trifid Nebula (top) is an H II region in the north-west of Sagittarius in a star-forming region in a nearby spiral arm's Scutum-centered part. The Lagoon Nebula (bottom) is a giant interstellar cloud in the constellation Sagittarius. It is classified as an emission nebula and as an H II region. – June 15-16, 2021"

ASTROPHOTOGRAPHY TIP OF THE MONTH:

Here's a nifty way to plate solve on the go when using a DSLR without WIFI: Take a test image on your camera at high ISO. Use your cellphone to photograph the test image from the DSLR's playback mode. Crop the resulting photo using any cropping tool on your phone. Upload the image to astrometry.net and wait a couple minutes for the results!

BOOK REVIEW: ROAD ATLAS FOR THE TOTAL SOLAR ECLIPSE OF 2024

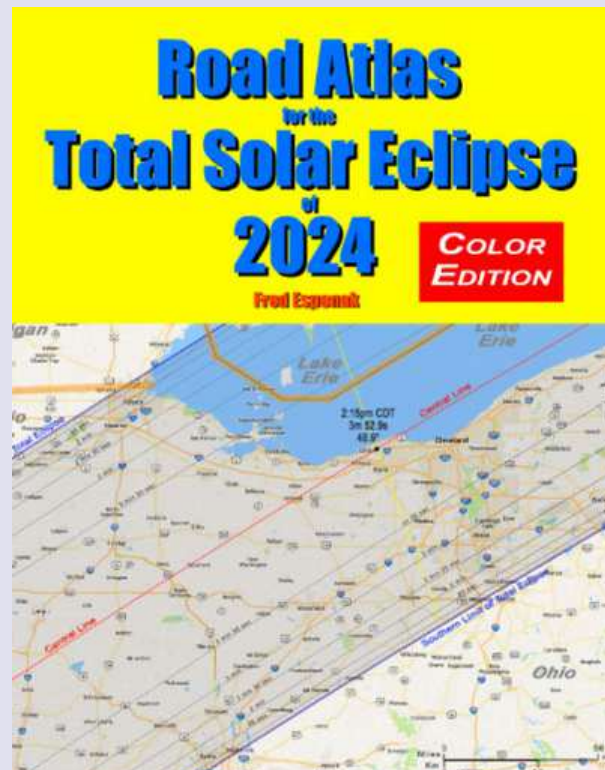
BY JOHN MANNEY

On Monday, April 8, 2024, we will have the opportunity to experience a total solar eclipse in the continental US. Having enjoyed the eclipse of 2017, I am starting to plan for our next opportunity.

The heart of this book is three overview maps and 26 detail maps of the path of totality in Mexico, the United States, and Canada. The base map is the familiar Google Maps rendition of the towns, major roads, major parks, and bodies of water. This base is overlaid with northern and southern limits of totality, the centerline, and lines indicating duration of totality. For every 5-minute interval, the location of mid-eclipse is marked on the centerline, with a notation of the duration of totality and the elevation of the Sun.

This is the basic information needed to begin to select a place to view the eclipse.

When I was planning for the August 2017 total eclipse, I didn't buy the 2017 edition of this atlas. Since much of the information in the atlas was available elsewhere, I didn't see the need to buy the book. I learned (the hard way) that planning is more efficient when all the basic information is **on the same sheet of paper**.



The print clarity of the maps was a disappointment. The major roads are easy to identify, but the secondary roads are almost invisible, especially in the path of totality, which is shaded light gray. To get to a location, better maps or navigation software would be needed.

In 2017, I had a good look at the eclipsed Sun, and enjoyed watching peoples' reactions to the whole experience. In 2024, I would like to watch the Moon's shadow as it appears to move across the ground. My "dream location" would include a high point overlooking a valley. I will be able to do the initial screening for possible sites with Espenak's atlas, combined with other resources.

I bought my 2024 atlas early so I can combine site exploration with my other travels. My home is only a 3 ½ hour drive from Indianapolis, which is near the centerline. In the next four years, I hope to have a chance to visit some sites in this area. I would also like to identify some alternate locations further away, in case cloudy skies are predicted.

