University Lowbrow Astronomers
Ann Arbor, Michigan

REFLECTIONS / REFRACTIONS

University Lowbrow Astronomers

January 2021

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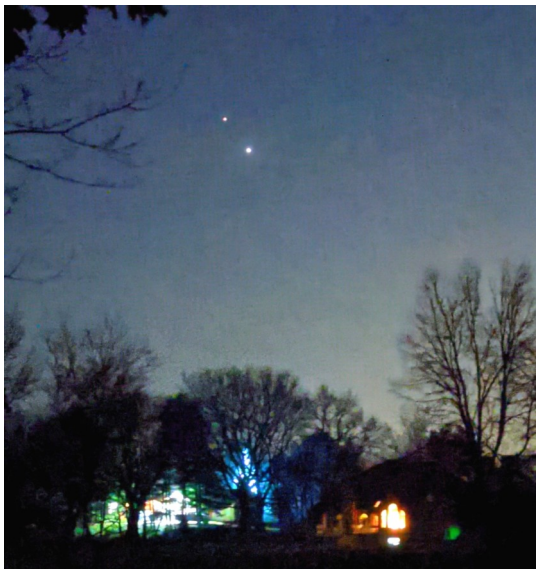
The Great Jupiter Saturn Conjunction of 2020

As seen by Lowbrows

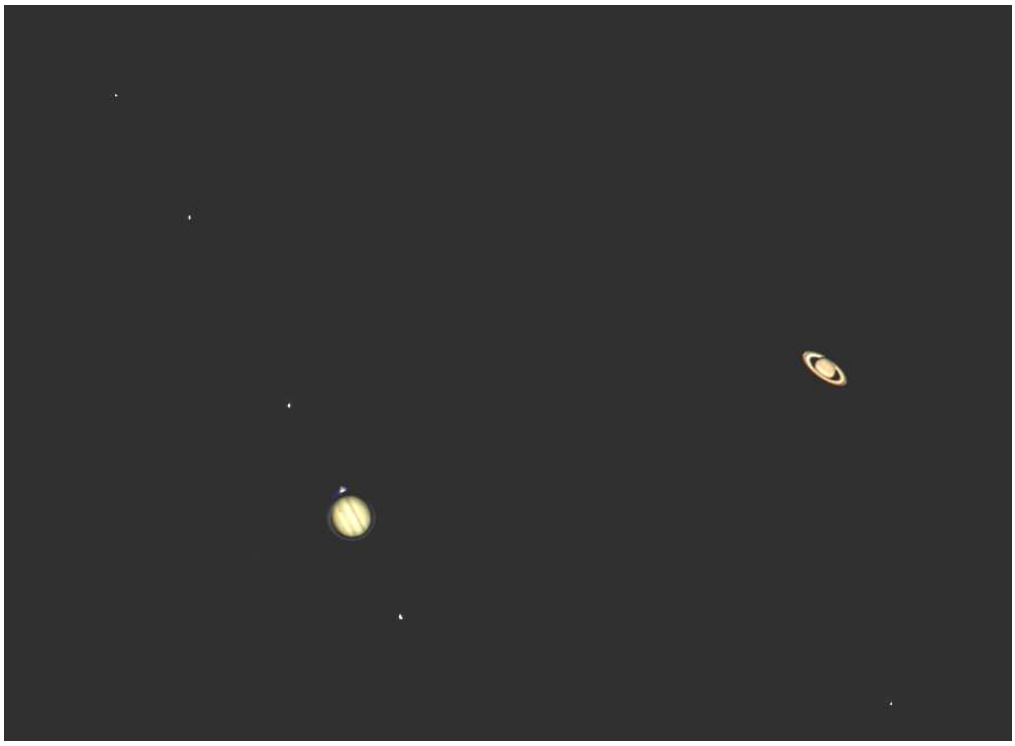
Conjunction from Ypsilanti, Yogesh Chavarkar wrote to members on Sun, Dec 20th. "Totally lucked out with clear skies between 6 and 7:30PM to take some great pics and see the conjunction with naked eyes."



Brian Ottum sent this image to members on Dec 11th. Taken Dec 10th. 6:37pm

Photo by Adrian Bradley Dec. 17th. 7:00pm
From Grand Haven Michigan.