As eclipse day approaches, weather patterns may change suddenly, necessitating last-minute changes of plans. In this case, the eclipse road atlas could be worth its weight in gold.

LOWBROW MEETING SPEAKER SCHEDULE

JULY 16: Dr. Thomas Zurbuchen, NASA, Science Mission Directorate. Topic: ***Together We Explore***

AUGUST 20: Jodi McCullough, Lowbrow member. Topic: ***Use of Images Plus***

SEPTEMBER 17: Professor John Monnier, U-M. Topic: ***Telescope Interferometry - Stars and Exoplanets***

OCTOBER 15: Associate Professor, Keren Sharon, U-M Astronomy. Topic: ***Gravitational Lensing***

NOVEMBER 19: Dr. Fred Adams, U-M. Topic ***TBA***

DECEMBER 17: Don Fohey, Lowbrow member. Topic: ***The New Horizon Mission to Pluto***

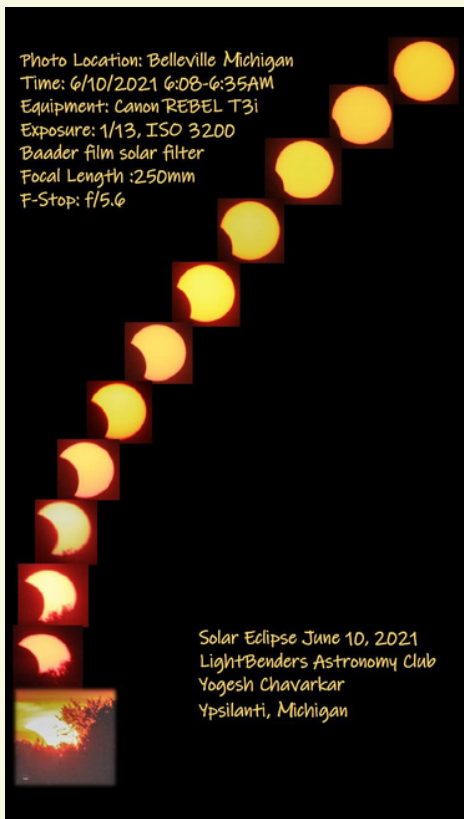
PHOTOS OF THE JUNE 10 SOLAR ECLIPSE



Above photo by GLENN KAATZ.
"Nikon D750 and a 150-500 Sigma zoom lens at 500 mm. F/6.3, ISO 100, shutter speed 1/4000 seconds. No solar filter was used as the sun was very low on the horizon."

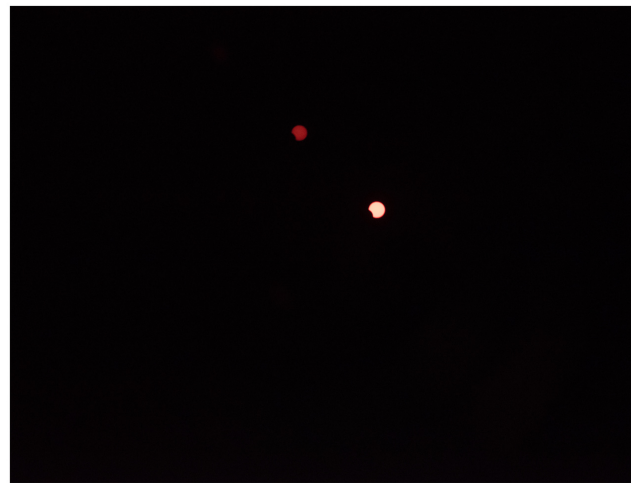


Above two photos by BRIAN CLOSE



Left and below by
YOGESH CHAVARKAR





Above two photos by PAUL WALKOWSKI. "Top photo is from the parking lot at the Leslie Park as soon as the sun cleared the trees, 5:10 am, 300mm Zoom lens, F8, 1/1600 sec, ISO 100 through a 4" solar filter held in front of the camera lens. The second photo was a happy accident where the handheld solar filter was tipped in such a way to make a secondary reflection off of the camera lens and the back of the solar filter itself."