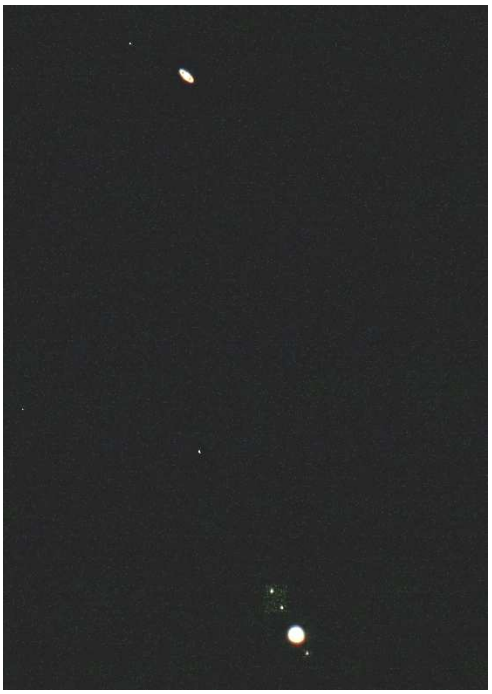
Jack Brisbin took these photos Dec. 22nd, using his 4 inch Mak Pro Cassegrain and cell phone.

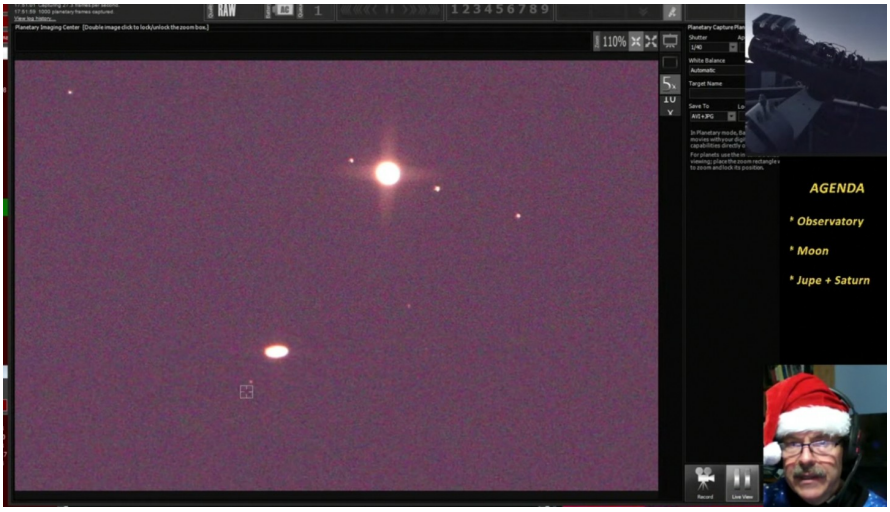


The conjunction, Dec. 21st 7:50pm

Howard Ritter sent this final processed image to members on Dec 30th.

Processed camera and video images

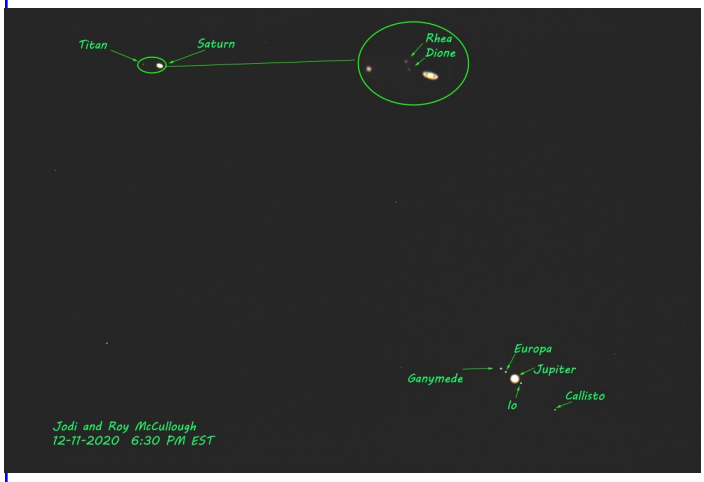




Brian Ottum Ph,D. conducted a live view from his telescope in NM. via instagram and youtube on Dec. 21st and Dec. 22nd.

The conjunction, Dec. 18th. 7:54pm

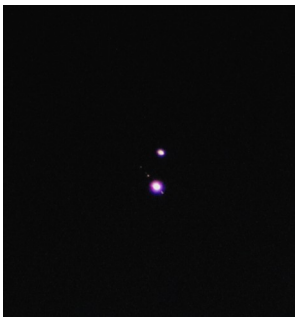
Howard Ritter sent this to members on Dec. 19th. Taken south of Tampa. single exposure taken with a DSLR at prime focus (1085 mm).



Roy McCullough sent an email to members Dec. 11th

"We were lucky enough to have an hour or so of clear sky tonight and found we could get the two in the same field of view in our TEC 180 with our Canon 5DSR. The main image was 1 second long with a slight brightening of Titan. In the enlargement, the blown out Saturn was replaced with an image taken at 1/60th of a second with the same equipment. Roy and Jodi"

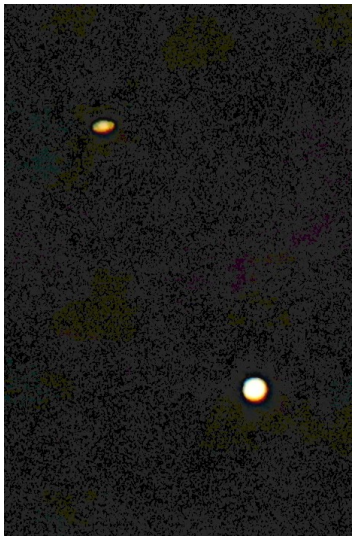
Adrian Bradley emailed this photo to members on Dec 20th



Amy Cantu took this photo Dec. 20th at 6:04pm. She wrote in an email to members. "Best I could do with an old Tamron 28-200mm Zoom. Just grateful I saw it at all!"

Glenn Kaatz took these photo on Dec, 20th.

Chuck Steele wrote Dec, 20th
"Nikon DSLR with a 200mm lens and a lens doubler 1 sec, f8 at ISO 3200."



Tom Ryan wrote o Dec. 20th to Low-brow members "

I grabbed my 4" f/10 Mak, set it up on the front porch to look at the planets which were about two degrees over the houses across the street, and took some unguided shots with my Canon RP."

Astrophotography Primer

By Jeff Kopmanis (kopmanis@gmail.com)

"I'd like to take astronomy pictures with my telescope. I have $xxxx dollars, what should I buy?"

How many times have we heard this question? Well, we got an inquiry recently and after a number of Lowbrows responded, I thought I'd summarize and intersperse my own comments and experiences. It's a big question, so the response to that question is also, well, big. Here's how it might go….

Your idea is completely doable, but it's also pretty ambitious and fraught with pitfalls that go beyond equipment purchases. That is not to say it's impossible; your budget is workable, but understanding more about what's involved beyond simple shots will help you make the most of your budget. I should mention that I've been at this astro-imaging for only a couple of years, so I'm still relatively new at it. I should also say that I use a dedicated astronomy camera, not a DSLR...there seems to be a pretty even split between the two camps.

Introduction

Firstly, taking images with a telescope is much more involved than taking a snapshot of what you're currently seeing. This was the first thing I learned, luckily with a relatively inexpensive camera ($80 Orion StarShoot--basically a web cam). BUT...it taught me the basic concepts of imaging: equipment choices, data collection, image stacking and post-processing. When I upgraded to a minimal, dedicated camera (ZWO ASI120MC-$130), it was so much more configurable that I really started getting good images.

Second, taking good astronomical photos is a hard thing to "buy" yourself into. What I mean, is that the equipment is only a piece of a larger pie. Yes, good equipment can eliminate some problems, but it will also introduce a number of complications that have the potential of souring you on the whole thing. I once owned a 12" Meade LX200--a marvelous piece of equipment. However, it was sufficiently complex and heavy that I was overwhelmed beyond my experience, and ended up trading down for something I could handle--smaller, simpler, lighter. I got a lot more satisfaction and learned more with my Celestron NexStar 8SE and perhaps am just now realizing what I could do with that LX200.

Conditions

Where you're taking your images (or viewing) makes a HUGE difference in what you'll have to do to accomplish the results you want. If you image from someplace like Ypsilanti or Ann Arbor, you'll have to compensate in your post-processing and probably your collection techniques. Taking images from someplace dark, like Lake Hudson State Park (a Lowbrow favorite) or in Northern Michigan, will simplify some of your capturing techniques and give you better results before you even start processing. Personally, I do it from my driveway in Ypsilanti, and like the challenge of getting good results *in spite of* the relatively awful viewing conditions

Dedicated Cameras vs. DSLR

I'm from the "dedicated" astronomy camera camp, as I believe they are easier to use, since they were designed for exactly the tasks we're trying to accomplish here. With that said, many club members use DSLRs and get great results. Sometimes there are some financial advantages of going the DSLR route, since you'll have a camera that might be able to be used for other things, but you'll still need a solid mount (although probably lighter), a telescope or other lens, and a computer (or some way to process the images you collect). DSLR users often don't have to take their full rig into the field, so it's more "grab'n'go" than my way.