MORE PHOTOS . . .



Above photo by BRIAN OTTUM



Above photo by ADRIAN BRADLEY, from his cellphone

University Lowbrow Astronomers

Monthly Club Meeting Minutes

18 June 2021, 7:35 pm, Individual Live Connections via conferencing tools

After some chatter to allow for late arrivals, President Charlie Nielsen called the meeting to order and then introduced our speaker.

Speaker

Who

Awni Hafedh

Subject

Solar Imaging and Processing

A Q&A session occurred afterward with audience members using multiple formats to ask questions. Charlie thanked our speaker for the presentation.

Business Meeting

| Name | Topic |
|----------------------------|--|
| President Charlie Nielsen | <p>We recently had an officers meeting this past month and highlighted the following:</p> <ul style="list-style-type: none">• The Detroit Observatory manager is a Lowbrow and would like us to tour the facility after its renovations are finished,• Or possibly just hold a meeting there.• With the intention of seeing if we feel it would be a suitable home for future Lowbrow meetings.• If it turns out to be a good fit, the manager will be looking for docents and Lowbrow volunteers to become operators of the telescope for events. <p>Our next month's (July) speaker <u>has canceled</u>.</p> <ul style="list-style-type: none">• This makes a recently brought up topic about a Swap Meet possible. We have not done one for many years now. Would there be any interest if we do not have a speaker for July and instead display items that we would like to sell or trade? An email poll to the membership will follow.• Or usually, in July, we are guests of member, <u>Norb Vance</u> at the EMU campus and have a mini planetarium show with pizza and open socializing. Not sure if the EMU campus will be open by our July date, but an email to Norb will follow. <p>Night Sky Network awards the club 3 pins each year to recognize members for outstanding dedication to club activities and especially public outreach involvement. Before covid, 3 pins were received and stored in the briefcase for safe-keeping to be discussed at future meetings and then forgotten. Just before covid, 3 more pins were received and were unable to be distributed. Very recently, 3 more arrived, bringing the total to 9 pins to distribute. Nominations and voting occurred at the recent officers meeting. The results are as follows: Adrian Bradley, Brian Ottum, John Wallbank, Jeff Kopmanis, Doug Bock, Jim Forrester, Don Fohey, Joy Poling, and Awni Hafedh.</p> |
| Vice President Joy Poling | <p>I am awaiting updates on when we will start in-person events and can update schedules accordingly.</p> |
| Vice President Liz Calhoun | <p>Other long-term construction projects underway near the Detroit Observatory have left the area resembling a crater, leaving the after-hours free street parking that we are accustomed to not possible for the next couple of years.</p> |