With that said, if the "dedicated astro-cam" idea is appealing, the rest of this is with that configuration in mind.

Equipment Choices

There are 4 pieces here: Telescope, Mount, Camera and Computer. This can be an expensive hobby, as you can spend as much as you like in any one of these areas, but finding the right balance for your needs is something that you might have to spend some time thinking about.

Telescopes: There are 3 types, each have positives and negatives, and excel in some way. If you already have a reasonable telescope, you can probably make it work for you and you can probably take photos of any kind of objects you like, but the results will vary for a whole number of reasons. Telescope choice is probably a magazine article series! My recommendation: "Run what ya brung".

Mount: Probably one of the most important parts of doing imaging. Generally speaking, for astrophotography (AP) work, you'll want an equatorial mount, as it will allow you to take longer-exposure images; they're more complicated to setup and use, but in the end, getting around the flaws of an altitude-azimuth mount for doing AP will get exhausting and you'll end up with an equatorial mount anyway. I highly recommend the iOptron CEM25p mount, as it's reasonably priced, and positively best-in-class. With that said, all of my photos so far have been taken with an alt-az mount, albeit a very good one--iOptron AZ Mount Pro. Getting something sturdy and able to carry the load of your telescope and camera equipment. Tip: get vibration pads...they're worth $35.

Camera: Generally, there are 2 types of cameras to cover the two different types of photos you'll be taking: planetary (uncooled) that are good for Lunar, Solar and the solar system planets (generally "bright" objects), and DSO (deep space objects--aka. "dim fuzzies") which are usually cooled cameras, as they're built to take longer exposures without accumulating artificial noise in the image. I have ZWO-brand cameras, but you'll find that most every sensor in the cams are built by Sony, and there are only a handful of sensors used, so no one brand offers much that's all that different from another. Planetary cameras start around $150, while DSO cooled cameras start around $700. Sometimes a DSO camera can be used for both types of photos, but sometimes, they don't. My DSO camera is a ZWO ASI294MC-Pro, which is "*not recommended for planetary photography*", according to ZWO, which I have confirmed. It has other characteristics that made it worth the effort. There are some mid-priced "all-stars" that do a decent job at both types of objects, that can be had for around $350-500.

Computer: This might be the easiest item to choose. Count on using Windows, as the astronomy software is mostly free and of high quality, but only for Windows. I've tried Macs and Linux and the software just isn't there unless you want to pay big bucks for that. For capturing images, just about any computer will do, as long as it uses USB 3.0 and you have an SSD (solid state drive) instead of a hard drive. An SSD is *very* important for planetary imaging where you want to take as many images as you can in a short time frame (usually < 2 mins!). For post-processing, you'll want lots of RAM memory (8-16GB), and a CPU that's reasonably powerful. I have a used $200 laptop with a slow i3 processor, and it adds HOURS to some of the stacking and processing times. However, it runs on battery for 2-3 hours during capturing sessions, which is great.

The Basic Procedures

As I mentioned earlier, taking pictures of what you're seeing in the telescope is more involved than just taking a simple snapshot. So if it's *not* a snapshot, what's involved? As I alluded to in the Intro, data collection, stacking and post-processing. Here's what I mean by those things:

> ***Data Collection***: This involves running software on your computer to pull images off your camera and store them on the computer. **SharpCap** and **FireCapture** are both excellent packages and are free. You'll have to spend a lot of money to get capabilities that exceed either of these two. I use SharpCap regularly, but there are some compelling features in FireCapture that I'll be looking into. In either case, you'll be collecting a series of images that will be used to produce a single photo. Planetary images usually need as many as you can capture in 2-3 minutes, and are often stored in .SER video-format files, as the individual images can number in the *thousands*. Good planetary cameras can capture 40-60 frames *per second*. Do the math! DSO images are different, as they number usually less than 50, but are each exposed for anywhere from 30 seconds to 5 minutes (which is why the equatorial mount is almost a necessity).
>
> After capturing all night, you'll usually get some sleep and for the next week or so, you have alot of computer work to do...