| | |
|-----------------------------------|---|
| Vice President Adrian Bradley | <p>Been keeping busy with outreach in multiple clubs.</p> <p>Astronomy At The Beach is still undetermined about how this year's event will be held. A questionnaire was emailed to the membership about what we would like to see happen this year. Please complete it and help AATB be a success this year. If you did not receive or lost the email, please email me, and I will resend the link.</p> <p>Shared an image of the eclipse taken from Pointe aux Barques Lighthouse in the Thumb area. Also, I will send out an email survey to the membership about whether or not a vaccine requirement to attend member nights would change your decision to attend.</p> |
| Jim Forrester | <p>Is anxiously awaiting the U to open the Peach Mtn. site for members only nights. Is anyone drafting an email to them to be ready to send it the instant the time is right? New moon is not long after the State moves us to the Final Phase, and if we are not ready, we will miss it and have to wait almost another month for the skies to darken again.</p> |
| Online Coordinator Jeff Kopmanis | <ul style="list-style-type: none"> Meeting attendance today reached a max of 34, with 28 on Zoom and 6 on YouTube. Had discussions with the UM ITS Web Hosting group manager regarding longevity of the current web resources we use, available options for supported CMS (Content Management Software) systems and other potential CMS and hosting options both internal at UM and elsewhere if UM options won't meet the Lowbrows' needs. |
| Observatory Director Jack Brisbin | <p>A small group ventured to the observatory and:</p> <ul style="list-style-type: none"> Installed the new focuser on the 8" Cave scope and repaired the corroded battery holder on its Telerad. The Argo Navis problem has been solved by bending the battery holder terminal bar to be snugger. Unfortunately, access to the bar required the cover to be removed. <p>Other observatory news:</p> <ul style="list-style-type: none"> Starlink Satellite Internet Service is set up and running on Peach Mtn. in preparation for... Professor Cutler to hold a class for the Fall semester in the radio telescope building. Preparations are underway to add security cameras, trim foliage for security cameras, and generally update the building to current classroom environment expectations. If the site will be open to in-person classes, it is a good possibility we would be able to resume open houses in September also. Using the site as a classroom would open up more options for potential funding possibilities. |
| Treasurer Doug Scobel | <ul style="list-style-type: none"> We have 168 memberships, which includes two new members who joined since our last meeting. We have \$10,454.49 in the treasury. This includes \$210.00 collected so far from members (re)joining the Astronomical League. This will be paid to the A.L before the end of June. Our only expenses paid out since the last meeting was our monthly \$15.85 to AT&T Messaging for our open house hotline. Amy sent me receipts for printing/ mailing costs for the June newsletter but I have not yet had a chance to reimburse her. We sold a Lowbrow T-shirt to one of our members. |

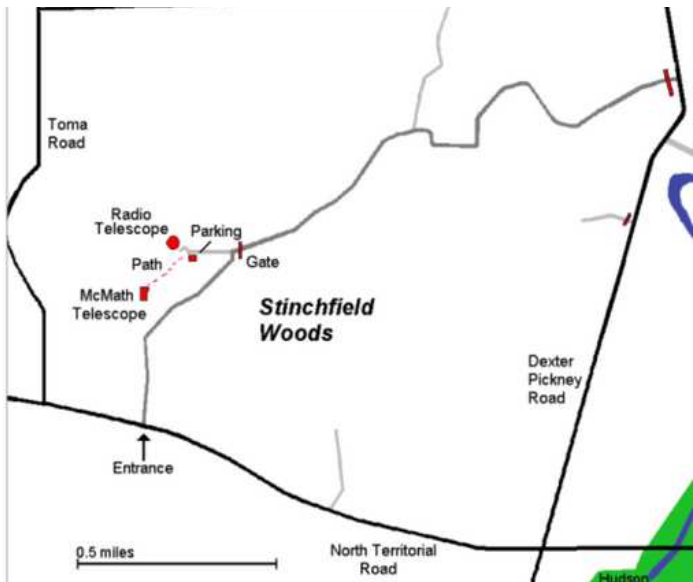
Adjourned
9:51 pm

Minutes were taken and transcribed by
Joy Poling

PLACES & TIMES

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

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



PUBLIC OPEN HOUSE / STAR PARTIES

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

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

MEMBERSHIP

Annual dues are \$30 for individuals and families, or \$20 for full time students and seniors age 55+. If you live outside of Michigan's Lower Peninsula then dues are just \$5.00. Membership lets you access our monthly newsletter online and use the 24" McMath telescope (after some training). You can have the newsletter mailed to you with an additional \$18 annual fee to cover printing and postage. Dues can be paid by Venmo, 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 - \$32.95/year
or \$65.90/2 years

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 |
| | Joy Poling |
| | Liz Calhoun |
| | Dave Jorgensen |
| Treasurer: | Doug Scobel (734) 277-7908 |
| Observatory Director: | Jack Brisbin |
| Newsletter Editor: | Amy Cantu |
| Key-holders: | Jim Forrester |
| | Jack Brisbin |
| | Charlie Nielsen |
| Webmaster: | Krishna Rao |
| Online Coordinator | Jeff Kopmanis |

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

Email to all members
Lowbrow-members@umich.edu



University Lowbrow Astronomers



www.youngastronomer.org