Stacking: In this step, you're taking your raw images and combining them ("stacking") into a single, higher quality image. The whole point is to increase your signal to noise ratio. Again, there are free options in Windows: **Autostackert! 3** for planetary, and **DeepSkyStacker** for DSOs. Additionally, for a fee, you can get **AstroPixelProcessor** (APP) (DSO's only) or **PixInsight**, both of which are available for any OS. All 4 are *excellent* packages. I tend to use Autostackert for planetary stacking and APP for DSOs. PixInsight is made by and for astrophotographers, and is kind of a "PhotoShop for Astrophotography", but it has a steep learning curve. Once you get done stacking, you'll want to save to an *uncompressed* format, like TIF, and ***not*** a compressed format (JPG, PNG), as they will limit your capabilities in post-processing. Stacking, by the way, is alot like Christmas: sometimes amazing images are hiding in what seem to be an awful capture session. Corollary: stack EVERYTHING you capture!

Post-Processing: This is where you take your high-quality image and put the final touches on it. "Final touches" will probably include some kind of light-pollution elimination, noise-reduction, color enhancement or suppression, sharpening, cropping, blemish editing, etc. For doing these kinds of chores, **GIMP** or **PhotoShop** are by far the most dominant. PhotoShop is popular because it has a number of excellent plug-ins that do alot of the heavy-lifting for you (ProDigital Software's **Astronomy Tools** and **AstroFlat Pro** are two that perform near-miracles for me). If you've used APP for stacking, it has some pretty good post-processing tools, but frankly, the ProDigital plug-ins work better and faster. **PixInsight** is another post-processing option, as it does everything that PhotoShop+ProDigital does, but again, it has a steeper learning curve.

When you finish post-processing, you'll want to share that image, which you'll want to save a copy as a .PNG or .JPG, as image sizes for TIF can get HUGE. Note that nearly every online sharing service (Facebook, Instagram, Google Photos) will be compressing your images, so save your upload times and just save them compressed.

If you're still with me, and while this all sounds crazy-complicated, it's insanely satisfying when you finish up and find that you've created an image that is ***vastly*** different from what your eyeball picked up in the eyepiece. By using the camera's sensor and modern software techniques, you can view objects that are often nearly invisible to the naked eye (generally, anything greater than magnitude 6.5). I've imaged things that approach my telescope's maximum of 14.7 (I think a mag-12 is the dimmest thing I've captured so far)...and this is from my light-polluted skies in Ypsilanti.

Now, with all of that said, the images you produce will *not* look like those spectacular images you see in the magazines or on the Hubble site, although as your techniques in using your equipment and the software improve, you'll be astonished at how good your own results will be. It won't happen overnight, and there will be many images that you'll simply delete as junk, but as you learn your equipment and the techniques, some of those images will be "best to date".

As a reward for reading through all of this, here's my surprise -best image to-date of the Eagle Nebula (M16)

The other jaw-dropping surprise was this one of the western Veil Nebula that appeared out of what I thought was junk

If you're interested in seeing more of my photos, head to my **Orange Can Astronomy** page on Facebook: https://facebook.com/orangecanastronomy. And, of course, I'm always open for questions at kopmanis@gmail.com

Awni Hafedh wrote to members on, Dec 12th.

"I believe Running Man Nebula is the second most photographed target ever only because it is so close to the Orion Nebula,"

"Equipment used was EdgeHD 9.25" with 0.7x reducer, Astronomik CLS-CCD filter, ZWO ASI1600MC-cool camera and iOptron CEM60 mount."

Howard Ritter wrote to members on Dec, 22nd.

"This was a stack of 39 x 60 sec subs, again with an unguided 6" refractor and a DSLR, through an Optolong L-eNhance emission-line filter. This is low-hanging fruit – now on to the Flame and Horsehead!"

The December meeting was recorded and can be viewed on you tube.
https://youtu.be/prHOgZZHDhA

Upcoming Events

Open House events have been canceled until further notice.

DATE	EVENT	LOCATION	
Friday Jan. 15th 7:30 pm	Monthly Meeting	By Video Conference. Instructions will be emailed to members,	Prof. Emeritus Patrick Seitzer, UofM Astronomy . Mega Constellations of Satellites and Astronomy

University Lowbrow Astronomers

Monthly Club Meeting Minutes

18 December 2020, 7:34 pm, Individual Live Connections via Zoom and YouTube

After some chatter to allow for late arrivals, President Charlie Nielsen called the meeting to order and then introduced our speaker, PhD Candidate Ryan Farber, from Wheaton College.

Speaker

Who
Ryan Farber, PhD Candidate at the University of Michigan, Ann Arbor

Subject
Will The Milky Way End in a Whimper or a Bang? Forecasting Galaxy Evolution at Billions of Years

A Q&A session occurred afterward with audience members. Then Charlie thanked Ryan for the presentation.

Business Meeting

Name	Topic
President Charlie Nielsen	Happy Hannukah week, have a good Christmas, and a good New Years
Newsletter Editor Don Fohey	Won't run for Newsletter Editor next year. He will put in a pitch for candidates to take over the job in the email used to distributing the January issue.
Treasurer Doug Scobel	156 memberships, $9119.78 in the treasury. Two new memberships since November, as well as two $50 donations in memory of the late club member Bernard Friberg. Doug will be able to continue duties as Treasurer for next year, but would have trouble accepting money directly when/if in person meetings resume.
VP Jim Forrester	Discussion of star parties Okie Tex and the Texas Star Parties. Not much credence given to COVID-19 or it's dangers. In light of this, people who plan to attend the event would have to be really careful and understand the risks.
Observatory Director Jack Brisbin	The 8" f/6 starliner was returned to the observatory. Everything else in the observatory looks fine. We're looking at an electric heater to heat up the observatory in the winter months. No other discussions about WiFi have occurred since November.
Online Coordinator Jeff Kopmanis	Will discuss in-person meetings and continuing the live streaming during them. We have had positive feedback concerning the YouTube feeds and Zoom meetings.

Addendum

38 people attended tonight's virtual meeting.

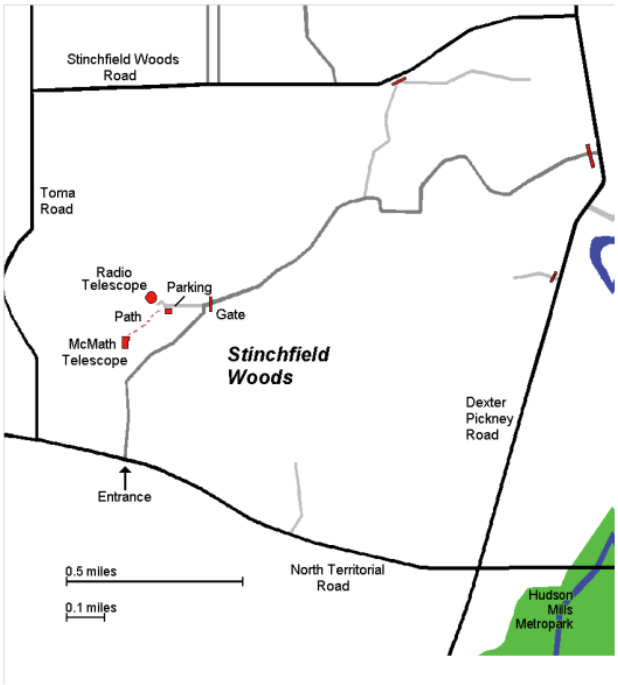
Adjourned
09:12:00 PM

Minutes were taken and transcribed by
Adrian Bradley

Places & Times

Monthly meetings of the University Lowbrow Astronomers are held the third Friday of each month at 7:30 PM. The location is usually Angel 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 radio telescope, 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 cancelled if the forecast is for clouds or temperature below 10° F. For the most up to date info on the Open House / Star Party status call: (734) 975-3248 after 4pm. 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. Evening can be cold so dress accordingly

Lowbrow's Home Page

http://www.umich.edu/~lowbrows/

Membership

Annual dues are $30 for individuals and families, $20 per year for students and seniors (age 55+) and $5 if you live outside of the Lower Peninsula. Membership entitles you online access to our monthly Newsletters and use of the 24" McMath telescope (after some training). A mailed copy of the newsletter can be obtained with an additional $18 annual fee to cover printing and postage. Dues can be paid by PayPal or by mailing a check. For information about dues or 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 of $83.00/3 years

For more information about magazine subscriptions contact the club treasurer.

Newsletter Contributions

Members and non-members are encouraged to write about any astronomy related topic. Contact the Newsletter Editor: Don Fohey **donfohey@gmail.com** to discuss format. Announcements, articles 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	(734) 663-1638
	Joy Poling	
	Dave Jorgensen	
Treasurer:	Doug Scobel	(734) 277-7908
Observatory Director:	Jack Brisbin	
Newsletter Editor:	Don Fohey	(734) 812-3611
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 each to the Observatory and the North Territorial Road gate to Peach Mountain. University policy limits possession of keys to those who 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

Night Sky Network

Member Club

Astronomical League Member Society
#201601, Great Lakes Region

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